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A Bacteriological Assessment of Oyster Pond, Pleasant Point Halifax Co., N.S. (Shellfish Area, N.S. No. 12)

Surveillance Report EPS 5-WP-72-19
Atlantic Region

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A BACTERIOLOGICAL ASSESSMENT STUDY

of

OYSTER POND AND THE SHELLFISH CULTURE STATION AT PLEASANT POINT, HALIFAX CO., NOVA SCOTIA

by

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for

Shellfish Bacteriological Surveillance
Environmental Protection Service

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ABSTRACT

A bacteriological assessment of the water quality in Oyster Pond, Shellfish Culture Station at Pleasant Point, N.S., was carried out during August and October 1972, by the Mobile Laboratory of Environmental Protection Service, Atlantic Region.

In conjunction with the bacteriological sampling and analysis, a physical sanitary investigation of the surrounding area and operating facilities was completed. There were no significant sources of pollution to the waters of Oyster Pond within the watershed. The bacteriological tests demonstrated that the waters within Oyster Pond were of satisfactory quality during each of the August and October sampling periods. Tidal exchange water from the Musquodoboit River Estuary had no detrimental effect on the waters within Oyster Pond.

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1. INTRODUCTION

A bacteriological survey of the water quality overlaying the shellfish producing beds in Oyster Pond was carried out during July 1970. The purpose of the survey at that time was to evaluate the actual or potential sources of pollution and the distance of such sources from the growing area. Other pertinent factors such as the reliability of sewage treatment systems, and the possibility of tidal currents transporting pollutant material over the growing area were also evaluated.

The report was submitted to the interdepartmental Shellfish Committee in March 1971. The report recommended that the area be classified as an approved shellfish producing area. This recommendation was accepted by the committee.

Following the 1970 survey report, the Director of Resource Development, Department of Fisheries for the Province of Nova Scotia, requested a second study be made of the area to determine the effect of seasonal weather conditions, migratory water fowl, and rainfall induced landwash. Due to transitional conditions in Departmental reorganization, Mobile Laboratory facilities were not available during the spring season. However, bacteriological surveys were conducted by the Mobile Laboratory of Environmental Protection Service, Atlantic Region during August and October of 1972. This report contains the results of those studies.

The objectives of these 1972 surveys were as follows:

(a) to make a comparison with the 1970 bacteriological survey and determine if there is a seasonal variation in the bacteriological quality of the shellfish producing waters,

(b) to determine the effect of migratory water fowl on the water quality,

(c) to determine the effect of rainfall induced landwash on the receiving waters of Oyster Pond.

A total of 160 water samples were collected during August 1972, and 128 samples during October 1972. All samples were collected from the same 32 sampling stations that were sampled during the 1970 survey.

A physical sanitary investigation of the watershed area surrounding Oyster Pond, was conducted during the sampling period. The conditions relevant to the bacterial quality of the waters of Oyster Pond were noted for consideration in this report.

Sampling times were arranged to cover the various tidal phases and the weather conditions, water temperatures and salinity were recorded at the time of sampling to relate with the bacteriological results.

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 samples by MPN methods using Bacto-Lauryl Tryptose Broth with 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 were 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 using composite samples. Salinities were expressed as parts per thousand (PPT).

Samples were obtained from the 32 sampling stations by a rod sampling device. These samples were placed into 8-ounce sterile glass bottles and transported to the Mobile Laboratory for subsequent analysis within one hour of collection.

3. RESULTS

The sampling times, related to tidal phases, were so arranged to provide the maximum information on dilution and dispersement by tidal currents. No significant variation was detected throughout the sampling periods (see Table 1).

The Department of the Environment, Atmospheric Environment Service for the area report a total of 2.77 inches of rainfall during the August sampling period, and 4.25 inches during the October sampling

period (see Tables 2 and 3). The rainfall during these periods does not appear to have any significant effect on the bacteriological quality in the waters of Oyster Pond.

Salinity determinations from composites of daily samples, show a range differential of 1.9 PPT. Considering the dilution due to flow from Lake William and the run-off during periods of rainfall, these values and ranges appear to be normal. They are also similar to the values of the 1970 survey (see Table 4).

Coliform densities obtained from the study area were comparatively low. Of the 288 samples collected from the 32 sampling stations, 99% confirmed to be less than 49 , and 72% confirmed to be 2 or less, as shown in Tables 5 and 6.

4. DISCUSSION

Oyster Ponds (North and South) are two physically similar coastal inlets, replenished by tidal waters from the estuary of Musquodoboit River (See Figure 1). Both bodies of water are shallow with a jagged shoreline, surrounded by woodland and sandbars, virtually uninhabited. A fresh water lake (Lake William) drains into the North Oyster Pond through woodland remote from domestic habitation. Activity in the ponds and watershed area is currently controlled by the Department of Fisheries for the Province of Nova Scotia as a shellfish culture area.

Private dwellings and fish landing jetties located at the

entrance and approaches to the Oyster Ponds are few; and any sources of sewage and/or waste materials entering these waters would be minute in comparison with the dilution factor. The transportation of pollutant material from the community of Musquodoboit Harbour, by way of tidal currents, is not probable. This is supported by the bacteriological data obtained from the 1970 and the present survey.

The coliform and fecal coliform MPN values have proven to be within an acceptable range both in level and in uniformity throughout the three sampling periods (i.e. Survey 1970, and August & October 1972).

As the data presented indicates, the water samples from all 32 sampling stations were of excellent bacteriological quality, and bacteriological compliance standards have been met.

"Satisfactory compliance", bacteriologically speaking, is when the coliform median MPN of the water does not exceed 70 per 100 ml of samples, and not more than 10% of the samples ordinarily exceed an MPN of 230 per 100 ml. for a five tube decimal dilution test (Reference: National Standards for Shellfish Growing Areas, Part 1, 1965 Edition).

The effect of seasonal variations in water quality could not be assessed due to the limited span of the three sampling periods (late summer through early fall). Therefore, a meaningful assessment of the seasonal variations could not be determined by these studies.

The bacteriological data for the October sampling period have shown no significant effects of migratory water fowl on the water quality of the area.

5. CONCLUSIONS

From the observations and data obtained, the following conclusions may be made:

(a) a physical sanitary investigation of the watershed area surrounding Oyster Pond was carried out in conjunction with the bacteriological survey of the pond waters, and this survey revealed no significant sources of pollution within the watershed area.

(b) the shellfish growing waters of Oyster Pond are demonstratively of superior quality, and were well within limits set for "satisfactory compliance", during each of the August and October sampling periods.

(c) a comparison of seasonal environmental variation effects on the water quality could not be adequately determined by this study.

(d) the presence of migratory water fowl in Lake William and Oyster Pond had no detectable effect on the bacteriological quality of the water in Oyster Pond.

6. RECOMMENDATIONS

It is recommended that:

(a) The waters of Oyster Pond, adjacent to Pleasant Point, Halifax County, Nova Scotia, continue to be classified an approved shellfish producing area.

TABLE 1. TIDAL PHASE AND SAMPLING TIMES FOR OYSTER POND SURVEY, AUGUST AND OCTOBER, 1972.

DATE 1972	TIDAL PHASE HIGH TIDE (hrs)	LOW TIDE (hrs)	SAMPLING TIME (hrs)
Aug. 3	0235	0935	1030 - 1130
Aug. 7	0730	0130	0900 - 1000
Aug. 9	0900	0310	0900 - 1000
Aug. 15	1255	0700	0830 - 0930
Aug. 16	1335	0730	1100 - 1200
Oct. 11	1105	1720	0930 - 1030
Oct. 23	0900	1535	0830 - 0930
Oct. 25	1035	1725	0900 - 1000
Oct. 28	0800	1305	0930 - 1030

TABLE 2. RAINFALL DATA FOR OYSTER POND

DURING THE AUGUST SAMPLING PERIOD , 1972.

DATE 1972	PRECIPITATION IN INCHES
Aug. 3	.88
Aug. 4	.29
Aug. 7	1.05
Aug. 8	.01
Aug. 18	.54
	TOTAL 2.77 INCHES

TABLE 3. RAINFALL DATA FOR OYSTER POND

DURING THE OCTOBER SAMPLING PERIOD, 1972.

DATE 1972	PRECIPITATION IN INCHES
Oct. 12	.81
Oct. 13	.29
Oct. 15	.85
Oct. 16	.15
Oct. 17	1.01
Oct. 19	.71
Oct. 20	.04
Oct. 23	.06
Oct. 24	.23
Oct. 25	.10
.	
.	
	TOTAL 4.25 INCHES

TABLE 4. SALINITY DATA OF COMPOSITED SAMPLES FOR OYSTER POND SURVEY DURING AUGUST AND OCTOBER 1972.

DATE 1972	SALINITY PARTS PER THOUSAND
Aug. 3	24.4
Aug. 7	23.9
Aug. 9	23.8
Aug. 15	23.3
Aug. 16	22.9
Oct. 11	23.0
Oct. 23	22.5
Oct. 25	23.7
Oct. 28	23.2

TABLE 5. Coliform and Fecal Coliform data, Oyster Pond Survey, August 1972. Shellfish Area N.S. #13

MOST PROBABLE NUMBERS (MPNS) PER 100 ML. OF WATER

Station Number	Coliform Aug. 3	F.C. Aug. 3	Coliform Aug. 7	F.C. Aug. 7	Coliform Aug. 9	F.C. Aug. 9	Coliform Aug. 15	F.C. Aug. 15	Coliform Aug. 16	F.C. Aug. 16	Median Coliform	Median F.C.
1	<2	<2	13	8	49	23	23	8	<2	<2	13	8
2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
3	<2	<2	8	<2	<2	<2	<2	<2	<2	<2	<2	<2
4	5	<2	<2	<2	<2	<2	13	<2	<2	<2	<2	<2
5	13	5	13	<2	23	13	<2	<2	49	<2	13	<2
6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
7	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
8	<2	<2	15	<2	<2	<2	5	<2	<2	<2	<2	<2
9	<2	<2	<2	<2	33	5	5	<2	8	3	5	<2
10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
11	70	23	<2	<2	<2	<2	<2	<2	5	<2	<2	<2
12	<2	<2	<2	<2	13	<2	<2	<2	23	15	<2	<2
13	<2	<2	23	13	8	<2	<2	<2	<2	<2	<2	<2
14	8	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
15	<2	<2	<2	<2	<2	<2	<2	<2	3	<2	<2	<2
16	13	<2	5	<2	<2	<2	23	8	<2	<2	5	<2
17	<2	<2	4	<2	<2	<2	<2	<2	<2	<2	<2	<2
18	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
19	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
20	<5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
21	<2	<2	<2	<2	<2	<2	<2	<2	5	2	<2	<2
22	<2	<2	<2	<2	<2	<2	<2	<2	5	<2	<2	<2
23	23	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
24	<2	<2	5	<2	<2	<2	2	<2	<2	<2	<2	<2

TABLE 5. Cont'd

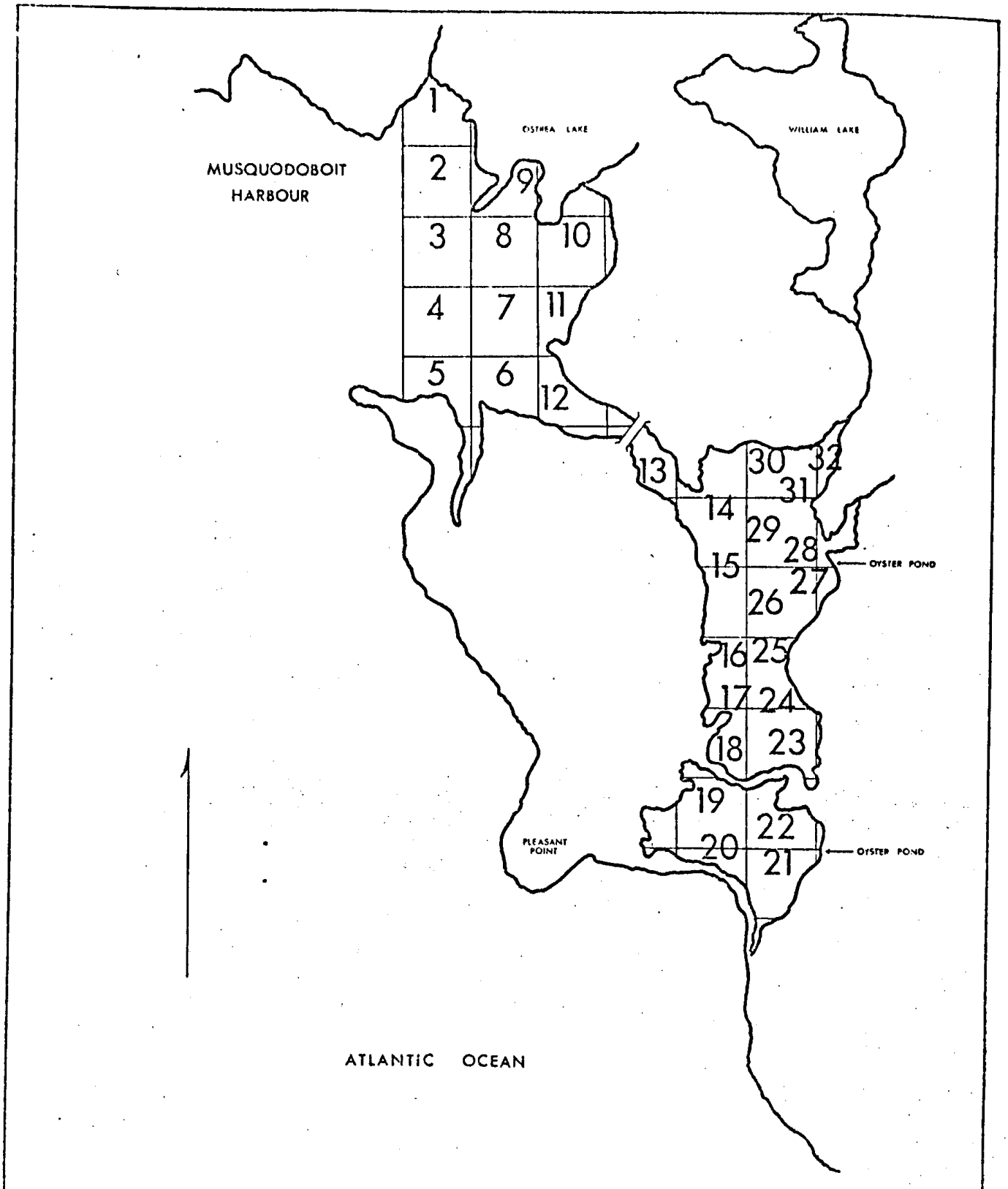
Station Number	Coliform Aug. 3	F.C. Aug. 3	Coliform Aug. 7	F.C. Aug. 7	Coliform Aug. 9	F.C. Aug. 9	Coliform Aug. 15	F.C. Aug. 15	Coliform Aug. 16	F.C. Aug. 16	Median Coliform	Median F.C.
25	5	<2	<2	<2	<2	<2	5	<2	<2	<2	<2	<2
26	<2	<2	<2	<2	8	<2	<2	<2	<2	<2	<2	<2
27	8	<2	<2	<2	<2	<2	<2	<2	5	2	<2	<2
28	<2	<2	4	<2	<2	<2	<2	<2	8	2	<2	<2
29	<2	<2	13	2	<2	<2	<2	<2	2	<2	<2	<2
30	<2	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	<2
31	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
32	<2	<2	<2	<2	<2	<2	2	<2	13	8	<2	<2

TABLE 6. Coliform and Fecal Coliform MPN Data, Oyster Pond Survey, October, 1972, Shellfish Area N.S. #13

Station Number	Coliform Oct. 11	F.C. Oct. 11	Coliform Oct. 23	F.C. Oct. 23	Coliform Oct. 25	F.C. Oct. 25	Coliform Oct. 28	F.C. Oct. 28	Coliform	F.C.	Median Coliform	Median F.C.
1	130	33	49	8	<2	<2	13	2			31	5
2	23	5	5	<2	8	2	<2	<2			7	2
3	<2	<2	2	<2	<2	<2	<2	<2			<2	<2
4	<2	<2	<2	<2	<2	<2	5	<2			<2	<2
5	23	8	<2	<2	<2	<2	2	2			2	2
6	<2	<2	8	8	<2	<2	2	<2			<2	<2
7	<2	<2	<2	<2	5	2	5	2			4	2
8	<2	<2	2	<2	2	2	<2	<2			2	<2
9	23	13	2	<2	2	<2	<2	<2			2	<2
10	<2	<2	<2	<2	<2	<2	<2	<2			<2	<2
11	<2	<2	<2	<2	23	8	<2	<2			<2	<2
12	<2	<2	<2	<2	2	2	<2	<2			<2	<2
13	<2	<2	5	2	<2	<2	5	5			4	2
14	<2	<2	2	<2	<2	<2	<2	<2			<2	<2
15	<2	<2	2	2	8	2	2	2			2	2
16	<2	<2	<2	<2	<2	<2	13	2			<2	<2
17	5	2	<2	<2	2	<2	8	<2			4	<2
18	2	<2	<2	<2	<2	<2	<2	<2			<2	<2
19	<2	<2	8	2	<2	<2	<2	<2			<2	<2
20	<2	<2	23	13	<2	<2	<2	<2			<2	<2
21	13	<2	<2	<2	<2	<2	<2	<2			<2	<2
22	2	2	<2	<2	<2	<2	<2	<2			<2	<2
23	<2	<2	<2	<2	<2	<2	<2	<2			<2	<2
24	2	<2	<2	<2	<2	<2	<2	<2			<2	<2

TABLE 6. Cont'd.

Station Number	Coliform	F.C.	Coliform	F.C.	Coliform	F.C.	Coliform	F.C.	Coliform	F.C.	Median	
	Oct. 11		Oct. 23		Oct. 25		Oct. 28				Coliform	F.C.
25	5	<2	5	2	<2	<2	2	<2			4	<2
26	<2	<2	8	2	49	5	<2	<2			5	2
27	2	<2	<2	<2	<2	<2	<2	<2			<2	<2
28	8	2	2	2	2	<2	5	2			4	2
29	<2	<2	<2	<2	2	2	5	<2			2	<2
30	<2	<2	<2	<2	<2	<2	<2	<2			<2	<2
31	8	5	<2	<2	<2	<2	<2	<2			<2	<2
32	2	<2	5	5	<2	<2	<2	<2			2	<2



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ATLANTIC REGION

Oyster Pond Shellfish Area N.S. #12, Survey Sampling Station 1972

SCALE: 0.5" = 1 mile	DATE: January, 1973	DWG. NO. 1
DRAWN: L.F.	CHECKED:	APPROVED: