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A Bacteriological Assessment of L'Etang River and L'Etang Harbour, Charlotte Co. (Shellfish Area, N.B. No. 14)

Surveillance Report EPS 5-WP-72-22
Atlantic Region

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A BACTERIOLOGICAL ASSESSMENT

OF

L'ETANG RIVER AND L'ETANG HARBOUR, CHARLOTTE CO.

(SHELLFISH AREA N.B. #14)

by

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for

Shellfish Bacteriological Surveillance

Environmental Protection Service

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ABSTRACT

During August 1972, a bacteriological survey was conducted to assess the bacteriological water quality of the L'Etang River and estuary. The results of the study indicate that the coliform densities of the river water are far above acceptable limits. Precipitation during the survey period was minimal, thus eliminating the possibility of bacterial increase in density normally associated with periods of heavy run-off. A physical sanitary survey of the surrounding watershed area revealed that the only significant source of pollution affecting the complete river course was a pulp mill at St. George, N.B.

The consistently high level of coliform densities throughout the river presents a potential public health hazard due to the possible consumption of shellfish from this area.

In compliance with the criteria for National Shellfish Standards, a shellfish closure is required in the whole of the river course and part of the estuary.

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1. INTRODUCTION

By request from the office of the Chief, Inspection Branch, Fisheries Service, Maritime Region, a bacteriological survey of the L'Etang River and the L'Etang Harbour (Shellfish Area N.B. #14) was carried out during the month of August 1972, by the Mobile Laboratory of the Environmental Protection Service, Atlantic Region.

An earlier survey of the river water and shellfish throughout the L'Etang River and estuary by the Fish Inspection Laboratory at Black's Harbour was carried out in May 1972, and revealed evidence of gross bacterial pollution throughout the river course.

The objective of the present study was to evaluate the bacteriological water quality and to locate the sources of pollution in the river.

A total of 232 water samples were collected from 60 designated sampling stations (see Figure 1). These were tested for the MPN coliform bacteria and fecal coliform bacteria per 100 ml of sample by the approved standard methods.

The physical sanitary investigation of the watershed and surrounding area was conducted during the sampling period and conditions relevant to the bacterial quality of the waters of L'Etang River were noted for consideration in this report.

Sampling times were scheduled to correspond to various tidal phases (see Table 1). Water temperatures, weather conditions,

and salinity concentrations were recorded at the time of sampling to relate with bacteriological and other data of this report (see Tables 2 and 3).

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 from 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 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 60 sampling stations by a rod sampling device. These samples were placed into sterile 8-ounce glass bottles and transported to the Mobile Laboratory within 1 hour of collection. The samples were immediately inoculated into prepared fermentation tubes in the appropriate graduated quantities for incubation.

3. RESULTS & DISCUSSION

The bacteriological data of this report demonstrates the whole river course was grossly polluted by coliform bacteria.

Sampling stations #1 to #32, inclusive, proved to have median MPN coliform densities greater than 2400 per 100 ml of sample (see Table 4).

Median coliform values were found to be within acceptable limits at stations #33 to #36 and stations #39 to #44, inclusive. These former stations are remote from the main course of the river and are much less influenced by the quality of the river water than the latter stations. However, the results from this sector probably reflect increased dilution by the waters of Passamaquoddy Bay.

Stations #45 to #48 and stations #51 to #54, inclusive, had median coliform MPN values in excess of acceptable limits. These stations represent the water quality within and adjacent to the existing closure $14-1.

From stations #54 to #60, inclusive, the MPN values rapidly diminish to within favourable limits. This may be due to a high dilution factor by tidal exchange.

From the physical investigation of the watershed and the surrounding area, a number of pollution sources were detected: (a) numerous private dwellings, (b) Black Harbour Community Hospital, (c) Fundy Forest Products Limited. Both (a) and (b) discharge untreated

sanitary waste directly to the shoreline waters near station #54. The effluent from these sources are considered to be responsible for the gross pollution as represented by sampling stations #53 and #54. Probably the greatest source of pollution to the total river course is (c), the combined sanitary and industrial wastes emanating from the pulp mill.

A wood pulp operation is located north of the causeway on a tributary to the L'Etang River. This plant discharges approximately 2,000,000 gallons per day of combined sanitary and industrial wastes. The mill effluents were not only the major contributor of coliform bacteria but also nutrient to the river which could result in bacterial regrowth in the river further downstream. The deteriorating effect of the mill effluent on the water quality is visually evident by the change in water color, shoreline staining and production of an offensive odour from the bacterial decomposition of sulfur compounds.

4. CONCLUSIONS

It may be concluded that:

(a) the L'Etang River is grossly polluted, and this is mainly attributable to the combined industrial and sanitary wastes entering the river waters from the forest products plant;

(b) a shellfish closure on the L'Etang River and estuary is required in compliance with criteria for "Sanitation of Shellfish Growing Waters", Part 1, 1965 Edition.

5. RECOMMENDATIONS

That a shellfish closure on the L'Etang River, Charlotte County, New Brunswick, be implemented as follows:

(a) the waters inside a straight line drawn in an eastward direction from survey monument #3 as shown in the plan of Passamaquoddy Bay to survey monument #4 as indicated in Figure 1 of this report.

(b) that the appropriate pollution abatement and regulatory authorities be advised of the existing polluting sources and of the water quality of the L'Etang River and estuary.

TABLE 1. Tidal Phase and Sampling Time, L'Etang River & L'Etang Harbour, Charlotte Co., New Brunswick.

DATE 1972	TIDAL PHASE HIGH TIDE (hrs)	LOW TIDE (hrs)	SAMPLING TIME (hrs)
Aug. 24	0220	0813	1200-1330
Aug. 25	0250	0850	1300-1500
Aug. 28	0430	1045	0930-1100
Aug. 29	0505	1125	0900 1130
Aug. 30	0540	1210	1000-1230

TABLE 2. Climatological Data for L'Etang River and L'Etang Harbour, Charlotte Co., N.B.

DATE 1972	SAMPLING TIME (hrs)	WATER TEMP. °C	AIR TEMP °C	WIND VELOCITY AND DIRECTION (MPH)
Aug. 24	1200-1330	15°	25.5°	W. 5
Aug. 25	1300-1500	14°	18°	SW 5/10
Aug. 28	0930-1100	15°	22°	NW 3/10
Aug. 29	0900-1130	16°	15°	NW 5/10
Aug. 30	1000-1230	15°	20°	W 5/10

Only Precipitation During Sample Period
August 27 P.M. = 0.58 inches

Table 3. Salinity Data for the L'Etang River & L'Etang Harbour, Charlotte Co., New Brunswick.

DATE 1972	SALINITY PARTS PER THOUSAND
Aug. 24	20.8
Aug. 25	19.5
Aug. 28	21.0
Aug. 29	21.3
Aug. 30	19.8

TABLE 4. Coliform and Fecal Coliform MPN Data for L'Etang River and L'Etang Harbour, N.B., 1972 (Shellfish Area N.B. #14).

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.
	Aug. 24		Aug. 25		Aug. 28		Aug. 29		Aug. 30			
1	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
2	+ 2400	460	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
3	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
4	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
5	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
6	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
7	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
8	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
9	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
10	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400					+ 2400	+ 2400
11	+ 2400	240	+ 2400	1100	+ 2400	+ 2400					+ 2400	1100
12	+ 2400	240	+ 2400	1100	+ 2400	+ 2400					+ 2400	1100

TABLE 4. Cont'd.

Station No.	Coli-form Aug. 24	F.C. Aug. 24	Coli-form Aug. 25	F.C. Aug. 25	Coli-form Aug. 28	F.C. Aug. 28	Coli-form Aug. 29	F.C. Aug. 29	Coli-form Aug. 30	F.C. Aug. 30	Median Coli-form	Median F.C.
13	+2400	460	+2400	240	+2400	+2400					+2400	460
14	+2400	240	+2400	460	+2400	460					+2400	460
15	+2400	240	+2400	1100	+2400	460					+2400	460
16	+2400	240	+2400	240	+2400	1100					+2400	240
17	+2400	460	+2400	240	+2400	240					+2400	240
18	+2400	460	+2400	240	+2400	1100					+2400	460
19	+2400	240	+2400	1100	+2400	460					+2400	460
20	+2400	240	+2400	460	+2400	460					+2400	460
21	+2400	460	+2400	460	1100	240					+2400	460
22	+2400	240	1100	240	+2400	1100					+2400	240
23	+2400	240	+2400	93	43	15					+2400	93
24	+2400	460	+2400	150	1100	240					+2400	240
25	+2400	240	+2400	240	+2400	460					+2400	240

TABLE 4. Cont'd

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.
	Aug. 24		Aug. 25		Aug. 28		Aug. 29		Aug. 30			
26	+ 2400	93	+ 2400	240	+ 2400	460					+ 2400	240
27	+ 2400	460	+ 2400	240	+ 2400	150					+ 2400	240
28	+ 2400	150	+ 2400	1100	+ 2400	460					+ 2400	460
29	+ 2400	1100	+ 2400	460	+ 2400	210					+ 2400	460
30	+ 2400	460	+ 2400	93	1100	150					+ 2400	150
31	+ 2400	1100	+ 2400	240	1100	240					+ 2400	240
32	+ 2400	93	+ 2400	75	+ 2400	93	+ 2400	240			+ 2400	93
33	23	4	43	15	20	9	93	15	15	<3	23	9
34	<3	<3	9	<3	15	9	<3	<3	9	4	9	<3
35	9	3	15	<3	9	3	23	9	4	3	9	3
36	4	4	9	3	<3	<3	<3	<3	4	3	4	3
37	+ 2400	+ 2400	1100	460	+ 2400	460	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400	+ 2400
38	+ 2400	1100	+ 2400	460	+ 2400	+ 2400	+ 2400	240	1100	460	+ 2400	460

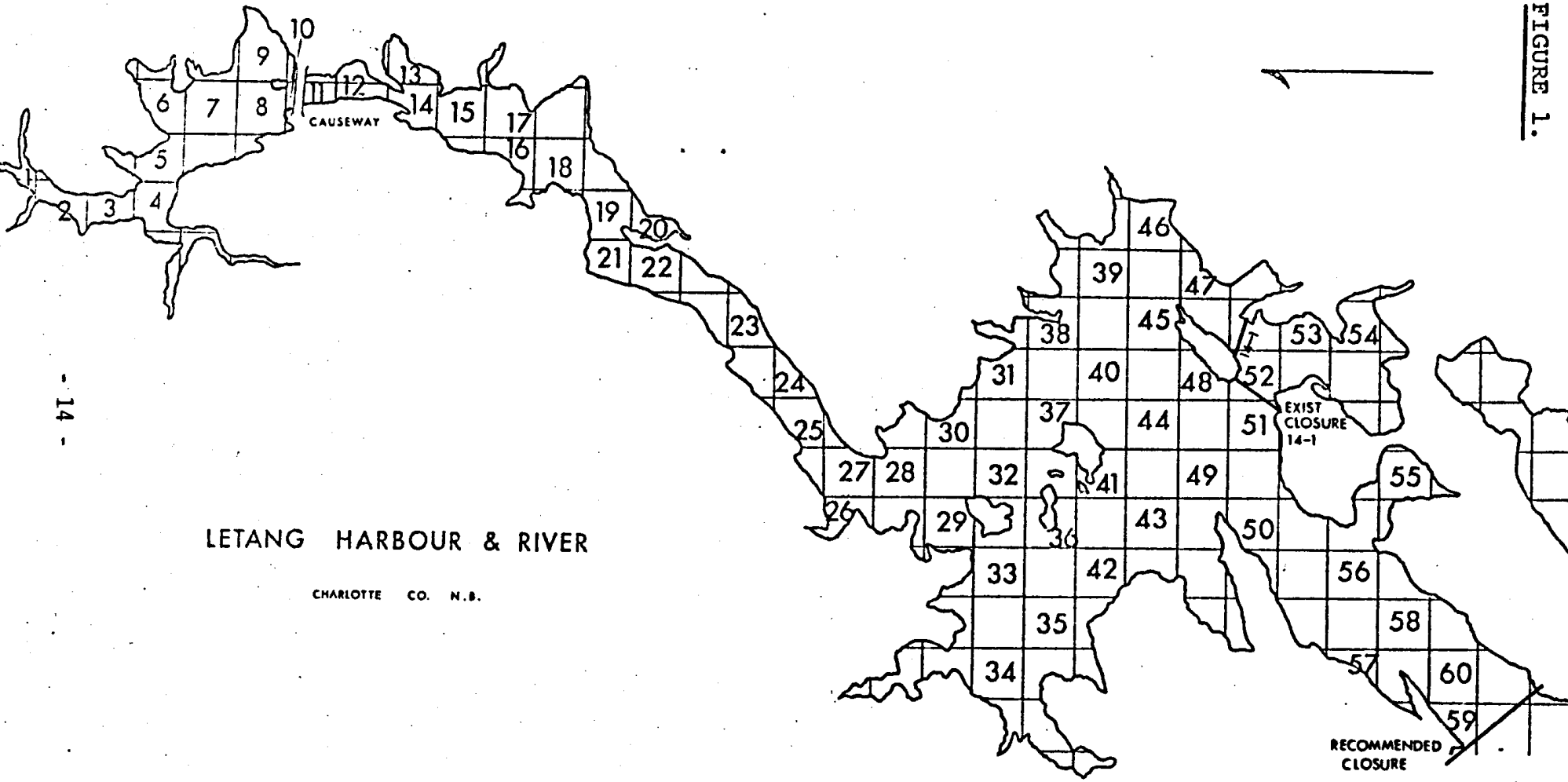
TABLE 4 . Cont'd

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.
	Aug. 24		Aug. 25		Aug. 28		Aug. 29		Aug.30			
39	43	3	23	9	93	11	43	15	93	23	43	11
40	240	93	43	15	7	3	43	9	9	3	43	9
41	20	7	9	7	9	3	7	4	7	3	9	4
42	9	3	11	4	4	4	3	<3	<3	<3	4	3
43	15	3	7	4	9	9	9	4	4	3	9	4
44	11	3	15	9	9	<3	7	3	9	3	9	3
45	1100	240	2400+	93	2400	240	1100	240	460	23	1100	240
46	460	93	240	43	150	23	460	240	2400+	240	460	93
47	2400+	1100	2400+	460	460	93	2400+	1100	1100	93	2400+	460
48	460	43	240	23	240	93	21	21	4	<3	240	23
49	21	15	15	15	43	11	23	9	15	<3	21	11
50	93	23	15	9	9	3	15	4	7	3	15	4
51	2400+	240	2400+	1100	460	150	1100	240	1100	460	1100	240

TABLE 4. Cont'd

Station I.D.	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.
	Aug. 24		Aug. 25		Aug. 28		Aug. 29		Aug. 30			
52	460	150	1100	93	240	240	1100	240	460	93	460	150
53	+ 2400	1100	+ 2400	150	1100	240	460	460	+ 2400	240	+ 2400	240
54	+ 2400	460	+ 2400	240	+ 2400	460	1100	460	+ 2400	460	+ 2400	460
55	15	3	23	<3	21	9	43	11	21	15	21	9
56	9	<3	7	3	7	3	9	4	23	7	9	3
57	43	23	9	3	7	<3	9	3	15	3	9	3
58	93	15	<3	<3	15	4	<3	<3	9	<3	9	<3
59	20	9	4	<3	<3	<3	4	<3	<3	<3	4	<3
60	150	23	93	23	75	9	93	20	43	15	93	20

FIGURE 1.



LETANG HARBOUR & RIVER

CHARLOTTE CO. N.B.

DEPT. OF THE ENVIRONMENT

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

L'Etang Harbour & River
Shellfish Area N.B. #14
Survey Sampling Stations 1972

SCALE: 5/16" = 1 mile	DATE: January, 1973	DWG. NO. 2
DRAWN: L.F.	CHECKED:	APPROVED: