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A Bacteriological Assessment of Pownal Bay, Queens Co. (Shellfish Area, P.E.I. No. 7)

Surveillance Report EPS 5-WP-72-16
Atlantic Region

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A BACTERIOLOGICAL ASSESSMENT

of

POWNAL BAY, QUEENS CO.

(SHELLFISH AREA P.E.I. #7)

by

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for

Shellfish Bacteriological Surveillance
Environmental Protection Service
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ABSTRACT

The Fisheries Service, Inspection Laboratory at Charlottetown, P.E.I., has reported incidences of higher than acceptable MPN coliform counts from shellfish stock harvested in Pownal Bay.

A bacteriological survey was carried out, from June 25 to July 12, 1972, by the Mobile Laboratory, located in Charlottetown, P.E.I. The purpose of the survey was to reassess the present classification of the area for harvesting shellfish.

A total of 200 water samples were collected from 40 sampling stations and analysed for coliform and fecal coliform densities using the approved standard method.

The results of this study indicate that a small section of the area was contaminated with coliform bacteria. The data also indicates that the whole area may be subject to a high level of coliform pollution following periods of rainfall induced landwash.

In compliance with criteria for National Shellfish Standards, (growing areas), a shellfish closure is required on a sector of Pownal Bay, P.E.I.

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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 physical sanitary and bacteriological survey of Pownal Bay, P.E.I., was carried out during the months of June and July 1972, by the Mobile Laboratory of Environmental Protection Service, Atlantic Region.

Reported incidences of higher than the acceptable MPN coliform counts, in shellfish harvested from Pownal Bay, required that an investigation of the water quality and the surrounding watershed be made during the 1972 survey season. The purpose of this survey was to determine the extent and sources of coliforms in the shellfish growing waters.

Sampling and analysis were carried out by the Mobile Laboratory, located in Charlottetown, over a period of 20 days. A sanitary investigation of the shoreline and watershed was conducted in conjunction with the water sampling program.

A total of 200 water samples were collected from the 40 sampling stations (See Figure 1). The sampling times were so arranged as to obtain samples representing conditions at different tidal phases (See Table 1).

The physical sanitary survey of the surrounding watershed was conducted during the sampling period for evidence of actual or potential pollution sources.

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

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

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 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 200 sampling stations by a rod sampling device. Water samples were collected in sterile 8-ounce glass bottles and transported to the Mobile Laboratory for bacteriological analysis within one hour of collection.

3. RESULTS

The location of a total of 40 water sampling stations included in the monitoring study are shown in Figure 1. Coliform and fecal coliform MPN counts for the 200 samples collected are recorded in Table 5.

Sampling stations #1 to #4 represent the water quality of the Pownal River. The median values of these stations for five samplings were consistently higher than the acceptable standards of 70 coliforms per 100 ml.

Salinity determinations of the composite of daily sampling show a range differential of 2.1 PPT. Considering the flow of fresh water from Pownal River and the rainfall data during the sampling period (total 0.64 inches), there appeared to be no significant difference in salinity during the study sampling period (See Table 4).

The Department of the Environment, Atmospheric Environment Service, reported 0.12 inches of precipitation during the June period of sampling, and 0.52 inches during the July period, for a total of 0.64 inches (see Tables 3 and 4).

4. DISCUSSION

At sampling stations #1 to #4 inclusive, representing the water quality of Pownal River, all samples had MPN coliform counts greater than the standard for "Satisfactory compliance". The source or sources of pollution affecting the water quality at these stations, appeared to be the normal activity of resident population and seepage by septic tank effluent from residences near the shoreline (see Table 5).

At sampling stations #5 to #40 inclusive, representing the water quality of Pownal Bay and Pownal River estuary, all the samples collected June 26, 28 and July 3, and 11 had low bacterial counts and met the standards for "Satisfactory compliance". On July 11th, samples at Stations #'s 21, 22 and 24 had bacterial counts greater than the standard for "Satisfactory compliance". These unusually high counts may be attributed to the presence of large numbers of water fowl at these locations. This was especially apparent during sampling on July 11th. Large concentrations of water fowl (mainly gulls) were observed to use the three small islands in the range of station #25 as a nesting ground. Sampling station #33 had an abnormally high bacterial count on July 11th and was attributed to the increase in recreational activity in the range of station #33 (noted only on this date). The MPN coliform median values recorded for all sampling stations from #5 to #40 inclusive, were of satisfactory level, ranging from a median value low of <2, to a median value high of 23.

"Satisfactory compliance", bacteriologically, is when the coliform median MPN of the samples ordinarily exceed 70 per 100 ml

and not more than 10% of the sample exceed an MPN of 230 per 100 ml for a five tube decimal dilution test, or 330 per 100 ml where a three tube decimal dilution test is used.

5. CONCLUSIONS

It may be concluded that:

(a) the water course of Pownal River is polluted from domestic waste materials entering the stream, as is demonstrated by the bacteriological data of this report. A shellfish closure, in compliance with standards for "Sanitation of Shellfish Growing Areas, Part 1, 1965 Edition", is required,

(b) the concentration of water fowl (Herring Gull) occupying the three small islands as a nesting ground is a periodic contributing source of coliform bacteria to the surrounding area,

(c) a monitoring program over an extended sampling time would be necessary to determine if a potentially significant health hazard does exist as a result of the water fowl populations in this area.

6. RECOMMENDATION

(a) That a shellfish closure on Pownal Bay, Queens County, Prince Edward Island, be implemented as follows: the waters inside a line across the estuary of Pownal River as indicated by Figure 1 of this report, and to be so marked with appropriate shellfish closure monuments with numbers.

TABLE 1. TIDAL PHASE & SAMPLING TIME ON POWNAL BAY DURING SAMPLING PERIOD OF JUNE, 1972.

DATE 1972	TIDAL PHASE HIGH TIDE (hrs)	LOW TIDE (hrs)	SAMPLING TIME (hrs)
June 26	0915	1640	1000 - 1130
June 28	1100	1805	1300 - 1430
July 3	0515	1215	0900 - 1030
July 10	0915	1625	0900 - 1030
July 11	1015	1715	0930 - 1100

TABLE 2. SALINITY DATA OF COMPOSITED SAMPLES COLLECTED FROM POWNAL BAY, DURING JUNE 1972, SHELLFISH AREA #7.

DATE 1972	SALINITY PARTS PER THOUSAND
June 26	31.6
June 28	29.9
July 3	32.0
July 10	31.4
July 11	31.7
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TABLE 3, CLIMATOLGOICAL DATA FOR POWNAL BAY

DURING SURVEY PERIOD OF JUNE 1972, SHELLFISH AREA #7.

DATE	SAMPLING TIME (hrs)	WATER TEMP. °C	AIR TEMP °C	WIND VELOCITY and DIRCTION (MPH)
June 26	1000 - 1130	16°	20°	W 5
June 28	1300 - 1430	16°	22°	SW 5/10
July 3	0900 - 1030	17°	18°	W 5
July 10	0900 - 1030	14.5°	26°	SE 3
July 11	0930 - 1100	15.5°	23°	SW 3/10

TABLE 4. RAINFALL DATA FOR POWNAL BAY

DURING THE SURVEY PERIOD JUNE 1972, SHELLFISH AREA #7.

Date 1972	Daily Precipitation in inches.	
June 26	0,05	
June 27	0.01	
June 28	0.02	
June 29	0.04	
	sub total	0.12
July 1	0.17	
July 3	0.02	
July 4	0.29	
July 10	0.04	
.	sub total	0.52
.		
	TOTAL	0.64 inches

TABLE 5, COLIFORM & FECAL COLIFORM MPN DATA FOR POWNAL BAY

SURVEY 1972, SHELLFISH AREA #7.

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.
	June 26		June 28		July 3		July 10		July 11			
1	1100	1100	460	240	920	79	1100	460	+1600	430	1100	430
2	1100	1100	1100	460	+1600	130	43	43	920	240	1100	240
3	460	240	>2400	>2400	1600	110	150	43	430	430	460	240
4	460	93	43	43	79	8	43	8	93	23	79	23
5	150	150	<3	<3	33	5	13	8	<2	<2	13	5
6	4	4	9	4	13	3	<3	<3	43	23	9	4
7	4	4	<3	<3	23	2	9	3	<2	<2	4	2
8	4	4	4	4	8	<2	9	<3	13	2	8	2
9	9	4	9	4	13	5	9	<3	13	2	9	4
10	9	4	4	4	49	13	4	<3	43	8	9	4
11	<3	<3	4	4	<2	<2	4	<3	23	13	4	<3
12	<3	<3	<3	<3	5	<2	13	<3	43	13	5	<3
13	9	9	<3	<3	<2	<2	<3	<3	49	13	<3	<3

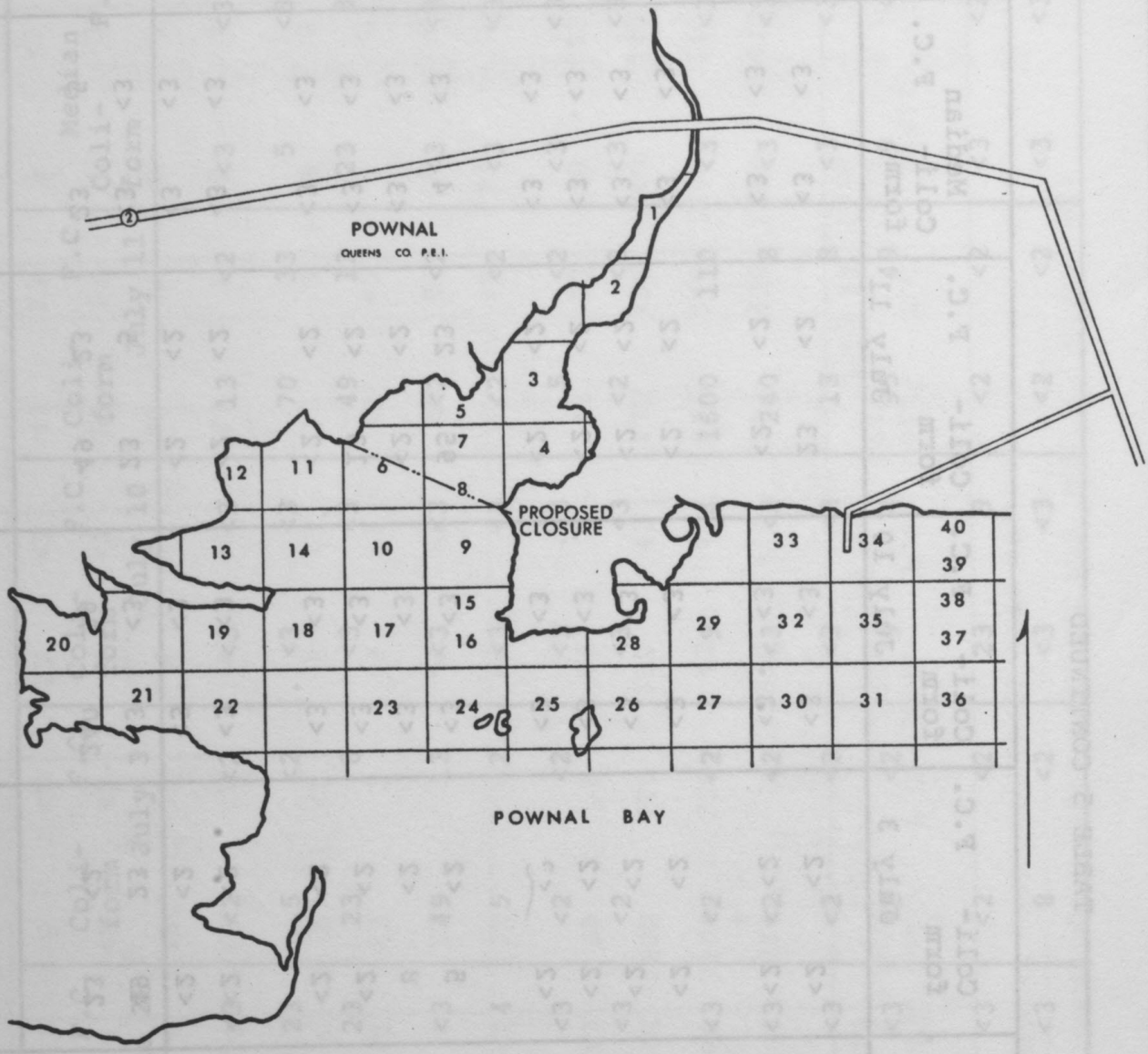
TABLE 5 CONTINUED

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.
	June 26		June 28		July 3		July 10		July 11			
14	<3	<3	<3	<3	<2	<2	<3	<3	13	<2	<3	<3
15	<3	<3	23	23	5	<2	<3	<3	70	33	5	<3
16	<3	<3	23	23	23	8	<3	<3	49	13	23	8
17	<3	<3	<3	<3	49	13	<3	<3	<2	<2	<3	<3
18	<3	<3	9	4	5	2	<3	<3	<2	<2	<3	<3
19	43	43	<3	<3	<2	<2	<3	<3	5	<2	<3	<3
20	<3	<3	9	<3	<2		<3	<3	<2	<2	<3	<3
21	<3	<3	<3	<3	<2	<2	9	4	1600	110	<3	<3
22	15	15	<3	<3	<2	42	<3	<3	240	8	<3	<3
23	9	9	<3	<3	<2	<2	<3	<3	13	8	<3	<3
24	9	9	<3	<3	<2	<2	9	4	95	49	9	4
25	9	4	<3	<3	<2	<2	23	9	<2	<2	<3	<3
26	<3	<3	4	<3	8	<2	<3	<3	<2	<2	<3	<3

TABLE 5 CONTINUED

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.
	June 26		June 28		July 3		July 10		July 11			
27	<3	<3	4	<3	<2	<2	<3	<3	23	<2	<3	<3
28	<3	<3	4	<3	<2	<2	<3	<3	<2	<2	<3	<3
29	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
30	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
31	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
32	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
33	4	<3	<3	<3	5	<2	<3	<3	95	23	4	<3
34	14	4	<3	<3	8	<2	<3	<3	<2	<2	<3	<3
35	20	7	<3	<3	<2	<2	<3	<3	13	<2	<3	<3
36	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
37	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
38	<3	<3	<3	<3	<2	<2	<3	<3	<2	<2	<3	<3
39	<3	<3	<3	<3	49	23	<3	<3	23	5	<3	<3
40	13	<3	8	5	23	<2	240	79	49	23	23	5

Figure 1.



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SCALE:	DATE:	DWG. NO.
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