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A Bacteriological Assessment of the East River, Lunenburg Co. (Shellfish Area, N.S. No. 13)

Surveillance Report EPS 5-WP-72-20
Atlantic Region

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A BACTERIOLOGICAL ASSESSMENT

of

THE EAST RIVER, LUNENBERG CO., NOVA SCOTIA

(SHELLFISH AREA, N.S. #13)

by

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for

Shellfish Bacteriological Surveillance
Environmental Protection Service

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ABSTRACT

A bacteriological study was conducted at Little East River Cove a sector of Mahone Bay, Lunenburg County, Nova Scotia, from September 14th to October 11th, 1972. The purpose of this study was to determine the bacteriological water quality in the waters of Little East River estuary and the adjacent cove between Indian Point and a point of land on the eastern shore (See Figure 1).

A total of 150 water samples were collected and analysed for coliform and fecal coliform densities by the approved standard method.

The results indicate that the estuary and the waters surrounding Little East River are polluted by the combined industrial and sanitary wastes from the wood products mill at East River. A shellfish closure as indicated on Figure 1 is required.

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1. INTRODUCTION

In compliance with a proposal adopted by the Inter-departmental Shellfish Committee Meeting in Ottawa in March 1972, a bacteriological survey on the waters of Little East River estuary and the adjacent cove, was conducted from September 14 to October 11, 1972. This study was completed by the Mobile Laboratory of the Environmental Protection Service, Atlantic Region.

The purpose of this study was to assess the bacteriological water quality of the Little East River estuary, and of the tidal waters in the adjacent cove area (See Figure 1).

A total of 150 water samples were collected from the 30 sampling stations and were tested for coliform and fecal coliform densities by the approved standard method. Sampling schedules were so arranged as to obtain samples representing conditions at different tidal phases (see Table 1).

Salinity determinations were made from composited water samples collected each day, to determine the dilution effect of rainfall and induced landwash (See Table 2).

Weather data was obtained from the Department of the Environment, Atmospheric Environmental Service, for the area. Parameters such as wind velocity and direction, atmospheric temperature and precipitation for the area were recorded for consideration in this report (see Tables 3 and 4).

A shoreline and watershed investigation for evidence of actual and potential sources of pollution was conducted in conjunction with the water monitoring schedule.

The Little East River extends inland in a northerly direction approximately 2 miles from the tidal waters of the cove through dense bush and woodland. No dwellings or human activity were detected along the river course. The only discharge noted entering the river was the effluent from Anil Wood Products Limited. The adjacent cove shoreline is sparsely populated and each dwelling is remote from the water. No other potential sources of pollution were observed in the area.

A recreational beach area, in the range of sampling stations #9 to #13 inclusive, is frequently covered with waste material dispersed to this section by tidal currents and the prevailing wind.

2. METHODS

All samples were tested for coliform bacteria by the methods outlined in A.P.H.A. "Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish", Fourth Edition 1970. Coliform and fecal coliform densities were determined on all water samples by multiple dilution tubes (MPN) methods using Bacto-Lauryl Tryptose Broth with three or five tubes in each of at least three consecutive decimal dilutions with incubation at 35.5°C for 24 and 48 hours. Confirmation of all positive cultures was

was completed in (a) Bacto-Brilliant Green Bile Broth with incubation at 35.5°C for 24 and 48 hours, and in (b) Bacto-E.C. medium with incubation for 24 hours at 44.5°C in a recirculating water bath.

Salinity determinations were made by the Knudsen Method from composite samples. Salinities were expressed as parts per thousand (PPT).

Samples were obtained from the 30 sampling stations with the aid of a rod sampling device. These samples were collected in sterile 8-ounce glass bottles and transported to the Mobile Laboratory for bacteriological analysis within 1 hour of collection.

3. RESULTS

The location of a total of 30 water sampling stations included in the assessment study are shown in Figure 1. Coliform and fecal coliform MPN counts for the 150 water samples collected are recorded in Table 5.

Sampling stations #1 and #2 represent the river water quality above flood tide levels and all samples analyzed from these locations show evidence of gross pollution in Little East River.

Sampling station #3 represents the water quality of the tidal estuary of Little East River. The MPN coliform values at this station were lower than those at stations #1 and #2 due to dilution factor from tidal exchange. However, coliform values at this station were still above acceptable levels.

Sampling stations #4 to #15 inclusive, represent the shoreline water quality. All samples analysed from these stations show coliform values far higher than acceptable levels. The variation in coliform levels may be the result of dilution by greater depth at some stations.

Sampling stations #16 to #30, inclusive represent the tidal water quality extending outward to Mahone Bay. The coliform and fecal coliform densities progressively decreased offshore with increased dilution.

4. DISCUSSION

The degradation of the water quality in the Little East River is apparently a result of waste disposal methods employed by the wood products plant, a wood fibre board industry. This has been a source of profound concern to both Provincial and Federal Environment Agencies.

Coliform bacteria are found in large numbers in untreated sewage effluents. A test for coliform organisms is therefore useful in evaluating the extent of sewage pollution in a river or marine waters. The standard MPN coliform and fecal coliform tests were utilized in this report.

The bacteriological quality of a river or marine waters will vary greatly in relation to the time of year and rainfall. However, the analytical results of this survey can be accepted with confidence, since only two significant rainfalls were recorded

during the extended survey period, and no significant effect in the average of coliform bacterial levels at individual sampling stations was recorded.

5. CONCLUSIONS

It may be concluded that:

(a) the Little East River and estuary are grossly polluted, extending into the tidal waters of Mahone Bay, from the combined industrial and sanitary waste entering Little East River,

(b) the high levels of coliform and fecal coliform bacteria found in the tidal estuary and recreational shoreline demonstrates the need for a shellfish closure, in the interest of public health.

6. RECOMMENDATIONS

(a) That a shellfish closure be implemented on a sector of Mahone Bay, Lunenburg Co., N.S. at the estuary of Little East River as indicated by Figure 1.

(b) That the appropriate enforcement authorities be informed of the existing water quality conditions in the Little East River for the appropriate corrective action.

TABLE 1. TIDAL PHASE AND SAMPLING TIME FOR LITTLE EAST RIVER SURVEY DURING SEPTEMBER AND OCTOBER, 1972.

DATE	TIDAL PHASE HIGH TIDE (hrs)	LOW TIDE (hrs)	SAMPLING TIME (hrs)
Sept 14	1150 - 1845		0930 - 1030
Sept 20	0535 - 1155		0930 - 1030
Oct 2	0355 - 1025		1100 - 1200
Oct 4	0545 - 1215		0930 - 1030
Oct 10	0930 - 1545		1230 - 1330
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TABLE 2. SALINITY DATA OF COMPOSITED SAMPLES FOR LITTLE EAST RIVER SURVEY DURING SEPTEMBER AND OCTOBER, 1972.

DATE 1972	SALINITY PARTS PER THOUSAND
Sept 14	29.9
Sept 20	30.0
Oct 2	30.1
Oct 4	31.0
Oct 10	28.2

TABLE 3. CLIMATOLOGICAL DATA FOR LITTLE EAST RIVER DURING SEPTEMBER AND OCTOBER, 1972.

DATE 1972	SAMPLING TIME (HRS)	WATER TEMP. °C	AIR TEMP °C	WIND VELOCITY AND DIRCTION (MPH)
Sept 14	0930 - 1030	12°	19°	SW 0-5
Sept 20	0930 - 1030	10°	17°	W 0-5
Oct 2	1100 - 1200	11°	14°	W 5-10
Oct 4	0930 - 1030	9°	15°	NE 10-13
Oct 10	1230 - 1330	10°	9°	N 5-10

TABLE 4. RAINFALL DATA FOR LITTLE EAST RIVER SURVEY DURING SEPTEMBER AND OCTOBER, 1972.

Date 1972	Precipitation in inches	
Sept 14	0.02	
Sept 18	0.02	
Sept 19	0.06	
Sept 22	0.95	
Sept 27	0.04	
Sept 30	0.18	
		1.27
Oct 1	0.03	
Oct 7	2.97	
Oct 8	0.05	
		3.05
	TOTAL	4.32

TABLE 5. COLIFORM & FECAL COLIFORM MPN DATA FOR LITTLE EAST RIVER SURVEY 1972, SHELLFISH AREA #13.

Station No.	Coli-form	F.C.	Coli-form	F.C.	Coli-form	F.C.	Coli-form	F.C.	Coli-form	F.C.	Median Coli-form	Median F.C.
	Sept. 14		Sept. 20		Oct. 2		Oct. 4		Oct. 10			
1	1600+	1600+	1600+	1600+	1600+	920	1600+	1600+	1600+	1600+	1600+	1600+
2	1600+	340	1600+	350	1600+	540	1600+	1600+	1600+	1600+	1600+	1600+
3	920	540	1600+	350	1600	540	1600+	350	1600+	1600+	1600+	540
4	280	130	920	95	540	350	350	130	920	350	540	130
5	350	240	220	49	350	240	350	49	350	130	350	130
6	180	49	110	33	350	130	920	79	920	350	350	79
7	540	79	920	350	540	49	350	140	220	110	540	110
8	540	79	920	350	920	350	920	110	350	110	920	110
9	240	130	220	95	1600	110	350	79	79	8	240	79
10	180	70	110	79	95	8	11	2	110	49	110	49
11	70	23	33	23	95	23	79	33	70	5	70	23
12	95	33	70	23	33	8	79	8	130	23	79	23

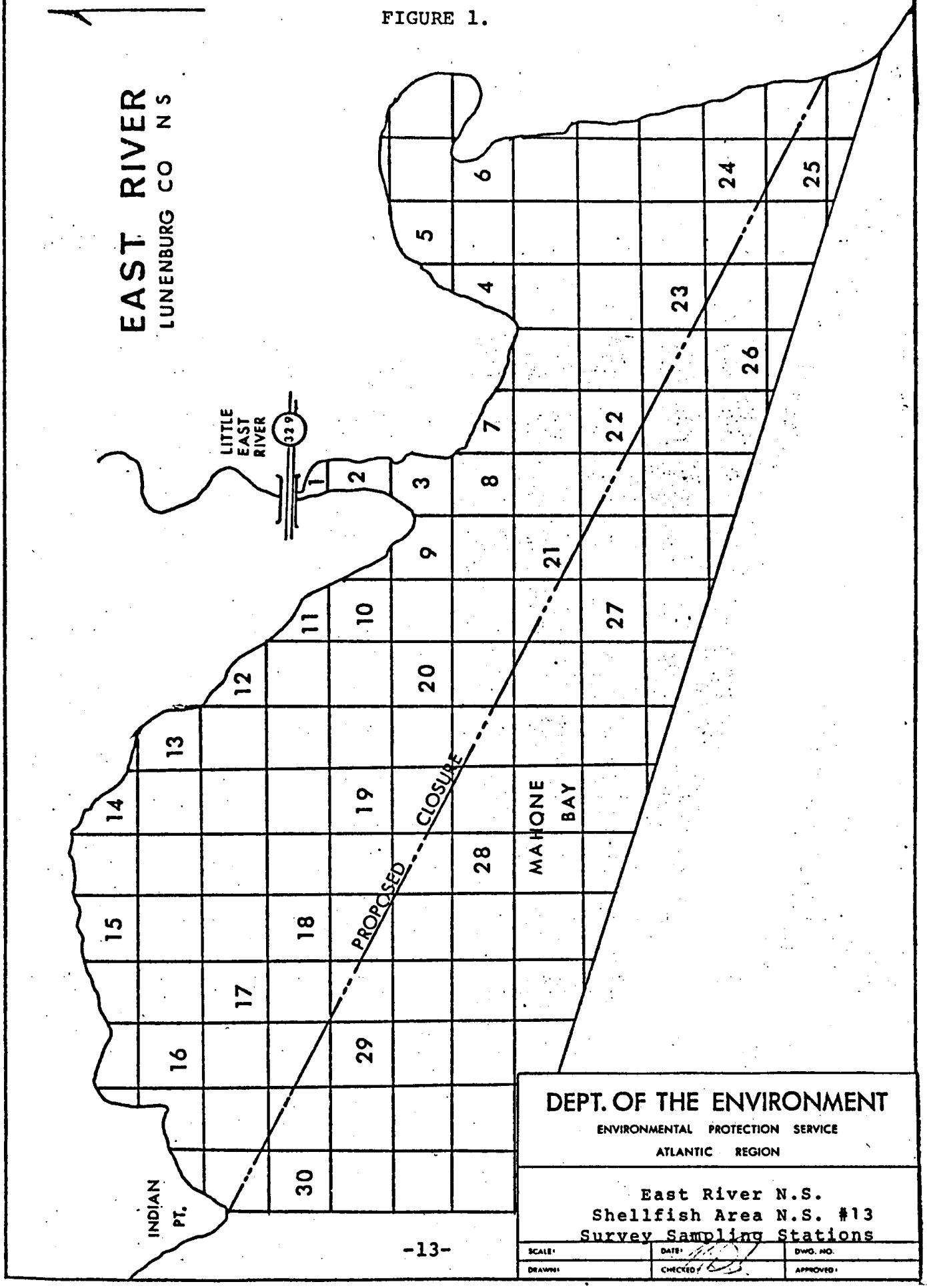
TABLE 5 CONTINUED

Station No.	Coli-form Sept 14	F.C.	Coli-form Sept 20	F.C.	Coli-form Oct 2	F.C.	Coli-form Oct 4	F.C.	Coli-form Oct 10	F.C.	Median Coli-form	Median F.C.
13	180	49	350	49	70	23	110	49	350	110	180	49
14	220	33	93	33	70	11	180	79	95	13	95	33
15	180	33	95	11	110	33	79	13	49	8	95	13
16	79	33	350	130	95	23	170	79	95	13	95	33
17	21	8	240	49	14	8	33	<2	13	2	21	8
18	33	13	33	23	70	33	70	23	14	5	33	23
19	240	70	350	130	350	110	79	13	350	33	350	70
20	350	240	350	240	540	350	350	49	920	180	350	240
21	540	130	540	180	540	130	350	130	350	95	540	130
22	240	70	110	49	350	79	240	79	350	130	240	79
23	79	33	49	49	17	5	23	5	49	23	49	23
24	49	14	110	33	2	<2	11	2	95	8	49	8

TABLE 5 CONTINUED

Station No.	Coli-form Sept 14	F.C. Sept 14	Coli-form Sept 20	F.C. Sept 20	Coli-form Oct 2	F.C. Oct 2	Coli-form Oct 4	F.C. Oct 4	Coli-form Oct 10	F.C. Oct 10	Median Coli-form	Median F.C.
25	8	<2	13	2	3	<2	11	<2	<2	<2	3	<2
26	33	5	79	2	49	5	5	5	22	5	33	5
27	49	23	11	5	33	2	5	2	8	2	11	2
28	<2	<2	2	<2	<2	<2	<2	<2	13	5	<2	<2
29	11	2	13	5	8	5	11	2	2	<2	11	2
30	<2	<2	8	<2	5	5	2	<2	5	2	5	<2

FIGURE 1.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MAHONE BAY
PROPOSED CLOSURE
INDIAN PT.
DEPT. OF THE ENVIRONMENT
ENVIRONMENTAL PROTECTION SERVICE
ATLANTIC REGION
East River N.S.
Shellfish Area N.S. #13
Survey Sampling Stations
SCALE:
DATE:
DWG. NO.
DRAWN:
CHECKED:
APPROVED: