

MORPHOMETRIC CALCULATIONS FOR LAKE ERIE

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Introduction

A relevant inclusion to the limnological characterization of lacustrine environments is the assessment of their physical dimensions. Indeed, morphological considerations, together with climatic and edaphic influences and their interactions, are primary determinants of the nature of the lake environment (Cole, 1979). Knowledge of the physical dimensions and associated structural interactions that define inland waters is particularly useful in the study of biological productivity (Welch, 1948) and is all but essential to the realm of theoretical limnology (Cole, 1979).

Gross morphometric calculations for Lake Erie have been reported by several authors (Great Lakes Basin Commission, 1972; U.S. Department of Commerce, 1979; Schwab and Sellers, 1980) as part of broader morphometric or descriptive analyses of the Great Lakes and vicinity. However, a detailed and summary treatment relating specifically to the morphology of Lake Erie has been largely unavailable (note, however, Verber, 195). The purpose of this study is to both supplement and update the present accumulation of Lake Erie morphometric data, and through its application, contribute to a better understanding of lake processes and environment in general.

Methods

The present determination of morphometric characteristics of Lake Erie was achieved through the use of navigational charts of the National Oceanic and Atmospheric Administration and the Canadian Hydrographic Service.

In addition, one 7.5 minute series map of the U.S. Geological Survey was employed. Specific charts utilized and the agency responsible for their development include: 14820, 14823, 14824, 14830, 14833, LS 3, LS 31, LS 34, LS 35, LS 41, LS 354 (National Oceanic and Atmospheric Administration); 2101 and 2110 (Canadian Hydrographic Service); and Whitman's Grove Quadrangle (U.S. Geological Survey).

The gross boundaries of Lake Erie were defined at 42°04' latitude at the Detroit River, 83°02'30" longitude at the Sandusky Bay-Muddy Creek Bay vicinity, and 42°54'30" latitude at the Niagara River. Adjacent harbors, wetland areas and river basins readily discernible from the lake proper (i.e., Rondeau Harbor, Marblehead Peninsula harbors, and Portage River, respectively) were excluded from consideration. However, encroaching man-made harbors (i.e., Cleveland, Buffalo) were included in the present treatment.

The three basins of Lake Erie were delimited as follows: 1) Western and Central Basins by a line extending from Point Pelee to Sandusky Pier-head Light and 2) Central and Eastern Basins by an arc along the shallow water-deep water demarcation of the basins, extending from 80°20' longitude at the Canadian shoreline to the Presque Isle light.

Both county and state demarcations for Lake Erie were established by extending lakeward in the same direction the established terrestrial political boundaries. The sole exception in this regard is the Chatauqua-Erie County Line (New York), which coincides with westerly-flowing Cuttaraugus Creek. In this case, the county demarcation was extended due north at the point of confluence with Lake Erie.

Morphometric assessment of Lake Erie followed the methods of Cole (1979) and Welch (1948). The plane of reference for all measurements was Low Water Datum, 568.6 feet (173.3 meters). Dimensions determined in the present study include:

A. Surface dimensions

1. Maximum length
2. Maximum effective length
3. Maximum width
4. Mean width
5. Area, derived via utilization of a Salmoiraghi Model 236-A polar planimeter
6. Shore length (inclusive of islands), derived via utilization of a Keuffels and Esser Model 620330 cartometer
7. Shoreline development

B. Subsurface dimensions

1. Maximum depth
2. Mean depth
3. Volume, determined as the aggregate of volumes of subsurface strata. For comparative purposes, the volume of Lake Erie and its basins was also derived through utilization of hypsographic curves.
4. Volume development
5. Basin slope
6. Mean slope

Results

Morphometric calculations for Lake Erie proper are given in Table 1. A more detailed morphometric accounting, according to basin and county, is presented in Table 2 for isobath (including surface) area; Table 3 for strata volume; Table 5 for basin slope; and Table 6 for contour (including shore) length. Table 4 provides, in abridged form, the metric equivalents for basin area and volume values given in Tables 2 and 3, respectively.

Hypsographic curves for Lake Erie basins and lake proper are presented in Figures 1-4. Volume determinations attained via this graphic method closely approximate those derived through mathematical formulation (Cole, 1979) and given in Table 3.

Table 7 renders, for comparative purposes, morphometric data for Lake Erie as given in several studies, including: Verber (195); Great Lakes Basin Commission (1972); U.S. Department of Commerce (1979); Schwab and Sellers (1980); and the present morphometric calculations for Lake Erie by county remain largely unreported. However, Table 8 provides shore length and surface area determinations for State of Ohio counties as reported by Herdendorf (1966) along with those of the present study.

Table 1. Morphometric Data for Lake Erie

A) Surface Measurements

Maximum Length.....	240.75mi	386.56km
Maximum Effective Length.....	240.75mi	386.56km
Maximum Width.....	58.00mi	93.32km
Mean Width.....	40.07mi	64.46km
Area.....	9949.13mi ²	25758.30km ²
Shore Length.....	795.41mi	1279.81km
Shoreline Development.....	2.25	

B) Subsurface Measurements

Maximum Depth.....	210.00ft	64.01m
Mean Depth.....	60.24ft	18.36m
Volume.....	113.47mi ³	472.59km ³
Volume Development.....	.87	
Basin Slope.....	Table 5.	
Mean Slope.....	Western Basin	.12%
	Central Basin	.07%
	Eastern Basin	.22%
	Lake Erie	.11%

Table . Lake Erie. Isobath .areas for respective counties, in ml².

County	Depth	0'	6	12	18	24	30	36	42
Western Basin Michigan		(1262.47)	(1145.03)	(1051.12)	(911.12)	(677.18)	(365.48)	(25.91)	(1.53)
Monroe		122.61	99.82	73.75	37.76	.58			
Ohio									
Lucas		249.35	227.40	209.77	184.95	98.92	4.28		
Ottawa		306.17	272.85	242.80	194.89	145.47	62.56	1.12	
Erie		81.94	58.14	51.52	47.72	39.69	31.42	16.74	1.53
Sandusky		5.24							
Ontario									
Essex		497.16	486.82	473.28	445.80	392.52	267.22	8.05	
Central Basin		(6310.08)	(6267.81)	(6227.45)	(6172.97)	(6093.27)	(5974.15)	(5790.41)	(5307.83)
Ohio									
Ottawa		2.83	2.83	2.83	2.83	2.79	2.03	1.04	
Erie		279.78	276.69	272.81	268.04	257.86	244.13	223.86	89.96
Lorain		440.63	437.94	434.62	431.86	427.19	419.63	409.48	370.51
Cuyahoga		788.92	787.14	784.71	781.92	777.72	770.72	758.53	731.91
Lake		752.83	749.66	745.13	739.68	732.89	722.92	709.47	687.96
Ashtabula		642.23	638.78	634.56	630.80	624.66	618.93	613.14	600.41
Pennsylvania									
Erie		323.75	315.10	312.01	308.78	301.56	285.87	272.73	245.22
Ontario									
Essex		95.00	94.09	92.69	89.97	80.83	71.21	37.42	.88
Kent		1482.67	1474.86 *	1469.12 *	1459.46 *	1446.31	1420.02	1395.63	1295.91
Elgin		1195.20	1186.23 *	1177.01 *	1161.78 *	1146.60	1127.63	1086.72	1020.57
Haldimand-Norfolk		306.24	304.49 *	301.96 *	297.85 *	294.86	291.06	282.39	264.50
Eastern Basin		(2376.58)	(2300.38)	(2258.87)	(2213.12)	(2144.71)	(2058.77)	(1963.93)	(1879.94)
Pennsylvania									
Erie		428.34	424.28	422.38	419.99	415.82	409.98	399.85	379.54
New York									
Chautauqua		470.05	463.16	459.19	453.90	447.09	442.34	437.45	432.21
Erie		113.28	109.29	105.17	100.68	94.19	81.62	67.98	54.60
Ontario									
Haldimand-Norfolk		1184.42	1130.93	1105.30	1079.08	1035.29	979.90	922.49	886.60
Niagara		180.49	172.72	166.83	159.47	152.32	144.93	136.16	126.99
Total		9949.13	9713.22	9537.44	9297.21	8915.16	8398.40	7780.25	7189.30

*- denotes estimate

Table .., continued.

County	48	54	60	66	72	78	84	90
Depth								
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin								
Ohio	(4783.95)	(4338.83)	(3792.98)	(2951.34)	(1631.11)	(299.25)		
Ottawa								
Erie	.04							
Lorain	283.09	206.39	140.85	62.80	13.01			
Cuyahoga	697.98	632.71	568.61	488.27	356.30	131.71		
Lake	671.20	651.47	616.49	562.45	447.92	14.36		
Ashtabula	562.88	530.00	503.04	464.14	178.06			
Pennsylvania								
Erie	221.63	201.20	152.89	104.05	47.20	1.42		
Ontario								
Essex								
Kent	1172.87	1072.87	954.45	734.12	501.08	151.76		
Elgin	938.22	860.72	726.84	511.39	87.54			
Haldimand-Norfolk	236.04	183.47	129.81	24.12				
Eastern Basin	(1772.97)	(1576.93)	(1479.66)	(1356.68)	(1231.69)	(1091.91)	(996.10)	(894.37)
Pennsylvania								
Erie	350.17	321.65	279.71	262.01	239.06	189.58	173.36	157.94
New York								
Chautauqua	423.61	407.30	375.21	348.91	314.20	286.63	260.16	233.11
Erie	35.60	19.66	5.70					
Ontario								
Haldimand-Norfolk	852.82	729.27	748.68	697.23	661.41	611.68	562.58	503.32
Niagara	110.77	99.05	70.36	48.53	17.02	4.02		
Total	6556.92	5915.76	5272.64	4308.02	2862.80	1391.16	996.10	894.37

Table ., continued.

County	96	102	108	114	120	126	132	138
Depth								
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin								
Ohio								
Ottawa								
Erie								
Lorain								
Cuyahoga								
Lake								
Ashtabula								
Pennsylvania								
Erie								
Ontario								
Essex								
Kent								
Elgin								
Haldimand-Norfolk								
Eastern Basin	(805.37)	(735.12)	(669.28)	(606.53)	(530.55)	(457.45)	(399.53)	(341.33)
Pennsylvania								
Erie	141.39	124.56	104.41	84.69	58.71	35.02	26.68	24.67
New York								
Chautauqua	213.67	197.40	182.25	165.84	150.25	135.66	114.97	81.37
Erie								
Ontario								
Haldimand-Norfolk	450.31	413.16	382.62	356.00	321.59	286.77	257.88	235.29
Niagara								
Total	805.37	735.12	669.28	606.53	530.55	457.45	399.53	341.33

Table ., continued.

County	144	150	156	162	168	174	180	186
Depth								
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin								
Ohio								
Ottawa								
Erie								
Lorain								
Cuyahoga								
Lake								
Ashtabula								
Pennsylvania								
Erie								
Ontario								
Essex								
Kent								
Elgin								
Haldimand-Norfolk								
Eastern Basin	(281.46)	(235.83)	(199.23)	(171.79)	(142.99)	(110.12)	(78.65)	(54.49)
Pennsylvania								
Erie	23.18	18.76	10.67	5.56	1.63	.93	.31	.02
New York								
Chautauqua	52.73	32.32	22.48	16.31	12.42	9.12	4.49	.71
Erie								
Ontario								
Haldimand-Norfolk	205.55	184.75	166.08	149.92	128.94	100.07	73.85	53.76
Niagara								
Total	281.46	235.83	199.23	171.79	142.99	110.12	78.65	54.49

Table ., continued.

County	Depth	192	198	204	210	Total		
Western Basin						(5439.84)		
Michigan						334.52		
Monroe						974.67		
Ohio						1225.86		
Lucas						328.70		
Ottawa						5.24		
Erie						2570.85		
Sandusky						(65941.43)		
Ontario						17.18		
Essex						1913.17		
Central Basin						4078.00		
Ohio						9057.15		
Ottawa						8804.43		
Erie						7241.63		
Lorain						3093.41		
Cuyahoga						562.09		
Lake						16031.13		
Ashtabula						12226.45		
Pennsylvania						2916.79		
Erie						(33480.84)		
Ontario						5934.85		
Essex						7646.51		
Kent						787.77		
Elgin						17522.05		
Haldimand-Norfolk						1589.66		
Eastern Basin						1.13		
Pennsylvania						9.21		
Erie						18.49		
New York						35.68		
Chautauqua						35.68		
Erie						18.49		
Ontario						9.21		
Haldimond-Norfolk						1.13		
Niagara						104862.11		
Total		35.68	18.49	9.21	1.13	104862.11		

Table . Lake Erie. Strata volumes for respective counties, in mf².

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Western Basin	(1.37)	(1.25)	(1.11)	(.90)	(.58)	(.18)	(.01)	
Michigan								
Monroe	.13	.10	.06	.02				
Ohio								
Lucas	.27	.25	.22	.16	.05			
Ottawa	.33	.29	.25	.19	.12	.03		
Erie	.08	.06	.06	.05	.04	.03	.01	
Sandusky								
Ontario								
Essex	.56	.55	.52	.48	.37	.12		
Central Basin	(7.18)	(7.14)	(7.05)	(7.01)	(6.87)	(6.70)	(6.31)	(5.73)
Ohio								
Ottawa								
Erie	.32	.31	.31	.30	.29	.27	.17	.03
Lorain	.50	.50	.49	.49	.48	.47	.44	.37
Cuyahoga	.90	.90	.89	.89	.88	.87	.85	.81
Lake	.86	.85	.85	.84	.83	.82	.80	.77
Ashtabula	.73	.73	.72	.72	.71	.70	.69	.66
Pennsylvania								
Erie	.36	.36	.35	.35	.33	.32	.30	.27
Ontario								
Essex	.11	.11	.10	.10	.09	.06	.02	
Kent	1.69*	1.68*	1.67*	1.66*	1.63	1.60	1.53	1.41
Elgin	1.36*	1.35*	1.33*	1.32*	1.30	1.26	1.20	1.12
Haldimand-Norfolk	.35*	.35*	.34*	.34	.33	.33	.31	.29
Eastern Basin	(2.67)	(2.59)	(2.56)	(2.49)	(2.40)	(2.29)	(2.19)	(2.09)
Pennsylvania								
Erie	.49	.48	.48	.48	.47	.46	.44	.42
New York								
Chautauqua	.53	.53	.52	.51	.51	.50	.50	.49
Erie	.13	.12	.12	.11	.10	.09	.07	.05
Ontario								
Haldimond-Norfolk	1.32	1.27	1.25	1.21	1.15	1.08	1.03	.99
Niagara	.20	.19	.19	.18	.17	.16	.15	.14
Total	11.22	10.98	10.72	10.40	9.85	9.17	8.51	7.82

*- denotes estimate.

Table ., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78	78 - 84	84 - 90	90 - 96
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin	(5.20)	(4.62)	(3.82)	(2.54)	(.98)	(.12)		
Ohio								
Ottawa								
Erie								
Lorain	.28	.20	.11	.04	.01			
Cuyahoga	.76	.68	.60	.48	.27	.05		
Lake	.75	.72	.67	.57	.21	.01		
Ashtabula	.62	.59	.55	.35	.07			
Pennsylvania								
Erie	.24	.20	.15	.08	.04			
Ontario								
Essex								
Kent	1.28	1.15	.96	.70	.35	.06		
Elgin	1.03	.90	.70	.31	.03			
Haldimand-Norfolk	.24	.18	.08	.01				
Eastern Basin	(1.90)	(1.74)	(1.61)	(1.48)	(1.32)	(1.19)	(1.08)	(.96)
Pennsylvania								
Erie	.38	.34	.31	.29	.24	.21	.19	.17
New York								
Chautauqua	.47	.45	.41	.38	.34	.31	.28	.25
Erie	.03	.01						
Ontario								
Haldimond-Norfolk	.90	.84	.82	.77	.73	.67	.61	.54
Niagara	.12	.10	.07	.04	.01			
Total	7.10	6.36	5.43	4.02	2.30	1.31	1.08	.96

Table ., continued.

County	96 - 102	102 - 108	108 - 114	114 - 120	120 - 126	126 - 132	132 - 138	138 - 144
Western-Basin Michigan Monroe Ohio Lucas Ottawa Erie Sandusky Ontario Essex Central Basin Ohio Ottawa Erie Lorain Cuyahoga Lake Ashtabula Pennsylvania Erie Ontario Essex Kent Elgin Haldimand-Norfolk Eastern Basin Pennsylvania Erie New York - Chautauqua Erie Ontario Haldimond-Norfolk Niagara	(.87) .15 .23 .49	(.80) .13 .22 .45	(.73) .11 .20 .42	(.65) .08 .18 .39	(.56) .05 .16 .35	(.49) .04 .14 .31	(.42) .03 .41 .28	(.36) .03 .08 .25
Total	.87	.80	.73	.65	.56	.49	.42	.36

Table ., continued.

County	144 - 150	150 - 156	156 - 162	162 - 168	168 - 174	174 - 180	180 - 186	186 - 192
Western Basin Michigan Monroe Ohio Lucas Ottawa Erie Sandusky Ontario Essex Central Basin Ohio Ottawa Erie Lorain Cuyahoga Lake Ashtabula Pennsylvania Erie Ontario Essex Kent Elgin Haldimand-Norfolk Eastern Basin Pennsylvania Erie New York Chautauqua Erie Ontario Haldimand-Norfolk Niagara	(.29) .02 .05 .22	(.25) .02 .03 .20	(.21) .01 .02 .18	(.18) .02 .16	(.14) .01 .13	(.11) .01 .10	(.07) — .07	(.05) .05
Total	.29	.25	.21	.18	.14	.11	.07	.05

Table ., continued.

County	192 - 198	198 - 204	204 - 210	Total				
Western Basin				(5.40)				
Michigan				.31				
Monroe				.95				
Ohio				1.21				
Lucas				.33				
Ottawa								
Erie								
Sandusky								
Ontario				2.60				
Essex				(71.27)				
Central Basin								
Ohio								
Ottawa				2.00				
Erie				4.38				
Lorain				9.83				
Guyahoga				9.55				
Lake				7.84				
Ashtabula								
Pennsylvania				3.35				
Erie								
Ontario				.59				
Essex				17.37				
Kent				13.21				
Elgin				3.15				
Haldimand-Norfolk				(36.80)				
Eastern Basin								
Pennsylvania				6.52				
Erie								
New York				8.44				
Chautauqua				.83				
Erie								
Ontario				19.29				
Haldimond-Norfolk				1.72				
Niagara								
Total	.03	.02	.01	113.47				

Table . Lake Erie. Isobath surface areas and strata volumes for respective basins.

Basin	depth(for area) stratum(for volume)	0' 0 - 6'	6	12	18	24	30	36	42
			6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Western:									
area (mi ²)		1262.47	1145.03	1051.12	911.12	677.18	365.48	25.91	1.53
(km ²)		3268.53	2964.48	2721.35	2358.89	1753.22	946.23	67.08	3.96
volume(mi ³)		1.37	1.25	1.11	.90	.58	.18	.01	—
(km ³)		5.71	5.21	4.66	3.74	2.41	.74	.03	—
Central:									
area (mi ²)		6310.08	6267.81	6227.45	6172.97	6093.27	5974.15	5790.41	5307.83
(km ²)		16336.80	16227.36	16122.87	15981.82	15775.48	15467.07	14991.37	13741.97
volume(mi ³)		7.18	7.14	7.05	7.01	6.87	6.70	6.31	5.73
(km ³)		29.85	29.64	29.41	29.12	28.64	27.93	26.30	23.90
Eastern:									
area (mi ²)		2376.58	2300.38	2258.87	2213.12	2144.71	2058.77	1963.93	1879.94
(km ²)		6152.97	5955.68	5848.21	5729.77	5552.65	5330.16	5084.61	4867.16
volume(mi ³)		2.67	2.59	2.56	2.49	2.40	2.29	2.19	2.09
(km ³)		11.11	10.83	10.62	10.34	9.98	9.55	9.13	8.66
Total:									
area (mi ²)		9949.13	9713.22	9537.44	9297.21	8915.16	8398.40	7780.25	7189.30
(km ²)		25758.30	25147.53	24692.43	24070.48	23081.35	21743.46	20143.06	18613.09
volume(mi ³)		11.22	10.98	10.72	10.40	9.85	9.17	8.51	7.82
(km ³)		46.67	45.68	44.69	43.20	41.03	38.22	35.46	32.56

Table .., continued.

Basin	48	54	60	66	72	78	84	90
depth(for area)	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78	78 - 84	84 - 90	90 - 96
Stratum(for volume)								
Western:								
area (mi ²)								
(km ²)								
volume(mi ³)								
(km ³)								
Central:								
area (mi ²)	4783.95	4338.83	3792.98	2951.34	1631.11	299.25		
(km ²)	12385.65	11233.23	9820.03	7641.02	4222.94	774.76		
volume(mi ³)	5.20	4.62	3.82	2.54	.98	.12		
(km ³)	21.64	19.29	15.95	10.62	4.10	.49		
Eastern:								
area (mi ²)	1772.97	1576.93	1479.66	1356.68	1231.69	1091.91	996.10	894.37
(km ²)	4590.22	4082.67	3830.84	3512.44	3188.85	2826.95	2578.90	2315.52
volume(mi ³)	1.90	1.74	1.61	1.48	1.32	1.19	1.08	.96
(km ³)	7.94	7.26	6.72	6.14	5.52	4.95	4.49	4.03
Total:								
area (mi ²)	6556.92	5915.76	5272.64	4308.02	2862.80	1391.16	996.10	894.37
(km ²)	16975.87	15315.90	13650.87	11153.46	7411.79	3601.71	2578.90	2315.52
volume(mi ³)	7.10	6.36	5.43	4.02	2.30	1.31	1.08	.96
(km ³)	29.58	26.55	22.67	16.76	9.62	5.44	4.49	4.03

Table .. continued.

depth(for area)	96	102	108	114	120	126	132	138
Basin stratum(for volume)	96 - 102	102 - 108	108 - 114	114 - 120	120 - 126	126 - 132	132 - 138	138 - 144
Western:								
area (mi ²)								
(km ²)								
volume(mi ³)								
(km ³)								
Central:								
area (mi ²)								
(km ²)								
volume(mi ³)								
(km ³)								
Eastern:								
area (mi ²)	805.37	735.12	669.28	606.53	530.55	457.45	399.53	341.33
(km ²)	2085.10	1903.23	1732.77	1570.31	1373.59	1184.34	1034.38	883.70
volume(mi ³)	.87	.80	.73	.65	.56	.49	.42	.36
(km ³)	3.66	3.33	3.03	2.70	2.34	2.03	1.75	1.48
Total:								
area (mi ²)	805.37	735.12	669.28	606.53	530.55	457.45	399.53	341.33
(km ²)	2085.10	1903.23	1732.77	1570.31	1373.59	1184.34	1034.38	883.70
volume(mi ³)	.87	.80	.73	.65	.56	.49	.42	.36
(km ³)	3.66	3.33	3.03	2.70	2.34	2.03	1.75	1.48

Table , continued.

depth(for area)	144	150	156	162	168	174	180	186
Basin stratum(for vol.)	144 - 150	150 - 156	156 - 162	162 - 168	168 - 174	174 - 180	180 - 186	186 - 192
Western:								
area (mi ²)								
(km ²)								
volume(mi ³)								
(km ³)								
Central:								
area (mi ²)								
(km ²)								
volume(mi ³)								
(km ³)								
Eastern:								
area (mi ²)	281.46	235.83	199.23	171.79	142.99	110.12	78.65	54.49
(km ²)	728.70	610.56	515.81	444.76	370.20	285.10	203.62	141.07
volume(mi ³)	.29	.25	.21	.18	.14	.11	.07	.05
(km ³)	1.23	1.03	.88	.73	.59	.44	.30	.21
Total:								
area (mi ²)	281.46	235.83	199.23	171.79	142.99	110.12	78.65	54.49
(km ²)	728.70	610.56	515.81	444.76	370.20	285.10	203.62	141.07
volume(mi ³)	.29	.25	.21	.18	.14	.11	.07	.05
(km ³)	1.23	1.03	.88	.73	.59	.44	.30	.21

Table ., continued.

Basin	192	198	204	210	Total		
depth (for area)	192 - 198	198 - 204	204 - 210	210 - 216	Total		
stratum (for vol.)							
Western:							
area (mi ²)					5439.84		
(km ²)					14083.74		
volume (mi ³)					5.40		
(km ³)					22.50		
Central:							
area (mi ²)					65941.43		
(km ²)					170722.37		
volume (mi ³)					71.27		
(km ³)					296.88		
Eastern:							
area (mi ²)	35.68	18.49	9.21	1.13	33480.84		
(km ²)	92.38	47.87	23.84	2.93	86681.86		
volume (mi ³)	.03	.02	.01		36.80		
(km ³)	.13	.07	.02		153.21		
Total:							
area (mi ²)	35.68	18.49	9.21	1.13	104862.11		
(km ²)	92.38	47.87	23.84	2.93	271487.97		
volume (mi ³)	.03	.02	.01		113.47		
(km ³)	.13	.06	.02		472.59		

Table Lake Erie. Contour lengths for respective counties, in miles.

County	0'	6	12	18	24	30	36	42
Western Basin								
Michigan	38.12	52.05	57.06	29.49	5.30			
Monroe								
Ohio								
Lucas	28.00	27.57	17.03	17.30	44.46	5.04		
Ottawa	86.24	61.17	75.52	84.56	65.94	64.41	2.39	
Erie	34.73	20.08	15.77	23.86	22.66	25.84	21.60	6.89
Sandusky	11.65							
Ontario								
Essex	63.52	67.55	64.83	89.98	102.25	125.88	13.45	
Central Basin								
Ohio								
Ottawa								
Erie	21.06	21.60	21.95	23.74	22.52	1.33	1.99	
Lorain	21.32	21.53	21.53	21.69	22.96	19.81	18.67	39.13
Guyahoga	29.42	29.10	29.15	29.52	29.37	22.86	21.85	46.13
Lake	30.11	30.69	30.74	30.42	32.43	29.00	28.47	29.68
Ashtabula	28.78	28.36	28.41	28.47	28.63	36.13	30.79	32.17
Pennsylvania						28.47	28.36	35.67
Erie	25.50	25.50	25.08	28.94	32.01	31.06	30.42	24.34
Ontario								
Essex	9.87	10.93	11.40*	25.05*	20.34	28.89	36.84	3.18
Kent	56.00	56.00*	56.80*	57.60*	57.60	58.66	65.34	87.20
Elgin	54.14	54.40*	54.40*	54.40*	53.86	53.60	53.34	52.80
Haldimand-Norfolk	20.54	20.00*	20.00*	20.00	20.00	20.00	19.46	19.46
Eastern Basin								
Pennsylvania								
Erie	24.07	22.70	22.70	22.33	22.38	22.01	23.44	22.54
New York								
Chautauqua	41.11	41.59	40.85	42.43	42.96	42.28	43.92	42.17
Erie	32.38	23.76	29.10	32.54	30.11	38.57	28.89	23.91
Ontario								
Haldimond-Norfolk	117.19	107.54	115.61	118.70	104.83	107.56	90.46	80.48
Niagara	35.56	36.47	53.73	40.66	42.28	38.18	31.82	31.46
Total	809.31	758.59	791.66	821.68	802.89	799.58	591.50	577.21
Total Western Basin	262.26	228.42	230.21	245.19	240.61	221.17	37.44	6.89
Central Basin	296.74	298.11	299.46	319.83	319.72	329.81	335.53	269.76
Eastern Basin	250.31	232.06	261.99	256.66	242.56	248.60	216.53	200.56

Table .., continued.

County	48	54	60	66	72	78	84	90
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin								
Ohio								
Ottawa								
Erie								
Lorain	32.96	24.13	18.94	13.43	5.60			
Cuyahoga	30.42	33.44	28.57	29.68	22.42	26.40		
Lake	29.79	28.68	28.52	28.84	40.99	11.36		
Ashtabula	35.40	30.48	29.79	30.53	38.73			
Pennsylvania								
Erie	24.55	34.39	60.26	63.17	51.43	4.71		
Ontario								
Essex		1						
Kent	79.74	76.80	72.80	68.00	51.46	39.74		
Elgin	50.94	50.94	48.54	48.80	25.86			
Haldimand-Norfolk	20.80	25.06	28.26	12.54				
Eastern Basin								
Pennsylvania								
Erie	32.43	36.51	37.35	35.93	36.98	30.84	29.79	28.36
New York								
Chautauqua	41.59	53.54	54.92	55.56	49.53	44.41	26.03	24.23
Erie	18.51	14.33	6.62	.48				
Ontario								
Haldimond-Norfolk	97.15	105.57	103.28	86.26	97.84	88.36	70.39	74.06
Niagara	31.24	22.57	23.38	17.13	12.13	8.35		
Total	525.52	536.44	541.23	490.35	432.97	254.17	126.21	126.65
Western Basin								
Central Basin	304.60	303.92	315.68	294.99	236.49	82.21		
Eastern Basin	220.92	232.52	225.55	195.36	100.40			

Table .., continued.

County	96	102	108	114	120	126	132	138
Western Basin Michigan Monroe Ohio Lucas Ottawa Erie Sandusky Ontario Essex Central Basin Ohio Ottawa Erie Lorain Cuyahoga Lake Ashtabula Pennsylvania Erie Ontario Essex Kent Elgin Haldimand-Norfolk Eastern Basin Pennsylvania Erie New York Chautauqua Erie Ontario Haldimand-Norfolk Niagara	26.83 35.40 71.58	25.98 31.80 67.68	23.18 31.27 65.21	21.16 28.97 61.85	16.04 26.83 60.66	11.99 25.98 58.98	15.30 24.39 55.19	16.39 30.74 51.34
Total	133.81	125.46	119.66	111.98	103.53	96.95	94.88	98.47
Western Basin Central Basin Eastern Basin	133.81	125.46	119.66	111.98	103.53	96.95	94.88	98.47

Table ., continued.

County	144	150	156	162	168	174	180	186
Western Basin Michigan Monroe Ohio Lucas Ottawa Erie Sandusky Ontario Essex Central Basin Ohio Ottawa Erie Lorain Cuyahoga Lake Ashtabula Pennsylvania Erie Ontario Essex Kent Elgin Haldimand-Norfolk Eastern Basin Pennsylvania Erie New York Chautauqua Erie Ontario Haldimand-Norfolk Niagara	144	150	156	162	168	174	180	186
	9.62	9.21	6.06	5.45	3.97	2.43	1.96	.74
	29.37	17.46	15.03	12.70	11.90	11.57	9.73	2.80
	54.48	51.69	53.30	51.59	55.65	55.04	51.84	48.20
Total	93.47	78.36	74.39	69.74	71.52	69.04	63.53	51.74

Western Basin

Central Basin

Eastern Basin

93.47

78.36

74.39

69.74

71.52

69.04

63.53

51.74

Table ., continued.

County	192	198	204	210		
Western Basin						
Michigan						
Monroe						
Ohio						
Lucas						
Ottawa						
Erie						
Sandusky						
Ontario						
Essex						
Central Basin						
Ohio						
Ottawa						
Erie						
Lorain						
Cuyahoga						
Lake						
Ashtabula						
Pennsylvania						
Erie						
Ontario						
Essex						
Kent						
Elgin						
Haldimand-Norfolk						
Eastern Basin						
Pennsylvania						
Erie						
New York						
Chautauqua						
Erie						
Ontario						
Haldimond-Norfolk						
Niagara						
Total	31.45	22.58	15.67	5.00		
Western Basin						
Central Basin						
Eastern Basin						
	31.45	22.58	15.67	5.00		

Table . Lake Erie. Basin slope for respective counties, as %

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Western Basin								
Michigan								
Monroe	.23	.24	.14	.05				
Ohio								
Lucas	.14	.14	.08	.04				
Ottawa	.25	.26	.19	.17				
Erie	.13	.31	.59	.33	.09	.06		
Sandusky					.33	.18	.11	
Ontario								
Essex	.71	.56	.32	.20	.10	.03		
Central Basin								
Ohio								
Ottawa								
Erie	.78	.64	.54	.26	.17	.19	.02	
Lorain	.91	.74	.89	.25	.19	.13	.03	.05
Cuyahoga	1.87	1.36	1.19	.80	.47	.27	.12	.10
Lake	1.09	.77	.64	.53	.39	.28	.17	.21
Ashtabula	.94	.76	.86	.53	.56	.56	.29	.11
Pennsylvania								
Erie	.33	.93	.95	.48	.23	.27	.11	.12
Ontario								
Essex	1.30	.84	.76	.28	.29	.11	.06	
Kent	.81*	1.12*	.67*	.50*	.25	.29	.09	.08
Elgin	.69*	.67*	.40*	.40*	.32	.15	.09	.07
Haldimand-Norfolk	1.32*	.90*	.55*	.76*	.60	.26	.12	.08
Eastern Basin								
Pennsylvania								
Erie	.65	1.36	1.07	.61	.43	.25	.13	.11
New York								
Chautauqua	.68	1.18	.89	.71	1.02	1.00	.93	.55
Erie	.80	.73	.78	.55	.31	.28	.22	.13
Ontario								
Haldimond-Norfolk	.24	.49	.51	.29	.22	.20	.27	.31
Niagara	.53	.87	.73	.66	.62	.45	.39	.22

* = denotes estimate

Table ., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78	78 - 84	84 - 90	90 - 96
Western Basin								
Michigan								
Monroe								
Ohio								
Lucas								
Ottawa								
Erie								
Sandusky								
Ontario								
Essex								
Central Basin								
Ohio								
Ottawa								
Erie								
Lorain	.04	.04	.02	.02				
Cuyahoga	.06	.05	.04	.02	.01			
Lake	.17	.09	.06	.03	.01			
Ashtabula	.11	.13	.09	.01				
Pennsylvania								
Erie	.16	.11	.14	.11	.07			
Ontario								
Essex								
Kent								
Elgin	.09	.07	.04	.03	.01			
Haldimand-Norfolk	.07	.04	.03	.01				
Eastern Basin	.05	.06	.02					
Pennsylvania								
Erie	.14	.10	.24	.18	.08	.21	.21	.19
New York								
Chautauqua	.33	.19	.24	.17	.19	.15	.11	.17
Erie	.12	.09	.07					
Ontario								
Haldimand-Norfolk	.19	.27	.21	.29	.21	.18	.14	.16
Niagara	.19	.11	.11	.05	.09			

Table , continued.

County	96 - 102	102 - 108	108 - 114	114 - 120	120 - 126	126 - 132	132 - 138	138 - 144
Western Basin Michigan Monroe Ohio Lucas Ottawa Erie Sandusky Ontario Essex Central Basin Ohio Ottawa Erie Lorain Cuyahoga Lake Ashtabula Pennsylvania Erie Ontario Essex Kent Elgin Haldimand-Norfolk Eastern Basin Pennsylvania Erie New York Chautauqua Erie Ontario Haldimand-Norfolk Niagara	Interv .18 .23 .21	.14 .24 .25	.13 .21 .27	.08 .20 .20	.07 .21 .20	.19 .14 .22	.90 .09 .27	.99 .12 .20

Table ., continued.

County	192 - 198	198 - 204	204 - 210				
Western Basin							
Michigan							
Monroe							
Ohio							
Lucas							
Ottawa							
Erie							
Sandusky							
Ontario							
Essex							
Central Basin							
Ohio							
Ottawa							
Erie							
Lorain							
Cuyahoga							
Lake							
Ashtabula							
Pennsylvania							
Erie							
Ontario							
Essex							
Kent							
Elgin							
Haldimand-Norfolk							
Eastern Basin							
Pennsylvania							
Erie							
New York							
Chautauqua							
Erie							
Ontario							
Haldimand-Norfolk							
Niagara							
	.18	.23	.15				

Table . Lake Erie morphometric calculations from various sources.

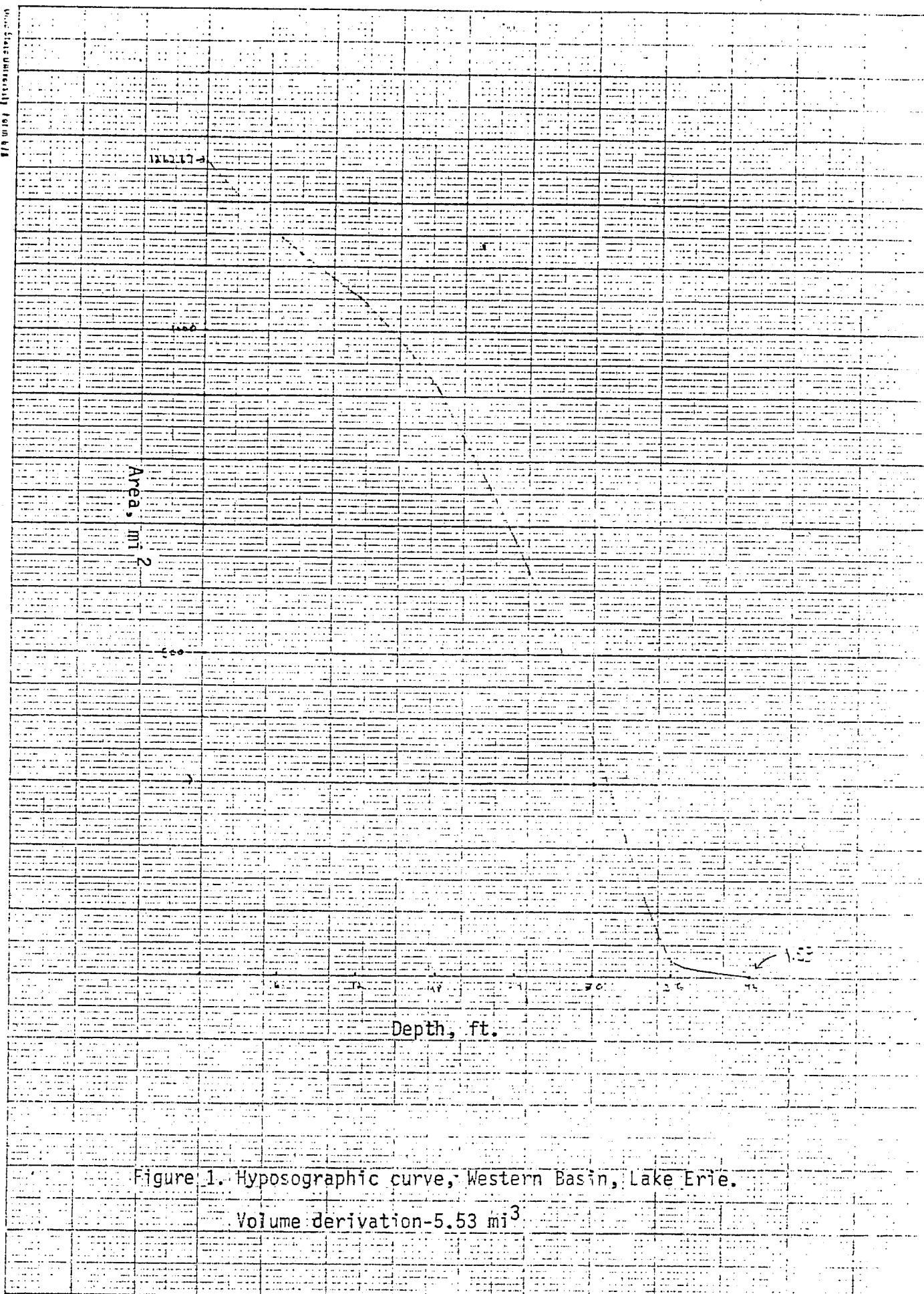
Measurement	source	Verber (1953)	Great Lakes Basin Comm.	Schwab & Sellers (1925)	U. S. Dept. Commerce (1970)	Present
Maximum length	mi km	241. 387.8	241. 388.		241. 388.	240.75 386.56
Max. effect. length	mi km	217.5 350.				240.75 386.56
Maximum width	mi km	57.5 92.5	57. 92.		57. 92.	58. 93.32
Average width	mi km	41.2 66.3				40.07 64.46
Surface area	mi ² km ²	9919. 25691.	9910. 25657.	9772 25300.	9910. 25657.	9949.13 25758.36
Western Basin		1265. 3276.				1262.47 3268.53
Central Basin		6246. 16177.				6310.08 16336.80
Eastern Basin		2408. 6238.				2376.58 6152.97
Shore length	mi km	845. 1359.4	856. 1377.	901. 1450.		809.37 1302.18
Western Basin		268.3 431.7				262.26 421.97
Central Basin		313.3 504.1				296.74 477.45
Eastern Basin		263.3 423.6				250.31 402.75
Shoreline development		2.3				2.25
Maximum depth	ft m	210. 64.			210. 64.	210. 64.01
Average depth	ft m	60.7 18.5				60.24 18.36
Volume	mi ³ km ³	114. 475.1	116. 483.	113. 470.		113.47 472.59
Western Basin		5.79 24.24				5.40 22.50
Central Basin		71.8 299.28				71.27 296.88
Eastern Basin		36.44 151.58				36.80 153.21
Volume development		.87				.87

Table 1. Shore length and surface area determinations for Ohio counties;

H=values from Herdendorf(1966), P=present values.

	Shore Length		Surface Area	
	H	P	H	P
Lucas	31.1	28.	257.21	249.35
Ottawa	92.9	86.24	315.46	309.
Sandusky	13.2	11.65	5.64	5.24
Erie	57.7	55.79	369.23	361.72
Lorain	22.	21.32	426.54	440.63
Cuyahoga	32.2	29.42	783.18	788.92
Lake	30.5	30.11	730.25	752.83
Ashtabula	30.8	28.78	637.44	642.23
Total*	310.4	291.31	3524.95	3549.92

*- Exclusive of Marblehead Peninsula harbors



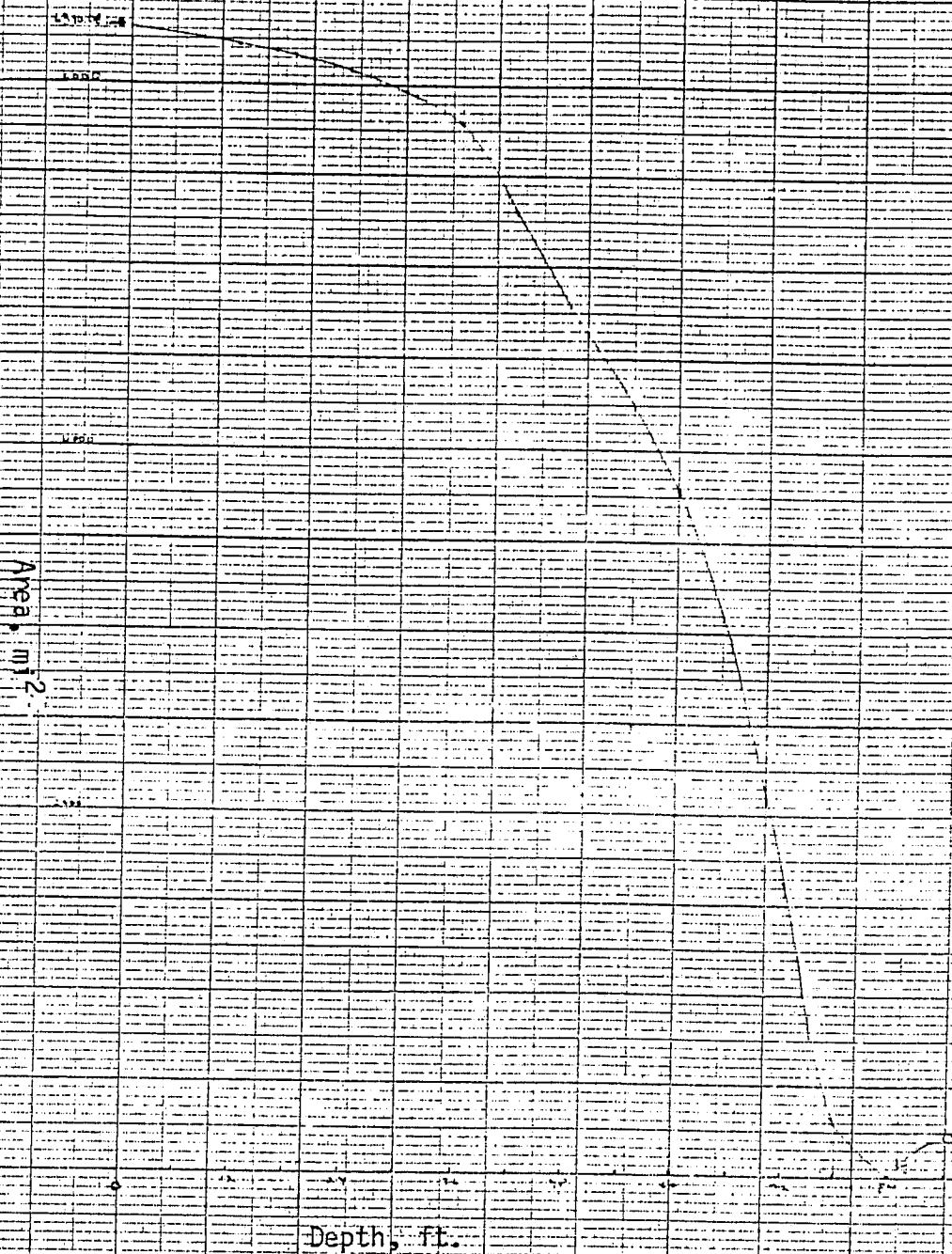
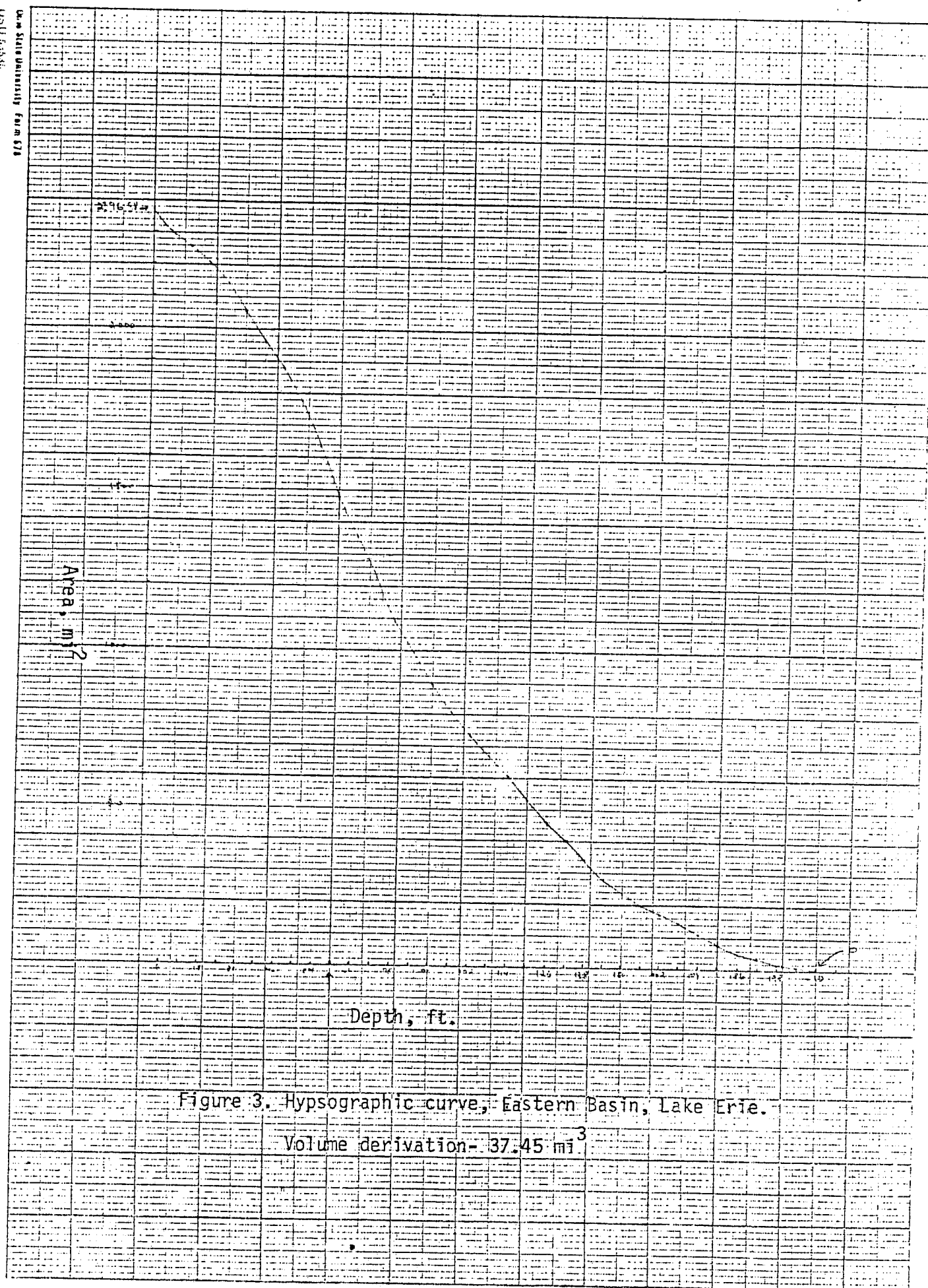


Figure 2. Hypsographic curve, Central Basin, Lake Erie.
 Volume derivation-72.06 mi³



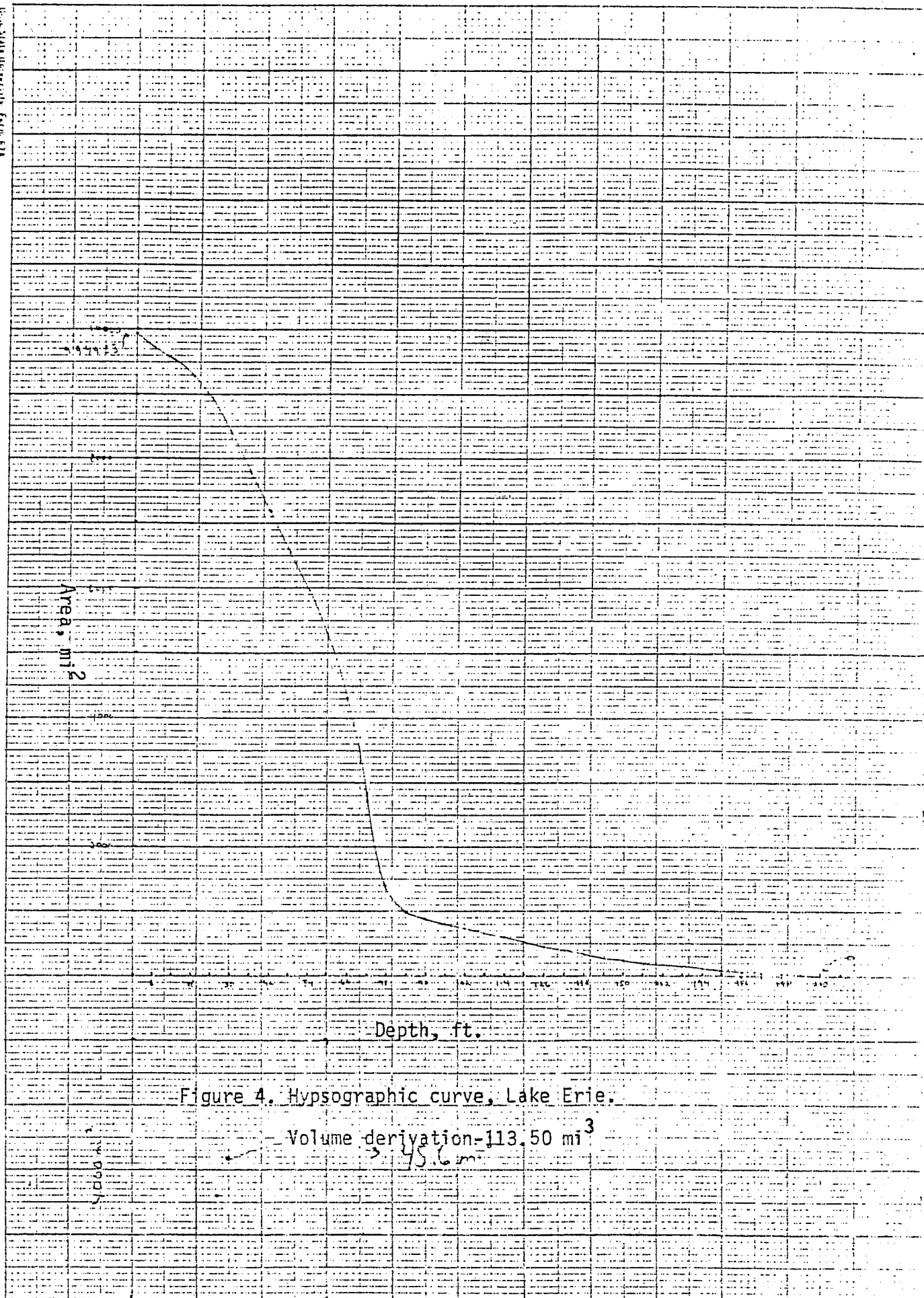


Figure 4. Hypsographic curve, Lake Erie.

a, 3 and 6. Basin) just reduced
Metric values for
volume however, are contained in
2a, 5a & 8a. Do we want to
appendix any of this?

Appendix

Morphometric calculations for Lake Erie by basin
for respective basin centers

Cont'd: Table 1A. Western Basin, isobath surface areas, in mi^2

2A. " strata volumes, in mi^3 and km^3

3A. " basin slope, as %

4A. Central basin, isobath surface areas, in mi^2

5A. " strata volumes, in mi^3 and km^3

6A. " basin slope, as %

7A. Eastern Basin, isobath surface areas, in mi^2

8A. " strata volumes, in mi^3 and km^3

9A. " basin slope, as %

Table 2

County

Michigan
Monro

Ohio

Lucas

Ottaw

Erie

Sandu

Ontario

Essex

Total

Table 3. western basin, Lake Erie. Strata volumes for respective basin counties; upper figure= mi², lower = km².

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48	Total
Michigan									
Monroe	.13 .54	.10 .41	.06 .26	.02 .07					.31 1.28
Ohio									
Lucas	.27 1.13	.25 1.04	.22 .94	.16 .66	.05 .20				.95 3.97
Ottawa	.33 1.37	.29 1.22	.25 1.04	.19 .81	.12 .48	.03 .12			1.21 5.04
Erie	.08 .33	.06 .26	.06 .24	.05 .21	.04 .17	.03 .11	.01 .03		.33 1.35
Sandusky									
Ontario									
Essex	.56 2.34	.55 2.28	.52 2.18	.48 1.99	.37 1.56	.12 .51			2.60 10.86
Total	1.37 5.71	1.25 5.21	1.11 4.66	.90 3.74	.58 2.41	.18 .74	.01 .03		5.40 22.50

Table 6. Central Basin, Lake Erie. Isobath surface areas for respective basin counties, in mi².

County	Depth	0	6	12	18	24	30	36	42
Ohio									
Ottawa		2.83	2.83	2.83	2.83	2.79	2.03	1.04	
Erie		279.78	276.69	272.81	268.04	257.86	244.13	223.86	89.96
Lorain		440.63	437.94	434.62	431.86	427.19	419.63	409.48	370.51
Cuyahoga		788.92	787.14	784.71	781.92	777.72	770.72	758.53	731.91
Lake		752.83	749.66	745.13	739.68	732.89	722.92	709.47	687.96
Ashtabula		642.23	638.78	634.56	630.80	624.66	618.93	613.14	600.41
Pennsylvania									
Erie		323.75	315.10	312.01	308.78	301.56	285.87	272.73	245.22
Ontario									
Essex		95.00	94.09	92.69	89.97	80.83	71.21	37.42	.89
Kent		1482.67	1474.86 [*]	1469.12 [*]	1459.46 [*]	1446.31	1420.02	1395.63	1295.91
Elgin		1195.20	1186.23 [*]	1177.01 [*]	1161.78 [*]	1146.60	1127.63	1086.72	1020.57
Haldimand-Norfolk		306.24	304.49 [*]	301.96 [*]	297.85 [*]	294.86	291.06	282.39	264.50
Total		6310.08	6267.81	6227.45	6172.97	6093.27	5974.15	5790.41	5307.83

Table 6., continued.

County	Depth	48	54	60	66	72	78	Total
Ohio								
Ottawa								17.18
Erie	.04							1913.17
Lorain	283.09	206.39	140.85	62.80	13.01			4078.00
Cuyahoga	697.98	632.71	568.61	488.27	356.30	131.71		9057.15
Lake	671.20	651.47	616.49	562.45	447.92	14.36		8804.43
Ashtabula	562.88	530.00	503.04	464.14	178.06			7241.63
Pennsylvania								
Erie	221.63	201.20	152.89	104.05	47.20	1.42		3093.41
Ontario								
Essex								562.09
Kent	1172.87	1072.87	954.45	734.12	501.08	151.76		16031.13
Elgin	938.22	860.72	726.84	511.39	87.54			12226.45
Halldmand-Norfolk	236.04	183.47	129.81	24.12				2916.79
Total	4783.95	4338.83	3792.98	2951.34	1631.11	299.25		65941.43

Table 7. Central Basin, Lake Erie. Strata volumes for respective basin counties; upper figures = mi³, lower = km³.

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Ohio								
Ottawa								
Erie	.32 1.32	.31 1.30	.31 1.28	.30 1.25	.29 1.19	.27 1.11	.17 .72	.03 .15
Lorain	.50 2.09	.50 2.07	.49 2.06	.49 2.04	.48 2.01	.47 1.97	.44 1.85	.37 1.55
Cuyahoga	.90 3.74	.90 3.73	.89 3.72	.89 3.70	.88 3.68	.87 3.63	.85 3.54	.81 3.40
Lake	.86 3.57	.85 3.55	.85 3.53	.84 3.50	.83 3.46	.82 3.40	.80 3.32	.77 3.23
Ashtabula	.73 3.04	.73 3.02	.72 3.00	.72 2.98	.71 2.95	.70 2.93	.69 2.88	.66 2.76
Pennsylvania								
Erie	.36 1.52	.36 1.49	.35 1.47	.35 1.45	.33 1.39	.32 1.33	.30 1.23	.27 1.11
Ontario								
Essex	.11 .45	.11 .44	.10 .43	.10 .41	.09 .36	.06 .25	.02 .07	
Kent	1.69 7.02	1.68 6.99	1.67 6.95	1.66 6.90	1.63 6.81	1.60 6.69	1.53 6.39	1.41 5.86
Elgin	1.36 5.65	1.35 5.61	1.33 5.55	1.32 5.48	1.30 5.40	1.26 5.26	1.20 5.00	1.12 4.65
Haldimand-Norfolk	.35 1.45	.35 1.44	.34 1.42	.34 1.41	.33 1.39	.33 1.36	.31 1.30	.29 1.19
Total	7.18 29.85	7.14 29.64	7.05 29.41	7.01 29.12	6.87 28.64	6.70 27.93	6.31 26.30	5.73 23.90

Table 7., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78,	78 - 84	Total
Ohio							
Ottawa							
Erie							
Lorain	.28	.20	.11	.04	.01		2.00
	1.16	.82	.47	.17	.04		8.32
Cuyahoga	.76	.68	.60	.48	.27		4.38
	3.16	2.85	2.51	2.00	1.12	.05	18.30
Lake	.75	.72	.67	.57	.21	.21	9.83
	3.14	3.01	2.80	2.39	.86	.01	40.99
Ashtabula	.62	.59	.55	.35	.07	.04	9.55
	2.59	2.45	2.30	1.47	1.28		39.80
							7.84
							32.65
Pennsylvania							
Erie	.24	.20	.15	.08	.04		3.35
	1.00	.84	.61	.35	.19		13.98
Ontario							
Essex							
Kent	1.28	1.15	.96	.70	.35	.06	5.59
	5.33	4.81	4.00	2.92	1.47	.24	2.41
Elgin	1.03	.90	.70	.31	.03		17.37
	4.27	3.77	2.93	1.28	.14		72.38
Halldimand-Norfolk	.24	.18	.08	.01			13.21
	.99	.74	.33	.04			54.99
							3.15
							13.06
Total	5.20	4.62	3.82	2.54	.98	.12	71.27
	21.64	19.29	15.95	10.62	4.10	.49	296.88

Table 8. Central Basin, Lake Erie. Basin(inter-contour)slope for respective counties, as %.

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Ohio								
Ottawa						.19		
Erie	.78	.64	.54	.26	.17	.11	.02	
Lorain	.91	.74	.89	.25	.19	.13	.03	.05
Cuyahoga	1.87	1.36	1.19	.80	.47	.27	.12	.10
Lake	1.09	.77	.64	.53	.39	.28	.17	.21
Ashtabula	.94	.76	.86	.53	.56	.56	.29	.11
Pennsylvania								
Erie	.33	.93	.95	.48	.23	.27	.11	.12
Ontario								
Essex	1.30	.84	.76	.28	.29	.11	.06	
Kent	.81 [†]	1.12 [†]	.67 [†]	.50 [†]	.25	.29	.09	.08
Elgin	.69 [†]	.67 [†]	.40 [†]	.40 [†]	.32	.15	.09	.07
Haldimand-Norfolk	1.32 [†]	.90 [†]	.55 [†]	.76 [†]	.60	.26	.12	.08

Table 8., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78,		
Ohio							
Ottawa							
Erie							
Lorain	.04	.04	.02	.02			
Cuyahoga	.06	.05	.04	.02	.01		
Lake	.17	.09	.06	.03	.01		
Ashtabula	.11	.13	.09	.01			
Pennsylvania							
Erie	.16	.11	.14	.11	.07		
Ontario							
Essex							
Kent	.09	.07	.04	.03	.01		
Elgin	.07	.04	.03	.01			
Haldimand-Norfolk	.05	.06	.02				

Table 10. Eastern Basin, Lake Erie. Isobath surface areas for respective basin counties, in mi².

County	Depth	0	6	12	18	24	30	36	42
Pennsylvania Erie		428.34	424.28	422.38	419.99	415.82	409.98	399.85	379.54
New York Chautauqua		470.05	463.16	459.19	453.90	447.09	442.34	437.45	432.21
Erie		113.28	109.29	105.17	100.68	94.19	81.62	67.98	54.60
Ontario Haldimand-Norfolk		1184.42	1130.93	1105.30	1079.08	1035.29	979.90	922.49	886.60
Niagara		180.49	172.72	166.83	159.47	152.32	144.93	136.16	126.99
Total		2376.58	2300.38	2258.87	2213.12	2144.71	2058.77	1963.93	1879.94

Table 10., continued.

County	Depth	48	54	60	66	72	78	84	90
Pennsylvania									
Erie		350.17	321.65	279.71	262.01	239.06	189.58	173.36	157.94
New York									
Chautauqua		423.61	407.30	375.21	348.91	314.20	286.63	260.16	233.11
Erie		35.60	19.66	5.70					
Ontario									
Haldimand-Norfolk		852.82	729.27	748.68	697.23	661.41	611.68	562.58	503.32
Niagara		110.77	99.05	70.36	48.53	17.02	4.02		
Total		1772.97	1576.93	1479.66	1356.68	1231.69	1091.91	996.10	894.37

Table 10., continued.

County	96	102	108	114	120	126	132	138
Pennsylvania Erie	141.39	124.56	104.41	84.69	58.71	35.02	26.68	24.67
New York Chautauqua Erie	213.67	197.40	182.25	165.84	150.25	135.66	114.97	81.37
Ontario Haldimand-Norfolk Niagara	450.31	413.16	382.62	356.00	321.59	286.77	257.88	235.29
Total	805.37	735.12	669.28	606.53	530.55	457.45	399.53	341.33

Table 10., continued.

County	144	150	156	162	168	174	180	186
Pennsylvania Erie	23.18	18.76	10.67	5.56	1.63	.93	.31	.02
New York Chautauqua Erie	52.73	32.32	22.48	16.31	12.42	9.12	4.49	.71
Ontario Haldimand-Norfolk Niagara	205.55	184.75	166.08	149.92	128.94	100.07	73.85	53.76
Total	281.46	235.83	199.23	171.79	142.99	110.12	78.65	54.49

Table 10., continued.

County	Depth	192	198	204	210	Total		
Pennsylvania Erie						5934.85		
New York Chautauqua						7646.51		
Erie						787.77		
Ontario Haldimand-Norfolk		35.68	18.49	9.21	1.13	17522.05		
Niagara						1589.66		
Total		35.68	18.49	9.21	1.13	33480.84		

Table 11. Eastern Basin, Lake Erie. Strata volumes for respective basin counties; upper figures = mi^3 , lower = km^3 .

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Pennsylvania Erie	.49 2.02	.48 2.01	.48 2.00	.48 1.98	.47 1.96	.46 1.92	.44 1.85	.42 1.73
New York Chautauqua	.53 2.22	.53 2.19	.52 2.17	.51 2.14	.51 2.11	.50 2.09	.50 2.07	.49 2.03
Erie	.13 .53	.12 .51	.12 .49	.11 .46	.10 .42	.09 .35	.07 .29	.05 .21
Ontario Haldimand-Norfolk	1.32 5.50	1.27 5.31	1.25 5.19	1.21 5.02	1.15 4.78	1.08 4.52	1.03 4.30	.99 4.13
Niagara	.20 .84	.19 .81	.19 .77	.18 .74	.17 .71	.16 .67	.15 .62	.14 .56
Total	2.67 11.11	2.59 10.83	2.56 10.62	2.49 10.34	2.40 9.98	2.29 9.55	2.19 9.13	2.09 8.66

Table 11., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78	78 - 84	84 - 90	90 - 96
Pennsylvania Erie	.38 1.59	.34 1.43	.31 1.29	.29 1.19	.24 1.02	.21 .86	.19 .79	.17 .71
New York Chautauqua	.47 1.97	.45 1.86	.41 1.72	.38 1.57	.34 1.43	.31 1.30	.28 1.17	.25 1.06
Erie	.03 .13	.01 .06						
Ontario Haldimand-Norfolk	.90 3.75	.84 3.51	.82 3.43	.77 3.23	.73 3.02	.67 2.79	.61 2.53	.54 2.26
Niagara	.12 .50	.10 .40	.07 .28	.04 .15	.01 .05			
Total	1.90 7.94	1.74 7.26	1.61 6.72	1.48 6.14	1.32 5.52	1.19 4.95	1.08 4.49	.96 4.03

Table 11., continued.

County	96 - 102	102 - 108	108 - 114	114 - 120	120 - 126	126 - 132	132 - 138	138 - 144
Pennsylvania Erie	.15 .63	.13 .54	.11 .45	.08 .34	.05 .22	.04 .15	.03 .12	.03 .11
New York Chautauqua Erie	.23 .98	.22 .90	.20 .83	.18 .75	.16 .68	.14 .59	.11 .46	.08 .32
Ontario Haldimand-Norfolk Niagara	.49 2.05	.45 1.89	.42 1.75	.39 1.61	.35 1.44	.31 1.29	.28 1.17	.25 1.05
Total	.87 3.66	.80 3.33	.73 3.03	.65 2.70	.56 2.34	.49 2.03	.42 1.75	.36 1.48

Table 11., continued.

County	144 - 150	150 - 156	156 - 162	162 - 168	168 - 174	174 - 180	180 - 186	186 - 192
Pennsylvania Erie	.02 .10	.02 .07	.01 .04					
New York Chautauqua Erie	.05 .20	.03 .13	.02 .09	.02 .07	.01 .05	.01 .03		
Ontario Haldimand-Norfolk Niagara	.22 .93	.20 .83	.18 .75	.16 .66	.13 .54	.10 .41	.07 .30	.05 .21
Total	.29 1.23	.25 1.03	.21 .88	.18 .73	.14 .59	.11 .44	.07 .30	.05 .21

Table 11., continued.

County	192 - 198	198 - 204	204 - 210	Total			
Pennsylvania Erie				6.52 27.12			
New York Chautauqua				8.44 35.18			
Erie				.83 3.45			
Ontario Haldimand-Norfolk	.03 .13	.02 .06	.01 .02	19.29 80.36			
Niagara				1.72 7.10			
Total	.03 .13	.02 .06	.01 .02	36.80 153.21			

Table 12. Eastern Basin, Lake Erie. Basin(inter-contour)slope for respective counties, as %.

County	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
Pennsylvania Erie	.65	1.36	1.07	.61	.43	.25	.13	.11
New York Chautauqua	.68	1.18	.89	.71	1.02	1.00	.93	.55
Erie	.80	.73	.78	.55	.31	.28	.22	.13
Ontario Haldimand-Norfolk	.24	.49	.51	.29	.22	.20	.27	.31
Niagara	.53	.87	.73	.66	.62	.45	.39	.22

Table 12., continued.

County	48 - 54	54 - 60	60 - 66	66 - 72	72 - 78	78 - 84	84 - 90	90 - 96
Pennsylvania Erie	.14	.10	.24	.18	.08	.21	.21	.19
New York Chautauqua	.33	.19	.24	.17	.19	.15	.11	.17
Erie	.12	.09	.07					
Ontario Haldimand-Norfolk	.19	.27	.21	.29	.21	.18	.14	.16
Niagara	.19	.11	.11	.05	.09			

Table. 12., continued.

County	96 - 102	102 - 108	108 - 114	114 - 120	120 - 126	126 - 132	132 - 138	138 - 144
inter-								
Pennsylvania								
Erie	.18	.14	.13	.08	.07	.19	.90	.99
New York								
Chautauqua	.23	.24	.21	.20	.21	.14	.09	.12
Erie								
Ontario								
Haldimand-Norfolk	.21	.25	.27	.20	.20	.22	.27	.20
Niagara								

Table 12., continued.

County	144 - 150	150 - 156	156 - 162	162 - 168	168 - 174	174 - 180	180 - 186	186 - 192
Pennsylvania Erie	.24	.11	.13	.14	.52	.40	.53	
New York Chautauqua	.13	.19	.26	.36	.40	.26	.19	
Erie								
Ontario Haldimand-Norfolk	.29	.32	.37	.29	.22	.23	.28	.23
Niagara								

Table 12., continued.

County	192 - 198	198 - 204	204 - 210					
Pennsylvania Erie								
New York Chautauqua								
Erie								
Ontario Haldimand-Norfolk	.18	.23	.15					
Niagara								