

RESULTS OF 1969
WATER QUALITY MONITORING PROGRAM
LAKE HURON BASIN OFFICE
LHBO 33-A

APRIL 1970

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Great Lakes Region
Lake Huron Basin Office
Grosse Ile, Michigan

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INTRODUCTION

The Lake Huron Basin Office located in Grosse Ile, Michigan, administers the Federal Water Pollution Control Administration Programs in the Lake Huron drainage basin and Southeastern Michigan drainage basin to Lake Erie.

The primary goal of the Federal Water Pollution Control Administration is to enhance and maintain the quality of the water resources in the United States. In directing this effort, quantitative information is required on levels of water quality and how these levels vary over periods of time and how they compare to standards. The purpose of this report is to present information collected by the Lake Huron Basin Office during 1969 for use by pollution control agencies on improving the environment.

FIGURE 1

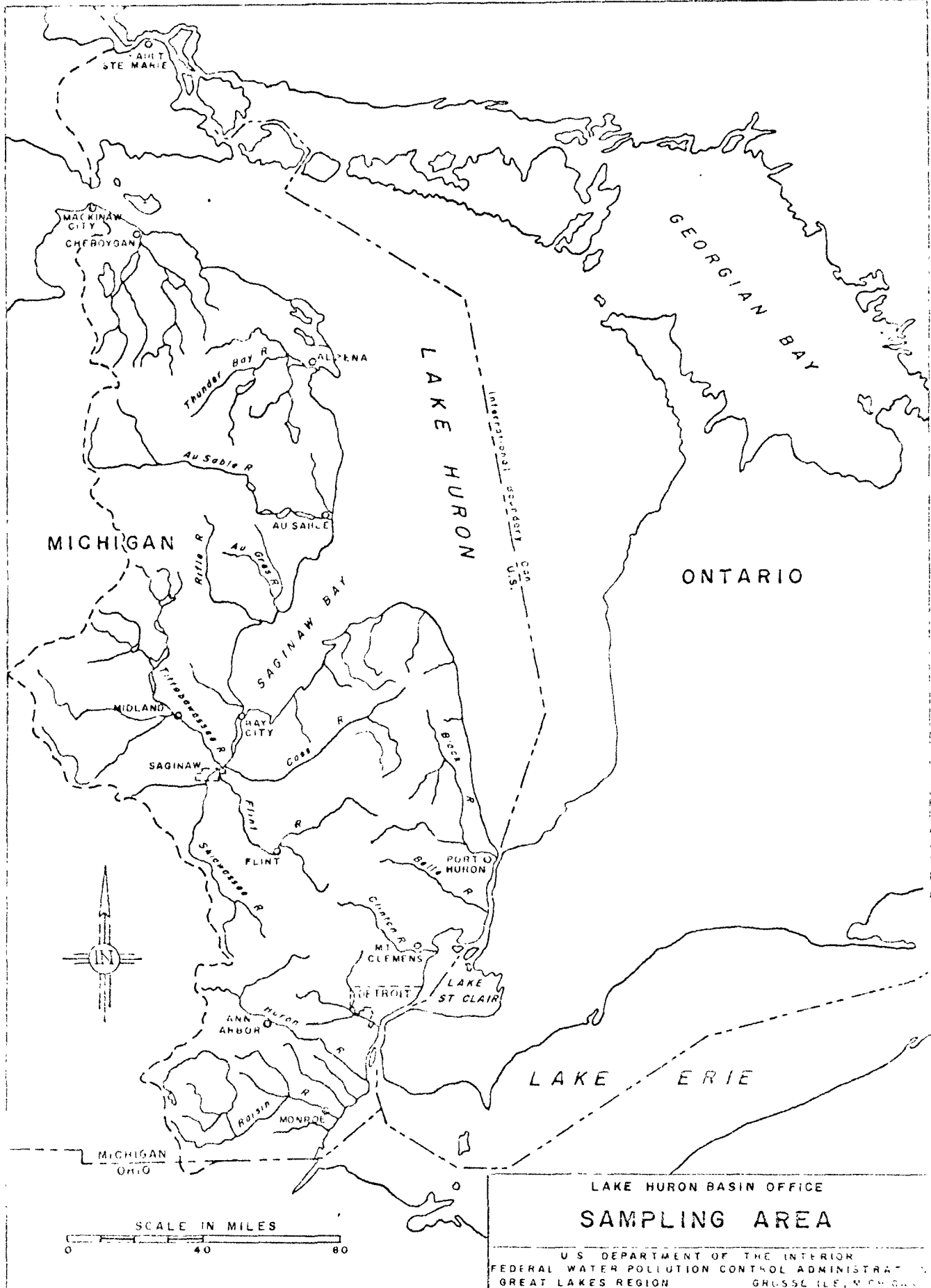


FIGURE 2

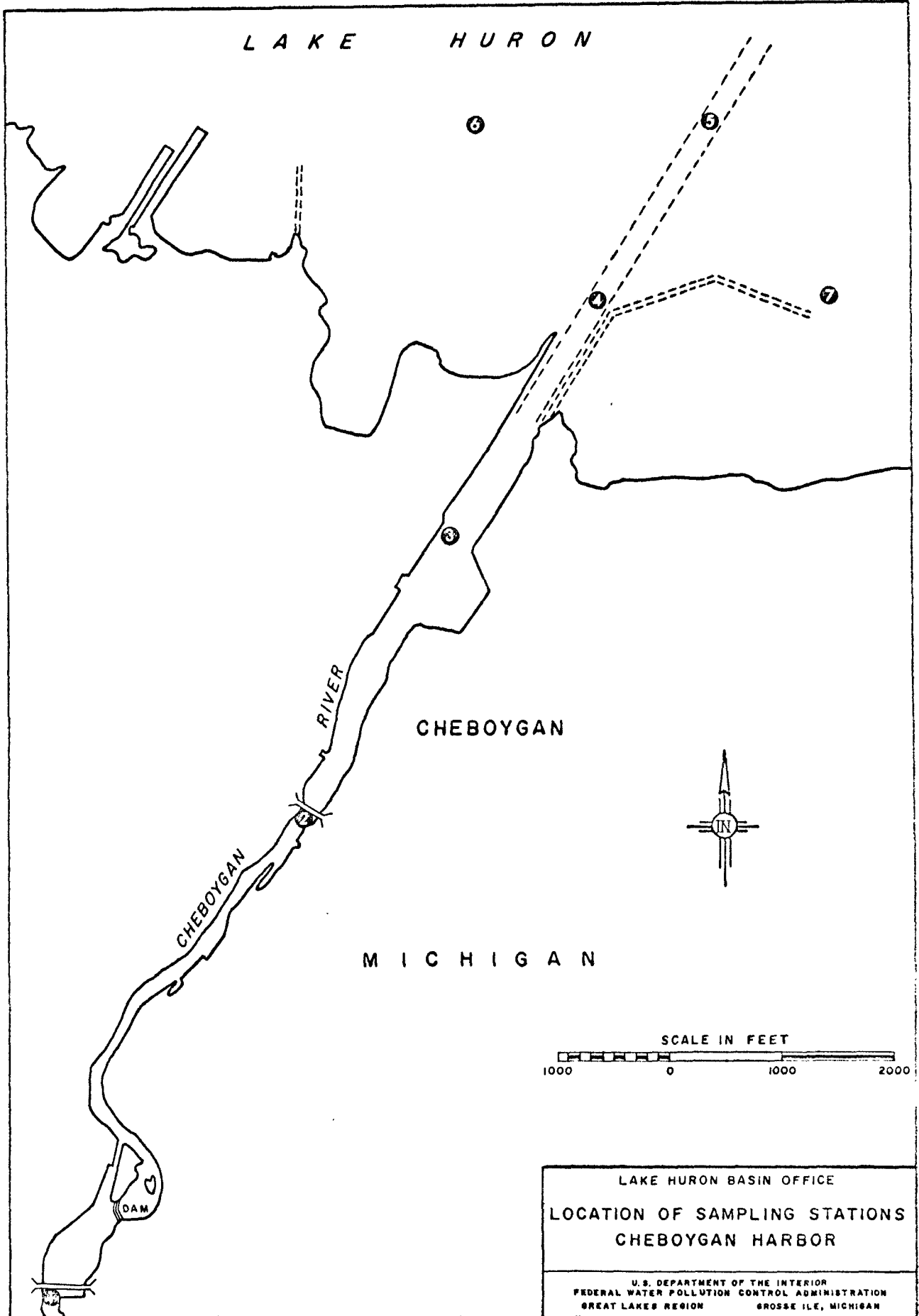


TABLE 1
1969 SAMPLE ANALYSIS RESULTS
Lake Huron: Cheboygan

Station:	<u>C-1</u>	<u>C-2</u>	<u>C-3</u>	<u>C-4</u>	<u>C-5</u>	<u>C-6</u>	<u>C-7</u>
<u>Date</u>							
			Parameter: Temperature (°C)				
7-15	21.0	22.5	22.0	19.0	18.0	18.5	19.0
9-3	21.5	21.5	21.5	20.5	19.0	19.5	20.0
			Parameter: pH				
7-15	8.3	8.1	8.4	8.4	8.4	8.4	8.4
9-3	8.4	8.3	8.4	8.3	8.5	8.5	8.4
			Parameter: Conductivity (umhos/cm)				
7-15	260	280	270	230	240	220	240
9-3	300	300	300	290	260	250	290
			Parameter: Chlorides (mg/l)				
9-3	3	3	4	4	6	6	4
			Parameter: Sulfates (mg/l)				
9-3	7	6	5	5	8	9	3
			Parameter: Alkalinity (mg/l)				
7-15	140	140	140	99	120	92	110
9-3	120	140	130	130	99	95	120

TABLE 1
1969 SAMPLE ANALYSIS RESULTS
Lake Huron: Cheboygan

FWPCA, LHBO

Station:	<u>C-1</u>	<u>C-2</u>	<u>C-3</u>	<u>C-4</u>	<u>C-5</u>	<u>C-6</u>	<u>C-7</u>
<u>Date</u>			Parameter: Nitrates (mg/l)				
7-15	<.1	<.1	<.1	<.1	<.1	<.1	<.1
9-3	<.1	<.1	<.1	<.1	<.1	<.1	<.1
			Parameter: Ammonia-N (mg/l)				
7-15	.08	.11	.11	.10	.07	.12	.10
9-3	.07	<.05	<.05	<.05	.05	<.05	<.05
			Parameter: Organic-N (mg/l)				
7-15	.22	.22	.24	.27	.20	.20	.22
9-3	.41	.36	.41	.39	.25	.31	.27
			Parameter: Total Phosphorus (mg/l)				
7-15	.007	.87	.08	.02	.01	.01	.02
9-3	.02	.06	.08	.03	.02	.04	.03
			Parameter: Total Soluble Phosphorus (mg/l)				
7-15	.003	.74	.08	.02	.008	.005	.005
9-3	.008	.03	.08	.03	.02	.03	.02
			Parameter: Iron (ug/l)				
7-15	70	90	110	60	90	40	50
9-3	80	80	70	60	30	30	50

TABLE 1
1969 SAMPLE ANALYSIS RESULTS
Lake Huron: Cheboygan

FWPCA, LHBO

Station:	<u>C-1</u>	<u>C-2</u>	<u>C-3</u>	<u>C-4</u>	<u>C-5</u>	<u>C-6</u>	<u>C-7</u>
<u>Date</u>							
7-15	1	3	2	1	1	1	2
9-3	2	2	1	1	.5	<.1	2
			Parameter: Turbidity (JCU)				
			Parameter: Suspended Solids (mg/l)				
7-15	3	5	5	2	2	2	1
9-3	6	4	5	5	1	2	4
			Parameter: Total Solids (mg/l)				
7-15	200	200	200	170	180	160	160
9-3	180	190	180	180	160	180	160
			Parameter: Dissolved Solids (mg/l)				
7-15	200	200	200	170	180	160	160
9-3	180	190	180	170	150	180	160

FIGURE 3

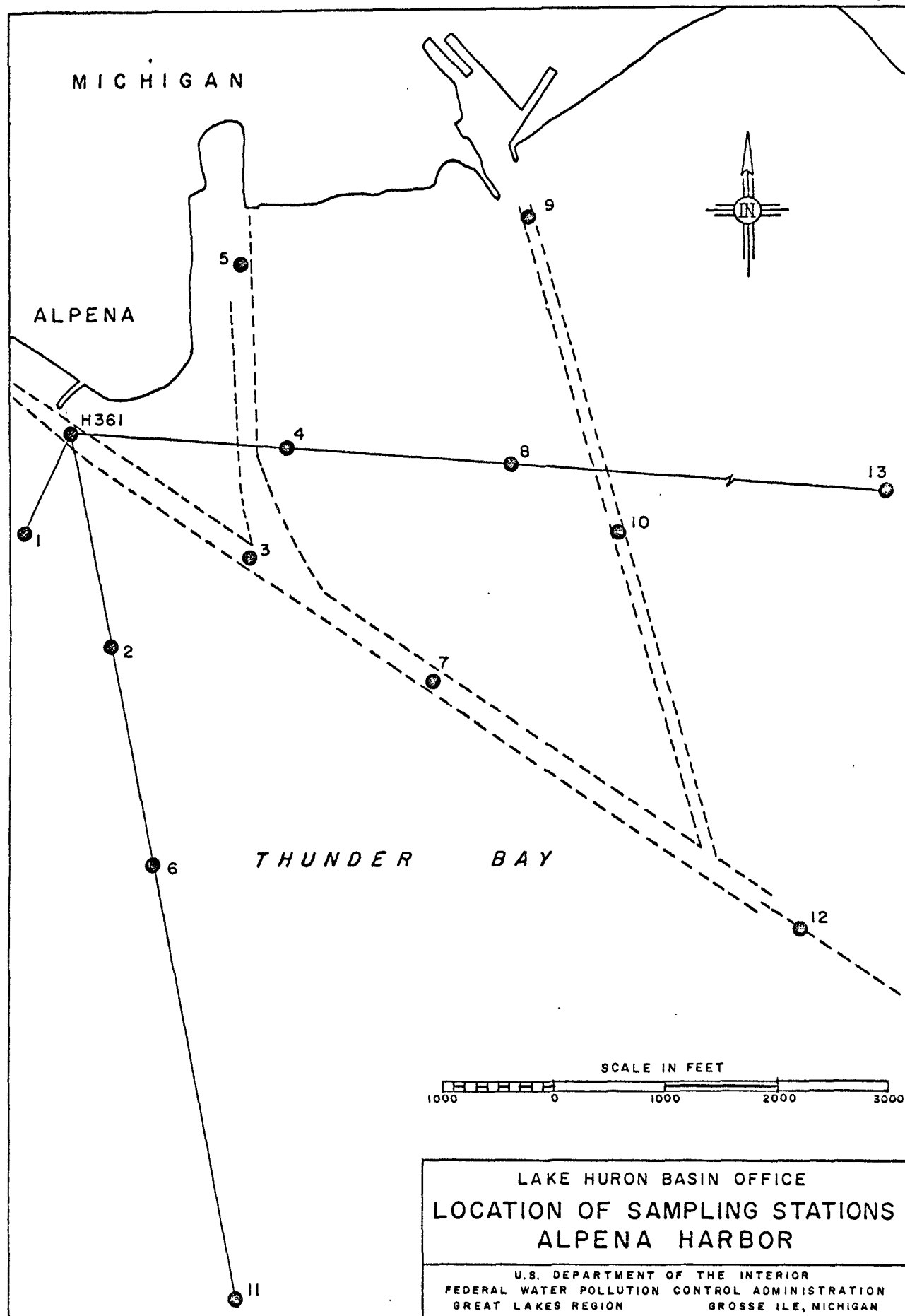


TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

FWPCA, LHBO										
Station:	Alp. <u>68-1</u>	Alp. <u>68-2</u>	Alp. <u>68-3</u>	Alp. <u>68-4</u>	Alp. <u>68-5</u>	Alp. <u>68-6</u>	Alp. <u>68-7</u>	Alp. <u>68-8</u>	Alp. <u>68-9</u>	H-361
Date	Parameter: Temperature (C°)									
7-15	23.0	23.0	22.5	22.5	22.0	22.5	22.5	21.5	22.0	22.5
9-3	22.0	22.5	23.5	22.0	21.5	21.5	21.5	22.0	22.5	23.0
	Parameter: Conductivity (umhos/cm)									
7-15	260	240	250	220	220	230	220	220	220	230
9-3	290	310	250	250	230	220	210	200	210	340
	Parameter: pH									
7-15	8.3	8.2	8.2	8.4	8.3	8.3	8.3	8.4	8.4	8.2
9-3	7.8	8.2	7.8	8.0	8.1	8.2	8.4	8.4	8.3	8.3
	Parameter: Chlorides (mg/l)									
9-3	6	6	5	4	5	5	4	4	5	4
	Parameter: Sulfate (mg/l)									
9-3	7	7	20	12	5	5	3	2	2	7
	Parameter: Alkalinity (mg/l)									
7-15	120	100	120	97	96	100	98	92	98	110
9-3	120	130	86	100	85	88	77	75	75	150

TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

FWPCA, LHBO

Station:	Alp. 68-10	Alp. 68-11	Alp. 68-12	Alp. 68-13
<u>Date</u>	Parameter: Temperature (°C)			
7-15	21.5	22.0	21.5	21.5
9-3	21.5	21.0	20.5	21.5
	Parameter: Conductivity (umhos/cm)			
7-15	220	220	210	220
9-3	210	300	300	210
	Parameter: pH			
7-15	8.4	8.4	8.4	8.4
9-3	8.5	8.5	8.2	8.5
	Parameter: Chlorides (mg/l)			
9-3	5	4	5	4
	Parameter: Sulfates (mg/l)			
9-3	2	1	2	3
	Parameter: Alkalinity (mg/l)			
7-15	96	92	93	93
9-3	75	63	74	76

TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

Station:		Alp. <u>68-1</u>	Alp. <u>68-2</u>	Alp. <u>68-3</u>	Alp. <u>68-4</u>	Alp. <u>68-5</u>	Alp. <u>68-6</u>	Alp. <u>68-7</u>	Alp. <u>68-8</u>	Alp. <u>68-9</u>	H-361
<u>Date</u>		Parameter: Nitrate (mg/l)									
7-15	9-3	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	.1	< .1
		.1	< .1	.1	< .1	< .1	< .1	.1	.1	.1	< .1
Parameter: Ammonia-N (mg/l)											
7-15	9-3	.20	.11	.13	.14	.15	.16	.12	.11	.13	.11
		.05	.05	.09	.05	.05	.05	.06	.05	.09	.05
Parameter: Organic-N (mg/l)											
7-15	9-3	.34	.31	.39	.33	.32	.31	.32	.28	.35	.38
		.45	.38	.41	.34	.27	.21	.15	.21	.14	.42
Parameter: Total Phosphorus (mg/l)											
7-15	9-3	.04	.02	.02	.03	.02	.03	.03	.02	.02	.03
		.14	.04	.12	.11	.09	.03	.10	.10	.05	.02
Parameter: Total Soluble Phosphorus (mg/l)											
7-15	9-3	.02	.008	.006	.01	.008	.02	.01	.006	.008	.01
		.11	.03	.05	.11	.09	.02	.10	.09	.05	.02

TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

FWPCA, LHBO

Station:	Alp. <u>68-10</u>	Alp. <u>68-11</u>	Alp. <u>68-12</u>	Alp. <u>68-13</u>	
Date	Parameter: Nitrate (mg/l)				
7-15	.1	.1	.1	.1	
9-3	.1	.1	.1	.1	
	Parameter: Ammonia-N (mg/l)				
7-15	.11	.10	.10	.10	
9-3	.08	.08	.10	.08	
	Parameter: Organic-N (mg/l)				
7-15	.27	.28	.27	.27	
9-3	.14	.13	.18	.16	
	Parameter: Total Phosphorus (mg/l)				
7-15	.02	.02	.01	.01	
9-3	.08	.06	.36	.07	
	Parameter: Total Sol. Phosphorus (mg/l)				
7-15	.009	.006	.004	.004	
9-3	.08	.06	.35	.06	

TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

Station:	Alp. <u>68-1</u>	Alp. <u>68-2</u>	Alp. <u>68-3</u>	Alp. <u>68-4</u>	Alp. <u>68-5</u>	Alp. <u>68-6</u>	Alp. <u>68-7</u>	Alp. <u>68-8</u>	Alp. <u>68-9</u>	H-361
<u>Date</u>	Parameter: Iron (ug/l)									
7-15	100	90	480	80	60	70	60	50	60	80
9-3	80	70	260	70	80	60	30	30	70	80
12	Parameter: Turbidity (JCU)									
	7-15	1	2	1	1	1	1	1	1	1
	9-3	1	.5	.8	2	1	1	.1	1	2
	Parameter: Total Solids (mg/l)									
7-15	180	160	180	140	170	150	140	160	170	160
9-3	180	190	180	150	140	160	120	130	130	200
	Parameter: Dissolved Solids (mg/l)									
	7-15	180	150	170	140	160	140	150	160	160
	9-3	180	190	160	150	140	150	120	130	200
	Parameter: Suspended Solids: (mg/l)									
7-15	2	4	7	1	1	1	2	1	8	1
9-3	3	1	13	2	2	3	1	3	2	4

TABLE 2
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Alpena

FWPCA, LHBO

Station:	Alp. <u>68-10</u>	Alp. <u>68-11</u>	Alp. <u>68-12</u>	Alp. <u>68-13</u>	
<u>Date</u>					Parameter: Iron (ug/l)
7-15	40	50	40	50	
9-3	30	20	20	390	
					Parameter: Turbidity (JCU)
7-15	1	1	.5	.7	
9-3	.7	1	1	2	
					Parameter: Total Solids (mg/l)
7-15	160	170	150	170	
9-3	120	120	120	150	
					Parameter: Dissolved Solids (mg/l)
7-15	160	160	150	170	
9-3	120	120	120	120	
					Parameter: Suspended Solids (mg/l)
7-15	4	9	2	4	
9-3	1	1	3	28	

FIGURE 4

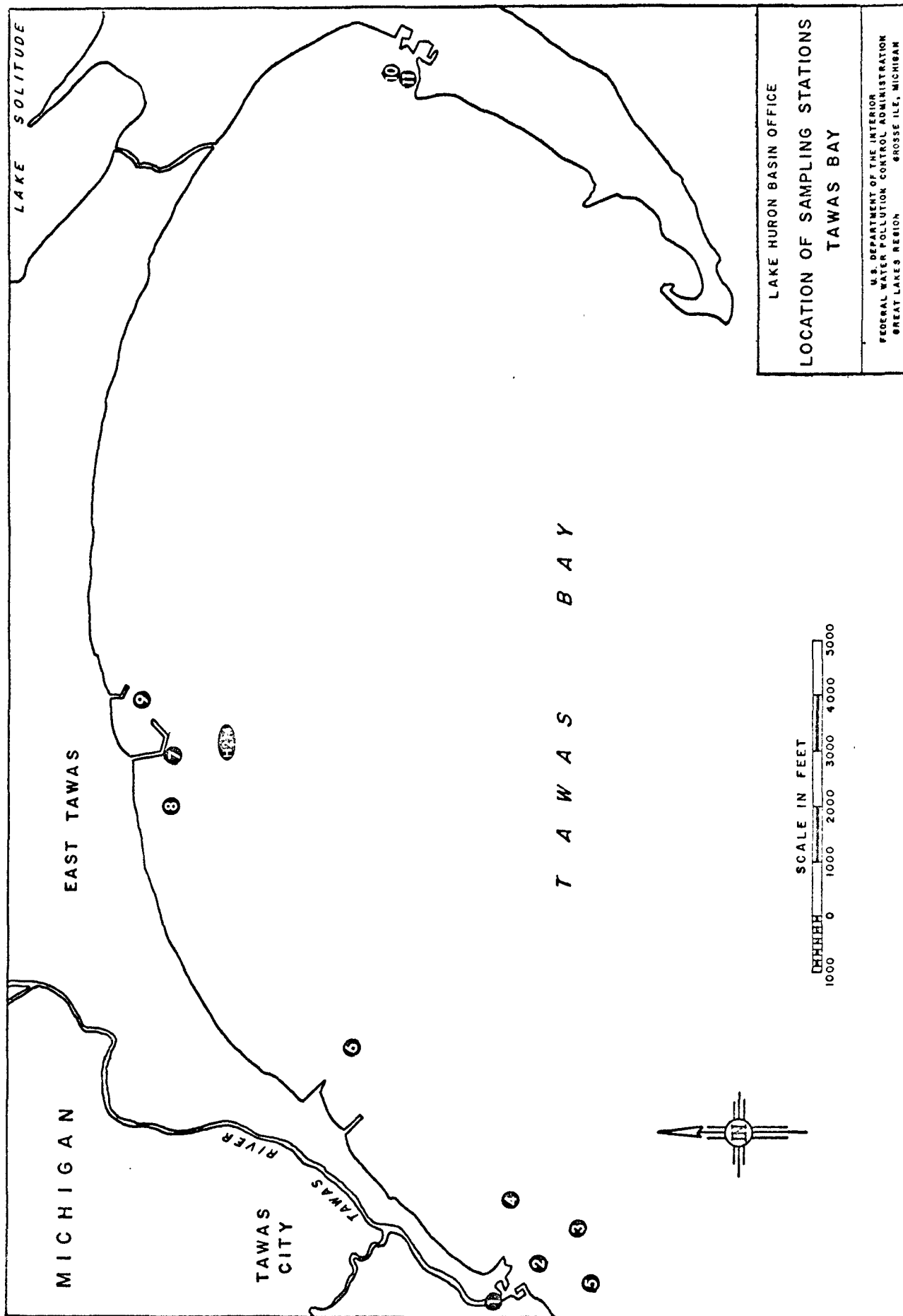


TABLE 3
1969 SAMPLE ANALYSIS RESULTS
Tawas Bay

FWPCA, LHBO

Station:	<u>T-1</u>	<u>T-2</u>	<u>T-3</u>	<u>T-4</u>	<u>T-5</u>	<u>T-6</u>	<u>T-7</u>	<u>T-8</u>	<u>T-9</u>	<u>T-10</u>	<u>T-11</u>	<u>H-214</u>
Date												
	25.5	22.5	22.0	22.0	22.5	22.5	23.0	23.5	24.5	23.0	23.0	23.0
7-16	21.0	20.5	21.0	21.0	21.0	20.5	20.5	20.5	20.5	19.5	19.5	20.5
9-4												
	7.8	8.2	8.2	8.2	8.1	8.2	8.3	8.2	8.2	8.1	8.2	8.2
7-16	7.8	8.1	8.6	8.7	8.7	8.6	8.6	8.5	8.6	8.4	8.5	8.6
9-4												
	4.6	6.8	8.4	8.6	8.7	8.4	8.5	8.5	8.4	7.8	8.2	8.6
9-4												
	52	76	95	97	98	94	95	95	94	86	90	96
9-4												
	240	220	210	210	200	210	200	210	200	200	200	200
7-16	320	270	230	220	230	220	220	220	220	220	220	210
9-4												
	4	7	8	7	7	7	7	7	7	8	8	7
7-16	6	7	6	6	7	7	7	7	7	7	7	7
9-4												

TABLE 3

1969 SAMPLE ANALYSIS RESULTS

Tawas Bay

FWPCA, LHBO

Station:	<u>T-1</u>	<u>T-2</u>	<u>T-3</u>	<u>T-4</u>	<u>T-5</u>	<u>T-6</u>	<u>T-7</u>	<u>T-8</u>	<u>T-9</u>	<u>T-10</u>	<u>T-11</u>	<u>H-214</u>
<u>Date</u>												
7-16	9	10	9	10	8	10	10	10	10	10	10	10
9-4	13	17	15	15	15	14	14	13	12	13	14	15
					Parameter: Sulfates (mg/l)							
7-16	120	87	88	79	88	83	83	80	82	82	82	81
					Parameter: Alkalinity (mg/l)							
7-16	.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
9-4	.1	.1	<.1	.1	<.1	<.1	.1	.1	.1	.1	.1	.1
					Parameter: Nitrates (mg/l)							
7-16	.36	.17	.14	.08	.14	.10	.10	.23	.12	.10	.13	.13
9-4	.42	.25	.12	.09	.09	.08	.08	.10	.09	.13	.10	.08
					Parameter: Ammonia-N (mg/l)							
7-16	.63	.35	.37	.25	.30	.22	.28	.16	.25	.23	.25	.93
9-4	.35	.30	.22	.20	.22	.18	.20	.16	.56	.22	.64	.22
					Parameter: Organic-N (mg/l)							
7-16	.10	.06	.06	.02	.06	.02	.02	.02	.02	.02	.02	.02
9-4	.50	.25	.10	.02	.03	.02	.03	.03	.02	.02	.02	.12
					Parameter: Total Phosphorus (mg/l)							

TABLE 3

1969 SAMPLE ANALYSIS RESULTS

Tawas Bay

FWPCA, LHBO

Station:	T-1	T-2	T-3	T-4	T-5	T-6	T-7	T-8	T-9	T-10	T-11	H-2114
Date												
7-16	.07	.05	.05	.01	.06	.01	.01	.01	.01	.01	.01	.01
9-4	.40	.24	.08	.01	.02	.009	.02	.02	.01	.01	.02	.004
7-16	420	170	60	90	50	50	50	50	50	40	60	40
9-4	240	140	90	40	40	50	90	80	80	60	60	100
7-16	3	3	0.7	1	2	3	2	0.9	0.9	1	0.9	0.8
7-16	15	6	5	2	2	3	3	1	2	5	1	1
9-4	2	4	4	4	5	2	7	1	2	1	2	4
7-16	200	190	150	130	140	130	140	160	160	150	140	140
9-4	200	170	140	140	140	130	130	130	150	130	130	130
7-16	180	180	140	130	140	130	130	160	160	140	140	130
9-4	200	160	140	130	130	130	120	130	140	130	120	130

TABLE 3
1969 SAMPLE ANALYSIS RESULTS
Tawas Bay
FWPCA, LHBO

Station:	<u>T-1</u>	<u>T-2</u>	<u>T-3</u>	<u>T-4</u>	<u>T-5</u>	<u>T-6</u>	<u>T-7</u>	<u>T-8</u>	<u>T-9</u>	<u>T-10</u>	<u>T-11</u>	<u>H-214</u>
<u>Date</u>												
9-4	2,000	3,000	2,000	110	2,400	1,900	500	1,900	2,800	2,000	1,100	400
9-4	74	72	12	2	2	2	2	2	2	2	2	2

TABLE 3
1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Tawas Bay

FWPCA, LHBO

Parameter: Phytoplankton (numbers per milliliter)

Station	Date	Centric Diatoms		Pennate Diatoms		Greens		Blue-Green Coccoids		Blue-Green Filamentous		Green Flag-ellates		Brown Flag-ellates		Total		Predominant Genera (10% or more)*
T-1	7/16 9/4	0 410		410 0		470 470		580 120		350 0		3,380 1,520		60 60		5,250 2,580		a,b a,d,e
T-2	7/16 9/4	120 230		1,050 410		700 290		0 0		700 180		2,570 1,860		230 0		5,370 2,970		a,c a,f
T-3	7/16 9/4	0 260		290 170		120 170		0 0		1,220 520		1,980 350		290 0		3,900 1,470		a,c c,e,a
T-4	7/16 9/4	120 150		290 290		60 350		0 90		930 840		1,630 640		290 0		3,320 2,360		a,c c,a
T-5	7/16 9/4	120 140		470 290		350 230		0 0		1,980 520		3,620 200		470 0		7,010 1,380		a,c c,a
T-6	7/16 9/4	0 290		230 120		120 260		0 120		3,380 640		3,380 180		230 30		7,340 1,640		a,c c,a
T-7	7/16 9/4	0 350		290 230		230 350		0 350		470 820		990 3,730		180 120		2,160 5,950		a,c c,a
T-8	7/16 9/4	0 230		230 0		290 470		0 230		640 700		1,400 2,800		410 120		2,970 4,550		a,c a,c

* see next page

TABLE 3

1969 SAMPLE ANALYSIS RESULTS
Lake Huron - Tawas Bay

FWPCA, LHBO

Parameter: Phytoplankton (numbers per milliliter)

Station	Date	Centric Diatoms	Pennate Diatoms	Greens	Blue- Green Coccolids	Blue- Green Fila- mentous	Green Flag- ellates	Brown Flag- ellates	Total	Predominant Genera (10% or more)*
T-9	7/16 9/4	0 230	580 120	230 180	0 180	470 1,460	930 3,960	350 60	2,560 6,190	a, c a, c
T-10	7/16 9/4	180 470	410 1,050	170 0	0 0	1,520 470	2,970 1,400	290 0	5,540 3,390	a, c a, c, g
T-11	7/16 9/4	470 120	350 120	180 350	0 120	580 1,050	3,030 1,870	350 0	4,960 3,630	a, c a, c
H-214	7/16 9/4	60 410	170 180	290 640	0 180	2,220 2,100	2,100 3,260	470 0	5,310 6,770	c, a a, c

*Key to predominant genera

a - Unidentified Green Flagellates

b - Anacystis

c - Oscillatoria

d - Trachelomonas

e - Cyclotella-Stephanodiscus

f - Navicula

g - Fragillaria

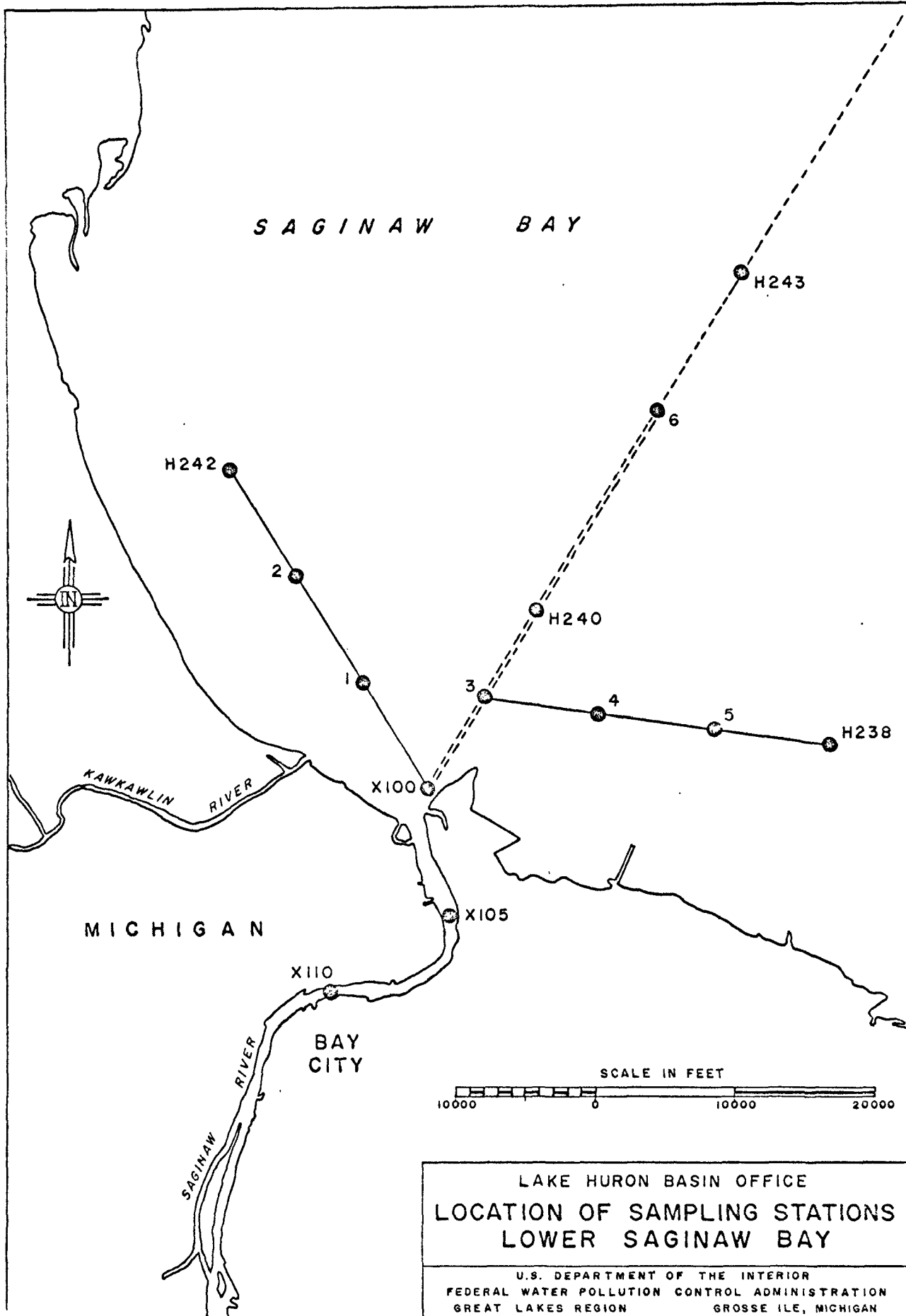


TABLE 4
1969 Sample Analysis Results

Station: <u>Date</u>	Lower Saginaw Bay				<u>FWPCA, LHBO</u>		
	Saginaw River <u>X110</u>	<u>X105</u>	<u>X100</u>	<u>H238</u>	Saginaw Bay <u>H240</u>	<u>H242</u>	<u>H243</u>
Parameter: Temperature ($^{\circ}\text{C}$)							
7-8	23.5	23.0	20.0	19.0	19.0	19.5	-
7-30	25.0	25.5	24.5	23.5	23.5	23.5	23.0
8-13	25.0	24.0	22.5	22.0	22.0	23.0	-
Max.	25.0	25.5	24.5	23.5	23.5	23.5	-
Min.	23.5	23.0	20.0	19.0	19.0	19.5	-
Parameter: pH							
7-8	7.9	8.0	8.8	8.8	8.5	8.8	-
7-30	7.9	7.8	8.7	8.3	8.4	9.0	8.4
8-13	8.3	8.3	8.7	9.0	8.8	8.8	-
Avg.	8.0	8.0	8.7	8.7	8.6	8.9	-
Max.	8.3	8.3	8.8	9.0	8.8	9.0	-
Min.	7.9	7.8	8.7	8.3	8.4	8.8	-
NS	3	3	3	3	3	3	-
Parameter: Dissolved Oxygen (mg/l)							
7-30	3.1	2.6	9.2	8.2	7.3	9.5	7.4
Parameter: % Saturation							
7-30	38	32	111	98	87	113	87
Parameter: Conductivity ($\mu\text{mhos/cm}$)							
7-8	650	660	400	360	380	350	-
7-30	760	820	450	400	410	460	340
8-13	800	830	410	340	380	390	-
Avg.	740	770	420	370	390	400	-
Max.	800	830	450	400	410	460	-
Min.	650	660	400	340	380	350	-
NS	3	3	3	3	3	3	-

TABLE 4
1969 Sample Analysis Results

Station: <u>Date</u>	Lower Saginaw Bay				<u>FWPCA, LHBO</u>		
	Saginaw River <u>X110</u>	<u>X105</u>	<u>X100</u>	<u>H238</u>	Saginaw Bay <u>H240</u>	<u>H242</u>	<u>H243</u>
Parameter: Phenol (ug/l)							
7-30	1	4	4	1	1	1	2
Parameter: Chloride (mg/l)							
7-8	84	90	42	35	40	32	-
7-30	39	120	140	47	49	61	33
8-13	150	140	47	44	42	42	-
Avg.	91	117	76	42	44	45	-
Max.	150	140	140	47	49	61	-
Min.	39	90	42	35	40	32	-
NS	3	3	3	3	3	3	-
Parameter: Sulfate (mg/l)							
7-8	38	37	30	26	29	24	-
7-30	59	61	32	27	28	33	20
8-13	69	66	28	27	26	26	-
Avg.	55	55	30	27	28	28	-
Max.	69	66	32	27	29	33	-
Min.	38	37	28	26	26	24	-
NS	3	3	3	3	3	3	-
Parameter: Alkalinity (mg/l)							
7-8	160	160	100	97	100	100	-
8-13	200	170	140	94	100	100	-
Parameter: Nitrate (mg/l)							
7-8	.8	.7	< .1	< .1	< .1	< .1	-
7-30	1.0	.9	.1	< .1	< .1	< .1	< .1
8-13	.6	.7	.1	< .1	.1	< .1	-
Avg.	.8	.8	.1	-	-	-	-
Max.	1.0	.9	.1	< .1	.1	< .1	-
Min.	.6	.7	< .1	< .1	< .1	< .1	-
NS	3	3	3	-	-	-	-

TABLE 4
1969 Sample Analysis Results

	Lower Saginaw Bay					FWPCA, LHBO	
Station: Date	Saginaw River			H238	Saginaw Bay		H243
	X110	X105	X100		H240	H242	
Parameter: Ammonia-N (mg/l)							
7-8	.47	.46	.25	.15	.38	.22	-
7-30	.08	.16	.76	.17	.28	.19	.17
8-13	.74	.68	.21	.14	.37	.34	-
Avg.	.43	.43	.41	.15	.34	.25	-
Max.	.74	.68	.76	.17	.38	.34	-
Min.	.08	.16	.21	.14	.28	.19	-
NS	3	3	3	3	3	3	-
Paramater: Organic-N mg/l)							
7-8	.78	.72	.74	.59	.54	.62	-
7-30	< .05	.68	.76	.63	.59	.99	.51
8-13	1.3	1.0	.88	.83	.64	.65	-
Avg.	.71	.80	.79	.68	.59	.75	-
Max.	1.3	1.0	.88	.83	.64	.99	-
Min.	< .05	.68	.74	.59	.54	.62	-
NS	3	3	3	3	3	3	-
Parameter: Total Phosphorus (mg/l)							
7-8	.40	.30	.06	.04	.07	.05	-
7-30	.30	.36	.08	.08	.10	.11	.04
8-13	.37	.41	.13	.09	.11	.10	-
Avg.	.36	.36	.09	.07	.09	.09	-
Max.	.40	.41	.13	.09	.11	.11	-
Min.	.30	.30	.06	.04	.07	.05	-
NS	3	3	3	3	3	3	-

TABLE 4
1969 Sample Analysis Results

Station: Date	Lower Saginaw Bay				FWPCA, LHBO		
	Saginaw River <u>X110</u>	<u>X105</u>	<u>X100</u>	<u>H238</u>	Saginaw Bay <u>H240</u>	<u>H242</u>	<u>H243</u>
Parameter: Total Sol. Phosphorus (mg/l)							
7-8	.24	.20	.02	.01	.02	.02	-
7-30	.22	.06	.02	.03	.05	.06	.008
8-13	.26	.26	.04	.02	.07	.01	-
Avg.	.24	.17	.03	.02	.05	.03	-
Max.	.26	.26	.04	.03	.07	.06	-
Min.	.22	.06	.02	.01	.02	.01	-
NS	3	3	3	3	3	3	-
Parameter: Turbidity (JCU)							
7-8	25	25	8	5	15	9	-
7-30	25	25	15	10	10	15	10
8-13	20	20	20	6	20	15	-
Avg.	25	25	15	7	15	15	-
Max.	25	25	20	10	20	15	-
Min.	20	20	8	5	10	9	-
NS	3	3	3	3	3	3	-
Parameter: Iron (ug/l)							
7-8	1,100	1,000	290	150	330	510	-
8-13	820	890	500	100	350	280	-
Parameter: Total Solids (mg/l)							
7-8	490	510	310	260	280	270	-
7-30	620	650	320	300	300	360	260
8-13	670	640	310	290	300	300	-
Avg.	590	600	310	280	290	310	-
Max.	670	650	320	300	300	360	-
Min.	490	510	310	260	280	270	-
NS	3	3	3	3	3	3	-

TABLE 4
1969 Sample Analysis Results

Lower Saginaw Bay							<u>FWPCA, LHBO</u>
Station:	Saginaw River				Saginaw Bay		
<u>Date</u>	<u>X110</u>	<u>X105</u>	<u>X100</u>	<u>H238</u>	<u>H240</u>	<u>H242</u>	<u>H243</u>
Parameter: Suspended Solids (mg/l)							
7-8	38	30	12	9	19	10	-
7-30	35	34	12	12	7	12	11
8-13	24	23	23	16	21	14	-
Avg.	32	29	16	12	16	12	-
Max.	38	34	23	16	21	14	-
Min.	24	23	12	9	7	10	-
NS	3	3	3	3	3	3	-
Parameter: Dissolved Solids (mg/l)							
7-8	460	480	300	250	260	260	-
7-30	580	620	310	280	300	350	250
8-13	640	620	290	270	280	290	-
Avg.	560	570	300	270	280	300	-
Max.	640	620	310	280	300	350	-
Min.	460	480	290	250	260	260	-
NS	3	3	3	3	3	3	-
Parameter: Total Coliform (MF/100 ml)							
7-30	3,700	13,000	< 20	190	< 10	< 10	< 10
Parameter: Fecal Coliform (MF/100 ml)							
7-30	490	830	< 2	< 20	< 20	< 20	< 20

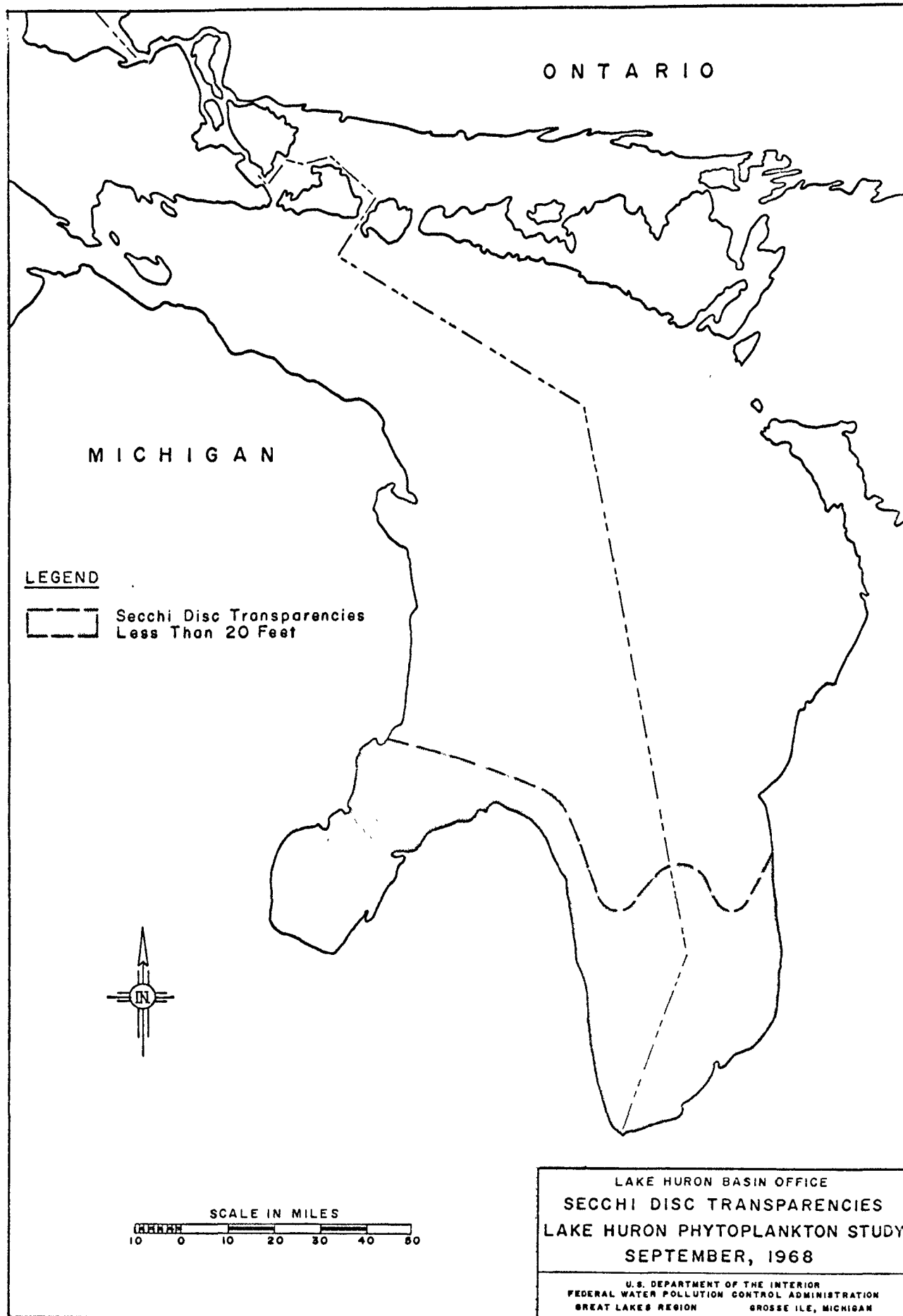
TABLE 4
1969 Sample Analysis Results
Lower Saginaw Bay, 7/30/69

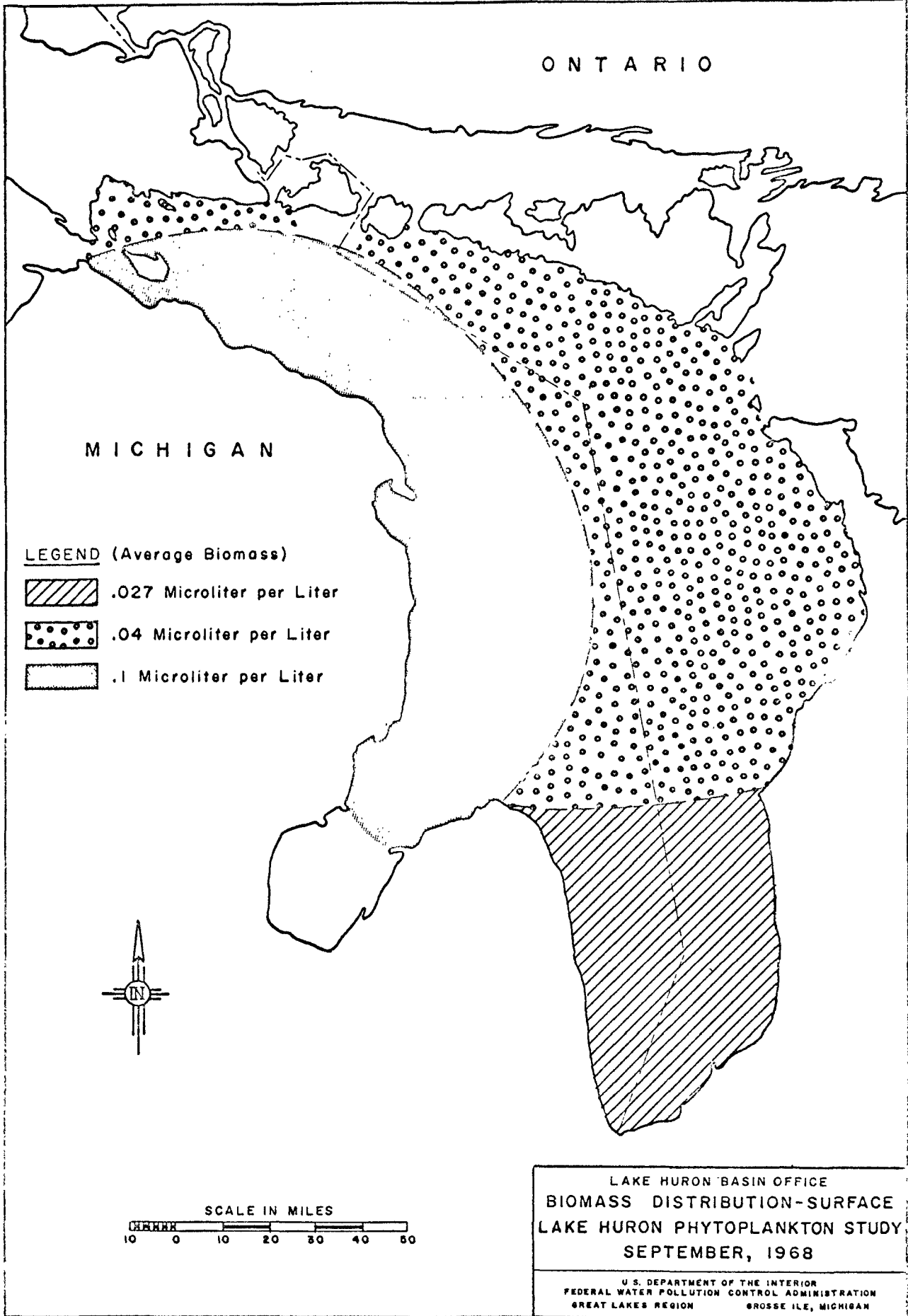
Station: <u>Parameter</u>	<u>FWPCA, LHBO</u>					
	<u>Sag. 1</u>	<u>Sag. 2</u>	<u>Sag. 3</u>	<u>Sag. 4</u>	<u>Sag. 5</u>	<u>Sag. 6</u>
Temperature (°C)	23.5	23.5	23.5	23.5	23.5	23.0
pH	9.0	8.8	8.6	8.6	8.7	8.4
Dissolved Oxygen (mg/l)	9.4	8.6	7.6	7.6	8.2	7.4
% Saturation	112	102	90	90	98	87
Conductivity (umhos/cm)	450	450	410	420	400	360
Phenol (ug/l)	2	3	4	2	1	2
Chloride (mg/l)	61	60	51	51	48	39
Sulfate (mg/l)	33	33	30	30	29	25
Nitrate (mg/l)	.1	.1	.1	< .1	< .1	< .1
Ammonia-N (mg/l)	.21	.20	.24	.17	.19	.19
Organic-N (mg/l)	1.0	.90	.73	.54	.75	.47
Total Phosphorus (mg/l)	.11	.10	.08	.07	.07	.06
Total Sol. Phosphorus (mg/l)	.01	.02	.01	.01	.01	.005
Turbidity (JCU)	15	15	15	10	10	10
Total Solids (mg/l)	360	360	310	320	300	260
Dissolved Solids (mg/l)	340	340	300	310	280	250
Suspended Solids (mg/l)	20	19	16	14	12	7
Total Coliform (MF/100 ml)	10	< 20	10	< 20	< 10	< 5
Fecal Coliform (MF/100 ml)	< 2	< 2	< 2	< 2	< 2	< 2

FIGURE 6



FIGURE 7





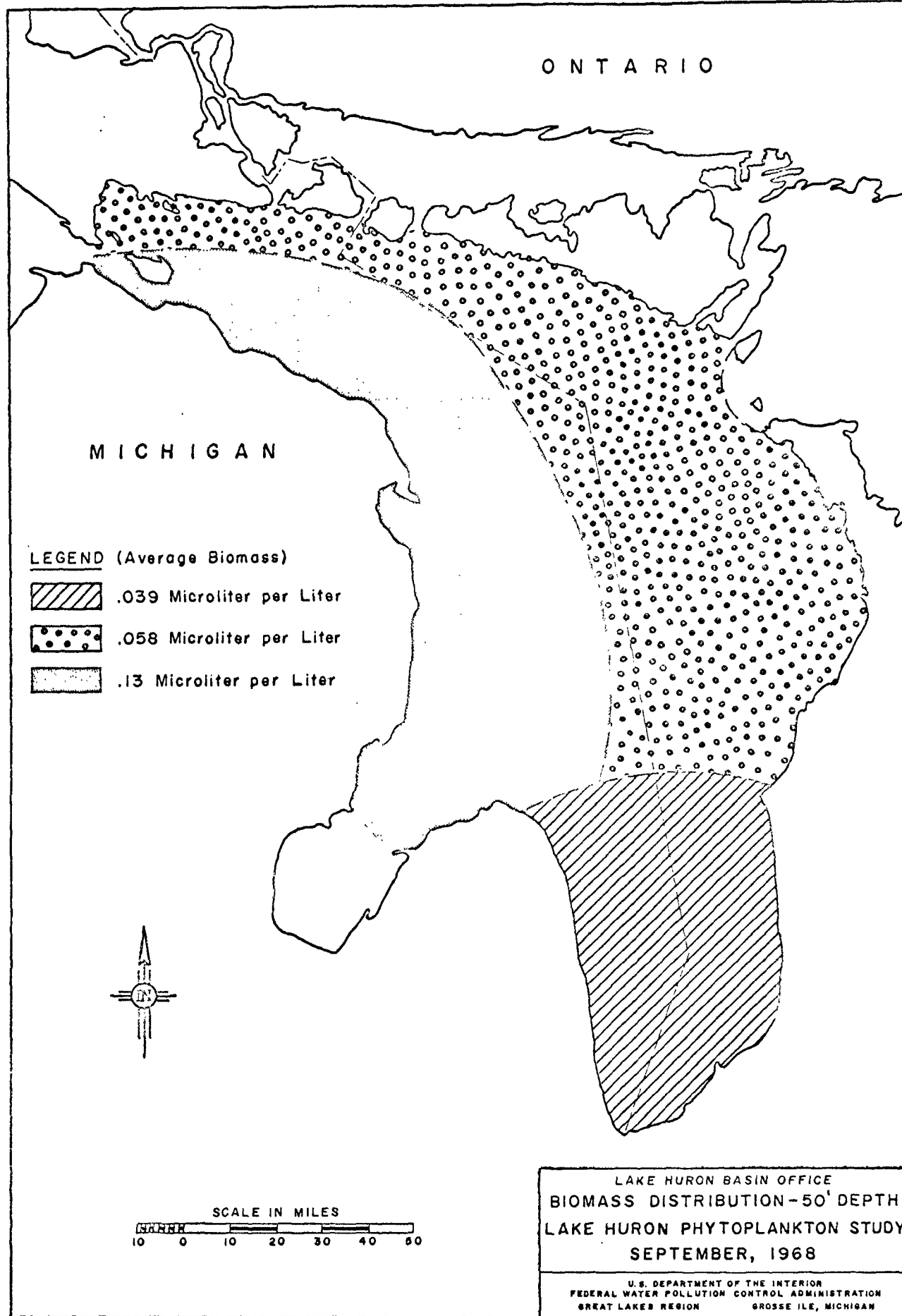


TABLE 5
Physical Observations
Lake Huron Phytoplankton Study
September 1968

FWPCA, LHBO

<u>Station</u>	<u>Date</u>	<u>Temp. at 0' (°C)</u>	<u>Temp. at 50' (°C)</u>	<u>Secchi Disc (ft.)</u>	<u>Cloud Cover (percent)</u>	<u>Euphotic Zone*</u>
H100	9/11	19	19	17.0	95	to bottom (20')
H104	9/11	19	17	17.0	99	to bottom (50')
H110	9/11	19	17	17.0	95	to bottom (30')
H113	9/10	18	18	8.0	90	to bottom (46')
H125	9/10	18	11	16.0	40	to bottom (45')
H130	9/10	20	20	20.0	80	+ 100
H132	9/10	19	19	18.0	90	+ 100
H133	9/10	20	20	19.0	55	+ 100
H134	9/10	20	20	25.0	80	+ 100
H136	9/10	20	20	16.0	60	to bottom (40')
H200	9/9	19	17	8.0	90	36
H202	9/9	18	18	18.0	90	80
H204	9/9	18	18	18.0	95	77
H206	9/9	18	10	16.0	90	to bottom (60')
H207	9/9	19	14	7.0	90	29
H212	9/9	19	18	8.0	90	30
H250	9/10	18	10	18.0	95	+ 100
H252	9/10	19	19	29.0	95	+ 100
H254	9/9	19	18	27.0	70	+ 100
H320	9/9	19	19	26.0	80	+ 100
H321	9/9	17	17	21.0	90	75
H322	9/9	18	17	26.0	75	+ 100
H324	9/9	17	17	26.0	75	+ 100
H326	9/9	17	17	28.0	60	+ 100
H328	9/9	18	18	28.0	75	+ 100
H330	9/9	18	18	27.0	75	to bottom (50')
H370	9/8	15	15	25.0	95	to bottom *65')
H372	9/8	15	15	25.0	95	90
H374	9/9	15	15	25.0	70	+ 100
H376	9/8	15	15	27.0	60	+ 100
H378	9/8	16	16	30.0	70	+ 100
H380	9/8	16	16	29.0	60	+ 100
H382	9/8	16	16	27.0	60	to bottom (90')

*Depth at which one percent of surface light remains.

TABLE 5
Physical Observations
Lake Huron Phytoplankton Study
September 1968

						<u>FWPCA, LHBO</u>
<u>Station</u>	<u>Date</u>	<u>Temp. at 0' (°C)</u>	<u>Temp. at 50' (°C)</u>	<u>Secchi Disc (ft.)</u>	<u>Cloud Cover (percent)</u>	<u>Euphotic Zone*</u>
H420	9/7	15	15	19.0	80	87
H422	9/7	15	15	28.0	85	+ 100
H424	9/7	15	14	29.0	70	+ 100
H426	9/7	16	15	29.0	40	+ 100
H428	9/7	17	17	27.0	20	+ 100
H432	9/6	17	10	22.0	30	89
H530	9/6	15	15	17.0	50	to bottom (35')
H532	9/6	16	16	18.0	50	99
H534	9/7	15	15	23.0	10	+ 100
H536	9/7	16	10	25.0	10	90
H814	9/6	15	15	19.0	10	90
H502	9/6	18	17	13.0	99	73
Max.		20.0	20.0	30	99	+ 100
Min.		15.0	10.0	7	10	29
Avg.		17.5	16.1	21.4	71	-
NS		45	45	45	45	45

*Depth at which one percent of surface light remains.

TABLE 6
Phosphorus Concentrations
Lake Huron Phytoplankton Study
September 1968

		FWPCA, LHBO	
<u>Station</u>	<u>Date</u>	<u>Total Soluble Phosphorus (mg/l)</u>	<u>Total Phosphorus (mg/l)</u>
<u>St. Clair River</u>			
P31	9/11	.005	.006
<u>Lake Huron</u>			
H100	9/11	.004	.004
H104	9/11	.004	.004
H110	9/11	.006	.007
H132	9/11	.004	.004
H324	9/11	.004	.004
H376	9/11	.004	.004
H424	9/11	.003	.004
H532	9/11	.005	.005
Max.		.006	.007
Min.		.003	.004
Avg.		.004	.005
NS		9	9

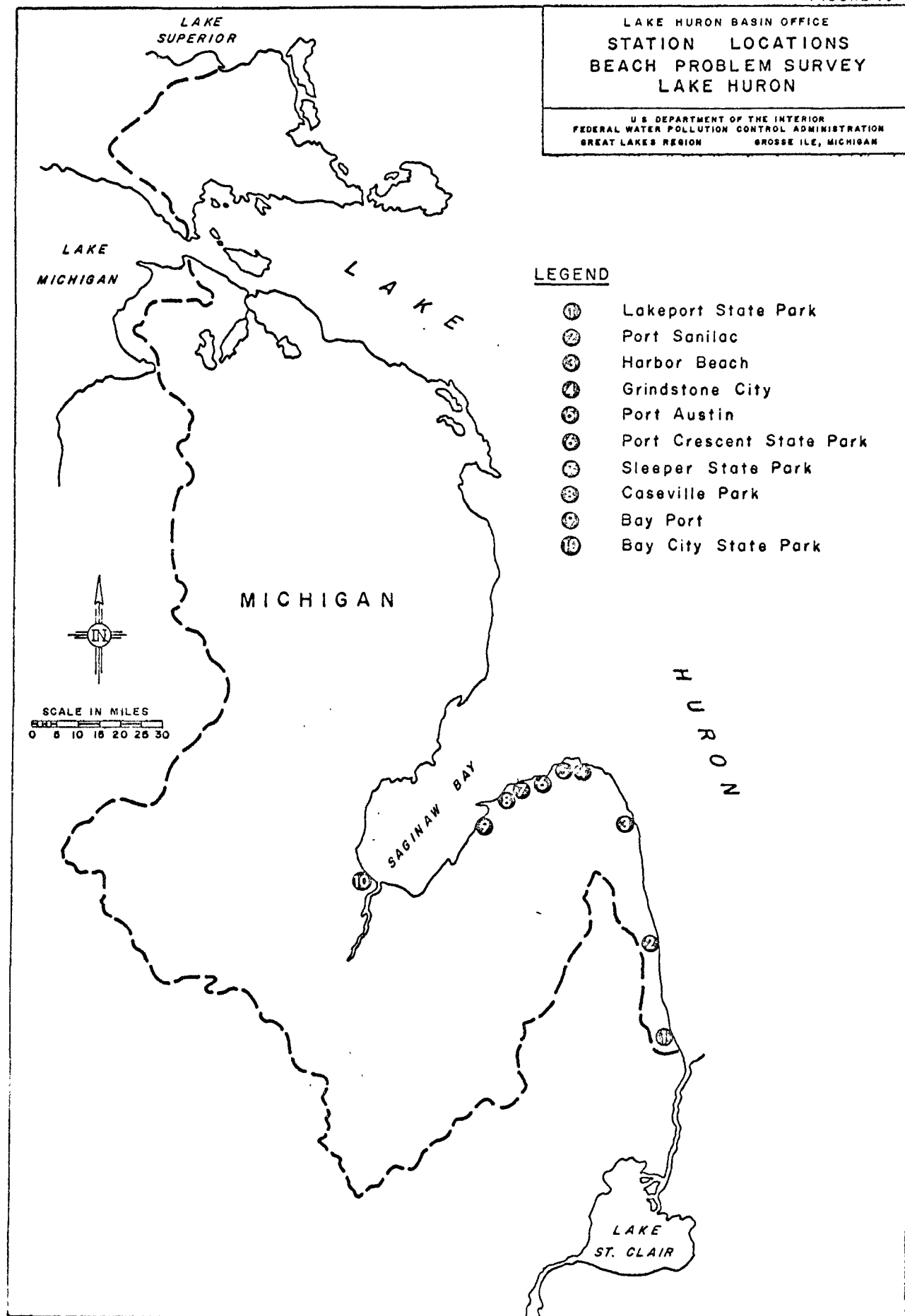


TABLE 7
LAKE HURON BEACH OBSERVATIONS - 1969

FWPCA, LHBO

Area	Date	Water		Dead Fish*	Attached Algal Growth	Comment
		Temp.(°C)	Color			
1 Lakeport State Park	5/22	9.0	blue-green	0	0	beach clean, 1 dead alewife
	7/10	-	clear blue	0	1"-6"	no problems
	7/14	21.0	-	1	<3"	little algae on beach
2 Port Sanilac	5/22	8.5	muddy-green	132	5"	water -dirty green, alewives dying
	7/14	19.0	-	8	med.	medium growth of attached algae
	9/5	-	-	mod	-	moderate alewife kill
3 Harbor Beach	5/22	11.0	blue-green	0	6"	beach - clean
	7/14	22.0	-	0	mod	six piles of weeds 1' high on beach, water edge dirty, many swimmers
4 Grindstone City	5/22	10.0	green	194	0	dead alewives
	7/14	20.0	-	2	2"	little algae on rocks
5 Port Austin	5/22	12.0	blue	100	0	beach - clean, 5,000 gulls present
	7/14	21.0	-	2	-	little algae
	9/5	-	-	mod	-	moderate alewife kill
6 Port Crescent State Park	5/22	12.0	blue	130	0	beach - dirty, weeds, fish, logs, etc.
	7/14	23.0	clear	16	med	many swimmers
7 Sleeper State Park	5/22	12.0	blue-green	234	0	beach - dirty with dead alewives
	7/14	22.0	clear	7	light	beach - clean, many swimmers
8 Caseville Park	5/22	12.5	brn-green	18	0	excellent condition, no problems
	7/14	24.0	-	1	light	fishy odor to water
9 Bay Port	5/22	12.5	brn-green	4	4"	no problems
	7/14	30.0	-	2	med	natural reed growths in shallows, no problems

*See next page.

*See next page.

TABLE 7
LAKE HURON BEACH OBSERVATIONS - 1969 FWPCA, LHBO

Area	Date	Water Temp. (°C)	Water Color	Dead Fish*	Attached Algal Growth	Comment
Bay City State Park	5/22	12.0	blk & green	100	0	decaying fish and plant detritus, filthy
	7/14	23.0	-	1	-	tractor raking beach daily, beach all sand
	7/30	23.5	-	0	-	no problems
<u>Other Areas Observed</u>						
Tawas-Pamela Beach	7/24	-	-	36	-	wood detritus washed up on beaches
Alabaster	7/24	-	-	6	-	-
Lakeside Park						
Port Huron	7/10	-	clear	0	0	clean beach
Lexington Public Beach	7/10	-	clear	2	0	traces of attached algae
Point Lookout	7/30	23.5	-	many	-	odor and flies from decaying alewives; not a recent kill

*per 100 feet of beach

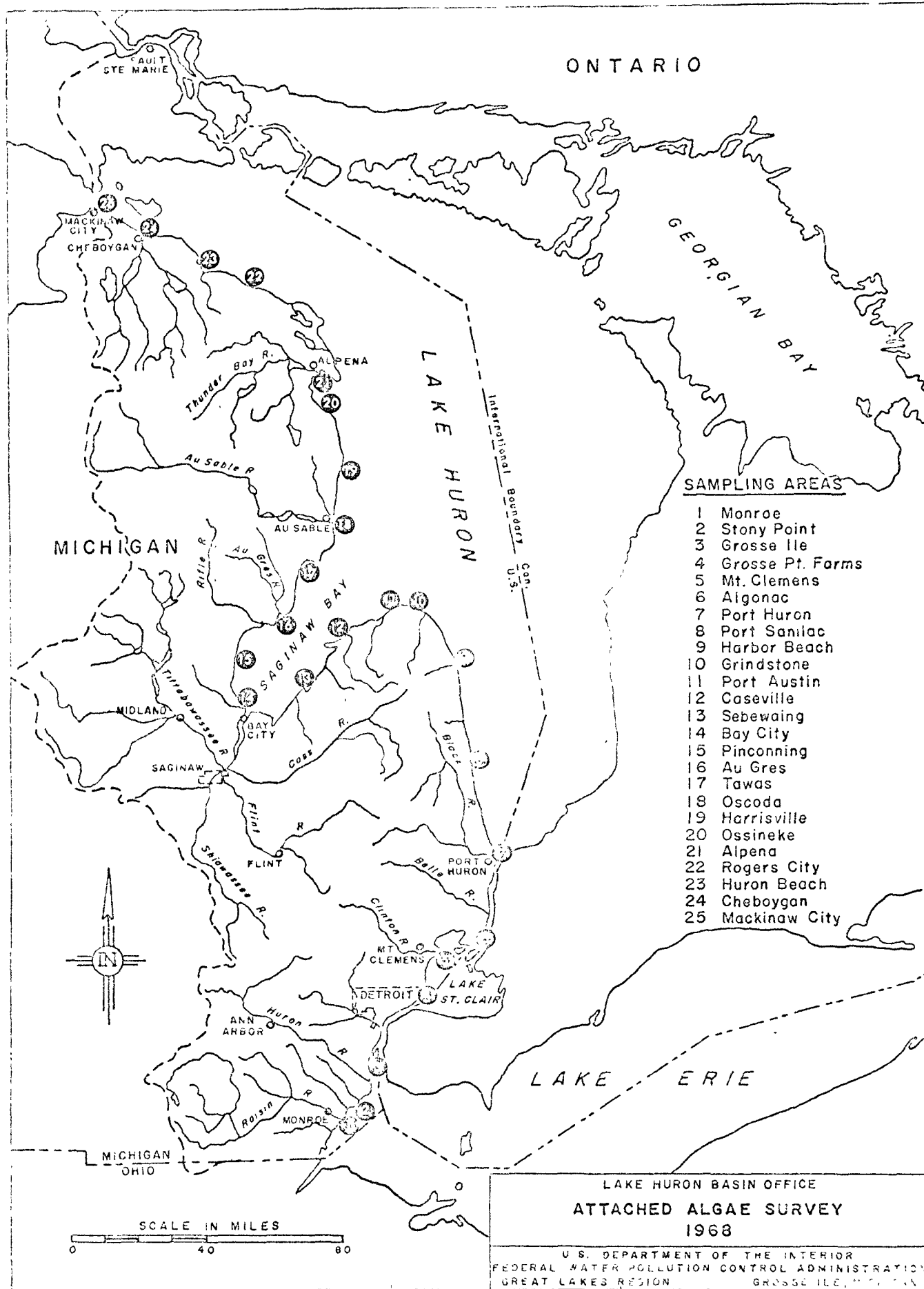


TABLE 8
Attached Algae (Survey I, June 1968)
Lake Erie, Detroit River, Lake St. Clair
St. Clair River and Lake Huron

Area	Sta.	FWPCA, LHBO		
		Attached Algae Length (in.)	% Algal Cover of Substrates	Predominant Type of Algae
1	1	1	1	Cladophora, Stigeoclonium
1	2	< 1	50	Cladophora, Stigeoclonium
1	3	0	0	None
2	1	6	30	Cladophora
3	1	1	-	Cladophora, blue-green slime
4	1	8	50	Cladophora
4	2	16	50	Cladophora
5	1	1	-	Cladophora, Spirogyra
5	2	22	100	Cladophora, Ulothrix
5	3	0	100	Ulothrix
6	1	8	30	Cladophora
7	1	0	0	None
8	1	21	25	Cladophora
8	2	11	25	Cladophora
9	1	24	-	P. crispus, Cladophora
10	1	10	-	Ulothrix, Cladophora
11	1	16	-	Cladophora
11	2	12	-	Cladophora
11	3	< 1	0	Blue-green slime
12	1	14	90	Cladophora
14	1	< 1	0	Blue-green Algae
14	2	6	50	Cladophora
15	1	24	-	Cladophora
16	1	12	-	Cladophora, Ulothrix
17	1	14	-	Cladophora, Chara
17	2	7	-	Cladophora, Chara
18	1	7	-	Cladophora, Chara
19	1	1	10	Zygnema
21	1	-	-	Chara, Cladophora
21	2	3	-	Ulothrix, Zygnema
22	1	< 1	0	Blue-green slime
23	1	0	0	None
24	1	3	-	Cladophora
25	1	8	90	Cladophora, Zygnema
25	2	2	-	Cladophora

TABLE 9
Attached Algae (Survey II, September 1968)
Lake Erie, Detroit River, Lake St. Clair
St. Clair River and Lake Huron

FWPCA, LH50

<u>Area</u>	<u>Sta.</u>	<u>Attached Algae Length (in.)</u>	<u>% Algae Cover of Substrates</u>	<u>Predominant Type of Algae</u>
1	1	< 1	1	Stigeoclonium
1	2	3	20	Cladophora
1	3	3	-	Cladophora
2	1	2	10	Cladophora
3	1	5	95	Cladophora
4	1	8	10	Cladophora
4	2	2	-	Cladophora, blue-green slime
5	1	< 1	1	Cladophora
5	2	3	-	Cladophora
5	3	2	10	Cladophora
6	1	< 1	-	Cladophora
7	1	2	-	Mougeotia
8	1	3	50	Cladophora
8	2	2	10	Cladophora
9	1	< 1	30	Cladophora
10	1	1	5	Cladophora
11	1	2	2	Cladophora
11	2	< 1	2	Cladophora
11	3	< 1	1	Cladophora
12	1	3	80	Cladophora
14	1	< 1	10	Blue-green, Spirogyra
14	2	0	0	None
15	1	2	1	Cladophora
16	1	1	1	Cladophora
17	1	1	1	Cladophora
17	2	6	100	Cladophora
18	1	0	0	None
19	1	< 1	1	Chara
21	1	3	25	Chara, Cladophora
21	2	4	100	Cladophora
22	1	0	0	None
23	1	1	1	Cladophora, Ulothrix
24	1	3	5	Cladophora
25	1	6	60	Cladophora
25	2	2	10	Cladophora, Chara

FIGURE 12

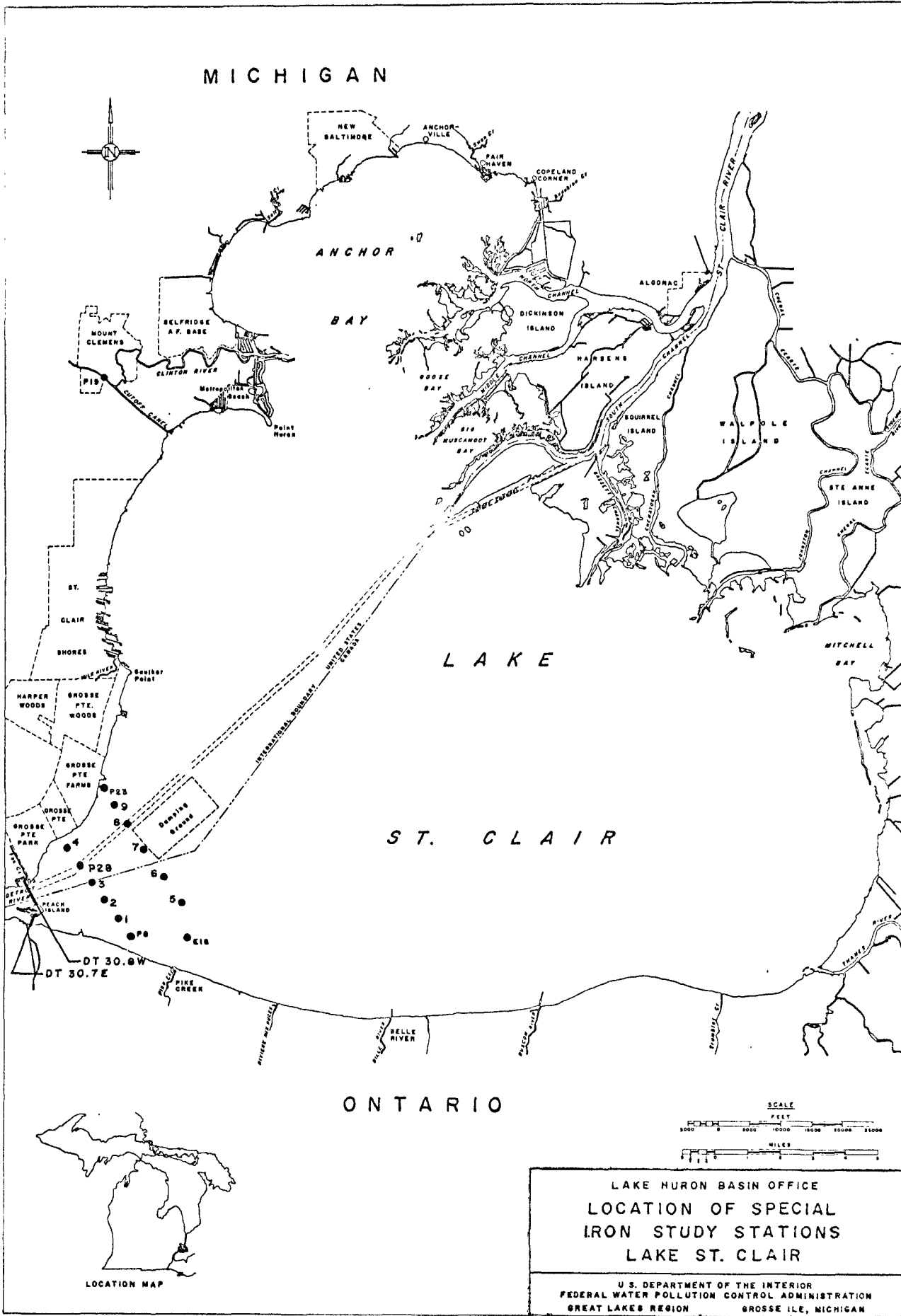


TABLE 10
1969 SAMPLE ANALYSIS RESULTS
LAKE ST. CLAIR - SPECIAL IRON STUDY
Parameter: Temperature (°C)

Station:	Fe-01	Fe-02	Fe-03	Fe-04	Fe-05	Fe-06	Fe-07	Fe-08	P-08	P-23	P-28	E-18
Date												
5-6	13.5	12.5	12.0	14.0	12.5	12.0	11.0	11.0	14.0	15.0	11.0	13.0
6-30	20.0	20.0	19.0	21.0	19.5	19.5	19.0	20.0	21.0	21.0	19.0	20.0
7-22	23.0	23.0	22.5	23.0	22.5	22.5	22.0	22.0	23.0	23.0	22.5	22.5
8-12	-	-	-	23.5	-	-	-	23.5	-	24.0	23.0	-
9-9	20.0	20.5	20.5	20.5	20.5	20.5	20.0	20.5	20.5	20.5	20.5	20.0
10-13	16.5	16.5	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.5	16.0
Max.	23.0	23.0	22.5	23.5	22.5	22.5	22.0	23.0	23.0	24.0	23.0	22.5
Min.	13.5	12.5	12.0	14.0	12.5	12.0	11.5	11.0	14.0	15.0	11.0	13.0

TABLE 10
1969 SAMPLE ANALYSIS RESULTS
LAKE ST. CLAIR - SPECIAL IRON STUDY
Parameter: Conductivity (umhos/cm)

Station:		<u>Fe-01</u>	<u>Fe-02</u>	<u>Fe-03</u>	<u>Fe-04</u>	<u>Fe-05</u>	<u>Fe-06</u>	<u>Fe-07</u>	<u>Fe-08</u>	<u>Fe-09</u>	<u>P-08</u>	<u>P-23</u>	<u>P-28</u>	<u>E-18</u>
Date														
5-6		220	280	260	290	260	260	220	210	210	260	300	210	260
6-30		220	210	220	200	220	220	220	220	210	240	200	210	220
7-22		220	210	200	200	200	200	200	200	200	230	200	200	200
8-12		-	-	-	200	-	-	-	200	130	-	220	210	-
9-9		220	220	220	220	220	230	220	220	225	220	220	220	220
10-13		230	230	220	220	220	220	220	220	220	230	240	220	230
Avg.		220	230	220	220	220	230	220	210	200	240	230	210	230
Max.		230	280	260	290	260	260	220	220	225	260	300	220	260
Min.		220	210	200	200	200	200	200	200	130	220	200	200	200
NS		5	5	5	6	5	5	5	6	6	5	6	6	

TABLE 10
1969 SAMPLE ANALYSIS RESULTS
LAKE ST. CLAIR - SPECIAL IRON STUDY
Parameter: Iron (ug/l)

FWPCA, LHBC													
Station:	Fe-01	Fe-02	Fe-03	Fe-04	Fe-05	Fe-06	Fe-07	Fe-09	P-08	P-23	P-28	E-12	
5-6	520	500	400	200	260	290	150	100	470	150	150	400	
6-30	190	160	190	160	300	2200*	1400*	1300*	200	210	200	180	
7-22	230	90	100	230	110	60	150	120	240	200	110	120	
8-12	"	"	"	100	"	"	"	120	"	160	100	"	
9-9	230	90	60	250	110	50	20	140	240	180	110	160	
10-13	480	450	310	360	260	250	320	200	320	610	340	290	
Avg.	310	260	210	240	190	170	170	130	220	180	170	230	
Max.	520	500	400	360	260	2200	1400	1300	570	610	540	400	
Min.	190	90	60	100	110	60	20	100	200	150	100	120	
NS	5	5	5	6	5	4	4	6	5	6	6	5	

*Not Averaged

TABLE 10
1969 SAMPLE ANALYSIS RESULTS
DETROIT RIVER - SPECIAL IRON STUDY
Parameter: Temperature (°C)

Station: Ft. from W. Shore	Range: DT 30.8w		R102 500	R104 1000	R106 2500	DT 30.7E		FWPCA, LHBC
	R98 100	R100 300				R109* 500	R111* 850	R113* 980
5-6	14.5	15.0	14.0	11.0	12.0	14.0	13.0	13.5
6-2	17.5	17.5	17.5	16.5	15.5	17.0	17.0	17.5
6-30	20.0	20.5	19.5	19.0	19.5	20.0	20.0	20.0
7-22	23.5	24.0	23.5	23.0	22.5	23.0	23.0	23.0
8-12	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
9-9	20.5	20.5	20.5	20.5	20.5	20.0	20.0	20.0
10-13	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Max.	23.5	24.0	23.5	23.0	23.0	23.0	23.0	23.0
Min.	14.5	15.0	14.0	11.0	12.0	14.0	13.0	13.5
Parameter: Iron (ug/l)								
5-6	320	350	180	140	350	730	690	800
6-2	410	230	300	180	160	260	370	450
6-30	290	240	220	160	130	240	270	370
7-22	260	300	270	210	100	790	860	240
8-12	210	130	120	150	80	190	210	600
9-9	250	120	210	110	90	230	280	390
10-13	670	710	860	500	460	320	310	500
Avg.	340	300	310	210	200	390	430	510
Max.	670	710	860	500	460	790	860	800
Min.	210	120	120	110	80	190	210	240
NS	7	7	7	7	7	7	7	7

*Stations in Canadian Waters

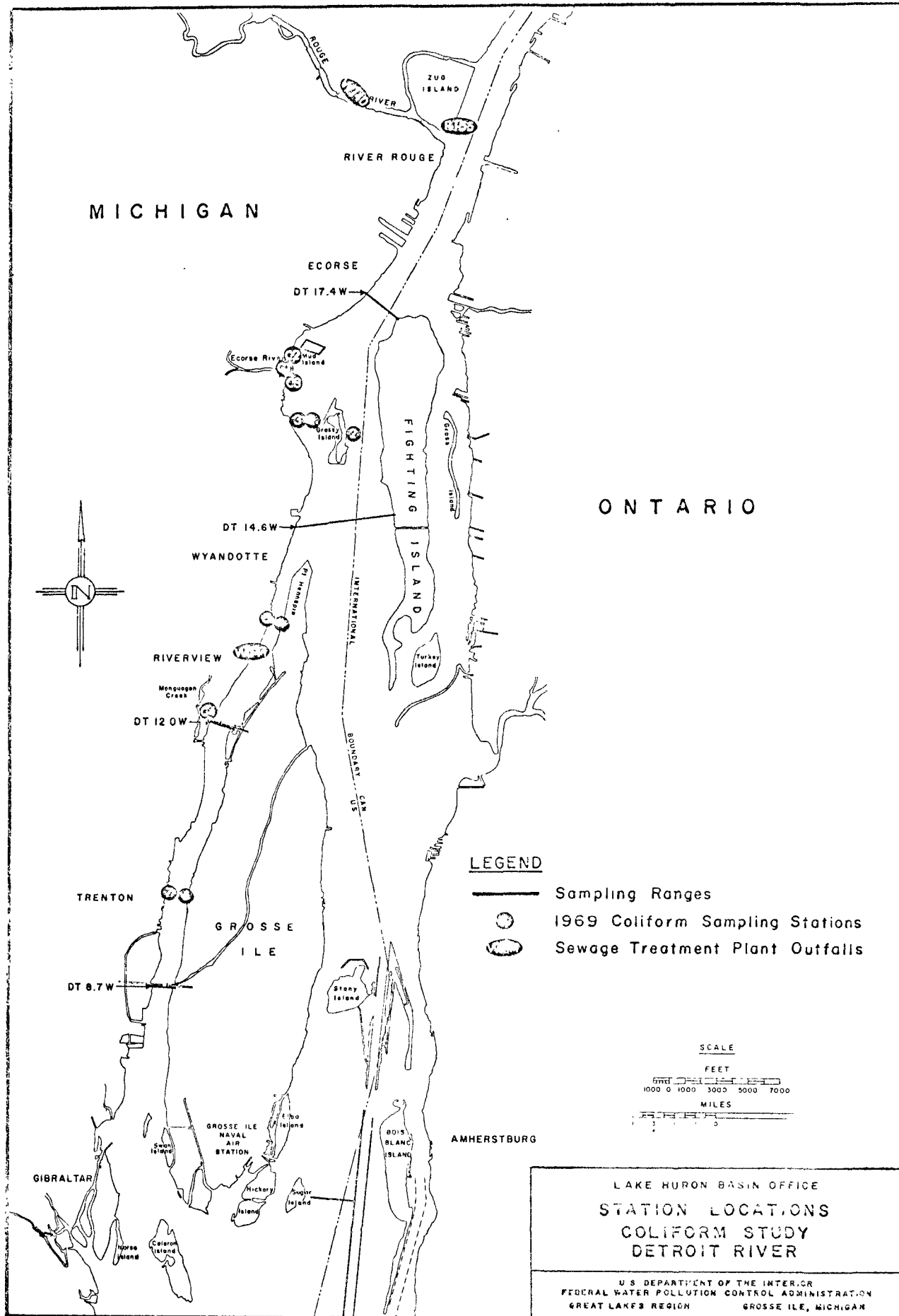


TABLE 11
1969 SAMPLE ANALYSIS RESULTS

Detroit River

Parameter: Total Coliforms (MP/100 ml)

FWPCA, 1980

Range DT 14.0W

Station: Feet from W. Shore:	R32 20	R33 100	R34 200	R35 300	R38 800	R40 1,200	P42 2,000	P44 3,000
Date								
5/1	20,000	-	10,000	-	600	600	240	120
5/15	25,000	25,000	22,000	10,000	5,200	1,000	2,200	200
5/27	88,000	25,000	5,500	5,500	600	400	1,800	600
6/23	72,000	97,000	81,000	15,000	10,000	52,000	40,000	280
7/28	240,000	300,000	240,000	20,000	10,000	15,000	8,000	2,000
8/4	-	10,000	-	-	5,000	3,000	-	-
9/8	16,000	30,000	14,000	12,000	8,000	4,000	6,000	1,800
10/13	2,500	2,200	5,000	4,500	1,000	1,200	1,500	50
10/20	-	490	-	-	-	270	-	-
Med.	28,000	28,000	12,000	15,000	5,200	3,000	4,100	280
Max.	240,000	240,000	140,000	200,000	10,000	52,000	60,000	23,000
Min.	2,500	490	3,000	4,500	600	270	240	50
NS	7	8	9	6	7	9	7	7

TABLE 11
1969 SAMPLE ANALYSIS RESULTS

Detroit River

Parameter: Total Coliforms (MF/100 ml)

FWPCA, LHBO

Range DT 8.7W

Station: Feet from W. Shore	R91	R92	R93	R94	R95	R96
<u>Date</u>	<u>80</u>	<u>280</u>	<u>480</u>	<u>680</u>	<u>980</u>	<u>1,240</u>
5/6	600	3,900	29,000	20,000	2,100	18,000
5/14	1,100	720	13,000	31,000	17,000	17,000
5/27	70,000	23,000	68,000	45,000	48,000	18,000
5/30	4,500	2,500	18,000	460,000	30,000	28,000
7/2	20,000	12,000	2,300	3,800	2,700	9,500
8/4	15,000	-	8,100	-	10,000	-
8/11	28,000	4,800	9,000	22,000	17,000	20,000
9/15	14,000	600	900	700	100	1,200
10/27	12,000	220	230	300	140	800
10/28	6,200	-	220	-	220	-
Med.	13,000	3,200	8,600	21,000	6,400	18,000
Max.	70,000	23,000	69,000	460,000	48,000	28,000
Min.	600	220	220	300	100	800
NS	10	8	10	8	10	8

TABLE 11
1969 SAMPLE ANALYSIS RESULTS
Detroit River
Parameter: Total Coliforms (MF/100 ml.)
FWPCA, LHBO

Station: Feet from W. Shore: Date	Range DT 17.4W									
	R17 <u>100</u>	R18 <u>200</u>	R19 <u>400</u>	R21 <u>800</u>	R23 <u>1,200</u>	R25 <u>1,600</u>	R26 <u>1,900</u>			
4/28	29,000	28,000	26,000	19,000	890	670	> 3,600			
5/12	58,000	40,000	31,000	5,700	80	54	200			
5/26	2,000	1,900	1,000	500	300	500	1,700			
7/7	110,000	70,000	61,000	3,900	> 800	2,300	> 800			
8/4	=	5,000	=	6,600	=	7,900	=			
8/18	3,400	16,000	12,000	5,200	3,600	2,900	2,000			
10/14	5,000	4,700	3,400	1,200	200	200	550			
10/28	=	500	=	170	=	80	=			
Med.	17,000	10,000	19,000	4,600	> 550	> 580	> 1,200			
Max.	110,000	70,000	61,000	19,000	3,600	7,900	3,600			
Min.	2,000	500	1,000	170	80	54	200			
NS	6	8	6	8	6	8	6			

TABLE 11
1969 DETROIT RIVER COLIFORM STUDY
Parameter: Fecal Coliform (MF/100 ml)

Range:	Station:	W140	R155	R18	DT 17.4W	R21	R25	C2	C1	C3	68-3	68-1	R33	R36	R40	DT 14.6W
Date																
5/7		<10	-	20	20	46	60	220	15	30	<10	36	15	4		

Range:	Station:	68-5	68-4	W141	C-4	R86	DT 12.0W	R88	R90	68-7	68-2	R91	R93	R95	DT 8.7W
Date															
5/7		80	<10	-	<5	10	8	4	4	<10	<10	580	14	12	

TABLE 11
1969 DETROIT RIVER COLIFORM STUDY
Parameter: Total Coliform (MF/100 mL)

FWPCA, LHBO

[illegible][illegible]

FIGURE 14

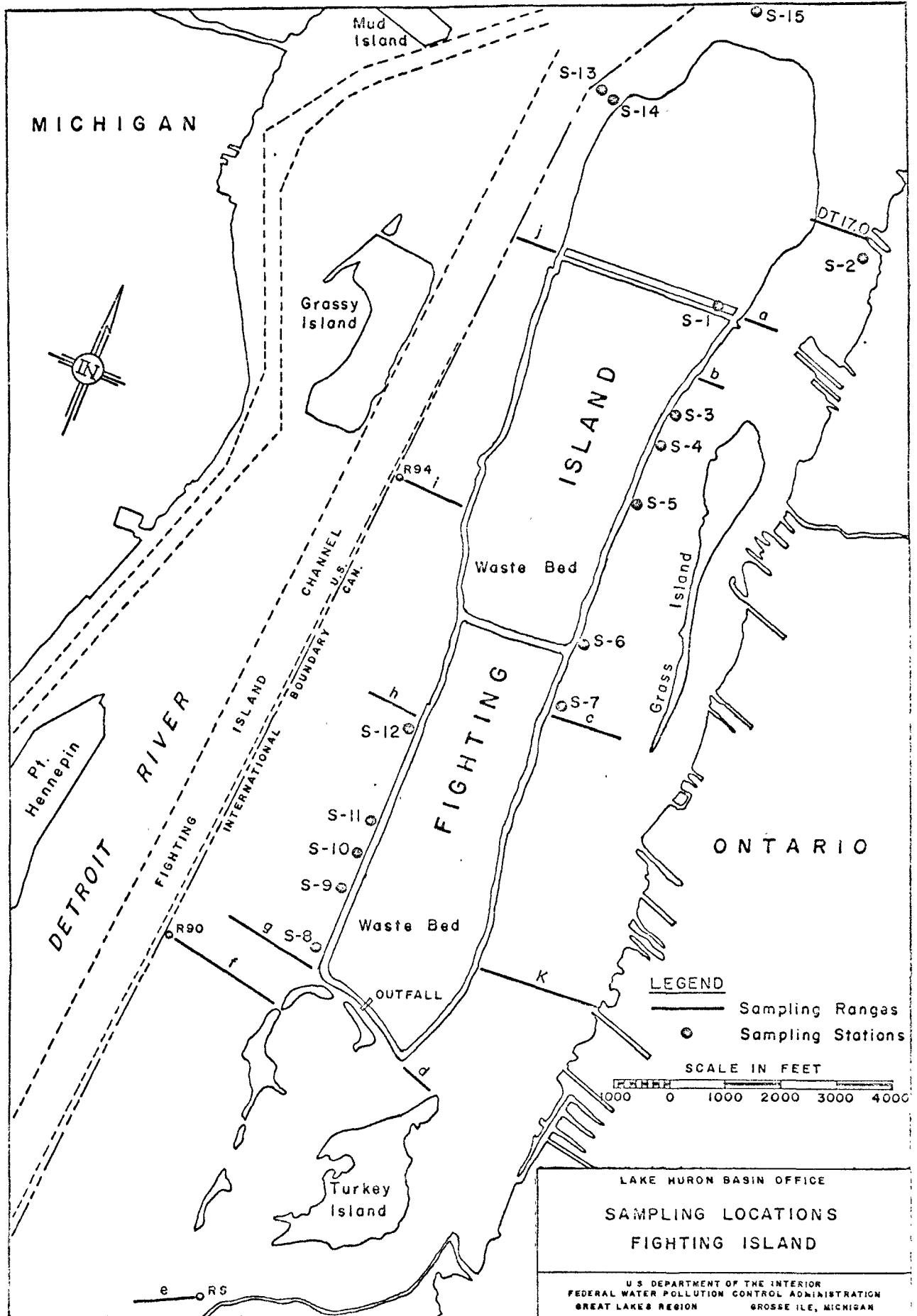


TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Temperature ($^{\circ}\text{C}$)

		FWPCA, LHRO											
Station:	A-1	B-1	B-2	C-1	C-2	D-1	D-2	E-1	E-2	E-3	F-1	F-2	
Date													
5-28	16.5	18.5	16.5	15.5	15.0	16.5	15.5	15.5	15.0	15.0	15.5	15.5	
8-7	21.5	21.0	21.0	21.5	21.5	-	-	-	-	-	-	-	
10-29	7.0	10.0	8.0	7.5	7.0	7.0	7.0	8.0	7.0	7.0	7.0	7.0	
	F-3	G-1	G-2	H-1	I-1	I-2	J-1	J-2	K-1	K-2	K-3	K-4	
5-28	14.5	15.5	15.5	15.5	15.5	15.5	17.5	16.5	-	-	-	-	
8-7	-	-	-	-	-	-	-	-	22.0	21.5	21.5	21.5	
10-29	7.0	7.0	7.0	7.0	8.0	8.0	7.5	7.5	8.5	7.0	7.0	7.0	
	K-5	R-29	R-30	R-31	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	
5-28	-	-	-	-	-	-	-	-	-	-	-	-	
8-7	22.0	21.5	21.5	21.5	21.0	21.5	22.0	21.5	22.0	22.0	21.5	21.5	
10-29	7.0	7.0	7.0	7.0	-	7.0	7.3	-	7.5	7.5	8.0	7.0	
	S-9	S-10	S-11	S-12	S-13	S-14	S-15	Channel Outfall					
5-28	-	-	-	-	-	-	-	-	-	-	-	-	
8-7	21.5	21.5	21.5	21.5	21.5	21.5	21.5	-	-	-	-	-	
10-29	7.0	7.0	7.0	8.0	7.5	7.5	8.0	6.0					

TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Conductivity (umhos/cm)

FWPCA, LHBO												
Station:	<u>A-1</u>	<u>B-1</u>	<u>B-2</u>	<u>C-1</u>	<u>C-2</u>	<u>D-1</u>	<u>D-2</u>	<u>E-1</u>	<u>E-2</u>	<u>E-3</u>	<u>F-1</u>	<u>F-2</u>
<u>Date</u>												
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	235	245	240	320	280	-	-	-	-	-	-	-
10-29	310	220,000	670	290	290	300	200	260	280	310	1000	320
	<u>F-3</u>	<u>G-1</u>	<u>G-2</u>	<u>H-1</u>	<u>I-1</u>	<u>I-2</u>	<u>J-1</u>	<u>J-2</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	<u>K-4</u>
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	-	-	-	-	-	-	-	-	280	275	250	260
10-29	230	920	640	390	650	300	300	290	330	300	300	290
	<u>K-5</u>	<u>R-29</u>	<u>R-30</u>	<u>P-31</u>	<u>S-1</u>	<u>S-2</u>	<u>S-3</u>	<u>S-4</u>	<u>S-5</u>	<u>S-6</u>	<u>S-7</u>	<u>S-8</u>
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	260	235	235	260	350	270	560	700	500	380	850	240
10-29	280	240	300	430	-	370	420	-	390	500	560	1000
	<u>S-9</u>	<u>S-10</u>	<u>S-11</u>	<u>S-12</u>	<u>S-13</u>	<u>S-14</u>	<u>S-15</u>	<u>Channel Outfall</u>				
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	740	600	580	300	235	230	235	-	-	-	-	-
10-29	1100	900	960	960	230	240	234	75,000				

TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Chlorides (mg/l)

FWPCA, LHBO												
Station:	<u>A-1</u>	<u>B-1</u>	<u>B-2</u>	<u>C-1</u>	<u>C-2</u>	<u>D-1</u>	<u>D-2</u>	<u>E-1</u>	<u>E-2</u>	<u>E-3</u>	<u>F-1</u>	<u>F-2</u>
Date												
5-28	38	660	120	79	18	150	34	15	29	48	70	43
8-7	9	10	9	37	20	-	-	-	-	-	-	-
10-29	32	66,000	140	28	27	29	29	22	22	34	260	38
	<u>F-3</u>	<u>G-1</u>	<u>G-2</u>	<u>H-1</u>	<u>I-1</u>	<u>J-2</u>	<u>J-1</u>	<u>J-2</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	<u>K-4</u>
5-28	10	150	110	110	80	14	14	10	-	-	-	-
8-7	-	-	-	-	-	-	-	-	-	-	-	-
10-29	9	230	140	60	140	33	30	29	40	32	26	22
	<u>K-5</u>	<u>R-29</u>	<u>R-30</u>	<u>R-31</u>	<u>S-1</u>	<u>S-2</u>	<u>S-3</u>	<u>S-4</u>	<u>S-5</u>	<u>S-6</u>	<u>S-7</u>	<u>S-8</u>
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	13	8	10	12	470	-	-	-	-	-	-	-
10-29	23	12	26	60	-	49	70	-	56	92	110	260
	<u>S-9</u>	<u>S-10</u>	<u>S-11</u>	<u>S-12</u>	<u>S-13</u>	<u>S-14</u>	<u>S-15</u>	<u>Channel Outfall</u>				
5-28	-	-	-	-	-	-	-	-	-	-	-	-
8-7	-	-	-	-	-	-	-	-	-	-	-	-
10-29	270	220	240	240	10	11	10	23,000				

TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Total Solids mg/l

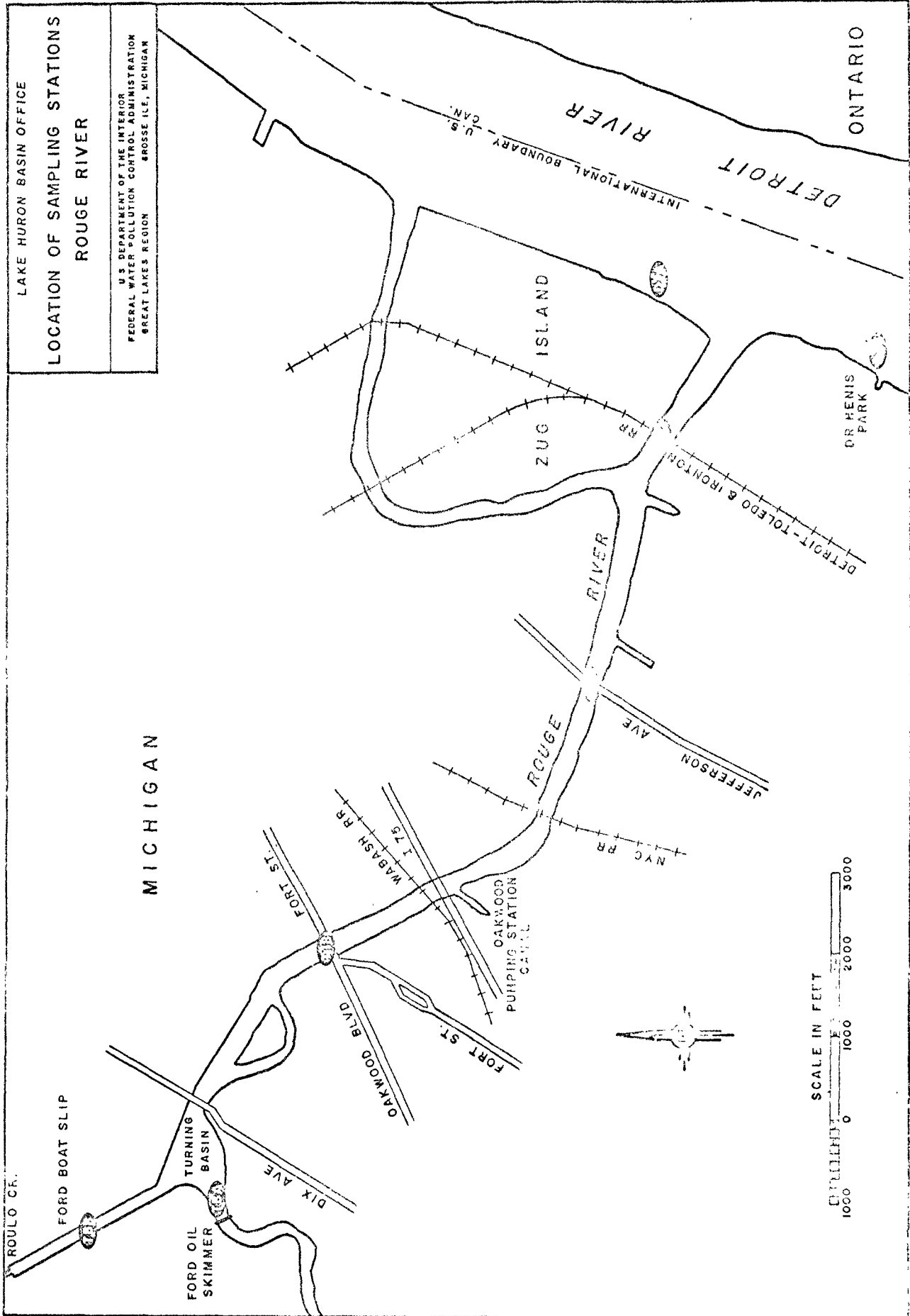
Station:		<u>A-1</u>	<u>B-1</u>	<u>B-2</u>	<u>C-1</u>	<u>C-2</u>	<u>D-1</u>	<u>D-2</u>	<u>E-1</u>	<u>E-2</u>	<u>E-3</u>	<u>F-1</u>	<u>F-2</u>
<u>Date</u>													
5-28		220	1,600	420	360	200	520	240	190	240	280	370	270
8-7		150	150	150	250	170	-	-	-	-	-	-	-
10-29		210	120,000	500	210	200	200	200	180	180	220	670	220
		<u>F-3</u>	<u>G-1</u>	<u>G-2</u>	<u>H-1</u>	<u>I-1</u>	<u>I-2</u>	<u>J-1</u>	<u>J-2</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	<u>K-4</u>
5-28		170	580	500	440	380	190	160	170	-	-	-	-
8-7		-	-	-	-	-	-	-	-	200	160	150	160
10-29		150	620	470	270	470	190	210	180	220	200	190	170
		<u>K-5</u>	<u>R-29</u>	<u>R-30</u>	<u>R-31</u>	<u>S-1</u>	<u>S-2</u>	<u>S-3</u>	<u>S-4</u>	<u>S-5</u>	<u>S-6</u>	<u>S-7</u>	<u>S-8</u>
5-28		-	-	-	-	-	-	-	-	-	-	-	-
8-7		180	150	140	160	1200	-	-	-	-	-	-	-
10-29		170	160	190	280	-	220	310	-	250	370	370	720
		<u>S-9</u>	<u>S-10</u>	<u>S-11</u>	<u>S-12</u>	<u>S-13</u>	<u>S-14</u>	<u>S-15</u>	<u>Channel Outfall</u>				
5-28		-	-	-	-	-	-	-	-	-	-	-	-
8-7		-	-	-	-	-	-	-	-	-	-	-	-
10-29		720	660	630	640	140	150	150	48,000				

TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Dissolved Solids mg/l

		FWPCA, LHBO											
Station:		<u>A-1</u>	<u>B-1</u>	<u>B-2</u>	<u>C-1</u>	<u>C-2</u>	<u>D-1</u>	<u>D-2</u>	<u>E-1</u>	<u>E-2</u>	<u>E-3</u>	<u>F-1</u>	<u>F-2</u>
Date													
5-28		220	1,600	410	350	190	510	220	180	220	270	340	260
8-7		140	140	140	230	160	-	-	-	-	-	-	-
10-29		190	120,000	480	180	180	180	190	160	160	200	670	200
		<u>F-3</u>	<u>G-1</u>	<u>G-2</u>	<u>H-1</u>	<u>I-1</u>	<u>I-2</u>	<u>J-1</u>	<u>J-2</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	<u>K-4</u>
5-28		160	530	460	420	360	170	150	150	-	-	-	-
8-7		-	-	-	-	-	-	-	-	190	160	140	140
10-29		130	510	460	250	460	180	190	160	210	180	170	150
		<u>K-5</u>	<u>R-29</u>	<u>R-30</u>	<u>R-31</u>	<u>S-1</u>	<u>S-2</u>	<u>S-3</u>	<u>S-4</u>	<u>S-5</u>	<u>S-6</u>	<u>S-7</u>	<u>S-8</u>
5-28		-	-	-	-	-	-	-	-	-	-	-	-
8-7		150	150	140	160	1,100	-	-	-	-	-	-	-
10-29		150	140	170	270	-	220	300	-	240	360	360	710
		<u>S-9</u>	<u>S-10</u>	<u>S-11</u>	<u>S-12</u>	<u>S-13</u>	<u>S-14</u>	<u>S-15</u>	<u>Channel Outfall</u>				
5-28		-	-	-	-	-	-	-	-	-	-	-	-
8-7		-	-	-	-	-	-	-	-	-	-	-	-
10-29		700	630	610	620	120	130	120	48,000				

TABLE 12
1969 SAMPLE ANALYSIS RESULTS
FIGHTING ISLAND
Parameter: Suspended Solids (mg/l)

Station:	Date	FWPCA, LHBO											
		<u>A-1</u>	<u>B-1</u>	<u>B-2</u>	<u>C-1</u>	<u>C-2</u>	<u>D-1</u>	<u>D-2</u>	<u>E-1</u>	<u>E-2</u>	<u>E-3</u>	<u>F-1</u>	<u>F-2</u>
5-28	13		22	13	9	13	12	12	18	14	16	26	18
8-7	6		10	7	20	9	-	-	-	-	-	-	-
10-29	20		630	16	26	20	20	20	21	21	21	7	12
	<u>F-3</u>		<u>G-1</u>	<u>G-2</u>	<u>H-1</u>	<u>I-1</u>	<u>I-2</u>	<u>J-1</u>	<u>J-2</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	<u>K-4</u>
5-28	13		41	37	19	18	17	14	17	-	-	-	-
8-7	-		-	-	-	-	-	-	-	14	3	9	12
10-29	22		12	8	17	13	14	25	18	16	16	15	16
	<u>K-5</u>		<u>R-29</u>	<u>R-30</u>	<u>R-31</u>	<u>S-1</u>	<u>S-2</u>	<u>S-3</u>	<u>S-4</u>	<u>S-5</u>	<u>S-6</u>	<u>S-7</u>	<u>S-8</u>
5-28	-		-	-	-	-	-	-	-	-	-	-	-
8-7	25		2	6	10	40	-	-	-	-	-	-	-
10-29	17		15	18	19	-	10	10	-	15	8	12	11
	<u>S-9</u>		<u>S-10</u>	<u>S-11</u>	<u>S-12</u>	<u>S-13</u>	<u>S-14</u>	<u>S-15</u>	<u>Channel Outfall</u>				
5-28	-		-	-	-	-	-	-	-	-	-	-	-
8-7	-		-	-	-	-	-	-	-	-	-	-	-
10-29	15		24	19	20	15	14	23	-	-	-	-	43



LAKE HURON BASIN OFFICE

LOCATION OF SAMPLING STATIONS
ROUGE RIVER

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION
GROSSE ILE, MICHIGAN

TABLE 13
ROUGE RIVER STUDY
OCTOBER - NOVEMBER 1969
FIELD OBSERVATIONS

FWPCA, LHBO

<u>Sta.</u> <u>No.</u>	<u>Date</u>	<u>Time</u>	<u>Lab.</u> <u>No.</u>	<u>Temp.</u> <u>(°C)</u>	<u>Color</u>	<u>Odor*</u>	<u>Visible</u> <u>Wastes* *</u>
TB-A	10/31	1235	44805	20.5	black	none	hvy. oil
	11/3	0905	45805	18.5	black	none	hvy. oil
	11/4	0830	45825	18.0	dk. gray	oily (Ch)	mod. oil
	11/5	0835	45845	17.0	gray	none	mod. oil
	11/6	0905	45865	17.0	black	none	oil spots
TB-B	10/31	1250	44806	19.0	amber	none	lt. oil
	11/3	0900	45806	17.0	amber	none	lt. oil
	11/4	0840	45826	16.0	amber	phenolic (Cm)	lt. oil
	11/5	0843	45846	16.0	amber	phenolic (Cm)	blk. oil
	11/6	0855	45866	18.0	amber	none	oil spots
T-18	10/31	1225	44804	18.0	dk. gray	none	lt. oil
	11/3	0920	45804	15.5	black	none	blk. oil
	11/4	0850	45824	16.0	dk. gray	none	oil spots
	11/5	0850	45844	16.0	dk. gray-green	none	oil spots
	11/6	0920	45864	17.0	lt. green	none	none
T-15	10/31	1215	44803	17.5	lt. gray	H ₂ S (Cs)	lt. oil
	11/3	0930	45803	14.5	black	none	lt. oil
	11/4	0900	45823	15.0	dk. gray	none	oil spots
	11/5	0900	45843	16.0	dk. gray-green	none	oil spots
	11/6	0930	45863	15.5	lt. green	none	none
T-12	10/31	1202	44802	15.0	lt. gray	none	lt. oil
	11/3	0940	45802	12.5	black	none	lt. oil
	11/4	0910	45822	12.5	dk. gray	none	lt. oil
	11/5	0910	45842	13.0	gray-green	none	none
	11/6	0935	45862	10.0	lt. gray	none	none
DT-A	10/31	1155	44800	8.5	green	none	lt. oil
	11/3	0950	45801	9.0	green	none	lt. oil
	11/4	0920	45821	8.5	lt. green	none	none
	11/5	0917	45841	8.5	green	none	none
	11/6	0945	45861	8.5	green	none	none
DT-B	10/31	1320	44801	8.5	green	none	lt. oil
	11/3	0955	45800	11.0	black	none	lt. oil
	11/4	0930	45820	11.5	gray-green	none	none
	11/5	0925	45840	13.0	gray-green	none	none
	11/6	0955	45860	13.0	lt. green	none	none

* For detailed odor description see Table 15.

** For detailed oil film description see Table 16.

TABLE 13
ROUGE RIVER STUDY
ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969

FWPCA, LHBO

<u>Sta.</u> <u>No.</u>	<u>Date</u>	<u>pH</u>	<u>Cond.</u>	<u>Phenol</u>	<u>DO</u>	<u>BOD</u>	<u>Percent</u> <u>Saturation</u>
TB-A	10/31	7.8	360	230	7.1	-	80
	11/3	7.5	480	64	5.4	-	58
	11/4	7.5	420	290	5.2	-	55
	11/5	7.4	400	180	6.0	-	62
	11/6	7.6	400	150	6.1	-	63
	Average	7.6	410	180	6.0	-	64
TB-B	10/31	7.5	290	11	8.7	-	95
	11/3	6.7	380	21	5.0	-	52
	11/4	7.1	340	9	5.7	-	58
	11/5	7.4	350	5	5.0	-	51
	11/6	7.2	300	8	7.3	-	77
	Average	7.2	330	11	6.3	-	67
T-18	10/31	7.6	320	58	5.9	-	62
	11/3	7.5	380	15	5.8	-	59
	11/4	7.4	370	8	4.5	-	46
	11/5	7.2	340	8	5.8	-	59
	11/6	7.5	340	6	6.3	-	66
	Average	7.4	350	19	5.7	-	58
T-15	10/31	7.6	320	3	9.0	4	94
	11/3	7.5	380	8	3.7	6	36
	11/4	7.5	390	5	4.0	5	40
	11/5	7.2	360	5	4.0	3	41
	11/6	7.4	340	4	5.6	2	56
	Average	7.4	360	5	5.3	4	53
T-12	10/31	7.8	320	4	5.4	-	54
	11/3	7.7	320	7	7.1	-	67
	11/4	7.6	340	5	8.6	-	81
	11/5	7.4	330	2	6.5	-	62
	11/6	7.9	260	5	9.9	-	88
	Average	7.7	310	5	7.5	-	70

Note: Units of Measurements on pg.

TABLE 13
ROUGE RIVER STUDY
ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969

FWPCA, LHBO

<u>Sta. No.</u>	<u>Date</u>	<u>pH</u>	<u>Cond.</u>	<u>Phenol</u>	<u>DO</u>	<u>BOD</u>	<u>Percent Saturation</u>
DT-A	10/31	7.9	220	2	11.3	-	97
	11/3	8.2	220	5	11.3	-	98
	11/4	8.1	220	6	11.3	-	97
	11/5	8.0	220	1	10.9	-	93
	11/6	8.1	210	1	11.0	-	94
Average		8.1	220	3	11.2	-	96
DT-B	10/31	8.1	240	15	11.3	4	97
	11/3	7.9	240	3	10.6	3	96
	11/4	7.8	240	9	10.2	2	94
	11/5	7.7	240	1	9.9	2	94
	11/6	7.9	240	4	10.6	1	101
Average		7.9	240	6	10.5	2	96

Note: Units of measurements on page

TABLE 13
ROUGE RIVER SURVEY
ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969

FWPCA, LHBO

<u>Sta. No.</u>	<u>Date</u>	<u>Total Iron</u>	<u>Oil & Grease</u>	<u>Susp. Solids</u>	<u>Diss. Solids</u>	<u>Total Solids</u>	<u>Total Coliform</u>	<u>Fecal Coliform</u>
TB-A	10/31	3,600	6	38	190	230	5,200	340
	11/3	4,300	16	49	280	330	>80,000	>60,000
	11/4	3,500	7	41	280	320	190,000	5,700
	11/5	3,400	4	34	230	260	56,000	900
	11/6	3,800	8	42	240	280	27,000	1,100
Average		3,700	8	41	240	280	56,000*	1,100*
TB-B	10/31	2,300	4	20	130	150	900	5
	11/3	14,000	7	54	230	280	>8,000	>600
	11/4	9,300	4	20	220	240	14,000	200
	11/5	2,700	6	30	200	240	34,000	1,400
	11/6	4,000	7	19	160	180	12,000	500
Average		6,500	6	29	190	220	12,000*	500*
T-18	10/31	3,500	4	36	160	200	1,800	190
	11/3	3,600	6	57	220	280	>80,000	>60,000
	11/4	3,200	7	43	210	260	180,000	7,700
	11/5	2,600	6	30	200	230	20,000	700
	11/6	2,500	9	28	190	220	24,000	1,200
Average		3,100	6	39	200	240	24,000*	1,200*
T-15	10/31	2,100	4	31	160	200	3,200	500
	11/3	2,400	4	42	220	260	>80,000	>6,000
	11/4	3,000	5	31	260	290	350,000	12,000
	11/5	2,600	3	29	220	250	20,000	1,000
	11/6	3,500	8	50	190	240	16,000	900
Average		2,700	5	37	210	250	20,000*	1,000*
T-12	10/31	1,600	3	25	170	190	8,500	140
	11/3	1,200	2	32	180	210	>80,000	>600
	11/4	1,700	3	25	200	220	260,000	13,000
	11/5	2,000	4	32	190	220	56,000	1,500
	11/6	1,100	7	20	140	160	48,000	2,400
Average		1,500	4	27	180	200	56,000*	1,500*

*Median

Note: Units of measurements on page

TABLE 13
 ROUGE RIVER STUDY
 ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969
 FWPCA, LHBO

Sta. No.	Date	Total Iron	Oil & Grease	Susp. Solids	Diss. Solids	Total Solids	Total Coliform	Fecal Coliform
DT-A	10/31	560	4	13	120	130	60	5
	11/3	360	2	19	110	130	5,600	420
	11/4	290	2	10	120	130	1,100	45
	11/5	240	2	14	120	130	100	4
	11/6	180	6	10	120	130	40	4
Average		330	3	13	120	130	100*	5*
DT-B	10/31	680	5	21	120	140	80	5
	11/3	730	2	33	110	140	8,000	300
	11/4	690	3	13	130	150	66,000	4,400
	11/5	730	5	23	130	150	44,000	2,200
	11/6	640	6	11	130	140	45,000	2,000
Average		670	4	20	120	140	44,000*	2,000*

* Median

Note: Units of measurements on page

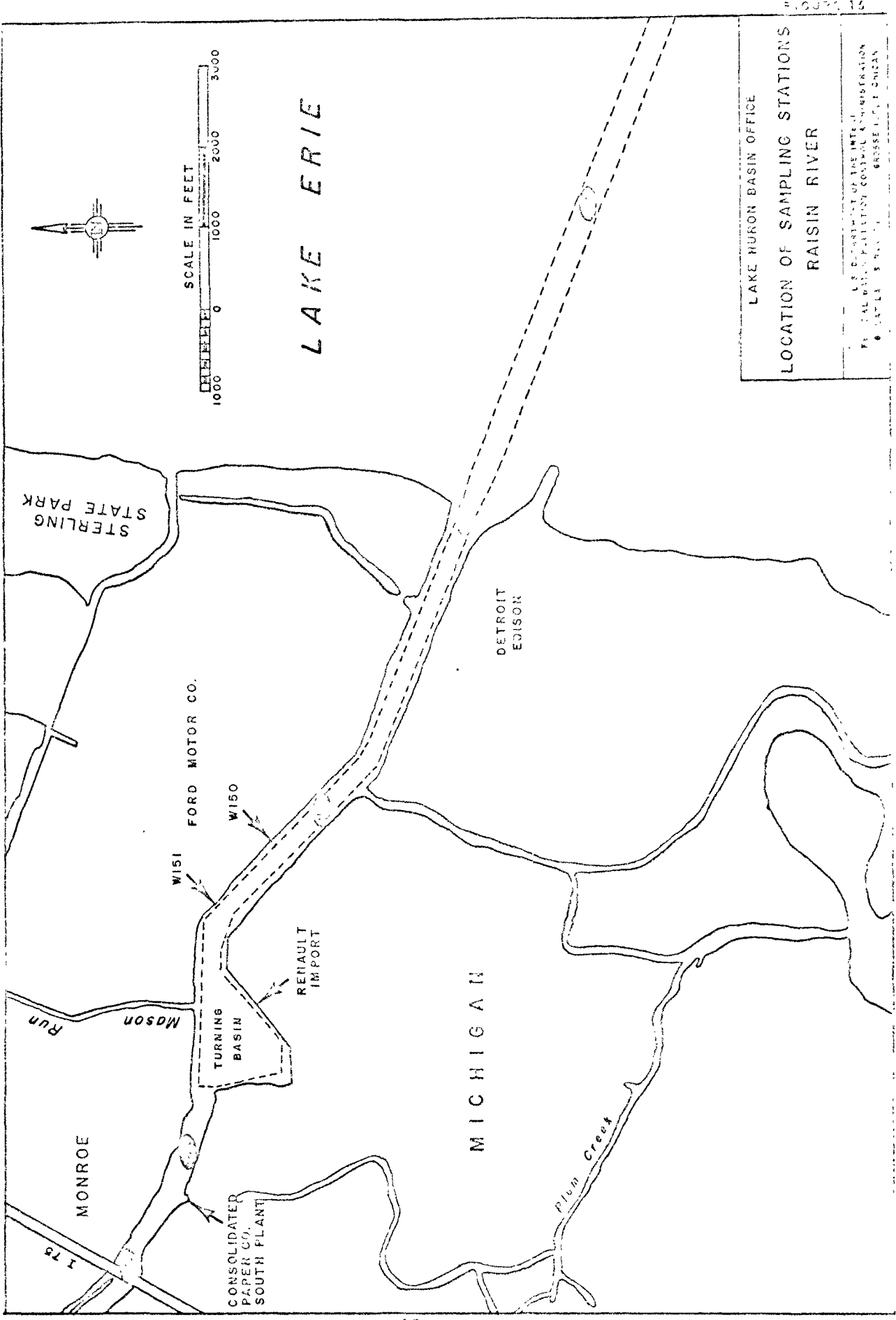


TABLE 14
RAISIN RIVER STUDY
OCTOBER - NOVEMBER 1969
FIELD OBSERVATIONS

FWPCA, LHBO

<u>Sta. No.</u>	<u>Date</u>	<u>Time</u>	<u>Temp. (°C)</u>	<u>Color</u>	<u>Odor*</u>	<u>Visible Wastes**</u>
T-84	10/31	1355	13.0	black	(Ch), (M)	hvy. oil, blk. water
	11/3	1240	10.0	black	none	blk. water
	11/4	1200	8.0	green	none	lt. oil
	11/5	1210	7.5	green	none	trace of oil
	11/6	1247	8.0	lt. green	none	none
T-83	10/31	1340	13.0	beige	pulp(M)	hvy. oil, pulp, algae
	11/3	1235	11.0	jet black	pulp(M)	pulp islands
	11/4	1150	9.5	milky	none	white paper waste
	11/5	1250	9.5	beige	(Ch), (M)	pulp & oil
	11/6	1240	9.5	black	none	blk. water
RR-A	10/31	1320	9.0	murky green	pulp	hvy. oil, pulp, algae
	11/3	1215	11.0	black	none	lt. oil
	11/4	1140	9.5	dk. gray	oily(Ch)	lt. oil
	11/5	1155	9.0	beige	oily(Ch)	mod. oil
	11/6	1230	9.0	gray-brown	oily(Ch)	lt. oil
T-80	10/31	1310	9.0	murky green	oily(Ch)	lt. oil
	11/3	1205	9.0	black	none	lt. oil
	11/4	1130	9.5	dk. gray	none	lt. oil
	11/5	1145	9.5	murky green	oily(Ch)	mod. oil
	11/6	1215	10.0	lt. green	none	lt. oil
L-28	10/31	1300	9.0	green	none	none
	11/3	1155	9.0	green	none	mild oil film
	11/4	1120	8.0	green	fishy(Df)	none
	11/5	1135	8.0	green	none	none
	11/6	1155	8.0	lt. green	none	none

* For detailed odor description see Table 15.

**For detailed oil film descriptions see Table 16.

TABLE 14
RAISIN RIVER SURVEY
ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969

FWPCA, LHBO

<u>Sta. No.</u>	<u>Date</u>	<u>pH</u>	<u>Cond.</u>	<u>Phenol</u>	<u>DO</u>	<u>BOD</u>	<u>Percent Saturation</u>
T-84	10/31	7.4	750	29	10.9	> 180	104
	11/3	8.3	710	2	9.9	4	88
	11/4	8.2	700	4	10.0	4	84
	11/5	8.3	680	14	9.8	9	81
	11/6	8.4	690	4	11.1	4	93
Average		8.1	710	11	10.3	40	90
T-83	10/31	7.2	690	69	0.4	> 180	4
	11/3	7.7	730	8	8.7	11	79
	11/4	8.1	720	4	9.6	18	84
	11/5	8.2	680	30	4.0	32	35
	11/6	8.1	720	7	10.5	14	92
Average		7.9	710	24	6.6	51	59
RR-A	10/31	8.3	420	4	9.7	7	84
	11/3	7.5	610	11	2.0	12	18
	11/4	7.7	610	16	11.1	5	98
	11/5	7.8	610	16	3.2	15	28
	11/6	7.7	620	21	3.6	12	31
Average		7.8	570	14	5.9	10	52
T-80	10/31	8.5	380	4	11.3	5	98
	11/3	8.0	380	3	8.8	5	76
	11/4	7.5	620	11	1.3	10	11
	11/5	7.8	660	11	10.7	18	94
	11/6	7.7	640	14	2.2	12	20
Average		7.9	540	9	6.9	10	60
L-28	10/31	8.1	330	5	9.9	3	86
	11/3	8.3	310	1	10.5	3	91
	11/4	8.4	320	1	4.6	6	39
	11/5	8.1	260	3	10.7	5	90
	11/6	8.4	310	3	11.4	5	96
Average		8.3	310	3	9.4	4	80

Note: Units of measurements on page 104.

TABLE 14
RAISIN RIVER SURVEY
ANALYTICAL RESULTS - OCTOBER THRU NOVEMBER 1969

FWPCA, LHBO

Sta. No.	Date	Susp. Solids	Diss. Solids	Total Solids	Total Coliform	Fecal Coliform	Cyanides	Phyto- plankton
T-84	10/31	350	720	1,100	330,000	10,000	-	-
	11/3	21	480	500	29,000	1,400	-	-
	11/4	16	450	470	13,000	820	-	-
	11/5	16	450	470	11,000	900	-	-
	11/6	20	420	440	7,400	460	-	-
Average		85	500	600	13,000*	900*	-	-
T-83	10/31	120	410	530	690,000	> 100	-	21,600
	11/3	25	510	530	10,000	100	-	-
	11/4	34	490	520	180,000	> 160	-	-
	11/5	24	490	520	8,000	-	-	-
	11/6	38	500	540	1,700	< 100	-	-
Average		48	480	530	10,000*	> 100*		
RR-A	10/31	31	230	260	300	> 100	< .01	36,500
	11/3	26	410	440	> 800	80	< .01	13,400
	11/4	22	390	410	280	< 10	.02	-
	11/5	32	400	430	1,600	-	.01	-
	11/6	26	390	410	13,000	> 100	< .01	12,400
Average		27	360	390	> 800*	> 90*	< .01	20,100
T-80	10/31	36	180	220	100	< 10	< .01	16,200
	11/3	22	230	250	> 800	32	< .01	16,700
	11/4	27	400	420	12,000	> 50	< .01	-
	11/5	37	420	460	3,800	-	.04	-
	11/6	29	400	420	1,200	< 10	.02	10,100
Average		30	330	350	1,200*	21*	.02	14,300
L-28	10/31	32	150	180	500	< 10	-	-
	11/3	15	180	190	50	4	-	10,300
	11/4	29,	190	220	90	< 2	1	-
	11/5	13	150	170	40	< 2	-	-
	11/6	12	180	190	32	< 2	-	5,300
Average		20	170	190	50*	< 2*		

* Median

Note: Units of measurements on page 104.

TABLE 15

A GUIDE TO REPORTING QUALITATIVE DESCRIPTIONS OF ODORS*

FWPCA-LHBO 1969

<u>Code</u>	<u>Nature of Odor</u>	<u>Description (Such as Odors of:)</u>
<u>A</u>	<u>Aromatic (spicy)</u>	camphor, cloves, lavender, lemon
Ac	cucumber	<u>Synura</u>
<u>B</u>	<u>Balsamic (flowery)</u>	geranium, violet, vanilla
Bg	geranium	<u>Asterionella</u>
Bn	nasturtium	<u>Aphanizomenon</u>
Bs	sweetish	<u>Coelosphaerium</u>
Bv	violet	<u>Mallomonas</u>
<u>C</u>	<u>Chemical</u>	industrial wastes or treatment chemicals
Cc	chlorinous	free chlorine
Ch	hydrocarbon	oil refinery wastes
Cm	medicinal	phenol and iodoform
Cs	sulfuretted	hydrogen sulfide
<u>D</u>	<u>Disagreeable</u>	(pronounced, unpleasant)
Df	fishy	<u>Uroglenopsis</u> , <u>Dinobryon</u>
Dp	pigpen	<u>Anabaena</u>
Ds	septic	stale sewage
<u>E</u>	<u>Earthy</u>	damp earth
Ep	peaty	peat
<u>G</u>	<u>Grassy</u>	crushed grass
<u>M</u>	<u>Musty</u>	decomposing straw
Mm	moldy	damp cellar
<u>V</u>	<u>Vegetable</u>	root vegetable

*Standard Methods of Examination of Water & Wastewater, 11th Edition,
p. 255.

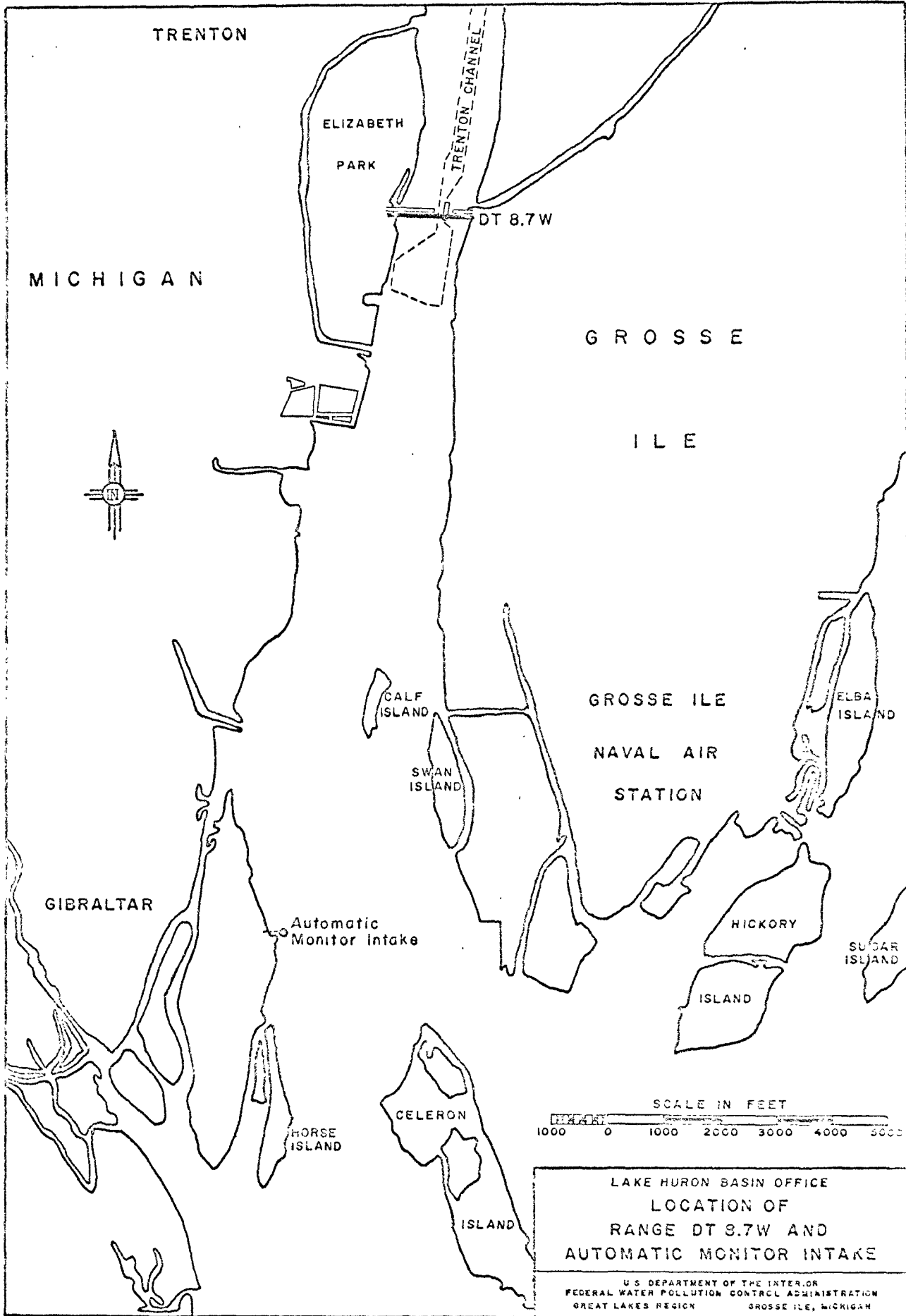
TABLE 16

A GUIDE TO REPORTING QUALITATIVE OIL FILM OBSERVATIONS* - 1969

FWPCA, LHBO

<u>Severity Code</u>	<u>Severity Description</u>	<u>Gal. Oil/ sq.mi.</u>	<u>Approx. Film Thickness (in.) 10^{-6}</u>	<u>Appearance</u>
0	none	<25	-	Not visible
1	trace	25	1.5	Barely visible
2	mild	50	3.0	Visible as silvery sheen
3	light	100	6.0	First trace of color observed (iridescent)
4	moderate	200	12.0	Bright bands of color visible (iridescent)
5	serious	666	40.0	Colors begin to turn dull
6	heavy	1,332	80.0	Colors much darker
7	extreme	>1,332	-	Viscous opaque layer of black, brown, amber, yellow or greenish oil

* Based on American Petroleum Institute (1949) studies and Oil and Hazardous Materials, Emergency Procedures in the Water Environment (1968).



1969 OIL OBSERVATIONS
Trenton Channel, Detroit River

During the first three months of 1968, and again in 1969, the Lake Huron Basin Office has been conducting a daily oil slick vigil of the Trenton Channel of the Detroit River. The information collected is part of the Michigan Bureau of Water Management study to determine the cause of winter duck mortalities in the lower Detroit River.

The relative oil concentration for each sampling day is listed in the following table, along with a summary of the field observations. Oil observed at each of the six stations (R91 thru R96) across the Trenton Channel is given according to the following key:

Key to Oil Film Observations:

- O = No oil observed
- X = Light traces of silvery oil or small spots of iridescent oil
- XX = A large film of iridescent oil
- XXX = A thick or heavy cover of oil, dark iridescent or opaque in color

TABLE 17
1969 OIL OBSERVATIONS
Detroit River, Range DT 8.7W

FWPCA, LHBO

Date	Observation Points						Ice Cover (%)	Air Temp (°F)	Water-fowl	Remarks
	R91 80*	R92 280*	R93 480*	R94 680*	R95 980*	R96 1240*				
01-06-69	X	0	0	0	0	0	50	25	Present	Rainbow colored oil spots.
01-07-69	X	X	X	X	0	0	10	32	"	Very thin silver-blue film of oil,
01-08-69	X	X	X	0	0	0	50	19	"	Very thin silver-blue film of oil,
01-09-69	X	0	0	X	0	0	15	22	"	Rainbow colored oil spots.
01-10-69	X	X	X	0	0	0	50	12	"	Spots of silvery oil; ice on E side.
01-13-69	X	X	X	X	X	X	10	22	"	Thin blue film covering river.
01-14-69	0	X	X	X	X	X	10	19	"	Light blue-brown oil patches.
01-15-69	X	X	0	0	X	0	20	22	"	Small rainbow colored oil spots.
01-16-69	X	0	X	X	X	0	20	30	"	Very thin silvery oil.
01-17-69	XX	XX	XX	XX	XX	XX	0	40	Absent	Thin silvery oil covering river.
01-20-69	0	0	XX	0	0	0	33	35	"	Oil of medium thickness, rainbow colored.
01-21-69	XX	X	X	0	0	0	0	34	"	Blue-brown oil film.
01-22-69	XX	XX	X	0	X	0	25	38	-	Rainbow colored oil.
01-24-69	XX	XX	XX	XX	XX	XX	-	30	"	Bluish-silver oil film.
01-27-69	X	0	0	0	0	0	100	10	Present	Thin film of bluish oil.
01-28-69	X	X	X	X	0	0	-	30	Absent	Very thin silver oil.
01-29-69	XX	XX	X	0	0	X	0	40	-	Rainbow colored oil.
01-30-69	X	0	0	0	0	0	0	42	Absent	Bluish oil film, some coal dust & sewage.
01-31-69	X	X	X	X	X	X	0	32	Absent	Very thin silver oil film.
02-03-69	X	X	X	X	X	0	-	30	Absent	Thin silver-grey film.
02-04-69	0	X	X	0	0	0	20	15	Present	Very thin light blue oil.
02-05-69	X	X	X	0	X	0	10	25	-	Small rainbow colored oil spots.
02-06-69	X	X	X	0	0	0	-	32	Present	Spotted with silver oil.
02-07-69	XX	XX	X	X	X	X	15	17	-	Spots of rainbow colored oil.
02-10-69	X	X	0	0	0	0	-	27	-	Thin silver oil film.
02-11-69	X	X	X	X	X	0	0	34	Present	Very thin bluish-white oil film.
02-12-69	XX	X	X	0	0	0	0	25	-	Rainbow colored oil.
02-13-69	0	0	0	0	0	0	-	30	Present	No oil.

*Seen from west shore

TABLE 17
1969 OIL OBSERVATIONS
Detroit River, Range DT 8.7W

FWPCA, LHBO

Date	Observation Points							Ice		Air Temp (°F)	Water- fowl	Remarks
	R91 80*	R92 280*	R93 480*	R94 630*	R95 930*	R96 1240*		Cover (%)				
02-14-69	XX	X	X	0	0	0		10	15		-	Rainbow colored oil.
02-17-69	0	0	0	0	0	0		-	30		-	No oil.
02-18-69	X	X	X	X	0	0		0	40		-	Brownish & bluish debris, thin blue oil.
02-19-69	XX	XX	X	0	X	XX		10	37		Present	Rainbow & silver oil.
02-20-69	X	X	0	0	0	X		0	35		Absent	Thin silver oil film. Sewage at R96.
02-25-69	X	X	X	X	X	X		0	35		Present	Thin light blue oil film.
02-26-69	XX	X	X	0	0	XX		0	33		-	Silver colored oil.
02-27-69	X	X	X	0	0	X		-	35		Present	Very thin silver roil film.
02-28-69	0	0	0	0	0	0		5	28		Absent	No oil.
03-3-69	X	X	X	0	0	0		50	39		-	Ice floe covering E. 1/2 of river.
03-4-69	X	X	X	X	X	X		1	35		Absent	Lt. blue oil spots.
03-5-69	XX	XX	X	X	X	XX		50	40		-	Rainbow colored oil.
03-6-69	X	X	X	X	X	X		50	35		-	Film of silver oil across entire river.
03-7-69	X	X	X	0	0	X		0	21		Absent	Small patches of brown-blue oil.
03-10-69	X	X	X	X	X	X		1	25		Absent	Film of brown-blue oil.
03-11-69	0	0	0	0	0	0		0	25		Absent	No oil.
03-12-69	X	X	0	0	0	X		0	17		Present	Rainbow colored oil.
03-13-69	X	X	X	X	0	0		0	24		Absent	Patches of bluish-white oil
03-14-69	X	X	X	X	X	X		0	35		Absent	Thin film of silvery oil.
03-17-69	0	0	0	0	0	0		-	45		-	No oil.
03-18-69	X	X	X	X	X	X		-	45		-	Thin silvery oil film
03-19-69	XX	X	X	0	0	X		0	65		-	Rainbow colored oil.
03-20-69	X	X	X	X	X	X		-	40		Absent	Very light oil film.
03-21-69	X	XX	X	X	0	X		0	40		-	Light film of oil.
03-24-69	X	X	X	X	X	X		0	40		-	Light film of oil.
03-25-69	X	X	X	X	X	X		0	40		Present	Silver to rainbow colored oil film.
03-26-69	X	X	X	X	X	X		0	27		-	Light film of oil.
03-27-69	X	X	X	X	X	X		0	30		-	Light film of oil.
04-1-69	X	X	0	0	0	0		0	46		Absent	Light film of oil.

* Feet from west shore.

TEMPERATURE-CONDUCTIVITY-DISSOLVED OXYGEN AUTOMATIC MONITOR 1969

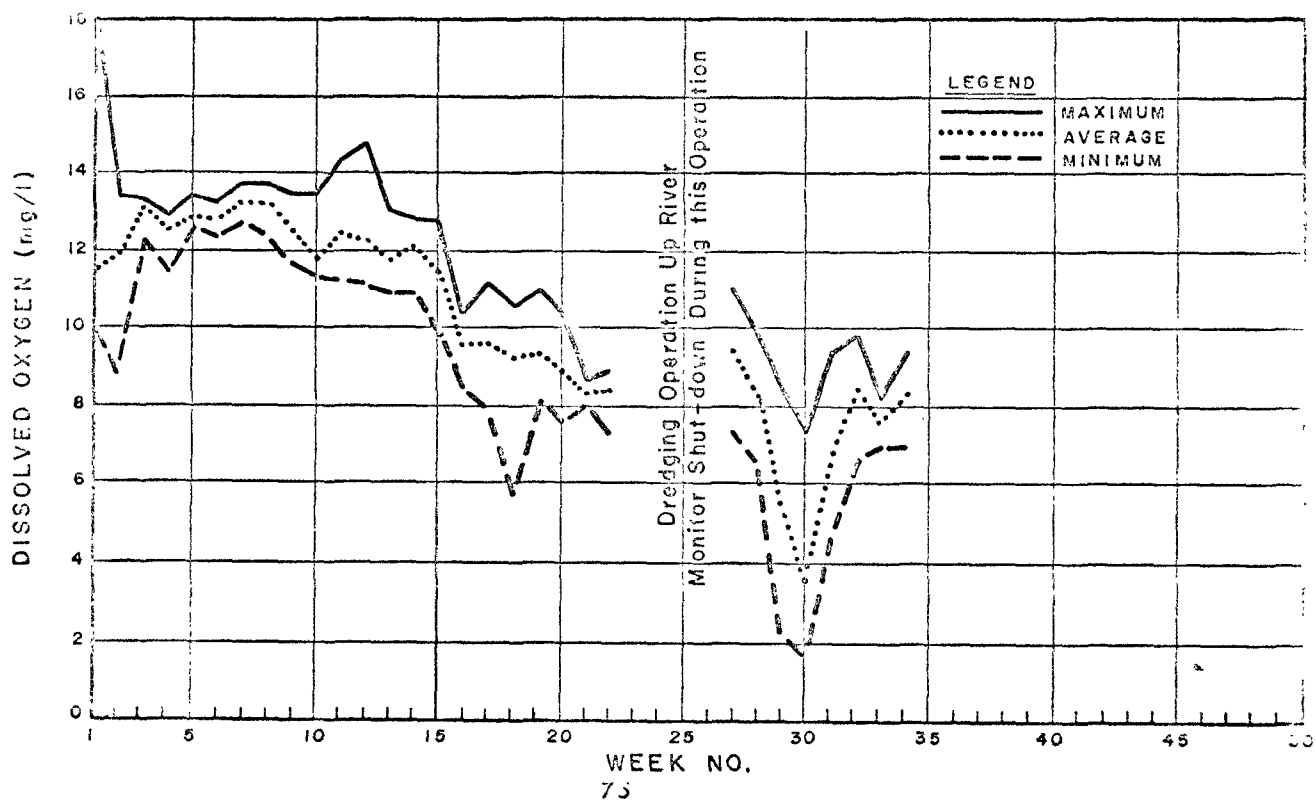
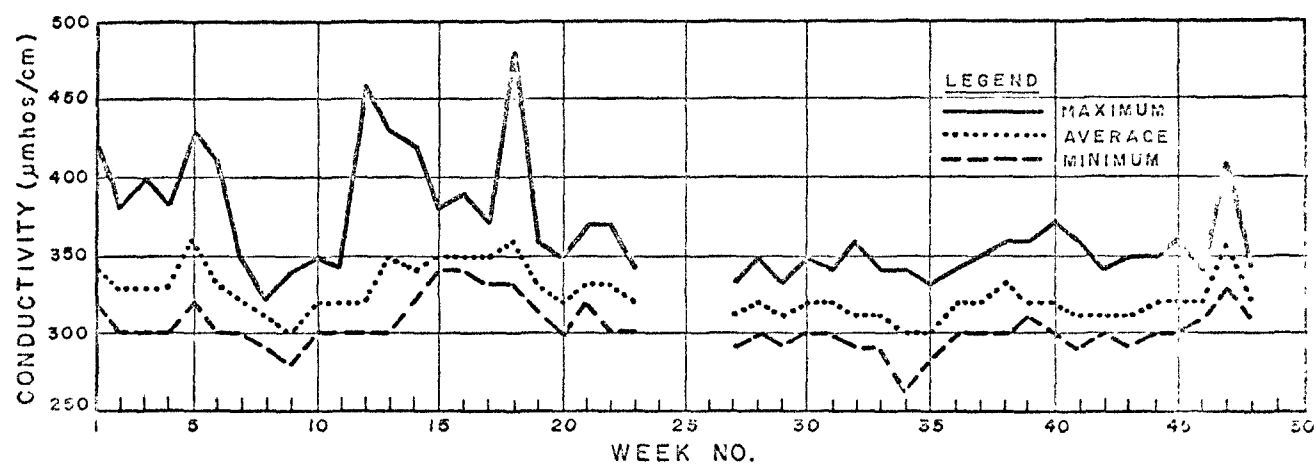
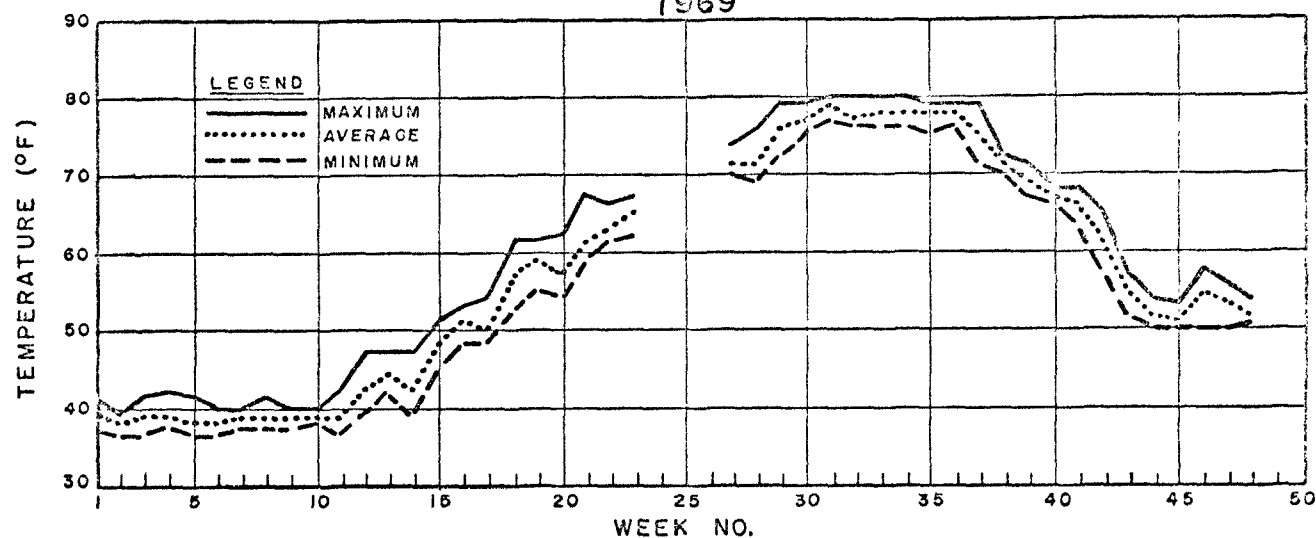


TABLE 18
1969 AUTOMATIC MONITOR RESULTS
Detroit River at Gibraltar, Michigan

FWPCA, LHBO

<u>Week No.</u>	<u>Date</u>		<u>Temp. (°F)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Conductivity (umhos/cm)</u>
1	12/29 - 1/4	Avg.	39	11.5	340
		Max.	41	18.0	420
		Min.	37	10.1	320
2	1/5 - 1/11	Avg.	38	11.9	330
		Max.	39	13.4	380
		Min.	36	8.8	300
3	1/12 - 1/18	Avg.	39	12.9	330
		Max.	41	13.3	400
		Min.	36	12.3	300
4	1/19 - 1/25	Avg.	39	12.5	330
		Max.	42	12.9	380
		Min.	37	11.4	300
5	1/26 - 2 /1	Avg.	38	12.9	360
		Max.	41	13.3	430
		Min.	36	12.6	320
6	2/2 - 2/8	Avg.	38	12.8	330
		Max.	40	13.2	410
		Min.	36	12.2	300
7	2/9 - 2/15	Avg.	39q	13.2	320
		Max.	40	13.7	350
		Min.	37	12.7	300
8	2/16 - 2/22	Avg.	39	13.2	310
		Max.	41	13.7	320
		Min.	37	12.4	290
9	2/23 - 3/1	Avg.	39	12.5	300
		Max.	40	13.4	340
		Min.	37	11.8	280
10	3/2 - 3/8	Avg.	39	11.8	320
		Max.	40	13.4	350
		Min.	38	11.3	300

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<u>Week No.</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Conductivity (umhos/cm)</u>
11	3/9 - 3/15	Avg. 39	12.4	320
		Max. 42	14.4	340
		Min. 36	11.2	300
12	3/16 - 3/22	Avg. 42	12.3	320
		Max. 47	14.8	460
		Min. 39	11.1	300
13	3/23 - 3/29	Avg. 44	11.8	350
		Max. 47	13.0	430
		Min. 42	10.9	300
14	3/30 - 4/5	Avg. 42	12.1	340
		Max. 47	12.8	420
		Min. 39	10.9	320
15	4/6 - 4/12	Avg. 48	11.4	350
		Max. 51	12.7	380
		Min. 45	9.8	340
16	4/13 - 4/19	Avg. 51	9.5	350
		Max. 53	10.3	390
		Min. 48	8.3	340
17	4/20 - 4/26	Avg. 50	9.5	350
		Max. 54	11.1	370
		Min. 48	7.9	330
18	4/27 - 5/3	Avg. 57	9.1	360
		Max. 61	10.5	480
		Min. 52	5.7	330
19	5/4 - 5/10	Avg. 59	9.2	330
		Max. 61	10.9	360
		Min. 55	8.1	310
20	5/11 - 5/17	Avg. 57	8.7	320
		Max. 62	10.3	350
		Min. 54	7.5	300

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<u>Week No.</u>	<u>Date</u>		<u>Temp. (°F)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Conductivity (umhos/cm)</u>
21	5/18-5/24	Avg.	61	8.3	330
		Max.	67	8.6	370
		Min.	59	8.0	320
22	5/25 - 5/31	Avg.	63	8.3	330
		Max.	66	8.8	370
		Min.	61	7.1	300
23	6/1 - 6/7	Avg.	65	-	320
		Max.	67	-	340
		Min.	62	-	300
(Dredging upstream - monitor shut off)					
27	6/29 - 7/5	Avg.	71	9.4	310
		Max.	73	11.0	330
		Min.	70	7.4	290
28	7/6 - 7/12	Avg.	71	8.2	320
		Max.	75	9.7	350
		Min.	69	6.5	300
29	7/13 - 7/19	Avg.	76	5.4	310
		Max.	79	8.4	330
		Min.	72	2.2	290
30	7/20 - 7/26	Avg.	77	3.6	320
		Max.	79	7.3	350
		Min.	75	1.6	300
31	7/27 - 8/2	Avg.	79	6.8	320
		Max.	80	9.3	340
		Min.	77	4.7	300
32	8/3 - 8/9	Avg.	77	8.4	310
		Max.	80	9.7	360
		Min.	76	6.7	290
33	8/10 - 8/16	Avg.	78	7.5	310
		Max.	80	8.1	340
		Min.	76	6.9	290

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Detroit River at Gibraltar, Michigan

FWPCA, LHBO

<u>Week No.</u>	<u>Date</u>		<u>Temp. (°F)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Conductivity (umhos/cm)</u>
34	8/17 - 8/23	Avg.	78	8.2	300
		Max.	80	9.3	340
		Min.	76	6.9	260
35	8/24 - 8/30	Avg.	78	-	300
		Max.	79	-	330
		Min.	75	-	280
36	8/31 - 9/6	Avg.	78	-	320
		Max.	79	-	340
		Min.	76	-	300
37	9/7 - 9/13	Avg.	75	-	320
		Max.	79	-	350
		Min.	71	-	300
38	9/14 - 9/20	Avg.	71	-	330
		Max.	72	-	360
		Min.	70	-	300
39	9/21 - 9/27	Avg.	69	-	320
		Max.	71	-	360
		Min.	67	-	310
40	9/28 - 10/4	Avg.	67	-	320
		Max.	68	-	370
		Min.	66	-	300
41	10/5 - 10/11	Avg.	66	-	310
		Max.	68	-	360
		Min.	63	-	290
42	10/12-10/18	Avg.	62	-	310
		Max.	65	-	340
		Min.	57	-	300
43	10/19-10/25	Avg.	55	-	310
		Max.	57	-	350
		Min.	52	-	290

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Detroit River at Gibraltar, Michigan

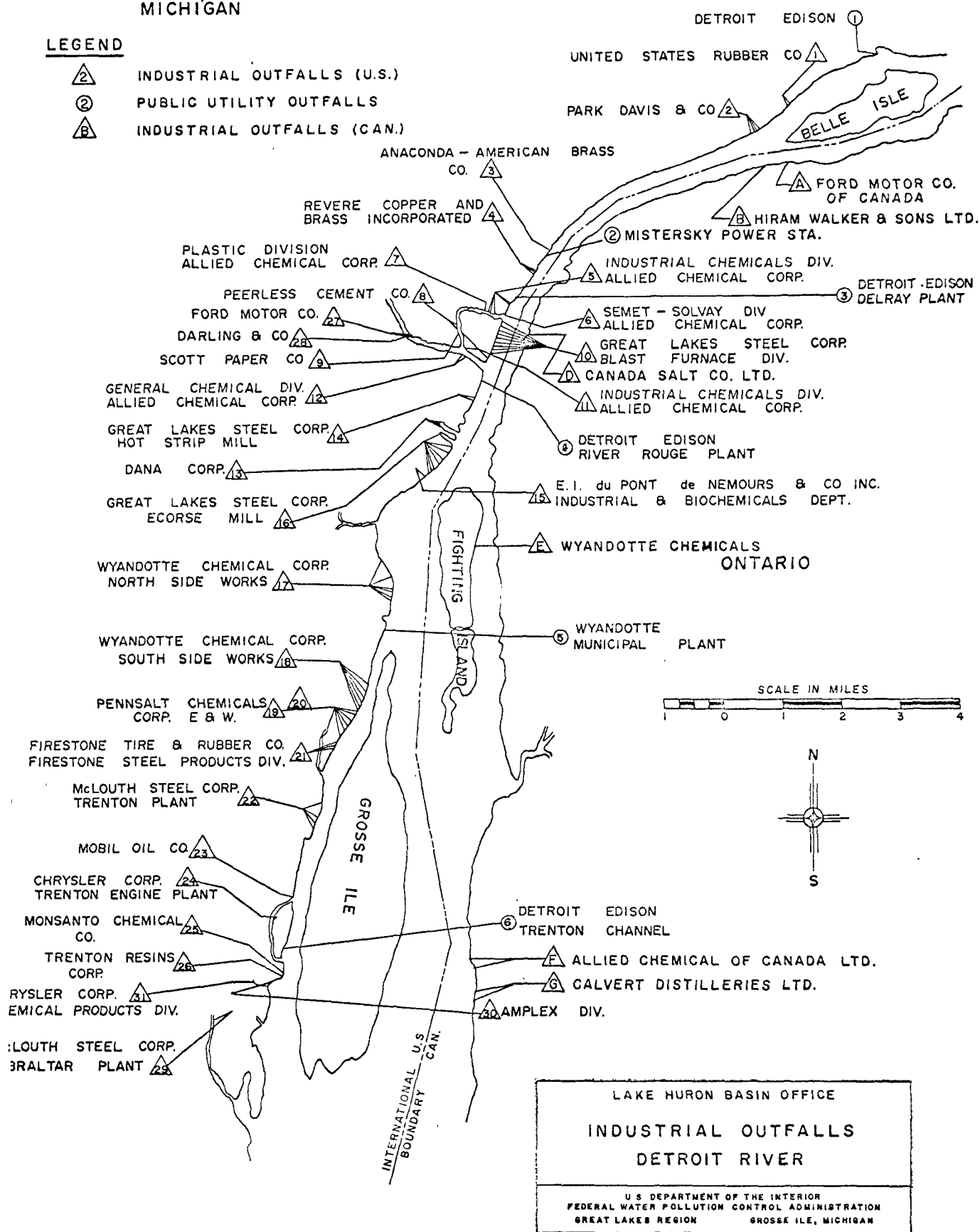
FWPCA, LHBO

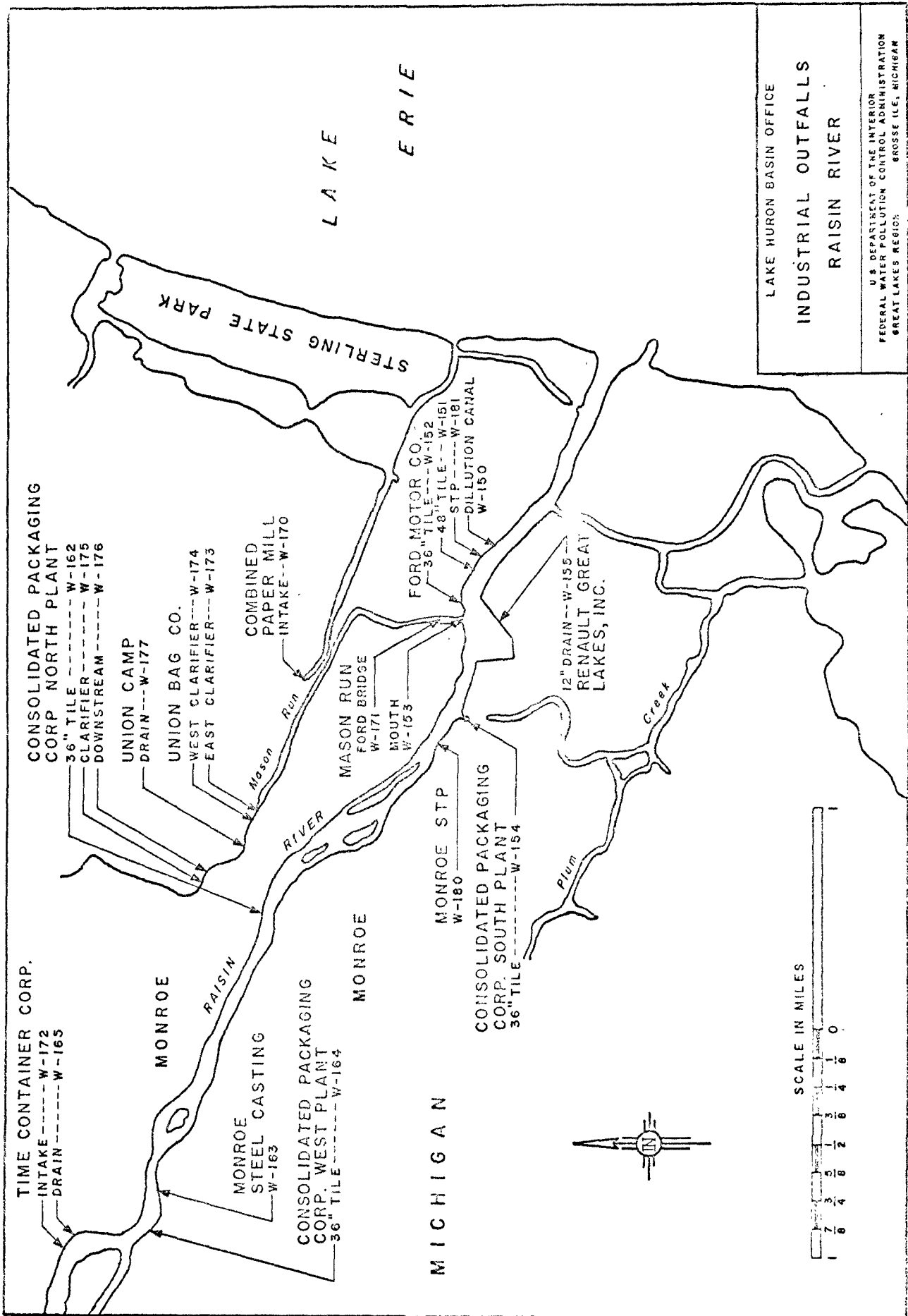
<u>Week No.</u>	<u>Date</u>		<u>Temp. (°F)</u>	<u>Dissolved Oxygen (mg/l)</u>	<u>Conductivity (umhos/cm)</u>
44	10/26-11/1	Avg.	52	-	320
		Max.	54	-	350
		Min.	50	-	300
45	11/8-11/15	Avg.	51	-	320
		Max.	53	-	360
		Min.	50	-	300
46	11/16-11/22	Avg.	55	-	320
		Max.	58	-	340
		Min.	50	-	310
47	11/23-11/29	Avg.	54	-	360
		Max.	56	-	410
		Min.	50	-	330
48	11/30-12/6	Avg.	52	-	320
		Max.	54	-	340
		Min.	51	-	310

MICHIGAN

LEGEND

- ② INDUSTRIAL OUTFALLS (U.S.)
 ② PUBLIC UTILITY OUTFALLS
 Ⓐ INDUSTRIAL OUTFALLS (CAN.)





OBSERVATION RUNS - 1969

RAISIN RIVER

General Observations

- 1/17 Oil was seen on river surface at several locations: Penn-Central RR bridge, in vicinity of Elm Street at Dixie Highway, and outfall at Monroe Steel and Casting Company.
- 1/27 Flooding due to ice occurred at site of Monroe water treatment plant.
- 1/31 Heavy oil concentrations were seen extending downstream for 75' from Consolidated Packaging Corp.-North Plant outfall W162. Light oil concentrations were seen further downstream at Renault Great Lakes, Inc. outfall W155. Pulp fiber was observed at Elm Street and Dixie Highway and at the site of Consolidated Packaging Corp. South Plant outfall W154.
- 2/25 Oil was found in the river at Monroe Steel Casting Company outfall W163. Further downstream, oil and oil traces were observed at Consolidated Packaging Corp. outfall W162.
- 3/11 Oil traces were found in the area of Monroe Steel Casting Company outfall. An oil film was observed in the river at US 223 bridge at Palmyra. Oil traces were seen in Mason Run at W162 and in the turning basin and dockside area of Renault Great Lakes, Inc. outfall W155. Milky effluent and heated pulp residues were evident on the river bank in the area of Consolidated Packaging Corp. outfall W154.
- 3/27 Heated, milky water covered with brown scum was observed near the Time Container Corp. water intake. Oil traces continued at Monroe Steel Casting Company (W163) and oil and paper pulp wastes

Raisin River (cont.)

observed at Elm Street bridge and Dixie Highway. In Mason Run at Dixie Highway crossing, there was evidence of heated paper pulp wastes.

4/25 Area above the industrialized lower portion of the river was clear. A black area of heavy pulp concentration was observed in the vicinity of outfall W165. Water between W154 and W152 varied from a dark green containing heavy pulp concentrations to a milky color containing oil, suspended solids, and a soapy substance. At the mouth of Mason Run, water was milky and contained oil.

6/9 Effluents from eleven outfalls varied in color from light clear to a dark gray. Some grease was observed at the Monroe sewage treatment plant outfall W180. Paper mill wastes were observed at outfalls of Consolidated Packaging Corp. South and North plants. Oil traces were detected at Ford Motor Company outfall W152. Overall, the river appeared clean.

7/29 Paper mill wastes were observed at Time Container Corp. outfall W165. Paper pulp wastes were also observed at Consolidated Packaging Corp.-South Plant outfall. Waste covered an area approximately 1,000'x175'. Paper pulp waste was also observed in Mason Run at the site of the Ford Company bridge. The waste area extended 1,000'x50'. At the mouth of Mason Run, a light gray waste area, with a sewage odor, extended 500'x100'. Some oil was observed at the Union Camp Corp. drain W177 as well as the Dilution Canal at W150.

Raisin River (cont.)

8/10 A gray-colored effluent containing heavy concentrations of paper pulp waste was observed at Consolidated Packaging Corp. South Plant outfall W154. The gray-colored pulp carrying discharge covered a 400'x75' area of the river.

8/15 Dark, milk-colored effluent containing paper waste extended for an area 400'x75' from the Consolidated Packaging Corp.-South Plant outfall W154. At the same time, the entire length of Mason Run was colored brown. Upstream on the river, a dark-gray discharge poured from outfall W164 at the site of Consolidated Packaging Corp.-West Plant. Heavy oil concentrations occupying 25'x10' area were also observed. Downstream from the Renault Company outfall, a light-milky colored effluent with an oil area 25' square was observed. A black effluent was observed pouring out of the Ford Motor Company sewage treatment (W181).

8/26 Heavy concentrations of paper pulp were observed in the gray effluent emanating from Consolidated Packaging Corp.-South Plant outfall W154. The area affected extended for 300'x100'. Paper wastes were also observed in a 300'x100' area at the mouth of Mason run (W153).

Light to medium oil concentrations were observed at outfall W151 and W150, respectively.

10/16 Paper reprocessing wastes and odors were observed at a number of outfalls. A beige-colored effluent with characteristic paper processing odor was observed flowing strongly from the Time Container Corp. outfall. The effect was visible from 50' offshore to 200 yards downstream. Downstream, small paper pulp deltas

Raisin River (cont.)

were building up in front of Consolidated Packaging Corp.--North Plant outfall W162 and the South Plant outfall W154.

In the turning basin, a grayish discharge was observed coming from the Renault Great Lakes outfall. An oil odor was detected at a 75' diameter iridescent oil slick around a boil in the river at Ford's submerged outfall W150.

OBSERVATION RUNS - 1969

DETROIT AND ROUGE RIVERS

General Observations

- 1/9 There was oil on the surface of the water from 300' above W130 to the mouth of the Rouge River. Grease and meat fat were observed at Darling and Company and downstream. Ford turning basin and slip were a bright rust color traceable downstream to the Jefferson Avenue bridge.
- 1/16 The Rouge River appeared a rust color with a trace of oil noted from the Fort Street bridge to the Detroit River. Both W122 and W123 from the Ford Motor Co. were discharging a black substance and some oil. An oil film appeared from W130 downstream to the turning basin. Ford turning basin was a bright rust color with traces of oil from the basin to 300' above W130.
- 1/24 A film of grease and oil was noted from W130 to the Fort Street bridge. Again, Ford's W122 and W123 were discharging black water and oil. Ford's skimmer boom was across the Rouge River downstream from W126. Heavy black oil was trapped at the northwest corner of the Dix Avenue bridge.
- 1/28 Oil was seen from W130 to the mouth of the Rouge River. A black substance and oil were again being discharged from Ford's W122 and W123. At the mouth of the Rouge River, there was a yellowish substance in the ice.
- 2/6 Grease and oil on the upper Rouge caused it to have a glossy appearance. Water in Ford's turning basin did not look rusty.

Mermentau and Rouge Rivers (cont.)

Oil was observed along the south shore of the river. The old channel looked better than normal.

2/29 A light oil film was observed on the upper Rouge River from W140 to Ford's turning basin where it seemed to disappear. Oil or tar substance at the North-western RR bridge was traced to a leak or overfill from the Terminal Asphalt Company. The old channel appeared in good condition.

1/7 The oil was observed along the river from W140 to Ford's turning basin where it seemed to disappear. Oil or tar substance at the North-western RR bridge was traced to a leak or overfill from the Terminal Asphalt Company. The old channel appeared in good condition.

3/1 As a whole, the Rouge River looked good. The old channel had a greenish color.

3/13 For about 1/2 mile, more heavy oil appeared behind the skimmer below W130. Oil trapped at Dix Avenue bridge had started to move out and travel downstream. The old channel appeared good despite Great Lakes Steel W101 discharging a black substance. The shore-out channel had a light tannish color and a film of oil on it.

3/17 The downriver end of the skimmer at Dix Avenue bridge was opened and oil, grease, and trash floated downstream. The old channel of the Rouge River as well as the turning basin appeared good. The water did not look as rusty as usual.

3/21 Upstream past Telegraph Road, the Rouge River is being filled in with dirt.

The skimmer at the northwest corner of Dix Avenue bridge was moved. Oakwood Pumping Station canal had oil in it that was bypassing the skimmer and entering the Rouge River.

Detroit and Rouge Rivers (cont.)

3/28 Oil was leaking around the south end of the skimmer located west from W130. Oakwood Pumping Station canal still had oil leaking. The old channel appeared good, although some white segments of lard were found near the DT&I RR bridge.

4/10 Oil from Firestone W12 and Moxogagon Creek was seen in the Detroit River near Monsanto.

Pennwalt W15 discharged a heavy flow of light, tan-colored oil into the river.

4/10 Black to gray-colored effluents from Great Lakes Steel were observed, with oil accumulating along the shore.

Slight traces of oil and debris were observed coming from the Ecorse Creek.

4/18 Water was high, therefore, most of the outfalls were submerged or partly submerged. The Detroit River was full of sewage and debris from street runoff and combined sewer overflows. Blood, small pieces of meat, and animal entrails were flowing from the DuBois sewer.

5/16 Ford had a boom across the river south of W126. There was no flow at Scott Paper Co. (W109) or Allied Chemicals (W100). An oil slick 75' wide and 1500' to 1800' long was observed on the U.S. side, south of the Ambassador Bridge. The Detroit River appeared fairly clean, as did Connors Creek. The Rouge River had little iron oxide, except for the north half of the turning basin.

6/24 Due to high water level, 60 percent of the outfalls were submerged. The Rouge River was clear of rust-colored water. In the old channel, creosote spots 6" x 8" covered the entire channel.

Detroit and Rouge Rivers (cont'd.)

A boom was across the channel at the Ford foundry. The Rouge River looked black with a light oil film covering the river surface.

6/26 The Rouge River was free of oil and looked good. The bank near the Inland Lime and Stone Company was being cleaned by a barge-tug. Scrap iron, piled near the Rouge River on the Detroit Marine Terminal property, had slid into the river. This was reported to the Detroit Corps of Engineers. On 7/7, a crane and electromagnet were observed retrieving the metal from the river.

7/9 High water and light traces of oil and debris were observed on the Rouge River. Debris was very heavy at the Ford turning basin.

7/25 The Detroit River north of the Rouge River looked very clear. Dredging operations were underway at Great Lakes Steel and grease-coated debris was floating in the area. The Detroit STP outfall (R155) had slight traces of sewage solids.

8/8 Oil slicks (50'x30', 10'x5', and 15'x10') were seen in Ford's boat slip behind the oil skimmer.

8/19 There was heavy black oil along both banks of the Rouge River from the mouth to the turning basin at Ford's. Traces of oil and a creosote-type material were found in the old channel. The turning basin contained heavy iron oxide. Little debris was found near the Dix Avenue bridge.

8/22 Heavy iron oxide concentrations were evident in the Rouge River turning basin. Light traces of oil and possible creosote were found in the old channel. A boom was across the Rouge River at Ford's W126, with a crew of men cleaning up the river behind the boom.

Detroit and Rouge Rivers (cont.)

8/28 Heavy areas of oil, probably creosote, were seen in the old channel near Zug Island as well as along the north bank downstream from the turning basin at Roulo Creek and downstream from the Ford foundry (W130). The oil boom downstream from the Ford foundry was out of position and full of scraps and oil. The river was a heavy iron color downstream from the foundry. Heavy oil was found at W127 and coming from under the skimmer below W130. Oakwood Pumping Station was free of oil.

10/24 The Rouge River was black with leaves and solids on the surface. Behind the middle skimmer at Ford's W125, the area was filled with oil.

10/30 The upper Detroit River water was clear, blue-green color with some weeds. Lower Detroit River was green and turbid with an abundance of floating weeds and some sewage and grease. Few oil slicks were observed. The Rouge River had little visible effect on the Detroit River. The general condition of the Detroit River was above average.

Monsanto was working on their lagoons and a steady flow of gray solids was pouring out of the south dike opening. Gas bubbles were observed rising in the adjacent river area.

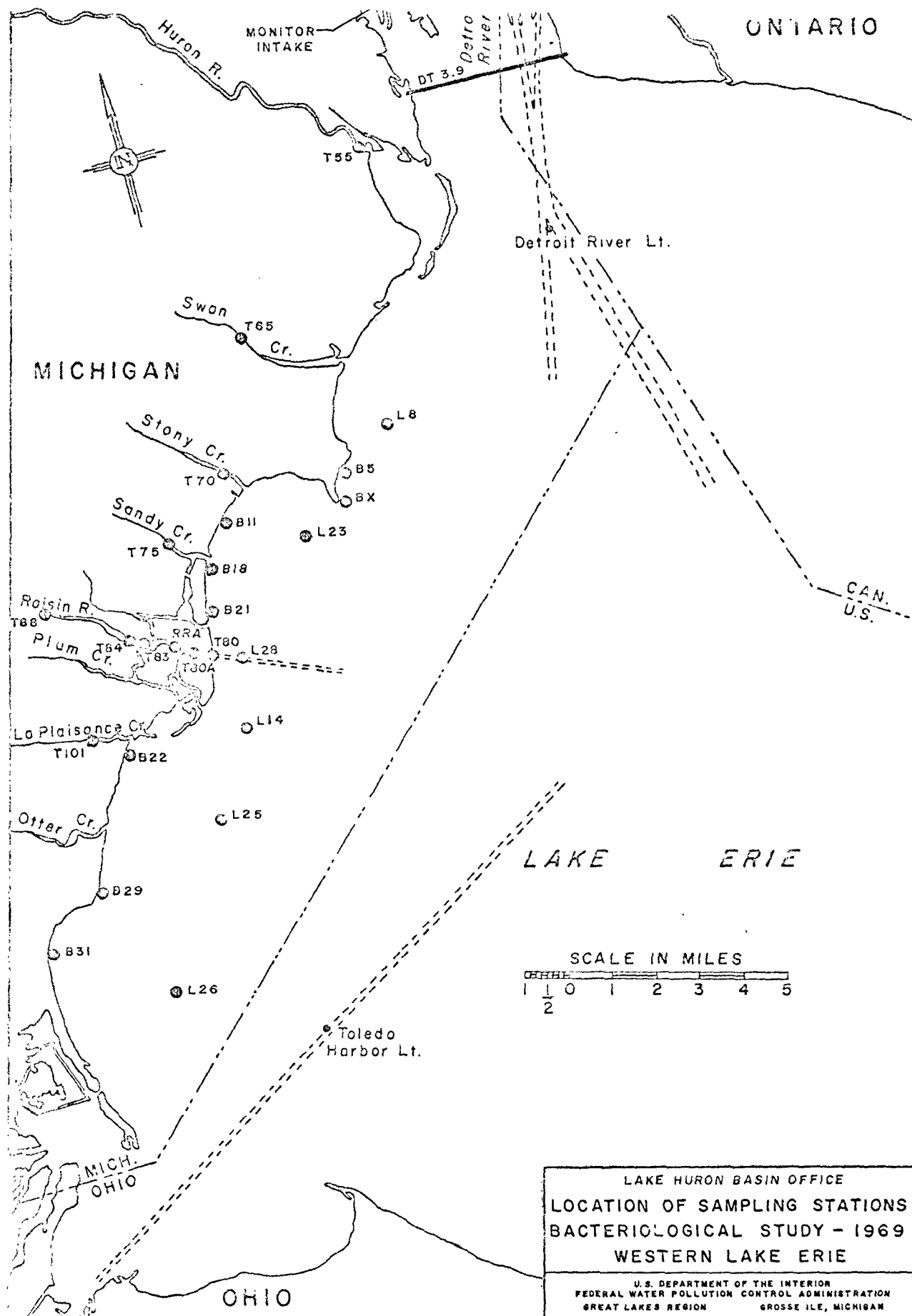


TABLE 19
1969 Bacteriological Study Of
Western Lake Erie Beaches and Tributaries
Detroit River DT 3.9 (U.S.)
Parameter: Temperature (°C)

Station: Ft. from W. Shore		R66	R67	R68	R69	R70	R71	R73
		2500	3500	4500	5500	6500	7500	9500
Date								
5-14		14.0	13.0	12.5	12.0	11.5	11.5	11.0
6-10		19.0	17.0	16.5	16.5	16.5	16.5	16.0
7-2		23.0	21.5	21.0	21.0	20.5	20.5	20.0
8-11		25.0	25.0	25.0	24.5	24.0	24.0	24.0
9-15		21.5	21.0	21.0	20.5	20.0	20.0	20.0
10-27		9.0	9.0	8.5	9.0	8.5	8.5	8.5
Max.		25.0	25.0	25.0	24.5	24.0	24.0	24.0
Min.		9.0	9.0	8.5	9.0	8.5	8.5	8.5
Parameter: Total Coliform (MF/100 ml)								
5-14		2,300	120	90	2,900	3,600	3,000	1,900
6-10		34,000	420	1,600	5,300	13,000	13,000	8,400
7-2		20,000	> 30,000	69,000	55,000	46,000	28,000	7,700
8-11		20,000	2,900	18,000	8,200	4,900	2,200	300
9-15		4,000	3,800	2,700	1,700	1,100	1,800	5,800
10-27		160	400	250	600	300	150	100
Med.		12,000	1,700	2,200	4,100	4,200	2,600	3,800
Max.		34,000	> 30,000	69,000	55,000	46,000	28,000	8,400
Min.		160	120	90	600	300	150	100
NS		6	6	6	6	6	6	6

TABLE 19

1969 Bacteriological Study
Western Lake Erie Beaches and Tributaries
Detroit River DT 3.9 (Canadian)
Parameter: Temperature (°C)

Station: 13		FWPCA, LHBO							
Feet from W. Shore		R75	R77	R79	R81	R82	R83	R84	R85
		<u>11,500</u>	<u>13,500</u>	<u>15,000</u>	<u>16,500</u>	<u>17,500</u>	<u>18,500</u>	<u>19,000</u>	<u>19,300</u>
Date									
5-14		11.0	10.5	10.5	11.0	11.5	11.5	11.5	12.0
6-10		16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.5
7-2		20.0	20.0	20.0	20.0	19.5	20.0	20.0	20.0
8-11		24.0	24.0	23.0	22.0	22.0	22.0	22.0	22.0
9-15		20.0	19.5	19.5	20.0	20.0	20.0	20.0	20.0
10-27		8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0
Max.		24.0	24.0	23.0	22.0	22.0	22.0	22.0	22.0
Min.		8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0
Parameter: Total Coliform (MF/100 ml)									
5-14		690	580	2,500	3,600	8,600	8,900	7,000	24,000
6-10		4,500	4,000	3,900	1,300	2,200	6,600	6,700	12,000
7-2		6,100	3,000	1,800	1,200	8,000	9,200	2,000	3,300
8-11		1,400	1,100	1,000	2,900	16,000	16,000	23,000	15,000
9-15		1,000	700	400	2,100	14,000	27,000	55,000	22,000
10-27		160	260	5,900	25,000	40,000	35,000	31,000	36,000
Med.		1,200	900	2,200	2,500	11,000	13,000	15,000	18,000
Max.		6,100	4,000	5,900	25,000	40,000	35,000	55,000	36,000
Min.		160	260	400	1,200	2,200	6,600	2,000	3,300
NS		6	6	6	6	6	6	6	6

TABLE 19
 1969 Western Lake Erie Beaches and Tributaries
 : Detroit River - Gibraltar Monitor
 Parameter - Total Coliform (MF/100 ml)

				<u>FWPCA, LHBO</u>	
<u>Date</u>		<u>MF/100 ml</u>	<u>Date</u>		<u>MF/100 ml</u>
Jan. 2		1,300	June 11		290,000
Jan. 15		460	June 16		39,000
Jan. 29		13,000	June 25		170,000
Feb. 26		21,000	July 2		76,000
March 12		3,900	July 16		67,000
March 26		49,000	July 30		39,000
April 9		7,900	Aug. 13		19,000
April 23		18,000	Sept. 11		650
May 7		16,000	Oct. 8		87,000
May 14		1,100,000*	Oct. 20		840
May 28		19,000	Nov. 3		38,000
June 4		5,500	Nov. 17		900

Med. 19,000/100 ml

Max. 1,100,000/100 ml

Min. 460/100 ml

NS 24

*Dredging going on upstream

TABLE 19
1969 Bacteriological Study
Western Lake Erie Beaches and Tributaries
June Survey

Station	June 16th			June 18th			FWPCA, LHBO	
	Total Coliform MF/100 ml	Fecal Strep MF/100 ml	Fecal Coliform MF/100 ml	Water Temp. (°C)	Total Coliform MF/100 ml	Fecal Strep MF/100 ml	Fecal Coliform MF/100 ml	Water Temp. (°C)
T55	22,000	630	320	17.0	4,300	1,200	300	19.5
T65	9,000	500	930	17.0	5,900	580	780	19.0
B5	170	< 5	5	17.0	310	28	7	16.0
BX	400	200	< 5	17.0	360	750	44	16.0
T70	7,300	790	1,500	15.0	9,400	500	1,800	17.0
B11	400	280	55	17.0	380	310	18	18.0
B18	700	< 10	5	17.0	540	310	14	19.0
B21	800	10	10	17.0	220	110	10	18.5
T75	37,000	2,500	3,100	13.0	25,000	2,400	1,800	16.0
T80	5,900	150	170	17.5	20,000	300	230	19.5
T101	57,000	12,000	3,500	13.0	19,000	1,000	1,100	18.0
B22	960	160	140	16.5	600	1,000	52	19.0
B29	75	10	4	16.5	440	28	6	18.0
B31	350	10	35	16.5	860	640	-	18.0

Weather Conditions During Surveys

	Weather Conditions During Surveys		% Sky Cover
	Air Temp.	Wind Speed Wind Direction	
June 16, 1969	70°F	- -	0
June 18, 1969	72°F	10 mph N.W.	100%

TABLE 19
1969 Bacteriological Study
Western Lake Erie Beaches and Tributaries
Raisin River and Sterling State Park

Date	Sta. No.	Location	Salmonella Serotypes Isolated	Total Coliform (MF/100 ml)	Fecal Coliform (MF/100 ml)	Plate Count (MF/1 ml)			FWPCA, LHBO
						20°C	35°C	41.5°C	
4/14	T80A	Raisin River	S. heidelberg S. montevideo	10,000	230	94,000	99,000	94,000	
	B21	Sterling Beach- south end	None isolated	700	20	78,000	1,600	5,000	
4/28	T80A	Raisin River	S. heidelberg	7,400	160	160,000	370,000	360,000	
	B21	Sterling Beach- south end	None isolated	8,400	44	2,600,000	160,000	120,000	
	B18	Sterling Beach- north end	None isolated	12,000	48	1,500,000	79,000	150,000	
5/12	T80A	Raisin River	Pads missing	22,000	1,500	-	-	-	
	B21	Sterling Beach- south end	-	700	6	-	-	-	
	B18	Sterling Beach- north end	Pads missing	19,000	540	-	-	-	
6/9	T80A	Raisin River	-	4,500	-	-	-	-	
		Raisin River above dam	-	16,000	-	-	-	-	
	B21	Sterling Beach- south end	-	440	-	-	-	-	
	B18	Sterling Beach- north end	-	140	-	-	-	-	

TABLE 19
1969 Bacteriological Study
Western Lake Erie Beaches and Tributaries
Lake Erie and Raisin River

FWPCA, LHBO

Parameter: Temperature (°C)

Station: L8	L14	L23	L25	L26	L28	T80	RRA	T83	T84
Date									
7/1	21.5	20.5	21.5	21.5	-	21.5	-	-	-
9/10	19.5	21.0	20.0	20.5	-	22.0	-	-	-
10/20	12.0	12.0	12.0	12.0	-	12.0	-	-	-
10/31	-	-	-	-	9.0	9.0	9.0	13.0	13.0
11/3	-	-	-	-	9.0	9.0	11.0	11.0	10.0
11/4	-	-	-	-	8.0	9.5	9.5	9.5	8.0
11/5	-	-	-	-	8.0	9.5	9.0	9.5	7.5
11/6	-	-	-	-	8.0	10.0	9.0	9.5	8.0
Max.	21.5	21.0	21.5	21.5	9.0	22.0	11.0	13.0	13.0
Min.	12.0	12.0	12.0	12.0	8.0	9.0	9.0	9.5	7.5

Parameter: Total Coliform (MF/100 ml)

7/1	250	42	5	4	-	4,500	-	-	-
9/10	380	140	40	4	-	36,000	-	-	-
10/20	55	19	>60	6	-	82,000	-	-	-
10/31	-	-	-	-	500	100	300	690,000	330,000
11/3	-	-	-	-	50	>800	>800	10,000	29,000
11/4	-	-	-	-	90	1,200	280	180,000	13,000
11/5	-	-	-	-	40	3,800	1,600	8,000	11,000
11/6	-	-	-	-	32	1,200	13,000	1,700	7,400
Med.	250	42	40	4	50	4,200	>800	10,000	13,000
Max.	380	140	>60	6	500	82,000	13,000	690,000	330,000
Min.	55	19	5	4	32	100	280	1,700	7,400
NS	3	3	3	3	5	8	5	5	5

TABLE 19
1969 Bacteriological Study
Western Lake Erie Beaches and Tributaries
Lake Erie and Raisin River

FWPCA, LHBO

Parameter: Fecal Coliform (MF/100 ml)

Station:	<u>L28</u>	<u>T80</u>	<u>RRA</u>	<u>T83</u>	<u>T84</u>
<u>Date</u>					
10/31	10	10	100	100	10,000
11/3	4	32	80	100	1,400
11/4	2	50	10	160	820
11/5	2	-	-	-	900
11/6	2	10	100	100	460
Med.	2	-	-	-	900
Max.	10	50	100	160	10,000
Min.	2	10	10	100	460
NS	5	4	4	4	5

TABLE 19
Bacteriological Study - 1969
Western Lake Erie Beaches and Tributaries
Lake Erie and Raisin River

FWPCA, LHBO

Parameter: Fecal Coliform (MF/100 ml.)					
Station:	<u>L28</u>	<u>T80</u>	<u>RRA</u>	<u>T83</u>	<u>T84</u>
<u>Date</u>					
10/31	<10	<10	>100	>100	10,000
11/3	4	32	80	100	1,400
11/4	<2	>50	<10	<160	820
11/5	<2	-	-	-	900
11/6	<2	<10	>100	>100	460
Median	<2	-	-	-	900
Maximum	<10	>50	<100	<160	10,000
Minimum	2	<10	< 10	<100	460
NS	5	4	4	4	5

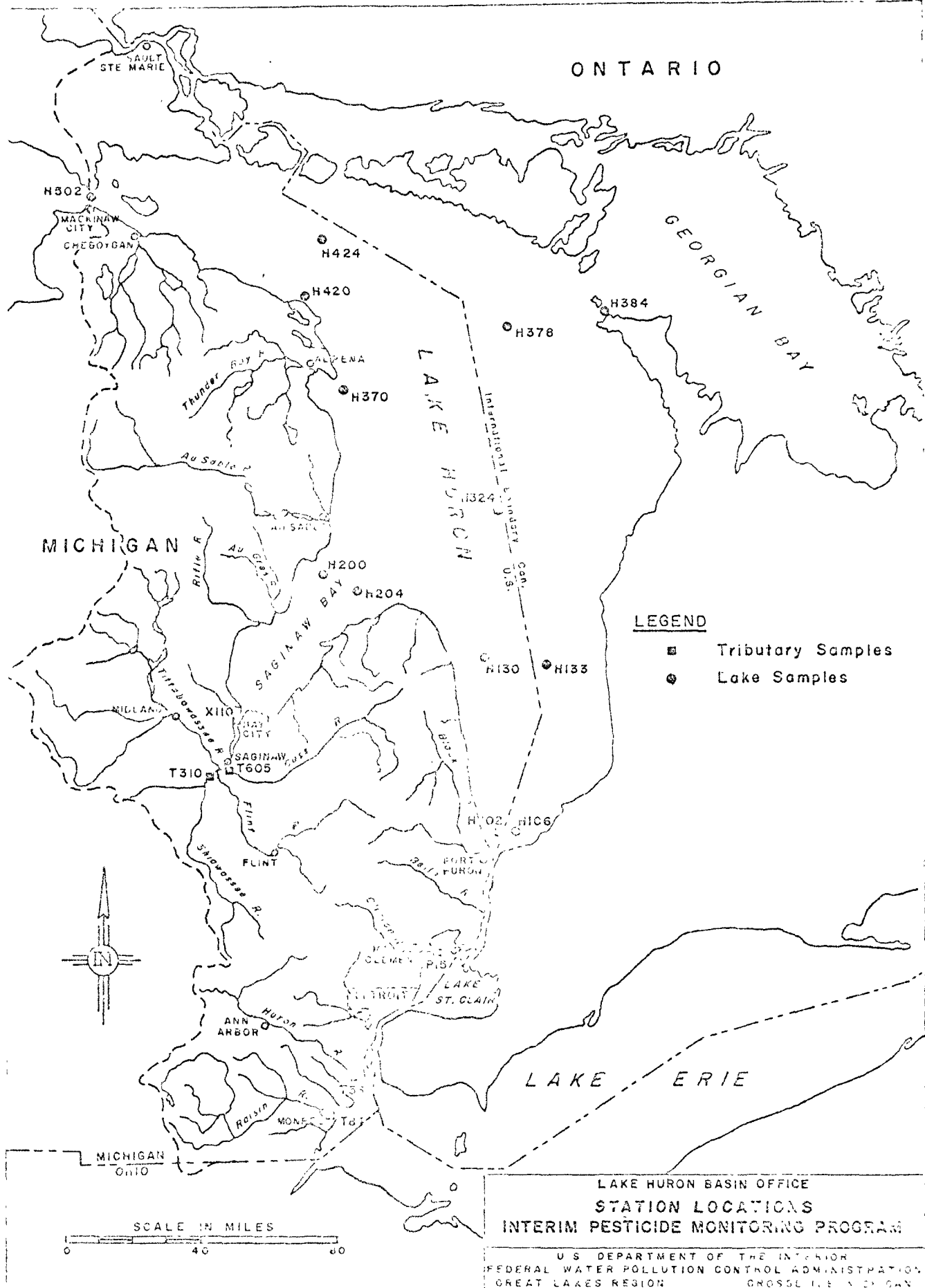


TABLE 20
1969 SAMPLE ANALYSIS RESULTS
INTERIM PESTICIDE MONITORING PROGRAM

Tentative Identification of Pesticides
(Ng/l)

Sta. No.	Location	Date	Hepta- chlor			Hepta- chlor Epoxide			Endrin	Dieldrin	DDE	o,p'- DDT		p,p'- DDT		DDD		Total Methoxy- DDT	
			Lindane	Hepta- chlor	Aldrin	Hepta- chlor	Epoxide	Hepta- chlor				DDT	DDT	DDT	DDT	DDT	DDT	DDT	chlor
T84	Raisin River	7/28	-	-	-	-	-	-	-	133	-	-	-	-	-	-	-	-	-
T56	Huron River	7/28	-	-	32	-	-	-	-	2	-	-	21	-	-	9	30	-	-
P15	Clinton River	7/17	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-
X110	Saginaw River	7/30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X605	Cass River	7/28	4	9	19	-	-	-	-	24	8	46	30	-	-	-	84	-	-
X310	Shiawassee River	7/28	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H200	Saginaw Bay	7/14	-	7	53	-	-	-	-	-	-	43	51	-	-	-	94	-	-
H204	Saginaw Bay	7/24	2	5	72	-	-	-	-	7	-	29	30	-	-	12	71	-	-
H102	Lake Huron	7/17	14	16	32	-	-	-	-	-	12	67	51	-	-	-	118	-	-
H106	"	7/17	4	8	17	-	-	-	-	20	7	27	24	-	-	-	58	-	-
H130	"	7/17	10	16	31	55	-	-	-	-	52	65	54	-	-	-	171	-	-
H133	"	7/17	3	10	18	-	-	-	-	14	5	31	23	-	-	-	59	-	-
H324	"	7/23	2	5	10	-	-	-	-	24	-	51	33	-	-	-	84	-	-
H370	"	7/20	5	10	28	-	-	-	-	-	4	39	31	-	-	-	74	-	79
H374	"	7/23	5	13	22	-	-	-	-	34	9	55	67	-	-	-	131	-	-
H378	"	7/23	18	15	34	18	-	-	-	-	34	74	56	-	-	-	164	-	194
H384	"	7/23	5	6	11	1	-	-	-	-	-	20	17	-	-	-	37	-	-
H420	"	7/21	5	13	12	-	-	-	-	-	16	62	58	-	-	-	136	-	-
H424	"	7/22	6	19	49	-	-	15	-	17	14	100	79	-	-	-	193	-	-
H502	"	7/16	-	16	34	-	-	-	-	-	-	49	52	-	-	19	120	-	-

Note: Dash = analyzed but none detected.

LABORATORY METHODS

The analytical methods used by the laboratory for physical, chemical, and biological analyses were the procedures published in "Standard Methods for the Examination of Water and Wastewater," 12th Edition, 1965. Also, procedures were followed from the FWPCA Methods for Chemical Analysis of Water and Wastes, September 1969. Additional analytical procedures and modifications developed by the Great Lakes Region Committee on Analytical Methods, FWPCA, were employed as required in the analysis of bottom sediment material. Modifications have been made on some of the methods to improve the sensitivity or to expedite a systematic analytical scheme. Before adopting any modification, a thorough study was made to evaluate the effect of the change.

To assure continually reliable data, reference standards of known composition and blanks were analyzed simultaneously with all tests.

A summation of the analyses performed is shown on the following pages. Specific techniques or modifications to "Standard Methods" procedure are shown where applicable.

Lake Huron Basin Office

Summary of Laboratory Procedures

<u>Analysis</u>	<u>Unit</u>	<u>Technique or Modification</u>
Temperature	°C	No modification
Conductivity	umhos/cm	Specific conductance cell
pH	SU	Glass electrode method
Dissolved oxygen	mg/l	Method A - Alsterberg (Azide), modification of the Winkler method
Initial dissolved oxygen demand	mg/l	No modification
Biochemical oxygen demand	mg/l	Dissolved oxygen analyzer
Chemical oxygen demand	mg/l	No modification
Chloride	mg/l	Mercuric nitrate
Sulfate	mg/l	Barium sulfate, autoanalyzer
Acidity	mg/l	No modification
Alkalinity	mg/l	Potentionmetric pH 4.5 and pH 8.3
Nitrate-Nitrogen	mg/l	Brucine sulfate method
Nitrite-N	mg/l	No modification
Ammonia-N	mg/l	Minor modification "Standard Methods"
Organic-N	mg/l	" " "
Total Kjeldahl-N	mg/l	" " "
Total phosphorus	mg/l	Potassium antimony tartrate method
Total soluble phosphorus	mg/l	" " "
Phenol	µg/l	Aminoantipyrine
Iron	µg/l	1,10 phenanthroline
Turbidity	JCU	Hach "2100" turbidimeter
Oil and grease	mg/l	Hexane extraction

Lake Huron Basin Office

Summary of Laboratory Procedures(cont.)

<u>Analysis</u>	<u>Unit</u>	<u>Technique or Modification</u>
Total solids	mg/l	Total residue, porcelain dish
Dissolved solids	mg/l	By difference (total solids minus suspended)
Suspended solids	mg/l	Filtrable residue, Gooch crucible
Total volatile solids	mg/l	No modification
Total volatile dissolved solids	mg/l	" "
Volatile suspended solids	mg/l	" "
Settleable solids	mg/l	By weight, Gooch crucible
Non-settleable solids	mg/l	" " "
Volatile settleable solids	mg/l	" " "
Volatile non-settleable solids	mg/l	" " "
Chlorine residual	mg/l	Orthotolidine method
Cyanide	mg/l	Elly modification of Serfass method
Sodium	mg/l	Flame photometry
Potassium	mg/l	" "
Magnesium	mg/l	No modification manually, autoanalyzer
Calcium	mg/l	EDTA titration, murexide indicator
Hardness	mg/l	EDTA titration, calmagite indicator
Total coliform	MF/100 ml	No modification
Fecal coliform	MF/100 ml	" "
Fecal Streptococcus	MF/100 ml	" "
Total plate count	MF/100 ml	" "
Phytoplankton	Org/ml	Sedgwick-Rafter cell clump counts