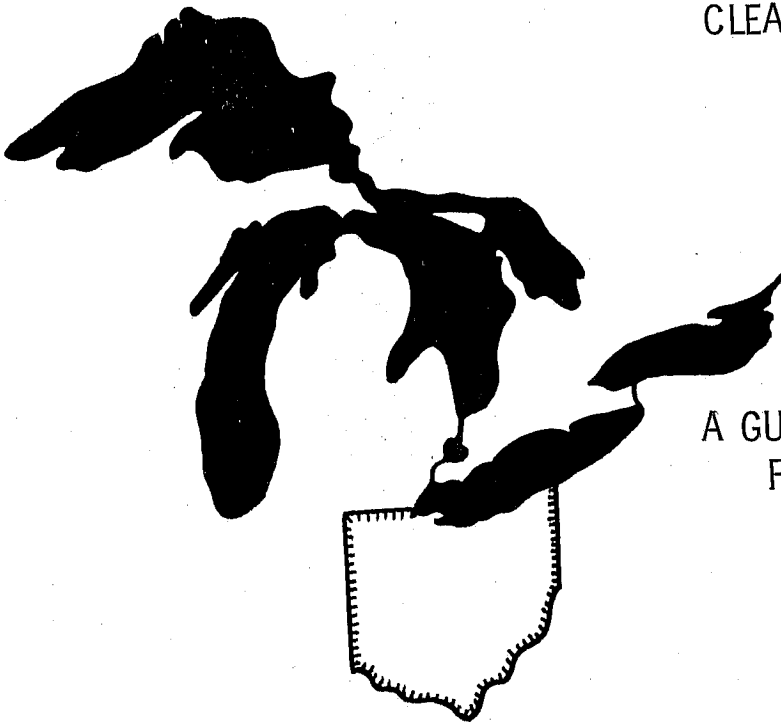


CLEAR TECHNICAL REPORT NO. 120



A GUIDE TO THE NATURAL AND CULTURAL  
FEATURES OF THE UNITED STATES  
SHORELINE OF LAKE ERIE

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Prepared for

U.S. Environmental Protection Agency  
Office of Public and Intergovernmental Affairs  
Region V, Chicago, Illinois

in cooperation with

Ohio Sea Grant Program

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COLUMBUS, OHIO

July 1979

## GREAT LAKES REGION

The Great Lakes Region is located in the highly industrialized North-central United States. It covers only 4 percent of the nation's land area but has 15 percent of its population and produces 50 percent of the nation's steel. The Great Lakes Region consists of land and water areas of 183 counties in 8 states and combines the drainage basins within the United States of 1) Lake Superior, 2) Lake Michigan, 3) Lake Huron, 4) Lake St. Clair, 5) Lake Erie, and 6) Lake Ontario (see Table 1 and Figure 1). It includes a land area of 115,000 sq. mi. (297,800 sq. km.) and a water area of 61,000 sq. mi. (158,000 sq. km.) for a total basin area of 176,000 sq. mi. (455,800 sq. km.) in the United States. This is 60 percent of the total 298,400 sq. mi. (772,900 sq. km.) in the Great Lakes Region. The International Boundary with Canada which defines the northern limit of the U.S. Great Lakes Region, passes through all of the Great Lakes and their connecting channels with the exception of Lake Michigan which is wholly within the United States.

The entire Great Lakes system extends over 2,000 mi. and has a water surface area of 95,000 sq. mi. (246,000 sq. km.). The Great Lakes are connected by rivers: 1) St. Mary's River (Lake Superior to Lake Huron), 2) Straits of Mackinac (Lake Michigan to Lake Huron), 3) St. Clair River (Lake Huron to Lake St. Clair), 4) Detroit River (Lake St. Clair to Lake Erie), 5) Niagara River (Lake Erie to Lake Ontario), and 6) St. Lawrence River (Lake Ontario to the Atlantic Ocean). The Detroit River is about 32 miles long and contains about 20 islands. The upper part of the river has a velocity of approximately 1.5 mph that increases to 4 mph near its mouth. Because Detroit is the second port in the U.S. in terms of cargo

shipped, and since most of this transport is via the Detroit River, this waterway annually carries more traffic (freight and cargo craft) than any other water route in the world. The tributary streams of the Great Lakes Region are generally small in drainage area and short in length. The drainage areas range from 6,600 sq. mi. (17,100 sq. km.) for the Maumee River in northwestern Ohio, to streams of a few sq. mi., that flow directly into the Lakes. The Great Lakes Region ranges in elevation from 1,980 ft. above sea level at Mt. Curwood (Huron Mountains south of Lake Superior) to 152 ft. above sea level at Massena, New York (St. Lawrence River near the International Boundary).

The Great Lakes were formed by the scouring action of vast continental glaciers. The Lakes are relatively recent features, geologically, only 10,000 - 12,000 years old. Thousands of feet of ice gouged and polished the resistant bedrock of Canada and the more easily eroded sedimentary rocks to the south. An excellent example is the spectacular Glacial Grooves cut into fossiliferous limestone on Kelleys Island in Lake Erie. The immense troughs excavated by the ice sheets were eventually to contain the Great Lakes. As the melt waters from the receding glaciers accumulated within these basins the predecessors to the present Great Lakes were formed. The present outlines of the Lakes are the result of several thousands of years of shore erosion and accretion, drainage outlet changes, water level fluctuations, temporary ice readvances and crustal rebound after the weight of the glacial ice had been removed. At one time the water level of western Lake Erie was 240 feet above the present surface and a large lake extended to the southwest to the vicinity

of Fort Wayne, Indiana. Now abandoned, sandy beaches mark the shoreline of at least 5 former lakes, forming conspicuous concentric ridges in the Lake Erie drainage basin.

The water levels of the Great Lakes have varied on time scales ranging from thousands of years to minutes. Variations of the ancestral lake levels were largely related to the uncovering of new and lower lake outlet channels as the glaciers receded. Variations of present lake levels are of two types: 1) long-period oscillations (several years to seasonal) which are related to volumetric changes of the lake principally caused by fluctuations in rainfall and 2) short-term oscillations (hours to minutes) which are due to a tilting of the lake surface by wind or atmospheric pressure differences over the lake. Wind tides, seiches, surges and harbor resonance are examples of short-term changes. Sun and lunar tides are negligible on the Great Lakes, resulting in maximum fluctuations of a few inches.

Water levels at the ends of Lake Erie (Toledo and Buffalo) have a greater fluctuation than at the center of the lake where tilting of the lake surface results in a non-oscillating zone. High water levels, coupled with northeast storms, have produced fluctuations of 9 ft. above Low Water Datum at Toledo. Conversely, low water levels and southwest winds have lowered the lake to 7 ft. below Datum at the same location, a range of 16 ft. Under the influence of wind, currents tend to bank up water on the windward shore. The forced movement of the lake surface is known as wind tide and the amount of rise produced is the wind setup. The resulting free oscillation or "sloshing" of the lake surface caused by the inequality of water level is called a seiche.

The major seiches on Lake Erie are essentially parallel to the longitudinal axis (northeast - southwest) of the lake. Seiches along this axis have a period from crest to crest of approximately 12 to 14 hours. Seiche periods as recorded at Put-in-Bay on South Bass Island indicate that longitudinal seiches are in operation about 44 percent of the year. Surface winds from the SW or NE are likely to produce such seiches. Wind records from Sandusky, Ohio are in agreement with the frequency of longitudinal seiches; surface winds from the SW and NE occur approximately 150 days (42%) of the year.

Because the Great Lakes Region is located between latitudes 41° and 50°, it experiences severe climatic variations expected for such high latitudes. However, the large surface area and depths of the Lakes moderate the summer and winter temperatures along the shores. The average annual temperature in the Region ranged from 39.0°F near Lake Superior to 48.7°F near Lake Erie. On each lake, the maximum monthly temperature occurs in July and the minimum in February. The mean annual precipitation for the entire Great Lakes drainage basin is 31 inches with a range of 25 inches (1930) to 37 inches (1950). In June of 1966, 10.5 inches of rain fell on Sandusky, Ohio within a 24-hour period. The annual snowfall ranges from 40 to 120 inches for the entire basin. Pelee Island in western Lake Erie received 36 inches of snow from one storm in February 1905.

The Great Lakes shoreline provides some of the most scenic and productive wildlife habitat areas in the Basin. They comprise areas of great biological diversity and productivity. Fish habitat provided by the Lakes supports a wide variety of cold- and warm-water species for sport fishing and a limited commercial fishery. Approximately

73 species of fish are represented in the Great Lakes system. Of these, 53 have, at various times, contributed to the commercial fishery as food. The varieties of wildlife that occupy the shore habitats are diverse, including big and small game, furbearers, waterfowl, shorebirds, wading birds, and song birds. These are about 63 species of mammals and 300 species of birds native to the Basin. Some of these animals are rare and endangered, but most are common. All of the open water of the Lakes are used from time to time by navigating waterfowl. The western basin of Lake Erie is important in waterfowl production because of the extensive marshes and wetlands bordering the shoreline.

The total area of the Great Lakes region is 83,579,700 acres, including: 1) urban and built-up areas--6,987,700 acres (8.4%); 2) cropland--28,609,000 acres (33.8%); 3) pasture land--3,505,800 acres (4.6%); 4) forest land--39,624,700 acres (47.4%); and 5) other lands (wetlands, mines, etc.)--4,852,000 (5.8%). Most of the 29 million people in the Great Lakes Basin reside in urban port areas along the shores of the Great Lakes. Major urban complexes accounting for the dominant shore of the Region's population include Duluth, Milwaukee, Chicago, Detroit, Toledo, Lorain, Cleveland, Erie, and Buffalo. Over 80 percent of the Region's population is classified as urban. The Region is typified by a wide variety of economic conditions and occupational pursuits. The northern part of the Basin is characterized by industry dependent on forest and mineral resources and the growing year-round recreation and tourist industry. Agriculture and diversified manufacturing are concentrated in the central section of the basin, which on the Lake shores there are a number of centers for heavy industry, with emphasis on iron, steel, petroleum, and chemical production. General farming

is practiced over large areas of the southern part of the basin, while specialized crops (orchards and fruit farms) are grown along the lee sides of the Lakes. The recreation industry is important in the northern and eastern sections of the Basin.

TABLE 1

## GENERAL PHYSICAL INFORMATION FOR THE GREAT LAKES

Description	Lake Superior	Lake Michigan	Lake Huron	Lake St. Clair	Lake Erie	Lake Ontario	Total
Low Water Datum (LWD) Elevation in feet IGLD (1955)	600.0	576.8	576.8	571.7	568.6	248.8	
Dimensions in miles:							
Length	350	307	206	26	241	193	
Breadth	160	118	183	24	57	53	
Shoreline including islands	2,980	1,660	3,180	169	856	726	9,571
Areas in square miles: <sup>1</sup>							
Drainage basin in U.S.	37,500	67,900	25,300	2,370	23,600	16,800	173,470
Drainage basin in Canada	43,500	0	49,500	4,150	9,880	15,300	122,330
Total drainage basin (land & water)	81,000	67,900	74,800	6,520	33,500	32,100	295,800
Water surface in U.S.	20,600	22,300	9,100	162	4,980	3,460	60,602
Water surface in Canada	11,100	0	13,900	268	4,930	3,880	34,078
Total water surface	31,700	22,300	23,000	430	9,910	7,340	94,680
Volume of water in cubic miles: <sup>1</sup>	2,935	1,180	849	1	116	393	5,474
Depths of water in feet: <sup>1</sup>							
Average over lake	489	279	195	10	62	283	
Maximum observed	1,333	923	750	21 <sup>2</sup>	210	802	
Outlet river or channel	St. Marys River	Str. of Mackinac	St. Clair River	Detroit River	Niagara River	St. Lawrence River	
Length in miles	70	---	27	32	37	502	
Average flow in CFS (1860-1970)	75,000	52,000	187,300	190,000	201,900	239,200	
Monthly Elevations in feet <sup>5</sup>							
Average (1860-1970)	600.38	578.68 <sup>3</sup>	578.68 <sup>3</sup>	573.05 <sup>4</sup>	570.39	244.77	
Maximum	602.06	581.94	581.94	575.70	572.76	248.06	
Minimum	598.23	575.35	575.35	569.86	567.49	241.45	
Average - winter low to summer high	1.1	1.1	1.1	1.6	1.5	1.8	
Maximum - winter low to summer high	1.9	2.2	2.2	3.3	2.7	3.5	
Minimum - winter low to summer high	0.4	0.1	0.1	0.9	0.5	0.7	
Annual precipitation in inches (1900-1970)							
Average on basin (land & water)	30	31	31	---	34	34	
Average on lake surface	30	30	31	---	33	33	

<sup>1</sup> Lake level at Low Water Datum elevation. LWD is a reference elevation for nautical charts and projects.

<sup>2</sup> Maximum natural depth.

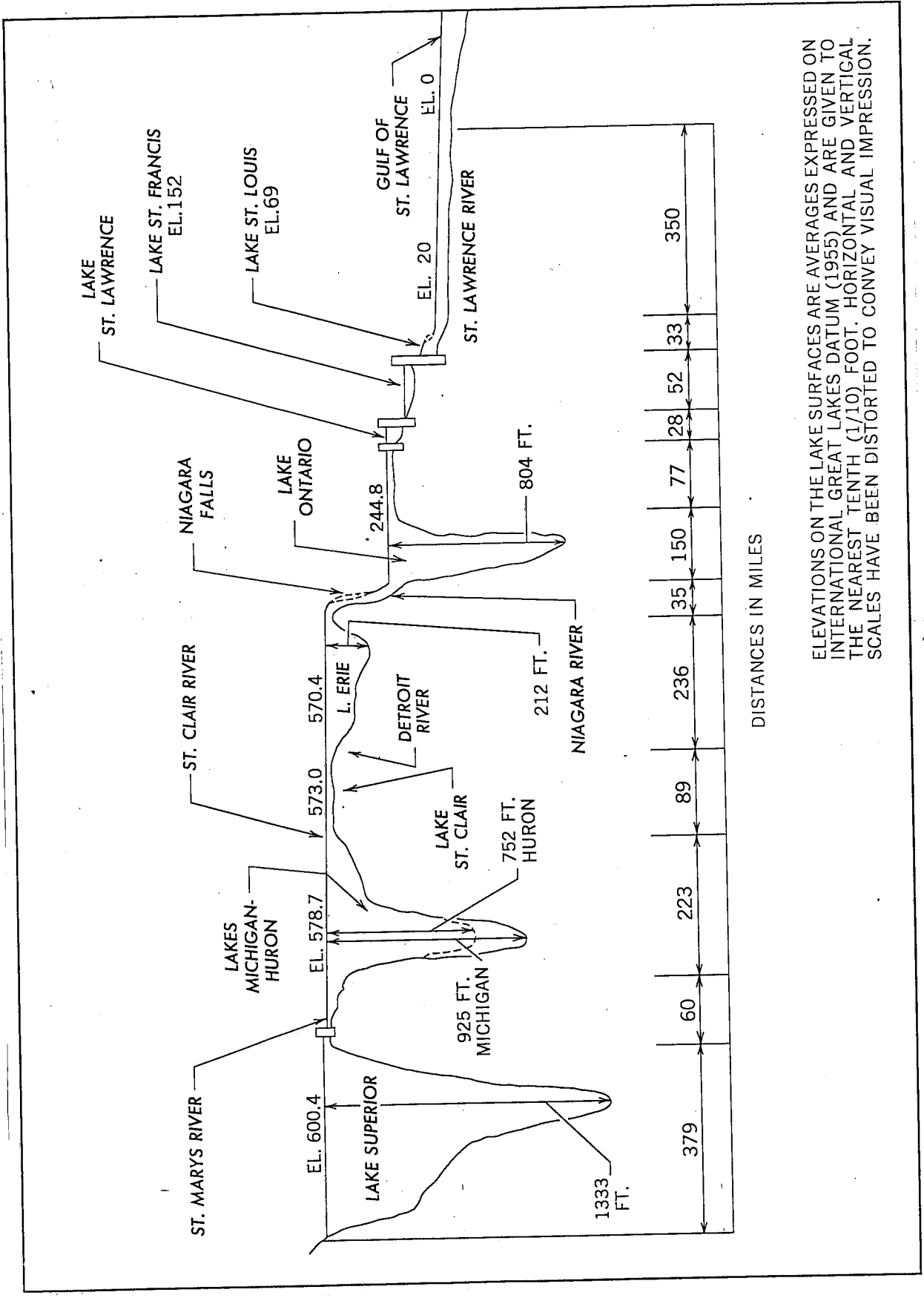
<sup>3</sup> The Straits of Mackinac between Lakes Michigan and Huron is so wide and deep that the difference in the monthly mean levels of the lakes is not measurable.

<sup>4</sup> Lake St. Clair elevations are available only for the period 1898 to date.

<sup>5</sup> Lake elevations are as recorded at Marquette (L. Superior), Harbor Beach (L. Michigan-Huron), Grosse Pointe Shores (L. St. Clair), Cleveland (L. Erie), and Oswego (L. Ontario). Recorded elevations are affected by man-made changes such as: regulation of outflows from Lake Superior (1921) and Lake Ontario (1960); diversions of water from Hudson Bay basin into Lake Superior (1939) and from Lake Michigan basin into Mississippi basin at Chicago (before 1860); and regimen changes in the natural outlet channels from the lakes throughout the period of record.

NOTE: Area data shown above were prepared by the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. Total basin areas do not necessarily equal the sum of their component parts due to rounding.





ELEVATIONS ON THE LAKE SURFACES ARE AVERAGES EXPRESSED ON INTERNATIONAL GREAT LAKES DATUM (1955) AND ARE GIVEN TO THE NEAREST TENTH (1/10) FOOT. HORIZONTAL AND VERTICAL SCALES HAVE BEEN DISTORTED TO CONVEY VISUAL IMPRESSION.

Figure 1. Profile of the Great Lakes System.

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for file

GUIDE TO THE NATURAL AND CULTURAL FEATURES  
OF THE UNITED STATES SHORELINE OF LAKE ERIE

KEY TO POINT SOURCE DISCHARGERS

COLUMN 1 - POINT SOURCE DISCHARGER AND LOCATION

The point source discharger is identified with the town or city it is located in. All municipal sources are listed as STPs (Sewage Treatment Plant) or WWTPs (Wastewater Treatment Plant). Included are all direct and indirect dischargers (upstream sources discharging to tributaries).

COLUMN 2 - DISCHARGE TO INDICATED PROBLEM AREA

The Problem Areas which are identified by the Surveillance Subcommittee are listed only if the point source discharges to it (whether upstream or direct).

COLUMN 3 - REPORTED FLOW

The flow in m<sup>3</sup>/d from the outfall(s) is listed. If there is more than 1 outfall a summation is given.

COLUMN 4 - REPORTED PARAMETERS

Only parameters submitted by the agency are listed.

COLUMN 5 - TOTAL EFFLUENT REQUIREMENTS

Effluent limits are given for reported parameters. If more than 1 outfall exists for each discharger, a summation is given. Generally in the U.S. NPDES average limits are given. These may be final or interim. In Canada, they are federal or provincial limits.

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Data Source: International Joint Commission (1978).

# POINT SOURCE DISCHARGERS ON THE DETROIT RIVER

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
BASF Wyandotte Corp., (Fighting Island)	Detroit River	42	DS	-	-	3,900,000
			Chlorides	-	-	2,290,000
			Phosphorus	42	-	0
			Ammonia	-	-	468
			SS	155	-	155
BASF Wyandotte Corp. North Works, Wyandotte	Detroit River	238.83	TSS	5,835	2,630	5,650
			NH <sub>3</sub>	1,809.4	-	865.4
			Chlorides	590,850	15,400	7,845
			Chlorine	110.9	15.5	26.7
			COD	-	23,300	17,636
			Oil & Grease	1,764	1,050	353
			Phenol	-	6.6	6.8
			Phosphorus	222	69.4	72.6
			pH	6.5 - 9.5	-	6.2 - 11.7
			BASF Wyandotte North Works Power Plant, Wyandotte	Detroit River	6.81	TSS
pH	6.5 - 9.5	-				7.7 - 8.6
BASF Wyandotte South Works, Wyandotte	Detroit River	188.88	Dis. Solids	-	214,000	146,355
			TSS	3,710	3,400	4,982
			NH <sub>3</sub>	185	6.9	30
			Chlorides	247,500	107,000	80,801
			Chlorine	92.7	465	44.9
			Oil & Grease	1,454	278	221
			pH	6.5 - 9.5	-	6.0 - 12.7
Belle River, STP	Detroit River	1.7	BOD <sub>5</sub>	-	-	3.2
			SS	-	-	14
			Phosphorus	1.7	-	.9
Chrysler Corp. Engine Plant, Trenton	Detroit River	N/A	N/A	N/A	N/A	N/A
Consumers Power Co., Luner Pier	-	944.37	Cl <sub>2</sub>	37.4	-	18.7
			TSS	337	-	172.1
			BTU	1,960x10 <sup>6</sup> /hr.	-	1,297x10 <sup>6</sup> /hr.
			pH	6.5 - 9.5	-	8.1 - 8.5
DEC - Delray Plant, Detroit	Detroit River	908.02	Cl <sub>2</sub>	35.9	-	8.1
			BTU	3,000x10 <sup>6</sup> /hr.	-	535x10 <sup>6</sup> /hr.
			TSS	330.3	-	384.1
			T Cu	11.02	-	0.22
			T Fe	11.02	-	35.1
			pH	6.5 - 9.5	-	8.3 - 8.5
DEC, Monroe	-	6,828.14	Cl <sub>2</sub>	273	-	615
			BTU	15,500x10 <sup>6</sup> /hr.	-	9,725x10 <sup>6</sup> /hr.
			TSS	2,258	-	1,014
			pH	6.5 - 9.5	-	8.1 - 8.6
DEC - Pennsalt Station, Riverview	Detroit River	32.90	Cl <sub>2</sub>	1.3	-	-
			TSS	27.5	-	41.4
			T Cu	0.23	-	0.02
			T Fe	0.23	-	0.23
			Phosphorus	0.46	-	0.28
			BTU	75x10 <sup>6</sup> /hr.	-	5.46x10 <sup>6</sup> /hr

POINT SOURCE DISCHARGERS ON THE DETROIT RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Detroit Edison Co. (DEC) Conners Creek Plant, Detroit	Detroit River	661.24	Cl <sup>2</sup>	26	-	112
			BTU	4,000x10 <sup>3</sup> /hr.	-	563x10 <sup>3</sup> /hr.
			TSS	855	-	1,334
			T Cu	0.09	-	0.009
			T Fe	0.09	-	0.009
			Phosphorus	-	-	0.30
DEC, River Rouge	Detroit River	1,492.1	Cl <sub>2</sub>	58.5	-	73.1
			BTU	6,100x10 <sup>6</sup> /hr.	-	1,388x10 <sup>6</sup> /hr.
			TSS	904.5	-	315.0
			T Cu	0.09	-	<0.009
			T Fe	0.09	-	<0.009
			pH	6.5 - 9.5	-	7.8 - 7.9
DEC, Trenton	Detroit River	1,633	Cl <sub>2</sub>	64.5	-	225.7
			BTU	8,500x10 <sup>6</sup> /hr.	-	3,321x10 <sup>6</sup> /hr.
			TSS	631.6	-	3,161
			pH	6.5 - 9.5	-	7.7 - 7.9
DEC, Enrico Fermi #1, Newport	-	46.16	BOD <sub>5</sub>	1.35	-	0.68
			TSS	3.0	-	0.51
			Cl <sub>2</sub>	1.84	-	0.18
			T Cu	0.055	-	<0.006
Detroit, WWTP	-	3,040	BOD <sub>5</sub>	281,010	228,866	182,400
			SS	516,800	122,402	456,000
			Phenols	-	-	365
			Oil & Grease	-	-	121,600
			Phosphorus	-	11,290	10,336
			pH	-	-	6.1 - 7.9
Firestone Steel Products Co., Riverview	Detroit River	5.9	pH	6.0-9.5	-	7.2-7.9
			BOD <sub>5</sub>	258	109	-
			Oil & Grease	88.5	63.6	6.7
			Phosphorus	17.2	7.73	45
			SS	258	127	60
Ford Motor Co., Rouge Complex, Dearborn	Detroit River	1,695.68	TSS	69,375*(3,481)	-	27,960
			Phenol	76*(70 max.)	-	24
			Oil & Grease	18,769*(16,957)	-	4,356
			T CN	764*(47)	-	105
			NH <sub>3</sub>	675*(285)	-	66
			pH	6.0-8.5	-	6.9-7.3
Ford Motor Co., Monroe	-	51.4	BOD <sub>5</sub>	472*	-	332
			Chlorine	51*	-	3.0
			T Cr	118*	-	84.5
			T Cu	93*	-	72.0
			CN	11.8*	-	0.5
			Ni	42.6*	-	14.5
			Oil & Grease	514*	-	7.2
			pH	7.0 - 12.0*	-	8.0 - 11.4
			Phosphorus	16.3*	-	4.0
			SS	2,412*	-	574
			Zn	47.2*	-	26.3
			T CN	12.8	-	5.1
			Ford Motor Co., Northville	Detroit River	1.90	Oil

POINT SOURCE DISCHARGERS ON THE DETROIT RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Great Lakes Steel National Steel Corp., Michigan Steel Plant, Ecorse	Detroit River	3.8	TSS	91	-	-
			dls Fe	-	-	40 µg/L
			Oil & Grease	30 mg/L	-	11.7
			pH	6.5 - 9.5	-	7.3 - 7.5
			Temperature	-	-	23 <sup>o</sup> C
Great Lakes Steel National Steel Corp., Ecorse Rolling Mill, Ecorse	Detroit River	187.28	TSS	26,354*(3,182)	-	4,908
			Oil & Grease	3,418*(2,809)	-	2,345
Great Lakes Steel, National Steel Corp., 80" Mill, River Rouge	Detroit River	557.72	TSS	22,256*(9,383)	15,400	55,214
			Oil & Grease	11,128*(8,346)	2,680	3,394
			Phenol	-	57	5.6
			NH <sub>3</sub>	-	1,780	151
			Phosphorus	-	-	50
			T Fe	-	-	12,270
Great Lakes Steel National Steel Corp., Zug Island	Detroit River	334,106	TSS	29,750*(1,765)	-	4,461
			NH <sub>3</sub>	7,488*(1,338)	-	2,628
			Phenol	82* (82 max.)	-	31
			T Fe	-	-	428
			Oil & Grease	8,149*(5,011)	-	2,439
			T CN	430*(239)	-	240
			COD	-	-	6,296
Grosse Ile Twp., WWTP	Detroit River	4.84	BOD <sub>5</sub>	445*	-	290
			SS	544*	-	200
Marysville, WWTP	St. Clair River	7.08	BOD <sub>5</sub>	283	-	107
			Phosphorus	-	9	7
			SS	283	-	91
McLouth Steel Corp., Gibraltar	Detroit River	2.9	TSS	102	-	17
			T Fe	-	-	11
			Oil & Grease	29	-	14
			pH	7.2 - 9.5	-	8.0 - 8.5
McLouth Steel Corp., Trenton	Detroit River	573.24	T SS	749 ave.	5,910	4,060
			T Fe	-	31	864
			T CN	45 ave.	29	47
			Oil & Grease	136 max.	460	452
			NH <sub>3</sub>	<378 ave. 1,134 max.	295	361
			COD	-	-	6,318
			Phenol	12 ave. 35 max.	.36	-
Monroe, WWTP	-	49.7	BOD <sub>5</sub>	2,722	-	400
			SS	2,722	-	8,300
			Phosphorus	-	27	30
Pennwalt Corp., East & West Plants, Wyandotte	Detroit River	160	NH <sub>3</sub>	224*	-	54
			T Chlorine	5,600*	-	145
			T Pb	14.7*	-	0.5
			pH	3.0 - 12.5*	-	2.0 - 12.5
			SS	2,563*	-	2,082
			T Cu	8.6*	-	38 µg/L
			T Fe	482*	-	1,343
			COD	2,634*	-	2,332
			Chlorides	230,787*	-	871

POINT SOURCE DISCHARGERS ON THE DETROIT RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Revere Copper & Brass Inc., Detroit	Detroit River	12.2	Cr	100 µg/L	-	<0.1
			T Cr	500 µg/L	-	<0.1
			T Cu	6.4	-	0.81
			T Ni	1,000 µg/L	-	<0.05
			Oil & Grease	122	-	2
			pH	6.5-9.5	-	7.2-7.8
			SS	366	-	18
			Zn	1,000 µg/L	-	0.02-0.1
Trenton, WWTP	Detroit River	18.4	BOD <sub>5</sub>	851	-	166
			Phosphorus	-	88	24
			SS	851	-	189
Union Camp Corp., Monroe	-	N/A	N/A	N/A	N/A	N/A
Warren, WWTP	Clinton River	N/A	N/A	N/A	N/A	N/A
Wayne County, Wyandotte, WWTP	Detroit River	272	BOD <sub>5</sub>	9.457	-	3,000
			Phosphorus	-	993	435
			SS	11,349	-	3,200
Wayne County, Flat Rock, WWTP	-	9.8	BOD <sub>5</sub>	231	-	456
			Phosphorus	-	-	14
			SS	308	-	380
Wayne County, Trenton	Detroit River	6.24	BOD <sub>5</sub>	-	-	370
			SS	-	-	430
			Phosphorus	-	-	35

POINT SOURCE DISCHARGERS ON WESTERN LAKE ERIE

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Archbold, STP	Toledo Area	6	BOD <sub>5</sub>	66	-	48
			SS	66	-	129
			Phosphorus	6.6	9.57	5
Bowling Green, STP	-	19.3	BOD <sub>5</sub>	1,825*	-	667
			SS	2,178*	-	647
			Phosphorus	30*	21.9	17
Bucyrus, STP	Sandusky River	224.5	BOD <sub>5</sub>	324*	-	126
			SS	428*	-	152
			Phosphorus	-	27.8	25
Defiance, STP	Toledo Area	14	BOD <sub>5</sub>	285*	-	103
			SS	474*	-	203
			Phosphorus	40*	19.5	19
Findlay, STP	Toledo	29.4	BOD <sub>5</sub>	1,968*	-	465
			SS	2,806*	-	637
			Phosphorus	-	49.9	55
Fostoria, STP	-	14.4	BOD <sub>5</sub>	269*	-	132
			SS	628*	-	226
			Phosphorus	-	5.71	6
Fremont, STP	Sandusky River	14.6	BOD <sub>5</sub>	1,377*	148	215
			SS	2,066*	601	458
			Phosphorus	-	12.6	46
Gulf Oil, Toledo	Toledo Area	-	BOD <sub>5</sub>	127	135	204
			Phenols	.6	1	10
			COD	895	639	613
			NH <sub>3</sub>	64	109	124
			Oil & Grease	37	68	51
			SS	101	359	292
Interlake Steel, Toledo	Toledo Area	170	SS	56	1,329	-
			NH <sub>3</sub>	37	25	-
			Cyanide	2	59	2
Lima, STP	Toledo Area	57.7	BOD <sub>5</sub>	631	-	147
			SS	.982	-	347
			Phosphorus	70	30.6	27
Lucas Co. - Maumee River, STP	-	11.6	BOD <sub>5</sub>	1,706	234	166
			SS	1,706	196	218
			Phosphorus	57	16.3	15
Norwalk, STP	Huron River	8.9	BOD <sub>5</sub>	274*	-	147
			SS	749*	-	326
			Phosphorus	-	61.1	76
Ohio Decorative Products, Spencerville	Toledo Area	10	Cyanide	.06*	-	.001
			Copper	.16*	-	.114
			Chrome	.08*	-	.036

POINT SOURCE DISCHARGERS ON WESTERN LAKE ERIE (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Ohio Electro-Polishing, Vendocia	Toledo Area	.11	Cyanide	.003	-	.02
			Cadmium	100 µg/L	-	.004
			Chromium	300 µg/L	-	.042
			Copper	200 µg/L	-	.004
			Zinc	500 µg/L	-	.091
			Lead	40 µg/L	-	-
Sandusky, STP	Sandusky River Area	38.7	BOD <sub>5</sub>	1,365	-	112
			SS	1,516	-	383
			Phosphorus	76	35.8	32
Sohio, Lima	Toledo Area	10	BOD <sub>5</sub>	100	-	123
			NH <sub>3</sub>	150	-	781
			Cr <sup>+6</sup>	500	-	4
			SS	300	-	199
			Oil & Grease	50	-	12
Standard Oil Refinery,	Toledo Area	178.3	BOD <sub>5</sub>	700	-	340
			COD	4,930	8,337	3,230
Standard Oil Oregon (cont'd)			Phenol	3	22	4
			SS	559	7,247	612
			NH <sub>3</sub>	131	280	120
			Oil & Grease	164	966	111
Sun Oil, Toledo	Toledo Area	-	BOD <sub>5</sub>	305	242	274
			COD	1,818	1,123	1,487
			NH <sub>3</sub>	133	32	9
			Oil & Grease	150	195	155
			Phosphorus	30	8	12
Tiffin, STP	Sandusky River Area	12.7	BOD <sub>5</sub>	243*	-	47
			SS	455*	-	216
			Phosphorus	-	11.7	15
Toledo, STP	Toledo Area	377	BOD <sub>5</sub>	14,080*	12,015	9,927
			SS	22,620*	6,378	18,269
			Phosphorus	565.5*	558	955
Van Wert, STP	-	10.4	BOD <sub>5</sub>	83	-	152
			SS	83	-	176
			Phosphorus	10.4	21.1	11
Vistron Corp., Lima	Toledo Area	10	BOD <sub>5</sub>	100	107	123
			NH <sub>3</sub>	150	660	781
			Cr <sup>+6</sup>	500	20	4
			SS	300	179	199
			Oil & Grease	50	13	12
Wapakoneta, STP	Toledo Area	5.2	BOD <sub>5</sub>	207*	-	97
			SS	244*	-	151
			Phosphorus	-	14.5	17
Whirlpool Corp., Clyde	Sandusky River	1.0	BOD <sub>5</sub>	49	-	124
			SS	49	-	12
			Oil & Grease	18	-	9
			Iron	0.8	-	2
			Nickel	1.62	-	1
			MBAS	2	-	12



POINT SOURCE DISCHARGERS ON CENTRAL LAKE ERIE

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Akron, STP	Cleveland Area	298.5	BOD <sub>5</sub>	11,932*	-	9,863
			SS	4,477*	-	12,208
			Phosphorus	299*	439	712
Ashtabula, STP	Ashtabula River	16.6	BOD <sub>5</sub>	415*	306	205
			SS	498*	295	291
			Phosphorus	33*	68.1	17
Avon Lake, STP	Black River	17.8	BOD <sub>5</sub>	398	-	413
			SS	398	-	430
			Phosphorus	88	13.9	30
Bedford, STP	Cleveland Area	9.4	BOD <sub>5</sub>	122	-	15
			SS	122	-	56
			Phosphorus	37.2	13.9	13
Bedford Heights, STP	Cleveland Area	9.2	BOD <sub>5</sub>	137*	-	135
			SS	164*	-	142
			Phosphorus	27.3*	13.9	11
Berea, STP	Rocky River	7.6	BOD <sub>5</sub>	238*	119	85
			SS	273*	141	147
			Phosphorus	-	-	50
Brookpark, STP	Rocky River	3.5	BOD <sub>5</sub>	90*	-	44
			SS	105*	-	36
			Phosphorus	-	-	28
Chase Bag, Chagrin Falls	-	5	BOD <sub>5</sub>	182	-	154
			SS	159	-	113
Cleveland Electric Illuminating, Ashtabula	Ashtabula River	781	SS	In adjudication during 1977	-	-
Cleveland Electric Illuminating, Avon Lake	Black River	3,052	SS	-	9,000	-
			Temperature	-	7°C Ave.	-
Cleveland Electric Illuminating, Cleveland	-	1,285.5	SS	-	4,318	816
			Temperature	-	8°C	7.4°C
Cleveland Electric Illuminating, Willoughby	-	3,216	SS	In adjudication during 1977	-	-
			Temperature	-	-	9°C
Cleveland Regional Sewerage District-Easterly, Cleveland	Cleveland Area	501.3	BOD <sub>5</sub>	15,039*	8,026	11,622
			SS	15,039*	11,546	14,564
			Phosphorus	501*	513	483
Cleveland Regional Sewerage District-Southerly, Cleveland	Cleveland Area	360	BOD <sub>5</sub>	10,800*	6,201	21,316
			SS	10,800*	7,223	33,565
			Phosphorus	720*	290	898

POINT SOURCE DISCHARGERS ON CENTRAL LAKE ERIE (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Cleveland Regional Sewerage District- Westerly, Cleveland	Cleveland Area	122.7	BOD <sub>5</sub>	14,724*	12,037	12,405
			SS	17,178*	12,977	9,143
			Phosphorus	429*	340	383
Conneaut, STP	Conneaut River	8.0	BOD <sub>5</sub>	200	-	60
			SS	240	-	99
			Phosphorus	16	20.3	20
Cuyahoga County- Rocky River, STP	Rocky River Area	35.8	BOD <sub>5</sub>	3,638*	-	1,935
			SS	3,638*	-	1,288
			Phosphorus	-	35.9	26
Cuyahoga County- District # 13, Brecksville	-	4.8	BOD <sub>5</sub>	185	-	160
			SS	159	-	138
			Phosphorus	5.3	3.16	3
Diamond Shamrock Chemical, Ashtabula	Ashtabula River	1.0	TDS	4,500	-	1,340
			SS	76	-	129
			Oil & Grease	-	-	4
			Chromium	.6	-	.024
			Phenols	.3	-	.032
DuPont DeNemours, Cleveland	Cleveland Area	12	TDS	-	10,649	-
			SS	143	32	-
			Zn	6	6	-
			Pb	.41	0.2	-
Elyria, STP	Black River	31	BOD <sub>5</sub>	2,450*	1,326	1,325
			SS	1,815*	666	852
			Phosphorus	-	112	96
Euclid, STP	-	72	BOD <sub>5</sub>	8,614*	-	4,764
			SS	10,375*	-	7,017
			Phosphorus	88*	299	407
Ford Motor Co., Cleveland	-	N/A	N/A	N/A	N/A	N/A
GMC Fisher Body, Elyria	Black River	4.2	Ni	2	2	1.46
			Copper	2	0.6	0.67
			Cyanide	.21	0.1	0.07
			Cr <sup>+2</sup>	.21	0.15	0.05
General Tire and Rubber, Ashtabula	Ashtabula River	1.0	BOD <sub>5</sub>	32	-	22
			TDS	1,450	-	773
			SS	32	-	13
			COD	120	-	207
Glidden Durkee, Ashtabula	Ashtabula River	3.0	TDS	15,000	1,070	1,145
Harshaw Chemical, Cleveland	Cleveland Area	6.5	TDS	-	3,359	-
			NH <sub>3</sub>	-	30	35
			SS	-	151	149
			Pb	-	0.4	.33
			NO <sub>3</sub>	-	72	-
			Fluoride	-	100	81
			Ni	6.5	9	7
			SO <sub>4</sub>	-	200	-
			Cl	-	800	-

POINT SOURCE DISCHARGERS ON CENTRAL LAKE ERIE (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Jones & Laughlin, Cleveland	-	N/A	SS Set. Sol. Oil & Grease NH <sub>3</sub> CN	N/A	31,800 150,500 1,300 446 12	N/A
Kent, STP	Cleveland Area	9.8	BOD <sub>5</sub> SS Phosphorus	455* 455* -	- - 8.5	157 123 39
Lake County- Madison S.D., Lake County	Grand River	-	Phosphorus	-	34.9	-
Lake County- Mentor S.D., Lake County	Grand River	20.7	BOD <sub>5</sub> SS Phosphorus	1,024* 1,251* 137*	- - 79.6	485 641 76
Lakewood, STP	Rocky River	43	BOD <sub>5</sub> SS Phosphorus	1,105* 1,842* 61.3*	542 1,020 143	609 1,005 100
Lorain, STP	Black River	52.8	BOD <sub>5</sub> SS Phosphorus	1,663* 1,663* 83*	838 1,346 309	512 732 271
Maple Heights, STP	Cleveland Area	2.5	BOD <sub>5</sub> SS Phosphorus	84* 84* -	- - 20.2	33 31 2
Medina County, S.D. # 100	Rocky River	5.35	BOD <sub>5</sub> SS Phosphorus	136 136 -	- - 47.0	138 266 31
Medina County, S.D. # 200	Rocky River	7.0	BOD <sub>5</sub> SS Phosphorus	917 1,671 -	- - -	884 1,159 44
Medina County, S.D. # 300	Rocky River	2.8	BOD <sub>5</sub> SS Phosphorus	152 152 -	- - -	6 24 6
Medina County, S.D. # 500	Rocky River	3.5	BOD <sub>5</sub> SS Phosphorus	113* 113* 5.7*	- - -	68 45 13
Medina County, S.D. # 2	Rocky River	N/A	N/A	N/A	N/A	N/A
Middleburg Heights, STP	Rocky River	10	BOD <sub>5</sub> SS Phosphorus	136 265 7.6	- - 35.1	97 479 23
New Jersey Zinc, Ashtabula	Toledo Area	1.6	TDS SS Lead Zinc	2,000 95 0.8 0.8	29,101 136 0.76 0.28	579 24 .073 .234

POINT SOURCE DISCHARGERS ON CENTRAL LAKE ERIE (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
North Olmstead, STP	Rocky River	33.3	BOD <sub>5</sub>	273	-	107
			SS	273	-	164
			Phosphorus	34	61.3	22
North Royalton, STP	Rocky River	3.1	BOD <sub>5</sub>	114*	-	8
			SS	114*	-	33
			Phosphorus	-	1.70	3
Ohio Edison Summit Co.	-	-	SS	-	-	948
			Oil & Grease	-	-	13
			Arsenic	-	-	.12
Olin Corp., Ashtabula	Ashtabula River	1.7	COD	160	198	220
			TDS	8,160	6,665	6,811
			SS	50	27	25
			Oil & Grease	19	5	8
			Organics	8.4	10	1
Painesville, STP	Grand River	16.6	BOD <sub>5</sub>	1,478*	846	852
			SS	1,024*	576	727
			Phosphorus	-	15.3	14
RMI, Ashtabula	Ashtabula River	22.3	TDS	4,087	15,400	21,295
			SS	170	475	487
			Chloride	-	14,966	8,629
Ravenna, STP	Cleveland Area	6	BOD <sub>5</sub>	106	-	75
			SS	127	-	44
			Phosphorus	10.6	5.58	13
Republic Steel, Cleveland	Cleveland Area	-	Phosphorus	-	73	-
			Oil & Grease	-	4,826	-
			SS	-	93,000	-
			NH <sub>3</sub>	-	8,000	-
Republic Steel (cont'd)			CN	-	555	-
			Phenols	-	170	-
Routh, J. H. Packing, Lorain	-	0.7	BOD <sub>5</sub>	16	-	18
			SS	27	-	38
			NH <sub>3</sub>	2.8	-	54
			Oil & Grease	7	-	10
Salon, STP	Cleveland Area	6	BOD <sub>5</sub>	442	-	304
			SS	563	-	778
			Phosphorus	-	-	82
Sodin Chemical Co., Ashtabula		12.9	TDS	-	172	-
			SS	33	-	215
Standard Oil Refinery, Lorain	-	18.4	BOD <sub>5</sub>	100	-	123
			NH <sub>3</sub>	150	-	781
			Cr <sup>+6</sup>	500	-	4
			SS	300	-	199
			Oil & Grease	50	117	12
Strongsville, STP	Rocky River	5.9	BOD <sub>5</sub>	295	72	460
			SS	295	73	897
			Phosphorus	-	11.2	11

POINT SOURCE DISCHARGERS ON CENTRAL LAKE ERIE (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Summit County, S.D. # 15	-	5.6	BOD <sub>5</sub>	739*	-	213
			SS	886*	-	630
			Phosphorus	-	25.4	29
Summit County, S.D. # 6	-	3.1	BOD <sub>5</sub>	56.8	-	92
			SS	56.8	-	146
			Phosphorus	5.7	-	13
U.S. Steel, Cleveland	Cleveland Area	N/A	N/A	N/A	N/A	N/A
U.S. Steel, Lorain	Black River	542	TDS	-	240,782	-
			SS	4,881	19,357	-
			Chloride	-	26,900	-
			Sulphate	-	59,606	-
			NH <sub>3</sub>	-	1,349	-
Union Carbide, Ashtabula	Ashtabula River	66.7	SS	1,815	8,946	1,871
			Cyanide	17	33	11
			Phenols	19	21	5
			Copper	46	21	25
			Manganese	86	41	10
Vermilion, STP	-	5.5	BOD <sub>5</sub>	265*	-	260
			SS	440*	-	320
			Phosphorus	-	24.1	29
Willoughby - Eastlake, STP	-	30	BOD <sub>5</sub>	757*	-	209
			SS	757*	-	370
			Phosphorus	37.7*	64.3	32

POINT SOURCE DISCHARGERS ON EASTERN LAKE  
ERIE AND THE NIAGARA RIVER

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Al-Tech Specialty Steel Corp., Dunkirk	-	N/A	T-Cd	-	N/A	N/A
			T-Mn	-	N/A	N/A
			Zinc	-	N/A	N/A
			Oil & Grease	15		
			SS	29		
			T-Cr	0.95		
			Cu	0.95		
			Ni	1.9		
			Fe	5.4		
			CN-ox	0.07		
			Fluoride	2.4 mg/L		
			Cr-hex	0.05 mg/L		
			Pb	0.05 mg/L		
Amherst Sanitary District No. 16	Upper Niagara River	35.0	BOD <sub>5</sub>	N/A	-	2,848.5
			SS	N/A	-	2,525
			Phosphorus	N/A	130	142
Ashland Oil Inc., Tonawanda	Upper Niagara River	7.42	Oil & Grease	454	176	242
			TNH <sub>3</sub>	1,178	617	444
			TOC	1,860	-	631
			Hex-Cr	0.14	.07	0.10
			SS	227	-	90
			BOD <sub>5</sub>	2,039	-	707
			Phenols	25	11	13
			TCr	2.0	-	0.73
			H <sub>2</sub> S	122	160	65
			Batavia, STP	Lower Niagara River	11.1	BOD <sub>5</sub>
SS	-	-				383
Phosphorus	-	116				127
Bethlehem Steel Corp., Hamburg	Buffalo River	845	Oil & Grease	435*	-	435
			T-NH <sub>3</sub>	1,009*	-	1,009
			CN	193*	-	193
			Sol-Zn	65*	-	478
			SS	13,698*	-	13,698
			Phenols	152*	-	152
			Zn	1,081*	-	478
			Cn	2,297*	-	156
Buffalo Color Corp.,	Buffalo River	49.2	Oil & Grease	492	-	60
			TNH <sub>3</sub>	57	-	64
Buffalo Color Corp., Buffalo (cont'd)			TOC	340	-	450
			SS	680	-	445
			BOD <sub>5</sub>	340	-	512
			Phenols	2.3	-	7.4
Buffalo Sewer Authority	Lower Niagara River	665.0	BOD <sub>5</sub>	19,650	-	55,069
			SS	19,650	-	56,025
			Phosphorus	-	1,518	1,796
Carborundum Corp. Buffalo Comp., Niagara Falls	Upper Niagara River	17.8	SS (Ave.)	4,627	4,552	1,074
			COD (Ave.)	2,767	350	926
			Oil & Grease (Ave.)	340	36	112
			BOD <sub>5</sub> (Ave.)	154	65	95
Cheektowaga Sanitary Dist. # 5	Buffalo River	37.5	BOD <sub>5</sub>	1,125	-	3,315
			SS	1,125	-	1,203

POINT SOURCE DISCHARGERS ON EASTERN LAKE  
ERIE AND THE NIAGARA RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Donner-Hanna Coke Corp., Buffalo	Buffalo River	N/A	Ca	-	-	761
			Chloride	-	-	3,675
			SO <sub>4</sub>	-	-	450
			Sulphide	-	-	0
			Oil & Grease	29	1	24
			NH <sub>3</sub>	187	148	263
			SS	100	263	1,270
			BOD <sub>5</sub> (Ave.)	354	160	621
			Phenols	3.6	38	1.3
			CN	4.4	-	4.0
Dunkirk, STP	-	25.73	BOD <sub>5</sub>	681	-	235.7
			SS	681	-	280.5
			Phosphorus	22.6	10	4.75
East Aurora, STP	-	8.04	BOD <sub>5</sub>	241	-	127.3
			SS	241	-	179.2
			Phosphorus	8	-	23
E.I. DuPont De Nemours Electro, Niagara Falls	Upper Niagara River	59.2	TOC	-	-	254
			Dis. Sol.	-	-	29,325
			COD	4,800	4,400	4,100
			Oil & Grease	136	79	161
			Fluoride	113	383	111
			Ba	45	107	52
			SS	680	745	599
E. I. DuPont (cont'd)			BOD <sub>5</sub>	953	2,558	-
E. I. DuPont De Nemours, Yerkes, Tonawanda	Upper Niagara River	24.4	COD	322	287	1,497
			TKN	64	41	396
			SS	50	66	113
			BOD <sub>5</sub>	50	351	113
Erie County S.D. # 2 South, Evans	-	16.5	BOD <sub>5</sub>	176	-	22.6
			SS	510	-	19.9
			Phosphorus	17.0	11.8	22.2
			NH <sub>3</sub>	63.0	-	0.29
			DO	6.0 mg/L	-	8.2 mg/L
Erie Sewer Authority, STP	-	243	Phosphorus	-	383	438
			BOD <sub>5</sub>	-	-	342
			SS	-	-	1,063
FMC Corp. Industrial Chem. Div., Tonawanda	Upper Niagara River	40	Dis. Solids	-	-	5,762
			TNH <sub>3</sub>	90.7	-	436
			Phosphorus	45.4	-	0.11
			TBoron	290	-	288
			SS	154	-	177
			Zn	-	-	0.4
Fredonia, STP	-	7.87	BOD <sub>5</sub>	1,665	-	841.6
			SS	760	-	337.5
			Phosphorus	15.0	-	-
Friedship Dairies Inc., Friedship	-	1.97	SS	136	-	189
			Zn	0.99	-	N/A
			T-Cr	1.97	-	N/A

POINT SOURCE DISCHARGERS ON EASTERN LAKE  
ERIE AND THE NIAGARA RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
General Electric, Erie	-	16.3	TSS	327	-	225
			Oil & Grease	163	-	78
			Cu	8.2	-	1.3
			Cadmium	5	-	.16
			Chrome	8.2	-	.33
			Zn	8.2	-	1.6
			T-Cn	8.2	-	0
			Fe	-	-	24
			PCB	-	-	<.001
			Phosphorus	-	-	9.8
General Motors Corp. Chevrolet Motor Div., Tonawanda	Upper Niagara River	106	Oil & Grease	513	-	638
			SS	1,075	-	869
			Phenols	6.8	-	2.5
General Motors Corp. Harrison Radiator Div., Lockport	Mouth of Niagara River to 18 Mile Creek	10.6	TNH <sub>3</sub>	106*	99.7	73
			Fluoride	159*	-	147
			Hex-Cr	1.1*	-	.03
			Pb	5.3*	-	3.6
			TAI	10.6*	.25	2.1
			SS	212*	85	74
			Phenols	3.2*	-	3.2
			Zn	7.4*	2.8	5.7
			TCr	10.6*	.02	.03
			Cu	6.36*	.89	.95
Fe	10.6*	.38	1.06			
Gowanda, STP	-	4.6	BOD <sub>5</sub>	-	-	348.8
			SS	-	-	288.8
Grand Island Biological Co., (Six Mile Cr.)	Upper Niagara River	N/A	Oil & Grease	0.59	-	0.50
			SS	1.9	-	1.3
			BOD <sub>5</sub>	1.8	-	2.4
			Phenols	0.0009	-	0.03
Hamburg Master Sewer District	-	12.2	BOD <sub>5</sub>	-	-	648
			SS	-	-	436
			Phosphorus	-	16	21
Hooker Chemical and Plastics Corp., Niagara Falls	Upper Niagara River	205	THg	0.07	-	0.01
			Fluoride	79	1,216	40
			COD	1,093	-	.984
			SS	4,790	-	3,824
			Halogenated Toluene	13	-	0.45
			Halogenated Organics	59	-	7.7
Hooker Chemical Corp., Durex Div., North Tonawanda	Upper Niagara River	4.35	COD	1,814	1,869	2,321
			TKN	249	-	48
			SS	58	27	11
			BOD <sub>5</sub>	907	965	90
			Phenols (Ave.)	16	15	5.7
Lackawana, STP	-	12.5	BOD <sub>5</sub>	-	-	585.9
			SS	-	-	553.9
			Phosphorus	-	72.7	22.5
Lewiston, STP	Lower Niagara River	3.01	BOD <sub>5</sub>	N/A	-	398
			SS	-	-	288.6
			Phosphorus	-	-	-

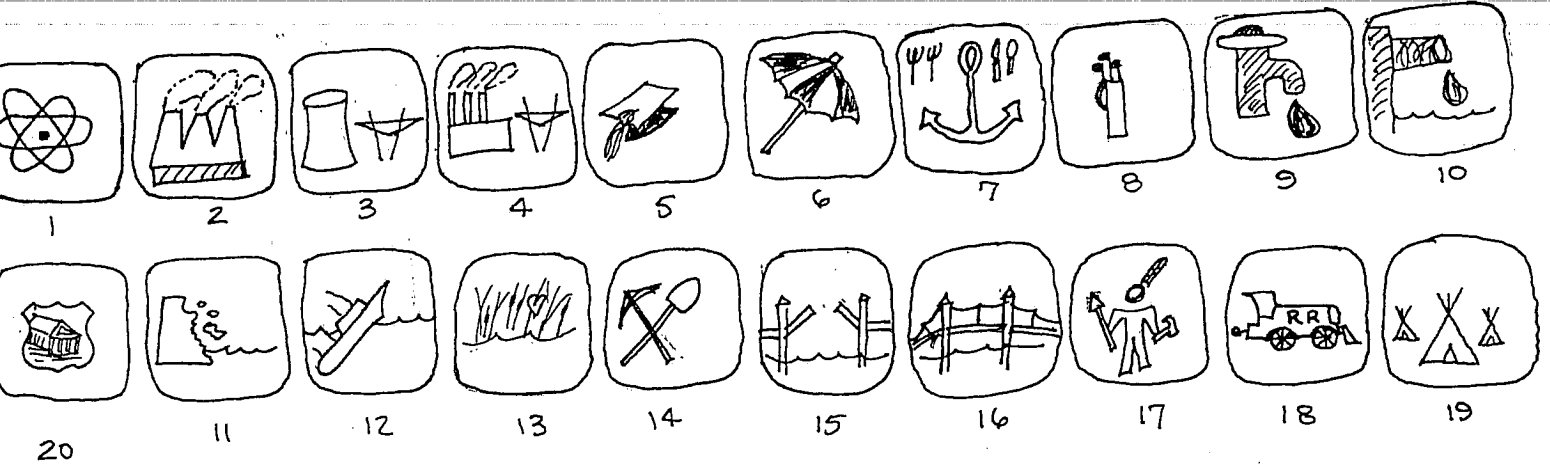


POINT SOURCE DISCHARGERS ON EASTERN LAKE  
ERIE AND THE NIAGARA RIVER (cont'd.)

POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Libby McNeill & Libby, (Marsh Creek)	-	0.0012	N/A	N/A	N/A	N/A
Lockport, STP	Mouth of Niagara River to 18 Mile Creek	50.45	BOD <sub>5</sub> SS Phosphorus	2,490 2,490 83	- - 4.0	327 570 4.02
Mobil Oil Corp., Buffalo	Buffalo River	N/A	NH <sub>3</sub> COD Oil & Grease Hex-Chrome SS BOD <sub>5</sub> Phenols T-Chrome H <sub>2</sub> S	135* 1,270* 72.5* 0.32* 739* 363* 22.6* 2.0* 9.1*	37 - - - 203 102 9 .06 5	28.6 996 34.9 0 492 293 12.7 0.20 3.2
Mt. Vernon, STP	-	1.4	BOD <sub>5</sub> SS Phosphorus	44.4 44.4 -	- - 4	133 105 4
National Steel Corp., Buffalo	Upper Niagara River	149	TNH <sub>3</sub> * SS * Phenols * TCN *	115 4,191 0.77 62	- - - -	115 4,191 0.77 62
Niagara Falls N.Y., STP	Lower Niagara River	73.4	COD SS Phenol Phosphorus	19,800 5,448 37 -	- - - -	14,244 2,067 - 815
Niagara Mohawk Power Corp., Dunkirk	-	24	SS Oil & Grease	12 6.8	- -	30 341
Niagara Mohawk Power Corp., Tonawanda	Upper Niagara River	148	TNH <sub>3</sub> SS Res-Cl	- 20.5 953	- - -	- 31.8 5.1
N. L. Industry Doehler-Jarvis, Batavia	Upper Niagara River	2.44	SS Oil & Grease	68 45	- -	97.6 29.3
North East, STP	-	1.19	BOD <sub>5</sub> SS Phosphorus	35.7 53.6 -	- - -	40.6 52.4 -
North End Paper Co., Oswego	Oswego Harbor	-	BOD <sub>5</sub> SS	- -	- -	60 50
North Tonawanda, STP	Upper Niagara River	22.5	BOD <sub>5</sub> SS Phosphorus	1,590 1,590 52.8	- - 60	1,571 1,223 53.37
Noury Chemical Corp.,	Mouth of Niagara River	0.76	TKN Phosphorus	- -	- -	0.73 0.59

POINT SOURCE DISCHARGERS ON EASTERN LAKE  
ERIE AND THE NIAGARA RIVER (cont'd.)

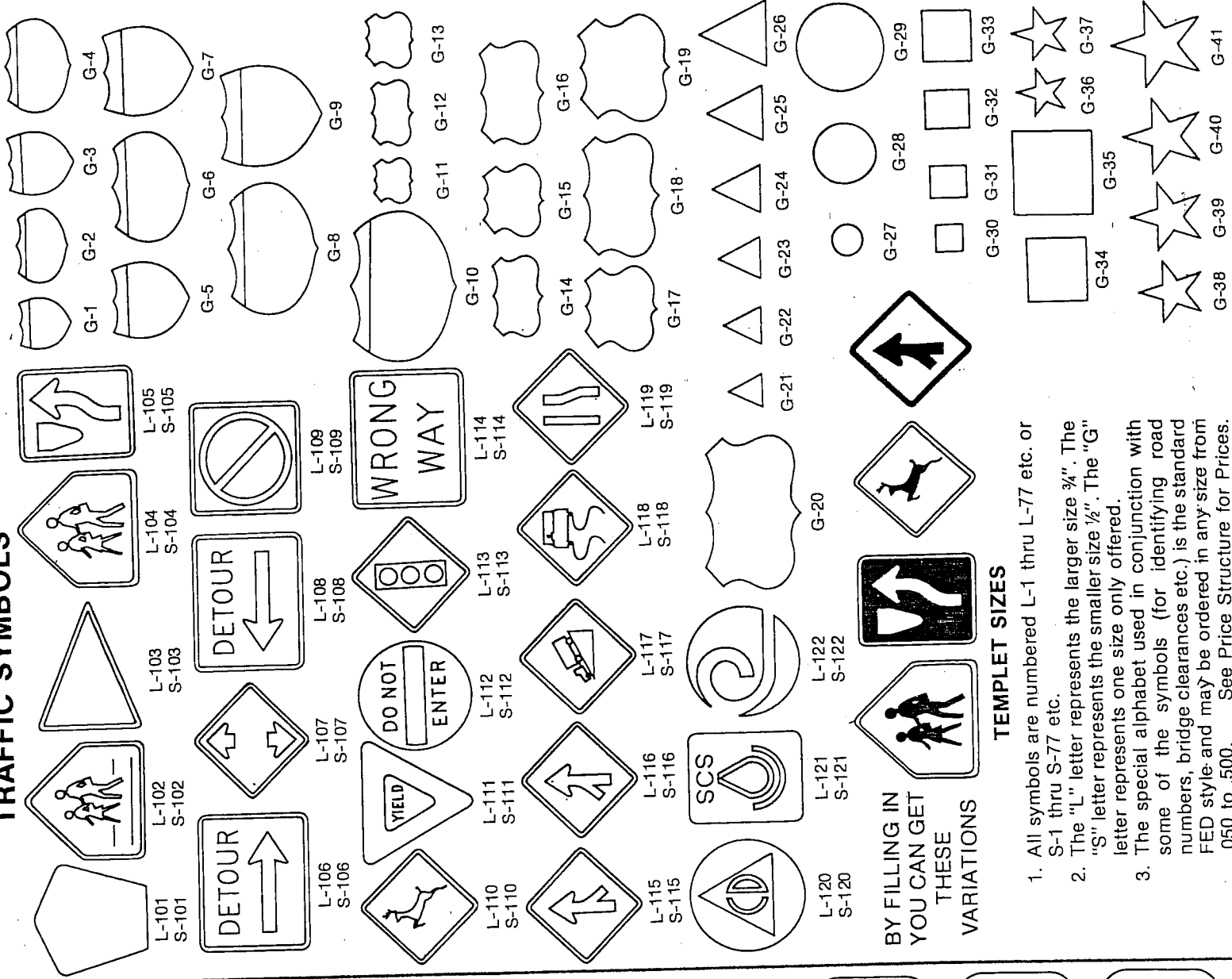
POINT SOURCE DISCHARGER AND LOCATION	DISCHARGE TO INDICATED PROBLEM AREA <sup>3</sup>	REPORTED 1977 FLOW (10 <sup>3</sup> m <sup>3</sup> /d)	REPORTED PARAMETERS	TOTAL EFFLUENT REQUIREMENTS <sup>1</sup> (kg/d)	REPORTED LOADINGS <sup>2</sup> (kg/d)	
					1976	1977
Olin Corp. Niagara Works, Niagara Falls	Upper Niagara River	114	Zn	49	-	25
			TCr	127	-	32
			BOD <sub>5</sub>	54	-	67
			Pb	2.0	-	.04
			Res-Cl	10	-	728
			Mercury	0.05	-	1.08
			SS	454	-	521
Ramco Steel Inc. (Trib. to Buffalo River)	Buffalo River	0.09	COD	18	-	4.6
			Oil & Grease	1.9	-	0
			Hex-Cr	.009	-	.004
			Sol-Fe	0.39	-	54
			TMn	0.39	-	1.2
			SS	5.8	-	6.9
			Zn	0.10	-	0.29
			TCr	0.05	-	.07
Republic Steel Corp., (Buffalo R.)	Buffalo River	140	Oil & Grease	635*	243	635
			SS	2,130*	1,054	2,130
			TNH <sub>3</sub>	91*	33	91
			CN (fr.)	27*	-	-
			Phenols	7.9*	2.8	7.9
			CN	18*	8	18
Spaulding Fibre Co. Ind. Plastic, Tonawanda	Upper Niagara River	N/A	BOD <sub>5</sub>	2,145	1,829	1,556
			SS	3,765	2,353	1,956
			pH	6 - 9	-	7.5
Stauffer Chem. Co., Niagara Falls, Lewiston	Lower Niagara River	1.09	Oil & Grease	5.0	-	.09
			TCd	0.1	-	.005
			Pb	0.2	-	.005
			Res-Cl	0.5	-	.005
			SS	20	-	2.5
			Zn	0.5	-	.0005
			Cu	0.2	-	.0005
			H <sub>2</sub> S	.0	-	.015
Westinghouse Elec. Co. Motor Div., Cheektowaga	Buffalo River	2.82	Oil & Grease	11.1	-	2.6
			Sol-Cd	0.06	-	0.01
			TCd	0.11	-	0.03
			Hex-Cr.	0.32	-	0.003
			Sol-Cd	0.12	-	0.06
			Sol-Fe	0.29	-	0.16
			Pb	0.01	-	0.04
			SS	26	-	11
			BOD <sub>5</sub>	13.2	-	3.7
			Zn	0.07	-	0.05
			TCr	0.29	-	0.003
			TCN	0.07	-	0.01
			Cu	0.59	-	0.08
			Fe	0.41	-	0.31
ox-CN	0.06	-	0.01			
Wheatfield, STP	Upper Niagara River	0.609	BOD <sub>5</sub>	5.65	-	4.3
			SS	28.2	-	17.2
Westfield, STP	-	5.41	BOD <sub>5</sub>	294	-	42.5
			SS	294	-	43.8
			NH <sub>3</sub>	19.6	-	1.35
			Phosphorus	9.8	-	4.34
Youngstown, STP	Mouth of Niagara River to 18 Mile Creek	0.821	BOD <sub>5</sub>	55.2	-	45.7
			SS	55.2	-	46.7



SKETCHES OF SUGGESTED SYMBOLS FOR  
LAKE ERIE GUIDE MAPS

1. Nuclear Reactor
2. Industrial Installation
3. Nuclear Power Plant
4. Fossil-Fuel Power Plant
5. Educational Institution
6. Public Beach
7. Nautical Restaurant
8. Golf Course
9. Water Treatment Plant
10. Sewage Treatment Plant (Discharge)
11. Shore Erosion
12. Sunken Ship
13. Wetlands
14. Quarries and Mines
15. Bridge (Bascule)
16. Bridge (Suspension)
17. Archaeological Site
18. Railroad Facilities
19. Indian Village Site
20. Federal Installation

# TRAFFIC SYMBOLS

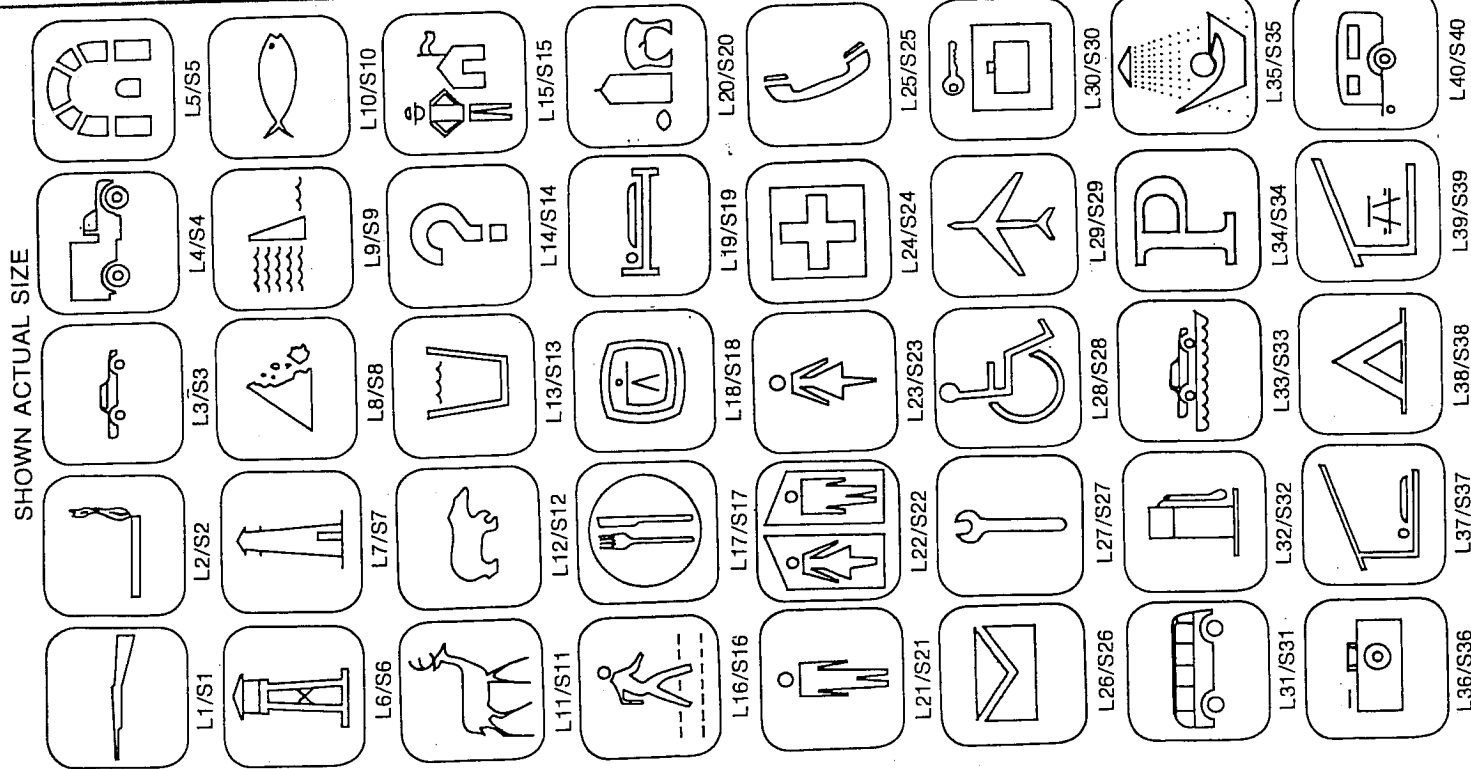


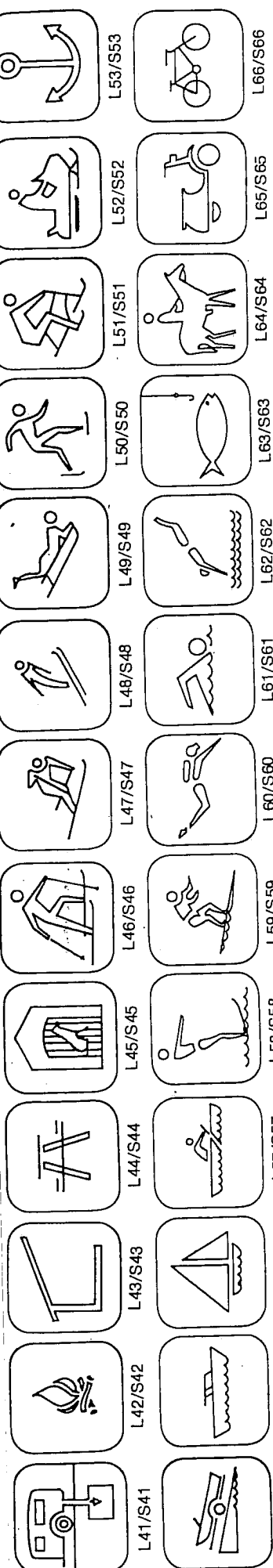
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THESE  
VARIATIONS

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1. All symbols are numbered L-1 thru L-77 etc. or S-1 thru S-77 etc.
2. The "L" letter represents the larger size 3/4". The "S" letter represents the smaller size 1/2". The "G" letter represents one size only offered.
3. The special alphabet used in conjunction with some of the symbols (for identifying road numbers, bridge clearances etc.) is the standard FED style and may be ordered in any size from .050 to .500. See Price Structure for Prices.

# NATIONAL PARK SERVICE RECREATIONAL SYMBOLS





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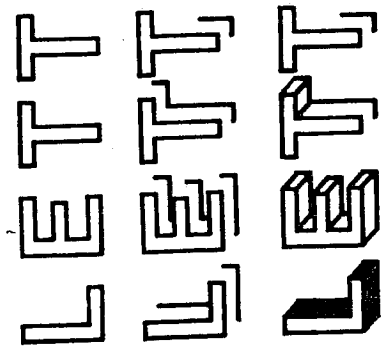
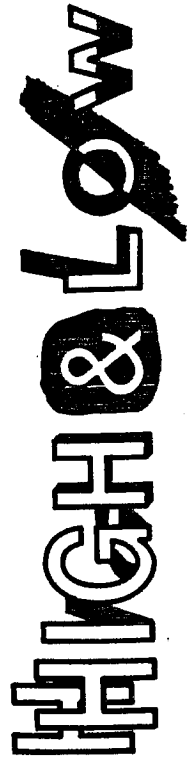
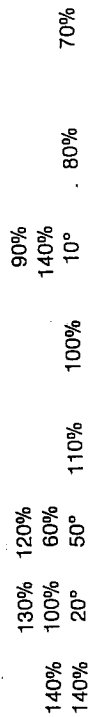
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A GUIDE TO THE NATURAL AND  
CULTURAL FEATURES OF THE  
MICHIGAN SHORELINE OF THE  
DETROIT RIVER

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Compiled by

Charles E. Herdendorf  
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The Ohio State University

Published by

U. S. Environmental Protection Agency  
Office of Public and Intergovernmental Affairs  
Region V, Chicago, Illinois

in cooperation with  
Ohio Sea Grant Program

June 1979

## 1. POWER PLANTS

### Chart No.

13	Detroit Edison Company (Conners Creek)
28	Detroit Edison Company (Atwater St.)
48	City of Detroit Public Lighting Comm.
50	Detroit Edison Company (Fort Wayne)
68	Detroit Edison Company (River Rouge)
91	Municipal Electric and Water Utilities (Wyandotte)
101	Detroit Edison Company (Trenton)
116	Ontario Hydra (Windson)

## 2. MARINAS, BOATING CLUBS AND LAUNCHING FACILITIES

### Chart No.

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4	Detroit Boat Club
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16	Sinbad's Marina (H,P)
17	Harbor Inn Marina (H)
18	Kean's Detroit Yacht Harbor (H)
19	Roostertail Marina (H)
20	St. Clair Yacht Club (H)
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22	Detroit Boat Basin (H,M)
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80	Windsor Yacht Club (H,R)
87	Nicks Marina (H,R)
88	Ecorse Boat Basin (H,R)
89	Wyandotte Marina (H,P)
89	Pier 500 (H)
89	Beacon Marina (H)
89	Marine Service Center (H)
89	Hidden Boat Harbor (H,P,R)
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90	Wyandotte Boat Club (H)
100	Trenton Riverside Marina (H,M)
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156	Launching Ramp
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158	Launching Ramp
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110	Humbug Marina (H)
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69	Civic Center Marina
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### Facilities Legend

H - boat hoist  
M - marine railway  
P - pump-out facility  
R - launching ramp  
S - Scuba service



### 3. INDUSTRIAL PLANTS AND WASTE DISPOSAL AREAS

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52, 61,	
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64	Ford Motor Company (Auto Mfg.)
65	Shell Oil Company (Petroleum Products)
66	Allied Oil Company (Petroleum Products)
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73	Revere Copper and Brass Inc. (Metalware)
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59	Detroit Waste Water Treatment Plant (Sewer discharge)
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Chart No.

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180	Wayne County	49
82	Riverview	2
178	Trenton	4
105	Grosse Ile	1
<u>Industrial</u>		
73	Revere Copper and Brass	3
52	Great Lakes Steel	90
61	Great Lakes Steel	72
62	Great Lakes Steel (Ecorse)	72
98	McLouth	66
102	Monsanto	18
112	Pennwalt Chemical	97
67	BASF Wyandotte Chemical (N)	57
94	BASF Wyandotte Chemical (S)	55
66	Allied Chemical	15
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\*Millions of gallons per day

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172	Round Island
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Pte. Mouille State Game Area

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183	Ecorse Park (Ecorse)
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Chart No.

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17. FERRY DOCKS

Chart No.

- 189 Bois Blanc Island Ferry Dock (Scheduled Passenger Ferry Service to Bois Blanc Is. Amusement Park, Amherstburg, Ontario)
- 70 Railroad Car Ferry Dock (Service to Windsor, G.T.W. RR)
- 72 Railroad Car Ferry Dock (Service to Windsor, N & W Ry)
- 92 Bob-Lo Dock (Scheduled Passenger Ferry Service to Bois Blanc Is. Amusement Park, Amherstburg, Ontario)

18. AIRPORTS

Chart No.

85

Grosse Ile Municipal Airport



19. CONCERT HALLS, CONVENTION CENTERS, STADIUMS

Chart No.

31	Cobo Hall
32	Renaissance Center
36	Tiger Stadium

## 20. EDUCATIONAL INSTITUTIONS

### Chart No.

73	University of Windsor
190	Detroit Institute of Technology
191	Wayne State University Medical Center
192	University of Detroit

## 21. COMMERCIAL SHIPPING SERVICES

### Chart No.

43	Marine Post Office
44	Fire Tug
9	Harbor Master (Belle Isle)
54	Great Lakes Towing Company
74	Windsor Harbour Comm.
78	Anchorage Area
93	National Ocean Service Water Level Gage House (Wyandotte)
111	National Ocean Service Water Level Gage House (Gibraltar)
114	Dunbar and Sullivan Dredging Co.
142	Detroit Marine Supply Co.

## 22. MARINE TERMINALS AND COMMERCIAL DOCKS

### Chart No.

42	Commercial Marine Terminal
45	Detroit Harbor Terminal
46	Commercial Terminals of Detroit
47	International Great Lakes Shipping Company
53	Great Lakes Steel (Ore Dock, Zug Island)
55	Detroit Marine Terminals
79	Nicholson Terminal and Dock Company
117	Canada Steamship Lines, Ltd.
141	Jefferson Marine Terminal
14	Arrowhead Company

23. COAST GUARD, HARBOR CONTROL AND NAVIGATION FACILITIES

Chart No.

8	Belle Isle Coast Guard Station
9	Harbor Master (Belle Isle)
26	U. S. Coast Guard Slip (Mt. Elliot Ave.)
30	U. S. Customs and Immigration (Winsor Tunnel)
33	U. S. Customs and Immigration (Ambassador Bridge)
117	Canada Customs and Immigration
118	Canada Customs and Immigration
126	Canada Customs and Immigration

## 24. MILITARY AND GOVERNMENTAL FACILITIES

### Chart No.

24	Brodhead Naval Armory
49	Fort Wayne (U. S. Army)
76	International Joint Comm., Great Lakes Hdqrs.
37	Federal Building (Detroit)
84	U. S. Environmental Protection Agency, Large Lakes Research Station (Grosse Ile)
93	National Ocean Service Water Level Gage House
30	U. S. Customs and Immigration (Windsor Tunnel)
33	U. S. Customs and Immigration (Ambassador Bridge)
117	Canada Customs and Immigration
118	Canada Customs and Immigration
126	Canada Customs and Immigration

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A GUIDE TO THE NATURAL AND  
CULTURAL FEATURES OF THE OHIO  
AND MICHIGAN SHORELINE OF  
WESTERN LAKE ERIE

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Published by

U. S. Environmental Protection Agency  
Office of Public and Intergovernmental Affairs  
Region V, Chicago, Illinois

in cooperation with  
Ohio Sea Grant Program

June 1979

# 1. PUBLIC BEACHES AND SHORELINES

## Chart No.

### Federal

- 99 Ottawa National Wildlife Refuge  
Cedar Point Unit, Lucas County
- 109 Ottawa National Wildlife Refuge  
Ottawa Unit
- 128 Ottawa National Wildlife Refuge  
Darby Marsh Unit, Ottawa County
- 407 Ottawa National Wildlife Refuge  
Navarre Marsh Unit
- 408 Ottawa National Wildlife Refuge  
West Sister Island Unit
- 171 Perry's Victory and International Peace Memorial  
South Bass Island

### State

- 409 Sterling State Park (Mi)
- 4 Pointe Mouillee (Mi)
- 98 Maumee Bay State Park
- 110 Crane Creek State Park
- 158 Catawba Island State Park
- 201 East Harbor State Park
- 163 South Bass Island State Park
- 161 Green Island State Park
- 188 Kelleys Island State Park
- 111 Magee Marsh State Wildlife Refuge
- 123 Camp Perry Ohio National Guard  
(National Rifle Assn. Matches)
- 380 Old Woman Creek Estaurine Sanctuary (ODNR)
- 169 Gibraltar Island

### County and Local

- 55 Cullen Park
- 59 Bay View Park
- 78 Promenade Park
- 89 Walbridge Park
- 410 Lakeview Park, Port Clinton
- 411 J. C. Park, Sandusky
- 262 Main Street Park, Huron



## 2. POWER PLANTS

### Chart No.

- 9 Enrico Fermi Power Plant (Nuclear)  
Detroit Edison Company  
2 units under construction  
Stony Point, Mi.
  
- 20 Monroe Power Plant (Fossil Fuel)  
Detroit Edison Company  
4 units  
Monroe, Mi.
  
- 36 Whiting Power Plant (Fossil Fuel)  
Consumer Power Company  
Luna Pier, Mi.
  
- 93 Bay Shore Power Plant (Fossil Fuel)  
Toledo Edison Company  
Toledo
  
- 72 Acme Power Plant (Fossil Fuel)  
Toledo Edison Company  
Toledo
  
- 116 Davis-Besse Nuclear Power Station (Nuclear)  
Toledo Edison and CEI)  
1 unit operating, 2 under construction  
Oak Harbor
  
- 245 Sandusky Bay Power Plant  
(American Electric Power/Ohio Power)  
Proposed Site  
Vickery
  
- 281 Erie Nuclear Power Station (Nuclear)  
(Ohio Edison)  
2 units proposed  
Berlin Heights

Chart No.County and Local (Continued)

284	Main Street Beach, Vermilion
412	Sherod Park, Vermilion Twp
171	Put-in-Bay Village Beach
97	South Park, Oregon
413	Pointe Aux Peaux Beach (Mi)
414	Stony Point Park (Mi)
415	Willow Beach, Brest Bay (Mi)
416	Toledo Beach, Luna Pier (Mi)

Private (Fee may be charged)

197	Gem Beach, Catawba Island
212	Lakeside Beach, Lakeside
225	Bay Point Beach, Marblehead
259	Cedar Point Amusement Park, Sandusky
266	Sawmill Creek Resort, Huron
274	Nickel Plate Park, Huron
287	Linwood Park, Vermilion

### 3. MARINAS, BOATING CLUBS AND LAUNCHING FACILITIES

Chart No.

#### MICHIGAN

##### Monroe County

- 1 Maynard's Marina (H,P,R)
- 2 Point Mouillee State Game Area (R)
- 3 Frankie's Boats and Baits
- 6 Swan Boat Club
- 7 Swan Yacht Basin (H,P)
- 12 Brest Bay Marina (H,P,R)
- 13 Detroit Beach Boat Club
- 14 Sterling State Park (R)
- 24 Trout's Yacht Basin (H,P,R)
- 25 Monroe Boat Club
- 26 Harbor Marina (H,P)
- 27 E. J. Miller Boat Livery (H)
- 28 Monroe Marina (R)
- 29 Ted Hoffman Memorial Park - public fishing site (R)
- 30 Joe's Boat and Bait (R)
- 31 Otter Creek Marina (H,R)
- 32 Rainbow Marina (H,P,R)
- 33 North Cape Yacht Club (H)
- 34 Toledo Beach Marina (H,P)
- 31 John's Marina (R)
- 40 Brewer's Boat and Bait (R)
- 41 Lotus Harbor Marina (P,R)
- 42 Action Marine, Inc. (H)

#### OHIO

##### Lucas County

- 44 Boat Hoist (H)
- 45 River View Yacht Club (H,P)
- 46 Counterman Marine Service (H,P)
- 47 Ottawa River Yacht Club (H)
- 48 Launching Ramp (R)
- 55 Cullen Park (R)
- 58 Bay View Yacht Club
- 60 Toledo Yacht Club
- 62 Harrison Marina
- 73 Brenner Marine, Inc. (H,R)
- 74 Bodette Marine Supply Co.
- 84 Rossford Municipal Marina (R)
- 85 Ott's Marine Service (M)
- 86 Kronfields Marina (M)
- 88 Toledo Sailing Club
- 90 Maumee River Yacht Club
- 91 Harbor View Yacht Club
- 102 Anchor Point Marina (H,R)
- 103 Lakemont Boat Rental (H,R)
- 106 Ro-Bo Marina (H,R)
- 107 Cooley Canal Yacht Club

Chart No.

## OHIO

Ottawa County

112	Turtle Point Marina (R)
113	East Side Fishery and Marina (H,R)
114	Long Beach Assn. (H)
115	Al's Harbor (R)
119	Floro's Little Place (R)
124	Meachen Grove (R)
127	Nugent's Canal Point (R)
125	Johnny's Boat Harbor (R)
126	Ottawa County Launching Facility (R)
129	Jacknife Marina (H)
129	Lazy Acres Marina
129	River Acres Marina (H,R)
130	Clinton Reef Marina (H)
131	H. J. Marina (H,P)
132	The Matthews Company (H)
133	David B. Jeremy & Son (H,M)
133	Drawbridge Marina
133	Lakeshore Launching (H,M)
135	Port Clinton City Dock
135	Tom's Charter Moat Service (P)
143	Winous Point Shooting Club (R)
144	Wonnell Road Launching Facility (R)
145	Hickory Grove (R)
146	Rahm's Marina
147	Knecht's Marina (H,R)
152	Kenykirk Harbor
153	West Catawba Marina (R)
154	Colony Club Harbor
155	Marina - Girl Scout Camp
156	Sugar Rock Harbor and Marina (H,R,P)
157	Catawba Island Marina (H,P)
157	Catawba Island Club
158	Catawba Island State Park (R)
159	Scott Point Boat Rental
163	South Bass Island State Park Marina
166	Golden Pheasant Inn
168	The Crew's Nest (P)
168	Put-in-Bay Yacht Club (R)
168	Miller Boat Line (M)
168	Oak Point State Dock
169	Snug Harbor
170	Ladd's Marine Sales and Service
170	Put-in-Bay Refuge Harbor (R)
170	Lake Erie Patrol Corp. (H)
172	Georgé F. Lonz Winery Yacht Basin
173	Lonz Marine Harbor

Chart No.

## Ohio

Ottawa County (continued)

191	Harbor Acres Marina (R)
192	Catawba Midway Marina (H,R)
193	Ottawa County Launching Facility (R)
194	Skyline View Marina
194	Greene's Marina (H,P,R)
195	Treasure Cove Marina (H,R)
196	Fox Haven Marina (H,P,R)
196	Chafee's Marina (H,P,R,S)
197	Gem Beach Service, Inc. (H,P,R)
198	East Harbor State Park Marina (H,R)
202	East Harbor State Park (R)
203	Ahrens' Park, Inc. (R)
204	Launching Ramp (R)
205	Harbor Haven (R)
205	Bass Haven (H,R)
206	Tibbels Marina (H,R)
207	Marine City (H,R,P)
207	Marine City Yacht Club
208	O's Anchorage (H)
208	Mar-Lu Motel - Marina (R)
208	Channel Grove Marina (R)
209	Bar Harbor (H,P)
210	Lakevue Marina (H,R)
210	Limpert Marina (H)
210	Truman's Marina
211	Shrock's Marina and Salvage (H,R)
211	Holiday Cove (H,R)
212	Lakeside Marine, Inc. (H,P)
213	Lakeside Assn. Dock
218	Winnie's Boat Basin
219	Turinsky's Dock (R)
219	Pleasant Point
221	Lakeview Bait Store (R)
222	Marblehead Marina (H)
222	Orib Boat Club
226	Bay Point Yacht Club (R)
230	Taylor's Resort (R)
231	Snug Harbor
232	Land's End (H,R)
232	Holiday Marina
233	Castaway Harbor (R)
234	Zeller's Beach (R)
235	Kamp Kozy Marina (R)
236	Sonny's Beach (H,R)
237	Hank's Place (R)

Chart No.

## Ohio

Ottawa County (continued)

441 Portage River Wildlife Access Area (R)  
459 Magee Marsh Wildlife Area (R)  
461 Burgandy Bay Marina  
462 Middle Bass Assn  
463 Meier's Wine Cellars, Inc.  
464 Ballast Island Marina  
465 Yachtsman's Club  
467 Lakefront Marina (H,P)

Erie County

180 Kellys Island Seaway Marina  
181 The Casino  
181 Miller Marina Service  
181 Martins Dock  
182 Sunset Point Boat Livery and Lodge (R)  
240 Bob Clemons Boats (H,R)  
241 Crystal Rock  
244 Bay Harbor Marina (H,R)  
246 Venice  
250 Sandusky Yacht Club  
251 Battery Park Marina (H,R)  
252 Sandusky Sailing Club  
252 Sadler Sailing Basin (H)  
254 Lyman Boat Works (H)  
255 Oando Marina (H)  
255 Sandusky Yacht Club Boathouses  
255 Venetian Marina (H,R)  
255 Inland Seas Boat Co. (H)  
256 Holiday Marina (R)  
258 Cedar Point Marina (H,P,R)  
258 Cedar Point Yacht Club  
266 Sawmill Creek Resort Marina  
273 Russ Boat Livery  
273 Joe's Bait Store  
275 Sandusky Small Boat Mooring Basin  
277 Huron Yacht Club  
277 The Boat Harbor Co. (H)  
277 Huron Marine Park (H)  
277 Gull Harbor (R)  
278 Holiday Harbor Marina, Inc. (H,R)  
278 Walski Lodge (H,R)  
278 Huron River Marina (H)  
279 Huron Lagoon Marina (H,R)  
282 Art Hayes Marina (R)  
285 Vermilion Yacht Club

Chart No.

Ohio

Erie County (Continued)

286 Vermilion Boat Club  
 286 Moes Marine Service (H)  
 286 Ryser's Boat Livery (H)  
 288 Parsons Marine and Indust. Service, Inc.  
 288 Valley Harbor Marina (H,R)  
 288 West Shore Boat Club  
 288 Jeavons Boat Yark (H,R)  
 288 Romp's Water Port, Inc. (H,R)  
 288 Vermilion Power Boat, Inc. (H)  
 418 K & W Charter Boats (H)  
 418 Great Lakes Towing Co. (H)  
 418 Deepwater Marina (H)  
 466 Cask Villa Boat Launch (R)

Wood County

84 Rossford Municipal Marina (R)

Sandusky County

139 Sandusky River Tacht & Outboard Club  
 139 Wightman's Grove (H,R)  
 140 Memory Marina (R)  
 244 Bay Harbor Marina (H,R)  
 468 Sunset Harbor  
 469 Muddy Creek Boat Livery

Facilities Legend

H - boat hoist  
 M - marine railway  
 P - pump-out facility  
 R - launching ramp  
 S - scuba service

#### 4. COASTAL INDUSTRIES

##### Chart No.

##### Wineries

164	Heineman's Winery
475	Mon Ami Winery
476	Bretz Winery
421	Manty's Winery
172	Lonz Winery
463	Meier's Wine Cellars

##### Boat and Shipbuilders

70	American Ship Building Co.
67	Hans Hansen Welding Co.
417	Ruhl Boats
132	Matthews Co.
254	Lyman Boat Works
255	Inland Seas Boats

##### Steel Mills

69	Interlake Steel, Inc.
419	Farrell-Cheek Steel Co.

##### Oil Refineries

68	Philips Petroleum
68	Gulf Oil Co.
69	Standard Oil Co.
65	Ashland Oil Co.
66	Shell Oil Co.
69	Sun Oil Co.

##### Paper Products Mfg.

62	St. Regis Paper Co. (Toledo)
18	Consolidated Packaging Corp. (Monroe)
19	Union Camp Corp. (Monroe)
418	Scott Paper Co. (Sandusky)

##### Glass Mfg.

83	Libby-Owens Ford Glass Co. (Rossford)
----	---------------------------------------



Chart No.

Automobile Mfg.

15	Ford Motor Co. (Monroe)
420	AMC Jeep (Toledo)
421	Ford Motor Co. (Sandusky)
422	General Motors Corp. (Sandusky)

Grain Elevators

79	Anderson's Elevators (Toledo)
81	Mid-States Terminals (Toledo)
70	Nabisco (Toledo)
276	Pilsbury (Huron)

5. COASTAL WETLANDS  
(Waterfowl Nesting/Resting Areas)

Chart No.

4	Pointe Mouillee (Mi)
8	Swan Creek (Mi)
423	Brest Bay (Mi)
424	LaPlaisance Bay (Mi)
425	Woodtick Peninsula
426	North Cape (Mi)
427	Ottawa River (Mi)
428	Maumee River (Corbott Island)
99	Cedar Point
429	Potters Pond
106	Ward Canal
108	Metzger Marsh
111	Magee Marsh (Crane Creek - Turtle Creek)
407	Navarre Marsh (Locust Point)
430	Toussaint River (Rushaw Creek)
128	Darby Marsh (Lacarbe Creek)
125	Portage River
198	West Harbor
431	Middle Harbor
200	East Harbor
167	Terwillager's Pond (South Bass)
174	Haunck Pond (Middle Bass)
173	Wehrle Pond (Middle Bass)
176	Smith's Pond (North Bass)
177	Fox Pond (North Bass)
187	Carp Pond (Kelleys Island)
225	Bay Point (Marblehead)
432	Meadow Brook (Sandusky Bay North Shore)
433	Muddy Creek Bay
434	Bay View Marshes, Heron Rookery (Sandusky Bay South Shore)
435	Sandusky East Bay (Cedar Point, Big Island)
278	Huron River (Mud Brook)
280	Old Woman Creek
436	Chappel Creek

## 6. FISH HATCHERIES

### Chart No.

100	Cedar Point (Lucas County)
167	Put-in-Bay (Ohio Division of Wildlife)
347	Blue Hole, Castalia
347	Castalia Trout Farm

### EAGLE NESTS

439	Rest Haven State Wildlife Area
110	Crane Creek State Park

## 7. PUBLIC HUNTING AND FISHING AREAS

### Chart No.

4	Point Mouillee State Game Area
50	Erie State Game Area
108	Metzger Marsh Wildlife Area
111	Magee Marsh Wildlife Area
440	Toussaint Wildlife Area
441	Portage River Wildlife Access Area
438	Little Portage Wildlife Area
439	Resthaven Wildlife Area
201	East Harbor State Park
185	Kelleys Island Wildlife Area
161	Green Island Wildlife Area
442	Miller Blue Hole Wildlife Area
239	Bay Bridge Public Fishing Access

8. HUNTING AND FISHING CLUBS

Chart No.

141	The Ottawa Shooting Club
141	Green Creek Hunting Club
470	West Bay Club
143	Winous Point Shooting Club
347	Castalia Trout Club

## 9. WILDLIFE RESERVATIONS

### Chart No.

#### Federal

- |     |  |
|-----|--|
| 99  | Ottawa National Wildlife Refuge<br>Cedar Point Unit, Lucas County  |
| 109 | Ottawa National Wildlife Refuge<br>Ottawa Unit                     |
| 128 | Ottawa National Wildlife Refuge<br>Darby Marsh Unit, Ottawa County |
| 407 | Ottawa National Wildlife Refuge<br>Navarre Marsh Unit              |
| 408 | Ottawa National Wildlife Refuge<br>West Sister Island Unit         |

#### State

- |     |                                     |
|-----|-------------------------------------|
| 4   | Point Mouilee (Mi)                  |
| 111 | Magee Marsh                         |
| 161 | Green Island                        |
| 280 | Old Woman Creek Estuarine Sanctuary |

#### Private

- |     |   |
|-----|---|
| 443 | Sheldon's Folly, Huron Twp, Erie County |
|-----|---|

10. SEWAGE TREATMENT PLANTS (STP) AND WATER INTAKES (WI) AND DISCHARGE (WD) STRUCTURES

Chart No.

17	Monroe Metro (STP)
61	Toledo (STP)
134	Port Clinton (STP)
460	Sandusky (STP)
270	Huron (STP)
288	Vermilion (STP)
11	Point Aux Peaux, Monroe (WI)
105	Toledo (WI)
104	Oregon (WI)
121	Erie Industrial Park (WI)
138	Port Clinton (WI)
165	Put-in-Bay (WI)
179	Kelleys Island (WI)
199	East Harbor State Park (WI)
214	Lakeside (WI)
262	Sandusky (WI)
216	Marblehead (WI)
270	Huron (WI)
283	Vermilion (WI)
37	Whiting Power Plant (WI)
92	Bay Shore Power Plant (WI)
10	Enrico Ferme Power Plant (WI)
117	Davis-Besse Nuclear Power Station (WI)
148	US Gypsum, Sandusky Bay (WI)
264	Plumb Brook NASA (WI)
118	Davis-Besse Nuclear Power Station (WD)
248	Sandusky STP (WD)
94	Bay Shore Power Plant (WD)
61	Toledo STP (WD)
38	Whiting Power Plant (WD)

11. PUBLIC PARKS

Chart No.

Monroe County, Michigan

14 Sterling State Park  
29 Ted Hoffman Memorial Park  
413 Pointe Aux Peaux Park  
414 Stony Point Park

Lucas County, Ohio

55 Cullen Park  
59 Bay View Park  
78 Promenade Park (Downtown Toledo)  
89 Walbridge Park  
349 Pearson Park  
98 Maumee Bay State Park  
110 Crane Creek State Park

Ottawa County, Ohio

410 Lakeview Park (Port Clinton)  
  
Erie Islands State Park:  
158 Catawba Island Unit  
163 South Bass Island Unit  
169 Oak Point Unit (South Bass Island)  
161 Green Island Unit  
188 Kelleys Island Unit (Erie County)  
201 East Harbor Unit  
  
170 Put-in-Bay Village Park

Erie County, Ohio

411 J. C. Park (Sandusky)  
251 Battery Park (Sandusky)  
262 Main Street Park (Huron)  
412 Sherod Park (Vermilion)  
284 Main Street Beach Park (Vermilion)



## 12. CAMPING AREAS

### Chart No.

201	East Harbor State Park
163	Erie Islands State Park - South Bass Island Unit
188	Erie Islands State Park - Kelleys Island Unit
242	Crystal Rock, KOA (Private)
259	Cedar Point Amusement Park (Private)
225	Bay Point Beach (Private)
14	Sterling State Park

## HIKING TRAILS

110	Crane Creek State Park (birdwalk)
185	Kelleys Island (abandoned quarries)

13. WINTER SPORTS

Chart No.

Ice Fishing

167 Put-in-Bay (Peach Point)  
477 Sandusky Bay (Bay View)

Ice Boating

168 Put-in-Bay (Harbor)  
254 Sandusky Bay (East Bay)

174

14. AMUSEMENT PARKS AND ZOOLOGICAL GARDENS

Chart No.

471	Enchanted Lake Point
259	Cedar Point Amusement Park
474	Deer Park
87	Toledo Zoo
473	Mystery Hill
472	African Lion Safari
473	Prehistoric Forrest

173

## 15. BEDROCK OUTCROPS

### Chart No.

414	Stony Point (dolomite-Silurian)
478	Rock Ledge (dolomite-Silurian)*
480	Catawba Island (dolomite-Silurian)*
160,163	South Bass Island (dolomite-Silurian)*
220	Marblehead Peninsula (limestone-Devonian)
161	Green Island (dolomite-Silurian)
166	Rattlesnake Island (dolomite-Silurian)
227	Johnson Island (limestone-Devonian)
189	Kelleys Island (limestone-Devonian)
	Glacial Grooves State Memorial
479	Oak Point, Huron (shale-Devonian)
287	Vermilion (shale-Devonian)*
169	Gibraltar Island (dolomite-Silurian, glacial grooves)
511	Crystal Rock (dolomite-Silurian)

### BEDROCK CAVES

481	Larcomb's Cave
482	Duff's Cave
484	Gasceyne Cave
483	Victory Cave
484	Perry's Cave-underground lake (open to the public)
485	Zura's Cave
484	Mammoth Cave
485	John Brown's Cave
484	Crystal Cave-celestite crystals (open to the public)
485	Cedar Forest Caves
485	Hole Cave
485	Brown's Cave
483	State Park Cave
484	Paradise Cave
484	Kindt's Cave
486	Two Tree Cave
486	Lundgren's Cave
484	Wulkowicz Cave
490	Coil's Cave
487	Semonic Cave
487	LaCloche Cave
487	Pettipon Cave
487	Petite Cloche Cave
487	Needle's Eye Cave
488	The Grotto Cave
489	Smuggler's Cave
511	Crystal Rock Cave-underground lake (open to the public)

\*High bluff shorelines, 30-40 ft above lake level

## 16. AREAS SUBJECT TO RAPID SHORELINE EROSION

### Chart No.

35	Luna Pier
425	Woodtick Peninsula
426	North Cap
97, 98	South Shore of Maumee Bay
339	Reno Beach
245	South Shore of Sandusky Bay
266	Base of Cedar Point, Rye Beach
280	Oberlin Beach

### MAJOR SAND SPITS AND BARRIER BEACHES

425	Woodtick Peninsula
426	North Cape
99	Cedar Point (Lucas Co.)
239	Cedar Point (Erie Co.)
409	Sterling State Park
200	East Harbor State Park
280	Old Woman Creek bar
111	Magee Marsh barrier beach
225	Bay Point
128	Darby Marsh barrier beach

17. FISHING REEFS, SHOALS AND DEEPS

Chart No.

354	Niagra Reef
355	Round Reef
356	Toussaint Reef
357	Crib Reef
358	Locust Point Reef
359	Flat Rock Reef
360	Cone Reef
361	Little Pickerel Reef
362	Clinton Reef
363	Turtle Reef
364	Crane Reef
365	West Sister Reef
366	Big Pickerel Reef
367	Northwest Reef
368	West Reef
369	Sugar Reef
370	Ballast Reef
371	Buckeye Reef
372	Starve Island Reef
373	Starve Island Deep (62')
374	Mouse Island Reef
375	Scott Point Shoal
376	South Shoal
377	American Eagle Shoal
378	Carpenter Point Reef
379	West Harbor Reef
380	Middle Harbor Reef
381	Lakeside Reef
382	Baypoint Reef
383	Marblehead Reef
384	Sawmill Reef
385	Huron Reef
386	Airport Reef
387	Kellys Island Shoal
388	Middle Passage Reef
389	Gull Island Shoal
390	Gull Island Deep (54')
391	Ennis Reef
392	Eagle Island Reef
393	Moseley Shoal

18. COMMERCIAL HARBORS WITH FEDERALLY-MAINTAINED NAVIGATION CHANNELS

Chart No.

16	Monroe Harbor
63	Toledo Harbor
136	Port Clinton Harbor
170	Put-in-Bay Harbor
250	Sandusky Harbor
273	Huron Harbor
286	Vermilion Harbor

## 19. SCENIC BRIDGES

### Chart No.

71	Craig Avenue Bridge - Interstate 280 Toledo (Drawbridge)
135	Port Clinton (Drawbridge)
238	Thomas A. Edison Bridge - Sandusky Bay
239	Sandusky Bay Bridge (Drawbridge)
229	Johnson Island Causeway Bridge (Private)
257	Cedar Point Causeway Bridge (Toll)
296	Bay Point Bridge (Private)
151	Catawba Island Bridge (Ohio Rte. 53)
297	East Harbor Causeway Bridge



20. MAJOR HIGHWAYS AND RAILROADS

Chart No.

Michigan Highways

298 I 75  
299 US Rte 24  
300 State Rte 56  
301 State Rte 125

Michigan Railways

302 ConRail  
303 Detroit & Toledo Shore Line RR

Ohio Highways

304 I 80 & 90 (James W. Shocknessy Ohio Tpk)  
305 I 75  
305 I 475  
306 I 280  
307 US Rte 6  
307 US Rte 23  
299 US Rte 24  
299 US Rte 223  
299 US Rte 20  
308 US Rte 250  
208 State Rte 184  
308 State Rte 120  
309 State Rte 25  
309 State Rte 246  
310 State Rte 579  
310 State Rte 795  
311 State Rte 65  
312 State Rte 51  
307 State Rte 2  
313 State Rte 590  
314 State Rte 19  
315 State Rte 163  
316 State Rte 358  
317 State Rte 53  
318 State Rte 269  
319 State Rte 357  
307 State Rte 2  
320 State Rte 575  
218 State Rte 269  
321 State Rte 4  
322 State Rte 13  
323 State Rte 61  
324 State Rte 60  
325 State Rte 99

Chart No.

Ohio Railways

327	Toledo Terminal RR
328	Ann Arbor RR
326	ConRail
329	D&TSL RR
330	Norfolk & Western
224	Standard Slag Company RR

S/P

## 21. CITIES AND OTHER PLACE NAMES

### Chart No.

332	Monroe, Mi (Outline)
333	Toledo (Outline)
334	Port Clinton (Outline)
335	Sandusky (Outline)
336	Huron (Outline)
337	Vermilion (Outline)
35	Luna Pier, Mi
338	Stony Point, Mi
24	Bolles Harbor, Mi
97	Oregon
339	Reno Beach
114	Long Beach
340	Gypsum
341	Danbury
342	Lakeside
217	Marblehead
343	Bay View
241	Crystal Rock
246	Venice
170	Put-in-Bay
344	Ceylon
345	Catawba Island
346	Bono
124	LaCarne
347	Castalia
311	Rossford

## 22. QUARRIES

### Chart No.

348	Rockwood, Mi (Dolomite)
350	Clay Center (Limestone & Dolomite) Mineral Collecting, Permission Required
149	Gypsum (Gypsum)
405	Rocky Ridge (Limestone - abandoned)
223	Marblehead (Limestone) Fossil Collecting, Permission Required
185 & 183	Kelleys Island (Limestone - abandoned) Fossil Collecting, Permission Required
347	Castalia (Limestone - abandoned)
406	Sandusky (Limestone)
281	Berlin Heights (Sandstone - abandoned)

## 23. HISTORICAL BUILDINGS

### Chart No.

21	General Beorge Custer's Birthplace
169	Jay Cooke's Castle*
172	George F. Lonz Winery
290	Ottawa County Courthouse
253	Erie County Courthouse
160	South Bass Island Lighthouse Dwelling
291	Enges and Krudwig Winery
292	Christ Episcopal Church, Huron

\*Registered National Historic Landmark

## 24. ARCHAEOLOGICAL AND HISTORICAL SITES AND MONUMENTS

### Chart No.

51	Gard Island (Indian Village Site)
52	Indian Island (Indian Village Site)
142	Squaw Island (Indian Village Site)
169	Perry's Monument, Gibraltar Island
171	Perry's Victory and International Peace Memorial
181	Inscription Rock, Kellys Island (Petroglyphs)
228	Johnson Island Civil War Prison, Cemetery and Fort Site
293	Fort Meigs, Perrysburg
294	Fort Miamis Site, Maumee
404	Battle of Lake Erie, September 10, 1813
411	Burial Site
444	Indian Earthwork (Crescent Shape Enclosure-3 Acres) Lucas County
445	Earthwork (Indian Mound) Lucas County
415	Sissung Site
446	Indian Village Site, Ward Canal
447	Earthwork (Indian Mound)
448	Earthwork (Indian Mound)
449	Earthwork (Crescent Shape Enclosure) South Shore Sandusky Bay
450	Earthwork (Square Enclosure)
451	Earthwork (Indian Mound)
452	Burial Site, Old Woman Creek
453	Indian Mound
454	Burial Site
455	Indian Mound
456	Burial Site
457	Indian Mound
458	Indian Village Site
491	Indian Mound
492	Indian Mound
493	Petroglyphs
494	Indian Mound
495	Earthwork (Crescent Shape Enclosure)
496	Indian Mound
497	Earthwork (Crescent Shape Enclosure)
498	Indian Mound
499	Indian Mound
500	Indian Village Site
501	Indian Mound
502	Indian Mound
503	Indian Village Site
504	Indian Village Site
505	Burial Site
506	Burial Site
507	Indian Mound
508	Indian Mound
509	Indian Mound
510	Indian Mound

Data Source: Mills, W. C. 1914. Archeological atlas of Ohio. Ohio State Archeological and Historical Society, Columbus. 11p, 88 plates.

25. MUSEUMS

Chart No.

75  
284

Toledo Museum of Art  
Great Lakes Historical Society Museum

26. SUNKEN SHIPS

Chart No.

394	Scooner Lexington - 1846
395	Steamer Anthony Wayne - 1850
396	Scooner Sylfh - 1824
397	Steamer Clarion - 1909
399	Convict Ship Success - 1946
400	Wreck Sandusky Bay
401	Johnson Island Wreck - Name Unknown
402	Kellys Island Wreck - Name Unknown
403	Rattlesnake Island Wreck - Dredge Toledo 1924



27. LIGHTHOUSES

Chart No.

53	Turtle Island Lighthouse (Ruins)
54	Toledo Harbor Lighthouse
120	West Sister Island Lighthouse
160	South Bass Island Lighthouse
161	Green Island Lighthouse (Ruins)
220	Marblehead Lighthouse
261	Sandusky Pierh Lighthouse
271	Huron Harbor Lighthouse
289	Detroit River Lighthouse

28. FERRY DOCKS

Chart No.

- 159 Scott Point, Catawba Island  
(Scheduled service to South Bass and Middle Bass Islands  
via Miller Boat Lines)
- 160 Lime Kiln Dock, South Bass Island  
(Scheduled service to Catawba Island)
- 170 Put-in-Bay  
(Scheduled service to Middle Bass Island and Port Clinton  
via Parker Boat Lines)
- 172 Middle Bass Island  
(Scheduled service to Put-in-Bay, Catawba Island and Port  
Clinton via Miller Boat Lines and Parker Boat Lines)
- 137 Port Clinton  
(Scheduled service to Put-in-Bay and Middle Bass Island  
via Parker Boat Lines)
- 215 Marblehead  
(Scheduled service to Kelleys Island via Neuman Boat Lines)
- 182 Kelleys Island  
(Scheduled service to Marblehead and Sandusky via Neuman  
Boat Lines)
- 249 Sandusky  
(Scheduled service to Kelleys Island via Neuman Boat Lines)
- 249 Sandusky  
(Scheduled service to Cedar Point via Cedar Point Amusement Co.)
- 249 Sandusky  
(Scheduled service to Pelee Island and Ontario mainland via  
Pelee Island, Leaminton and Kingsville Boat Line)
- 258 Cedar Point  
(Scheduled service to Sandusky via Cedar Point Amusement Co.)

## 29. AIRPORTS

### Chart No.

351	Metcalf Airport, Toledo
295	Custer Airport, Monroe, Mi
150	Keller Airport, Port Clinton (Scheduled air service to South Bass, Middle Bass and Rattlesnake Islands, via Island Airlines)
162	Put-in-Bay Airport (Scheduled air service to Port Clinton via Island Airlines)
263	Griffing-Sandusky Airport (Scheduled air service to Kelleys Island and Pelee Island, Canada via Griffing Flying Service)
186	Kelleys Island Airport (Scheduled air service to Sandusky via Griffing Flying Service)
268	Huron Airport
442	Warner Airport, Vickery
175	Middle Bass Island Airport
178	North Bass Island Airport (Private)
166	Rattlesnake Island Airport (Private)

30. MILITARY TEST FIRING IMPACT AREAS

Chart No.

352  
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Small Arms Impact Area  
Large Calibre Artillery and Anti-Aircraft Weapons Impact Area

31. US COAST GUARD STATIONS

Chart No.

57	Toledo
217	Marblehead
268	Sandusky

US CUSTOMS AND IMMIGRATION FACILITIES

78	Toledo
249	Sandusky

### 32. MUNICIPAL AND INDUSTRIAL WASTE DISCHARGE RATES

Chart No.

	<u>Municipal</u>	<u>Discharge Rate</u>
348	Rockwood	1 mgd*
17	Monroe	3
61	Toledo	69
94	Oregon	3
512	Oak Harbor	1
513	Fremont	3
270	Huron	1
288	Vermilion	1
134	Port Clinton	2
248	Sandusky	5
	 <u>Industrial</u>	
15	Ford Motor Company (Monroe)	130
19	Union Bag & Camp Paper (Monroe)	5
18	Consolidated Packaging (Monroe)	15
69	Interlake Steel (Toledo)	44
83	Libby-Owens-Ford (Rossford)	1
68	Gulf Oil (Toledo)	69
69	Sun Oil (Toledo)	2

\*millions of gallons per day

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A GUIDE TO THE NATURAL AND  
CULTURAL FEATURES OF THE OHIO  
SHORELINE OF CENTRAL LAKE ERIE

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Compiled by

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Center for Lake Erie Area Research  
The Ohio State University

Published by

U. S. Environmental Protection Agency  
Office of Public and Intergovernmental Affairs  
Region V, Chicago, Illinois

in cooperation with  
Ohio Sea Grant Program

July 1979

## 1. POWER PLANTS

### Chart No.

65	Cleveland Electric Illuminating Co., Avon Lake
73	Ohio Edison Co. (Edgewater Plant, Lorain)
23	Cleveland Electric Illuminating Co., Cuyahoga River
116	Municipal Light Plant, Cleveland
120	Cleveland Electric Illuminating Co., Cleveland
206	Cleveland Electric Illuminating Co., Eastlake
248	Cleveland Electric Illuminating Co., Ashtabula
313	Perry Nuclear Power Station (under construction)



## 2. MARINAS, BOATING CLUBS AND LAUNCHING FACILITIES

### Chart No.

47	Vermilion Yacht Club
48	Vermilion Boat Club
48	Moes Marine Service (H)
48	Ryser's Boat Livery (H)
48	Parsons Marine and Indust. Service (H)
49	Vermilion Power Boats (H)
49	Romp's Water Port (H,R)
51	Valley Harbor Marina (H,R)
52	Geavons Boat Yard (H,R)
52	West Shore Boat Club
57	Beaver Park Yacht Club
57	Beaver Park Co. (H)
57	Beaver Park Marina (H,R)
58	Beaver Creek Boat Club
58	Riverview Marina (H,R)
60	Cleveland Yachting Club (H)
61	West Lake Yachting Club (H)
63	Capt. Krumreig and Son (H)
63	Eddys Boat Harbor (H,R)
64	Sea Shell Marina (H)
69	Lee Marine Sales (R)
73	Lorain Yacht Basin
75	Lorain Yacht Club
75	Reagan's Marine Supplies
75	Gene's Marine Sales and Service (H)
77	Kromer Seaway Marine (H)
73	Seaway Marina
89	Edgewater Yacht Club (H)
90	Edgewater Park Marina (H,R)
91	Cuyahoga Boat and Engine Co. (H)
114	Lakeside Yacht Club (H)
117	Forest City Yacht Club (H,R)
117	Anchor Point Boat Sales
117	Gordon Shore Boat Club (H)
119	East 55th Street Marina (R)
123	Inter City Yacht Club
123	Gordon Park Boat House (R)
166	Northeast Yacht Club
167	Wildwood Yacht Club
182	Conneaut Municipal Pier (R)
182	Lake Erie Boating Club (H,R)
186	Conneaut Boat Club (R)
203	Mentor Harbor Yachting Club (H)
204	Mentor Lagoons Marina (H,P,R)
208	Chagrin Lagoons Yacht Club
209	Chagrin Harbor Beach Yacht Club (H,R)
210	Lake County Yacht Club
210	Bolton's Marine Incorp. (H)

Chart No.

211	Chagrin Boating Club
211	Chagrin Marine Boat Harbor (H)
211	Hi-Skipper Marina (H)
211	Lakeshore Marina (R)
235	Grand River Marina
235	Aero Marina (R)
242,236	Garrett's Landing (H,R)
237	Grand River Yacht Club
238	Fairport Harbor Yacht Club
239	Diamond Shamrock Employees Recreation Assn. Boat Club
246	Diamond Shamrock Employees Recreation Marina (H,R)
201	Fairport Harbor Public Launching Ramp (R)
251	Outboard Boating Club of Ashtabula (R)
256	Sutherland Marine Co. (R)
257	Jack's Automarine (R)
257	Ashtabula Yacht Club
258	Riverside Yacht Club
259	Ashtabula Public Launching Ramp (R)
264	Redbrook Boat Club
268	Geneva State Park (R)
287	Perry Township Park (R)
63	Public Launching Ramp (Rocky River)
117	Sailing, Incorp. (Cleveland)
210	Chagrin River Yacht Club
211	West Channel Yacht Club
235	Encounter Yachts
236	Winfield's Marina
236	Rutherfords Landing (R)
242	Grand Harbor Yacht Sales and Service
242	Western Reserve Yacht Club
298	Brockway Marine
220	Arcola Creek Public Access Area

H - hoist

P - pump-out facility

R - ramp

### 3. INDUSTRIAL AND COMMERCIAL INSTALLATIONS

#### Chart No.

48	Kishman Fish Co. (commercial fishing)
56	Ford Motor Co. (auto assembly)
59	WMI Lorain (marine radio-telephone service)
75	Bennett Fish Co. (commercial fishing)
76	American Ship Building Co. (shipbuilding, dry docks)
91, 77	Erie Sand and Gravel Co. (construction materials, lake sand)
78	U. S. Steel Corp. (steel mfg, pipe)
79	Ashland Oil Co. (petroleum products)
80	Lorain, Elyria Sand Co. (construction materials, lake sand)
81	National Gypsum Co. (construction materials)
94	International Salt Co. (salt mine)
111, 22	Sherman-Williams Co. (paint mfg.)
107	Republic Steel Corp. (steel mfg.)
108	State Fish, Inc. (commercial fishing)
110	Westinghouse Electric Corp. (electrical equip. mfg.)
108	Huron Cement Co. (construction materials)
24	Ford Motor Co. (Cleveland Foundry Dock)
112	Texaco Incorp. (petroleum storage)
112	Shell Oil Co. (petroleum storage)
112	Mobil Oil Co. (petroleum storage)
25	Gulf Oil Co. (petroleum storage)
112	National Sugar Refining Co. (food processing)
26	U. S. Steel Corp. (steel mfg.)
113	H. Leff Electric Co. (electrical equip. mfg.)
135	B. F. Goodrich (rubber and synthetic products)
94	Allied Oil Co. (petroleum storage)
163	General Electric Co. (Nela Park Research Center) East Cleveland
182	U. S. Steel Corp. (Eastern Limestone Operations)
185	U. S. Steel Corp (proposed steel mill)
182	Conneaut Fisheries Incorp. (commercial fishing)
230	I. R. C. Fibers Co. Subsidiary Cyanamide (chemical mfg.)
239	Diamond Shamrock Chemical Co. (docks)
244	Diamond Shamrock Chemical Co. (chemical mfg.)
245	Diamond Shamrock Chemical Co. (waste beds)
247	Polymer Dispersions, Inc. (chemical mfg.)
249	Union Carbide Metals Co. (chemical mfg.)
257	Lake Shore Steel Co. (metal fabrication)
236	Douglass and McLeod (sailboat mfg.)

#### 4. WETLANDS AND OTHER NATURAL AREAS

Chart No.

58	Beaver Creek Wetlands
140	Scenic Overlook of Vermilion River Valley (Ohio Rt. 2, I-90)
141	Mill Hollow Bacon Woods Park, Vermilion River
147	Shale Bedrock Lake Bluffs (50' high)
184	Conneaut Harbor Wetlands
202	Mentor Marsh
240	Shipman's Pond (Headlands Beach State Park)
241	Grand River Wetlands
267	Cowles Creek Wetlands
311	Armstrong Hemlock Grove and Bog, Conneaut
312	Ashtabula Harbor Wetlands
238	Grand River Wetlands
79	Black River Wetlands
322	Indian Creek Wetlands
323	Arcola Creek Wetlands

## 5. WATER AND SEWAGE TREATMENT PLANTS

### Chart No.

50	Vermilion Sewage Disposal Plant
53	Vermilion Waterworks
54	Vermilion PWI*
66	Elyria PWI
67	Elyria Waterworks
68	Lorain PWI
69	Lorain Waterworks
70	Avon Lake PWI
71	Avon Lake Waterworks
73	Lorain Water Pollution Control Plant
85 - 87	Cleveland PWI
88	Crom Water Filtration Plant, Westlake
91	Westerly Wastewater Treatment Plant, Cleveland
92	Westerly Wastewater Treatment Plant (sewer discharge)
93	Cleveland PWI
115, 109	Cleveland City Waterworks
130	Avon Lake STP**
131	Avon Lake STP (sewer discharge)
136	Vermilion-on-the-Lake STP and sewer discharge
148	Rocky River STP
151	Lakewood STP
166	White City STP, Cleveland
169	Euclid PWI
170	Euclid Waterworks
174	Euclid STP
175	Euclid STP (sewer discharge)
182	Conneaut STP
187	Conneaut PWI
190	Conneaut Waterworks
207	Eastlake STP
212	Eastlake STP (sewer discharge)
205	Willoughby - Mentor Water Pollution Control Center
213	STP Discharge
214	Mentor PWI
215	Painesville PWI
216	Fairport Harbor PWI
217	IRC Fibers Co. PWI
218	Lake County PWI, Redbird
219	Union Carbide PWI
220	Madison-on-the-Lake sewer discharge
221	Ashtabula STP (sewer discharge)
227	IRC Fibers Co. STP (sewer discharge)
231	Painesville Waterworks
234	Headlands Beach State Park PWI
243	Painesville STP
201	Fairport Harbor Waterworks
260	Ashtabula Waterworks
261	Ashtabula PWI

Chart No.

262	Ashtabula STP
268	Geneva-on-the-Lake STP
282	Mentor Headlands STP
293	Willoughby Waterworks

\*Potable Water Intake

\*\*Sewage Treatment Plant

## 6. PARKS AND CAMPS

### Chart No.

55	Linwood Park (private beach, fee charged)
48	Vermilion City Park
57	Beaver Park (private beach, fee charged)
72	Lakeview Park (public beach, rose gardens)
82	Washington Park, Lorain
83	Century Park (public beach)
121	Gordon State Park, Cleveland
122	Edgewater Park and Perkins Beach, Cleveland
126	Huntington Park (public beach) Bay Village
127	Cahoon Park, Bay Village (Dover Shooting Club)
128	Columbia Park, Bay Village
129	Avon Lake Municipal Park
132	Shellcove Park, Sheffield Lake
133	Sheffield Lake Community Park (public beach)
134	West Shore Park, Sheffield Lake
137	Showse Park (Sunnyside Beach) Vermilion
138	Longfellow Park, Lorain
141	Mill Hollow Bacon Woods Park, Vermilion River
144	Bartish Park, Lorain
145	Oakwood Park, Lorain
146	Cromwell Park, Lorain
149	Lake Edge Park, Rocky River
152	Lakewood Park
154	Gunning Playground, Cleveland
155	Brookside Park, Cleveland
155	Cleveland Zoological Park
115	Kirtland Park, Cleveland
158	Rockefeller Park (cultural gardens)
162	Forest Hill Park, Cleveland Heights
165	White City Park, Bratenahl
167	Wildwood Park, Euclid
168	Beachwood Park, Euclid
171	Euclid Creek Reservation
172	Graphite-Bronze Park, East Cleveland
173	Euclid Park
176	Euclid Memorial Park
179	Lake View Park, Conneaut
180	Conneaut Township Park
192	Conneaut Creek Park
193	Camp Calvary
194	Camp Luther
232	Headlands Beach State Park, Grand River (public beach)
201	Fairport Harbor Village Park
250	Lake Shore Park, Ashtabula
260	Walnut Beach Park, Ashtabula (public beach)
263	Cederquist Park, Ashtabula
266	Gulf Park, Ashtabula
268	Geneva State Park
271	Geneva-on-the-Lake Amusement Area

Chart No.

273	Tuttle Park, Redbird
274	Camp Wingfoot, Redbird
280	Painesville Recreation Park
283	Mentor City Park
230	Camp Wise (Painesville-on-the-Lake)
286	Painesville Township Park
287	Perry Township Park
288	Camp Roosevelt
289	North Perry Park
140	Vermilion River Reservation
73	Lakefront Park, Lorain
130	Miller Road Park, Avon Lake
148	Rocky River Park
324	Rocky River Reservation
122, 121,	
167, 119	Cleveland Lakefront State Park
297	Settler's Landing
22	Heritage Park
325	Sims Park
326	Willowick Park
327	Timberlake Park, Timberlake
328	Osborne Park, Willoughby
329	Mentor-on-the-Lake Park
330	Fairport Harbor Beach Park (public beach)
331	Parmly Park, North Perry
332	Lake Shore Reservation
333	Madison Township Park
323	Arcola Creek Park (under development)
334	Geneva Township Park
335	Saybrook Township Park



## 7. BEDROCK EXPOSURES

### Chart No.

55 - 137	Black Shale Lake Bluffs, Vermilion (Ohio Formation, Devonian)
132 - 314	Black Shale Lake Bluffs, Sheffield Lake to Lakewood (Ohio Formation, Devonian)
173	Black Shale Lake Bluffs - Moss Point, Euclid (Ohio Formation, Devonian)

## 8. AREAS OF EXCESSIVE SHORELINE EROSION

### Chart No.

315	Lorain, East of Black River
316	Eastlake
317	Mentor-on-the-Lake
318	Mentor Headlands
287	Perry
273	Redbird
319	Geneva-on-the-Lake
320	Kingsville-on-the-Lake
194	West of Conneaut

194

9. FEDERALLY MAINTAINED HARBORS, CHANNELS AND DREDGING DISPOSAL AREAS

Chart No.

188	Conneaut Harbor (26' deep)
189	Conneaut Harbor Dredge Dumping Ground
195	Fairport Harbor
196	Fairport Harbor Dredge Dumping Ground
197	Ashtabula Harbor
198	Ashtabula Harbor Dredge Dumping Ground
299	Vermilion Harbor
300	Vermilion Harbor Dredge Dumping Ground
301	Lorain Harbor
302	Lorain Harbor Dredge Dumping Ground
303	Rocky River Harbor
304	Rocky River Harbor Dredge Dumping Ground
305	Rocky River Harbor Dredge Dumping Ground
306	Cleveland Harbor
307	Cleveland Harbor Dredge Dumping Ground
308	Cleveland Harbor Dredge Dumping Ground (experimental)

## 10. SCENIC BRIDGES

### Chart No.

75	Lorain Harbor Bridge, Bascule
79	Henderson High-Level Bridge
269	Conneaut Creek Covered Bridge
297	Detroit-Superior High-Level Bridge
24	Lorain-Carnegie Bridge
158	Rockefeller Park Bridge
61	Rocky River Bridge

## 11. RAILWAY FACILITIES

### Chart No.

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22

Rocky River Railroad Depot  
Union Station, Cleveland  
B & O RR Freight Office

## 12. QUARRIES AND MINES

### Chart No.

- |          |  |
|----------|--|
| 94       | International Salt Co. (salt mine)   |
| 142      | Cleveland Quarries Co. (largest sandstone quarries in the world,<br>South Amherst)     |
| 143      | Sandstone Quarry, Amherst (abandoned, wave-cut shoreline features<br>of glacial lakes) |
| 228      | Morton Salt Co. (Fairport Salt Mine)   |
| 243, 245 | Diamond Shamrock Salt Wells  |

### 13. HISTORIC AND NOTEWORTHY BUILDINGS

Chart No.

84	William H. Root Homestead (National Historic Landmark)
103	Erievew Plaza Tower
104	Terminal Tower and Union Station
105	Cuyahoga County Courthouse
105	Cleveland City Hall
127	Bay Village City Hall
74	Lorain City Hall
201	Fairport Harbor Village Hall
336	103rd Ohio Volunteer Infantry Barracks, Sheffield Lake
105	Cleveland Arcade
337	Lake Shore and Michigan Southern Passenger Depot, Conneaut
164	Gwinn Estate (William G. Mather House)
312	Col. William Hubbard House, Ashtabula
338	Bay View Hospital, Bay Village
60	Westlake Hotel, Rocky River

## 14. MUSEUMS

### Chart No.

53	Great Lakes Historical Society Museum
101	U. S. Navy Submarine "Gar" (open to public)
121	Cleveland Aquarium
159	Cleveland Museum of Art
160	Cleveland Museum of Natural History
201	Fairport Marine Museum (abandoned lighthouse)



## 15. ARCHAEOLOGICAL AND HISTORICAL SITES

### Chart No.

- 1 - 4 Indian Mounds (Vermilion River)
- 5 Earthwork Enclosure (Vermilion River)
- 6 Petroglyphs (Amherst)
- 7 Indian Mound (Black River)
- 8 Earthwork Enclosure (French Creek)
- 9 Indian Village Site (Sheffield)
- 10 Indian Mound (Sheffield)
- 11 Earthwork Enclosure and Indian Mound (Black River)
- 12 Earthwork Enclosure (Black River)
- 13 Rock Shelter (Black River)
- 14 Rock Shelter (Cascade Park, Elyria)
- 15 Earthwork Enclosure (Sheffield)
- 16 - 19 Indian Mounds (Dover)
- 20 Earthwork Enclosure (Cleveland)
- 21 - 26 Indian Mounds (Cleveland)
- 27 Earthwork Enclosure (Chagrin River)
- 28 Indian Mound (Willoughby)
- 29 - 30 Indian Mound (Mentor)
- 31 Indian Mound (Painesville)
- 32 - 33 Indian Mounds (Grand River)
- 34 Earthwork Enclosure (Lane)
- 35 Indian Village Site (Grand River)
- 36 Earthwork Enclosure (Grand River)
- 37 Indian Village Site (Ashtabula River)
- 38 Indian Mound (Ashtabula)
- 39 Indian Mound (Hubbard Run)
- 40 Indian Mound (Gageville)
- 41 Earthwork Enclosure (Conneaut Creek)
- 42 Indian Mound (Conneaut Creek)
- 43 Indian Cemetery (Conneaut)
- 44 - 45 Indian Mounds (Conneaut)
- 46 Indian Mound and Earthwork Enclosure (Conneaut)

1.3

## 16. LIGHTHOUSES

### Chart No.

124	Cleveland Lighthouse
125	Lorain Lighthouse
126	Bay Village Lighthouse (historic)
178	Conneaut Lighthouse
199	Ashtabula Lighthouse
200	Fairport Harbor Lighthouse
201	Fairport Harbor Lighthouse (historic)

## 17. SHIPWRECKS

### Chart No.

222	Sunken Ship (NE of Ashtabula)
223	Sunken Ship (N of North Perry)
224	Tug "North Carolina" (N of Mentor-on-the-Lake, 1968)
225	Sunken Ship (N of Eastlake)
226	Barge "L.L. LAMB" (N of Fairport Harbor, 1902)
228	Barge "Clevecos" (N of Cleveland, 1942)
229	Sunken Ship (NW of Madison-on-the-Lake)
309	Sunken Ship (N of Avon Point)
310	Sunken Ship (NE of Avon Point)
321	Stone Barge (N of Avon Lake)

## 18. AIRPORTS

### Chart No.

102	Burke Lake Front Airport
153	Cleveland Hopkins Airport
276	Ashtabula-Conneaut Airport
277	Ashtabula-Jefferson Airport, Ashtabula County
279	Casement Airport, Painesville
290	Lost Nation Airport, Mentor

## 19. COMMERCIAL SHIPPING FACILITIES AND SERVICES

### Chart No.

59	WMI Lorain (marine radio-telephone service)
63	Port of Lakewood Dock
69	Lorain Municipal Pier
69	Toledo, Lorain and Fairport Co. (iron ore and coal docks, railroad car dumper)
74	Great Lakes Towing Co.
76	American Ship Building Co. (shipbuilding, dry docks)
80	Terminal Import-Export Co.
94	Dunbar and Sullivan Dredging Co.
95	Great Lakes Dredge and Dock Co.
97	Cleveland Stevedore Co. (Dock No. 20)
98	Cleveland Stevedore Co. (Dock No. 26)
99	Port of Cleveland Dock
106	Cleveland Fire Department - fire tug slip
118, 108	Nicholson Cleveland Terminal Co.
108	Beacon Hausheer Marine Co.
108, 109	Great Lakes Towing Co.
108	Samsel Rope and Marine Supply Co.
107	Cleveland Cliffs Iron Co. (Marine Repair Shop)
91	Cuyahoga Boat and Engine Co.
99	Great Lakes International (Dock No. 32)
89	Ohio and Western Pennsylvania Dock Co. (iron ore docks)
181	Pittsburg and Conneaut Dock (No. 2)
182	Pittsburg and Conneaut Dock (No. 1)
183	Pittsburg and Conneaut Dock (No. 4)
184	Pittsburg and Conneaut Dock (No. 3)
182	Conneaut Municipal Pier
228	Morton Salt Co. Boat Loader Wharf
239	Oglebay Norton Co. (docks)
252	Pinney Dock and Transport Co.
253	Union Dock Co.
253	Ashtabula and Buffalo Dock Co.
254	ConRail - Minnesota Slip
255	Lower Lake Dock Co.
255	ConRail (ship loader and silos)
256	Great Lakes Towing Co.
256	Cooks Marine Hardware Co.

## 20. U. S. GOVERNMENT INSTALLATIONS

### Chart No.

75	U. S. Coast Guard Station, Lorain
96	U. S. Coast Guard Station, Whiskey Island, Cleveland
100	U. S. Army Corps of Engineers (storehouse and docks)
100	U. S. Navy and Marine Corps Reserve Training Center
101	U. S. Coast Guard Station, Cleveland (fire boat dock)
103	Federal Office Building (U. S. Government Bookstore)
105	U. S. Court and Customhouse, Cleveland
138	Naval Reserve Training Center, Lorain
141	USGS Water Level Gaging Station, Vermilion River
153	NASA, Lewis Research Center
233	U. S. Coast Guard Station, Grand River
256	U. S. Coast Guard Station, Ashtabula
285	U. S. Military Reservation (radar facility)
293	USGS Water Level Gaging Station, Willoughby, Chagrin River
294	USGS Water Level Gaging Station, Ashtabula River
295	USGS Water Level Gaging Station, Conneaut Creek

## 21. EDUCATIONAL INSTITUTIONS

### Chart No.

156  
157  
161  
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Lorain County Community College  
Cleveland State University  
Case Western Reserve University, Cleveland  
Lake Erie College, Painesville

## 22. NAUTICAL RESTAURANTS

### Chart No.

49	McGarvey's Nautical Restaurant, Vermilion
53	L'Auberge du Port (French Inn), Vermilion
100	Captain Frank's Waterfront Restaurant, Cleveland
235	Beachcomber Restaurant, Grand River
297	Jim's Steak House, Cuyahoga River "Collision Bend"
235	Brennan's Old Country Tavern, Grand River
235	The Potted Lobster, Grand River
211	Quarter Deck Restaurant, Chagrin River
48	Old Prague Restaurant, Vermilion
182	Papes Restaurant, Conneaut Harbor
314	Pier W Restaurant, Lakewood



23. STADIUMS, GOLF COURSES, SPORTS FACILITIES

Chart No.

64	Cleveland Lake Front Stadium
139	Lorain Country Club (golf course)
150	Westwood Country Club (golf course)
164	Lake Shore Country Club (golf course)
177	Mayfield Country Club (golf course)
191	Conneaut Golf Course
265	Saybrook Golf Course
269	Driftwood Golf Course
270	Geneva-on-the-Lake Golf Course
272	Madison-on-the-Lake Golf Course
275	Redbird Country Club and Golf Course
278	Painesville Golf Course
284	Black Brook Golf Course
291	Lost Nation Country Club and Golf Course
292	Tam-A-Rac Country Club and Golf Course

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A GUIDE TO THE NATURAL AND  
CULTURAL FEATURES OF THE NEW YORK  
AND PENNSYLVANIA SHORELINE OF  
EASTERN LAKE ERIE

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Published by

U. S. Environmental Protection Agency  
Office of Public and Intergovernmental Affairs  
Region V, Chicago, Illinois

in cooperation with  
Ohio Sea Grant Program

July 1979

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## 1. POWER PLANTS

### Chart No.

22	Pennsylvania Electric Co.
108	Niagara Mohawk Power Corp. (Dunkirk)
198, 214	Niagara Mohawk Power Corp. (Buffalo)
221	Niagara Mohawk Power Corp. (Niagara Falls)
223	Robert Moses Niagara Power Plant
224, 225	Hydro-Electric Power Comm. of Ontario

## 2. INDUSTRIAL AND COMMERCIAL INSTALLATIONS

### Chart No.

1	Perry Bluff Ore Storage Area (U.S. Steel Corp.)
1	U.S. Steel Corp. (proposed steel mill)
28	Erie Marine Incorp. (Division of Litton Indust., shipbuilding graving dock 1250' x 140')
22	Lund Boat Works (shipbuilding)
21	Paasch Marine Service (shipbuilding)
22	R. D. McAllister and Son, Ltd. (marine services)
15	Perry Shipbuilding Corp.
15	United Oil Manufacturing Co. (petroleum storage)
15	Allied Oil Co. (petroleum storage)
16	Erie Builders Concrete (construction materials)
16	Lawrence Erie Stone Co. (construction materials)
21	Erie Sand and Gravel Co. (construction materials)
21	GAF Corp. (photographic materials)
22	Continental Grain Co. (grain shipping)
33	Hammermill Paper Co. (paper mfg.)
35	Sun Oil Co. (petroleum products)
35	Mobil Oil Co. (petroleum products)
54	Gulf Oil Corp. (petroleum storage)
31	Interlake Steel Corp. (steel mfg.)
35	Willis Dist. Co.
98	Westfield Fisheries (commercial fishing)
98	Henry C. Monroe Fisheries Inc. (commercial fishing)
117	Kraft Foods (food processing)
190	Bethlehem Steel Corp. (steel mfg.)
191	Hanna Furnace Corp. (metal fabrication)
192	Wyandotte Cement Incorp. (construction materials)
193	Cargill Incorp. (grain shipping)
194	Republic Steel Corp. (steel mfg.)
213, 195,	
196	Allied Chemical Corp. (chemical mfg.)
197	U.S. Steel Corp. (eastern limestone operations)
199	Pillsbury Co. (food processing)
199, 207	Agway Inc. (food processing)
200	General Mills (food processing)
201	International Salt (mineral products)
202	Standard Milling Co. (grain shipping)
202	Great Lakes Paper Fibers Corp. (paper mfg.)
203	Freezer Queen Foods Inc. (food processing)
204	Huron Cement (construction materials)
205	Mobil Oil Corp. (petroleum refinery)
206	Schaefer Brewing Co. (brewery)
209	Industrial Molasses Corp. (food processing)
210	General Motors Corp., Chevrolet Division (auto mfg.)
211	DuPont Corp. (chemical mfg.)
212	Dunlop Tire and Rubber Co. (rubber products)

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Chart No.

215	Exxon Co. (petroleum storage)
215	Texaco Inc. (petroleum storage)
215	Sun Oil Co. (petroleum storage)
215	Atlantic Refining Co. (petroleum storage)
216	Gulf Oil Co. (petroleum storage)
217	Ashland Oil Co. (petroleum storage)
218	American Oil Co. (petroleum storage)
219, 257	Hooker Chemical Co. (chemical mfg.)
220	DuPont Corp. (chemical mfg.)
220	Olin Mathieson Chemical Corp. (chemical mfg.)
220	Carborundum Co. (chemical mfg.)
222	International Paper Co. (paper mfg.)
220	Union Carbide Corp. (chemical mfg.)

### 3. WETLANDS, NATURAL AREAS AND WILDLIFE FACILITIES

#### Chart No.

37	Turkey Creek Natural Area
38	Racoon Creek Wetlands Area
44	Lake City Wetlands
17	Erie Fish Hatchery
75	Erie Harbor Wetlands
78	State Game Lands No. 163 (Greenfield)
13	Presque Isle Wetlands and Natural Area
2 & 43	Elk Creek Valley, Natural Area and Lake Erie Community Park
3	Walnut Creek Valley, Natural Area (Penn.)
76	Sixteenmile Creek Valley
41	Crøoked Creek Valley
90	Trout Run Valley
57	Fourmile Creek Valley
83	Sixmile Creek Valley
91	Sevenmile Creek Valley
92	Twelvemile Creek Valley
93	Sixteenmile Creek Valley
94	Twentymile Creek Valley
109	Dunkirk Harbor Wetlands
135	Chautaugua Creek Valley (Mt. Baldy, The Gulf, Ravines, Forests and Wetlands)
168	Canadaway Creek Nature Sanctuary (Arkwright Falls, Shumla Falls)
170	Walnut Creek Valley (N.Y.)
345	Buffalo Zoo
345	Buffalo Botanical Gardens
340	Tiffit Farm Nature Preserve (Buffalo)
299	Niagara Falls (American Falls)
300	Niagara Falls (Horseshoe Falls)
301	Niagara River Gorge and Whirlpool
317	Strawberry Island Wetlands
318	Motor Island Wetlands
319	Beaver Island Wetlands
321	Spicer Creek Wetlands
259	Gun Creek Wetlands
323	Buckhorn Island Wetlands
325	Cayuga Island Wetlands
340	Tiffit Wetlands
238	Two Mile Creek Wetlands
302	Grand Island Wetlands

#### 4. WATER AND SEWAGE TREATMENT PLANTS

##### Chart No.

6	Erie PWI
7	Eire PWI
8	Erie Water Filtration Plant
17	Erie Waterworks
50	Settling Basins (abandoned)
29	Erie STP
63	North East STP
32	Hammermill Paper Co. Water Intake
34	Sun Oil Co./Mobil Oil Co./Willis Dist. Co. Water Intake
53	Gulf Oil Corp. Water Intake
80	Erie STP Discharge
80	Hammermill Paper Co. Sewar Discharge
84	Public Water Intake (North Springfield)
85	Public Water Intake (Lake City)
86	Public Water Intake (Fairview)
87	Public Water Intake (North East)
88	Lake City STP
89	Girard STP
110	Dunkirk Waterworks
118	Dunkirk PWI
112	Dunkirk STP
113	Dunkirk STP Discharge
124	Angola PWI
125	Sturgeon Point PWI
128	Van Buren, Public Outfall
134	Westfield Watersorks
137	Westfield STP
155	Angola Water Filtration Plant
158	Sturgeon Point Water Filtration Plant
276	PWI (Hamburg)
277	PWI (Wanakah)
278	PWI (Lackawanna)
279	Ourfall (Bay View)
280	PWI (Buffalo)
281	Buffalo Waterworks
282	PWI (Kenmore)
283	Outfall (Tonawanda)
284	PWI (Tonawanda)
285	PWI (North Tonawanda)
286	PWI (Lockport)
287	Outfall (Niagara Falls)
289	PWI (Grand Island)
290	Outfall (Grand Island)
265	Buffalo STP
233	Buffalo Incinerating Plant
320	Grand Island STP
173	Bay View STP
179	Woodlawn STP
354	Grand Island Water Filtration Plant
356	Niagara Falls Water Filtration Plant
288	PWI (Niagara Falls)

## 5. MARINAS, BOATING CLUBS AND LAUNCHING FACILITIES

### Chart No.

2	Elk Creek Marina (R)
3	Manchester Beach Marina (R)
11	Presque Isle State Park Marina (H,R)
10	Presque Isle State Park Launching Ramp (R)
9	West Boat Livery
36	Erie Yacht Club (H)
36	Erie Marina (H)
36	Ferncliff Beach Assn. (H)
21	Presque Isle Yacht Club
21	Jims City Marina (H)
21	Paasch Marine Service (H)
22	Northwest Marina (H)
16	Launching Ramp (R)
17	Launching Ramp (R)
79	East Boat Livery (R)
31	Launching Ramp (R)
21	Sail Yard, Ltd. (H)
76	Freeport Yacht Club (R)
96	Shades Beach Marina
96	County Boat Livery (M,R)
97	Launching Ramp (R)
98	Barcelona City Dock (H,R)
98	Monroe's Marina (H,R)
109	Northern Chautauqua Conservation Club (R)
109	Bart's Cave (H,R)
110	Dunkirk Yacht Club
110	Joe's Sporting Goods (H)
111	Dunkirk Municipal Pier (R)
120	Snow Marine Basin (H)
121	Keene Marine (H,R)
122	Pinzel's Island Marine (H,R)
127	Sturgeon Point Launching Ramp (R)
192	Bouguard's Boat Livery (R)
228	Niagara Frontier Transportation Authority Small Boat Harbor (R)
201	Bison City Rod and Gun Club
231	Erie Basin Marina (R)
232	Buffalo Yacht Club (M,P)
233	Collins Marine Sales (H,R)
234	Rich Marine Sales (H,R)
208	Pier Aus-Tel Marina (H,P,R)
209	Jafco Marina (H,R)
235	Hank's Boat Livery (R)
236	Placid Harbor Marina (P)
237	Captains Yacht Harbor (H,P)
238	Two Mile Creek Marina (P,R)
239	Hi-Skipper Marina (H)
240	Wardell Boat Yark (H)
241	Harbor Lights Marina (P)



## MARINAS, BOATING CLUBS AND LAUNCHING FACILITIES

### Chart No.

242	Interharbor Yacht Club
242	Smith Boys Marine Sales and Service (H,P)
243	Niagara Park Marine Corp. (H)
244	Coast Guard Aux. (H)
245	Riverside Park Marina (P)
245	Niagara River Yacht Club
246	Wa-Ha-Kie Hotel (R)
247	Cayuga Marina (H,R)
248	LaSalle Marine (H,R)
248	Crosswind Marina
249	LaSalle Yacht Club
250	Niagara Falls Public Dock
251	Beaver Island State Park Marina (P)
252	Niagara Frontier State Park Comm. Marina (H,P,R)
253	Anchor Marine (H)
254	Buffalo Launch Club
255	Grandyle Marina (H,P)
256	Sandy Beach Yacht Club
258	Big Six Mile Boat Basin (P, R)
259	Niagara Sailing Club
260	Youngstown Boat Co. (H,M)
260	Youngstown Yacht Club
260	Pierce Marine Corp
291	Hamburg Park Marina (R)
173	Bay View Marina (R)
292	Athol Springs Marina (M)
335	Lewiston Marina (R)
252	Blue Water Marine (H,R)
260	Fort Niagara Yacht Club

H - hoist  
M - marine railway  
P - pump-out facility  
R - ramp

## 6. RECREATIONAL HARBORS

### Chart No.

2	Elk Creek
23	Erie Harbor
96	Eightmile Creek
76	Sixteenmile Creek
98	Barcelona Harbor
115	Dunkirk Harbor
121	Cataraugus Creek (Sunset Bay)
127	Sturgeon Point
175	Buffalo Harbor

## 7. PARKS, BEACHES AND CAMPS

### Chart No.

39	Camp Lambec (North Springfield)
40	Camp Judson (North Springfield)
41	Camp Fitch (North Springfield)
42	Camp Sequoyah (North Springfield)
3	Manchester Beach (public beach, Walnut Creek Access Area)
43	Lake Erie Community Park (Lake City)
45	Camp Caledon (Lake City)
46	Camp Sherwin (Fairplain)
47	Great Lakes Camp (Avonia)
5	Waldameer Park (Amusement Park)
10	Presque Isle State Park (Administration Building)
21	Niagra Park (Restoration of Perry's Flag Ship "Niagra")
70	Lakeside Park (Erie)
71	Bayview Park (Erie)
72	Wayne Park (Erie)
54	Lighthouse Park
55	Andrews Park
57	Lawrence Park
51	Frontier Park
59	Whiteford Park
76	Orchard Beach (Public Beach)
74	Gibson Park (North East)
18	Perrys Square (Erie)
26, 12,	
50, 81	Presque Isle State Park (public beach)
2	Elk Creek Public Beach
40	Crooked Creek Public Beach
82	Racoon Creek Public Beach
99	Lake Erie State Park (public beach)
105	Point Gratiot Park (public beach)
106	Cedar Beach Park (Dunkirk)
123	Evangola State Park (public beach)
112	Wright Park (public beach)
126	Wendt Beach
130	Ripley Beach
132	Forest Park (public beach)
133	Ottoway Park
136	Hawthorne Park
136	Bournes Beach
110	Bunkird Park
141	Chautauqua County Fairgrounds
143	Dunkirk Conference Brounds
146	Millers Beach
147	Wide Beach
148	Camp Forty Acres
150	Point Breeze Beach
151	Evans Beach
153	Buffalo Fresh Air Mission

Chart No.

154	St. Vincent DePaul
156	Buffalo Municipal Bathing Beach
157	Camp Lakeland
169	Cedar Creek Beach
171	State Line Beach
121	Sunset Bay Beach
172	Hanford Bay Beach
359	Frontierland Amusement Park (Grand Island)
303	Beaver Island State Park
304	Buckhorn Island State Park
305	Goat Island Park
306	Queen Victoria Park
327	Whirlpool State Park (Aerial Cable Car)
223	Moses Niagara Power Plant Visitors Center
291	Hamburg Park
239	Hake Shore Park
341	South Park
342	Cazenovia Park
343	Seneca Indian Park
348	Delaware Park
330	Niagara Square
350	LaSalle Park
311	Front Park
352	Riverside Park
353	Sheridan Park
238	Island View Park
355	Nia-Wanda Park
245	Gratwick Waterfront Park
357	Griffon Park
299	Niagara Falls Park

8. SUMMER AND WINTER STATE AND COUNTY PARK FACILITIES GUIDE

FACILITY ACTIVITY	Presque Isle State Park	Lake Erie State Park	Evangola State Park	Erie County Wendt Beach Park	Beaver Island State Park
Camping		X	X		
Tent & Trailer		X			
Cabins					X
Golf	X	X	X	X	X
Picnicking	X	X			
Hiking Trails	X	X	X	X	X
Swimming - Lake		X	X		X
Snowmobile tracks		X	X		X
Cross-Country Skiing		X	X		X
Marina Facilities	X				

9. ANGLERS, BOATERS AND DIVERS GUIDE TO FACILITIES, SERVICES AND STATE PARKS

Facility, Service	Erie Harbor	Presque Isle State Park	Barcelona Harbor	Lake Erie State Park	Dunkirk Harbor	Cattaraugus Creek	Evangola State Park	Buffalo Harbor	Beaver Island State Park
Food	X	X	X	X	X	X	X	X	X
Campground				X			X		
Public Launching Site	X	X	X		X			X	X
Marina Facilities	X	X	X		X	X		X	X
Protected Anchorage or Slips	X	X	X		X	X		X	
Yacht Club	X		X		X	X		X	
Bait and/or Tackle Shops	X	X	X		X			X	
Pier/breakwall	X	X	X	X	X			X	
Shore for Fishing	X	X	X	X	X	X		X	X
Dive Shop	X				X				

## 10. SHORELINE CLASSIFICATION BY SHORE EROSION TYPE AND BEACH MATERIAL

### Chart No.

1 to 5	Erodible High Bluff ( 30 <sup>0</sup> ), non-critical erosion area, not protected; sand and gravel beach material)
55 to 94	Erodible High Bluff ( 30 <sup>0</sup> ), non-critical erosion area, not protected; sand and gravel beach material; black shale outcrop in bluffs)
5 to 9	Erodible Low Plain (sand spit, subject to erosion, generally protected; sand and gravel beach material)
9 to 26	Erodible Low Plain (sand spit, critical erosion area, not protected; sand and gravel beach material)
132 to 133	Erodible Low Bluffs, non-critical erosion area, not protected; sand and gravel beach material
99 to 139	Erodible Low Bluffs, non-critical erosion area, not protected; sand and gravel beach material
172 to 147	Erodible Low Bluffs, subject to lake flooding; sand and gravel beach material
171 to 132	High Bluffs, non-erodible, shoreline not subject to flooding; ledge rock, sand and gravel beach material
133 to 99	High Bluffs, non-erodible, shoreline not subject to flooding; sand and gravel beach material or no beach
139 to 172	Low Bluffs, non-erodible, shoreline not subject to flooding; sand and gravel beach material, or no beach (Dunkirk Harbor protected by artificial fill)
147 to 127	Low Bluffs, non-erodible, shoreline not subject to flooding; sand and gravel beach material, or no beach
127 to 173	High Bluff, non-erodible, shoreline not subject to flooding; sand and gravel beach material or no beach
173 to 174	Artificial Fill Area, low plain, subject to erosion, generally protected by shore structures; no beaches

11. MUSEUMS

Chart No.

18	Erie Historical Museum
166	Chautauqua County Historical Center and Museum, Art Gallery
119	Dunkirk Historical Center
346	Buffalo Museum of Sciences
351	Buffalo Historical Society
351	Buffalo Art Gallery



## 12. HISTORIC AND NOTEWORTHY BUILDINGS AND MONUMENTS

### Chart No.

14	Perry Monument (Crystal Point, Misery Bay)
31	General Wayne Block House
30	Pennsylvania Soldiers and Sailors Home
18	Erie County Courthouse
95	St. Barnabas House
119	Dunkirk City Hall
165	Johnson Estate Winery
167	Merritt Estate Winery
226	Fort Erie (Ontario)
227	Fort Niagara (Youngstown, N.Y)
261	Fort Mississauga (Niagara-on-the-Lake, Ontario)
262	Fort George (Niagara-on-the-Lake, Ontario)
307	Brock Monument (Queenston, Ontario)
309	Marine Midland Center (Buffalo)
309	Buffalo Auditorium
310	Lackawanna Station (Historic Railway Station)
332	Niagara Falls Observation Towers (Oneida, Brock, Seagrams, Skylon, Heritage)
336	St. Columbans Retreat House
360	Rand Tower

### 13. LIGHTHOUSES

Chart No.

12	Presque Isle Lighthouse-1818
26	Erie Harbor Pierhead Light
98	Barcelona Lighthouse (Historic)
118	Dunkirk Lighthouse
108	Dunkirk Harbor Pierhead Light
308	Buffalo Harbor Lighthouse (Historic)

## 14. EDUCATIONAL INSTITUTIONS

### Chart No.

66	Devine Word Seminary
69	Villa Maria Academy
18	Gannon College
73	St. Benedicts Academy
74	Gannondale Academy
65	St. Marys College
140	Holy Cross Seminary
142	SUNY at Fredonia
144	St. Columbans Seminary
232	SUNY Great Lakes Laboratory
316	SUNY at Buffalo
337	Queen of Apostles Seminary
347	Canisius College
349	SUNY at Buffalo

## 15. AIRPORTS

### Chart No.

4	Erie International Airport (Erie)
62	Moorhead Airpark (North East)
131	Camp Vernon Airport (Westfield)
138	Van Buren Airport (Private; Fredonia)
114	Dunkirk Airport (Dunkirk)
149	Angola Airway (Angola)
178	Hamburg Airport (Hamburg)
229	Heussler Air Service Corp. (Heliport; Buffalo)
180	Orchard Park Airport (Buffalo)
182	Buffalo Airport (Buffalo)
181	Greater Buffalo International Airport (Buffalo)
183	Fort Erie Airport (Ontario)
185	Niagara Falls Airport (Ontario)
184	Niagara Falls International Airport (Niagara Falls)
186	St. Catharins Airport (Ontario)
187	St. Catharins Airport (Seaplane Base, Ontario)
188	Holland International (Willson, N.Y.)
189	Welland Airport (Ontario)
129	Ripley Airport

## 16. RAILWAY FACILITIES

### Chart No.

19	Union Station, ConRail (Erie)
20	Railway Depot, Norfolk and Western (Erie)
117	Dunkirk Railway Depot, ConRail (Dunkirk)

## 17. SHIPWRECKS

### Chart No.

53	Sunken Ships (3) (N.E. of Erie)
58	Sunken Ship (N.E. of Erie)
15	Sunken Steamer (Erie Harbor)
100	Sunken Ship (N.W. of Barcelona)
101	Sunken Hydraulic Dredge (W. of Angola)
102	Sunken Ship (N. of Ripley)
103	Sunken Sailing Ketch (W. of Dunkirk)
104	Sunken Tug Boiler (W. of Silver Creek)
201	Sunken Ship (Buffalo Harbor)
314	Sunken Ship (S.E. of Bird Island)
315	Sunken Ship (Middle Reef)
274	Sunken Ship (Bird Island Reef)
259	Sunken Ship (Niagara River at North Tonawanda)
322	Sunken Ship (Niagara River at Buckhorn Island)

## 18. INDIAN RESERVATIONS

### Chart No.

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Cattaraugus Indian Reservation  
Tuscarora Indian Reservation

## 19. STADIUMS, GOLF COURSES, SPORTS FACILITIES

### Chart No.

48	Golf Course (Vernondale)
67	Commodore Downs Racetrack
49	Golf Course (Vernondale)
68	Kah Kwa Country Club (golf course)
57	Lawrence Park Golf Course
60	Sevenmile Creef Golf Course
61	Golf Course (Harborcreek)
77	Lake View Country Club (golf course)
139	Shorewood Country Club (golf course)
152	Grandview Bay Golf Course
338	Wanakah Country Club (golf course)
342	Cazenovia Golf Course
353	Sheridan Park Golf Course
303	Beaver Island Golf Course
358	Grand Island Golf Course



20. NAUTICAL RESTAURANTS

Chart No.

22	Nautical Restaurant (Public Dock, Erie)
208	Showboat (Buffalo)
249	Treadway Inn (Niagara Falls)
326	Grand Island Holiday Inn

## 21. SPORT FISHING AREAS\*

### Chart No.

111	Dunkirk Public Dock
159	VanBuren Point
160	Silver Creek
161	Hanford Bay
162	Cattaraugus Creek
103	VanBuren Bay
163	Barcelona
164	Sturgeon Point
115	Dunkirk Harbor (Ice Fishing)
228	Small Boat Basin, Buffalo (Ice Fishing)
268	Seneca Shoal
269	Buffalo Harbor Entrance
270	Waverly Shoal
271	West Breakwater
272	Horseshoe Reef
273	Middle Reef
274	Bird Island Reef
275	Bay View Reef

\*Common Fish Species: Bass, Smelt, Salmon, Whitefish, Perch, Pike, Sunfish, Bullheads, Sheepshead, Rainbow, Trout, Brown Trout

## 22. SCENIC BRIDGES

### Chart No.

174	International Peace Bridge and Buffalo Skyway
293	South Grand Island Bridge
294	North Grand Island Bridge
295	Goat Island Bridge
296	Rainbow Bridge
297	Lewiston Bridge

23. COMMERCIAL SHIPPING FACILITIES AND SERVICES

Chart No.

11	Erie Public Dock
27	Erie International Marine Terminal
75 & 29	City of Erie Port Commission
28	Errie Marine Incorp. (Division of Litton Indust.)
22	Lund Boat Works
21	Paasch Marine Service
22	R. D. McAllister and Son, Ltd.
22	Marine Sheet Metal Works
21	Erie Marine Supply Co.
21	Sail Yard, Ltd.
21	Esco Dredge and Fill Co.
15	Perry Shipbuilding Corp.
117	Market Terminal Warehouse
111	Dunkirk Municipal Pier
229	Niagara Frontier Transportation Authority Buffalo Port Terminal
230	Marine Materials Handling Co.
199	Great Lakes Towing Co.
201	Seaway Piers

## 24. U.S. GOVERNMENT INSTALLATIONS AND CANADIAN GOVERNMENT INSTALLATIONS

### Chart No.

25	U.S. Coast Guard Station (Erie Harbor, Lookout Tower)
98	National Ocean Service Lake Level Gage (Barcelona)
107	U.S. Navy Reserve Training Facility (N.Y. Naval Militia)
118	U.S. Coast Guard Reservation
25	NOAA Weather Transmitter Erie, Pa.
308	NOAA Weather Transmitter Buffalo, N.Y.
308	U.S. Coast Guard Station (Buffalo)
311	U.S. Customs (Buffalo)
312	U.S. Customs (Niagara Falls)
313	U.S. Customs (Youngstown)
232	U.S. Naval and Marine Corps Reserve Training Center
328	U.S. Customs (Lewiston)
329	U.S. Naval Reserve
330	U.S. Federal Building (Buffalo)
331	Canada Customs (Fort Erie)
332	Canada Customs (Queenston)
334	Canada Customs (Niagara-on-the-Lake)
344	Buffalo Creek Water Level Gage
308	National Ocean Service Lake Level Gage (Buffalo)

25. FEDERALLY MAINTAINED HARBORS, CHANNELS AND DREDGING DISPOSAL AREAS

Chart No.

23	Erie Harbor and Entrance Channel
24	Erie Harbor and Entrance Channel Dredge Cumping Grounds
98	Barcelona Harbor
115	Dunkirk Harbor
116	Dunkirk Harbor Dredge Dumping Grounds
175	Buffalo Harbor
176 & 177	Buffalo Harbor Dredge Dumping Grounds
263	Anchorage Area (Niagara River)
264	Erie Canal
265	Black Rock Canal
234	Black Rock Canal Locks
266	Tonawanda Channel
267	Niagara River Channel
324	Niagara River Channel Dredge Dumping Grounds

OTHER CULTURAL AND NATURAL FEATURES\*

- a. Place names of cities, streams, islands
- b. Outlines of city limits
- c. Major highways and railroads

\*These features are hi-lighted in red on the accompanying Lake Erie Chart No. 39