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Bacteriological Survey
of the French Shore and
the Sissiboo River Area of
Nova Scotia
(Nova Scotia Shellfish Area
No. 16)

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Atlantic Region

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BACTERIOLOGICAL SURVEY OF THE FRENCH SHORE
and
THE SISSIBOO RIVER AREA OF NOVA SCOTIA
(Nova Scotia Shellfish Area No. 16)

by

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//

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ABSTRACT

A bacteriological water quality survey of the Nova Scotian French Shore (Shellfish Area NS-16) was conducted in June and August, 1974. A total of 407 water samples from 100 stations and 11 streams were collected and analysed for fecal coliform numbers using the standard 5-tube MPN method.

Bacteriological results indicate that the water quality along the shoreline from Meteghan to Belliveau Cove was generally good with the exception of the waters near the outfalls of fish plants at Saulnierville and Ticken Cove. The Sissiboo River was subjected to intermittent fecal contamination near the mouth of the river and at the Weymouth Highway Bridge. It is therefore recommended that the presently-enforced closures at Ticken Cove (16-3) and Sissiboo River (16-4) be maintained. The rest of the shoreline waters including Meteghan River (16-7) and Belliveau Cove (16-8) should be opened for the harvesting of shellfish.

RÉSUMÉ

Durant les mois de juin et août, un relevé bactériologique sur la qualité des eaux côtières a été entrepris sur la Côte Française de la Nouvelle-Ecosse (Secteur de Pêche de Coquillages N.E. - 16). Un total de 407 échantillons d'eaux provenant de 100 stations et de 11 ruisseaux furent analysés pour les colibacilles fécaux utilisant la méthode NPP à 5 éprouvettes.

Les résultats bactériologiques indiquent que la qualité des eaux côtières de Meteghan à Belliveau Cove était généralement bonne sauf celle des eaux près des égouts d'usine poissonnière à Saulnierville et Ticken Cove. La rivière Sissiboo était l'objet de contamination fécale intermittente près de l'embouchure de la rivière et au pont à Weymouth.

Il est donc recommandé que les fermetures présentement en vigueur à Ticken Cove (16-3) et à la rivière Sissiboo (16-4) soient maintenues; le reste des eaux côtières incluant la Rivière Meteghan (16-7) et Belliveau Cove (16-8) devraient être ouvertes à la récolte des mollusques.

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1 INTRODUCTION

A bacteriological water quality survey of shellfish growing areas was conducted in the District of Clare, Nova Scotia, during June and August, 1974, as recommended by the Interdepartmental Shellfish Committee Meeting at Ottawa in March, 1974. The study area covered a 26-mile section of shoreline waters from Meteghan to Weymouth, generally referred to in Nova Scotia as the French Shore. The purpose of this investigation was to reassess the adequacy of the present classification of this area for the harvesting of shellfish.

A preliminary bacteriological investigation of the French Shore in 1973 by Van Otterloo et. al., (4) indicated that intermittent high total and fecal coliforms were found in many areas along this section of shoreline. Although the data obtained were limited and in some cases inconclusive, it was felt that temporary shellfish closures should be implemented in Belliveau Cove and near the mouth of the Meteghan River for the protection of public health. The existing closure in the Sissiboo River was extended. These closures, which are presently enforced, are described in Schedule G. of the Nova Scotia Fisheries Regulations as follows:

"16-4 The Sissiboo River east of a line drawn from Survey Monument No. 13 on the north side as shown on the St. Mary's Bay area plan to the lighthouse on the south side of the river mouth."

"16-7 The waters adjacent to the mouth of the Meteghan River lying between a straight line drawn North 35° West true bearing from Survey Monument No. 19 located on the south side of the Meteghan River, approximately 600 yards south of the Breakwater, as shown on the St. Mary's Bay area plan and a straight line drawn North 35° West true bearing from Survey Monument No. 20 located on the north side of the Meteghan River, approximately one mile north of the Breakwater, as shown on that plan."

"16-8 The waters of Belliveau Cove lying between a straight line drawn North 21° West true bearing from Survey Monument No. 15 located 400 feet northeast of Belliveau Cove Wharf, as shown on the St. Mary's Bay area plan and a straight line drawn North 21° West true bearing from Survey Monument No. 16 located 1500 feet southwest of Belliveau Cove Light."

2 MATERIALS AND METHODS

2.1 Sampling. Water samples were collected in sterile glass bottles at a depth of approximately one foot by means of a rod sampling device. All samples collected were kept in an insulated cooler and transported to the mobile laboratory for analysis within two hours of collection.

2.2 Bacteriological Analyses. All water samples were tested for fecal coliform levels by multiple tube dilution (MPN) method according to the A.P.H.A. "Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish" (1). Bacto-Lauryl Tryptose Broth was used as the presumptive test medium with incubation at $35 \pm 0.5^\circ\text{C}$ for 24 and 48 hours, and positive cultures were transferred to Bacto-EC Medium and incubated in a water bath at $44.5 \pm 0.2^\circ\text{C}$ for 24 hours. The most probable number (MPN) of fecal coliform was derived using a 5-tube decimal dilution MPN table.

The total coliform test is deleted in this survey because a fecal coliform standard with a median MPN value of 14 with a 90 percentile value of 43 was proposed and adopted by the National Shellfish Sanitation Program for approved shellfish growing areas for an interim period of two years. This replaces the total coliform standard of 70 for the classification of the Canadian Atlantic shellfish growing waters for a two year interim period.

2.3 Physical Data. To facilitate the interpretation of bacteriological data, the following physical parameters were also determined:

Salinities (ppt) were determined by the Knudsen Method (2) from water samples collected from selected stations. Water temperatures were also recorded at several stations. The tidal stage was estimated and recorded for the time period encompassing the beginning and end of each sampling run. In addition, records of daily precipitation at Meteghan and Weymouth Falls were provided by the Atmospheric Environment Service, Environment Canada, Atlantic Region.

3 RESULTS AND DISCUSSION

A total of 407 water samples were collected from 100 sampling stations and 11 streams and analysed for fecal coliform densities. Fecal coliform MPN, salinity, tidal stage and water temperature data obtained from the study area are presented in the Appendix A (Tables A-1, A-2 and A-3). Daily rainfall data for the survey period at Meteghan and Weymouth Falls are presented in the Appendix B (Figures B-1 and B-2). For the purpose of discussion, the study area was divided into three sections.

3.1 Meteghan to Saulnierville. This section includes the villages of Meteghan (pop. 925) and Meteghan Centre (pop. 319), Meteghan River (pop. 423) and Saulnierville (pop. 450). The potential sources of pollution in this section are two fish plants. One located at Meteghan which employed 20 persons while the other bigger plant at Saulnierville employed approximately 100 people. Some degree of pollution may also be contributed by a shipyard operation at Meteghan.

The location of the sampling stations and the median fecal coliform levels for this section are presented in Figure 1. Bacteriological water quality in this section during this study was much better than that of the 1973 study (4). Of 159

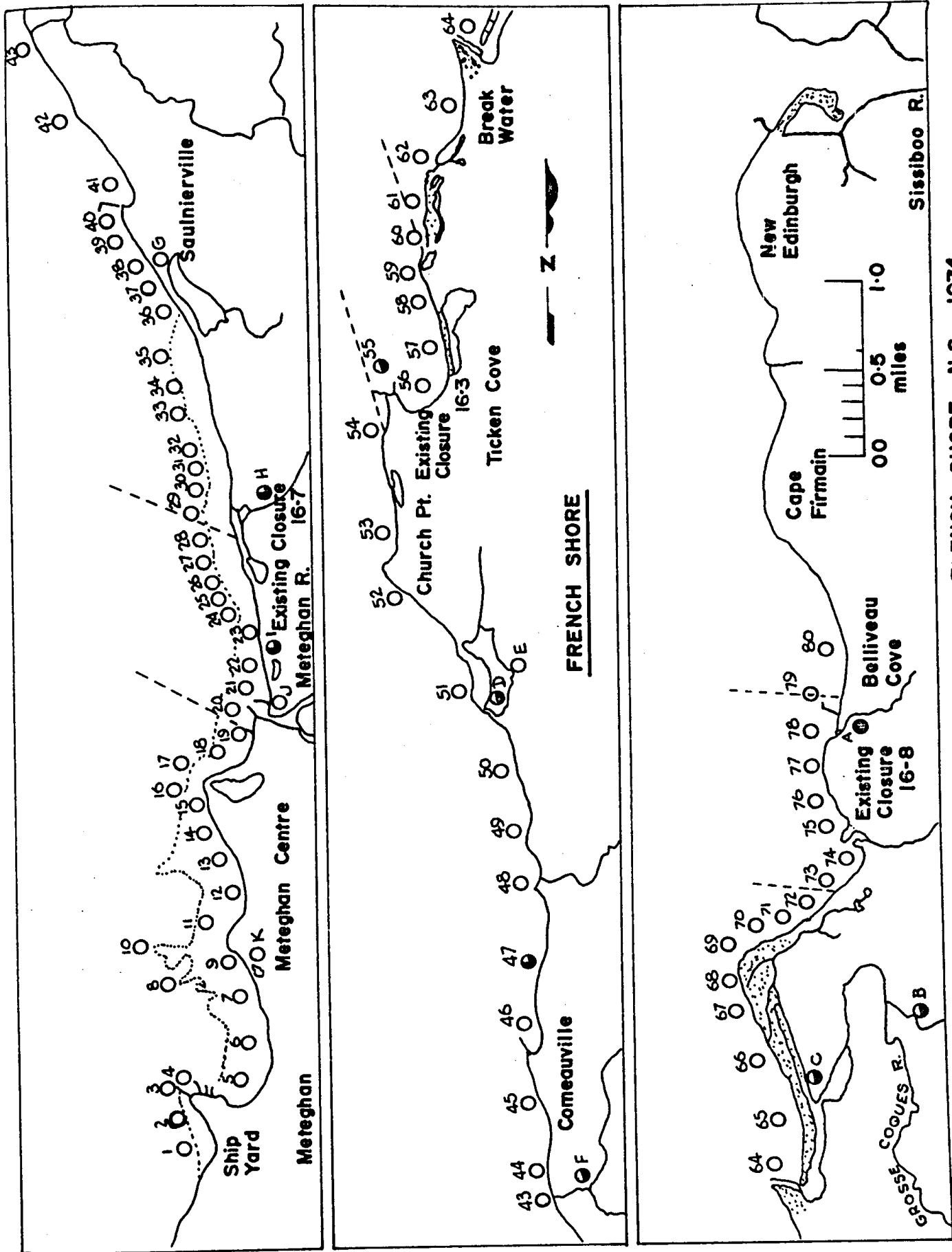


FIGURE 1: MEDIAN FECAL DENSITIES, FRENCH SHORE, N.S. 1974.

(LEGEND: ○ ≤14, ● 15-23, ● 24-230, ● >230)

seawater samples collected in this section, only two samples (stations 39 and 40) had an MPN value exceeding 230. None of the 40 stations had a median fecal coliform value over either of the proposed shellfish acceptable limits of 23 or 14. Seven stations (stations 2, 6, 13, 30, 32, 39 and 40) exceeded the 90 percentile value of 43 proposed for the fecal coliform standard of 14, while only two stations (stations 39 and 40) exceeded the 90 percentile value of 76 proposed for the fecal coliform standard of 23 (Figure 2). High fecal coliform counts (>2400) found at stations 39, 40 and 41 on August 27, were probably due to contamination by the discharge from the fish processing plant at Saulnierville. However, this contamination does not appear to produce any serious public health hazard as it is well within the standing wharf closure of 400 feet.

There are five streams and ponds (stations G-K) which flow into this sector of shoreline. Although two streams (H and I) had significant levels of fecal coliforms, (Table A-2 in Appendix A) they did not appear to have any marked effect on the data obtained in the receiving waters. No human fecal sources of contamination were detected, or are known to be present along the watercourses of these streams or ponds. It is probable that their bacterial load was from feces of birds or animals.

3.2 Saulnierville to Belliveau Cove. This section of the shoreline includes the villages of Little Brook (pop. 250), Comeauville (pop. 340), Church Point (pop. 330), Gross Coques (pop. 310) and Belliveau Cove (pop. 450). Some of the pollution sources that may affect this sector are wastes discharged from two small fish plants at Comeauville near the wharf, St. Anne's College and a home for the aged at Church Point. Both Comeau & Saulnier Ltd. and Claire Fisheries Ltd. at Comeauville have a septic tank system with an overflow drainage through the sand and then to the beach. St. Anne's College has

a total enrollment of 384 persons and the new home for the aged, built in the vicinity of the college, is intended to house 40 residents. The sanitary wastes from the college and the new home for the aged are first treated in an extended aeration unit and then chlorinated before discharge to the beach. Presently, both Ticken Cove (16-3) and Belliveau Cove (16-8) are closed for the harvesting of shellfish.

Bacteriological data obtained from this section (Figures 1 and 2) indicate that sporadic high fecal coliform counts occurred along the shoreline from Comeauville to Ticken Cove (stations 47-59). The bacterial variations in these stations can be probably attributed either to a random distribution of pollutants or to intermittent contamination from the immediate shore area. The large population of sea-gulls observed on this shoreline, especially near the fish plant outfalls, indicates that they may contribute a substantial quantity of fecal coliforms to this sector. The presence of coliform bacteria in birds and wild animals is well documented (3). Fecal coliforms derived from birds should be considered as indicative of a potential health hazard as those derived from human feces. Lofton et. al., (3) isolated Salmonellae from small mammals and birds and reported on the possible role of wildlife in transmitting gastroenteritis to man and domestic animals. Although the median fecal coliform levels in all of these stations were within the acceptable limit of 14 fecal coliforms per 100 ml of water (Figure 1), the 90 percentile levels of most of these stations in Ticken Cove were greater than 43 (Figure 2). In view of the potential hazard present in these waters in relation to the harvesting of shellfish for consumption in the raw state, we recommend that Ticken Cove remain closed to the harvesting of shellfish.

Bacteriological water quality in the shoreline section between Gross Coques and Belliveau Cove (stations 64-80) was

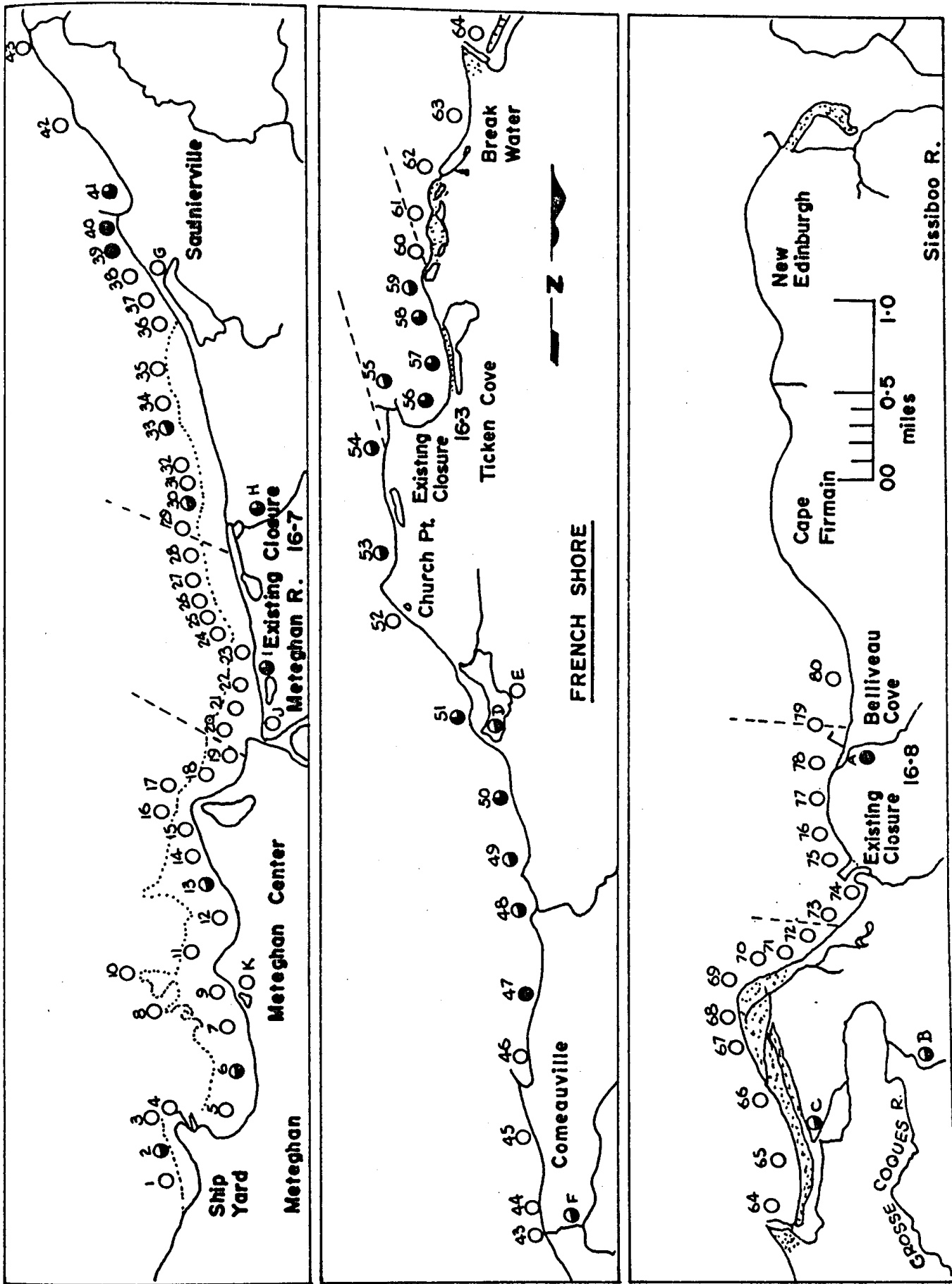


FIGURE 2: 90 PERCENTILE LEVELS OF FECAL COLIFORM MPN'S FRENCH SHORE, N.S. 1974.

(LEGEND: ○ < 43, ● > 760)

excellent. The median fecal coliform levels in most of these stations had a value of less than 2 per 100 ml. Fecal coliform counts were so low in most of the streams (stations B-F) that they did not appear to have any detrimental effect on the shoreline waters.

3.3 Sissiboo River. This section includes the communities of Ashmore (pop. 280), Weymouth North (pop. 320), Weymouth Mills (pop. 190), Weymouth Falls (pop. 390) and Weymouth (pop. 670). None of these villages have community water supply or sewage disposal system. The Weymouth consolidated school with 750 total enrollment, has an extended aeration system to treat their sanitary wastes before discharging them into the Sissiboo River. At present, Sissiboo River (16-4) is closed for the harvesting of shellfish due to sewage contamination.

The distribution of median fecal coliform levels at the 20 stations in Sissiboo River is presented in Figure 3. The bacteriological water quality in the river obtained during this survey was far better than that in the previous survey (4). Only two stations (stations 95 & 99) had a median fecal coliform value greater than 14 per 100 ml. Of 86 water samples from the river 9 samples had fecal coliform densities greater than 43 and only 3 samples (stations 87, 89 and 95) gave fecal coliform densities greater than 76 (Figure 4).

4 CONCLUSIONS

4.1 Meteghan to Saulnierville. The bacteriological water quality in this section of the shoreline has improved significantly since the previous survey (4). There are no major sources of domestic waste known to affect this area. The minor sources of pollution found in this section were from the intermittent discharge of waste from the fish plant and shipyard operations. However, these contaminants appear to be confined within the standing wharf closures and do not produce any detrimental effects on the bacteriological quality of the adjacent open waters.

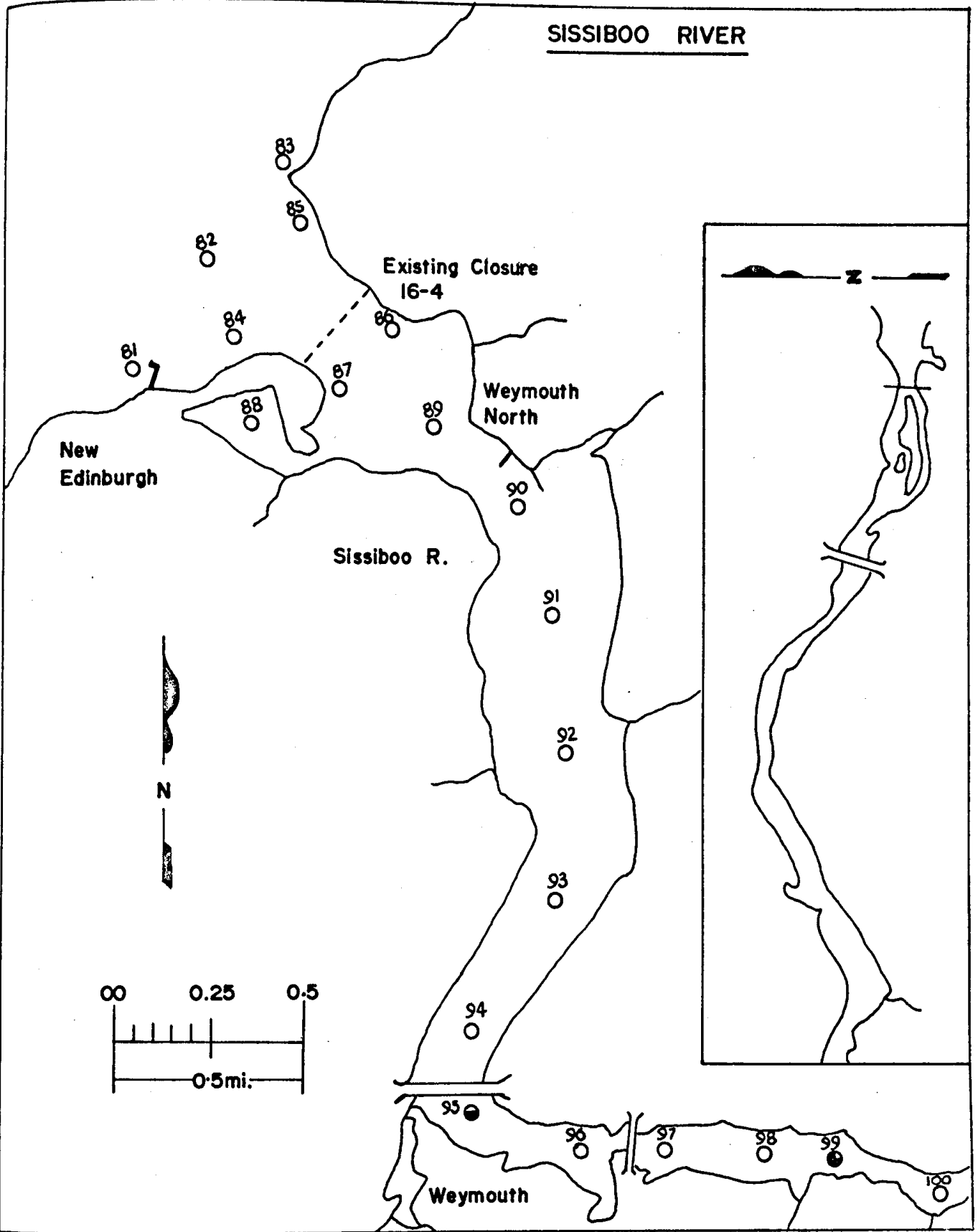


FIGURE 3: MEDIAN FECAL COLIFORM DENSITIES, SISSIBOO RIVER, N.S., 1974

(LEGEND: ○ ≤ 14, ◐ 15-23, ● 24-230, ● > 230)

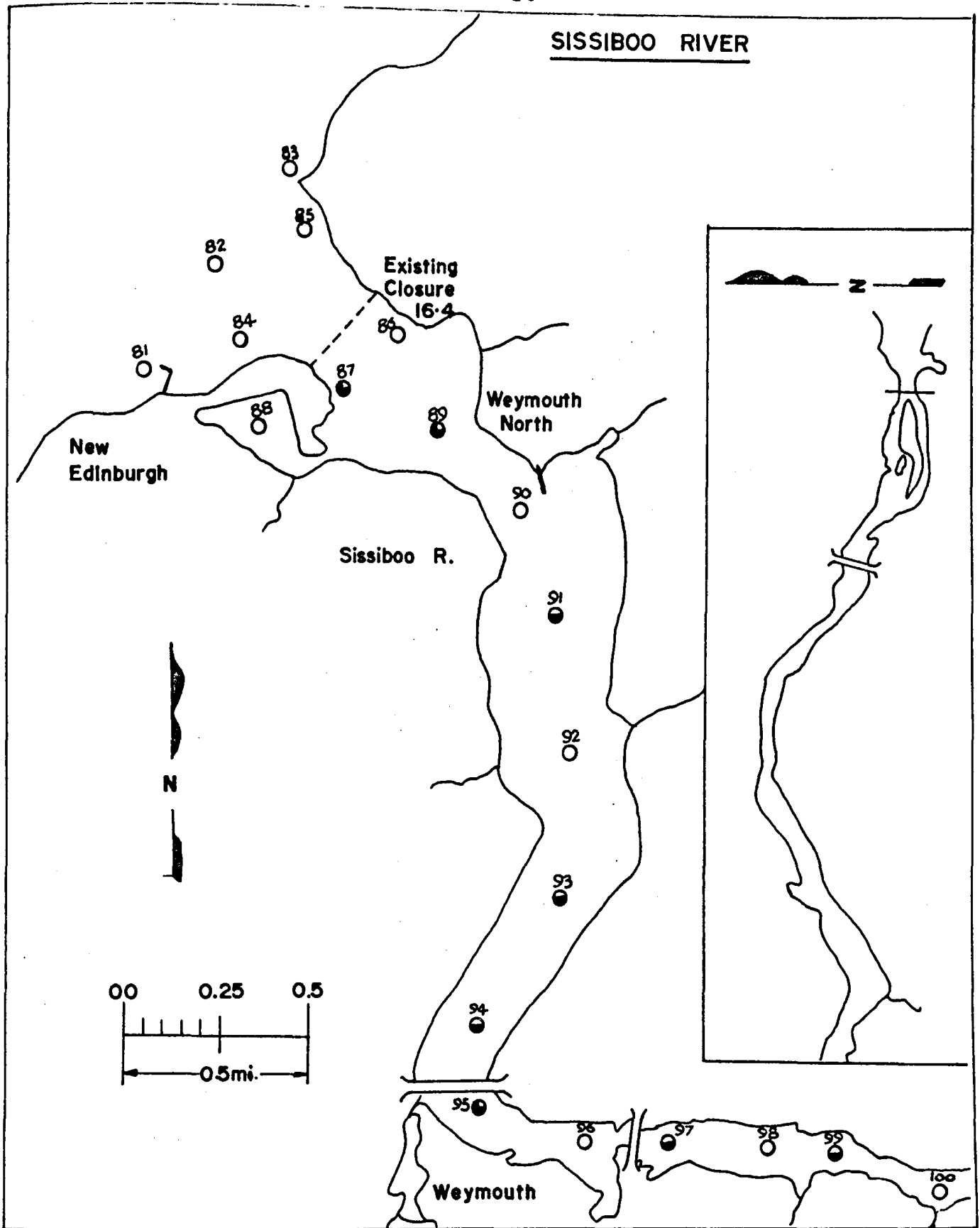


FIGURE 4: 90 PERCENTILE LEVELS OF FECAL COLIFORM MPN'S, SISSIBOO RIVER, N.S. 1974.

(LEGEND: ○ ≤ 43 , ◐ 44-76, ● 77-760, ● > 760)

In view of the satisfactory water quality and the adequacy of the standing wharf closures in this section, we recommend this shoreline be open for the harvesting of shellfish and the existing closure at Meteghan River (16-7) be rescinded.

4.2 Saulnierville to Belliveau Cove. Bacteriological investigation of this section indicates that fecal contamination occurs sporadically in the shoreline between Comeauville and Ticken Cove. Although the median fecal coliform values of all the stations in this sector are well below the acceptable limit of 14, the 90 percentile value of some of these stations are well above the 43 MPN limit, particularly in the Ticken Cove sector. We therefore recommend that the existing closure in Ticken Cove (16-3) remain in effect.

Water quality in the Belliveau Cove sector was excellent. The fish plant at Belliveau Cove is no longer in operation and therefore does not contribute any pollution to the cove waters. We recommend that the existing closure at Belliveau Cove (16-8) be rescinded. The two standing wharf closures of 400 feet will remain in effect.

4.3 Sissiboo River. Unsatisfactory bacteriological water quality was found in the section of the Sissiboo River above the Weymouth Highway Bridge and near the mouth of the river just inside the existing closure line (16-4). We therefore recommend that the existing closure at Sissiboo River (16-4) remain in effect.

5 RECOMMENDATIONS MARITIME STANDING COMMITTEE ON SHELLFISH

5.1 Meteghan River. The existing closure 16-7 (Schedule G of the Nova Scotia Fishery regulations) should be rescinded.

5.2 Saulnierville. The standing wharf closure at Saulnierville should be increased to include the area 1000 ft. north and south of the existing wharf (as shown on Figure 5).

5.3 Ticken Cove. The existing closure 16-3 at Ticken Cove is adequate and should remain in effect.

5.4 Belliveau Cove. The existing closure 16-8 at Belliveau Cove should be rescinded.

5.5 Sissiboo River. Unsatisfactory bacteriological water quality was found in the section of the Sissiboo River above the Weymouth Highway Bridge and near the mouth of the river just inside the existing closure line. It is recommended that the existing closure at Sissiboo River (16-4) remain in effect.

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APPENDIX A

TABLE A-1(a) FECAL COLIFORM DATA, METEGHAN TO SAULNIERVILLE, NS-16, 1974

STATION NO.	MOST PROBABLE NUMBERS (MPN's) PER 100 ml OF WATER				
	June 3	June 4	Aug. 19	Aug. 27	Median
1	<2	<2	<2	11	<2
2	2	<2	<2	70	<2
3	<2	<2	2	23	<2
4	<2	<2	<2	5	<2
5	2	<2	<2	2	<2
6	2	<2	46	2	<2
7	2	2	8	5	4
8	<2	2	2	<2	<2
9	<2	<2	8	<2	<2
10	<2	<2	2	<2	<2
11	<2	<2	2	<2	<2
12	<2	<2	13	23	<8
13	<2	<2	22	46	<12
14	<2	<2	33	2	<2
15	<2	5	8	2	4
16	<2	<2	<2	11	<2
17	<2	<2	<2	<2	<2
18	<2	<2	14	<2	<2
19	5	<2	4	<2	<3
20	<2	<2	11	<2	<7
21	13	9	<2	2	<6
22	<2	<2	7	<2	<4
23	<2	<2	2	11	<2
24	<2	<2	2	23	<2
25	<2	<2	2	<2	<2
26	<2	<2	<2	<2	<2
27	2	<2	<2	5	<2
28	5	<2	17	2	4
29	5	2	33	4	4
30	2	<2	64	23	12
31	<2	<2	2	<2	<2
32	<2	5	2	8	4
33	2	5	5	49	5
34	2	-	23	<2	2
35	<2	<2	23	<2	<2
36	5	<2	33	<2	<4
37	<2	7	33	<2	<5
38	<2	<2	33	<2	<2
39	<2	<2	2400+	<2	<2
40	<2	2	2400+	<2	<2

TABLE A-1(b) FECAL COLIFORM DATA, SAULNIERVILLE TO BELLIVEAU COVE, NS-16, 1974

STATION NO.	MOST PROBABLE NUMBERS (MPN's) PER 100 ml OF WATER						MEDIAN
	JUNE 3	JUNE 4	JUNE 12	AUG. 19	AUG. 26	AUG 27.	
41	<2	2		17		350	10
42	<2	<2		8		17	<5
43	<2	<2		23		21	<12
44	<2	<2		<2		23	<2
45	<2	2		<2		23	<2
46		<2		<2		23	<2
47		<2		920		130	130
48		<2		<2		46	<2
49		<2		<2		49	<2
50		<2		2		240	2
51		<2		<2		350	<2
52		<2		<2		14	<2
53		<2		23		95	23
54		<2		<2		180	<2
55		<2	<2	33	49		<18
56		<2	<2	350	22		<12
57		<2	<2	350	8		<5
58		<2	<2	540	2		<2
59		<2	<2	79	2		<2
60		<2	<2	13	<2		<2
61		<2	<2	2	<2		1
62		<2	<2	<2	<2		<2
63		<2	-	<2	2		<2
64		<2	<2	4	2		<2
65		<2	<2	<2	4		<2
66		8	<2	33	2		5
67		<2	<2	<2	<2		<2
68		<2	<2	2	5		<2
69		<2	<2	2	2		<2
70		<2	<2	2	<2		<2
71		<2	<2	<2	2		<2
72		<2	<2	<2	2		<2
73		<2	<2	<2	5		<2
74		<2	<2	7	13		5
75		<2	<2	2	<2		<2
76		20	<2	<2	-		<2
77		<2	<2	2	2		<2
78		<2	<2	14	23		<7
79		<2	<2	<2	<2		<2
80		<2	<2	<2	2		<2

TABLE A-1(c) FECAL COLIFORM DATA, SISSIBOO RIVER, NS-16, 1974

STATION NO.	MOST PROBABLE NUMBERS (MPN's) PER 100 ml OF WATER					
	JUNE 4	JUNE 11	JUNE 12	AUG. 19	AUG. 26	MEDIAN
81	5	2	<2	<2	4	2
82	5	<2	<2	<2	2	<2
83	2	<2	<2	<2	2	<2
84	<2	<2	<2	<2	8	<2
85	2	<2	<2	<2	11	<2
86	5	<2	<2	<2	49	<2
87	8	<2	<2	<2	110	<2
88	8	<2	<2	<2	23	<2
89	17	<2	5	<2	95	5
90	5	<2	2	<2	17	2
91	5	<2	14	<2	46	5
92	8	-	17	<2	34	12
93	9	-	8	<2	49	8
94	5	-	7	33	49	20
95	5	<2	9	33	110	9
96	<2	<2			23	<2
97	<2	<2			46	<2
98	<2	<2			11	<2
99	-	<2			49	25
100	<2	<2			11	<2

TABLE A-2 FECAL COLIFORM DATA OF STREAMS AND TRIBUTARIES, FRENCH SHORE, N.S., JUNE 27, 1974

STATION NO.	FECAL COLIFORM MPN/100 ml
A	240
B	23
C	23
D	23
E	9
F	23
G	4
H	93
I	120
J	7
K	<2

TABLE A-3 SALINITY, TIDAL STAGE, WATER TEMPERATURE, AT TIME OF SAMPLING, FRENCH SHORE, NOVA SCOTIA, 1974

STATIONS	DATE OF SAMPLING						
	<u>JUNE 3,</u>	<u>JUNE 4,</u>	<u>JUNE 11,</u>	<u>JUNE 12,</u>	<u>AUG. 19,</u>	<u>AUG. 26,</u>	<u>AUG. 27</u>
	<u>SALINITY (ppt)</u>						
2	27.2	22.0			27.6		29.5
21	22.0	20.6			26.2		27.5
39	22.0	27.2			27.8		29.8
53					29.3		
67		28.5		27.3	29.3	23.0	
74		28.2		26.3			
82		20.6	14.1	14.6	28.3	29.2	
95		0.0	0.0	0.0	11.2	8.1	
	<u>TIDAL STAGE</u>						
ALL STATIONS	Low-Rising	Low-Falling	Low-Rising	Low-Falling	High-Rising	High-Rising	High-Rising
	<u>WATER TEMPERATURE (° C)</u>						
AVERAGE	16	16	17	18	16	--	17

APPENDIX B

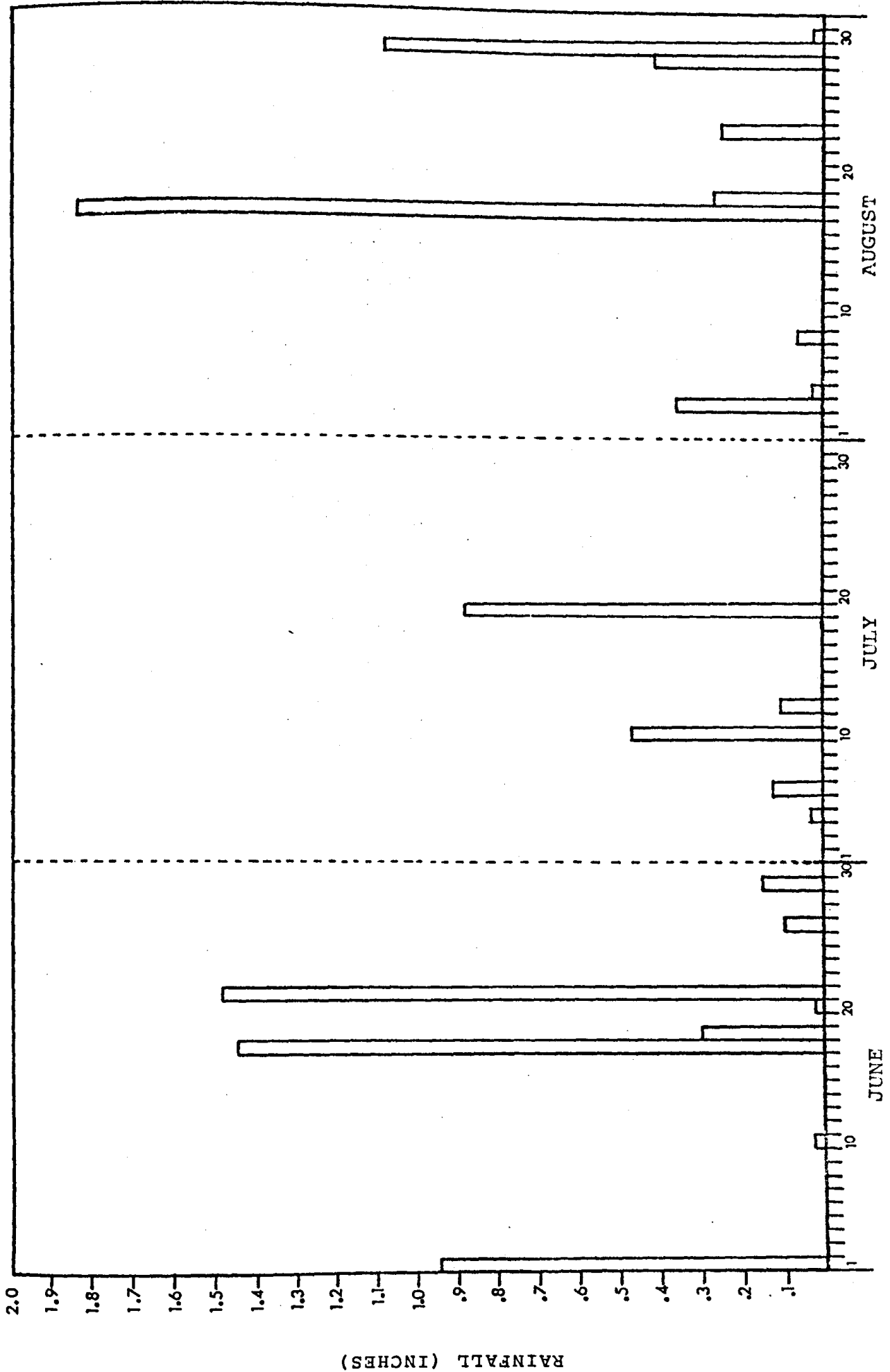


FIGURE B-1 DAILY PRECIPITATION (IN INCHES) AT METEGHAN, N.S.-16, 1974

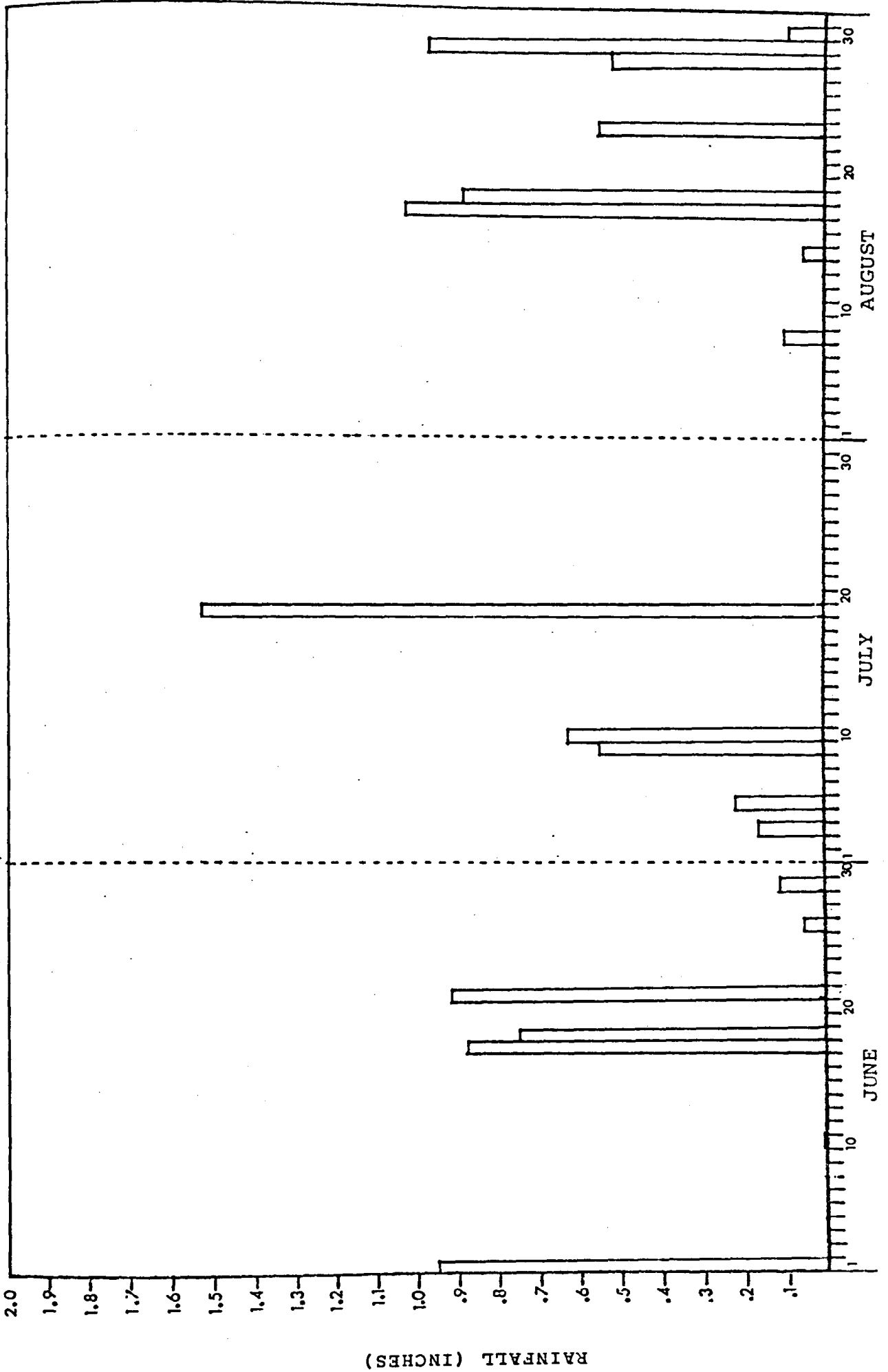


FIGURE B-2 DAILY PRECIPITATION (IN INCHES) AT WEYMOUTH FALLS, N.S. 1974

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