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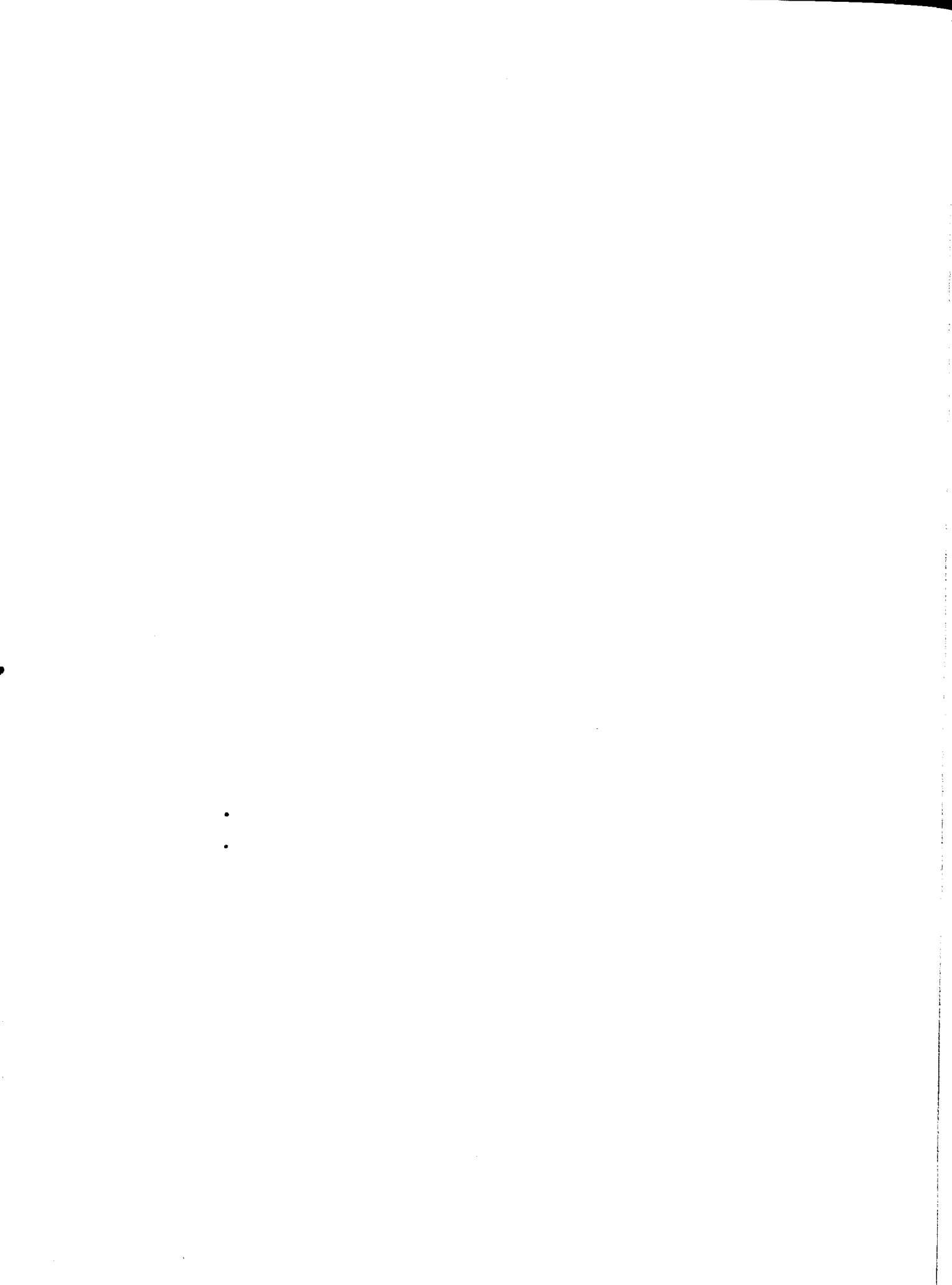
A BACTERIOLOGICAL SURVEY OF THE RICHIBUCTO AREA  
SHELLFISH AREA #5  
NEW BRUNSWICK

by

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ATLANTIC REGION

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ABSTRACT

A bacteriological and sanitary survey of the shellfish growing waters of Richibucto, Kent Co., N.B., was conducted by the Microbiology Section of the Environmental Protection Service, Atlantic Region during the period July 8 to August 2, 1975. The purpose of the survey was to reassess the adequacy of the present sanitary classification of the shellfish growing areas. This survey was requested by the Fisheries and Marine Service, Conservation and Protection Branch, due to the presently unexploited clam beds in the present closure area.

An earlier survey (Baxter, 1967) found several sectors of the river contaminated and the need for a closure to direct harvesting of shellfish. Presently, the Richibucto River is closed from a line across the harbour at Jardine Point to a point approximately one mile above the Rexton Bridge. The Little Aldouane River is closed at its mouth. Richibucto Village has never been surveyed.

Results of this survey indicate that the present closure 5-2 on the Richibucto River must be expanded to include all the tidal portions of the river system above Rexton. The sanitary conditions observed in Richibucto Harbour and Aldouane Lake do not warrant closure of this area at this time. The Little Aldouane River (closure 5-3) does not meet bacteriological or sanitary criteria and the present closure should remain in effect. A portion of the Aldouane River does not meet bacteriological standards and should be closed to shellfish harvesting. A portion of the Richibucto Village (French Creek) area does not meet acceptable bacteriological standards and should be closed to shellfish harvesting.

Une étude bactériologique et sanitaire des eaux coquillières de Richibucto, comté de Kent, au Nouveau Brunswick, a été entreprise par la Section de Microbiologie du Service de la Protection de l'Environnement, Région de l'Atlantique, pendant le 8 juillet au 2 août, 1975. Le but de cette étude était d'établir l'efficacité de la classification de ce secteur, suivant une demande fait par le Service des Pêches et Sciences Mers, Conservation et Protection. Cette demande était dut aux bancs de coques dans ce secteur qui ne sont pas utilisés présentement.

Une étude antérieure (Baxter, 1967) a trouvée plusieurs secteurs de la rivière contaminer et a établie le besoin d'une fermeture pour diriger la pêche des mollusques. Présentement, sur la rivière de Richibucto, la pêche aux mollusques est interdit d'une ligne tirer de la pointe Jardine à travers du havre jusgu'un point environs un mille en haut du pont de Rexton. La Petite Rivière Aldouane est fermée à son em bouchure. L'environs du village de Richibucto n'a jamais été examiné.

Les resultats de cette étude indiquent que la fermeture (5-2) présentement établie sur la rivière Richibucto doit être égrandit pour renfermer toute la zone de marée de la rivière en haut de Rexton. Les conditions sanitaires observées dans le havre de Richibucto ne justifient pas une fermeture dans ce secteur pour le moment. La petite rivière Aldouane (5-3) ne ce conforme pas aux critères bactériologiques où sanitaires, et la fermature présentement établie loit être retenue. Une portion de la rivière Aldouane aussi ne ce conforme pas au critérium bactériologique et doit être fermée à la pêche des mollusques. Une portion du secteur du village de Richibucto et French Creek ne se conforme pas aux étendards bactériologiques et doit aussi être fermée à la pêches des mollusques.

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1. INTRODUCTION

A bacteriological and sanitary survey of the shellfish growing waters of Richibucto, Kent Co., N. B., was conducted by the Microbiology Section of the Environmental Protection Service, Atlantic Region during the period July 8 to August 2, 1975. The purpose of this survey was to reassess the adequacy of the present classification of the areas used for the harvesting of shellfish. The survey was carried out at the request of the Fisheries and Marine Service, Conservation and Protection Branch.

Richibucto is situated on New Brunswick's eastern coast approximately 40 miles north from Moncton on Route 11. The Richibucto River originates more than 20 miles inland entering Richibucto Harbour through Rexton. Rexton, Richibucto and St. Louis de Kent border on the survey area in the west from the Richibucto River to Aldouane River. The sampling area started at the union of the Coal Branch and Richibucto Rivers less than 1/2 mile above Brown's Yard. Both rivers were sampled. Entering the Richibucto from the north, the Bass and Molus Rivers were sampled, as well as the St. Nicholas, entering from the south. Sampling was carried on in the river, through Rexton, past Richibucto and westerly into the Aldouane. The sampling stations continued out into the harbour, then eastward toward the Richibucto Village Bay for a total of 147 stations.

An earlier survey of the area conducted in September and October, 1967 (Baxter, 1967) found several sectors of the river contaminated and a need for a closure to direct harvesting (several closures existed). The Richibucto River was closed to shellfish harvesting from a line across the harbour at Jardine Point to a point approximately one mile above the Rexton Bridge. The Little Aldouane River is closed at its mouth. Richibucto Village (Sector III) has no existing closures, and has never been previously surveyed.

The request from the Fisheries and Marine Service for the reassessment of the area was due mainly to the presently unexploited clam beds lying on the eastern side of the harbour, running north from the Rexton Bridge to Pagan Point. According to the local Fisheries Office, the soft shelled clam Mya arenaria is commercially abundant in this area. From the Aldouane River, running south into the harbour, Mya arenaria is available for commercial and recreational digging; oyster Crassostrea virginica are also abundant and there are a number of oyster leases. Commercial quantities of oysters and clams exist in the Richibucto Village area (Sector III). There are oyster leases in the sector and a Oyster Producers Co-op is located at Babineau. Richibucto River and its tributaries have populations of oysters along the navigable sections of the river. Soft shelled clams Mya are also found in recreational quantities.

## 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 held 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 the multiple tube dilution (MPN) method according to the A.P.H.A. "Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish". (A.P.H.A. 1970) 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 bacteria was derived using a 5-tube 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 dilution test. In addition to bacteriological data, sanitary information on 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 (Anon. 1962) from water samples collected from selected stations (Appendix Tables A-2 and A-4). 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 (Appendix Tables A-1 and A-3). In addition, records of daily precipitation at Richibucto was provided by the Provincial Dept. of Forestry Ranger Station at Grande Aldouane (Appendix Table C-1).

## 3 SANITARY SURVEY

### 3.1 Sector I - Richibucto River

Sector I (Richibucto River) was sampled from Brown's Yard to the Rexton Bridge. The headwaters originate above the Rogersville Road, Route 126, from Coal Branch Station north to Kent Junction (See Figure 1). Two piggeries and a henery are situated along this section of road.

From Route 126 to the union of the Coal Branch and Richibucto Rivers there are 170 homes, 4 churches, 2 piggeries, 1 henery, 10 large cattle operations and a very limited amount of agriculture. Entering from the northwest, the Bass River contributes runoff from five cattle operations. The Molus River is heavily wooded downstream, lightly populated and probably has little influence on contamination levels.

Less than 10 miles from Rexton on Route 116 on the north side of the Richibucto River is the Big Cove Indian Reserve with a population of 1,100. Between 300-500 of the population are

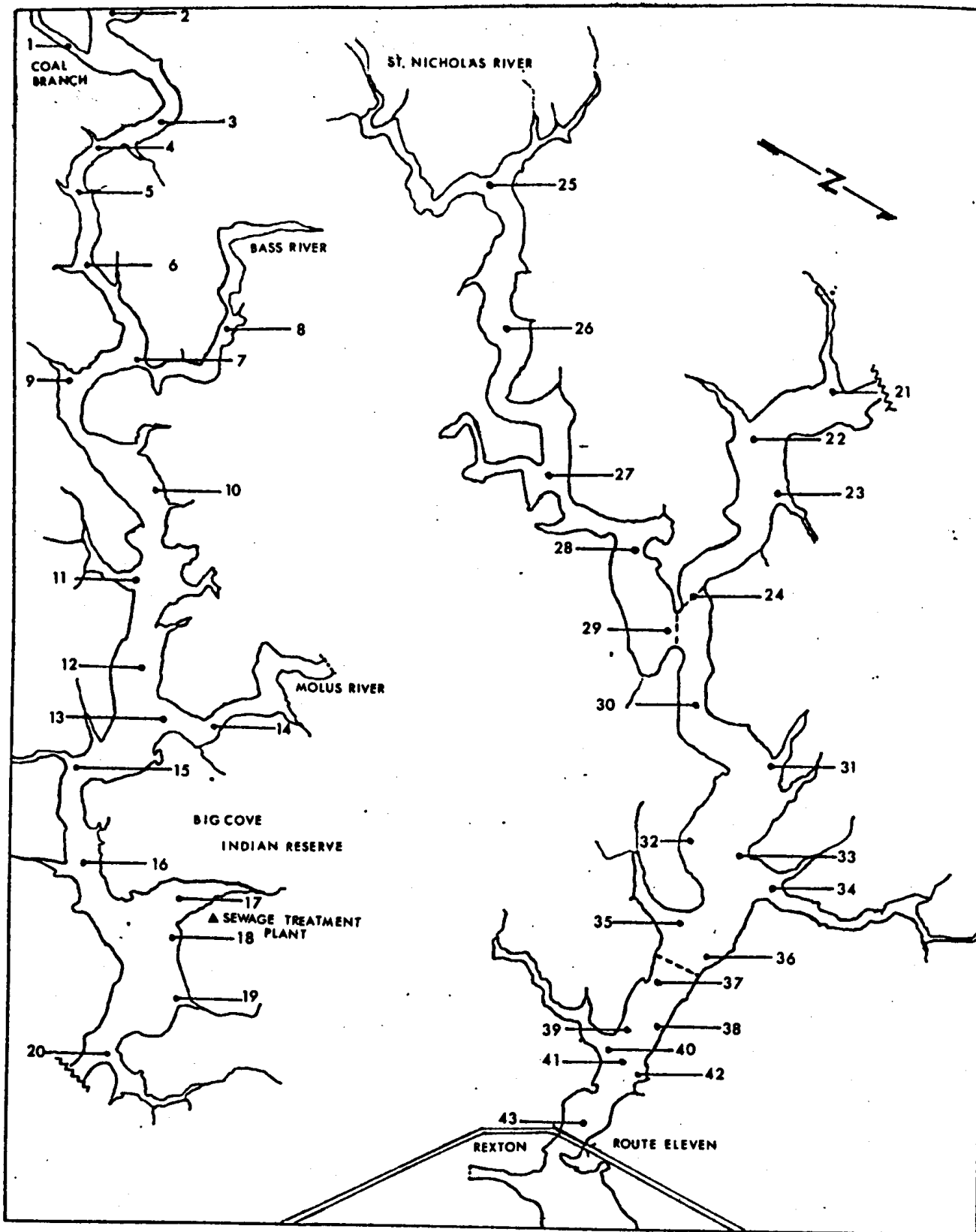


FIGURE 1 MAP OF THE RICHIBUCTO RIVER (SECTOR I) SHOWING THE LOCATIONS OF SAMPLING STATIONS

served by a small collection and treatment system. The remainder of the population are served by anything from pit toilets to septic tanks and tile fields. The treatment system is a high rate trickling filter which was installed in 1968 and has an estimated design capacity of 65,000 GPD/IMP (Donnelly 1975). Its operation at present is marginal at best due to excessive hydraulic and organic loading. The Plant's efficiency is low with BOD<sub>5</sub> reductions of 4-66% and suspended solids reductions of 50-44% (ADI Report 1975).

The entire Reserve is scheduled for a complete overhaul of its present sewage collection and treatment facilities, which includes expanding the collection system to service the entire population by 1977.

From the Reserve to the Saint Nicholas River there are several farms and homes adjacent to the river. Entering from the south, the St. Nicholas River has up to 30 large cattle operations. Fields run to the water's edge where cattle graze and drink, consequently wastes are deposited on the shores to be washed away by the tide and rains. From the Saint Nicholas there are two church residences, several farms and cottages and an increased number of homes as the river approaches Rexton.

### 3.2 Sector II Richibucto Harbour and Aldouane

Richibucto (Sector II) with a resident population of 2,500 increasing to 4,000 during the period June-September has a 12 year old sewage collection and treatment system (single cell lagoon). This system has not operated properly since its start up due to faulty construction and design (Figure 2). The single cell lagoon is situated at Mooney's Creek, above the Highway 11 Bridge,

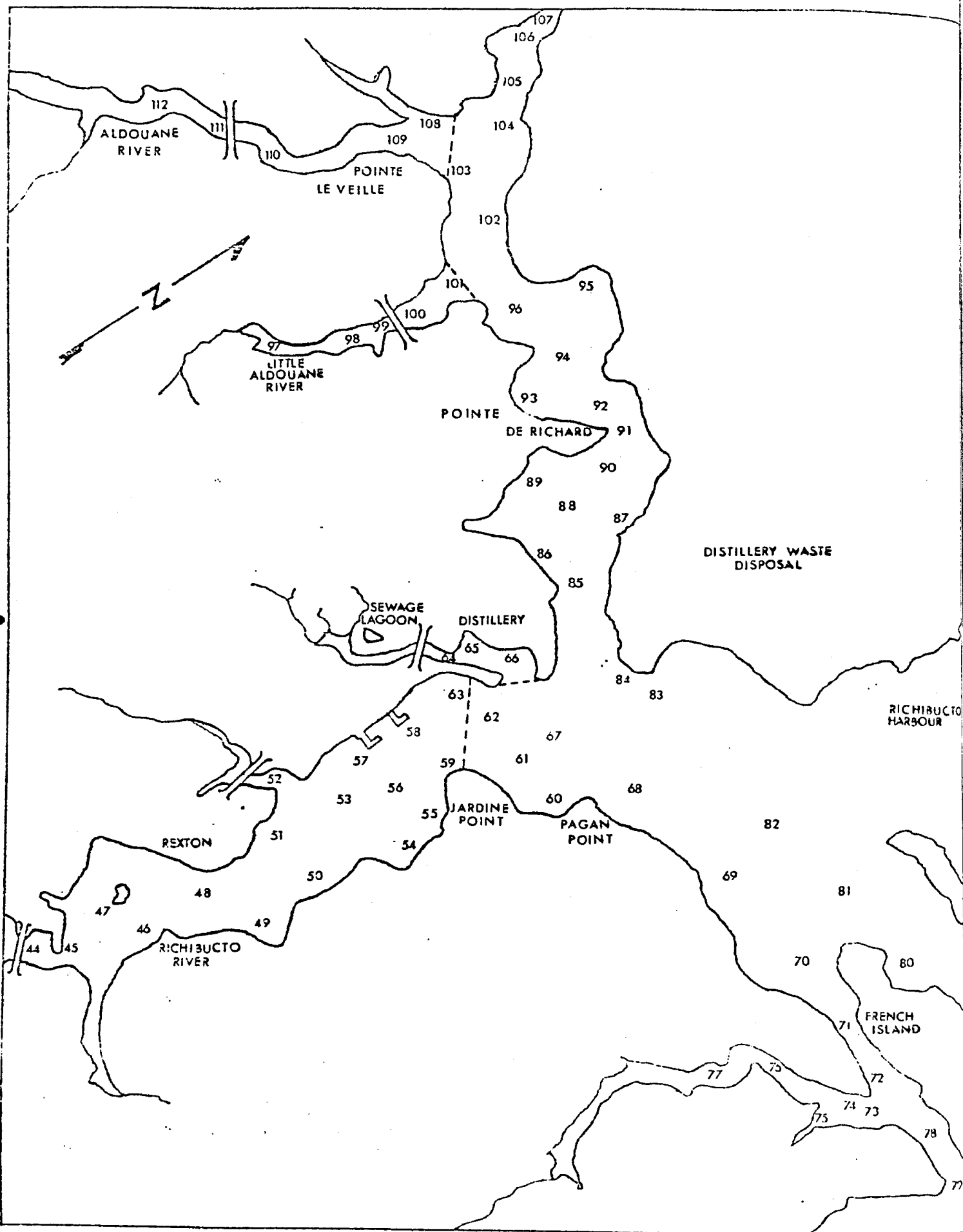


FIGURE 2 MAP OF THE RICHIBUCTO HARBOUR AND ALDOUANE LAKE SHOWING THE LOCATION OF SAMPLING STATIONS



emptying into Richibucto Harbour. Improvements and additions to the existing system are in the planning stages (Donnelly 1975).

A food processing plant (Stafford Foods) discharges its wastes directly to the municipal collector system. This waste consists of leaves and stems. Atlantic Distilleries manufactures and bottles alcoholic beverages, and disposes its wastes across the harbour via an underwater pipe to three seepage lagoons. Laurentide Chemicals is situated in the town; this operation uses the town collector system for disposal. A small fish packing plant is located near the government wharf and its wastes (minimal) are dumped near the shoreline. There are 50 to 70 boats moored in the vicinity of the wharf.

The Habitant motel, located just north of Richibucto on Highway 11, discharges its waste to a sewage pond. The unchlorinated effluent from the pond enters a small creek which flows eastward to the Harbour.

A small commercial slaughter house, which is used only for occasional slaughtering is located on the Aldouane at the Highway 11 Bridge. Evidence of recent slaughtering was visible on the shoreline and in the river during the sampling period.

From the Aldouane River to Richibucto town limits the houses are serviced at best by septic tanks and tile fields.

Jardine Provincial Park is a campground which overlaps the northern border of the Village of Rexton, with grounds for approximately 250 campers. There are no sewage services available. Wastes are handled by two pit toilets and two flushing toilets to a holding tank. There is a small dumping station provided and its wastes are routed to the same holding tank which is pumped out regularly. (Donnelly 1975). The beach area forms part of the west shore of the Richibucto River.

The Village of Rexton (population approximately 1,000), located on both sides of the Richibucto River, is a small residential centre with little or no industry. Residents must supply their own water and sewage disposal systems. The majority are served by septic tank and tile fields. However, due to marshlands and the proximity of the river, problems have occurred in the past with these private sewage systems flooding during severe storms which resulted in drinking water contamination. Several cottages line the western shore and these are, at best, served by septic tanks. Cottages and homes use privies, and others, it is suspected, discharge their wastes directly to the waterway. Only a house to house survey could firmly establish those with adequate waste disposal facilities (Donnelly, 1975).

### 3.3 Sector III - Richibucto Village

Richibucto Village (Sector III) is southeast of Rexton, situated at the mouth of French Creek (Figure 3). Donnelly (1975) states that of the 1,034 residents, most are employed in fishery-associated jobs. Very little agricultural or livestock activities are carried on here. However, there is a poultry operation (30,000 birds/year) on the outskirts of the Village. The Village is served by septic tanks and tile fields but many homes still use privies.

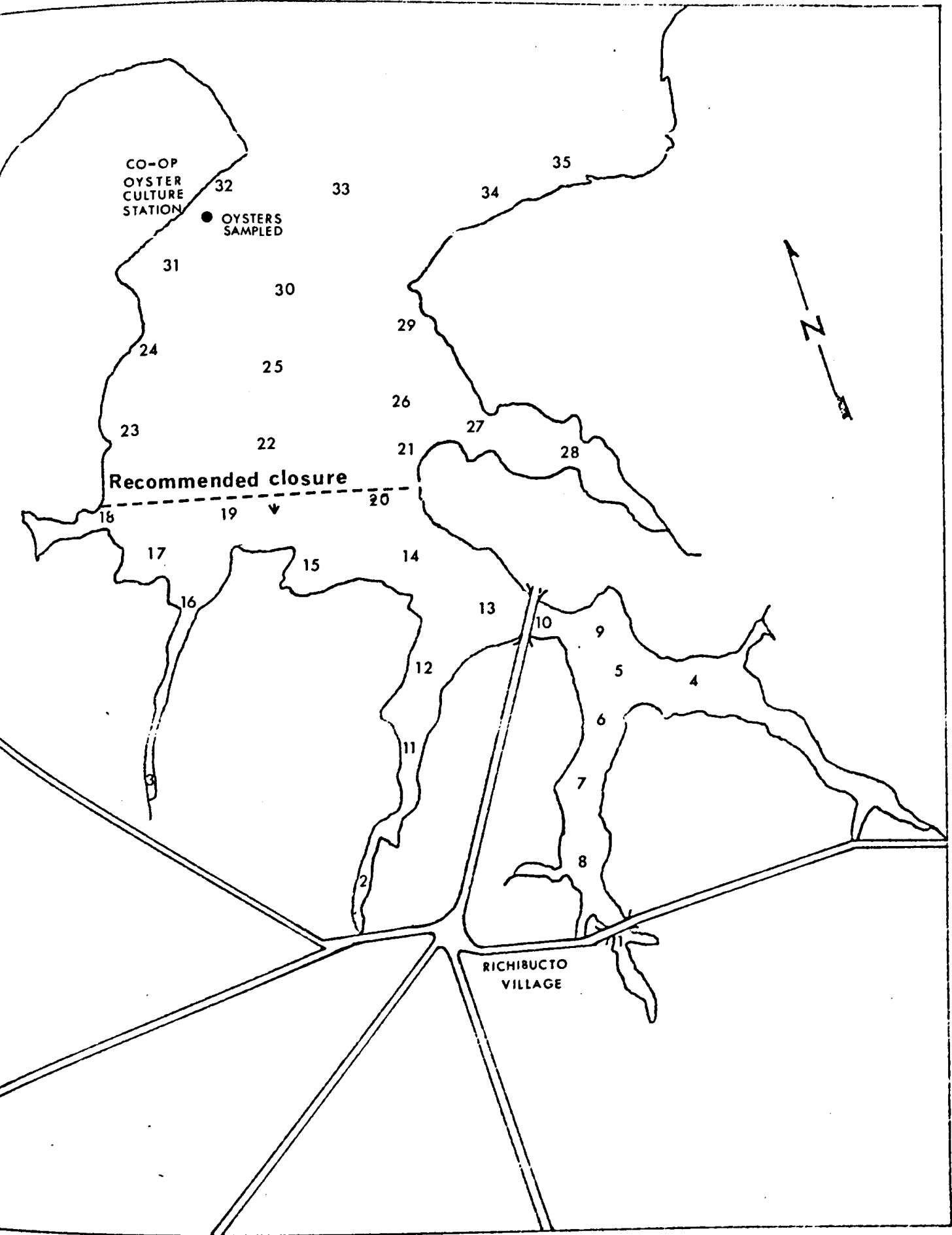


FIGURE 3 MAP OF THE FRENCH CREEK (RICHIBUCTO VILLAGE) AREA SHOWING THE LOCATIONS OF SAMPLING STATIONS

#### 4 BACTERIOLOGICAL RESULTS

##### 4.1 Sector I

A total of 194 samples were analyzed from the 43 stations situated from 1/2 mile above Brown's Yard down river to the Bridge at Rexton. Except for 11 stations, all were sampled 5 times. The results of the fecal coliform analyses are given in Appendix Table B-1. Stations 1 through 29, excluding Station 28 (just above the entry of the St. Nicholas River) showed bacteriological results exceeding those acceptable for shellfish growing waters. Twenty-two of the 28 stations (71.4%) exceeded the median F.C. limit of 14 and counts of 43 or greater occurred at 85.7% of the stations (Figure 4). In total 45.5% of the samples exceeded at fecal coliform density of 43 MPN/100 ml (Figure 5).

From Priest's Point to the old closure line above the Rexton Bridge bacteriological water quality meets the shellfish water quality standards. Only one of the eight stations (Station 31) exceeds the median F.C. limit. At Station 31 fecal coliform counts did not exceed 43 MPN/100 ml.

The portion of closure (5-2) above the Rexton Bridge does not meet shellfish growing standards, as counts of 43 or greater occur in excess of 10% of the samples analyzed during the survey period.

##### 4.2 Sector II

Richibucto Harbour and Aldouane Lake were sampled five times for a total of 339 samples collected at 69 stations. The results of the fecal coliform analyses completed on these samples are given in Appendix Tables B-1 and B-2.

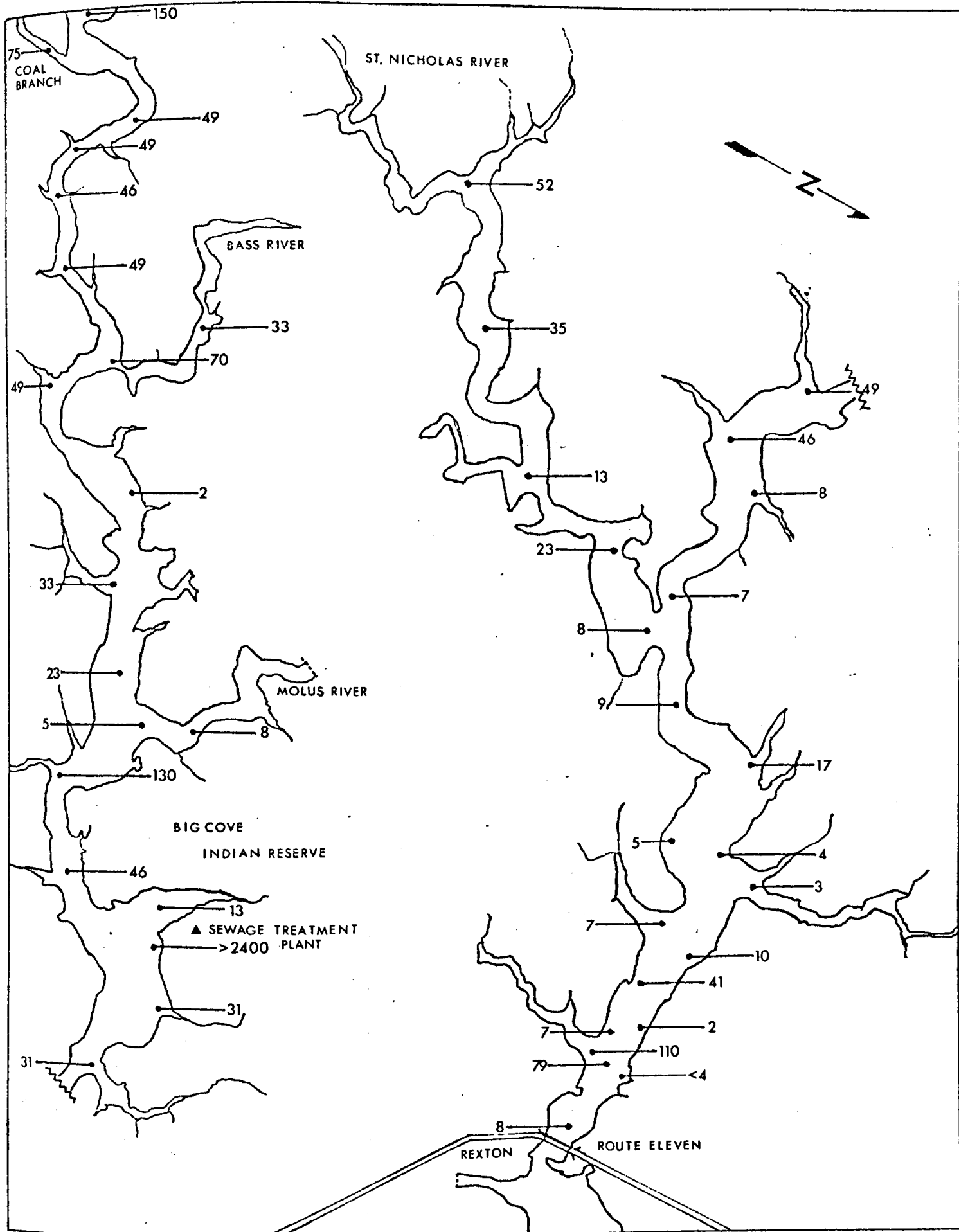


FIGURE 4 THE DISTRIBUTION OF MEDIAN FECAL COLIFORM LEVELS IN SECTOR I, RICHIBUCTO RIVER, JULY 12 - AUGUST 2, 1975

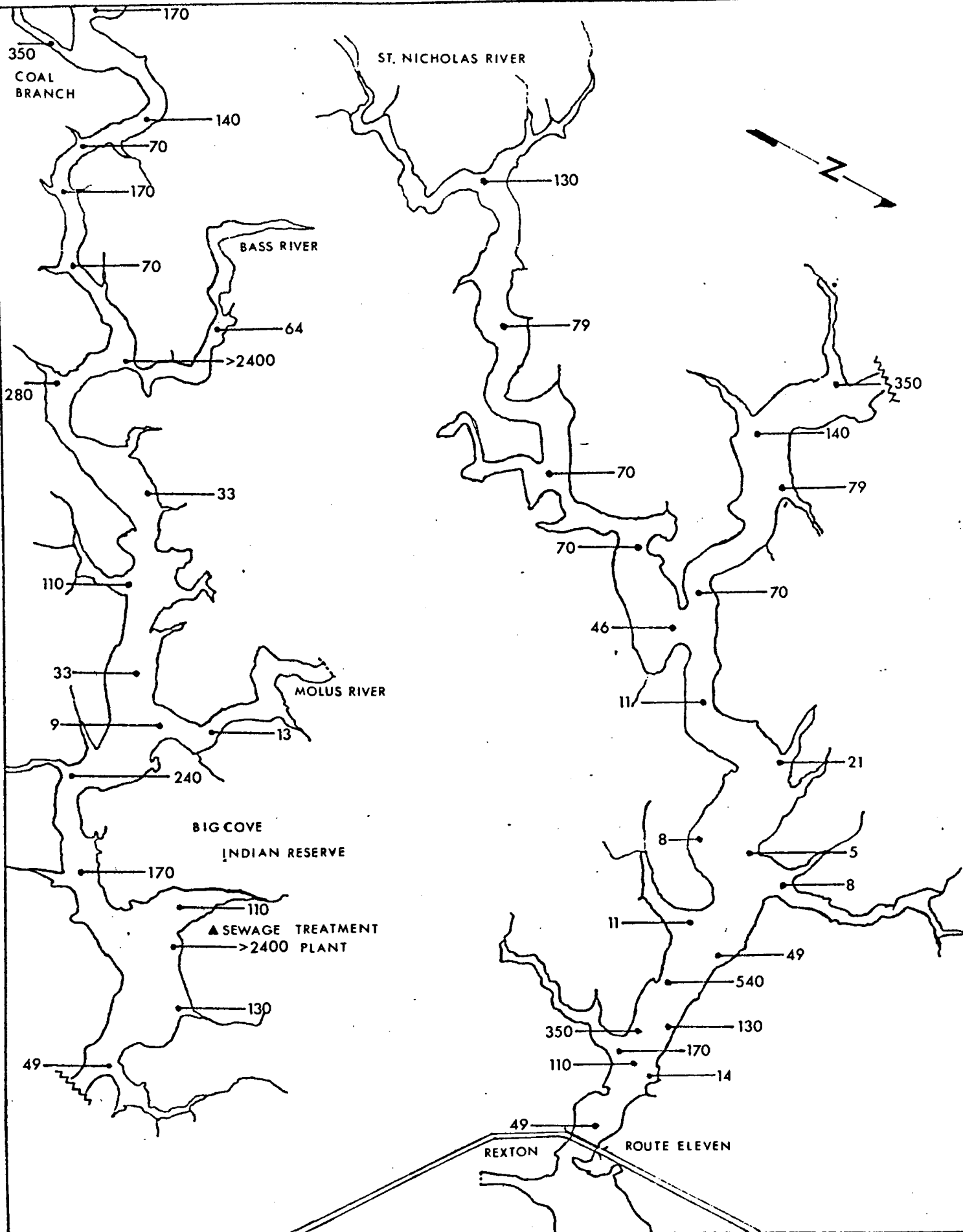


FIGURE 5 THE DISTRIBUTION OF MAXIMUM FECAL COLIFORM DENSITIES (MPN/100 ml) IN SECTOR I, RICHIBUCTO RIVER, JULY 12 -

Median fecal coliform levels in the area between the Rexton Bridge (Station 44) and the existing closure line (5-2) near the River mouth (Station 62) are generally below 14 with the exception of stations 44, 51 and 52 (Figure 6). In total 10.4% of the samples are in excess of 43 MPN/100 ml (Figure 7). The area near the sewage lagoon, represented by sampling stations 64 and 65, is currently included in closure 5-2. Fecal coliform levels at these stations were consistently in excess of the prescribed median and maximum limits.

Richibucto Harbour, (outside closure 5-4), and the French Island area have median fecal coliform levels less than 14 with one exception. Station 75, in the Gaspereau River, had a median count of 21 (Figure 6). Stations 76 and 77 also in the Gaspereau River had counts in excess of 43 MPN/100 ml on one day, July 29. Maximum levels at the remaining stations in the Harbour and French Island area were less than 43 MPN/100 ml.

In the Aldouane Lake portion of the sector only two areas exhibited fecal coliform levels in excess of approved growing area bacteriological criteria. The Aldouane River (sampling stations 68-112) had median fecal coliform levels in excess of 14 at two stations. However, fecal coliform counts in excess of 43 MPN/100 ml occurred in 33% of the samples. The Little Aldouane River (closure 5-3) also showed evidence of fecal contamination. Sampling stations 97-101, representing the present closure, had fecal coliform counts in excess of 43 MPN/100 ml in 16.6% of the samples. The higher counts, however, were restricted to stations 97 and 98 in the upstream portion of the present closure.





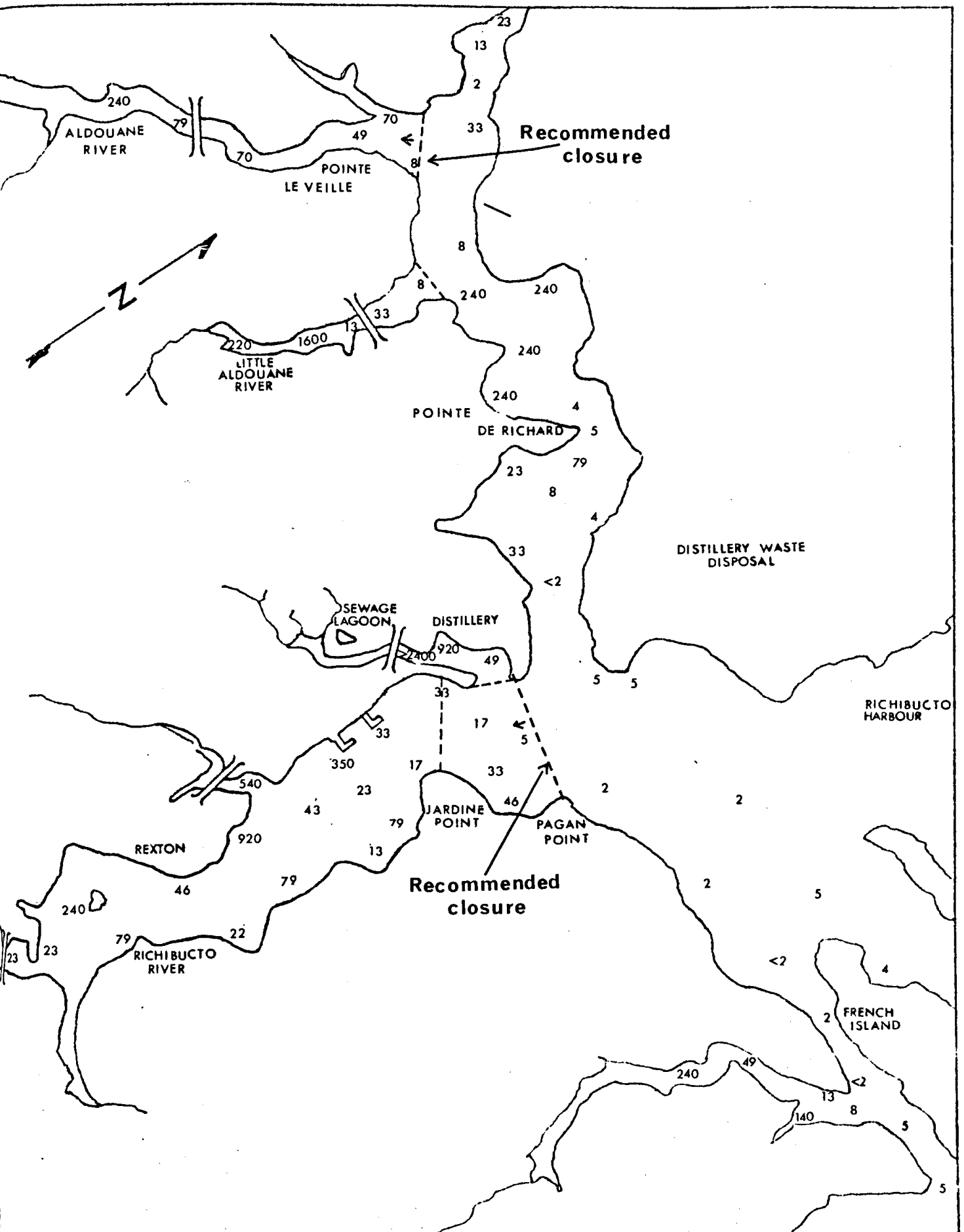


FIGURE 7 THE DISTRIBUTION OF MAXIMUM FECAL COLIFORM DENSITIES (MPN/100 ml) IN SECTOR II, RICHIBUCTO HARBOUR AND ALDOUANE LAKE, JULY 12 - AUGUST 2, 1975

#### 4.3 Sector III

The results of bacteriological analyses completed on samples collected from the French Creek (Richibucto Village) sector are given in Appendix Table B-3. Fecal coliform densities on days following little or no rainfall were consistently low in this embayment with the exception of certain tributaries, i.e. stations 1, 2, 3, 11 and 16 (Figures 8,9). However, following 0.87 and 0.71 inches of rain on July 28 and 29 respectively fecal coliform levels increased significantly (Appendix Table B-3). On July 29 fecal coliform levels were in excess of 49 MPN/100 ml at most stations in the area with the exception of the mouth of the embayment (stations 30-35) (Figure 8). On July 30 counts had dropped generally to 49-23 MPN/100 ml at stations in the Bay. However, counts in the tributaries and in the tidal waters near their mouths remained in excess of 100 MPN/100 ml.

On July 31 fecal coliform counts in excess of 43 MPN/100 ml were present in the tributary inlets and also occurred sporadically in the Bay. By August 2 fecal coliform densities were within acceptable limits at most stations. Median fecal coliform levels for the sampling period were greater than 14 at stations 1-29 (Figure 9). Isolates were taken from the high counts observed on July 30 and were subjected to biochemical tests in the EPS Laboratories at the Bedford Institute, Dartmouth. Of 119 isolates subjected to biochemical identification 76.5% were confirmed as coliforms of non-fecal origin. Only 23.5% of the isolates were identified as Escherichia coli. Clearly the sanitary significance of the fecal coliform counts observed during the July 29-31 period can be seriously questioned.

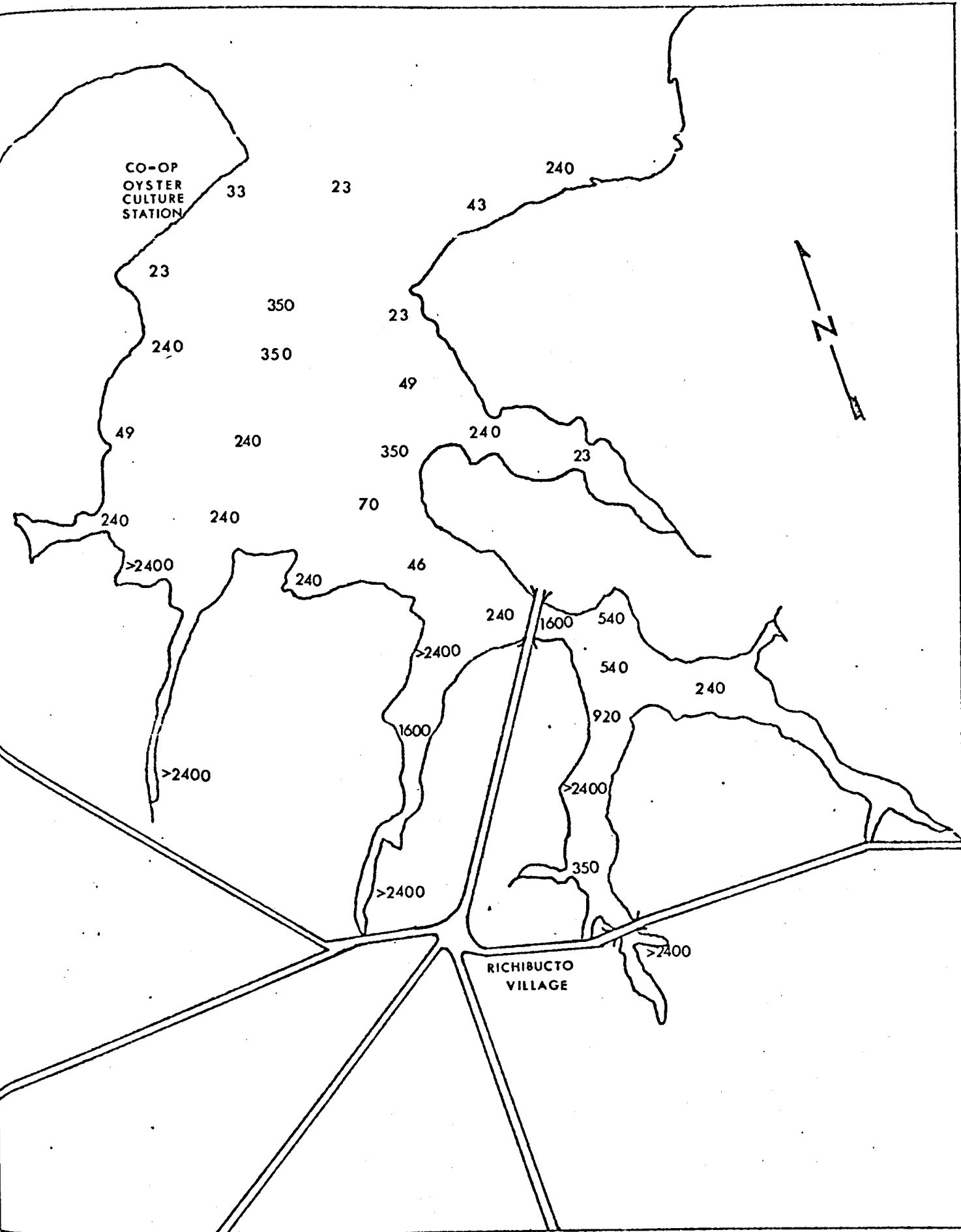


FIGURE 8 THE DISTRIBUTION OF MAXIMUM FECAL COLIFORM DENSITIES, SECTOR 3, RICHIBUCTO VILLAGE, JULY 12 - AUGUST 2, 1975

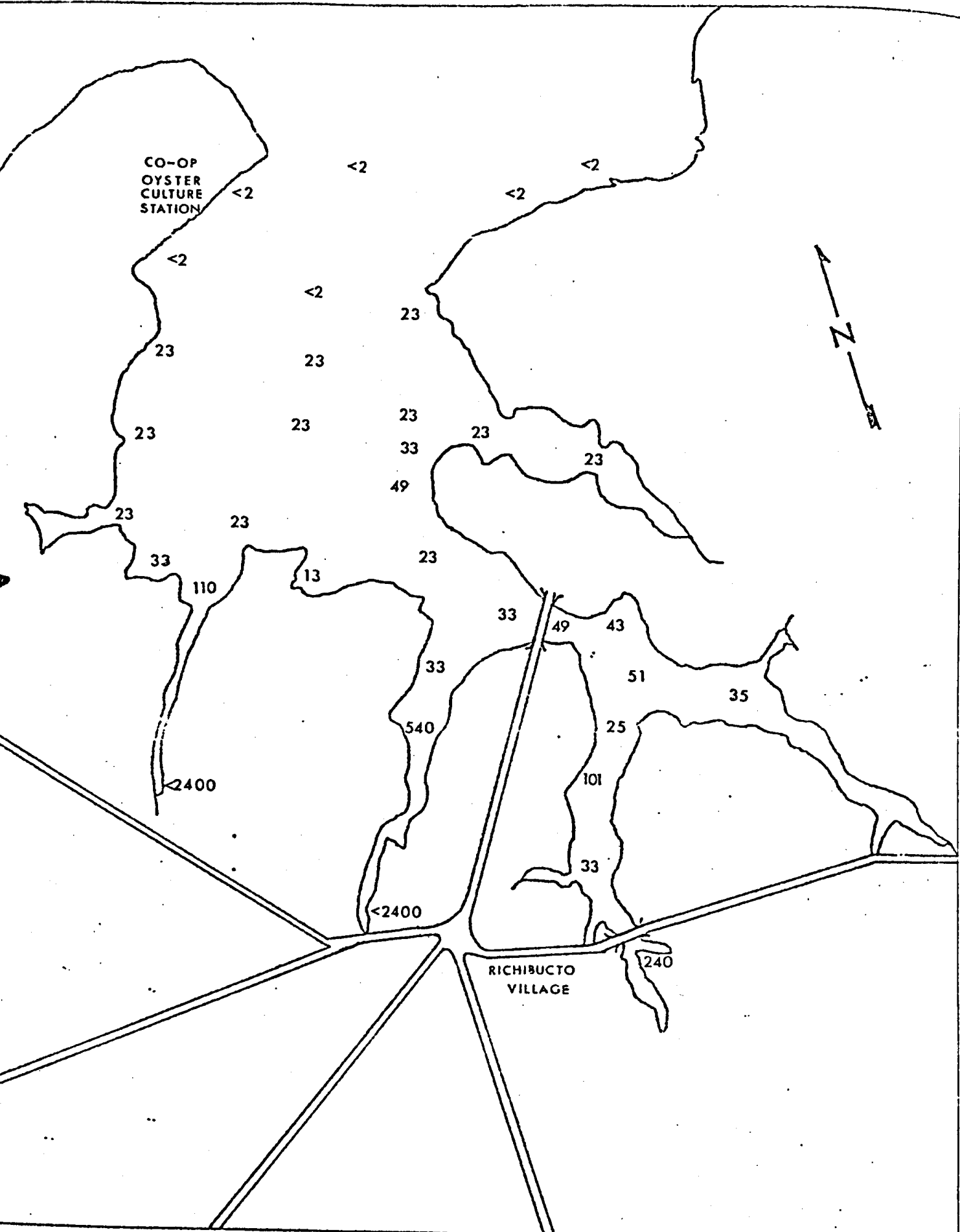


FIGURE 9 THE DISTRIBUTION OF MEDIAN FECAL COLIFORM LEVELS, SECTOR 3, RICHIBUCTO VILLAGE, JULY 12 - AUGUST 2, 1975

5 DISCUSSION

5.1 Sector I

In consideration of the data trends and sanitary observations in the study area, the river must be looked at in three sections A, B and C. Section A, covers sampling stations 1 through 29, including 28. This area from Brown's Yard east to the mouth of the St. Nicholas (including the St. Nicholas River) has high bacteriological counts. Fecal coliform levels in this section of the river exceed approved growing area water quality criteria with regard to both the median and 43 MPN/100 ml upper limit. The sanitary conditions on the St. Nicholas River and on the upper portion of the Richibucto River are unacceptable for an approved growing area. Cattle graze on and near the shore in numerous areas. The sanitary wastes of the Big Cove Indian Reserve are discharged poorly treated. These two sources appear to be the major cause of the current bacteriological contamination observed in this study.

The main branch of the Richibucto River from Priest's Point (at the mouth of the St. Nicholas) down river to the existing closure line (5-2) above the Rexton Bridge has acceptable bacteriological water quality. In general, median and maximum fecal coliform densities meet the criteria for an approved growing area. There are few significant sources of domestic waste to this area and there is less farming activity.

The portion of closure 5-2 above the Rexton Bridge is necessary and adequate in view of the bacteriological results and known sources of sanitary wastes which are discharged to this area.

5.2 Sector II

The portion of this area presently within closure 5-2 is nearly, as a whole, in compliance with the bacteriological water quality criteria for an approved growing area, at least during the survey period. However, shellfish harvesting water quality criteria are exceeded at a number of individual stations (47, 48, 51, 50, 57 and 55) encompassing the eastern shore of the area, and scattered along the eastern shore. The high fecal coliform levels were observed following rainfall on July 29 at a number of stations but high counts were observed also in dry periods (Appendix Tables B-1 and B-2). Sanitary conditions in the area were considered to be unacceptable in view of the potential failure of lift stations located on the western shore and the absence of collection and treatment facilities for Rexton. The area has numerous sources of fecal contamination which are a clear potential health hazard to the adjacent waters. In our opinion the present closure (5-2) is necessary and adequate and should remain in effect.

Richibucto Harbour, (outside closure 5-2) and the French Island area meet the criteria for an approved shellfish harvesting area with one exception. The Gaspereau River exhibited evidence of low levels of fecal contamination during the survey period. These levels rise after rainfall but are restricted to stations 76 and 77 and median levels are low (13-21) for the survey period. In view of the sanitary conditions observed which indicate a very sparse population in the area and no evidence of direct fecal discharges it is believed that this area does not require any closure to shellfish harvesting at this time.

Aldouane Lake generally meets approved growing area criteria with two exceptions. The Little Aldouane River (closure 5-3) area does not meet acceptable bacteriological or sanitary criteria and should remain under closure as presently specified. Aldouane River also does not meet acceptable standards. Sanitary surveillance along the river indicates numerous potential agricultural sources of contamination. It is, therefore, recommended that a closure be implemented in this area upstream of station 109.

### 5.3 Sector III

The Richibucto Village (French Creek area) does not meet acceptable bacteriological water quality standards at stations 1-29. This situation occurs following heavy rainfall as observed on July 29. Sanitary investigations document the existence of fecal contamination sources in Richibucto Village which enter the two tidal inlets near the Village. This situation also occurs in another tidal inlet north of the Village (Station 3 and 16) (Figures 8 and 9). Other than in the above-mentioned areas no obvious sources of fecal contamination were observed entering the Bay. The area is flat, forested and with no significant agricultural activities.

The sanitary significance of the coliforms originating from run-off depends on their origin - either fecal or vegetative. If it is proven that the coliforms are not of direct fecal origin and do not indicate a public health hazard, compliance with the set coliform limits becomes subject to interpretation based on environmental observation (U.S. Department of Health Education and Welfare 1965 - Part 1).

Coliform isolate information clearly suggested that much of the fecal coliform data in the Bay was not representative of the

presence of E. coli in the waters following heavy rainfall. The July 29-31 data should then be generally disregarded as evidence of fecal contamination. Following the surveillance by E.P.S., the Fish Inspection Laboratory at Shediac, N.B., tested 4 lots of oysters on August 11, September 5, 11 and 18, taken directly in front of the Village Oyster Co-op in Babineau N.B. All results were <20 MPN fecal coliform per 100 g. However, on the basis of sanitary observations and the data gathered before and after landwash conditions, it is recommended that closures should be implemented in the two tidal inlets adjacent to Richibucto Village and on a third inlet north of Village near Station 16.

## 6 CONCLUSIONS

### 6.1 Sector I

1. A new closure should be established on the upper Richibucto River to include the mouth of the St. Nicholas River and all tidal waters upstream of that point.
2. The existing closure 5-2 on the Richibucto River is adequate and should remain in effect.

### 6.2 Sector II

1. The existing closure 5-3 on Little Aldouane River is adequate and should remain in effect.
2. A new closure should be implemented on the Aldouane River upstream of Station 109 as shown in Figure 2.



6.3 Sector III

1. A new closure should be implemented on the waters of French Creek adjacent to Richibucto Village as shown in Figure 3.

It is also recommended that additional survey work be conducted in this sector to determine if any further closures are required.

RECOMMENDATIONS OF THE  
MARITIME STANDING COMMITTEE ON SHELLFISH  
ON THE 1976 GROWING AREA SURVEILLANCE REPORTS

A. NEW BRUNSWICK

Growing Area 5

1. Closure N.B. 5-2, Richibucto Harbour, should be recinded, and a new closure implemented to include all tidal waters west of a line drawn between Distillery Point and Pagan Point, as shown in Figure 7 of Surveillance Report EPS-5-AR-76-8.
2. Closure N.B. 5-3, Little Aldouane River is adequate and should remain in effect unchanged.
3. A new closure should be implemented on the Aldouane River as shown in Figure 7 of this Report.
4. A new closure should be implemented in the Richibucto Village as shown in Figure 3 of this Report.

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APPENDIX TABLES

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TABLE A-1 TIDAL STAGE AND TIME OF SAMPLING, RICHIBUCTO HARBOUR AND RIVER, NEW BRUNSWICK, 1975

DATE	TIME OF SAMPLING (HRS.)		TIDE
July 8	0930-1130	River	High Falling
July 9	1000-1230	River	High Falling
July 12	0830-1030	Harbour	High Falling
July 13	0830-1000	River	High Falling
July 21	0900-1100	Harbour	High-Low Falling
July 22	0810-1000	River	High Falling
July 29	0830-1100	Harbour	High-Low Falling
Aug. 1	0900-1100	Harbour	Low Falling
Aug. 2	0900-1100	River	Low Falling
Aug. 3	0800-1000	Harbour	High Falling

TABLE A-2 TEMPERATURE AND SALINITY DATA FOR RICHIBUCTO HARBOUR AND RIVER, NEW BRUNSWICK, 1975

STATION	DATE	TEMPERATURE °C	SALINITY o/oo
3	Aug. 2	23	3.8
7	Aug. 2	23	3.7
14	Aug. 2	22	7.7
30	July 22	25.6	
	Aug. 2	22.5	17.3
31	July 22	25.6	
36	July 22	25.6	
43	July 22	28.2	
47	July 22	28.4	
79	July 29	20.0	26.1
	Aug. 1	22	24.8
	Aug. 3	21.5	23.0
82	July 29	17.0	24.8
	Aug. 3	21	24.3
88	July 29	18	23.5
	Aug. 1	20.5	23.5
	Aug. 3	20	21.7
102	July 29	20	22.2
	Aug. 1	21.5	19.5

TABLE A-3 TIDAL STAGE AND TIME OF SAMPLING, RICHIBUCTO VILLAGE,  
NEW BRUNSWICK, 1975

DATE	TIME OF SAMPLING (HRS.)	TIDE
July 23	0830-0900	High Falling
July 29	1230-1400	Low
July 30	0900-1030	High Rising
July 31	0845-0930	Low Rising
Aug. 2	1230-1330	Low

TABLE A-4 TEMPERATURE AND SALINITY DATA FOR RICHIBUCTO VILLAGE,  
JULY-AUGUST, 1975

STATION	DATE	TEMPERATURE °C	SALINITY o/oo
5	July 23	21	23.5
	July 29	20	19.2
	July 30	20	21.4
	July 31	22	24.7
12	July 23	21	23.5
	July 29	24	25.9
	July 30	19	24.8
	July 31	22	22.0
	Aug. 2	24	27.7
17	July 23	21	28.2
	July 29	17	24.6
	July 30	19	24.8
	July 31	22	26.0
	Aug. 2	24	27.2
22	July 23	21	26.9
	July 29	21	25.9
	July 30	19	26.1
	July 31	21	26.0
	Aug. 2	23	27.2

TABLE B-1 FECAL COLIFORM MPN'S RICHIBUCTO RIVER, NEW BRUNSWICK, 1975  
(SECTOR 1 AND PART OF SECTOR 2)

SECTOR	STATION NO.	FECAL COLIFORM PER 100 ml (MPN)					MEDIAN
		JULY 8	JULY 9	JULY 13	JULY 22	AUG. 2	
1	1		79	33	350	70	75
	2		170	33	130	170	150
	3	140	49	49	49	130	49
	4	33	49	26	49	70	49
	5	130	23	46	170	33	46
	6	33	79	5	49	70	49
	7	33	>2400	33	110	70	70
	8			17	33	64	33
	9	280	49	4	49	140	49
	10	5	<2	2	2	33	2
	11	33	4	17	110	79	33
	12	31	5	2	33	23	23
	13	2	5	9	2	5	5
	14	5	5	8	13	11	8
	15	180	240	2	130	110	130
	16	46	8	8	170	46	46
	17	110	13	4	13	49	13
	18	>2400	>2400	>2400	170	1600	>2400
	19	130	5	31	46	13	31
	20	14	33	31	49	23	31
	21	49	7	7	350	140	49
	22	33	140	11	46	130	46
	23	8	7	2	79	49	8
	24	70	7	2	8	5	7
	25		70	8	130	33	52
	26		13	46	23	79	35
	27	14	5	4	70	13	13
	28	23	22	4	23	70	23
	29	8	23	<2	5	46	8
	30	2	9	2	11	11	9
	31	17	<2	21	2	23	17
	32		8	<2	8	2	5
	33				2	5	4
	34	2	2	7	8	3	3
	35	8	11	<2	5		7
	36		17	<2	49	2	10
	37		540	2	79	<2	41
	38	<2	<2	17	130	2	2
	39		2	2	12	350	7
	40		140	4	170	79	110
	41	110	17	<2	79	95	79
	42		5	<2	14	<2	<4
	43	8	2	2	49	9	8
2	44	23	4	<2	14	17	14
	45		23	2	<2	8	5
	46	5	2	7	79	5	5
	47	240	8	<2	2	6	6

TABLE B-2 FECAL COLIFORM MPN'S RICHIBUCTO HARBOUR, NEW BRUNSWICK 1975,  
SECTOR 2 (CONT'D)

SECTOR	STATION NO.	FECAL COLIFORM PER 100 ml (MPN)					MEDIAN
		JULY 12	JULY 21	JULY 29	AUG. 1	AUG. 2	
2	48	2	2	17	46	11	11
	49	2	2	22	5	5	5
	50	2	<2	8	79	2	2
	51	33	<2	17	920	11	17
	52	14	5	79	23	540	23
	53	2	5	17	43	2	5
	54	2	<2	13	13	4	4
	55	2	2	79	17		10
	56	2	<2	4	23	2	2
	57	<2	350	8	<2	5	5
	58	<2	6	33	5	11	6
	59	2	2	17	5	<2	2
	60	5	17	23	2	46	17
	61	5	<2	33	<2	8	5
	62	2	7	17	5	8	7
	63	5	5	5	33	11	5
	64	7	170	>2400	70	350	170
	65	240	2	920	170	13	170
	66	<2	5	5	46	49	5
	67	2	<2	<2	<2	5	<2
	68	<2	<2	2	<2	2	<2
	69	<2	<2		<2	2	<2
	70	<2	<2	<2	<2	<2	<2
	71	2	<2	<2	<2	<2	<2
	72	<2	<2	<2	<2	<2	<2
	73	<2	<2	8	<2	<2	<2
	74	2	2	13	5	5	5
	75	<2	11	31		140	21
	76	<2	13	49	13	2	13
	77	12	7	240	13	13	13
	78	<2	2	<2	5	<2	<2
	79	2	2	2	5	<2	2
	80	2	2	2	4	<2	2
	81	<2	<2	2	2	5	2
	82	<2	2	2	2	2	2
	83	<2	5	<2	<2	2	<2
	84	5	2	2	<2	2	2



TABLE B-3 FECAL COLIFORM MPN'S RICHIBUCTO HARBOUR, NEW BRUNSWICK 1975, SECTOR 2

SECTOR	STATION NO.	FECAL COLIFORM PER 100 ml (MPN)					MEDIAN
		JULY 12	JULY 21	JULY 29	AUG. 1	AUG. 2	
2	85	<2	<2	<2	<2	<2	<2
	86	2	<2	33	11	<2	2
	87	<2	2	4	<2	2	2
	88	4	<2	2	2	8	2
	89	23	2	<2	5	<2	2
	90	49	79	2	5	33	33
	91	2	<2	<2	5	5	2
	92	<2	<2	<2	<2	4	<2
	93	<2	<2	240	2	13	2
	94	8	2	240	2	<2	2
	95	<2	<2	240	<2	<2	<2
	96	<2	<2	240	<2	23	<2
	97	11	79	33		220	61
	98	1600	33	22	11	64	33
	99	11	2	5	2	13	5
	100	5	21	13	2	33	13
	101	2	<2	<2	4	8	2
	102	<2	<2	<2	5	8	<2
	103	5	8	<2	2	4	4
	104	<2	11	<2	2	33	2
	105	2	<2	<2	2	2	2
106	<2	<2	8	2	13	2	
107	4	17	8	2	23	8	
108	<2		8	<2	70	<5	
109	<2	8	49	2	13	8	
110	5	14	17	2	70	14	
111	13	49	70	17	79	49	
112	33	11	240	23	70	33	

TABLE B-4 FECAL COLIFORM MPN'S RICHIBUCTO VILLAGE, NEW BRUNSWICK 1975,  
SECTOR 3

SECTOR	STATION NO.	FECAL COLIFORM PER 100 ml (MPN)					MEDIAN
		JULY 23	JULY 29	JULY 30	JULY 31	AUG. 2	
3	1	140	>2400	540	240	17	240
	2	350	>1600	>2400	>2400	>2400	>2400
	3	570	>2400	>2400	>2400	920	>2400
	4	5	46	23	240	-	35
	5	<2	79	23	540	-	51
	6	<2	17	33	920	-	25
	7	<2	>2400	31	170	-	101
	8	13	350	33		-	33
	9	<2	540	43	240	11	43
	10	<2	240	49	1600	33	49
	11	540	1600	920	540	17	540
	12	<2	>2400	33	33	17	33
	13	2	33	33	240	11	33
	14	<2	46	23	43	13	23
	15	<2	2	31	240	13	13
	16	7	110	110	>2400	540	110
	17	<2	33	33	350	2	33
	18	2	240	23	49	2	23
	19	2	240	49	23	<2	23
	20	2	70	49	49	<2	49
	21	2	350	33	33	2	33
	22	<2	240	23	23	23	23
	23	<2	49	23	23	2	23
	24	<2	240	23	23	2	23
	25	<2	350	23	350	2	23
	26	2	49	23	23	2	23
	27	2	43	23	240	8	23
	28	<2		23	23	-	23
	29	2	17	23	23	2	23
	30	<2	<2	23	350	<2	<2
	31	<2	<2	23	23	<2	<2
	32	<2	<2	23	33	<2	<2
	33	<2	<2	23	23	<2	<2
	34	2	2	23	43	<2	2
	35	<2	2	23	240	<2	2

TABLE C-1 PRECIPITATION DATA FOR THE RICHIBUCTO AREA DURING THE STUDY PERIOD

DATE	PRECIPITATION (INCHES)	SAMPLING DATES
July 1		
2		
3		
4	.30	
5	T	
6	.30	
7	.12	
8		R.R.
9		R.R.
10		
11	.09	
12		R.H.
13	.02	
14	.21	R.R.
15		
16	.44	
17		
18	T	
19		
20		
21		R.H.*
22	.57	R.R.*
23		R.V.*
24		
25	.12	
26		
27		
28	.87	
29	.71	R.V., R.H.
30	.05	R.V.
31		R.V.
Aug. 1		R.H.
2		R.V., R.R.
3	.09	R.H.

\* R.H. - Richibucto Harbour  
 R.R. - Richibucto River  
 R.V. - Richibucto Village

Environment Canada - Environnement Canada

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