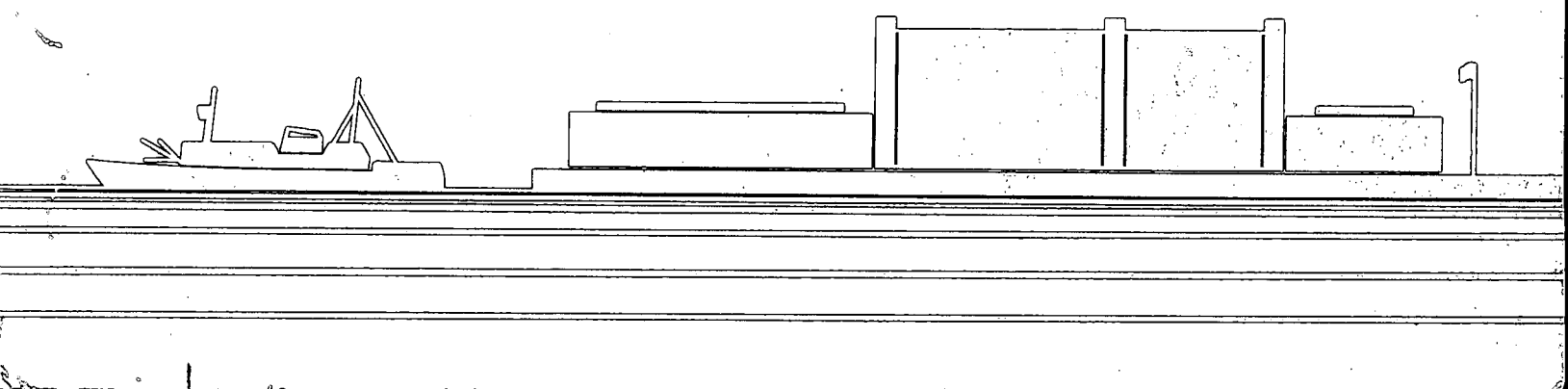
CANADA CENTRE FOR INLAND WATERS

CCIW PAPER NO. 8

Bacteriological Study of the St. Lawrence River, 1968-71

B.J. DUTKA



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B.J. DUTKA

ENVIRONMENTAL PROTECTION SERVICE
MICROBIOLOGY UNIT
CANADA CENTRE FOR INLAND WATERS

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ABSTRACT

Report summarizes bacteriological data obtained from the last four years (1968-1971) of a multi-disciplinary study of the International Section of the St. Lawrence River initiated in 1965.

During the study, coliform MF and 20°C and 35°C Standard Plate Count tests were performed routinely on all samples. Fecal coliform MF and fecal streptococcus MF tests were only performed routinely on all samples during the last two years of the study.

Bacteriological data obtained during the study indicate (a) a downstream increase in bacterial densities, (b) no significant variation in parameter densities have occurred, and (c) no obvious cross-boundary bacterial pollution has occurred during the study period.

INTRODUCTION

From 1965 through to 1971, water quality studies of the International Section of the St. Lawrence River have been conducted by the Public Health Engineering Division, Department of National Health and Welfare, Kingston, Ontario (1965-1970) and the Public Health Engineering Division, Department of the Environment, Kingston and the Canada Centre for Inland Waters, Burlington, Ontario (1971).

The original impetus for these studies was a request made on October 7, 1964, by the Secretary of State for External Affairs for the Government of Canada and the Secretary of State for the Government of the United States, to the International Joint Commission to investigate and report upon the extent, causes and locations of pollution in the waters of Lake Erie, Lake Ontario and the International Section of the St. Lawrence River, and to recommend any remedial measures which may be considered necessary.

Bacteriological data presented in this report summarizes studies performed during the 1968-1971 period. Bacteriological data obtained during 1969 and prior studies have been reported in Public Health Engineering Division Manuscript Reports No. 67-2, 67-18, KR.68-1, and KR.69-2; they have also been summarized in (a) Progress Report, presented to the International Joint Commission Water Pollution Board Meeting in Cleveland, Ohio, on February 8-9, 1967, and (b) Report to the International Joint Commission on the Pollution of Lake

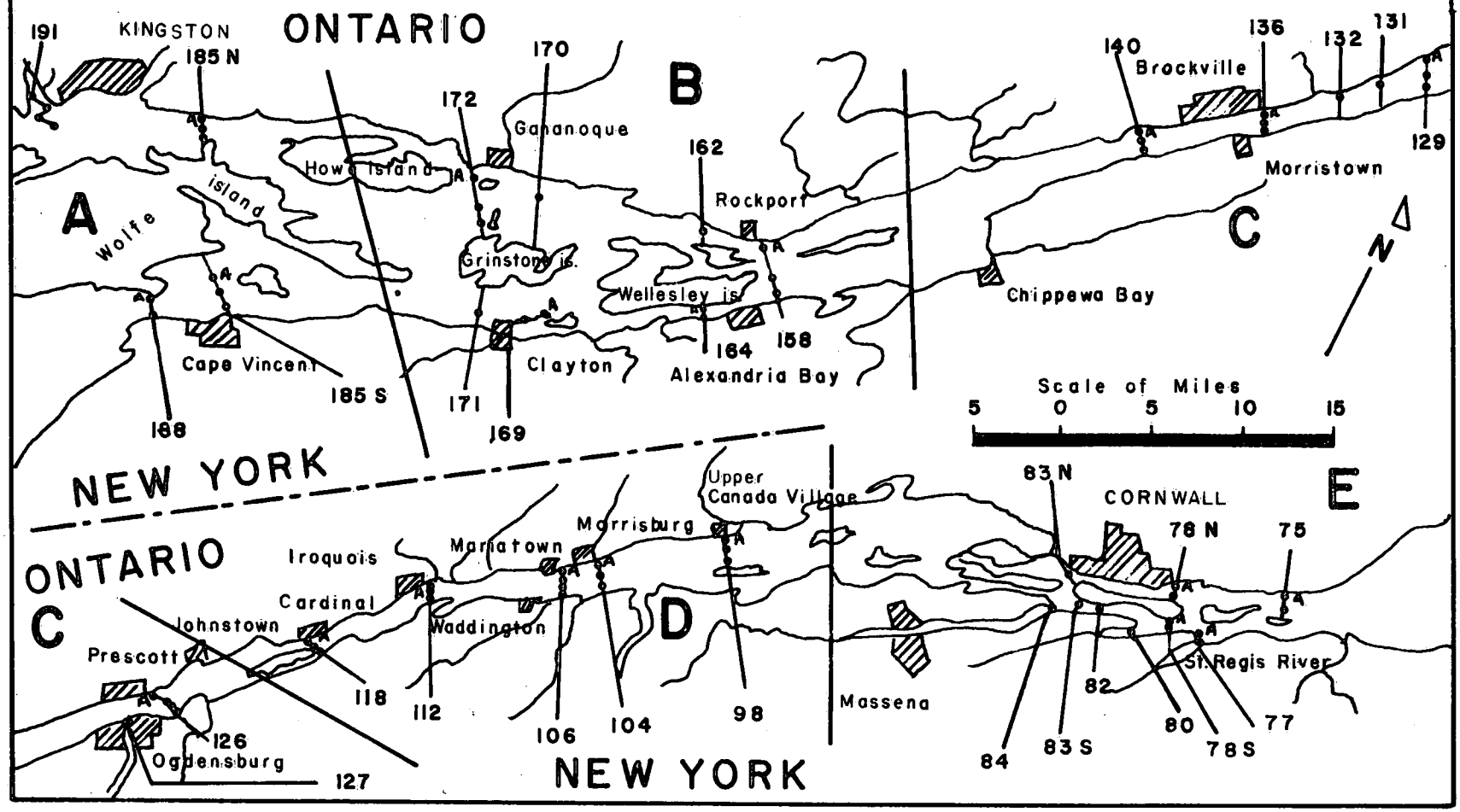
Erie, Lake Ontario and the International Section of the St. Lawrence River, Volume I - Summary, by the International Lake Erie Water Pollution Board and the International Lake Ontario-St. Lawrence River Water Pollution Board, 1969.

Pre-1969 bacteriological studies were designed to (a) accumulate data which would provide bacteriological baselines for future water quality evaluations and (b) indicate areas which have or which, in the future, may have bacteriological pollution problems. Sampling programs initiated after 1968 were primarily designed to monitor these previously surveyed waters and provide data for Salmonella isolation research studies (Dutka, Collins, Bell and Vanderpost, 1970; Dutka and Bell, 1972). Ranges and station patterns established in 1968 were used in these later studies (Dutka, Bell and Jurkovic, 1968).

For purposes of identification, sampling station locations were related to mileage reference points as indicated on the general charts of the St. Lawrence Seaway, Montreal to Lake Ontario, compiled by the Canadian Hydrographic Service. The zero mileage reference point was established at Longueil, Quebec and the sampling ranges started at mile 75 on the St. Lawrence River (downstream Cornwall) and ended at mile 191, east of Carruthers Point in Cataraqui Bay, Lake Ontario.

The location of the 32 St. Lawrence River ranges are shown in Table I (a, b and c) of the Appendix and Figure 1 of the text.

FIG. I LOCATION OF ST. LAWRENCE RIVER SAMPLING RANGES, STATIONS AND SECTORS. (1968 - 1971)



Channel markers, islands and other topagraphical reference points, were used to identify and locate the sampling stations on each range.

BACTERIOLOGICAL METHODS AND PARAMETERS

All water samples collected for bacteriological study were iced and delivered to the Bacteriological Laboratory, Public Health Engineering Division, Kingston. Samples collected during 1971 were delivered to a bacteriological field laboratory established in the Public Health Engineering Division offices in Kingston.

Samples were usually received 2 to 4 hours after collection, and all tests were performed and completed on the day of sampling, usually within 6 hours of collection.

Bacteriological techniques used in analysing the submitted water samples were those outlined in the 12th Edition of the American Public Health Association "Standard Methods for the Examination of Water and Wastewater" (1965).

The Membrane Filter (MF) test for coliforms, fecal coliforms and fecal streptococci and 20° and 35°C Standard Plate Count tests, were performed on all 1970 and 1971 water samples. However, in 1968 and 1969 only coliform MF and 20° and 35°C Standard Plate Count tests were performed on all samples. Tests for fecal coliforms and fecal streptococci were performed on approximately 40 per cent of the submitted samples.

Coliform Density Determinations, Membrane Filter

The A.P.H.A. Standard Methods (1965) Membrane

Filter (MF) Procedure was used for the estimation of coliform densities. The medium used was m-Endo Agar LES. Membrane filtrations were made from 3 or 4 appropriate volumes of each water sample. Incubation was at 35° ± 0.5°C for 20 ± 2 hours in an atmosphere of saturated humidity. The development of dark colonies with a golden metallic-appearing surface luster (sheen) was interpreted as direct evidence of the presence of coliform organisms. The numbers of sheened colonies appearing on the MF preparations were determined from the appropriate sample volumes. All colony counts were performed with the aid of a 10X stereomicroscope. Counts were calculated and recorded in terms of coliforms per 100 ml of water.

Fecal Coliform Density Determinations, Membrane Filter

A technique perfected by Geldreich et al., (1965) based on the use of m FC Broth to which rosolic acid was added, coupled with an incubation temperature of 44.5°C ± 0.2°C for 24 ± 2 hours, was used to estimate fecal coliform densities by membrane filtration. Membrane filtrations were made from 2 or 3 appropriate volumes of each water sample. The membranes were placed on pads, soaked with 2 ml of m FC Broth, in tight-fitting plastic petri dishes (Millipore) which were placed in waterproof plastic bags (Whirl-Pak), inverted and submerged in a 44.5°C waterbath for 24 ± 2 hours.

The development of blue colonies was interpreted as evidence of the presence of fecal coliforms. All colony

counts were performed with the aid of a 10X stereomicroscope. Counts were calculated and recorded in terms of fecal coliforms per 100 ml of water.

Fecal Streptococcus Density Determinations, Membrane Filter

The A.P.H.A. Standard Methods (1965) Membrane Filter (MF) Procedure was used for the estimation of fecal streptococci. The medium used was m Enterococcus Agar. Membrane filtrations were made for each of 2 or 3 appropriate volumes of each water sample. Incubation was at 35 ± 0.5°C for 48 hours in an atmosphere of saturated humidity. The development of maroon and pink colonies was interpreted as evidence of the presence of fecal streptococci. All colony counts were performed with the aid of a 10X stereomicroscope. The combined totals of maroon and pink colonies were counted and recorded in terms of fecal streptococci per 100 ml of water.

Standard Plate Counts

The A.P.H.A. Standard Methods (1965), Standard Plate Count test was used for the estimation of total viable bacterial densities at 35 ± 0.5°C and at 20 ± 0.5°C. Plate counts were made using 1.0 ml test aliquots of 1, 2, 3 or 4 appropriate dilutions of each water sample to be tested. Plate Count Agar was tempered in a waterbath at 45°C before use. Total colony counts were determined at 24 ± 2 hours for plates incubated at 35°C and 48 ± 3 hours for plates incubated at 20°C. Counts were recorded as Standard Plate Counts per ml of water

at the specified incubation temperature.

OBSERVATIONS AND DISCUSSION

Bacteriological data collected during this study are recorded in Tables II to VII of the Appendix. Coliform and 20°C SPC data summaries of the above are presented in Tables I and II and Figures 2 to 6 of the text. For comparison purposes the St. Lawrence River has been divided into 5 sectors as shown in Figure 1 and Table 1.

Median coliform data presented in Table I (a-d) illustrate a steady downstream increase in coliform densities with very little sector variation during the four year study. This downstream coliform progression, which was previously noted and recorded by Dutka, et.al.,(1968), has with minor sector fluctuations remained relatively constant since 1965, when the initial study in this series was completed. Data presented in Figure 2 are supportive of the observation that coliform densities have stabilized within the study area.

When coliform data from the north (Canadian) and south (U.S.) shore of cross-boundary ranges are compared, invariably the north shore stations have the higher coliform counts with the exception of Range 158, where the southernmost station has continuously recorded the highest coliform counts. This north-south coliform pattern is closely related to population density patterns.

Coliform data presented in Table I, and Tables II to V of the Appendix, are not suggestive nor indicative of

FIG. 2. COLIFORM MF COUNT EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970 AND 1971.

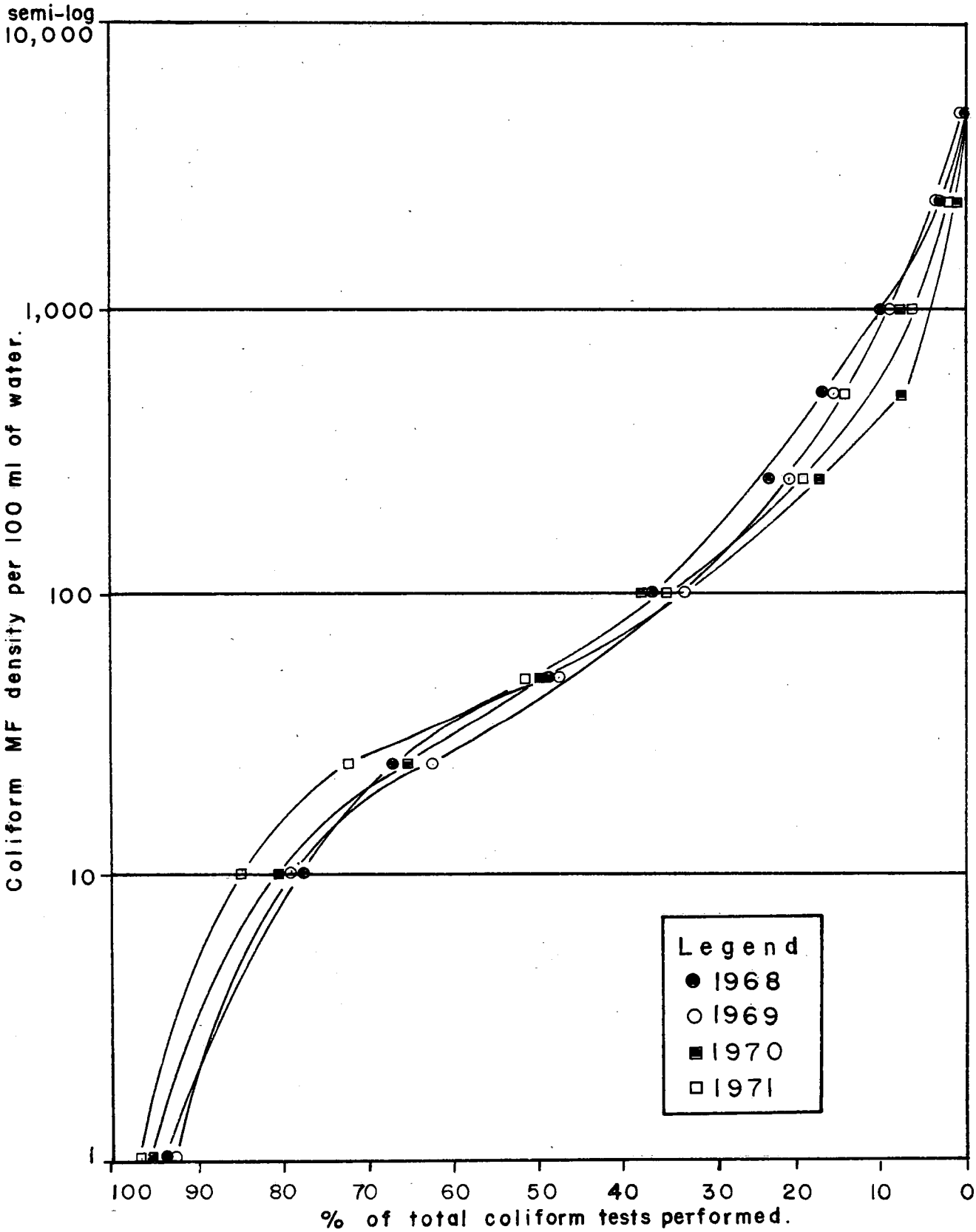


TABLE I (a). SUMMARY OF MEDIAN COLIFORM MF DENSITIES PER 100 ML FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1968.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
		SECTOR A				
191	49	7	5	1	6	
188	0	0	-	-	0	
185(N)	5	8	1	-	3	
185(S)	1	3	1	-	1	2
		SECTOR B				
172	3	4	8	-	4	
172(S)	2	-	-	-	2	
170(N)	29	-	-	-	29	
169(S)	10	10	-	-	10	
164	8	12	-	-	9	
162	14	-	-	-	3	
158	12	9	50	-	22	10
		SECTOR C				
140	4	3	13	-	4	
136	44	17	20	-	32	
132	43	-	-	-	43	
131	29	-	-	-	29	
129	26	30	53	-	40	
127	250	-	-	-	250	
126	910	19	180	170	370	40
		SECTOR D				
118	880	28	35	-	77	
112	600	38	35	-	43	
106	580	120	36	21	110	
104	800	180	160	-	220	
98	64	94	95	-	95	110
		SECTOR E				
84	95	-	-	-	95	
83(N)	110	-	-	-	110	
83(S)	400	-	-	-	400	
82(S)	55	-	-	-	55	
80(S)	2000	-	-	-	2000	
78(N)	1400	34	-	-	350	
78(S)	60	230	-	-	140	
77(S)	200	360	-	-	250	
75	1300	70	-	-	320	180

TABLE I (b). SUMMARY OF MEDIAN COLIFORM MF DENSITIES PER 100 ML FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1969.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
		SECTOR A				
191	31	37	3	1	6	
188	2	2	-	-	2	
185(N)	30	13	6	-	20	
185(S)	7	19	15	-	13	12
		SECTOR B				
172	119	63	23	-	30	
171	3	-	-	-	3	
170	620	-	-	-	620	
169	5	67	-	-	19	
164	12	35	-	-	19	
162	62	-	-	-	62	
158	53	21	140	-	39	30
		SECTOR C				
140	24	9	12	-	15	
136	380	3	9	-	12	
132	33	-	-	-	33	
131	29	-	-	-	29	
129	69	38	16	-	38	
127	350	-	-	-	350	
126	630	13	180	230	250	34
		SECTOR D				
118	1600	8	17	-	77	
112	1800	24	38	-	45	
106	180	23	20	43	43	
104	120	86	35	-	86	
98	140	120	70	-	95	74
		SECTOR E				
84	660	-	-	-	660	
83	72	-	-	-	72	
82	66	-	-	-	66	
80	710	-	-	-	710	
78(N)	1600	78	-	-	710	
78(S)	71	130	-	-	88	
77	530	660	-	-	580	
75	1200	41	-	-	310	150

TABLE I (c). SUMMARY OF MEDIAN COLIFORM MF DENSITIES PER 100 ML FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1970.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
		SECTOR A				
191	16	14	33	4	14	
188	3	7	-	-	5	
185(N)	34	29	21	-	29	
185(S)	26	16	30	-	26	16
		SECTOR B				
172	41	16	21	-	21	
171	50	-	-	-	50	
170	43	-	-	-	43	
169	30	16	-	-	23	
164	16	14	-	-	16	
162	21	-	-	-	21	
158	27	30	220	-	30	27
		SECTOR C				
140	40	43	36	-	43	
136	230	13	36	-	36	
132	62	-	-	-	62	
131	50	-	-	-	50	
129	110	41	33	-	41	
127	480	-	-	-	480	
126	350	35	140	450	180	50
		SECTOR D				
118	130	50	40	-	65	
112	180	56	60	-	85	
106	140	70	140	150	110	
104	180	110	130	-	110	
98	40	120	73	-	73	85
		SECTOR E				
84	880	-	-	-	880	
83	100	-	-	-	100	
82	73	-	-	-	73	
80	660	-	-	-	660	
78(N)	3200	120	-	-	780	
78(S)	46	150	-	-	130	
77	1100	700	-	-	900	
75	110	2	-	-	39	180

TABLE I (d). SUMMARY OF MEDIAN COLIFORM MF DENSITIES PER 100 ML FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1971.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
		SECTOR A				
191	66	31	15	1	23	
188	2	1	-	-	1	
185(N)	12	56	11	-	12	
185(S)	5	2	2	-	2	6
		SECTOR B				
172	120	14	30	-	30	
171	4	-	-	-	4	
170	36	-	-	-	36	
169	17	180	-	-	100	
164	27	51	-	-	39	
162	26	-	-	-	26	
158	31	51	41	-	41	38
		SECTOR C				
140	17	15	24	-	15	
136	240	15	32	-	42	
132	120	-	-	-	120	
131	120	-	-	-	120	
129	64	40	26	-	40	
127	750	-	-	-	750	
126	1300	27	150	90	150	42
		SECTOR D				
118	750	15	90	-	90	
112	740	25	61	-	61	
106	350	70	66	76	81	
104	290	72	76	-	76	
98	66	100	52	-	63	76
		SECTOR E				
84	900	-	-	-	900	
83	110	-	-	-	110	
82	65	-	-	-	65	
80	870	-	-	-	870	
78(N)	1200	64	-	-	540	
78(S)	66	110	-	-	74	
77	880	930	-	-	920	
75	830	50	-	-	380	480

any direct cross-boundary bacterial pollution nor do they indicate downstream cross-boundary current-related pollution.

During the progress of the surveys, much time and care was expended on the collection of 20°C Standard Plate Count data under the premise that the acquired data are indicative of organic nutrient levels available for bacterial nutrition. Although the majority of colonies developing at 20°C are non-pathogenic to humans, they do provide an indication of the amount of extraneous organic matter available for bacterial nutrition that has gained access to the water from various sources. Generally, the greater the amount of organic matter present, the more likely the water is to be contaminated with potentially pathogenic organisms.

Median 20°C SPC data presented in Table II (a-d) are indicative of general downstream increase in bacterial densities with minimal yearly fluctuation. Data presented in Figure 3 are supportive of the observation that over the past 4 years 20°C SPC densities have stabilized within the study area.

There is a general north-south density gradient although not as definite or constant as that observed with the coliforms. Again density distributions are related to population densities.

Samples collected from Station 75A have been found to contain some of the highest 20° and 35°C SPCs and coliform counts recorded during this study. There is no obvious

FIG. 3. 20°C STANDARD PLATE COUNTS EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970, AND 1971.

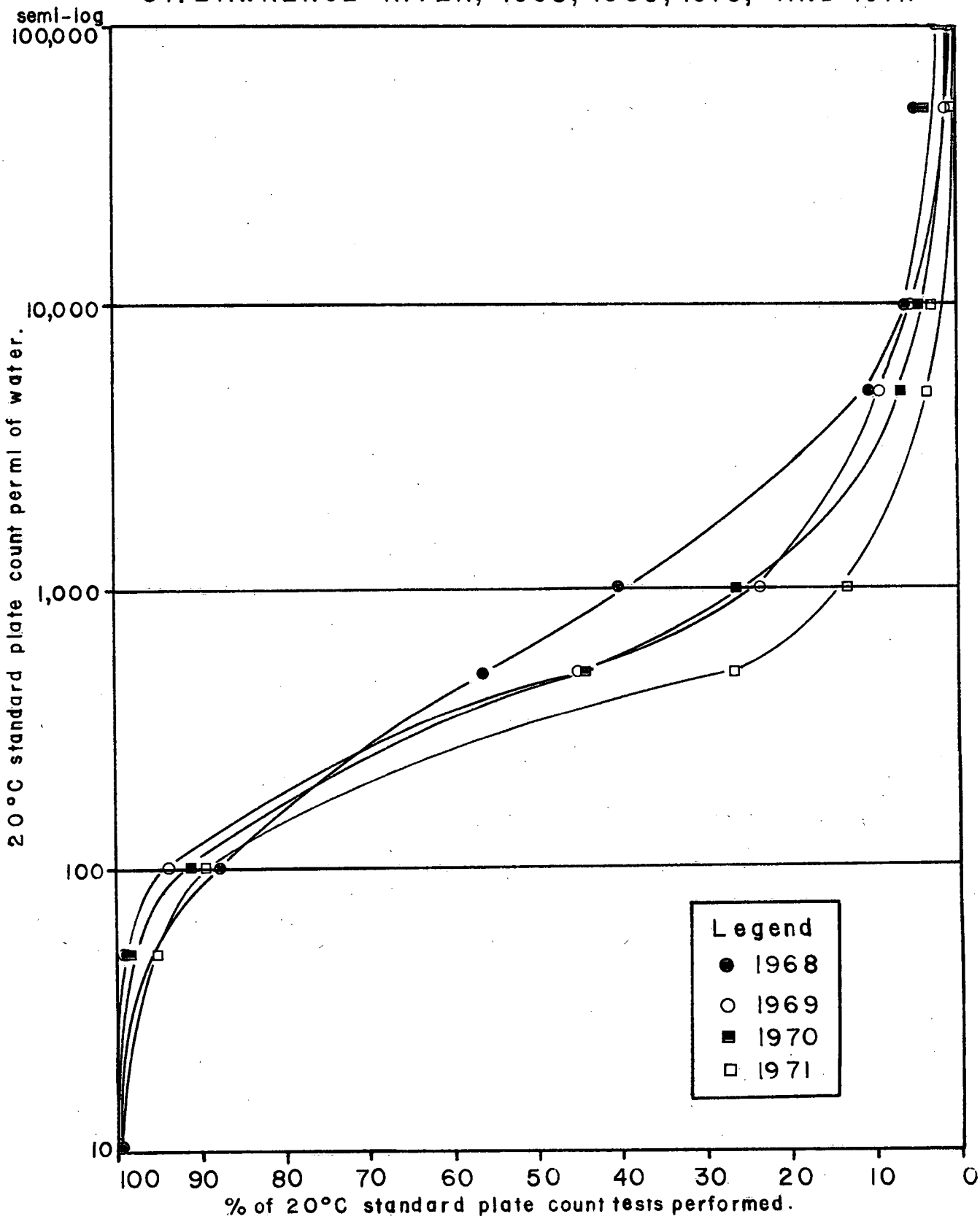


TABLE II (a). SUMMARY, MEDIAN 20°C STANDARD PLATE COUNT DENSITIES PER ML, FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1968.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
			SECTOR A			
191	69000	280	750	100	800	
188	52	42			47	
185(N)	400	350	150		370	
185(S)	110	60	78		66	110
			SECTOR B			
172	180	87	96		170	
171	150				150	
170	160				160	
169	190	200			190	
164	150	210			180	
162	310				310	
158	150	190	260		190	190
			SECTOR C			
140	440	500	300		480	
136	500	460	310		380	
132	170				170	
131	180				180	
129	750	420	500		470	
127	3200				3200	
126	1700	400	970	5500	1200	600
			SECTOR D			
118	11000	310	350		440	
112	2000	390	940		1000	
106	3000	1600	760	610	1500	
104	6000	5200	930		1300	
98	3800	3300	1100		3300	1100
			SECTOR E			
84	1100				1100	
83(N)	2100				2100	
83(S)	1200				1200	
82(S)	1700				1700	
80	4500				4500	
78(N)	3000	1400			1700	
78(S)	1400	2500			1600	
77	1300	1000			1000	
75	10000	1500			1900	1400

TABLE II (b). SUMMARY, MEDIAN 20°C STANDARD PLATE COUNT DENSITIES PER ML, FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1969.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
			SECTOR A			
191	5000	1200	110	250	300	
188	220	300			230	
185	400	170	82		200	
185(S)	210	260	310		220	210
			SECTOR B			
172	290	90	90		120	
171	140				140	
170	580				580	
169	75	160			100	
164	150	130			140	
162	300				300	
158	300	340	140		200	160
			SECTOR C			
140	420	450	220		250	
136	370	190	290		310	
132	400				400	
131	450				450	
129	3500	480	230		530	
127	6900				6900	
126	32000	240	880	1100	4900	440
			SECTOR D			
118	10000	300	400		340	
112	1500	420	220		590	
106	960	440	530	480	460	
104	600	890	620		660	
98	1000	1300	1000		1000	500
			SECTOR E			
84	1200				1200	
83(N)	530				530	
82(S)	700				700	
80	2600				2600	
78(N)	4500	1200			1600	
78(S)	920	2400			1000	
77	530	560			530	
75	24000	840			1500	830

TABLE II (c). SUMMARY, MEDIAN 20°C STANDARD PLATE COUNT DENSITIES PER ML, FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1970.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
		SECTOR A				
191	9100	880	300	110	300	
188	140	100			120	
185(N)	240	430	180		240	
185(S)	160	160	290		160	240
		SECTOR B				
172	260	230	480		260	
171	420				420	
170	240				240	
169	130	160			150	
164	220	240			230	
162	240				240	
158	250	120	270		250	260
		SECTOR C				
140	74	100	150		78	
136	140	240	90		140	
132	610				610	
131	400				400	
129	2000	85	200		200	
127	10000				10000	
126	5300	270	7000	3800	3100	270
		SECTOR D				
118	2800	430	1500		1900	
112	560	460	1300		1100	
106	490	400	710	1600	710	
104	4100	460	970		850	
98	600	950	1100		950	880
		SECTOR E				
84	1200				1200	
83(N)	1100				1100	
82	520				520	
80	510				510	
78(N)	33000	370			940	
78(S)	260	630			590	
77	680	8 0			760	
75	200000	690			1300	630

TABLE II (d). SUMMARY, MEDIAN 20°C STANDARD PLATE COUNT DENSITIES PER ML, FOR RANGES, STATIONS AND SECTORS, ST. LAWRENCE RIVER, 1971.

RANGE	STATION A	B	C	D	RANGE MEDIAN	SECTOR MEDIAN
			SECTOR A			
191	19000	240	210	130	230	
188	82	41			61	
185(N)	510	320	84		260	
185(S)	160	270	340		220	210
			SECTOR B			
172	1200	230	330		340	
171	100				100	
170	540				540	
169	95	140			95	
164	130	230			180	
162	180				180	
158	210	110	180		160	180
			SECTOR C			
140	210	110	170		150	
136	170	160	150		160	
132	210				210	
131	580				580	
129	250	200	170		200	
127	1300				1300	
126	640	180	680	1900	660	210
			SECTOR D			
118	470	180	320		380	
112	2400	160	490		470	
106	850	290	500		500	
104	830	340	410		410	
98	300	480	470		430	430
			SECTOR E			
84	4900				4900	
83(N)	300				300	
82(S)	250				250	
80	2200				2200	
78(N)	3500	200			1400	
78(S)	260	360			270	
77	900	750			750	
75	150000	250			35000	400

explanation for these elevated counts. All potential nutrient inputs into the St. Lawrence River should theoretically have been picked up at Ranges 78N, 78S and 77.

Visual inspection of the area did not reveal any obvious local source of organic matter which could account for this increased bacterial population. Perhaps due to the vagaries of St. Lawrence River currents this area is a collecting and pooling point of various nutrient enriched upstream waters which could stimulate bacterial metabolism and growth. However, as no current studies were performed during this study, the above hypothesis cannot be supported.

Coliform, fecal coliform and fecal streptococcus data presented in Tables IV and V of the Appendix were examined and the following relationships based on means were established:

	Coliform: F. Coliform	Coliform: F. Streptococcus	F. Coliform: F. Streptococcus
1970	13:1	54:1	4:1
1971	12:1	60:1	3:1

Coliform:fecal coliform ratios suggest that fecal coliforms (including *Escherichia coli* Type I) constitute approximately 8 per cent of the total coliforms in the St. Lawrence River.

Fecal streptococci occur in sewage in appreciable numbers although not generally exceeding one-tenth the number of *E. coli*. Soil and water subject to sewage pollution are found to contain these cocci but otherwise as in virgin soil

and unpolluted waters, fecal streptococci are absent (Taylor, 1958). Practical experience gained from five years of sampling and testing off-shore Great Lakes waters strongly support the above statement. Thus the coliform:fecal streptococcus and fecal coliform:fecal streptococcus ratios presented above are indicative of the St. Lawrence River being polluted with sewage to some degree.

In 1966 Geldreich reported that fecal coliform:fecal streptococcus ratios 4:1 or greater were indicative of pollution by domestic wastes. Ratios of less than 0.6 suggested that pollution was derived from livestock, poultry wastes or from storm-water run-off. The above ratios, along with the tendency for bacterial densities to be elevated immediately downstream of population densities, strongly suggest that the main source of bacterial pollution in the St. Lawrence River is domestic wastes.

Data presented in Tables II to V of the Appendix were subjected to various statistical analyses in an attempt to (a) study sector influences on bacterial densities and (b) show significant relationships, if any, between the various bacterial parameters.

The only parameters consistently tested for at all stations during the four year study were coliform MF and 20° and 35°C SPCs. From Tables III, IV and V and Figure 4 it can be seen that statistical analysis of the four year accumulated coliform data illustrates a steady downstream increase

TABLE III. EXAMINATION OF SECTOR INFLUENCE ON BACTERIAL DENSITIES (1968-71) BY ANALYSIS OF VARIANCE AND DUNCAN'S MULTIPLE RANGE TESTS.

Sector	Coliform MF	20°C SPC	35°C SPC
E	76607 a*	1920050 a	202389 a
D	21961 b	325279 c	29758 c
C	15581 c	96419 d	33067 b
B	4922 d	26821 e	12717 d
A	2214 e	1153330 b	12967 d
	Significance level = 0.05		

TABLE IV. YEARLY EXAMINATION OF SECTOR INFLUENCE ON BACTERIAL DENSITIES BY ANALYSIS OF VARIANCE AND DUNCAN'S MULTIPLE RANGE TESTS.

	Coliform MF		35°C SPC
Sector	1968	1969	1968
E	12921 a*	23726 a	7549 c
D	10368 b	7335 b	8429 b
C	198 cd	6916 b	12546 a
B	535 cd	1112 c	615 e
A	650 c	340 d	1911 d
	Significance level = 0.05		

*Within a column, arithmetic means having a letter in common, are not significantly different at 5 per cent level by Duncan's Multiple Range Tests.

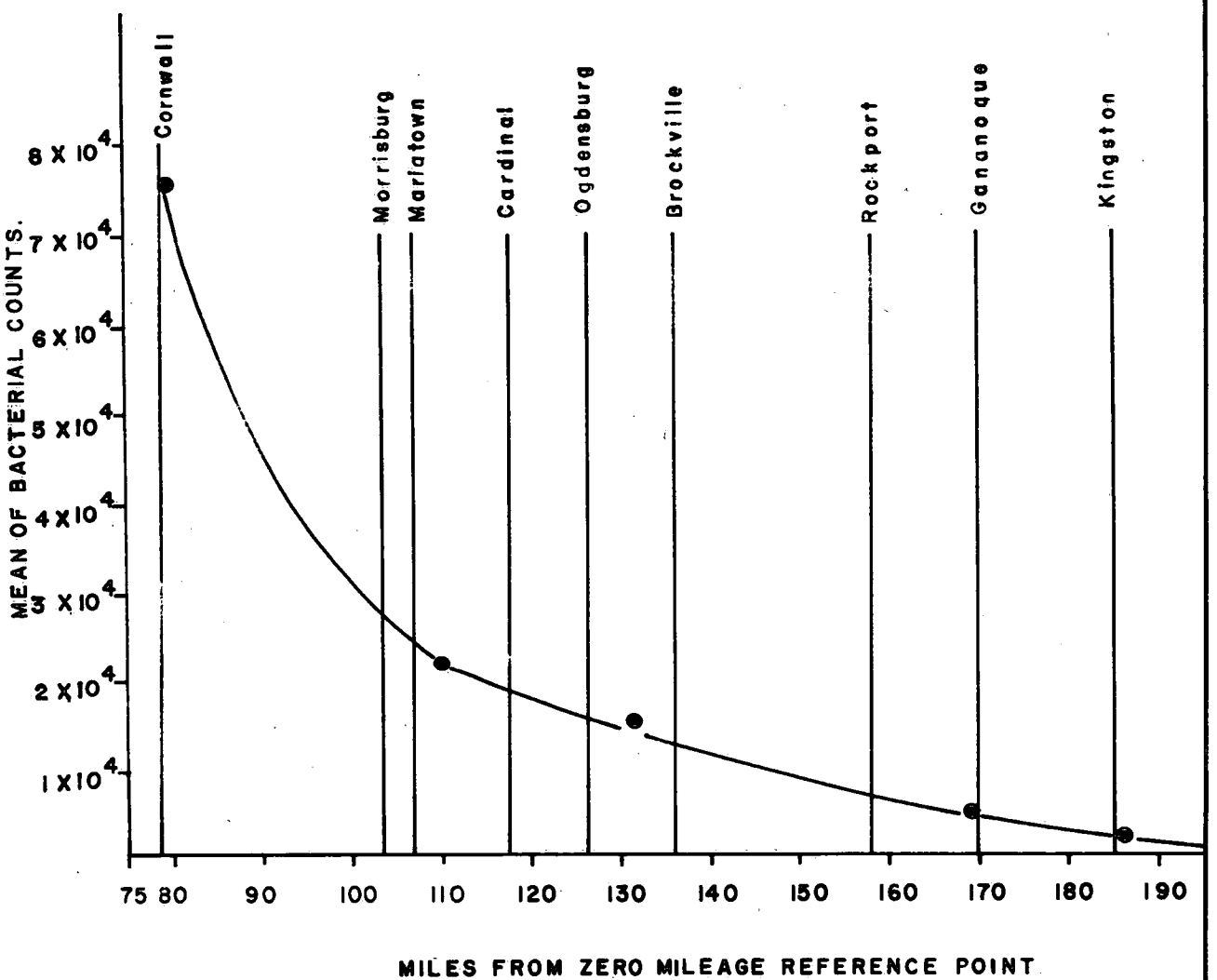
TABLE V. YEARLY EXAMINATION OF SECTOR INFLUENCE ON BACTERIAL DENSITIES BY ANALYSIS OF VARIANCE AND DUNCAN'S MULTIPLE RANGE TESTS.

	Coliform MF		F. Coliform MF		F. Streptococcus MF		35°C SPC	
Sector	1970	1971	1970	1971	1970	1971	1970	1971
E	24023 a*	664 a	1306 a	31 a	406 a	10 a	80197 a	3247 a
D	3416 b	150 bc	409 b	13 b	71 b	3 bc	3761 b	102 bcd
C	2167 c	263 b	231 c	43 a	71 b	5 b	3328 bc	137 bc
B	1946 c	55 bcd	218 c	7 bc	31 bc	1 bcd	3277 bcd	17 cd
A	532 d	29 bcd	39 d	2 bc	19 bc	1 bcd	1873 bcd	303 b

Significance level = 0.05

*Within a column, arithmetic means having a letter in common, are not significantly different at 5 per cent level by Duncan's Multiple Range Tests.

FIG. 4. INFLUENCE OF SECTOR ON COLIFORM MF COUNTS. (1968 - 1971)



in coliform densities with significant differences between sectors. However, analysis of yearly data indicates that there are fluctuations in sector ranking i.e. 1971 Sectors E, D, and C, and often no significant differences between sectors i.e. 1968 Sectors C and B.

As fecal coliform and fecal streptococci densities were only performed routinely on all 1970 and 1971 samples statistical analysis was limited to these years. Analysis of both parameters indicates increasing densities with down stream progression similar to that observed with coliform densities, with fluctuations in sector ranking i.e. 1971 fecal coliform, Sectors E, D, and C,and in some instances no significant differences between sectors at the 5 per cent level, i.e. 1970, fecal streptococcus Sectors D and E (Table V).

Analysis of the four year 20°C SPC mean data indicates that with the exception of Sector A, there is a steady downstream increase in 20°C SPCs (Table III, Figure 5). However, examination of yearly 20°C SPC mean data indicated no significant difference between sectors at the 5 per cent level and therefore these data were not presented in Table IV or V. The high mean 20°C SPC shown for Sector A reflects the organic nutrient input from the Kingston Township sewage treatment plant which is picked up at Stations 191A and B.

Four year 35°C SPC data indicate a general downstream increase in densities with no significant difference at the 5 per cent level between Sectors A and B (Table III,

FIG. 5 INFLUENCE OF SECTOR ON 20°C STANDARD PLATE COUNTS. (1968-1971)

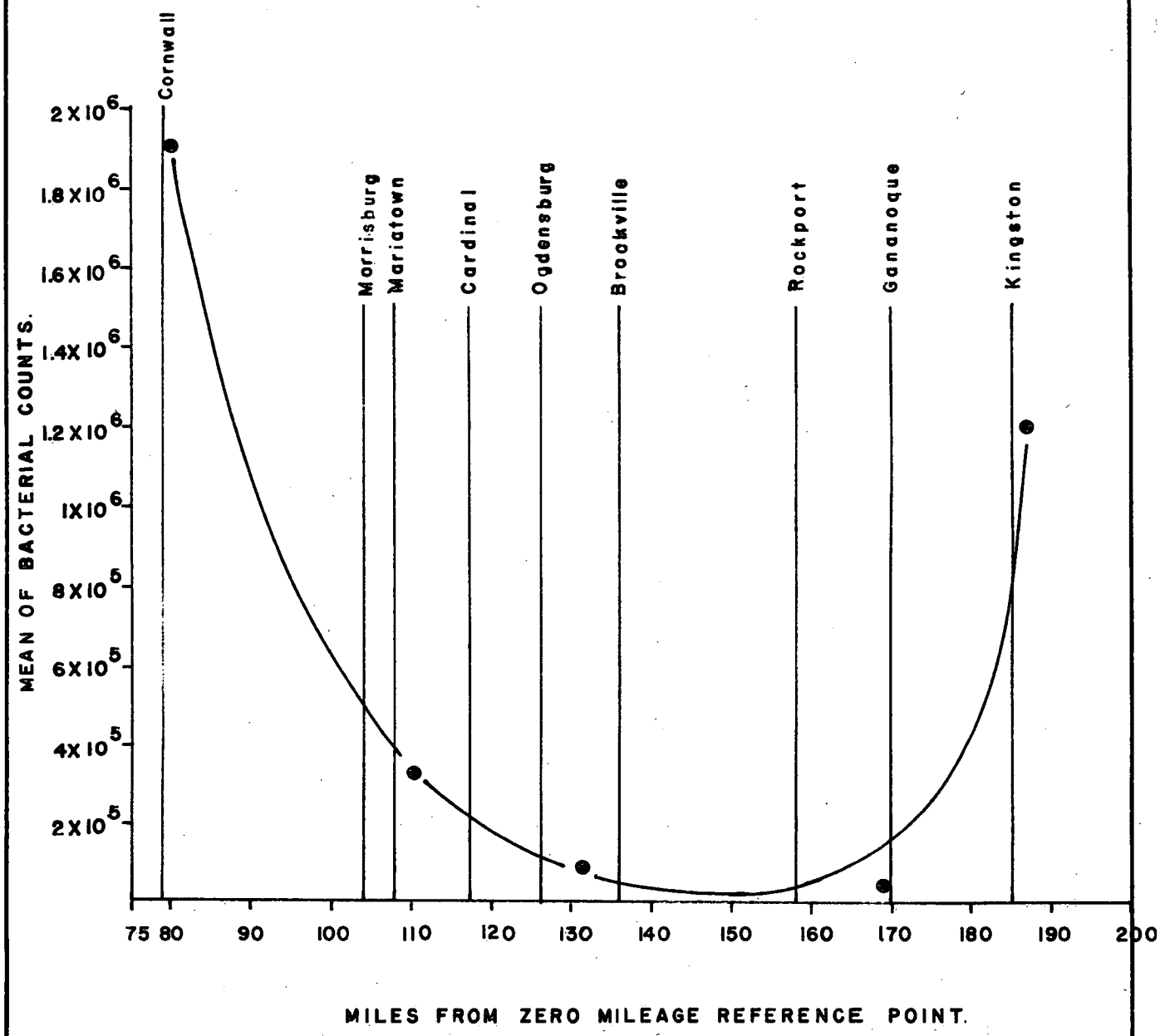


Figure 6). However a year by year analysis indicates that often the majority of sectors are not significantly different at the 5 per cent level i.e. 1971 Sector A, B, C, and D. 1969 sector analysis indicated no significant differences between any sector at the 5 per cent level, therefore these data were not included in Table IV.

Analysis of variance tests using 5 per cent significance levels indicate that there has been no significant difference in coliform or 20° and 35°C SPC densities from year to year during the 1968-71 period. These test findings are supportive of data presented in Tables VI and VII of the Appendix and Figures 2 and 3 of the text which indicate that these parameters have stabilized during the four year study.

Tables VI and VII summarize the analysis of covariance of various bacterial relationships.

From Table VI it can be seen that while there is no significant relationship between coliforms and 20°C SPCs there is a significant relationship between 35°C SPCs and coliforms. Thus the observed significant relationship between 35°C SPCs and coliforms would tend to support the hypothesis that 35°C SPCs are indicative of the presence of soil, sewage or intestinal organisms. Thus the greater the 35°C SPC, the more likely it is that pathogenic organisms will be found. However, this hypothesis support is nullified to some extent by Table VII data where it can be seen that there are no significant relationships between fecal coliforms and 35°C SPCs,

FIG. 6 INFLUENCE OF SECTOR ON 35°C STANDARD PLATE COUNTS. (1968-1971)

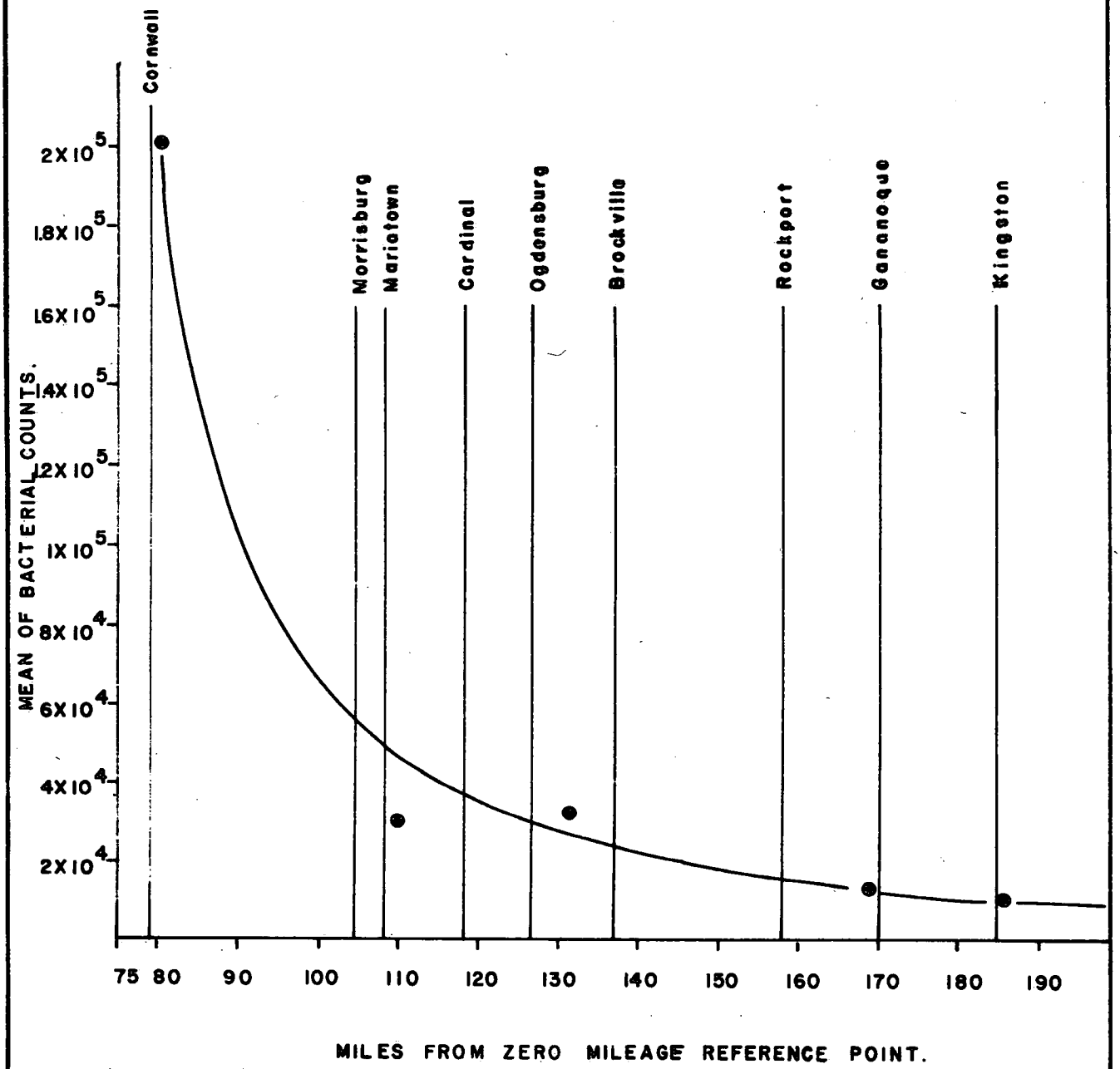


TABLE VI. BACTERIAL PARAMETER RELATIONSHIPS BY ANALYSIS OF COVARIANCE, 1968-1971.

Year	Coliform - 20°C SPC	Coliform - 35°C SPC
1968	No*	Yes r^2=44.9%
1969	No	Yes r^2= 7 %
1970-71	No	Yes r^2=17 %

Significance level = 0.05

TABLE VII. BACTERIAL PARAMETER RELATIONSHIPS BY ANALYSIS OF COVARIANCE, 1970-71

Year	Coli-F.Coli	Coli-F.Strept	F.Coli-F.Strept	Coli-20°C SPC	F.Coli-20°C SPC	F.Strept-20°C SPC	Coli-35°C SPC	F.Coli-35°C SPC	F.Strept-35°C SPC
1970	Yes** r^2=29%	No	Yes r^2=13.8%	Yes r^2=28%	Yes r^2=8%	No	Yes r^2=11%	Yes r^2=7%	No
1971	Yes r^2=40%	Yes r^2=51.7%	Yes r^2=61.2%	Yes r^2=12%	No	No	No	No	No
1970-71	Yes r^2= 54.4%	Yes r^2=9%	Yes r^2=22.4%	No	No	No	No	No	No

Significance level = 0.05

* Linear relationship is not significant at 5 per cent level.
**Linear relationship is significant at 5 per cent level.
r^2=Coefficient of determination.

nor between fecal streptococci and 35°C SPCs, at the 5 per cent level.

Table VII data indicate that there are significant relationships between coliforms and fecal coliforms; fecal coliforms and fecal streptococci; and coliforms and fecal streptococci (except 1970). Coliform and 20°C SPC data presented in Table VII indicate a significant relationship in 1970 and 1971, however when both 1970 and 1971 data are combined no significant relationship exists at the 5 per cent level as shown in Table VI.

CONCLUSIONS

1. Statistical and median examination of coliform and 20° and 35°C SPC data during the four year study indicate:
   (a) there is a downstream increase in bacterial densities;
   (b) no significant variation in parameter densities have occurred during the four study years;
   (c) there is an indication of stabilizing conditions.
2. No obvious cross-boundary bacterial pollution has occurred during the study period.
3. Where sampling ranges contain both Canadian and U.S. shore stations, invariably samples collected from the Canadian (north-shore) station contained the highest bacterial densities with the exception of Range 158.
4. A significant relationship was found to exist between coliforms and 35°C SPCs, coliforms and fecal coliforms, coliforms and fecal streptococci and fecal coliforms and

fecal streptococci, while no significant relationship was found between coliforms and 20°C SPCs.

5. No ready explanation is available to explain elevated coliform and 20°C and 35°C SPCs at Station 75A.

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REFERENCES

1. American Public Health Association. Standard Methods for the Examination of Water and Wastewater, Twelfth Edition. American Public Health Association, New York, 1965.

2. Bruce, A., Jurkovic, A. and Dutka, B.J. A Bacteriological Study of the International Section St. Lawrence River, Conducted for the Advisory Board on Water Pollution, International Joint Commission, 1967. Dept. of National Health & Welfare, Public Health Engineering Division, Manuscript Report 67-18. 1968.

3. Dutka, B.J., Bruce, A., Bell, J., and Tennant, A.D. A Bacteriological Study of the St. Lawrence River and the Bay of Quinte, Conducted for the Advisory Board on Water Pollution, International Joint Commission, 1966. Dept. of National Health and Welfare, Public Health Engineering Division, Manuscript Report 67-2, 1967.

4. Dutka, B.J., Bell, J.B. and Jurkovic, A. A Bacteriological Study of the Bay of Quinte and the International Section of the St. Lawrence River, Conducted for the Advisory Board on Water Pollution, International Joint Commission, 1968. Dept. of National Health & Welfare, Pubiic Health Engineering Division, Manuscript Report No. KR.68-1, 1968.

5. Dutka, B.J., Bell, J.B. and Jurkovic, A. A Bacteriological Study of the International Section of the St. Lawrence River, Conducted for the Advisory Board on Water Pollution, International Joint Commission, 1969. Dept. of National Health & Welfare, Public Health Engineering Division, Manuscript Report KR.69-2, 1969.

6. Dutka, B.J., Collins, P.G., Bell, J.B. and Vanderpost, J.M. Comparison of Sampling Methods for the Isolation of Salmonella from Moderately Polluted Natural Waters. Dept. of National Health & Welfare, Public Health Engineering Division, Manuscript Report No. KR.70-1, 1970.

7. Dutka, B.J. and Bell, J.B. Isolation of Salmonellae from Moderately Polluted Natural Waters. J.W.P.C.F. (In Press) 1972.

8. Geldreich, E.E., Clark, H.F., Huff, C.B. and Best, B.C. Fecal Coliform Organism Medium for the Membrane Filter Technique. J.A.W.W.A. 57: 208-214, 1965.

9. Geldreich, E.E. Sanitary Significance of Fecal Coliforms in the Environment. U.S. Department of the Interior, Federal Water Pollution Control Administration. Publication WP-20-3, 122 pp., 1966.

10. Taylor, W. The Examination of Waters and Water Supplies 7th Edition. J & A Churchill Ltd., London, 1958.

A P P E N D I X

TABLES I - VII

TABLE I (a). ST. LAWRENCE RIVER SAMPLING POINTS. MILEAGE TAKEN FROM SEAWAY CHART NO. 1400 ("O" AT LONGUEUIL), 1968, 69, 70 and 71.

Sampling Ranges (Mileage)	Sta.	Latitude	Longitude	Description	
				Canadian Side	U.S. Side
191 N	A	44°12'53"	76°32'46"	Above Kingston in Cataraqui Bay, Opposite Samson Pt. and Carruthers Pt.	
	B	44°12'43"	76°31'48"		
	C	44°12'30"	76°32'36"		
	D	44°12'10"	76°31'56"		
188	A	44°07'40"	70°21'58"	Above Alexandria Pt.	Above Cape Vincent
	B	44°07'19"	76°21'40"		
185 N	A	44°14'24"	76°24'57"	Below Kingston Mainland to Abraham Head	
	B	44°14'07"	76 24'39"		
	C	44°13'54"	76 24'26"		
185 S	A	44°09'22"	76 19'54"	East of Button Bay	Below Cape Vincent
	B	44°09'04"	76 19'25"		
	C	44°08'45"	76 18'57"		
172	A	44°19'03"	76 10'30"	Above Gananoque. Mainland to McRay Pt. Grindstone Is.	
	B	44°18'06"	76 09'39"		
	C	44°17'19"	76 08'54"		
171	A	44°14'31"	76 06'36"		Opposite Bartlett Pt.
170	A	44°19'28"	76 08'41"	Below Gananoque. Midpoint Mainland and Corn Island	
169	A	44°15'20"	76 04'26"		Below Clayton
	B	44°14'51"	76 04'57"		
164	A	44°18'10"	75 58'56"		Thousand Is. Bridge
	B	44°18'08"	75 58'53"		
162	A	44°21'39"	75 58'50"	Thousand Is. Bridge	
158	A	44°22'33"	75 55'40"	Rockport	Iroquois Point
	B	44°21'27"	75 54'28"		
	C	44°21'11"	75 54'14"		
140	A	44°34'00"	75 42'50"	Above Brockville	West of Jacques Cartier Park
	B	44°33'51"	75 42'24"		
	C	44°33'40"	75 41'54"		

TABLE I (b). ST. LAWRENCE RIVER SAMPLING POINTS. MILEAGE TAKEN FROM SEAWAY CHART NO. 1400 ("O" AT LONGUEUIL), 1968, 69, 70 and 71.

Sampling Ranges (Mileage)	Sta.	Latitude	Longitude	Description	
				Canadian Side	U.S. Side
136	A	44° 36'04"	75°39'36"	Below Brockville	East of Morristown
	B	44° 35'52"	75°39'20"		
	C	44° 35'41"	75°39'05"		
132	A	44° 38'57"	75°35'01"	Above Maitland	
131	A	44° 39'39"	75°34'23"	Downstream Maitland	
129	A	44° 40'39"	75°33'08"	Above Prescott Little Church Bay	Nevins Point
	B	44° 40'22"	75°32'46"		
	C	44° 40'14"	75°32'28"		
127	A	44° 41'46"	75°29'56"		Creek Mouth Ogdensburg
126	A	44° 42'50"	75°30'03"	Downstream Prescott	Downstream Ogdensburg
	B	44° 42'58"	75°28'59"		
	C	44° 42'51"	75°28'28"		
	D	44° 42'44"	75°28'00"		
118	A	44° 47'12"	75°22'21"	Eastern Section Cardinal	Mid-channel South East tip Galop Island
	B	44° 47'13"	75°22'01"		
	C	44° 47'14"	75°21'34"		
112	A	44° 51'04"	75°17'29"	Downstream Iroquois	Above Whitehouse Creek
	B	44° 50'52"	75°17'17"		
	C	44° 50'39"	75°17'05"		
106	A	44° 53'11"	75°11'34"	Above Morrisburg (Maria Town)	Clark Point
	B	44° 53'02"	75°11'33"		
	C	44° 52'40"	75°11'28"		
	D	44° 52'32"	75°11'27"		
104	A	44° 54'00"	75°09'36"	Below Morrisburg (Nash Creek)	East of Murphy Is.
	B	44° 53'45"	75°09'23"		
	C	44° 53'29"	75°09'07"		
98	A	44° 56'32"	75°03'38"	Whitney Pt. (Upper Canada Village)	Wilson Hill
	B	44° 56'12"	75°03'21"		
	C	44° 56'03"	75°03'12"		
84	A	44° 59'09"	74°46'18"		Mouth of Grass River

TABLE I (c). ST. LAWRENCE RIVER SAMPLING POINTS. MILEAGE TAKEN FROM SEAWAY CHART NO. 1400 ("O" AT LONGUEUIL), 1968, 69, 70 and 71.

Sampling Ranges (Mileage)	Sta.	Latitude	Longitude	Description	
				Canadian Side	U.S. Side
83 N	A	45°00'23"	74°45'35"	Cornwall Is. to Universal Terminal	
*83 S	A	44°59'16"	74°45'04"		Midpoint Between Grass R. & Roosevelt Bridge
82	A	44°59'23"	74°44'21"		Immediately Downstream Roosevelt Bridge - Mid-channel
80	A	44°59'23"	74°41'23"		Mouth of Raquette R.
78 N	A B	45°01'17" 45°01'09"	74°41'06" 74°41'00"	Cornwall Is.	
78 S	A B	45°00'07" 44°59'57"	74°40'10" 74°40'03"	Below Cornwall	
77	A B	45°00'04" 44°59'52"	74°38'22" 74°38'36"	Mouth of St. Regis River	
75	A	45°02'12"	74°36'29"	East of Glengarry Pt. on Mainland. Eastern tip St. Regis I.	

*Sampled in 1968 only.

TABLE II(a). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			191(A)				
April 23	49					260000	650
June 27	440					69000	840
Sept. 24	1					3400	32
			191(B)				
April 23	7					1900	18
June 27	88					280	30
Sept. 24	< 1					100	33
			191(C)				
April 23	5					8500	13
June 27	52					750	20
Sept. 24	2					66	24
			191(D)				
April 23	1	< 1	< 1			100	13
June 27	61	< 1	< 1			860	10
Sept. 24	1	< 1	< 1			84	20
			188(A)				
May 15	< 1					31	8
July 12	< 1					80	16
Sept. 24	1					52	40
			188(B)				
May 15	< 1					37	7
July 12	< 1					110	10
Sept. 24	< 1					42	12
			185(N)(A)				
April 23	6	< 1	< 1			600	12
May 10						12	
May 16	3	< 1	< 1			580	12
June 27	48	< 1	< 1			400	20
Sept. 24		< 1	< 1			49	4
			185(N)(B)				
April 23	8					550	6
May 10	2	< 1	< 1				12
May 16	3	< 1	< 1			1100	12
June 27	50					150	10
Sept. 24	< 1					70	31

TABLE II(b). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			185(N)(C)				
April 23	< 1					1000	15
June 27	23					150	20
Sept. 24	1					100	8
			185(S)(A)				
May 15	< 1					39	12
July 12	4					200	42
Sept. 24	1					110	52
			185(S)(B)				
May 15	3					59	31
July 12	6					60	4
Sept. 24	1					71	25
			185(S)(C)				
May 15	1	1	< 1			78	27
July 12	1	< 1	< 1			210	10
Sept. 24	26	1	< 1			62	16
			172(A)				
April 29	2					170	7
July 2	10					820	30
Sept. 25	3					180	100
			172(B)				
April 29	4					52	1
July 2	13					170	4
Sept. 25	2					87	6
			172(C)				
April 29	< 1					73	5
July 2	19					220	5
Sept. 25	8					96	18
			171(A)				
April 29	< 1					150	6
July 2	12					270	15
Sept. 25	2					62	9

TABLE II(c). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			170(A)				
April 29	< 1					160	13
July 2	180	29	4	6.2:1	7.3:1	670	59
Sept. 25	29	5	3	5.8:1	1.7:1	160	54
			169(A)				
April 29	< 1					190	7
July 2	10					610	10
Sept. 25	80					110	39
			169(B)				
April 29	1	< 1	< 1			220	15
June 12	110	4	2	27:1	2:1	190	34
June 19	170	3	4	56:1	0.8:1	200	51
July 2	10	3	1	3.3:1	3:1	440	28
Sept. 25	1	< 1	< 1			57	7
			164(A)				
April 29						140	6
April 30	1	< 1	< 1			110	
July 4	10	< 1	< 1			310	27
Sept. 26	8	3	< 1	2.6:1		160	21
			164(B)				
April 29							4
April 30	1					210	
July 4	12					360	62
Sept. 26	24					180	24
			162(A)				
April 29	< 1	< 1	< 1				10
July 4	39	8	< 1	4.9:1		460	59
Sept. 26	3	1	< 1	3:1		170	25
			158(A)				
April 29	< 1					120	6
May 1							2
June 12	22	< 1	< 1			180	23
June 19		< 1	< 1			150	28
July 4	41					380	45
Sept. 26	2					140	20

TABLE II(d). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			158(B)				
April 29	< 1					110	8
July 4	27					350	40
Sept. 26	9					190	16
			158(C)				
April 29	15					160	5
June 12	310	17	13	18:1	1.3:1	260	34
June 19		2	< 1			440	11
July 4	65	11	< 1	5.9:1		300	55
Sept. 26	50					250	32
			140(A)				
Feb. 12	4	4	< 1	1:1		360	13
Feb. 19	1	< 1	< 1			820	2
Feb. 26	1	< 1	< 1			510	5
Mar. 4	< 1	1	1		1:1	280	2
Mar. 11	4	< 1	2			680	7
May 1	4	< 1	< 1			110	22
June 11	2	2	< 1	1:1		45	11
July 3	13	1	< 1	13:1		600	35
Sept. 30	14	< 1	6			190	50
			140(B)				
Feb. 12	10	2	< 1	5:1		1100	7
Feb. 19	2	< 1	< 1			340	6
Feb. 26	1	< 1	< 1			1400	6
Mar. 4	< 1	< 1	< 1			530	3
Mar. 11	4		4			1100	6
May 1	3					120	10
June 11	3					120	4
July 3	33					500	30
Sept. 30	22					98	26
			140(C)				
May 1	10					100	6
June 11	6					120	15
July 3	27					480	28
Sept. 30	15					7100	1200

TABLE II(e). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			136(A)				
Feb. 12	580	270	66	2.2:1	4.1:1	840	40
Feb. 19	23	8	< 1	2.9:1		770	9
Feb. 26	30	18	1	1.7:1	18:1	730	30
Mar. 4	57	16	4	3.6:1	4:1	330	8
May 1	34	9	3	3.8:1	3:1	120	13
June 4	96	< 1	11			500	25
June 11	2	2	< 1	1:1		150	12
July 3	64	3	5	21:1	0.6:1	560	50
Sept. 30	44	9	10	4.9:1	0.9:1	120	41
			136(B)				
Feb. 12	530	130	130	4.1:1	1:1	950	30
Feb. 19	280	120	18	2.3:1	6.7:1	1300	25
Feb. 26	63	6	2	10:1	3:1	710	22
Mar. 4	17	8	3	2.1:1	2.6:1	380	6
May 1	7					180	6
June 11	6					110	14
July 3	17					540	27
Sept. 30						100	21
			136(C)				
May 1	11					120	6
June 4	20	20	< 1	1:1		400	18
June 11	56	10	< 1	5.6:1		310	18
July 3	22					510	13
Sept. 30	17					82	21
			132(A)				
May 1	96	20	6	4.8:1	3.3:1	1	24
June 11	18	6	< 1	3:1		220	26
July 3	50	2	3	25:1	0.6:1	400	58
Sept. 30	35	8	1	4.4:1	8:1	130	29
			131(A)				
May 1	72	10	1	7.2:1	10:1	170	8
June 11	20	2	2	10:1	1:1	190	36
July 3	34	3	< 1	11:1		4500	22
Sept. 30	24	1	3	24:1	0.3:1	99	39

TABLE II(f). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				129(A)				
Feb.	12	53	13	27	4.1:1	0.5:1	900	40
Feb.	19	40	6	8	6.6:1	0.8:1	1200	17
Feb.	26	23	10	2	2.3:1	5:1	1400	24
Mar.	4	7	2	2	3.5:1	1:1	450	32
Mar.	11	10	12	190	0.8:1	0.1:1		450
May	2	210	57	9	3.7:1	6.3:1	270	170
May	28	21	< 1	< 1			600	
July	8	760	85	5	8.9:1	17:1	1900	
Oct.	1	26	10	10	2.6:1	1:1	240	150
				129(B)				
Feb.	12	140	48	33	2.9:1	1.5:1	730	30
Feb.	19	20	20	4	1:1	5:1	1400	20
Feb.	26	57	6	6	9.5:1	1:1	1200	490
Mar.	4	23	17	4	1.4:1	4.3:1	370	33
Mar.	11	17	< 1	7			2500	47
May	2	75					120	16
May	28	28					220	70
July	8	710					420	
Oct.	1	30					90	45
				129(C)				
Feb.	12	300	150	77	2:1	1.9:1	920	60
Feb.	19	57	22	3	2.6:1	7.3:1	1200	16
Feb.	26	110	10	7	11:1	1.4:1	1800	470
Mar.	4	53	28	4	1.9:1	7:1	500	39
Mar.	11	47	14	16	3.4:1	0.9:1	1900	31
May	2	1					120	12
May	28	6					110	10
July	8	72					320	
Oct.	1	26					80	17
				127(A)				
May	2	170	37	44	4.6:1	0.8:1	1200	130
May	28	150	81	11	1.9:1	7.4:1	2400	84
June	4	190	10	8	19:1	1.3:1	43000	110
July	8	3600	140	79	25:1	1.8:1	4100	
July	29	200	20	4	10:1	5:1	9400	950
July	30	6100	3100	32	1.9:1	96:1	15000	14000
July	31	2700	2700	70	1:1	38:1	8800	4900
Aug.	1	1400	540	50	2.6:1	10:1	1400	520
Oct.	1	20	46	190	0.4:1	0.2:1	910	170

TABLE II(g). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				126(A)				
May	2	540	120	37	4.5:1	3.2:1	380	140
May	28	780	220	50	3.5:1	4.4:1	480	110
June	4	640	62	22	10:1	2.8:1	750	480
July	8	1500	140	100	10:1	1.4:1	2500	
July	29	2600	200	30	13:1	6.6:1	18000	2400
July	30	200	42	2	4.8:1	21:1	1200	240
July	31	1800	390	47	4.6:1	8.3:1	4500	480
Aug.	1	3100	360	110	8.6:1	3.3:1	5300	560
Oct.	1	910	240	52	3.8:1	4.6:1	1700	1600
				126(B)				
May	2	32					140	12
May	28	5					150	16
July	8	240					340	
July	29	27					590	55
July	30	< 1					900	300
July	31	50					5000	1500
Aug.	1	10					460	58
Oct.	1	< 1					110	23
				126(C)				
May	2	160					950	200
May	28	200					1000	110
July	8	670					800	
July	29	40					1300	1200
July	30	60					780	260
July	31	1100					7700	3700
Aug.	1	710					4600	2500
Oct.	1	20					150	29
				126(D)				
May	2	100	8	4	12:1	2:1	6800	110
May	28	72	6	< 1	12:1		14000	34
June	4	170	2	2	85:1	1:1	110000	66
July	8	800	6	< 1	133:1	43:1	1100	
July	29	350	8	3	43:1	2.6:1	4500	2200
July	30	70	10	2	7:1	5:1	2600	1300
July	31	390	150	2	2.6:1	75:1	6400	3700
Aug.	1	1000	90	4	11:1	22:1	5500	3200
Oct.	1	150	33	6	4.5:1	5.5:1	1900	690

TABLE II(h). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				118(A)				
May	2	830	15	12	55:1	1.3:1	220	100
May	28	920	4	110	230:1	0.1:1	140000	150
July	8	3900	36	6	108:1	6:1	8900	
Oct.	1	440	180	22	2.4:1	8.2:1	13000	1300
				118(B)				
May	2	44					130	20
May	28	11					190	
July	8	100					650	
Oct.	1	< 1					440	67
				118(C)				
May	2	36					350	22
May	28	34						
July	8	110					210	
Oct.	1	2					580	71
				112(A)				
May	7	27	10	2	2.7:1	5:1	320	43
May	29	320	4	3	80:1	1.3:1	2000	310
June	5	1200	26	74	46:1	0.3:1	1900	800
July	9	7700	36	66	213:1	0.5:1	11000	5200
Oct.	2	600	56	480	10:1	0.1:1	120000	1700
				112(B)				
May	7	43					220	15
May	29	33					3700	
July	9	440					480	54
Oct.	2	13					300	81
				112(C)				
May	7	22					1100	22
May	29	47						510
July	9	180					460	70
Oct.	2	7					940	54
				106(A)				
May	7	580	5	22	116:1	0.2:1	1500	65
May	29	1400	6	30	233:1	0.2:1	3000	330
June	5	380	10	44	38:1	0.2:1	1400	280
July	9	1200	6	10	200:1	0.6:1	9500	690
Oct.	2	130	18	86	7.2:1	0.2:1	26000	200

TABLE II(i). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				106(B)				
May	7	140					2100	18
May	29	90						
July	9	610					1600	110
Oct.	2	7					1200	
				106(C)				
May	7	30					750	23
May	29	44					3000	120
July	9	510					770	120
Oct.	2	16					320	54
				106(D)				
May	7	41	3	< 1	13:1		290	31
May	29	20	1	< 1	20:1		2700	100
June	5	21	< 1	2			1900	110
July	9	440	2	2	220:1	1:1	610	45
Oct.	2	10	4	< 1	2.5:1		350	47
				104(A)				
May	7	240	< 1	9			1100	49
May	29	1300	71	24	18:1	2.9:1	6000	400
June	5	800	14	8	57:1	1.7:1	2400	310
July	9	1000	4	2	250:1	2:1	8100	270
Oct.	2	40	30	18	1.3:1	1.6:1	31000	590
				104(B)				
May	7	140					470	37
May	29	220					1000	90
July	9	1000					9400	1200
Oct.	2	8					15000	90
				104(C)				
May	7	130					1300	29
May	29	190					1100	160
July	9	230					550	59
Oct.	2	20					650	56
				98(A)				
May	7	64	2	< 1	32:1		880	31
July	9	120	2	< 1	60:1		3800	53
Oct.	2	10	1	< 1	10:1		12000	47

TABLE II(j). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				98(B)				
May	7	97					1000	23
July	9	140					3300	340
Oct.	2	20					21000	190
				98(C)				
May	7	95					1100	33
July	9	280					3400	720
Oct.	2	43					620	63
				84(A)				
May	8	110	4	< 1	27:1		600	57
May	30	80	7	< 1	11:1		1400	220
July	10	340	< 1	< 1			800	260
Oct.	3	33	2	< 1	16:1		1500	60
				83(N)(A)				
May	8	18					300	46
May	30	200						
July	10	340					4000	810
Oct.	26	26					2100	41
				83(S)(A)				
May	8	370					1400	120
May	30	440					990	160
July	10	1300					4400	
Oct.	3	150					460	72
				82(A)				
May	8	6					460	34
May	30	100					1800	190
July	10	400					1600	23
Oct.	3	10					1800	51
				80(A)				
May	8	2100					3300	200
May	30	2800					210000	800
July	10	1800					5600	22000
Oct.	3	20					1800	50
				78(N)(A)				
April	30	1200	400	150	3:1	2.6:1	760	240
May	6	710	280	160	2.5:1	1.7:1	3400	210
May	8	420	38	11	11:1	3.5:1	1100	97
May	30	2300	120	30	19:1	4:1	2700	
July	10	3900	130	20	30:1	6.5:1	6200	1600
Oct.	3	1500	1100	90	1.3:1	12:1	5400	640

TABLE II(k). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1968.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			78(N)(B)				
April 30	38	10	10	3.8:1	1:1	2000	29
May 6	8	8	8	1:1	1:1	1500	20
May 8	< 1					250	30
May 30	270					1300	130
July 10	100					1100	330
Oct. 3	30					2300	74
			78(S)(A)				
May 8	20					1300	16
May 30	180					1400	100
July 10	100					1100	130
Oct. 3	20					1700	28
			78(S)(B)				
May 8	180	14	1	12:1	14:1	2600	68
May 30	500	130	5	3.8:1	26:1	52000	260
July 10	280	1	< 1	280:1		57000	220
Oct. 3	10	6	2	1.6:1	3:1	1500	21
			77(A)				
April 30	170	44	100	3.8:1	0.4:1	880	150
May 6	120	22	4	5.4:1	5.5:1	430	79
May 8	330	24	< 1	13:1		3800	67
May 30	790	50	11	15:1	4.5:1	1700	60
July 10	520	8	4	6.5:1	2:1	1900	490
Oct. 3	63	24	4	2.6:1	6:1	530	66
			77(B)				
April 30	160	44	130	3.6:1	0.3:1	1200	570
May 6	140	12	12	11:1	1:1	640	60
May 8	680					980	76
May 30	560					1100	80
July 10	1400					1400	180
Oct. 3	80					290	48
			75(A)				
May 8	1200					1200	140
May 30	540					1900	70
July 10	1300					19000	1000
Oct. 3	1300					160000	1500
			75(B)				
May 8	72					670	47
May 30	96					1900	40
July 10	68					1300	140
Oct. 3	40					1800	36

TABLE III(a). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			191(A)				
Feb. 10	130						
April 29	42					5000	110
July 2	18					750000	49
Sept. 29	20					370	110
			191(B)				
Feb. 10	< 1						
April 29	60					1200	38
July 2	14					9600	21
Sept. 29	77					170	16
			191(C)				
Feb. 10	< 1						
April 29	< 1					110	16
July 2	19					220	25
Sept. 29	7					84	13
			191(D)				
Feb. 10	< 1	< 1	< 1			300	3
April 29	< 1	< 1	< 1			110	2
July 2	5	1	< 1	5:1		300	8
Sept. 29	2	< 1	< 1			110	27
			188(A)				
Feb. 11	1					450	5
April 29	< 1					74	4
July 2	12					330	41
Sept. 29	4					100	14
			188(B)				
Feb. 11	< 1	< 1	< 1			810	3
April 29	< 1	< 1	< 1			120	6
July 2	14	1	< 1	14:1		480	5
Sept. 29	4	< 1	< 1			36	6
			185(N)(A)				
Feb. 10	33	4	< 1	8.2:1		340	3
April 29	39	11	2	3.5:1	5.5:1	470	27
July 2	20	1	< 1	20:1		2400	7
Sept. 29	26	< 1	< 1			84	17

TABLE III(b). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			185(N)(B)				
Feb. 10	< 1						
April 29	22					210	23
July 2	21					170	8
Sept. 29	6					95	7
			185(N)(C)				
Feb. 10	< 1						
April 29	< 1					82	10
July 2	20					190	25
Sept. 29	13					64	7
			185(S)(A)				
Feb. 11	1					300	4
April 29	< 1					120	6
July 2	13					790	7
Sept. 29	13					36	12
			185(S)(B)				
Feb. 11	< 1					700	7
April 29	25					150	11
July 2	14					380	17
Sept. 29	90					72	21
			185(S)(C)				
Feb. 11	1	< 1	< 1			530	3
April 29	1	1	< 1	1:1		96	6
July 2	29	3	< 1	9.6:1		480	20
Sept. 29	73	10	3	7.3:1	3.3:1	140	45
			172(A)				
Feb. 12	810	200	49	4:1		1600	130
April 30	6	1	< 1	6:1		160	7
July 3	68	< 1	< 1			120	9
Sept. 30	170	5	< 1	34:1		400	56
			172(B)				
Feb. 12	260					550	46
April 30	3					52	6
July 3	25					58	7
Sept. 30	100					130	29

TABLE III(c). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			172(C)				
April 30	2					9	2
July 3	16					90	11
Sept. 30	30					160	34
			171(A)				
Feb. 13	< 1	< 1	< 1			900	7
April 30	< 1	< 1	< 1			57	1
July 3	28	2	< 1			220	16
Sept. 30	7	< 1	1			53	14
			170(A)				
Feb. 12	1300	310	87	4.2:1	3.6:1	1500	79
April 30	11	6	< 1	1.8:1		130	14
July 3	1000	160	11	6.2:1	14:1	650	120
Sept. 30	250	8	2	31:1	4:1	510	110
			169(A)				
Feb. 13	< 1					930	2
April 30	< 1					47	4
July 3	38					83	12
Sept. 30	10					68	11
			169(B)				
Feb. 13	250	120	4		30:1	910	13
April 30	19	9	1		9:1	98	7
July 3	86	20	< 1			210	17
Sept. 30	47					110	16
			164(A)				
April 30	1	1	< 1	1:1		74	2
July 3	28	1	1	28:1		300	20
Sept. 30	12	< 1	< 1			150	25
			164(B)				
April 30	6					86	3
July 3	35					540	18
Sept. 30	53					130	38
			162(A)				
April 30	2	1	< 1	2:1		65	9
July 3	62	1	2	62:1	0.5:1	300	10
Sept. 30	170	< 1	1			420	55

TABLE III(d). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			158(A)				
Feb. 14	70					910	24
April 30	4					73	7
July 3	69					200	19
Sept. 30	37					410	59
			158(B)				
April 30	3					82	4
July 3	39					430	16
Sept. 30						340	40
			158(C)				
Feb. 17	150	50	1	3:1	50:1	190	11
April 30	19	8	5	2.4:1	1.6:1	59	9
July 3	140	12	1	12:1	12:1	510	28
Sept. 30	330	44	< 1	7.5:1		97	28
			140(A)				
Feb. 14	29	1	< 1	29:1		510	8
May 1	2	2	< 1	1:1		92	55
July 7	19	4	< 1	4.7:1		610	33
Oct. 1	29	2	< 1	15:1		340	22
			140(B)				
May 1	3					80	6
July 7	9					650	23
Oct. 1	29					450	30
			140(C)				
Feb. 17	15					190	6
May 1	< 1					120	4
July 7	10					440	17
Oct. 1	36					250	26
			136(A)				
Feb. 14	600	190	19	31:1	10:1	310	67
May 1	150	60	11	2.5:1	5.5:1	150	12
July 7	6	1	< 1	6:1		440	50
Oct. 1	1400	210	48	6.7:1	4.4:1	550	160
			136(B)				
May 1	< 1					150	13
July 7	3					190	25
Oct. 1	23					340	31

TABLE III(e). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				136(C)				
Feb.	17	5					130	16
May	1	1					180	8
July	7	12					590	11
Oct.	1	36					400	41
				132(A)				
Feb.	14	31	23	< 1	1.3:1		380	17
May	1	34	9	4	3.8:1	2.3:1	140	21
July	7	28	9	< 1	3.1:1		430	40
Oct.	1	1200	79	10	15:1	7.9:1	530	83
				131(A)				
Feb.	14	42	14	3	3:1	4.7:1	720	17
May	1	15	3	1	5:1	3:1	70	16
July	7	17	5	< 1	3.4:1		500	30
Oct.	1	670	60	3	11:1	20:1	390	110
				129(A)				
Feb.	14	44	17	1	2.6:1	17:1	530	22
May	5	28	3	2	9.3:1	1.5:1	4200	580
July	8	93	18	2	5.2:1	9:1	2700	4400
Oct.	2	2400	230	9	10:1	25:1	10000	1500
				129(B)				
May	5	17					15000	1800
July	8	38					260	4400
Oct.	2	2300					480	80
				129(C)				
Feb.	17	13					140	
May	5	4					15000	1900
July	8	18					150	19
Oct.	2	280					300	52
				127(A)				
Feb.	17	10	1	< 1	10:1		14000	78
May	5	700	240	12	2.9:1	20:1	6900	1200
May	26	350	85	8	4.1:1	10:1	760	210
July	8	120	8	30	15:1	0.3:1	740	470
Oct.	2	690	120	24	5.8:1	5:1	7400	1100
				126(A)				
May	5	270	110	9	2.5:1	12:1	32000	800
July	8	630	230	21	2.7:1	11:1	18000	9400
Oct.	2	11000	930	70	11:1	13:1	49000	3200

TABLE III(f). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				126(B)				
May	5	13					120	15
July	8	9					240	32
Oct.	2	530					340	39
				126(C)				
May	5	330					880	310
July	8	120					1300	540
Oct.	2	180					210	36
				126(D)				
May	5	230	23	< 1	10:1		1100	100
July	8	59	14	1	4.2:1	14:1	950	430
Oct.	2	930	30	6	31:1	5:1	8100	500
				118(A)				
May	5	77	7	< 1	11:1		340	50
July	8	1600	230	120	6.9:1	1.9:1	10000	4500
Oct.	2	2800		180			21000	7300
				118(B)				
May	5	4					120	28
July	8	8					310	79
Oct.	2	500					300	30
				118(C)				
May	5	17					460	43
July	8	16					400	45
Oct.	2	280					250	68
				112(A)				
May	6	4700	350	110	20:1	3.2:1	1300	220
July	9	520	42	15	12:1	2.8:1	1500	520
Oct.	14	1800	180	20	10:1	9:1	4600	1300
				112(B)				
May	6	24					70	29
July	9	12					420	96
Oct.	14	45					590	78
				112(C)				
May	6	38					210	45
July	9	31					220	46
Oct.	14	63					800	57

TABLE III(g). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			106(A)				
Feb. 18	160	33	25	4.8:1	1.3:1	1000	65
May 6	130	2	2	65:1	1:1	440	76
July 9	650	32	24	20:1	1.3:1	920	430
Oct. 14	200	17	1	11:1	17:1	1200	350
			106(B)				
Feb. 18	17					3200	36
May 6	21					150	17
July 9	25					440	150
Oct. 14	91					430	100
			106(C)				
May 6	20					760	250
July 9	16					360	140
Oct. 14	69					400	57
			106(D)				
Feb. 21	6	6	< 1	1:1		1500	52
May 6	28	3	< 1	9.3:1		500	38
July 9	43	< 1				210	28
Oct. 14	65	6	< 1	11:1		460	42
			104(A)				
Feb. 18	110	29	130	3.8:1	0.2:1	920	54
May 6	60	< 1	5			94	25
July 9	130	14	5	10:1	2.8:1	290	260
Oct. 17	770	56	3	13:1	19:1	5500	1600
			104(B)				
Feb. 18	73					670	53
May 6	99					250	32
July 9	58					1100	190
Oct. 17	270					1300	530
			104(C)				
Feb. 21	24					950	10
May 6	27					660	43
July 9	42					580	64
Oct. 17	110					430	50
			98(A)				
Feb. 18	74	25	8	3:1	3.1:1		
May 6	110	< 1	< 1				
July 9	190	14	< 1	13:1			
Oct. 7	180	24	1	7.5:1	24:1		

TABLE III(i). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratio 1:2	Ratio 2:3	20°C	35°C
				98(B)				
Feb.	21	32					480	15
May	6	77					540	21
July	9	160					2000	500
Oct.	7	400					6500	110
				98(C)				
Feb.	21	24					380	4
May	6	60					960	67
July	9	80					1100	160
Oct.	7	150					1400	65
				84(A)				
Feb.	20	3200	930	260	3.4:1	3.6:1	7500	330
May	7	690					820	100
July	10	630					1600	210
Oct.	17	53					360	580
				83(A)				
May	7	7	2	< 1	3.5:1		140	27
July	10	72	5	1	14:1		530	70
Oct.	17	150	14	2	10:1		1100	290
				82(A)				
May	7	7					400	12
July	10	66					700	110
Oct.	17	98					260000	120
				80(A)				
Feb.	20	510	140	61	3.6:1	2.3:1	4900	150
May	7	1900	310	24	6.1:1	13:1	1500	130
July	10	500	60	16	8.3:1	3.6:1	390	180
Oct.	17	920	340	1	2.7:1	340:1	3700	700
				78(N)(A)				
Feb.	19	1300	310	25	4.2:1	12:1	7400	64
May	7	1300	660	17	2:1	39:1	820	500
July	10	9500	730	44	13:1	17:1	180000	780
Oct.	17	1800	340	5	5.3:1	68:1	1600	790

TABLE III(j). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1969.

DATE		DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
		Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
				78(N)(B)				
Feb.	19	74					6000	19
May	7	< 1					200	17
July	10	83					830	200
Oct.	17	120					1600	210
				78(S)(A)				
Feb.	19	43					2000	13
May	7	5					220	11
July	10	110					440	160
Oct.	17	100					1400	220
				78(S)(B)				
Feb.	19	39	6	5	6.5:1	1.2:1	4100	17
May	7	210					680	27
July	10	76					680	110
Oct.	17	170					330000	330
				77(A)				
Feb.	20	930	400	46	2.3:1	8.7:1	760	73
May	7	150	70	2	2.1:1	35:1	580	44
July	10	1300	17	19	76:1	0.9:1	250	120
Oct.	17	150	8	1	18:1	8:1	470	190
				77(B)				
Feb.	20	1100					750	100
May	7	230					930	91
July	10	3600					380	330
Oct.	17	180					190	82
				75(A)				
Feb.	19	760	300	32	2.5:1	9.4:1	7400	75
May	7	540	17	4	31:1	4.3:1	340	31
July	10	1900	40	1	47:1	40:1	40000	13000
Oct.	17	1600	83	1	19:1	83:1	46000	20000
				75(B)				
Feb.	19	39					2200	14
May	7	6					280	28
July	10	42					770	190
Oct.	17	78					920	120

TABLE IV (a). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			191(A)				
April 21	16	< 1	1			9100	130
July 6	7	2	2	3.5:1	1:1	35000	130
Aug. 31	17	3	6	5.7:1	0.5:1	430	1400
			191(B)				
April 21	4	1	< 1	4:1		880	13
July 6	14	3	< 1	4.7:1		1500	58
Aug. 31	97	4	1	24:1	4:1	38	60
			191(C)				
April 21	< 1	< 1	< 1			300	44
July 6	43	1	< 1	43:1		310	59
Aug. 31	33	3	1	11:1	3:1	65	220
			191(D)				
April 21	1	< 1	1			110	23
July 6	14	< 1	< 1			250	12
Aug. 31	4	< 1	< 1			75	200
			188(A)				
April 21	< 1	< 1	< 1			57	6
July 6	40	< 1	< 1			210	15
Aug. 31	3	< 1	< 1			46	140
			188(B)				
April 21	< 1	< 1	< 1			59	3
July 6	87	< 1	< 1			330	38
Aug. 31	7	< 1	1			39	100
			185(N)(A)				
April 21	9	2	< 1	4.5:1		240	44
July 6	34	1	< 1	34:1		1500	2
Aug. 31	55	5	2	11:1	2.5:1	43	200
			185(N)(B)				
April 21	75	23	9	3.1:1	2.6:1	610	17
July 6	29	< 1	< 1			430	5
Aug. 31	21	1	2	21:1	0.5:1	39	140
			185(N)(C)				
April 21	21	7	6	3:1	1.2:1	490	18
July 6	9	< 1	< 1			180	4
Aug. 31	36	< 1	< 1			36	150

TABLE IV (b). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			185(S)(A)				
April 21	< 1	< 1	< 1			42	16
July 6	43	1	1	43:1	1:1	310	40
Aug. 31	26	< 1	5			72	160
			185(S)(B)				
April 21	< 1	< 1	< 1			58	7
July 6	28	< 1	< 1			160	19
Aug. 31	16	1	1	16:1	1:1	140	430
			185(S)(C)				
April 21	14	8	1	1.7:1	8:1	92	15
July 6	100	< 1	< 1			500	16
Aug. 31	30	1	1	30:1	1:1	120	290
			172(A)				
April 21	1	1	< 1	1:1		75	10
July 7	41	< 1	< 1			260	10
Sept. 1	290	< 1	< 1			120	260
			172(B)				
April 22	< 1	< 1	< 1			300	30
July 7	16	< 1	< 1			230	1
Sept. 1	100	3	< 1	33:1		67	100
			172(C)				
April 22	< 1	< 1	< 1			180	7
July 7	21	< 1	1			480	8
Sept. 1	99	1	< 1	99:1		1000	230
			171(A)				
April 22	< 1	1	< 1			420	7
July 7	58	< 1	< 1			600	4
Sept. 1	50	2	< 1	25:1		78	160
			170(A)				
April 22	< 1	< 1	65			210	14
July 7	59	< 1	< 1			240	8
Sept. 1	43	5	< 1	8.6:1		94	160
			169(A)				
April 22	< 1	< 1	< 1			93	6
July 7	57	< 1	< 1			880	6
Sept. 1	30	1	1	30:1	1:1	120	130

TABLE IV (c). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			169(B)				
April 22	< 1	1	< 1			39	2
July 7	140	11	< 1	13:1		450	13
Sept. 1	440	130	9	3.3:1	14:1	87	160
			164(A)				
April 23	4	< 1	< 1			140	3
July 9	48	5	< 1	9.6:1		220	11
Sept. 2	16	< 1	1			90	300
			164(B)				
April 23	9	5	< 1	1.8:1		52	9
July 9	22	6	< 1	3.7:1		240	5
Sept. 2	14	2	< 1	7:1		100	380
			162(A)				
April 23	3	1	71	3:1		240	9
July 9	21	< 1	< 1			350	4
Sept. 2	33	< 1	< 1			110	210
			158(A)				
April 23	3	1	< 1	3:1		250	6
July 9	27	< 1	< 1			5600	13
Sept. 2	23	1	< 1	23:1		94	160
			158(B)				
April 23	3	2	< 1	1.5:1		28	5
July 9	33	1	< 1	33:1		270	12
Sept. 2	30	4	< 1	7.5:1		140	120
			158(C)				
April 23	57	20	1	2.9:1	20:1	110	8
July 9	220	84	5	2.6:1	17:1	330	15
Sept. 2	600	47	1	13:1	47:1	140	270
			140(A)				
April 27	1	< 1	< 1			63	2
July 13	73	4	2	18:1	2:1	84	8
Sept. 3	40	1	< 1	40:1		38	
			140(B)				
April 27	1	2	1	0.5:1	2:1	47	3
July 13	60	< 1	< 1			160	9
Sept. 3	43	1	< 1	43:1		35	

TABLE IV (d). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			140(C)				
April 27	< 1	1	< 1			72	< 1
July 13	50	2	< 1	25:1		230	14
Sept. 3	36	3	< 1	12:1		51	
			136(A)				
April 27	8	3	< 1	2.7:1		130	1
July 13	350	90	33	3.8:1	2.7:1	150	180
Sept. 3	230	61	5	3.8:1	12:1	100	
			136(B)				
April 27	1	< 1	< 1			140	6
July 13	45	2	< 1	22:1		340	18
Sept. 3	13	3	< 1	4.3:1		29	
			136(C)				
April 27	9	1	< 1	9:1		48	2
July 13	51	5	< 1	10:1		130	< 1
Sept. 3	36	1	< 1	36:1		51	
			132(A)				
April 27	19	8	< 1	2.4:1		220	3
July 13	200	30	3	6.7:1	10:1	1000	83
Sept. 3	62	9	3	6.8:1	3:1	41	
			131(A)				
April 27	15	10	3	1.5:1	3.3:1	300	7
July 13	280	26	5	11:1	5.2:1	510	1400
Sept. 3	50	5	1	10:1	5:1	40	
			129(A)				
April 28	10	3	< 1	3.3:1		810	460
July 14	270	11	5	24:1	2.2:1	2500	490
Sept. 8	110	12	< 1	9.2:1		530	2000
			129(B)				
April 28	7	2	1	3.5:1	2:1	82	4
July 14	60	4	2	15:1	2:1	85	17
Sept. 8	41	5	< 1	8.2:1		14	230
			129(C)				
April 28	1	< 1	< 1			57	5
July 14	58	5	1	12:1	5:1	320	14
Sept. 8	33	1	1	33:1	1:1	30	200

TABLE IV (e). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			127(A)				
April 28	160	78	24	2.1:1	3.3:1	10000	51
July 14	1000	50	33	20:1	1.5:1	56000	1300
Sept. 8	480	29	32	17:1	0.9:1	380	680
			126(A)				
April 28	220	63	33	3.5:1	1.9:1	250	210
July 14	1300	320	48	4.1:1	6.7:1	5300	1300
Sept. 8	350	100	17	3.5:1	5.9:1	27000	470
			126(B)				
April 28	7	1	< 1	7:1		71	4
July 14	35	2	3	18:1	0.7:1	290	11
Sept. 8	60	3	1	20:1	3:1	270	40
			126(C)				
April 28	140	70	6	2:1	12:1	7000	26
July 14	490	46	11	11:1	4.5:1	7100	77
Sept. 8	90	2	1	45:1	2:1	1100	58
			126(D)				
April 28	31	10	4	3.1:1	2.5:1	3800	12
July 14	450	20	6	23:1	3.3:1	2400	82
Sept. 8	490	11	1	45:1	11:1	20000	160
			118(A)				
April 28	65	28	1	2.3:1	28:1	180	130
July 14	420	51	13	8.2:1	3.9:1	2800	650
Sept. 8	130	60	20	2.2:1	3:1	56000	920
			118(B)				
April 28	7	6	2	1.2:1	3:1	100	17
July 14	50	8	1	6.3:1	8:1	1900	1900
Sept. 8	75	2	< 1	38:1		430	41
			118(C)				
April 28	19	11	4	1.7:1	2.8:1	1500	38
July 14	160	118	4	1.4:1	30:1	360	24
Sept. 8	40	6	< 1	6.7:1	1.5:1	2200	61
			112(A)				
April 29	150	44	12	3.4:1	3.7:1	200	77
July 15	230	25	24	9.2:1	1:1	860	
Sept. 9	180	30	6	6:1	5:1	2700	210

TABLE IV (f). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			112(B)				
April 29	4	3	< 1	1.3:1		340	24
July 15	56	4	1	14:1	4:1	460	
Sept. 9	85	8	< 2	11:1		1200	46
			112(C)				
April 29	16	7	< 1	2.3:1		1300	14
July 15	130	3	3	43:1	1:1	1100	
Sept. 9	60	4	2	15:1	2:1	4100	74
			106(A)				
April 29	50	10	2	5:1	5:1	430	58
July 15	140	17	4	8.2:1	4.3:1	850	
Sept. 9	1200	25	6	48:1	4.2:1	490	360
			106(B)				
April 29	18	2	2	9:1	1:1	400	8
July 15	70	6	2	12:1	3:1	160	
Sept. 9	85	2	< 2	43:1		2300	120
			106(C)				
April 29	9	3	< 1	3:1		710	15
July 15	140	5	1	28:1	5:1	610	
Sept. 9	360	8	< 2	45:1		1200	78
			106(D)				
April 29	25	7	< 1	3.6:1			13
July 15	150	8	1	19:1	8:1	890	
Sept. 9	160	< 1	2			2300	89
			104(A)				
April 29	86	23	5	3.7:1	4.6:1		65
July 15	180	16	5	11:1	3.2:1	640	
Sept. 9	1100	42	2	26:1	21:1	7500	280
			104(B)				
April 29	17	4	< 1	4.3:1		460	35
July 15	110	17	2	6.5:1	8.5:2	430	
Sept. 9	270	7	< 1	39:1		2800	100

TABLE IV (g). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			104(C)				
April 29	6	4	1	1.5:1	4:1	970	16
July 15	63	5	< 1	13:1		700	
Sept. 9	130	1	< 1	130:1		1600	69
			98(A)				
April 29	11	2	< 1	5.5:1		600	32
July 15	40	3	1	13:1	3:1	260	
Sept. 9	220	7	1	31:1	7:1	2400	120
			98(B)				
April 29	8	4	1	2:1	4:1	950	27
July 15	120	11	< 1	11:1		400	
Sept. 9	270	17	4	16:1	4.3:1	1000	120
			98(C)				
April 29	16	2	< 1	8:1		1100	10
July 15	73	8	< 1	9.1:1		1200	
Sept. 9	370	9	2	41:1	4.5:1	650	100
			84(A)				
April 30	240	83	15	2.9:1	5.5:1	400	89
July 16	880	40	6	22:1	6.7:1	1200	800
Sept. 10	1200	26	2	46:1	13:1	8000	1000
			83(A)				
April 30	13	4	< 1	3.3:1		260	22
July 16	130	14	1	9.3:1	14:1	1500	1400
Sept. 10	100	5	< 2	20:1		1100	150
			82(A)				
April 30	7	2	< 1	3.5:1		520	30
July 16	150	6	3	25:1	2:1	340	120
Sept. 10	73	3	< 2	24:1		1100	46
			80(A)				
April 30	460	130	52	3.5:1	2.5:1	420	63
July 16	1300	53	10	25:1	5.3:1	510	290
Sept. 10	660	56	12	12:1	4.7:1	680	280

TABLE IV (h). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1970.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			78(N)(A)				
April 30	280	33	142	8.5:1	0.2:1	340	59
July 16	4600	70	8	66:1	8.8:1	33000	19000
Sept. 10	3200	110	12	29:1	9.2:1	100000	7900
			78(N)(B)				
April 30	1	2	< 1	0.5:1		370	14
July 16	120	5	< 1	24:1		320	140
Sept. 10	1300	160	10	8.1:1	16:1	1500	50
			78(S)(A)				
April 30	9	1	1	9:1	1:1	620	14
July 16	190	5	3	38:1	1.7:1	260	260
Sept. 10	46	< 2	2			110	60
			78(S)(B)				
April 30	120	39	5	3.1:1	7.8:1	630	30
July 16	260	7	2	37:1	3.5:1	560	110
Sept. 10	150	6	4	25:1	1.5:1	740	88
			77(A)				
April 30	180	36	15	5:1	7.2:1	520	53
July 16	1100	71	22	15:1	3.2:1	680	320
Sept. 10	1300	160	8	8.1:1	20:1	1300	160
			77(B)				
April 30	180	46	9	3.9:1	5.1:1	510	73
July 16	1800	66	18	27:1	3.7:1	850	410
Sept. 10	700	170	12	4.1:1	14:1	1500	160
			75(A)				
April 30	560	140	95	40:1	1.5:1	610	92
July 16	3400	60	< 2	57:1		200000	33000
Sept. 10	2800	110	16	25:1	6.9:1	680000	18000
			75(B)				
April 30	17	7	3	2.4:1	2.3:1	690	23
July 16	370	2	1	185:1	2:1	340	150
Sept. 10	40	< 1	< 2			1600	31

TABLE V (a). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			191(A)				
May 10	66	3	< 1	22:1		480	63
July 5	3	< 1	< 1			19000	120
Sept. 21	100	8	2	13:1	4:1	>30000	6200
			191(B)				
May 10	31	< 1	< 1			2100	44
July 5	3	< 1	< 1			200	19
Sept. 21	160	2	< 1	80:1		240	93
			191(C)				
May 10	< 1	< 1	< 1			110	8
July 5	15	< 1	< 1			210	77
Sept. 21	220	10	8	22:1	1.3:1	590	240
			191(D)				
May 10	1	< 1	< 1			130	7
July 5	< 1	< 1	< 1			40	11
Sept. 21	33	0	< 1			130	38
			188(A)				
May 10	< 1	< 1	< 1			82	7
July 5	2	1	1	2:1	1:1	11	10
Sept. 20	39	< 1	< 1			110	12
			188(B)				
May 10	1	< 1	< 1			130	7
July 5	1	< 1	< 1			36	6
Sept. 20	10	< 1	< 1			41	13
			185(N)(A)				
May 10	12	< 1	< 1			220	6
July 5	4	< 1	< 1			2300	5
Sept. 20	160	3	1	53:1	3:1	510	380
			185(N)(B)				
May 10	100	4	< 1	25:1		320	20
July 5	< 1	< 1	< 1			89	8
Sept. 20	56	< 1	< 1			410	170
			185(N)(C)				
May 10	11	< 1	< 1			84	13
July 5	< 1	< 1	< 1			60	26
Sept. 20	41	< 1	< 1			310	51

TABLE V (b). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			185(S)(A)				
May 10	< 1	< 1	< 1			91	8
July 5	5	< 1	< 1			160	13
Sept. 21	130	13	2	10:1	6.5:1	330	120
			185(S)(B)				
May 10	< 1	< 1	< 1			280	15
July 5	2	< 1	< 1			140	5
Sept. 21	43	4	< 1	11:1		270	50
			185(S)(C)				
May 10	1	< 1	< 1			16	12
July 5	2	< 1	< 1			580	6
Sept. 21	41	6	1	6.8:1	6:1	340	82
			172(A)				
May 11	18	< 1	< 1			1200	4
July 6	120	< 1	1			650	110
Sept. 20	520	33	1	16:1	33:1	1700	260
			172(B)				
May 11	2	< 1	< 1			350	8
July 6	14	< 1	< 1			180	26
Sept. 20	43	5	2	8.6:1	2.5:1	230	90
			172(C)				
May 11	1	< 1	< 1			110	4
July 6	30	2	2	15:1	1:1	330	48
Sept. 20	190	11	< 1	17:1		1200	80
			171(A)				
May 11	1	< 1	< 1			190	8
July 6	4	2	< 1	2:1		31	17
Sept. 20	17	< 1	< 1			100	25
			170(A)				
May 11	36	8	1	4.5:1	8:1	1100	44
July 6	65	< 1	< 1			270	67
Sept. 20	130	3	2	43:1	1.5:1	540	70
			169(A)				
May 11	1	< 1	< 1			95	11
July 6	100	12	1	8.3:1	12:1	110	57
Sept. 20	47	6	1	7.8:1	6:1	81	16

TABLE V (c). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			169(B)				
May 11	290	72	7	4.0:1	10:1	200	12
July 6			No Sample Submitted				
Sept. 20	32	1	1	32:1	1:1	80	16
			164(A)				
May 11	2	1	< 1	2:1		130	7
July 6	27	7	1	3.9:1	7:1	35	24
Sept. 20	68	5	4	14:1	1.3:1	330	39
			164(B)				
May 11	19	3	< 1	6.3:1		230	6
July 6	51	7	1	7.3:1	7:1	140	68
Sept. 20	100	7	< 1	14:1		260	57
			162(A)				
May 11	3	< 1	< 1			180	9
July 6	26	3	2	8.7:1	1.5:1	120	65
Sept. 20	65	5	1	13:1	5:1	330	54
			158(A)				
May 11	4	< 1	< 1			210	11
July 6	31	< 1	1			150	70
Sept. 20	48	1	1	48:1	1:1	330	77
			158(B)				
May 11	51	2	< 1	26:1		93	15
July 6	150	11	2	14:1	5.5:1	110	69
Sept. 20	28	3	3	9.3:1	1:1	160	22
			158(C)				
May 11	29	12	2	2.4:1	6:1	180	8
July 6	390	32	4	12:1	8:1	100	50
Sept. 20	41	23	4	1.8:1	5.8:1	200	71
			140(A)				
May 12	3	1	< 1	3:1		300	13
July 7	17	5	2	1.8:1	2.5:1	200	130
Sept. 22	37	5	< 1	7.4:1		210	40
			140(B)				
May 12	7	< 1	< 1			200	5
July 7	15	< 1	< 1			110	39
Sept. 22	47	3	< 1	16:1		140	36

TABLE V (d). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			140(C)				
May 12	8	< 1	1			160	18
July 7	24	1	< 1	24:1		120	61
Sept. 22	31	3	< 1	10:1		170	48
			136(A)				
May 12	110	42	1	2.6:1	42:1	160	16
July 7	250	34	1	7.4:1	34:1	170	120
Sept. 22	240	72	3	3.3:1	24:1	230	86
			136(B)				
May 12	3	< 1	< 1			180	10
July 7	15	1	< 1	15:1		150	77
Sept. 22	45	4	1	11:1	4:1	160	30
			136(C)				
May 12	13	< 1	< 1			220	14
July 7	42	1	2	42:1	0.5:1	150	86
Sept. 22	32	5	< 1	6.4:1		150	44
			132(A)				
May 12	22	9	3	2.4:1	3:1	250	25
July 7	220	16	2	14:1	8:1	130	100
Sept. 22	120	6	3	20:1	2:1	210	63
			131(A)				
May 12	33	4	< 1	8.3:1		220	10
July 7	120	9	1	13:1	9:1	580	95
Sept. 22	140	8	1	18:1	8:1	3400	> 500
			129(A)				
May 13	64	15	4	4.3:1	3.8:1	80	99
July 8	42	4	3	11:1	1.3:1	350	180
Sept. 23	70	4	1	18:1	4:1	250	45
			129(B)				
May 13	17	< 1	< 1			170	120
July 8	42	4	1	11:1	4:1	250	22
Sept. 23	40	2	< 1	20:1		200	54
			129(C)				
May 13	26	2	< 1	13:1		530	170
July 8	13	< 1	4			130	18
Sept. 23	37	4	< 1	9.3:1		170	24

TABLE V (e). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			127(A)				
May 13	510	79	8	6.5:1	9.9:1	1300	110
July 8	750	24	14	31:1	1.7:1	740	740
Sept. 23	1500	35	81	43:1	0.4:1	63000	>5000
			126(A)				
May 13	1300	270	51	4.8:1	5.3:1	640	920
July 8	650	130	15	5:1	8.7:1	630	120
Sept. 23	2800	400	19	7:1	21:1	2400	1300
			126(B)				
May 13	29	2	< 1	15:1		390	200
July 8	24	2	1	12:1	2:1	110	30
Sept. 23	27	2	< 1	14:1		180	30
			126(C)				
May 13	290	43	9	6.7:1	4.8:1	680	110
July 8	140	5	4	28:1	1.3:1	530	330
Sept. 23	150	10	< 1			1500	540
			126(D)				
May 13	250	17	< 1	15:1		730	290
July 8	40	2	6	20:1	0.3:1	1900	590
Sept. 23	90	6	< 1	15:1		2000	720
			118(A)				
May 13	1500	130	9	12:1	14:1	380	410
July 8	130	16	5	8.1:1	3.2:1	470	120
Sept. 23	750	91	8	8.2:1	11:1	1900	100
			118(B)				
May 13	13	4	1	3.3:1	4:1	33	47
July 8	15	1	1	15:1	1:1	250	1500
Sept. 23	60	4	< 1	15:1		180	80
			118(C)				
May 13	110	10	6	11:1	1.7:1	320	72
July 8	11	2	4	5.5:1	0.5:1	310	64
Sept. 23	90	2	< 1	45:1		400	170
			112(A)				
May 14	740	95	< 1	7.8:1		3900	120
July 9	80	9	8	8.9:1	1.1:1	380	1200
Sept. 24	2300	120	30	19:1	4:1	2400	730

TABLE V (f). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			112(B)				
May 14	25	3	< 1	8.3:1		76	12
July 9	30	2	3	15:1	0.7:1	160	44
Sept. 24	160	6	2	27:1	3:1	400	110
			112(C)				
May 14	61	5	< 1	12:1		490	28
July 9	42	2	12	21:1	2:1	470	86
Sept. 24	95	6	< 1	16:1		1900	280
			106(A)				
May 14	240	7	< 1	34:1		1900	78
July 9	350	20	12	18:1	1.7:1	280	73
Sept. 24	370	27	3	14:1	9:1	850	820
			106(B)				
May 14	120	4	3	30:1	1.3:1	1800	450
July 9	33	1	6	33:1	0.2:1	290	66
Sept. 24	70	4	< 1	18:1		270	230
			106(C)				
May 14	66	1	1	66:1	1:1	610	360
July 9	40	< 1	3			310	59
Sept. 24	85	3	< 1	28:1		440	120
			106(D)				
May 14	76	4	< 1			420	45
July 9	35	3	10	12:1	0.3:1	500	65
Sept. 24	90	1	1	90:1	1:1	500	170
			104(A)				
May 14	290	9	5	32:1	1.8:1	1800	150
July 9	130	10	14	13:1	0.7:1	260	53
Sept. 24	480	36	< 1	13:1		830	550
			104(B)				
May 14	66	6	< 1	11:1		670	40
July 9	72	3	8	24:1	0.4:1	330	56
Sept. 24	180	20	7	9:1	2.9:1	340	330

TABLE V (g). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			104(C)				
May 14	76	5	< 1	15:1		700	82
July 9	76	2	18	38:1	0.1:1	410	70
Sept. 24	52	4	< 1	13:1		370	180
			98(A)				
May 14	66	1	< 1	66:1		430	73
July 9	18	2	12	9:1	0.2:1	300	55
Sept. 24	76	10	< 1	7.6:1		210	190
			98(B)				
May 14	46	8	< 1	5.8:1		480	50
July 9	100	4	3	25:1	1.3:1	300	57
Sept. 24	210	13	< 1	16:1		600	270
			98(C)				
May 14	61	2	1	32:1	2:1	470	34
July 9	21	< 1	11			530	58
Sept. 24	52	1	< 1	52:1		240	140
			83(A)				
May 15	66	2	< 1	33:1		lost	lost
July 10	380	5	27	76:1	0.2:1	400	170
Sept. 25	110	3	< 1	37:1		190	120
			84(A)				
May 15	900	52	4	17:1	13:1	lost	lost
July 10	450	20	22	23:1	0.9:1	3100	4200
Sept. 25	1900	3	3	633:1	1:1	6600	7500
			82(A)				
May 15	70	3	1	23:1	3:1	lost	lost
July 10	40	3	6	13:1	0.5:1	220	68
Sept. 25	65	240	< 1	0.3:1		270	100
			80(A)				
May 15	870	98	9	8.9:1	11:1	lost	lost
July 10	850	46	50	18:1	0.9:1	590	570
Sept. 25	1200	96	17	13:1	5.6:1	3800	970

TABLE V (h). BACTERIOLOGICAL DATA, ST. LAWRENCE RIVER, 1971.

DATE	DENSITIES AND RATIOS PER 100 ML					SPC PER ML	
	Coliform MF (1)	Fecal Coliform MF (2)	Fecal Streptococcus MF (3)	Ratios 1:2	Ratios 2:3	20°C	35°C
			78(N)(A)				
May 15	1200	2	1	600:1	2:1	lost	lost
July 10	970	22	14	44:1	1.6:1	2600	580
Sept. 25	2000	19	1	105:1	19:1	4400	2500
			78(N)(B)				
May 15	64	< 1	< 1			lost	lost
July 10	24	1	10	24:1	0.1:1	150	20
Sept. 25	100	3	1	33:1	3:1	250	150
			78(S)(A)				
May 15	66	1	< 1	66:1		lost	lost
July 10	29	< 1	8			160	57
Sept. 25	93	8	< 1	12:1		350	180
			78(S)(B)				
May 15	520	40	19	13:1	2.1:1	lost	lost
July 10	58	6	16	9.7:1	0.4:1	190	96
Sept. 25	110	8	< 1	14:1		520	260
			77(A)				
May 15	670	51	8	13:1	6.4:1	lost	lost
July 10	880	30	16	29:1	1.9:1	400	300
Sept. 25	2500	170	35	15:1	4.9:1	1400	460
			77(B)				
May 15	900	50	11	18:1	4.5:1	lost	lost
July 10	930	26	20	36:1	1.4:1	370	240
Sept. 25	2900	220	53	13:1	4.2:1	1100	930
			75(A)				
May 15	700	< 1	< 1			lost	lost
July 10	830	11	12	75:1	0.9:1	70000	27000
Sept. 25	2200	63	2	35:1	32:1	220000	45000
			75(B)				
May 15	50	2	1	25:1	2:1	lost	lost
July 10	9	1	9	9:1	0.1:1	240	33
Sept. 25	70	8	< 1	8.8:1		260	130

TABLE VI (a). COLIFORM MF COUNT EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970 AND 1971.

Coliform Densities per 100 ml, Equal to or Greater Than	SAMPLING AREA											
	A				B				C			
	1968	1969	1970	1971	1968	1969	1970	1971	1968	1969	1970	1971
1	66.7	72.9	86.0	80.5	84.8	91.3	84.2	100	97.2	96.4	97.9	100
10	44.4	52.1	63.8	50.0	54.5	71.7	71.0	78.9	81.5	81.8	81.2	91.7
25	14.8	22.9	41.6	38.9	33.3	60.9	52.6	65.8	59.2	61.8	72.9	72.9
50	3.7	10.4	13.8	22.2	15.2	39.1	31.6	31.6	44.4	41.8	54.2	41.7
100	0	2.1	2.8	16.7	9.1	26.1	15.7	18.4	28.7	38.2	33.3	35.4
250	0	0	0	0	3.0	15.2	7.9	8.3	18.5	29.1	20.8	18.8
500	0	0	0	0	0	6.5	2.6	2.8	13.9	21.8	20.8	12.5
1000	0	0	0	0	0	4.3	0	0	5.6	9.1	4.2	6.3
2400	0	0	0	0	0	0	0	0	3.7	3.6	0	2.1
5000	0	0	0	0	0	0	0	0	0.9	1.8	0	0

Sampling Area A = 191, 188, 185(N), 185(S)
Sampling Area B = 172, 171, 170, 169, 164, 162, 158
Sampling Area C = 140, 136, 132, 131, 129, 127, 126

TABLE VI (b). COLIFORM MF COUNT EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970 AND 1971.

Coliform Densities per 100 ml, Equal to or Greater Than	SAMPLING AREA											
	D				E				A B C D E			
	1968	1969	1970	1971	1968	1969	1970	1971	1968	1969	1970	1971
1	98.5	100	100	100	98.3	97.8	97.2	100	93.5	92.0	95.8	96.6
10	92.3	94.6	89.6	100	95.0	97.8	86.1	97.2	77.5	78.4	80.1	84.9
25	76.9	76.8	77.1	87.5	85.0	89.1	80.5	94.4	66.1	62.4	66.0	72.8
50	58.5	60.7	70.8	72.9	76.7	80.4	77.8	88.9	47.1	46.8	49.7	51.9
100	52.3	39.3	45.8	35.4	66.7	63.0	72.2	63.9	36.9	33.6	37.2	34.0
250	32.3	19.6	14.6	16.7	46.7	63.0	41.7	55.6	23.9	20.8	18.3	19.4
500	23.1	14.3	14.6	8.3	31.7	41.3	33.3	50.0	16.7	16.4	8.9	14.1
1000	12.3	7.1	4.2	4.2	20.0	23.9	22.2	19.4	8.9	8.4	6.3	5.8
2400	3.1	3.6	0	0	3.3	6.5	5.6	5.6	2.7	2.8	1.0	1.5
5000	1.5	0	0	0	0	2.2	0	0	0.7	0.8	0	0

Sampling Area D = 118, 112, 106, 104, 98
Sampling Area E = 84, 83, 82, 80, 78(N), 78(S), 77, 75

In 1968 E = 84, 83(N), 83(S), 82(S), 80(S), 78(N), 78(S), 77(S), 75

TABLE VII(a). 20°C STANDARD PLATE COUNTS EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970 AND 1971.

20°C SPC Densities per ml, Equal to or Greater Than	SAMPLING AREA											
	A				B				C			
	1968	1969	1970	1971	1968	1969	1970	1971	1968	1969	1970	1971
10	100	100	100	100	100	100	100	100	100	100	100	100
50	84.6	95.3	97.2	86.1	100	97.8	94.9	94.7	100	100	95.0	100
100	63.9	76.7	83.3	72.2	86.7	65.2	87.2	84.2	95.8	94.8	77.5	95.8
500	33.3	20.9	22.2	19.4	6.7	23.9	10.3	15.8	58.3	46.6	40.0	31.3
1000	19.4	11.6	13.8	11.1	0	4.3	5.1	10.5	35.8	24.1	32.5	14.6
5000	8.3	7.0	13.8	5.6	0	0	2.6	0	11.7	17.2	17.5	2.1
10000	8.3	2.3	5.6	5.6	0	0	0	0	4.2	12.1	10.0	2.1
50000	5.6	2.3	0	0	0	0	0	0	4.2	0	2.5	2.1
100000	2.8	0	0	0	0	0	0	0	0.8	0	0	0

Sampling Area A = 191, 188, 185(N), 185(S)
Sampling Area B = 172, 171, 170, 169, 164, 162, 158
Sampling Area C = 140, 136, 132, 131, 129, 127, 126

TABLE VII(b). 20°C STANDARD PLATE COUNTS EXPRESSED AS A PERCENTAGE OF TOTAL COUNTS PERFORMED, ST. LAWRENCE RIVER, 1968, 1969, 1970 AND 1971.

20°C SPC Densities per ml, Equal to or Greater Than	SAMPLING AREA											
	D				E				A B C D E			
	1968	1969	1970	1971	1968	1969	1970	1971	1968	1969	1970	1971
10	100	100	100	100	100	100	100	100	100	100	100	100
50	100	100	100	100	100	100	100	100	98.2	98.8	97.5	95.4
100	100	96.5	100	95.8	100	100	100	100	91.7	87.6	89.8	88.7
500	75.8	52.6	67.4	33.3	91.5	71.7	72.2	44.0	56.9	44.0	43.1	27.2
1000	59.7	31.6	43.4	14.6	74.6	43.5	36.1	36.0	40.3	23.6	26.9	14.9
5000	22.6	8.8	2.2	0	13.6	19.6	13.9	12.0	12.0	10.8	8.6	3.1
10000	14.5	3.5	2.2	0	8.5	10.9	11.1	8.0	6.5	6.0	5.6	2.6
50000	14.5	0	0	0	6.8	6.5	8.3	8.0	2.8	1.6	2.5	0.5
100000	3.2	0	0	0	3.4	6.5	8.3	4.0	1.8	1.2	1.5	0

Sampling Area D = 118, 112, 106, 104, 98
Sampling Area E = 84, 83, 82, 80, 78(N), 78(S), 77, 75

In 1968 E = 84, 83(N), 83(S), 82(S), 80(S), 78(N), 78(S), 77(S), 75

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