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A Bacteriological Assessment
of Chester Harbour,
Lunenburg Co.
(Shellfish Area, N.S. No. 13)

Dartmouth Env. Can. Lib./Bib.



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72-21

Surveillance Report EPS 5-WP-72-21
Atlantic Region

TD
172
C3352
no. 72-61

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A BACTERIOLOGICAL ASSESSMENT

of

CHESTER HARBOUR, LUNENBURG CO.

(SHELLFISH AREA N.S. #13)

by

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Environmental Protection Service

Halifax, N. S.

for

Shellfish Bacteriological Surveillance

Environmental Protection Service

Report Number EPS 5-WP-72-21

February, 1973

QUESTION 1

1.1.1. The following table shows the number of students who took part in a school sports day. The number of students who took part in each sport is given in the table.

Sport	Number of students
Football	15
Netball	10
Table Tennis	5
Badminton	8
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Badminton	8

1.1.2. The following table shows the number of students who took part in a school sports day. The number of students who took part in each sport is given in the table.

Sport	Number of students
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Badminton	8

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ABSTRACT

During September 1972, the waters of Chester Harbour, were examined bacteriologically, as part of a continuing shoreline surveillance of shellfish growing waters.

Bacteriological results indicate high levels of coliform bacteria throughout the waters of Chester Harbour, Marriots Cove, and a sector known as the Marina.

A physical sanitary investigation of the surrounding shoreline and watershed revealed evidence of numerous sources of untreated sanitary waste discharging to the shoreline waters.

The existing shellfish closure #13-5 on Chester Harbour and Marriots Cove was implemented as a result of these pollution conditions and in compliance with National Standards for shellfish producing waters. The present closure is adequate.

TABLE OF CONTENTS

	Page
ABSTRACT	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iv
SECTION 1. INTRODUCTION	1
SECTION 2. METHODS	2
SECTION 3. RESULTS	3
SECTION 4. DISCUSSION	5
SECTION 5. CONCLUSIONS	6
SECTION 6. RECOMMENDATIONS	7

LIST OF TABLES

Table	Page
1. Tidal Phase and Sampling Time for Chester Harbour Survey during September, 1972	8
2. Salinity Data of Composited Sampling for Chester Harbour Survey during September and October, 1972	9
3. Climatological Data for Chester Harbour Survey During September, 1972 ...	10
4. Rainfall Data for Chester Harbour Survey During September, 1972	11
5. Coliform and Fecal Coliform MPN Data for Chester Harbour Survey 1972, Shellfish Area N.S. #13	12, 13, 14

LIST OF FIGURES

Figure	Page
1. Chester Harbour and Marriots Cove, Lunenburg County, N.S. Survey Map, with sampling stations and reference points	15

1. INTRODUCTION

In compliance with a proposal adopted by the Inter-departmental Shellfish Committee Meeting in Ottawa in March, 1972, a bacteriological assessment of the waters in Chester Harbour was carried out by the Mobile Laboratory, Environmental Protection Service, Atlantic Region, during the month of September, 1972. This survey followed a recommendation by a sanitary survey report conducted in 1969 by the Moncton office of Public Health Engineering Division, National Health and Welfare.

A previous bacteriological and sanitary survey by the Moncton office of Public Health Engineering Division, National Health and Welfare in 1951 recommended the existing shellfish closure on Chester Harbour. The number of sewage outfalls to the shoreline waters and the high coliform densities present in the surrounding waters warranted the closure in the interest of public health.

The purpose of the 1972 study was to determine the adequacy of the existing shellfish closure #13-5 and to evaluate the degree of deterioration of bacteriological water quality as a result of increasing population and tourist activity in the surrounding area.

The area of study included both the tidal waters inside the shellfish closure lines (i.e. Chester Harbour, Marriots Cove, the Marine) and the waters on the outer side of the shellfish

closure lines to Gooseberry Island and Meisner Island.

Sampling and analysis were carried out by the Mobile Laboratory, located in Bridgewater, over a period of 16 days. The sanitary investigation of the shoreline and watershed was conducted in conjunction with the water monitoring program to evaluate the sources of coliform bacteria in the shellfish producing waters.

A total of 180 water samples were collected from 36 sampling stations and were tested for the presence of coliform bacteria by the standard method. Sampling times were so arranged so 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 effects of dilution due to rainfall and induced landwash (see Table 2).

Weather data was obtained from the Department of the Environment, Atmospheric Environmental Service, for the study area. Parameters such as wind velocity and direction, atmospheric temperature and precipitation, were recorded together with other pertinent information 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 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 36 sampling stations with the aid of a rod sampling device. These samples were placed into sterile 8-ounce glass bottles and transported to the Mobile Laboratory within one hour of collection. The samples were immediately inoculated into prepared fermentation tubes in the appropriate graduated quantities for incubation.

3. RESULTS

From a sanitary investigation of the shoreline and surrounding watershed, a number of pollution sources were detected. In the harbour area, untreated sanitary waste enters the harbour from 20 or more outfalls. Marine pleasure craft are also a source

of pollution to the harbour. In the marina area, untreated sanitary waste enters the waters directly from more than 20 dwellings and from a number of marine pleasure craft. In the Marriots Cove area, untreated sanitary waste enters the water from 10 or more outfalls.

The location of a total of 36 sampling stations in the monitoring study are shown in Figure 1. Coliform and fecal coliform MPN counts for the 180 water samples collected from these stations are recorded on Table 5.

Sampling stations #1 to #15 represent the water quality of Chester Harbour and the eastern sector of the closure area. The median values for sampling stations #1 to #8 in this sector exceed the limits for approved standards. Stations #9 to #16 inclusive, represent the waters near the closure line from Zinck Head to Peninsula Point. Coliform MPN values at these stations are within the limits for satisfactory compliance. Thus it is demonstrated by the bacteriological data that the Eastern sector of the shellfish closure is adequate.

Sampling stations #16 to #36, represent the whole of the west sector. The Marine is represented by stations #18 to #26, Marriots Cove by stations #33 to #36, and the closure line for this sector by stations #16, #17, #18 and #30. The median of MPN coliform counts at stations #18 to #26, and also the median MPN values at stations #33 to #36 exceed the limits for approved standards.

The bacterial counts and median values for stations #16, #17, #18 and #30 are within the limits for satisfactory compliance. Thus, it is further demonstrated that the western sector as well as the eastern sector of the existing shellfish closure line is adequate.

Salinity determinations of the daily composited samples from stations #1 to #36 inclusive, show a range differential of 3.6 PPT. Considering the dilution effect of the flow of fresh water from Stanford Lake, the salinity range appears to be normal. The fluctuating salinity values are probably the result of tidal dilution (see Table 4).

A total of 1.5 inches precipitation were recorded during the 16 day survey period. The wind was from an off-shore direction during sampling on September 12 and 26, and from an on-shore direction during the sampling on September 19, 21 and 25. No significant effect was reflected in the bacteriological data as a result of the precipitation and wind direction.

4. DISCUSSION

The community of Chester, is a well known summer resort, and as such, the population ranges from 1500 in the winter months to more than 3500 during the summer tourist season.

Presently most homes have cesspools or septic tanks with tile fields, and as noted, there are a number of shoreline dwellings

discharging sanitary wastes directly into the shoreline waters. At one time, a portion of the village was serviced by a combination sewage collector and storm drain system which discharged to the harbour waters. This system services fewer residences now, but continues to serve as a storm drain system.

The data and observations of this 1972 survey provides sufficient information in support of the existing shellfish closure.

5. CONCLUSIONS

It may be concluded that:

- (a) the tidal waters of Chester Harbour, Marriots Cove and the Marine are grossly polluted as a result of untreated sanitary sewage discharging from sources at these sectors into shoreline waters;
- (b) the bacteriological data of this report illustrates the need for continuing maintenance of the existing shellfish closure #13-5, in compliance with the National Standards for shellfish producing waters.

6. RECOMMENDATIONS

It is recommended that:

- (a) The existing shellfish closure is adequate and to remain in effect as defined by the Nova Scotia Fishery Regulations, P.C. 1970-2189, Schedule "G" as follows:

"Item 13-5: Chester Harbour, Lunenburg County, between a straight line drawn from Fitch Point to Peninsula Point, and a straight line drawn from Peninsula Point to Zinck's Head."

- (b) The appropriate pollution abatement and regulatory authorities should be advised of the existing polluting sources and of the bacteriological quality of the tidal waters in Chester Harbour, Lunenburg County, Nova Scotia.

TABLE 1. TIDAL PHASE & SAMPLING TIME FOR CHESTER HARBOUR
SURVEY DURING SEPTEMBER, 1972.

DATE 1972	TIDAL PHASE		SAMPLING TIME (hrs)
	HIGH TIDE (hrs)	LOW TIDE (hrs)	
Sept. 12	1040	- 1700	1000 - 1200
Sept. 19	0455	- 1055	0930 - 1200
Sept. 21	0620	- 1235	1130 - 1300
Sept. 25	0910	- 1545	1300 - 1500
Sept. 26	0955	- 1640	0930 - 1130
.			
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TABLE 2 SALINITY DATA OF COMPOSITED SAMPLES FOR
 CHESTER HARBOUR SURVEY DURING SEPTEMBER AND OCTOBER, 1972

DATE 1972	SALINITY PARTS PER THOUSAND
Sept 12	28.9
Sept 19	31.6
Sept 21	30.4
Sept 25	32.0
Sept 26	30.1

TABLE 3. CLIMATOLOGICAL DATA FOR CHESTER HARBOUR SURVEY
DURING SEPTEMBER, 1972

DATE 1972	SAMPLING TIME (hrs)	WATER TEMP. °C	AIR TEMP. °C	WIND VELOCITY AND DIRECTION (MPH)
Sept 12	1000 - 1200	12°	24°	NW 5-10
Sept 19	0930 - 1200	11.5°	18°	SW 5
Sept 21	1130 - 1300	14°	19°	W 5
Sept 25	1300 - 1500	12°	19°	SW 5-10
Sept 26	0930 - 1130	14°	28°	NW 5-10

TABLE 4. RAINFALL DATA FOR CHESTER HARBOUR SURVEY
DURING SEPTEMBER, 1972

Date	1972	Precipitation, Inches
Sept.	14	0.02
Sept.	18	0.02
Sept.	19	0.06
Sept.	22	0.95
		TOTAL 1.05

TABLE 5 COLIFORM & FECAL COLIFORM MPN DATA FOR

CHESTER HARBOUR SURVEY 1972, SHELLFISH AREA #13

Station No.	Sept. 12	Sept. 19	Sept. 21	Sept. 25	Sept. 26	Median Coli- form F.C.
1	1600 ⁺ 540	1600 ⁺ 1600	1600 920	540 46	1600 ⁺ 920	1600 ⁺ 920
2	1600 ⁺ 920	1600 ⁺ 240	920 350	1600 220	1600 ⁺ 350	1600 ⁺ 350
3	1600 240	1600 540	920 540	1600 ⁺ 350	920 350	1600 350
4	240 79	920 240	920 540	540 350	1600 350	920 350
5	920 120	79 23	1600 ⁺ 350	1600 130	1600 540	1600 170
6	240 49	33 8	110 70	140 49	220 79	110 49
7	240 130	93 33	110 79	70 23	95 33	95 33
8	95 23	46 23	220 70	49 23	170 33	95 23
9	110 33	220 95	49 23	11 8	49 49	49 33
10	8 <2	33 11	23 8	<2 <2	11 5	11 5
11	23 <2	33 8	23 13	11 5	14 3	23 5
12	49 13	70 23	49 11	8 2	8 <2	49 11
13	8 <2	17 8	5 <2	8 <2	13 <2	8 <2
14	5 <2	5 5	13 2	13 2	13 5	13 2
15	33 8	8 <2	5 <2	49 5	79 11	33 5
16	<2 <2	5 <2	5 5	<2 <2	<2 <2	<2 <2

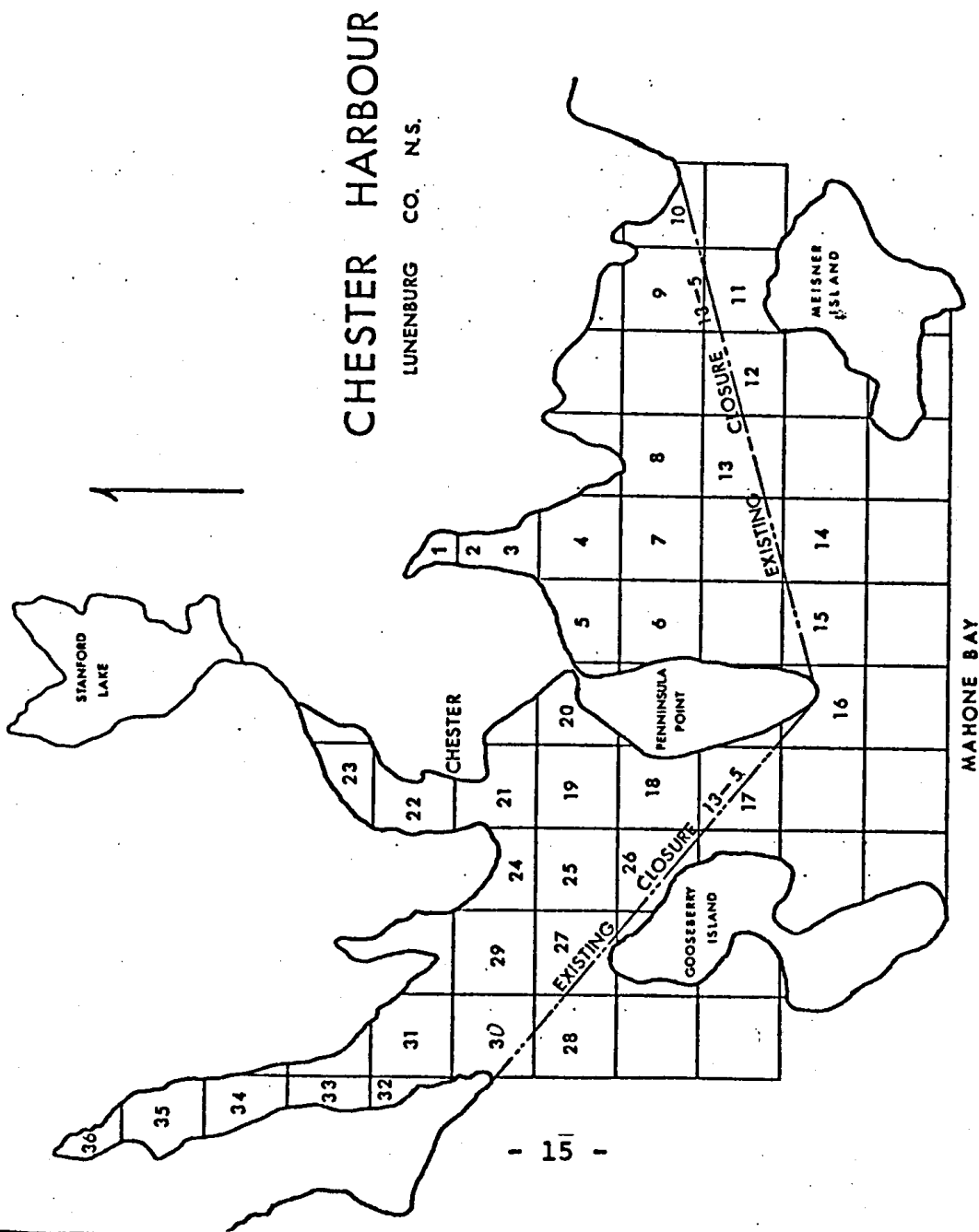
TABLE 5 CONTINUED

Station No.	Coli-form Sept 12	F.C. Sept 12	Coli-form Sept 19	F.C. Sept 19	Coli-form Sept 21	F.C. Sept 21	Coli-form Sept 25	F.C. Sept 25	Coli-form Sept 26	F.C. Sept 26	Median Coli-form	F.C.
17	<2	<2	5	2	8	2	<2	<2	<2	<2	<2	<2
18	79	23	130	33	79	8	170	33	93	33	95	33
19	240	49	920	540	920	240	540	350	920	350	920	350
20	920	240	1600	1600	540	240	340	350	920	340	920	350
21	920	240	920	920	1600	1600	1600	1600	1600	920	1600	920
22	1600	1600	1600	1600	920	340	1600	1600	1600	1600	1600	1600
23	1600	1600	1600	1600	1600	540	1600	1600	1600	920	1600	1600
24	540	70	240	240	1600	220	920	540	1600	70	920	220
25	240	79	95	33	280	110	350	93	350	49	280	79
26	33	8	70	23	79	23	350	170	540	13	79	23
27	8	<2	5	5	33	33	23	8	11	<2	11	5
28	2	<2	8	<2	<2	<2	13	5	17	5	8	<2

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	F.C.
29	70	23	33	11	79	11	49	8	110	33	70	11
30	11	5	23	5	11	5	49	8	49	8	23	5
31	23	5	49	23	46	11	79	23	23	2	46	11
32	79	23	220	170	33	17	93	33	49	23	79	23
33	79	8	130	79	350	95	180	110	240	240	180	95
34	130	33	350	79	79	23	220	78	540	350	220	79
35	540	220	920	33	240	130	540	350	1600	350	540	220
36	240	79	540	46	920	170	540	350	920	350	540	170

Figure 1.



DEPT. OF THE ENVIRONMENT	
ENVIRONMENTAL PROTECTION SERVICE	
ATLANTIC REGION	
Chester Harbour Shellfish Area N.S. #13 Survey Sampling Stations	
SCALE:	DATE:
DRAWN:	CHECKED:
	DWG. NO.:
	REVISED:

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A BACTERIOLOGICAL ASSESSMENT OF CHESTER HARBOUR,
LUNenburg CO. (SHELLFISH AREA, N. S. #13)
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