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U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Environmental Research Laboratories

Lake Erie Beginning-of-Month Water Levels and Monthly Rates of Change of Storage

FRANK H. QUINN

JAN A. DERECKI

BOULDER, COLO.
FEBRUARY 1976



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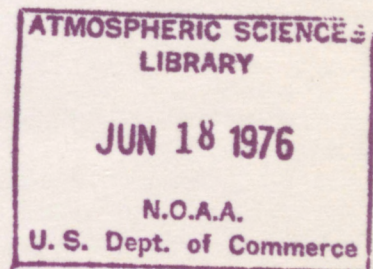
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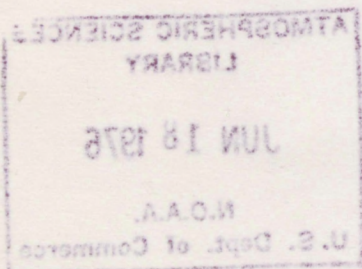
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Lake Erie Beginning-of-Month Water Levels and Monthly Rates of Change of Storage



FRANK H. QUINN
JAN A. DERECKI



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LAKE ERIE BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE

Frank H. Quinn and Jan A. Derecki

This report describes the results of a study of Lake Erie beginning-of-month water levels and monthly changes of storage. The study established that the number and distribution of water level gages in the presently existing gage network are adequate for the computation of beginning-of-month water levels. Computed beginning-of-month water levels and changes of storage for the period 1900-1974 are listed for use in scientific and planning studies.

1. INTRODUCTION

A study of the Lake Erie beginning-of-month water levels was undertaken to provide information necessary for lake studies concerning hydrology, beach and shore erosion, navigation, and hydro-electric power and lake regulation. The monthly changes of storage, which are computed from the beginning-of-month levels from two consecutive months, are utilized in water budget studies such as the determination of lake evaporation rates and net groundwater influx into the lakes.

Initial consideration was given to the 1950-1970 time base since it contains a sufficient number of water level gages to analyze the effect of the gage network size on the beginning-of-month level computations. This period is also significant as it includes the modern record high lake levels of 1952 as well as the record lows of 1964.

The Thiessen polygon procedure was used to compute the beginning-of-month lake levels. This is the technique commonly used by hydrologists to obtain a weighted average (a representative basin value) of point source measurements of precipitation within a basin. The Thiessen polygon procedure provides a better overall representative lake level than straight averaging and at the same time standardizes a procedure for computing these levels.

Results of the initial study revealed that the Thiessen polygon procedure was adequate and should be used in quantifying the data for the years prior to 1950, i.e., for the 1900-1949 period. Further, it showed that the presently existing gage network is adequate for updating the data in the future. Therefore, this report has quantified beginning-of-month levels and rates of change of lake storage data for the period of 1900-1974 as presented in section 3.

2. METHODOLOGY

2.1 Mathematical Procedure

The beginning-of-month water levels for Lake Erie were computed by use of a water level gage network located on the periphery of the lake. Ideally, these beginning-of-month levels should represent the instantaneous levels at the beginning of the months. Practically, however, representative instantaneous true water levels are difficult, if not impossible, to measure because of the effect of short-term fluctuations in wind speed and direction and changes in atmospheric pressure over very small time periods. These fluctuations could cause considerable error in computing a true instantaneous level for the lake. This error is lessened by specifying that the beginning-of-month level for each gage shall be equal to the average of the daily mean water levels of the first day of the month and the last day of the previous month.

The computations procedure was set forth by Quinn (1971) and consists of applying weighting factors to each water level gage in the network. The weighting factors were computed from Thiessen polygon networks drawn from the various water level gage networks. This is expressed mathematically as

$$L_o = W_1 L_1 + W_2 L_2 + W_3 L_3 + \dots + W_n L_n$$

$$\text{for } W_1 + W_2 + W_3 + \dots + W_n = 1.0$$

where L_o is the weighted Lake Erie beginning-of-month water level,
 L_1-L_n are the beginning-of-month levels at the various gage locations,
 W_1-W_n are the Thiessen polygon weighting factors for gage locations,
 n is the number of water level gages in the network.

The basic data used consist of daily mean water levels for the first and last days of the months for each water level gage in operation. These levels were computed from the gages by the use of sampling rates varying from hourly values in the current period to tri-daily readings in the early nineteen hundreds. The gage response time of less than 1 minute is sufficient to filter out wind waves and ship effects but maintain the longer period variations. The water level gages used in the study, along with their period of record for the daily mean values, are given in table 1, and their location is shown in figure 1. The period of record at a number of gages had interruptions due to missing data, but these were occasional, except for the gage at Toledo, which had several periods of missing data between the years 1908 and 1940. The occasional missing gage data were interpolated from the existing gages. The more extensive missing data at Toledo were derived from the lake profile computed by the least-squares method. The missing data least-squares program was based on a straight line fit of the four other gages located closest to Toledo, which indicated the relationship between the gage distance along the lake axis and the corresponding water levels.

Table 1. Water Level Gages and Period of Record

Gage Location	Period of Record (daily means)
Buffalo	1887-1974
Sturgeon Point	1969-1974
Barcelona	1961-1974
Erie	1959-1974
Cleveland	1900-1974
Marblehead	1960-1974
Toledo	1906-1974
Fermi	1964-1974
Bar Point	1967-1974
Kingsville	1963-1974
Erieau	1959-1974
Port Stanley	1927-1974
Port Dover	1960-1974
Port Colborne	1912-1974

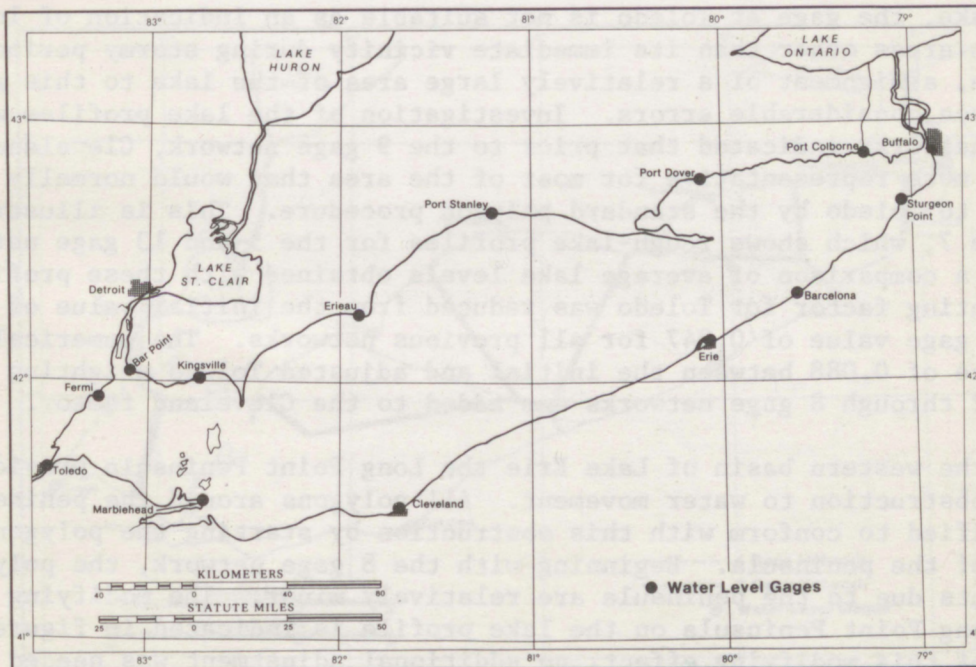


Figure 1. Water level gage locations.

In the initial analysis eight different gage networks were developed for the 1950-1970 period to determine the optimum network size as well as to quantify a data set for this period. For obtaining a quantified data set for the 1900-1949 period, additional two, three, and four gage networks were established. The Thiessen polygons shown on figures 2-6 were drawn and weighting factors computed for the gages in the various networks. These networks with their corresponding gages and weighting factors are given in table 2.

Listed gage networks and their corresponding weighting factors contain some modifications of the basic Thiessen polygons to conform with lake characteristics imposed by the dominant physical features of the lake. The dominant hydraulic features are the constrictions occurring at the lake extremities and the major open-lake constriction provided by the Long Point Peninsula. Because the main lake axis coincides with the predominant wind direction, these constrictions promote high wind tides or wind setups on the leeward side and low wind tides on the windward side. The effect of the constrictions on lake levels during periods of predominant westerly storms is illustrated by the 13 gage profile in figure 7. A comparison with the lake level profiles for storm conditions causing the lake to tilt the opposite way produced a similar, but opposite effect. The modification of the basic Thiessen polygon method consisted of adjusting the weights assigned to individual gages in the critical areas discussed above. In the western end of the lake, Toledo was the only gage until the introduction of the 9 gage network. Because of its location at the extreme western constriction of the lake, the gage at Toledo is not suitable as an indication of lake levels in areas other than its immediate vicinity during stormy periods. Therefore, assignment of a relatively large area of the lake to this gage may produce considerable errors. Investigation of the lake profiles with various networks indicated that prior to the 9 gage network, Cleveland would be more representative for most of the area that would normally be assigned to Toledo by the standard polygon procedure. This is illustrated in figure 7, which shows rough-lake profiles for the 5 and 13 gage networks. Based on a comparison of average lake levels obtained with these profiles, the weighting factor for Toledo was reduced from the initial value of 0.135 to the 9 gage value of 0.047 for all previous networks. The numerical difference of 0.088 between the initial and adjusted Toledo weighting factor for the 2 through 8 gage networks was added to the Cleveland factor.

In the western basin of Lake Erie the Long Point Peninsula provides a natural obstruction to water movement. All polygons around the peninsula were modified to conform with this obstruction by starting the polygons at the tip of the peninsula. Beginning with the 8 gage network, the polygon adjustments due to the peninsula are relatively minor. The modifying effect of the Long Point Peninsula on the lake profile is indicated in figure 7. Because of this modifying effect, no additional adjustment was needed for the Buffalo weighting factor for the 2 and 3 gage networks when Buffalo was the only gage in the eastern end of the lake (see figure 2).

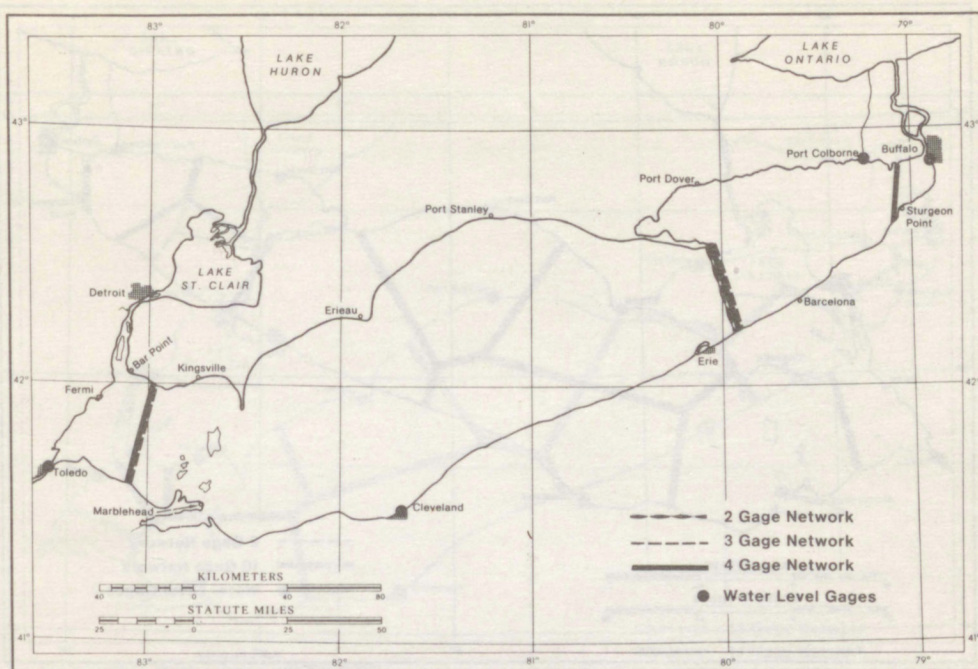


Figure 2. Thiessen polygon networks.

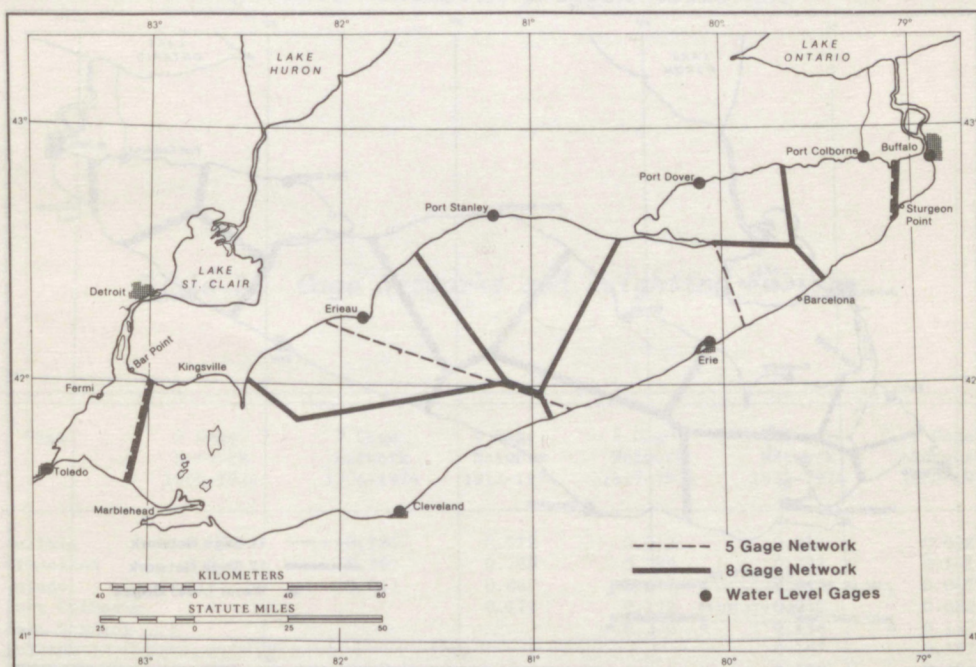


Figure 3. Thiessen polygon networks.

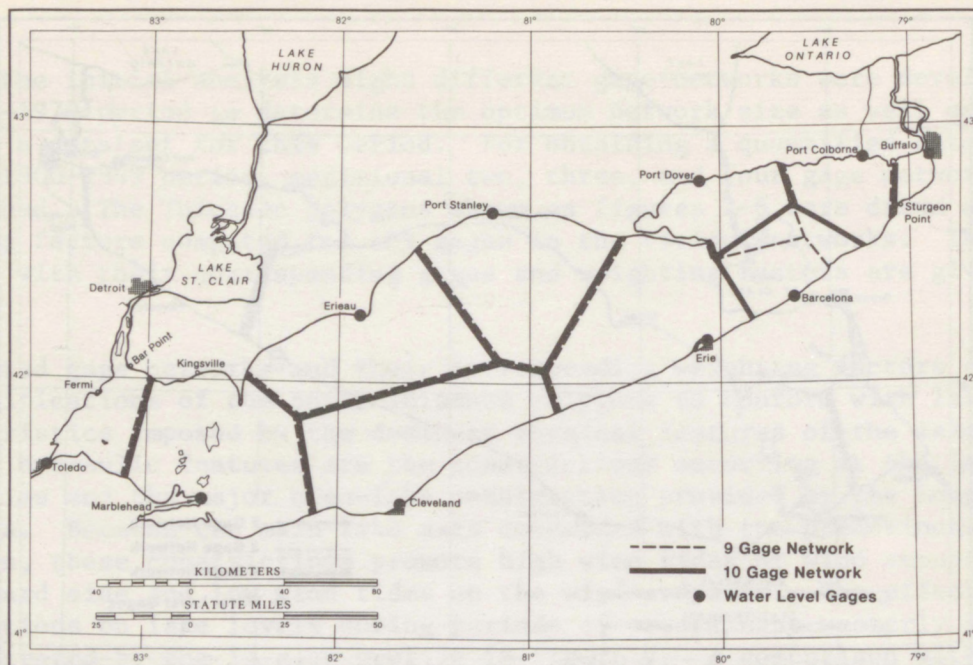


Figure 4. Thiessen polygon networks.

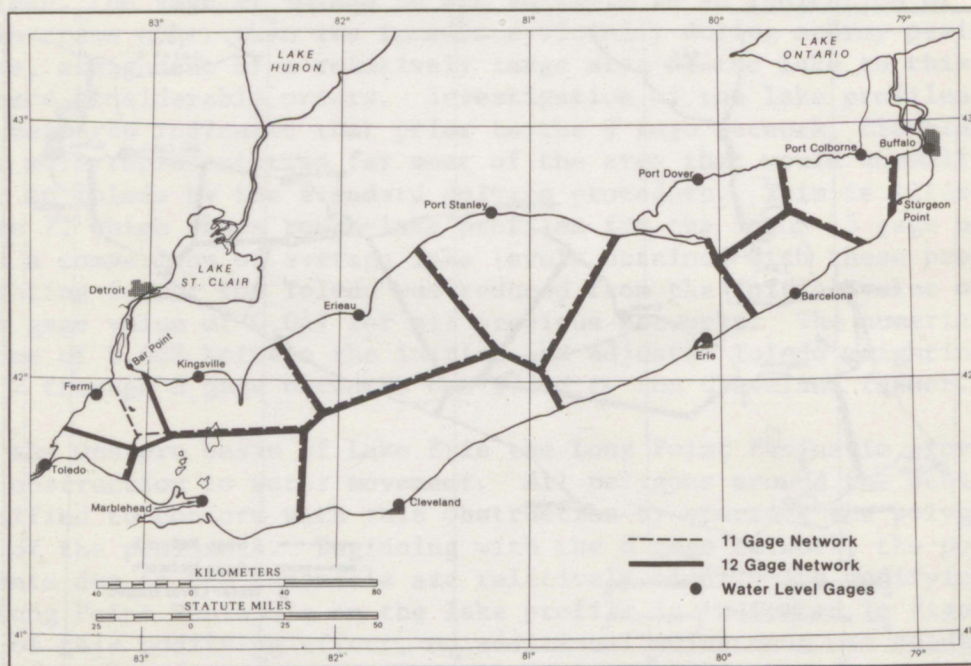


Figure 5. Thiessen polygon networks.

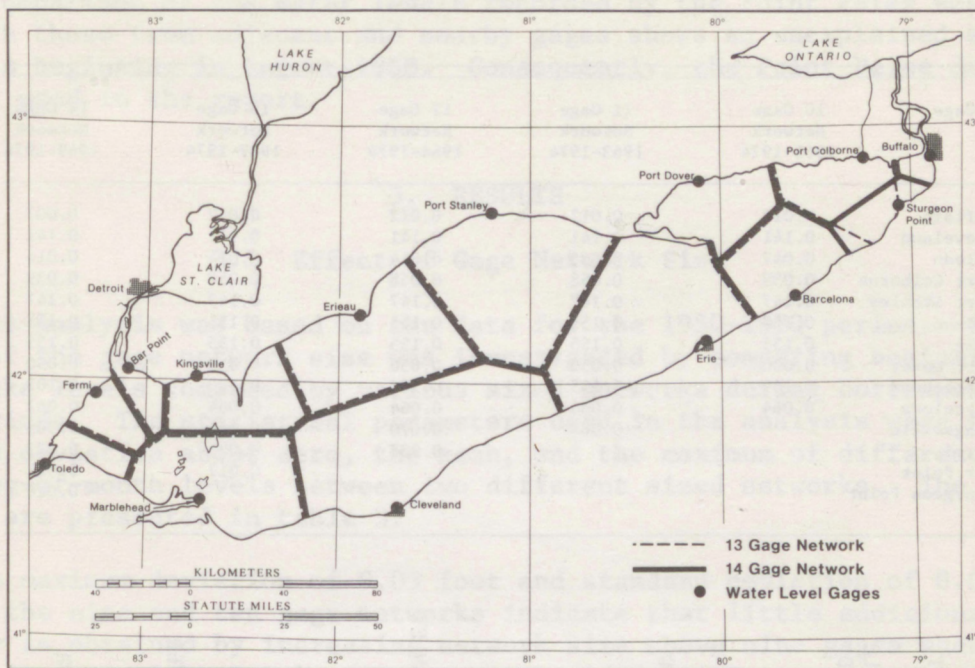


Figure 6. Thiessen polygon networks.

Table 2. Gage Networks and Weighting Factors

Gage	2 Gage Network 1900-1974	3 Gage Network 1906-1974	4 Gage Network 1912-1974	5 Gage Network 1927-1974	8 Gage Network 1959-1974	9 Gage Network 1960-1974
Buffalo	0.184	0.184	0.012	0.012	0.012	0.012
Cleveland	0.816	0.769	0.769	0.399	0.292	0.141
Toledo		0.047	0.047	0.047	0.047	0.047
Port Colborne			0.172	0.172	0.082	0.082
Port Stanley				0.370	0.154	0.147
Erieau					0.167	0.167
Erie					0.189	0.189
Port Dover					0.057	0.057
Marblehead						0.158

Table 2. Gage Networks and Weighting Factors (continued)

Gage	10 Gage Network 1961-1974	11 Gage Network 1963-1974	12 Gage Network 1964-1974	13 Gage Network 1967-1974	14 Gage Network 1969-1974
Buffalo	0.012	0.012	0.012	0.012	0.007
Cleveland	0.141	0.141	0.141	0.141	0.141
Toledo	0.047	0.033	0.014	0.014	0.014
Port Colborne	0.058	0.058	0.058	0.058	0.039
Port Stanley	0.147	0.147	0.147	0.147	0.147
Erieau	0.167	0.151	0.151	0.151	0.151
Erie	0.155	0.155	0.155	0.155	0.155
Port Dover	0.050	0.050	0.050	0.050	0.050
Marblehead	0.159	0.105	0.103	0.103	0.103
Barcelona	0.064	0.064	0.064	0.064	0.062
Kingsville		0.084	0.070	0.065	0.065
Fermi			0.035	0.023	0.023
Bar Point				0.017	0.017
Sturgeon Point					0.026

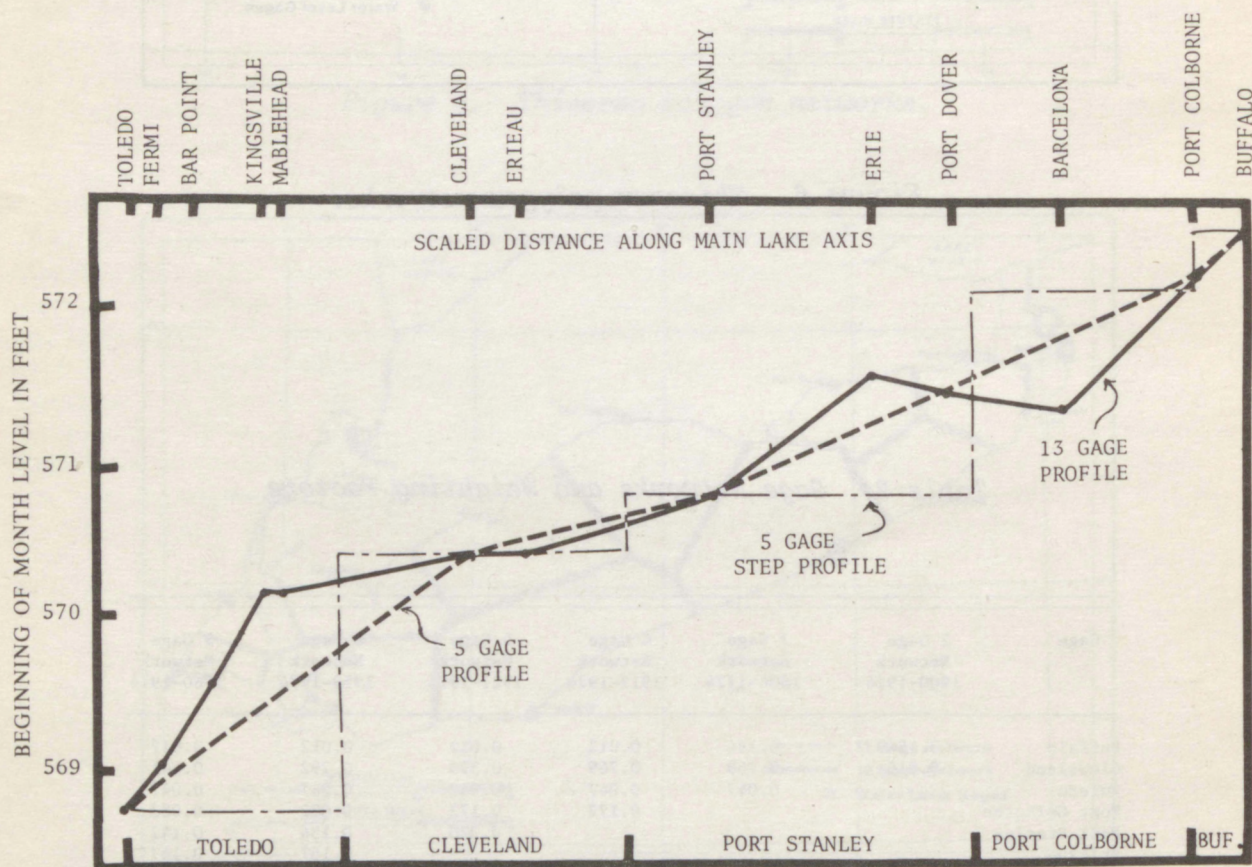


Figure 7. Rough-lake beginning-of-month levels - January 1969.

2.2 Gages Not Used

A comparison of the water levels recorded by the Point Pelee West gage with those from adjacent and nearby gages shows an unexplained shift in levels beginning in August 1968. Consequently, the Point Pelee data were not used in the report.

3. RESULTS

3.1 Effect of Gage Network Size

This analysis was based on the data for the 1950-1970 period. The effect of the gage network size was investigated by comparing beginning-of-month lake levels computed by various sized networks during corresponding time periods. The statistical parameters used in the analysis were the standard deviation about zero, the mean, and the maximum of differences in beginning-of-month levels between two different sized networks. The results are presented in table 3.

The maximum deviation of 0.03 foot and standard deviation of 0.01 foot between the nine and ten gage networks indicate that little additional accuracy is obtained by increasing network size above nine gages when using daily mean lake levels. However, the additional gages are providing better accuracy for studies involving shorter time periods or for studies related to lake dynamics.

Table 3. *Effect of Network Size on Beginning-of-Month Levels*

Period	No. of Points	Networks Compared	Mean Dev* (ft)	Std. Dev* (ft)	Max. Dev* (ft)
1906-1974	828	2 gage vs 3 gage	0.00	0.02	-0.10
1912-1974	756	3 gage vs 4 gage	-0.01	0.02	0.12
1927-1974	576	4 gage vs 5 gage	-0.01	0.06	-0.26
1959-1974	192	5 gage vs 8 gage	0.00	0.03	0.17
1960-1974	180	8 gage vs 9 gage	0.00	0.03	-0.14
1961-1974	168	9 gage vs 10 gage	0.00	0.01	0.03
1963-1974	144	10 gage vs 11 gage	0.00	0.01	0.02
1964-1974	132	11 gage vs 12 gage	0.00	0.00	0.01
1967-1974	96	12 gage vs 13 gage	0.00	0.00	0.02
1969-1974	72	13 gage vs 14 gage	0.00	0.00	0.01

* Dev = Deviation from corresponding beginning-of-month levels

3.2 Beginning-of-Month Levels

The beginning-of-month water levels computed for each gage are given in tables A.1-A.14 in the Appendix. Lake Erie beginning-of-month levels, computed with the gage networks given in table 4, are presented in table A.15.

Table 4. Gage Networks Used for Lake Erie Beginning-of-Month Levels

Period	No. of Gages in Network	Period	No. of Gages in Network
1900-1905	2	1961-1962	10
1906-1911	3	1963	11
1912-1926	4	1964-1966	12
1927-1958	5	1967-1968	13
1959	8	1969-1974	14
1960	9		

3.3 Change of Storage

The monthly changes in storage were computed by multiplying the difference between two consecutive beginning-of-month levels by the area of Lake Erie, 9,910 square miles. The changes in storage were then converted into monthly rates by dividing by the number of seconds in each month. These rates of change are given in table A.16 expressed as thousands of cubic feet per second months (TCFS-months).

3.4 Crustal Movement Analysis

A crustal movement analysis was undertaken to determine relative rates of subsidence, if any, along the dominant southwest-northwest lake orientation. The data used in the analysis consisted of yearly mean water levels for the period of study. The analysis showed a well defined movement between the Buffalo and Cleveland gages. As depicted in figure 8, the relative rate of movement between the two gages is 0.28 foot per 100 years. An apparent anomaly in the figure is the lack of zero difference between the two gage levels during the mid 1950's due to datum adjustments (IGLD, 1955). A check of the calm-season gage differences used for the datum adjustments (June-September, 1952-1958) verified the zero difference.

The higher annual levels at Buffalo are apparently caused by the pre-dominant wind setups during the rest of the year, which contains periods of seasonal storms.

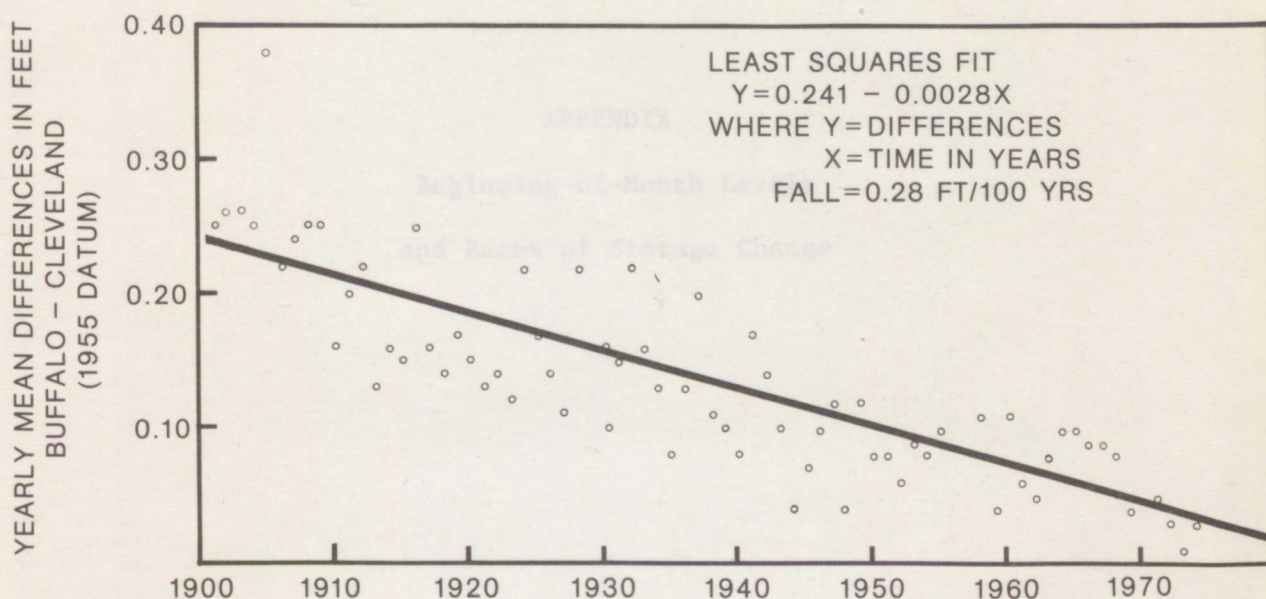


Figure 8. Plot demonstrating the relative crustal movement between Cleveland and Buffalo gages.

4. CONCLUSIONS AND RECOMMENDATIONS

This study shows that the present gage network is adequate for both scientific and planning studies and that no additional accuracy in beginning-of-month levels will be achieved by increasing the network size over the present level of 14 gages.

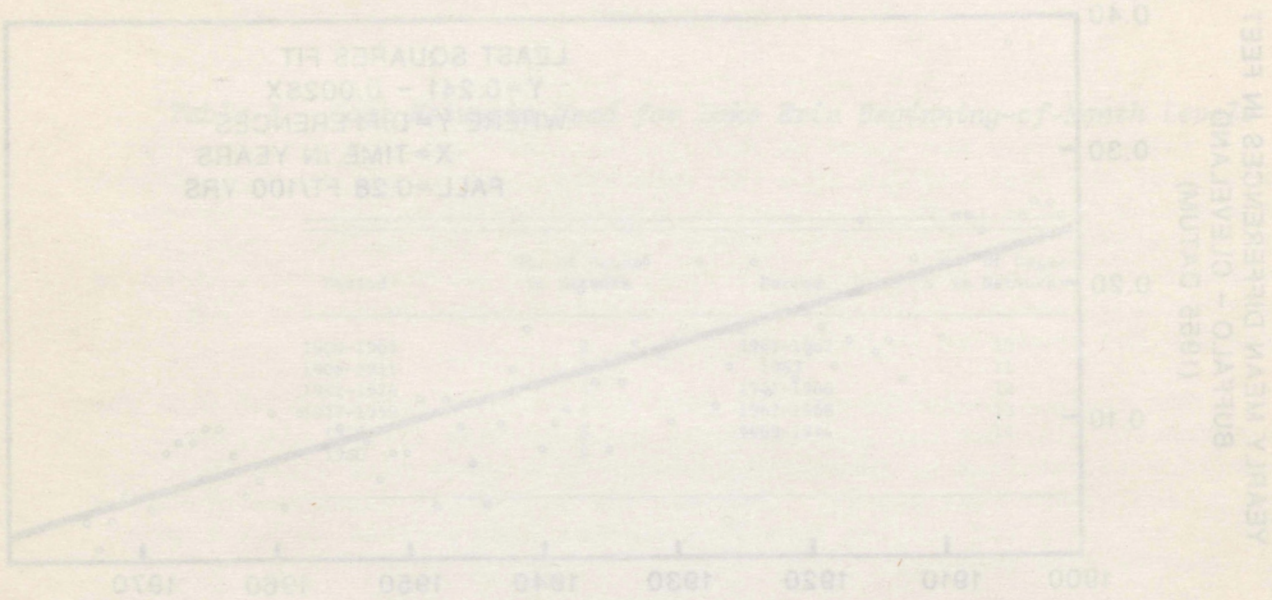
The beginning-of-month levels and storage changes listed in tables A.15 and A.16 are recommended for use in scientific and planning studies and should be updated on a yearly basis by the use of the Thiessen polygon procedure.

5. ACKNOWLEDGMENTS

The assistance of Raymond N. Kelley in data reduction and report assemblage is gratefully acknowledged.

6. REFERENCES

- Quinn, F. H. 1971. Quantitative Mathematical Models for Great Lakes Research. Ph.D. Dissertation, University of Michigan, Ann Arbor, Michigan.



APPENDIX

Beginning-of-Month Levels and Rates of Storage Change

Table A.1. Beginning-of-Month Levels at Buffalo (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1900	570.65	570.37	569.86	570.28	570.61	570.65	570.80	570.71	570.44	569.88	570.28	570.19
1901	569.98	569.62	569.02	569.38	569.33	569.87	570.21	570.26	569.89	569.89	569.87	569.50
1902	569.99	569.15	568.75	569.82	569.94	570.04	570.42	571.11	570.84	570.66	570.36	571.12
1903	570.39	570.01	570.29	570.61	571.68	570.70	571.38	571.02	571.05	570.70	570.23	569.96
1904	569.76	569.54	569.66	570.83	571.51	571.13	571.92	571.71	571.05	571.00	570.59	571.04
1905	570.38	569.57	569.30	569.88	570.53	570.86	571.49	571.27	571.23	570.94	571.10	570.23
1906	570.80	570.98	569.75	570.04	570.50	570.69	571.09	570.78	570.69	570.30	570.22	571.30
1907	570.96	570.91	570.02	570.80	570.93	570.73	571.55	571.60	570.96	570.78	570.63	570.60
1908	571.77	571.24	570.08	570.93	571.70	572.08	571.68	571.33	571.17	570.99	570.52	570.90
1909	570.68	569.93	569.87	570.14	571.05	571.18	571.48	570.96	570.97	571.11	569.84	569.70
1910	569.77	569.48	569.30	570.08	570.66	571.12	570.81	570.64	570.10	570.37	570.03	570.02
1911	569.12	568.86	569.56	569.59	570.09	570.29	570.09	569.70	569.82	569.22	569.58	570.67
1912	570.94	569.43	569.18	569.69	570.43	570.82	570.14	570.65	570.59	570.92	570.55	570.09
1913	569.89	572.22	570.32	572.05	572.17	572.13	571.87	571.50	571.02	570.94	571.23	570.33
1914	570.08	571.00	569.80	569.76	570.54	571.30	571.12	570.82	570.79	570.16	570.34	569.54
1915	569.59	568.15	569.68	569.54	569.62	569.69	569.92	570.32	570.36	569.77	570.43	570.39
1916	569.63	570.64	569.85	570.42	570.85	571.21	571.32	571.08	571.03	570.10	570.45	570.30
1917	570.13	569.46	569.42	570.09	571.28	571.41	572.01	572.05	571.43	571.60	571.58	571.33
1918	570.27	569.81	569.99	570.48	570.26	570.69	571.31	570.60	570.79	570.39	570.81	570.90
1919	570.89	570.69	571.11	570.83	571.18	571.92	571.59	571.32	571.17	570.32	570.75	572.04
1920	570.31	569.08	568.79	569.20	570.26	570.57	570.74	570.83	570.87	570.31	570.67	570.07
1921	570.00	569.51	569.86	570.72	571.31	570.95	571.01	570.98	570.44	571.14	569.04	570.04
1922	571.53	569.28	569.02	570.27	570.61	570.94	570.95	570.76	570.28	570.16	569.35	570.02
1923	569.59	569.09	568.80	569.47	569.83	569.96	570.11	569.91	569.60	569.43	569.45	569.54
1924	570.36	569.46	569.15	569.56	570.26	570.40	570.85	570.27	570.26	570.69	570.12	569.30
1925	567.97	568.44	568.91	569.40	569.57	569.43	568.83	569.21	568.93	568.86	568.59	568.66
1926	569.39	567.59	568.17	569.20	569.09	569.40	569.43	569.09	569.36	569.53	569.94	570.06
1927	569.57	569.39	568.98	568.88	569.81	570.41	570.30	570.18	569.85	569.79	569.49	569.82
1928	571.22	570.05	569.90	569.81	570.25	570.42	570.83	570.90	570.54	569.87	570.05	570.35
1929	570.24	570.23	570.14	571.89	571.99	572.51	572.46	572.11	571.84	570.80	570.91	572.38
1930	571.07	571.42	571.44	571.79	572.06	572.10	571.83	571.36	570.92	570.54	570.32	570.38
1931	570.75	569.46	568.90	568.50	569.38	569.71	569.83	569.45	569.51	569.51	569.18	569.93
1932	567.97	570.56	569.89	569.71	569.79	569.92	570.06	569.76	569.51	569.67	568.86	568.65
1933	569.09	569.11	568.88	569.31	569.86	570.26	570.29	569.89	569.18	569.13	568.43	568.80
1934	568.32	568.48	567.50	567.76	568.40	568.41	568.54	568.34	568.18	568.21	568.07	568.39
1935	568.25	567.51	567.73	567.77	568.95	568.76	568.75	569.23	568.89	568.80	568.07	568.82
1936	568.09	567.74	567.73	568.64	569.03	569.46	569.10	569.03	568.89	568.48	568.76	567.95
1937	568.94	570.28	569.82	569.35	570.01	570.34	570.90	570.50	570.25	569.55	569.13	569.63
1938	568.63	568.76	570.06	570.22	570.39	570.22	570.36	570.68	570.15	569.69	569.36	569.31
1939	569.63	568.98	569.73	569.74	570.49	570.37	570.81	570.73	570.05	569.51	569.68	569.30
1940	570.45	568.61	568.37	569.10	569.80	570.08	570.76	570.11	570.16	569.70	569.41	569.56
1941	569.78	569.81	569.15	569.04	569.46	569.44	569.80	569.75	569.61	569.15	569.04	568.62
1942	568.71	568.92	568.64	569.51	570.00	570.23	570.71	570.82	570.33	570.09	570.22	570.17
1943	570.48	570.67	570.33	570.46	571.24	572.04	572.17	572.18	571.75	571.07	570.80	570.97
1944	570.67	570.12	569.88	570.64	571.10	571.47	571.47	570.93	570.84	570.40	570.12	571.29
1945	570.56	569.73	569.60	570.55	571.04	571.10	571.99	571.63	571.48	571.16	571.32	570.72
1946	571.01	571.39	570.18	570.25	570.71	570.84	571.73	570.99	571.39	570.66	570.22	570.17
1947	569.60	570.49	569.40	569.83	571.24	572.11	572.44	572.02	571.74	571.18	570.55	571.15
1948	569.43	570.01	570.24	571.29	571.76	571.97	572.26	571.90	571.01	570.93	570.28	570.57
1949	570.63	571.33	571.21	569.59	570.56	570.68	570.64	570.49	570.97	570.02	569.49	569.76

* IGLD - International Great Lakes Datum

Table A. 1. Beginning-of-Month Levels at Buffalo (IGLD^{*} 1955) (continued)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1950	569.20	569.97	571.18	571.05	571.15	571.30	571.16	570.99	570.57	570.32	570.31	571.04
1951	570.59	570.38	571.44	571.68	571.67	571.97	572.13	571.84	571.02	570.95	570.82	570.89
1952	571.02	572.07	571.97	572.37	572.61	572.66	572.06	572.26	572.09	571.73	571.37	570.87
1953	570.69	571.59	571.12	571.38	571.18	571.86	572.14	571.81	571.65	571.22	570.88	570.73
1954	571.25	570.48	570.76	571.20	571.76	571.68	571.75	571.67	571.45	570.98	571.47	571.65
1955	571.39	571.22	571.45	572.04	572.25	572.12	571.94	571.71	571.67	570.91	570.83	570.86
1956	570.48	569.62	569.58	570.32	570.80	571.74	571.56	571.42	571.44	570.96	570.29	570.33
1957	570.75	569.65	569.57	569.91	570.83	570.93	571.62	571.15	570.54	570.50	569.78	570.70
1958	570.82	569.64	569.36	569.40	569.72	569.75	570.14	569.98	570.27	570.34	569.46	569.61
1959	568.55	568.87	569.24	569.62	570.37	570.49	570.37	570.22	569.84	569.03	570.07	570.26
1960	569.67	569.88	569.96	570.14	570.84	571.21	571.37	571.31	571.15	570.67	570.62	571.13
1961	569.70	569.35	569.73	570.33	571.44	571.53	571.37	571.09	571.21	570.83	570.87	570.02
1962	570.14	569.56	569.64	570.00	570.16	570.38	570.29	570.32	570.06	569.91	569.78	569.53
1963	569.52	568.96	568.72	569.48	570.14	569.92	569.83	569.87	569.57	569.40	569.43	569.23
1964	568.36	568.50	568.50	569.01	569.55	569.41	569.70	569.21	569.25	568.66	568.29	568.21
1965	568.25	568.67	568.42	568.98	569.76	569.79	569.77	569.56	569.63	569.82	570.02	569.98
1966	569.61	570.11	569.92	570.10	570.40	570.51	570.52	570.40	570.15	570.16	569.49	570.11
1967	570.21	569.95	569.93	570.16	570.55	570.73	571.08	570.96	570.50	570.83	570.14	569.82
1968	570.77	570.60	570.77	571.17	571.24	571.36	571.68	571.44	570.99	571.36	570.35	570.39
1969	572.49	570.93	570.57	571.19	571.72	572.11	572.40	572.64	572.09	571.64	570.87	571.68
1970	570.36	570.50	570.25	570.54	571.33	571.44	571.67	571.73	571.24	571.09	570.95	570.86
1971	570.68	570.89	571.66	571.20	571.48	571.55	571.85	571.72	571.05	571.10	571.05	570.80
1972	571.15	570.98	570.82	571.47	571.89	572.37	572.40	572.35	572.09	572.29	571.47	572.60
1973	573.33	571.85	572.23	572.96	573.10	573.45	573.44	573.10	572.85	571.97	573.48	572.30
1974	572.05	572.89	572.57	572.89	573.18	573.26	573.32	573.02	572.69	572.37	571.64	570.14

* IGLD - International Great Lakes Datum

Table A.2. Beginning-of-Month Levels at Sturgeon Point (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1969	572.47	570.94	570.56	571.20	571.72	572.12	572.38	572.62	572.08	571.63	570.87	571.68
1970	570.46	570.53	570.27	570.57	571.31	571.44	571.73	571.73	571.24	571.09	570.93	570.85
1971	570.72	570.90	571.64	571.32	571.61	571.59	571.83	571.68	571.07	571.10	571.04	570.81
1972	571.09	571.01	570.83	571.50	571.95	572.33	572.37	572.30	572.05	572.27	571.49	572.54
1973	573.16	571.98	572.24	572.97	573.12	573.40	573.43	573.06	572.78	571.85	573.00	572.20
1974	572.02	572.65	572.58	572.89	573.16	573.23	573.24	572.94	572.63	572.35	571.60	570.28

* IGLD - International Great Lakes Datum

Table A.3. Beginning-of-Month Levels at Barcelona (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1961	569.70	569.39	569.81	570.41	571.44	571.47	571.37	571.13	571.13	570.70	570.61	569.97
1962	569.92	569.57	569.60	570.02	570.15	570.29	570.28	570.22	570.10	569.77	569.71	569.52
1963	569.46	568.97	568.75	569.50	570.15	569.88	569.75	569.76	569.44	569.24	569.20	569.16
1964	568.31	568.45	568.46	569.00	569.51	569.40	569.56	569.12	569.16	568.59	568.26	568.19
1965	568.25	568.56	568.43	568.99	569.71	569.73	569.67	569.44	569.47	569.53	569.68	569.53
1966	569.42	569.83	569.80	570.07	570.31	570.43	570.41	570.26	570.08	569.94	569.26	569.90
1967	570.07	569.84	569.92	570.15	570.54	570.73	570.98	570.90	570.50	570.59	570.21	569.87
1968	570.74	570.58	570.72	571.08	571.17	571.31	571.68	571.33	570.94	571.04	570.30	570.37
1969	571.35	570.90	570.62	571.12	571.72	572.07	572.26	572.56	572.02	571.52	570.84	571.32
1970	570.44	570.47	570.25	570.61	571.29	571.39	571.56	571.55	571.53	570.96	570.87	570.71
1971	570.73	570.81	571.31	571.24	571.53	571.55	571.77	571.64	571.09	571.08	571.18	570.78
1972	570.97	570.97	570.80	571.40	571.93	572.25	572.37	572.26	572.04	572.16	571.50	572.21
1973	572.68	572.00	571.97	572.94	573.06	573.25	573.40	573.03	572.76	571.90	572.54	572.02
1974	571.96	572.58	572.38	572.84	573.06	573.21	573.21	572.89	572.56	572.14	571.55	570.47

* IGLD - International Great Lakes Datum

Table A.4. Beginning-of-Month Levels at Erie (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1959	568.75	568.97	569.32	569.73	570.39	570.57	570.39	570.23	569.89	569.40	569.89	569.79
1960	569.79	570.01	570.07	570.14	570.84	571.14	571.39	571.31	571.16	570.78	570.41	570.71
1961	569.71	569.44	569.86	570.45	571.52	571.51	571.42	571.26	571.14	570.66	570.51	569.96
1962	569.90	569.61	569.63	570.11	570.28	570.31	570.35	570.28	570.09	569.85	569.74	569.60
1963	569.55	568.99	568.77	569.60	570.17	569.96	569.86	569.70	569.47	569.26	569.17	569.14
1964	568.33	568.45	568.52	569.05	569.60	569.49	569.56	569.21	569.23	568.66	568.33	568.22
1965	568.31	568.61	568.45	569.04	569.75	569.80	569.77	569.54	569.50	569.51	569.62	569.68
1966	569.45	569.63	569.77	570.05	570.38	570.54	570.50	570.34	570.12	569.82	569.21	569.85
1967	570.02	569.83	569.86	570.12	570.54	570.79	571.03	570.95	570.62	570.51	570.13	570.06
1968	570.75	570.57	570.71	571.06	571.19	571.41	571.60	571.34	571.06	571.01	570.37	570.45
1969	571.59	570.88	570.67	571.10	571.75	572.16	572.31	572.59	572.06	571.47	570.29	571.40
1970	570.70	570.46	570.25	570.61	571.33	571.47	571.55	571.67	571.26	571.08	570.88	570.75
1971	570.77	570.88	571.34	571.34	571.60	571.67	571.82	571.70	571.23	571.16	571.05	570.90
1972	570.94	570.94	570.83	571.50	571.96	572.32	572.37	572.31	572.13	572.28	571.64	572.36
1973	572.82	572.27	572.31	573.11	573.20	573.34	573.48	573.15	571.79	572.01	572.56	571.99
1974	571.97	572.50	572.44	572.85	573.08	573.28	573.22	572.89	572.58	572.31	571.58	570.84

* IGLD - International Great Lakes Datum

Table A.5. Beginning-of-Month Levels at Cleveland (IGLD ^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1900	569.33	569.54	569.76	570.19	570.40	570.51	570.44	570.40	570.32	569.93	569.57	569.61
1901	569.42	569.13	568.79	569.24	569.29	569.58	569.90	569.99	570.10	569.61	569.22	569.07
1902	569.23	568.99	568.61	569.37	569.67	570.02	570.39	571.06	570.50	570.61	570.19	569.71
1903	569.67	569.58	569.76	570.52	571.25	571.24	570.97	571.05	570.90	570.32	569.98	569.80
1904	569.48	569.51	569.62	570.74	571.37	571.73	571.43	571.32	571.05	570.76	570.33	569.73
1905	569.59	569.43	569.16	569.66	570.19	570.73	571.13	571.09	570.85	570.55	570.00	570.18
1906	570.03	570.19	569.85	570.05	570.35	570.53	570.70	570.74	570.64	570.50	570.41	570.16
1907	570.34	570.91	570.44	570.81	570.92	571.22	571.40	571.32	570.88	570.88	570.60	570.46
1908	570.48	570.34	570.48	571.21	571.45	571.73	571.49	571.39	570.99	570.47	570.20	569.51
1909	569.39	569.66	569.82	569.89	570.42	571.19	571.26	571.08	570.76	570.04	569.64	569.82
1910	569.38	569.31	569.33	569.93	570.48	570.69	570.51	570.48	570.24	569.88	569.61	569.72
1911	569.17	569.25	568.97	569.33	569.87	569.97	569.97	569.63	569.58	569.70	569.51	569.02
1912	569.35	569.28	569.13	569.84	570.67	570.73	570.83	570.63	570.55	570.27	570.23	569.80
1913	569.64	570.52	570.37	571.69	572.19	571.97	571.74	571.51	571.07	570.67	570.24	570.42
1914	570.20	569.82	569.64	569.95	570.53	571.16	570.95	570.69	570.51	570.24	569.71	569.51
1915	569.22	569.47	569.54	569.43	569.54	569.83	569.98	570.21	570.30	570.31	569.67	569.30
1916	569.57	570.03	569.97	570.24	570.75	571.23	571.41	571.23	570.60	570.26	569.77	569.57
1917	569.58	569.64	569.37	570.01	570.63	571.32	571.73	571.84	571.47	571.15	571.03	570.86
1918	570.37	569.68	570.02	570.37	570.06	570.45	570.58	570.70	570.51	570.43	570.37	569.96
1919	570.42	570.33	569.94	571.12	571.39	571.95	571.71	571.39	571.09	570.75	570.56	569.70
1920	569.62	569.25	568.70	569.29	570.25	570.39	570.69	570.70	570.62	570.52	569.97	570.09
1921	570.00	570.24	569.77	570.59	571.20	571.26	571.11	570.70	570.36	569.77	570.16	569.85
1922	569.59	569.37	569.30	569.98	570.66	570.95	570.85	570.68	570.41	570.16	569.72	569.07
1923	569.10	569.10	568.75	569.36	569.66	570.05	570.03	569.95	569.58	569.59	569.07	568.89
1924	569.46	569.44	569.17	569.59	570.05	570.26	570.59	570.47	569.99	569.86	569.26	569.20
1925	569.19	568.49	568.77	569.36	569.36	569.24	569.22	569.17	569.12	569.00	568.55	568.64
1926	568.01	568.27	567.88	568.03	569.14	569.21	569.36	569.30	569.22	569.77	569.60	569.60
1927	569.47	568.91	569.03	569.78	569.82	570.24	570.21	570.29	569.85	569.42	569.13	569.74
1928	569.71	569.75	569.64	569.60	569.94	570.15	570.71	570.66	570.47	569.96	569.78	569.88
1929	570.03	570.17	570.24	570.97	572.20	572.47	572.26	572.13	571.53	571.47	570.93	570.66
1930	570.76	571.41	571.42	571.74	572.08	571.81	571.73	571.35	570.87	570.71	570.17	569.59
1931	569.34	569.36	569.09	569.17	569.39	569.60	569.66	569.76	569.30	569.11	568.98	568.77
1932	569.28	569.44	569.67	569.54	569.64	569.97	569.83	569.71	569.43	568.78	568.64	568.55
1933	568.74	568.82	568.69	569.25	569.80	570.27	569.88	569.58	569.25	568.86	568.46	568.06
1934	568.14	567.60	567.53	567.78	568.38	568.47	568.51	568.33	568.13	568.29	567.66	567.46
1935	567.54	567.60	567.49	568.25	568.33	568.78	568.90	568.87	568.68	568.24	568.18	567.94
1936	567.88	567.45	567.80	568.87	569.13	569.18	569.29	569.03	568.76	568.76	568.21	568.34
1937	568.17	569.28	569.24	569.34	570.28	570.26	570.78	570.61	570.23	569.43	569.25	568.62
1938	568.79	568.56	569.29	569.75	570.17	570.29	570.32	570.42	570.11	569.95	569.46	569.21
1939	568.85	569.14	569.10	569.63	570.45	570.42	570.44	570.37	570.10	569.91	569.42	569.14
1940	568.74	568.61	568.81	568.97	569.81	570.20	570.33	570.34	570.16	569.95	569.57	569.32
1941	569.79	569.50	569.23	569.21	569.46	569.63	569.71	569.65	569.27	568.82	568.68	568.70
1942	568.74	568.56	568.65	569.47	570.07	570.55	570.55	570.62	570.37	570.07	569.92	570.00
1943	570.15	569.83	569.85	570.34	570.97	572.00	572.07	572.07	571.58	571.25	570.94	570.58
1944	570.22	569.85	570.03	570.10	571.14	571.50	571.55	571.11	570.65	570.58	570.04	569.90
1945	569.72	569.48	569.61	570.58	570.96	571.57	571.83	571.70	571.25	571.32	571.12	571.07
1946	570.66	570.09	570.18	570.92	570.79	571.27	571.63	571.49	570.66	570.74	570.25	570.05
1947	569.84	569.77	569.62	570.05	571.46	572.04	572.31	572.06	571.89	571.34	571.16	570.35
1948	570.95	570.34	570.50	571.26	571.59	571.98	571.98	571.65	571.42	570.74	570.35	570.12
1949	570.11	570.01	570.63	570.88	570.72	570.85	570.77	570.63	569.96	569.63	569.50	569.07
1950	569.31	570.46	570.04	570.78	571.57	571.24	571.11	570.99	570.71	570.41	570.18	570.17
1951	570.37	570.61	570.89	571.52	572.02	572.06	572.01	571.82	571.53	570.96	570.83	570.78
1952	571.05	571.70	572.05	572.39	572.82	572.85	572.78	572.38	572.01	571.69	570.80	570.88
1953	570.98	571.08	571.18	571.51	571.73	572.10	572.05	571.92	571.68	571.15	570.73	570.63
1954	570.19	570.11	570.49	571.11	571.92	571.73	571.70	571.47	571.33	570.89	571.38	571.27
1955	571.26	571.29	571.38	571.96	572.27	572.05	571.80	571.58	571.39	570.96	570.57	570.33
1956	570.12	569.48	569.45	570.32	570.89	571.54	571.51	571.42	571.38	570.81	570.51	569.81
1957	570.00	569.81	570.00	570.08	570.97	571.09	571.23	571.20	570.68	570.34	570.00	569.52
1958	569.91	569.65	569.22	569.48	569.61	569.47	569.88	570.20	569.97	569.68	569.33	569.00
1959	568.83	568.96	569.31	569.92	570.44	570.64	570.48	570.24	569.98	569.76	569.34	569.01

* IGLD - International Great Lakes Datum

Table A.5. Beginning-of-Month Levels at Cleveland (IGLD* 1955) (continued)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1960	569.83	570.02	570.02	570.17	570.69	571.02	571.36	571.32	571.21	570.89	570.01	570.08
1961	569.65	569.53	569.92	570.61	571.53	571.43	571.41	571.36	571.04	570.54	569.97	569.84
1962	569.56	569.58	569.57	570.19	570.30	570.26	570.47	570.27	570.11	569.87	569.62	569.64
1963	569.44	569.05	568.93	569.77	570.22	570.05	569.91	569.73	569.47	569.06	568.89	568.73
1964	568.52	568.47	568.40	569.16	569.74	569.70	569.55	569.37	569.30	568.87	568.46	568.28
1965	568.37	568.40	568.96	569.41	569.75	569.88	569.82	569.61	569.48	569.21	569.01	568.78
1966	569.36	569.11	569.51	569.97	570.41	570.52	570.57	570.35	570.16	569.68	569.06	569.51
1967	569.89	569.87	569.82	570.20	570.65	570.94	571.00	571.00	570.84	570.32	570.20	570.30
1968	570.58	570.68	570.76	571.04	571.08	571.43	571.50	571.36	571.04	570.69	570.32	570.49
1969	570.32	570.88	571.14	570.98	571.87	572.21	572.28	572.56	572.05	571.49	570.98	571.02
1970	571.20	570.31	570.48	570.90	571.38	571.55	571.61	571.67	571.34	571.19	571.00	570.84
1971	571.06	570.55	570.88	571.42	571.60	571.84	571.81	571.61	571.58	571.33	571.06	570.94
1972	571.19	570.87	570.95	571.51	572.11	572.26	572.40	572.24	572.18	572.24	571.95	572.11
1973	572.29	572.62	572.32	573.32	573.31	573.26	573.51	573.22	572.83	572.34	571.81	571.76
1974	572.02	572.16	572.37	573.09	573.06	573.27	573.15	572.86	572.52	572.27	571.59	572.18

* IGLD - International Great Lakes Datum

Table A.6. Beginning-of-Month Levels at Marblehead (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1960	569.84	570.04	569.89	570.22	570.60	571.08	571.37	571.33	571.18	570.89	569.89	569.43
1961	569.61	569.65	570.06	570.63	571.56	571.34	571.38	571.38	571.04	570.48	569.72	569.80
1962	569.48	569.62	569.57	570.23	570.38	570.28	570.54	570.30	570.09	569.87	569.52	569.68
1963	569.39	569.17	569.00	569.87	569.97	570.07	569.93	569.69	569.46	568.97	568.63	568.43
1964	568.54	568.44	568.34	568.90	569.87	569.87	569.52	569.47	569.33	569.00	568.53	568.18
1965	568.45	568.24	569.15	569.58	569.81	569.95	569.94	569.63	569.38	569.00	568.51	568.45
1966	569.33	569.35	569.30	569.75	570.52	570.59	570.66	570.37	570.16	569.49	568.99	569.19
1967	569.90	569.94	569.74	570.26	571.08	571.14	571.00	571.03	570.95	570.18	570.28	570.57
1968	570.50	570.80	570.67	571.03	571.10	571.44	571.51	571.29	571.12	570.49	570.37	570.62
1969	570.17	570.84	571.34	570.86	571.89	572.37	572.29	572.50	572.08	571.52	571.12	570.61
1970	571.30	570.19	570.58	571.12	571.36	571.63	571.64	571.61	571.37	571.21	571.02	570.90
1971	571.14	570.25	571.54	571.46	571.55	571.98	571.87	571.59	571.78	571.42	571.04	570.75
1972	570.81	570.86	571.02	571.53	572.20	572.25	572.41	572.31	572.21	572.09	572.13	571.92
1973	571.99	572.85	572.36	573.47	573.39	573.28	573.54	573.24	572.85	572.62	571.22	571.61
1974	572.00	572.18	572.30	573.16	573.21	573.39	573.17	572.89	572.48	571.92	571.62	573.06

* IGLD - International Great Lakes Datum

Table A.7. Beginning-of-Month Levels at Toledo (IGLD* 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1906	569.86	569.65	569.99	570.20	570.55	570.57	570.64	570.97	570.64	570.92	570.44	569.72
1907	570.22	571.05	570.67	570.80	570.96	571.99	571.39	571.14	570.96	571.01	570.87	570.36
1908	570.24	569.90	570.76	571.07	571.46	571.58	571.63	571.34	571.12	570.85	570.43	570.53
1909	570.34	569.86	569.86	570.07	570.88	571.20	571.32	570.99	570.91	570.82	569.79	569.73
1910	569.66	569.43	569.31	570.04	570.61	571.00	570.73	570.59	570.14	570.24	569.92	569.94
1911	569.13	568.96	569.40	569.52	570.03	570.21	570.06	569.68	569.76	569.35	569.09	567.87
1912	568.78	569.38	569.48	571.95	571.04	570.84	571.69	570.69	570.54	569.89	569.81	569.98
1913	569.52	569.00	570.28	572.35	572.02	571.94	571.78	571.58	571.27	570.50	569.47	570.80
1914	570.36	569.45	569.49	571.11	570.68	571.06	570.75	570.73	570.37	570.21	569.44	569.56
1915	569.11	569.72	569.35	569.15	569.48	569.95	570.04	570.18	570.31	570.52	569.65	568.47
1916	569.44	570.54	570.12	570.84	570.83	571.56	571.69	571.42	570.60	570.54	569.90	569.10
1917	569.59	569.91	569.51	570.14	569.06	571.29	571.70	571.79	571.61	570.58	570.90	570.56
1918	570.88	569.84	570.49	570.38	570.03	570.13	569.63	570.87	570.70	570.41	570.62	570.62
1919	570.75	570.16	569.41	570.84	571.59	571.94	571.89	571.56	570.85	571.37	570.76	569.92
1920	569.54	569.39	568.65	569.09	570.65	570.54	570.89	570.63	570.37	569.92	569.75	570.07
1921	570.10	569.70	569.81	570.66	571.26	571.06	571.08	570.92	570.44	570.71	569.38	569.98
1922	570.83	569.31	569.11	570.13	570.65	570.98	570.93	570.76	570.34	570.17	569.46	569.71
1923	569.39	569.08	568.77	569.38	569.76	570.01	570.13	569.96	569.63	569.51	569.33	569.35
1924	570.06	569.42	569.16	569.56	570.17	570.38	570.70	570.57	569.81	569.38	568.74	569.15
1925	568.89	568.46	568.87	569.38	569.51	569.39	569.12	569.20	569.03	568.74	568.57	568.66
1926	568.94	567.87	568.14	568.91	569.17	569.37	569.41	569.17	569.33	569.64	569.88	569.95
1927	569.56	569.31	569.01	569.17	569.84	570.38	570.31	570.23	569.89	569.74	569.39	569.78
1928	570.84	570.02	569.92	569.81	570.27	570.36	570.82	570.86	570.54	569.95	570.00	570.24
1929	570.19	570.27	570.22	571.67	572.10	572.50	572.43	572.14	571.80	571.01	570.97	571.86
1930	571.05	571.52	571.51	571.91	572.15	572.06	571.84	571.39	570.97	570.60	570.31	570.21
1931	570.38	569.49	568.98	568.69	569.43	569.70	569.84	569.57	569.52	569.43	569.15	569.57
1932	568.40	570.25	569.87	569.71	569.82	570.00	570.02	569.77	569.52	569.46	568.83	568.68
1933	569.01	569.09	568.89	569.38	569.91	570.29	570.21	569.83	569.26	569.11	568.49	568.59
1934	568.31	568.21	567.57	567.81	568.44	568.45	568.56	568.35	568.23	568.25	567.99	568.16
1935	568.06	567.70	567.25	568.65	567.37	568.92	569.45	568.63	568.35	567.87	568.20	566.53
1936	568.06	567.70	567.05	569.37	569.10	568.99	569.44	568.99	568.51	569.16	568.42	568.82
1937	568.13	569.93	569.70	569.38	570.15	570.37	570.87	570.60	570.29	569.58	569.21	569.34
1938	568.76	568.77	569.92	570.17	570.35	570.29	570.40	570.62	570.16	569.78	569.44	569.30
1939	569.42	569.08	569.66	569.77	570.53	570.42	570.71	570.65	570.09	569.63	569.64	569.30
1940	569.89	568.66	568.52	569.09	569.44	570.43	570.12	570.71	570.09	570.24	570.06	569.08
1941	570.10	569.36	569.20	569.40	569.53	569.84	569.66	569.61	569.15	568.39	568.37	568.82
1942	568.86	568.30	568.64	569.24	570.14	570.68	570.55	570.58	570.44	570.08	569.64	569.85
1943	570.13	569.36	569.05	570.36	570.47	571.97	572.02	572.08	571.60	571.35	571.16	570.89
1944	570.18	569.52	569.94	569.58	571.23	571.50	571.70	571.31	570.55	570.68	570.12	568.59
1945	569.09	569.32	569.65	570.62	570.80	572.21	571.74	571.71	570.94	571.72	571.13	570.94
1946	570.52	569.17	570.22	571.58	570.99	571.55	571.56	571.75	570.32	570.21	570.57	569.65
1947	570.03	569.24	569.69	570.27	571.55	571.95	572.24	572.20	572.07	571.42	571.76	570.04
1948	571.87	570.51	570.59	571.33	571.54	571.99	571.68	571.35	571.63	570.52	570.40	569.83
1949	569.29	569.45	569.59	571.68	570.86	570.99	570.90	570.67	569.41	569.69	569.28	568.57

* IGLD - International Great Lakes Datum

Table A.7. Beginning-of-Month Levels at Toledo (IGLD^{*} 1955) (continued)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1950	569.41	570.97	569.78	570.25	572.08	571.34	571.23	571.01	570.98	570.51	570.09	569.69
1951	570.45	570.58	570.85	571.14	572.44	572.09	571.84	571.86	571.74	571.06	570.73	570.81
1952	571.25	571.71	572.04	572.41	572.84	572.91	573.42	572.44	572.08	571.64	570.61	570.73
1953	571.05	570.67	571.03	571.76	572.18	572.21	572.04	571.96	571.70	571.14	570.67	570.38
1954	569.41	570.12	569.84	571.06	572.04	571.64	571.57	571.40	571.04	570.93	571.09	571.06
1955	571.37	571.31	571.38	572.01	572.31	572.10	571.75	571.64	571.20	570.87	570.42	569.67
1956	569.94	569.27	569.30	570.44	571.08	571.25	571.43	571.31	571.26	570.83	570.61	569.42
1957	569.01	569.84	570.14	570.23	571.13	571.17	570.98	571.28	570.79	570.17	570.14	568.34
1958	569.25	569.58	569.05	569.61	569.49	569.76	569.73	570.43	569.49	569.04	569.32	568.36
1959	569.07	569.04	569.37	570.10	570.56	570.92	570.40	570.27	570.20	569.88	568.68	568.42
1960	569.88	570.07	569.90	570.38	570.38	571.05	571.42	571.40	571.25	570.97	569.81	568.71
1961	569.64	569.61	570.08	570.57	571.53	571.27	571.39	571.48	571.01	570.33	569.46	569.75
1962	569.59	569.70	569.59	570.38	570.43	570.24	570.69	570.30	570.14	569.95	569.42	569.70
1963	569.36	569.20	568.81	569.73	569.60	570.20	570.03	569.62	569.42	568.88	568.31	568.07
1964	568.59	568.49	568.24	569.35	570.00	570.04	569.43	569.54	569.34	569.14	568.66	568.05
1965	568.60	568.40	569.34	569.94	569.89	569.98	570.02	569.58	569.22	568.79	568.05	568.13
1966	569.35	568.82	569.15	569.43	570.58	570.59	570.73	570.33	570.15	569.33	568.85	568.83
1967	569.90	569.99	569.65	570.33	570.76	571.40	570.94	571.08	570.97	570.08	570.30	570.84
1968	570.45	571.07	570.66	571.04	571.04	571.26	571.39	571.29	571.21	570.37	570.43	570.72
1969	568.80	570.36	571.63	570.79	572.06	572.44	572.27	572.41	572.06	571.54	571.29	570.25
1970	571.31	570.32	570.67	571.48	571.25	571.58	571.57	571.52	571.35	571.20	571.00	570.92
1971	571.20	570.25	570.12	571.53	571.55	572.16	571.84	571.40	572.01	571.54	571.05	570.59
1972	570.77	570.94	571.07	571.57	572.30	572.18	572.41	572.26	572.21	572.68	572.38	571.78
1973	571.55	573.17	572.42	573.69	573.39	573.14	573.42	573.16	572.86	572.95	570.66	571.46
1974	571.96	572.00	572.19	573.22	573.21	573.46	573.05	572.79	572.43	571.50	571.66	574.06

* IGLD - International Great Lakes Datum

Table A.8. Beginning-of-Month Levels at Fermi (IGLD* 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1964	568.53	568.44	568.40	569.17	569.89	570.04	569.44	569.48	569.19	569.02	568.53	567.99
1965	568.54	568.31	569.19	569.70	569.81	569.91	569.88	569.59	569.26	568.95	568.25	568.36
1966	569.29	568.85	569.18	569.57	570.45	570.51	570.61	570.33	570.09	569.35	568.84	568.83
1967	569.87	569.93	569.59	570.27	570.80	571.13	570.96	571.02	570.83	570.13	570.29	570.64
1968	570.40	570.86	570.66	570.97	570.99	571.40	571.45	571.28	571.17	570.46	570.41	570.66
1969	569.04	570.83	571.35	570.88	571.97	572.42	572.26	572.47	572.03	571.53	571.22	570.28
1970	571.22	570.27	570.58	571.20	571.36	571.61	571.59	571.50	571.30	571.13	570.99	570.99
1971	571.13	570.31	570.37	571.63	571.56	572.02	571.80	571.52	571.83	571.46	571.06	570.50
1972	570.89	570.87	571.03	571.50	572.24	572.14	572.39	572.24	572.19	571.93	572.19	571.85
1973	571.79	573.08	572.40	573.53	573.44	573.18	573.55	573.19	572.85	572.75	570.94	571.73
1974	571.91	571.99	572.27	573.18	573.20	573.39	573.12	572.78	572.43	571.51	571.66	573.29

* IGLD - International Great Lakes Datum

Table A.9. Beginning-of-Month Levels at Bar Point (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1967	568.40	570.01	569.73	570.31	570.85	571.16	571.05	571.03	570.83	570.36	570.42	570.67
1968	570.51	570.91	570.78	570.83	570.89	571.34	571.48	571.27	571.20	570.58	570.53	570.73
1969	569.55	570.97	571.34	571.11	572.04	572.38	572.28	572.54	572.07	571.59	571.26	570.40
1970	571.24	570.38	570.62	571.20	571.45	571.65	571.60	571.59	571.25	571.13	571.03	571.05
1971	571.18	570.41	570.52	571.71	571.62	572.01	571.85	571.60	571.85	571.52	571.13	570.56
1972	570.96	571.05	571.09	571.56	572.27	572.20	572.41	572.29	572.24	572.05	572.19	571.97
1973	572.00	573.11	572.43	573.53	573.46	573.20	573.56	573.26	572.86	572.59	571.25	571.53
1974	571.96	572.05	572.33	573.14	573.18	573.40	573.10	572.73	572.43	571.58	571.68	572.72

* IGLD - International Great Lakes Datum

Table A.10. Beginning-of-Month Levels at Kingsville (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	569.36	569.17	568.96	569.83	569.71	570.05	569.92	569.61	569.47	569.04	568.69	568.28
1964	568.56	568.50	568.46	568.97	569.82	569.81	569.57	569.47	569.20	568.95	568.48	568.03
1965	568.48	568.31	569.10	569.56	569.78	569.92	569.82	569.63	569.37	569.14	568.75	568.60
1966	569.37	568.95	569.34	569.74	570.41	570.48	570.61	570.37	570.13	569.47	569.03	569.06
1967	569.85	569.90	569.62	570.26	570.76	570.99	570.98	570.95	570.74	570.23	570.29	570.50
1968	570.48	570.82	570.68	571.02	571.07	571.44	571.53	571.45	571.23	570.74	570.45	570.58
1969	570.19	570.70	571.16	570.95	571.91	572.38	572.27	572.55	572.07	571.54	571.16	570.51
1970	571.19	570.27	570.53	571.06	571.41	571.61	571.59	571.57	571.27	571.13	571.01	570.97
1971	571.11	570.34	570.65	571.58	571.58	571.91	571.89	571.59	571.77	571.40	571.08	570.59
1972	570.98	570.90	571.05	571.55	572.24	572.23	572.44	572.32	572.24	572.13	572.15	572.02
1973	572.13	572.91	572.36	573.44	573.43	573.27	573.58	573.24	572.87	572.60	571.33	571.57
1974	571.92	572.13	572.35	573.11	573.19	573.39	573.19	572.83	572.48	571.72	571.63	572.80

* IGLD - International Great Lakes Datum

Table A.11. Beginning-of-Month Levels at Erieau (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1959	568.89	568.96	569.33	569.85	570.42	570.67	570.37	570.13	569.97	569.56	569.30	569.25
1960	569.83	570.05	570.12	570.20	570.82	571.16	571.40	571.33	571.21	570.84	570.44	569.78
1961	569.70	569.60	570.01	570.55	571.60	571.52	571.44	571.33	571.09	570.69	569.92	569.92
1962	569.60	569.61	569.53	570.13	570.34	570.30	570.45	570.27	570.16	569.86	569.54	569.66
1963	569.36	569.13	568.89	569.73	569.83	570.02	569.89	569.74	569.49	569.15	568.84	568.56
1964	568.56	568.59	568.60	569.23	569.81	569.69	569.61	569.42	569.25	568.94	568.54	568.21
1965	568.50	568.59	569.00	569.47	569.87	569.98	569.83	569.70	569.57	569.31	568.91	568.91
1966	569.41	569.16	569.44	569.92	570.39	570.44	570.51	570.34	570.15	569.65	569.20	569.37
1967	570.00	569.97	569.77	570.33	570.78	570.99	571.08	571.00	570.70	570.36	570.28	570.29
1968	570.51	570.79	570.76	571.02	571.05	571.41	571.49	571.33	571.17	570.72	570.43	570.52
1969	570.31	570.89	571.09	571.06	571.87	572.32	572.28	572.63	572.08	571.58	571.17	570.84
1970	571.12	570.51	570.51	570.96	571.51	571.65	571.66	571.63	571.21	571.09	571.00	570.92
1971	571.07	570.72	570.98	571.57	571.57	571.80	571.82	571.64	571.58	571.37	571.09	570.69
1972	570.98	570.95	571.03	571.58	572.17	572.25	572.44	572.33	572.17	572.14	571.99	572.14
1973	572.35	572.71	572.40	573.33	573.40	573.35	573.58	573.24	572.89	572.43	571.78	571.76
1974	571.96	572.27	572.49	573.06	573.21	573.38	573.26	572.87	572.54	572.00	571.66	572.16

* IGLD - International Great Lakes Datum

Table A.12. Beginning-of-Month Levels at Port Stanley (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1927	569.43	569.09	568.95	569.43	569.82	570.24	570.28	570.24	569.89	569.64	569.35	569.59
1928	570.09	569.93	569.90	569.70	570.20	570.23	570.69	570.75	570.43	570.01	569.87	570.04
1929	570.04	570.26	570.29	571.29	572.13	572.39	572.27	572.04	571.65	571.10	570.95	571.00
1930	570.98	571.56	571.53	571.94	572.18	571.91	571.78	571.35	570.99	570.46	570.14	569.81
1931	569.81	569.42	568.93	568.80	569.42	569.58	569.82	569.65	569.46	569.25	568.97	568.83
1932	568.86	569.72	569.70	569.53	569.78	570.01	569.90	569.71	569.45	569.10	568.73	568.65
1933	568.76	569.03	568.72	569.41	569.96	570.22	570.06	569.67	569.30	569.02	568.48	568.20
1934	568.21	568.10	567.59	567.83	568.44	568.45	568.53	568.31	568.19	567.80	567.83	
1935	567.67	567.67	567.74	568.08	568.40	568.76	568.87	568.99	568.73	568.50	568.18	568.14
1936	568.05	567.64	567.79	568.72	569.17	569.33	569.17	568.99	568.76	568.69	568.62	568.17
1937	568.47	569.24	569.46	569.31	570.27	570.35	570.77	570.59	570.33	569.63	569.28	568.94
1938	568.90	568.61	569.57	569.99	570.23	570.35	570.42	570.47	570.11	569.80	569.48	569.19
1939	569.08	569.10	569.43	569.72	570.40	570.41	570.54	570.49	570.09	569.63	569.48	569.27
1940	569.05	568.65	568.64	569.00	569.90	570.19	570.47	570.16	570.20	569.82	569.62	569.39
1941	569.74	569.66	569.08	569.17	569.45	569.59	569.74	569.62	569.35	568.95	568.96	568.71
1942	568.84	568.59	568.68	569.50	570.12	570.43	570.64	570.72	570.42	570.11	570.02	570.12
1943	570.21	570.09	570.17	570.49	570.94	572.08	572.00	572.10	571.68	571.18	570.94	570.78
1944	570.41	569.83	569.76	570.31	571.19	571.50	571.42	571.01	570.88	570.55	570.19	569.85
1945	569.99	569.62	569.66	570.56	570.93	571.34	571.89	571.76	571.35	571.38	571.25	570.87
1946	570.61	570.83	570.26	570.76	570.75	571.15	571.67	571.34	571.01	570.30	570.26	569.86
1947	569.77	570.01	569.59	570.00	571.47	572.15	572.35	571.96	571.84	571.19	570.96	570.69
1948	570.38	570.26	570.42	571.36	571.65	571.98	571.97	571.63	571.18	570.78	570.32	570.14
1949	569.80	570.40	570.43	570.40	570.71	570.83	570.81	570.53	570.24	569.79	569.43	569.22
1950	569.39	570.30	570.67	571.15	571.49	571.35	571.17	571.03	570.68	570.44	570.31	570.38
1951	570.49	570.55	571.03	571.72	571.92	572.06	572.06	571.80	571.48	571.06	570.74	570.93
1952	571.10	572.00	572.04	572.50	572.74	572.80	572.55	572.22	572.13	571.70	571.05	570.71
1953	570.86	571.18	571.02	571.45	571.52	571.99	572.12	571.89	571.66	571.16	570.81	570.68
1954	570.47	570.32	570.50	571.15	571.91	571.78	571.73	571.54	571.21	570.99	571.51	571.28
1955	571.25	571.34	571.43	572.05	572.28	572.03	571.85	571.60	571.31	570.82	570.75	570.35
1956	570.12	569.50	569.51	570.17	570.75	571.65	571.62	571.50	571.57	570.88	570.46	570.02
1957	569.95	569.76	569.84	570.05	570.94	571.03	571.21	571.13	570.65	570.36	569.91	569.77
1958	570.17	569.55	569.30	569.44	569.72	569.85	570.11	570.12	570.02	569.93	569.38	569.18
1959	568.86	569.03	569.38	569.82	570.43	570.60	570.34	570.07	569.92	569.39	569.51	569.56
1960	569.82	569.97	570.09	570.16	570.84	571.15	571.37	571.26	571.20	570.76	570.61	570.03
1961	569.70	569.50	569.92	570.46	571.54	571.49	571.49	571.30	571.16	570.81	570.16	569.98
1962	569.71	569.57	569.47	570.07	570.30	570.35	570.41	570.23	570.10	569.82	569.57	569.61
1963	569.29	569.07	568.80	569.68	569.83	570.02	569.88	569.72	569.49	569.23	568.90	568.62
1964	568.48	568.56	568.65	569.11	569.71	569.59	569.58	569.31	569.21	568.80	568.42	568.19
1965	568.35	568.62	568.74	569.23	569.75	569.84	569.68	569.50	569.42	569.45	569.17	569.22
1966	569.47	569.28	569.58	570.00	570.26	570.34	570.40	570.26	570.20	569.68	569.28	569.43
1967	570.00	569.86	569.73	570.21	570.63	570.77	570.97	570.78	570.38	570.48	570.25	570.16
1968	570.61	570.74	570.78	571.04	571.06	571.41	571.52	571.36	571.15	570.85	570.39	570.47
1969	570.79	570.90	570.83	571.06	571.77	572.17	572.29	572.62	572.09	571.59	571.13	571.00
1970	570.79	570.50	570.32	570.67	571.32	571.43	571.50	571.71	571.17	571.06	571.06	571.00
1971	570.95	570.81	571.25	571.51	571.61	571.68	571.78	571.61	571.45	571.53	571.08	570.64
1972	571.08	570.89	570.93	571.52	572.03	572.17	572.50	572.37	572.16	572.15	571.79	572.21
1973	572.53	572.40	572.31	573.14	573.24	573.30	573.50	573.19	572.78	572.25	572.14	571.85
1974	571.89	572.31	572.50	572.91	573.10	573.28	573.22	572.82	572.49	572.06	571.65	571.39

* IGLD - International Great Lakes Datum

Table A.13. Beginning-of-Month Levels at Port Dover (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1960	569.75	569.89	570.01	570.12	570.83	571.05	571.31	571.21	571.12	570.65	570.60	570.41
1961	569.67	569.38	569.80	570.38	571.46	571.45	571.33	571.14	571.10	570.72	570.39	569.94
1962	569.84	569.51	569.56	569.98	570.16	570.25	570.25	570.18	570.07	569.76	569.60	569.53
1963	569.21	568.96	568.73	569.52	570.03	569.89	569.77	569.67	569.38	569.18	568.99	568.77
1964	568.31	568.47	568.48	568.98	569.51	569.40	569.55	569.19	569.13	568.63	568.25	568.13
1965	568.23	568.63	568.48	569.02	569.72	569.70	569.67	569.52	569.54	569.53	569.49	569.48
1966	569.41	569.59	569.72	570.09	570.28	570.40	570.40	570.31	570.08	569.77	569.32	569.68
1967	570.05	569.87	569.84	570.17	570.57	570.78	571.01	570.84	570.46	570.48	570.09	569.88
1968	570.63	570.61	570.71	571.01	571.08	571.32	571.51	571.27	570.95	570.91	570.27	570.34
1969	571.46	570.87	570.60	571.00	571.71	572.08	572.23	572.56	572.00	571.48	570.89	571.21
1970	570.54	570.49	570.22	570.57	571.27	571.41	571.53	571.60	571.09	571.00	570.89	570.80
1971	570.74	570.80	571.37	571.32	571.56	571.57	571.70	571.58	571.12	571.14	570.96	570.75
1972	570.99	570.81	570.80	571.50	571.92	572.19	572.32	572.23	572.02	572.14	571.54	572.31
1973	572.79	572.06	572.21	572.97	573.10	573.30	573.38	573.04	572.71	571.95	572.54	571.94
1974	571.87	572.39	572.51	572.83	573.07	573.20	573.18	572.82	572.51	572.17	571.55	570.66

* IGLD - International Great Lakes Datum

Table A.14. Beginning-of-Month Levels at Port Colborne (IGLD^{*} 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1912	570.61	569.34	569.39	569.63	570.44	570.77	570.20	570.64	570.55	570.78	570.45	569.99
1913	569.52	571.85	570.14	571.94	571.97	571.99	571.81	571.36	570.95	570.45	570.90	570.15
1914	570.36	570.44	569.49	569.73	570.54	571.32	571.11	570.87	570.80	569.99	570.29	569.44
1915	569.52	568.13	569.64	569.46	569.61	569.52	569.84	570.18	570.13	569.62	570.22	570.10
1916	569.41	570.41	569.67	570.25	570.60	570.99	571.17	570.83	570.67	569.89	570.09	570.07
1917	569.93	569.21	569.22	569.93	571.31	571.30	571.93	571.94	571.35	571.46	571.38	571.09
1918	570.06	569.52	569.73	570.33	569.87	570.49	571.20	570.42	570.61	570.26	570.48	570.70
1919	570.70	570.67	570.89	570.66	571.16	571.88	571.60	571.26	571.10	570.29	570.61	571.22
1920	569.94	568.57	568.56	569.04	570.22	570.38	570.66	570.73	570.85	570.21	570.48	569.91
1921	569.80	569.33	569.64	570.49	571.12	570.85	570.99	570.90	570.36	570.86	568.97	569.86
1922	570.92	569.15	568.91	569.96	570.54	570.89	570.83	570.68	570.19	570.04	569.23	569.75
1923	569.26	568.88	568.61	569.15	569.63	569.87	570.08	569.88	569.56	569.37	569.26	569.36
1924	570.06	569.19	569.01	569.38	570.02	570.30	570.77	570.25	570.19	570.40	570.01	569.11
1925	567.85	568.30	568.75	569.23	569.42	569.31	569.23	569.07	568.92	568.24	568.41	568.54
1926	569.06	567.71	568.16	569.18	569.12	569.31	569.29	569.00	569.25	569.50	569.90	569.97
1927	569.51	569.35	568.93	568.96	569.74	570.32	570.21	570.10	569.79	569.72	569.26	569.69
1928	571.13	570.02	569.92	569.80	570.33	570.29	570.77	570.82	570.48	569.86	569.96	570.24
1929	570.14	570.23	570.12	571.77	572.02	572.41	572.42	572.09	571.79	570.84	570.89	572.07
1930	571.01	571.51	571.48	571.97	572.11	572.03	571.78	571.30	570.92	570.53	570.30	570.34
1931	570.55	569.47	568.89	568.50	569.36	569.64	569.78	569.43	569.50	569.43	569.15	569.73
1932	568.11	570.37	569.89	569.73	569.79	569.94	569.98	569.69	569.46	569.56	568.80	568.63
1933	569.02	569.07	568.93	569.35	569.83	570.23	570.19	569.82	569.17	569.10	568.41	568.64
1934	568.27	568.08	567.49	567.73	568.36	568.34	568.46	568.24	568.14	568.15	568.00	568.22
1935	568.13	567.51	567.72	567.81	568.79	568.71	568.73	569.12	568.83	568.68	568.05	568.68
1936	568.10	567.72	567.74	568.66	569.03	569.39	569.09	568.96	568.80	568.46	568.66	567.94
1937	568.70	570.02	569.73	569.31	570.02	570.29	570.78	570.57	570.19	569.50	569.09	569.38
1938	568.65	568.81	570.07	570.23	570.29	570.17	570.32	570.58	570.06	569.64	569.35	569.22
1939	569.47	569.00	569.76	569.74	570.52	570.32	570.67	570.62	570.00	569.50	569.61	569.24
1940	570.05	568.58	568.35	569.03	569.78	570.06	570.60	570.04	570.13	569.63	569.41	569.47
1941	569.68	569.75	569.10	569.01	569.41	569.41	569.73	569.66	569.52	569.08	568.98	568.60
1942	568.70	569.87	568.64	569.53	569.97	570.24	570.61	570.72	570.27	570.05	570.16	570.13
1943	570.35	570.58	570.31	570.42	571.26	572.00	572.01	572.10	571.65	571.02	570.79	570.89
1944	570.60	570.08	569.85	570.57	571.07	571.40	571.41	570.91	570.82	570.39	570.12	570.99
1945	570.47	569.69	569.57	570.57	571.01	571.10	571.90	571.62	571.39	571.16	571.28	570.73
1946	570.92	571.49	570.21	570.34	570.69	570.85	571.59	570.99	571.27	570.54	570.18	570.11
1947	569.60	570.34	569.46	569.86	571.39	572.09	572.33	571.98	571.74	571.13	570.56	571.03
1948	569.51	570.01	570.24	571.29	571.72	571.95	572.11	571.80	571.01	570.85	570.26	570.46
1949	570.55	571.19	571.05	569.72	570.57	570.70	570.64	570.47	570.75	569.93	569.45	569.61
1950	569.25	569.98	571.23	571.12	571.20	571.28	571.14	570.99	570.55	570.32	570.31	570.87
1951	570.61	570.45	571.09	571.75	571.72	571.97	572.10	571.81	571.06	570.97	570.83	570.94
1952	571.04	572.09	572.00	572.44	572.69	572.77	572.21	572.27	572.09	571.74	571.32	570.88
1953	570.73	571.53	571.10	571.37	571.24	571.89	572.17	571.84	571.64	571.22	570.90	570.76
1954	571.14	570.46	570.85	571.23	571.83	571.74	571.80	571.68	571.43	570.99	571.49	571.58
1955	571.43	571.32	571.51	572.06	572.26	572.12	571.94	571.64	571.60	570.91	570.80	570.76
1956	570.34	569.58	569.57	570.27	570.77	571.70	571.55	571.42	571.41	570.92	570.29	570.25
1957	570.56	569.66	569.65	569.94	570.86	571.00	571.46	571.15	570.55	570.49	569.84	570.59
1958	570.68	569.61	569.36	569.40	569.71	569.75	570.12	570.01	570.25	570.27	569.38	569.52
1959	568.60	568.98	569.29	569.70	570.44	570.53	570.34	570.21	569.87	569.12	569.96	570.07
1960	569.76	569.96	570.07	570.12	570.88	571.14	571.45	571.34	571.17	570.71	570.68	570.89
1961	569.76	569.40	569.82	570.46	571.50	571.54	571.37	571.11	571.18	570.83	570.66	569.99
1962	570.03	569.55	569.64	570.03	570.15	570.34	570.28	570.25	570.13	569.89	569.74	569.56
1963	569.46	568.99	568.78	569.52	570.14	569.93	569.81	569.81	569.51	569.35	569.32	569.10
1964	568.35	568.51	568.51	569.05	569.53	569.41	569.66	569.21	569.20	568.64	568.27	568.23
1965	568.30	568.74	568.49	569.06	569.82	569.80	569.75	569.54	569.59	569.74	569.81	569.84
1966	569.57	570.12	569.93	570.16	570.37	570.46	570.44	570.39	570.14	570.02	569.45	569.98
1967	570.17	569.96	569.97	570.21	570.59	570.75	571.06	570.96	570.52	570.73	570.16	569.89
1968	570.83	570.66	570.79	571.19	571.28	571.38	571.65	571.40	571.01	571.28	570.40	570.44
1969	572.14	570.99	570.58	571.27	571.73	572.12	572.37	572.64	572.09	571.67	571.02	571.65
1970	570.53	570.62	570.36	570.61	571.41	571.51	571.76	571.81	571.34	571.14	571.06	570.92
1971	570.78	570.89	571.63	571.41	571.69	571.61	571.81	571.74	571.16	571.17	571.09	570.82
1972	571.17	571.02	570.86	571.56	572.07	572.33	572.41	572.35	572.10	572.30	571.52	572.57
1973	573.19	571.97	572.27	572.98	573.16	573.44	573.48	573.17	572.87	571.96	572.98	572.19
1974	572.02	572.60	572.64	572.93	573.17	573.27	573.30	572.97	572.67	572.33	571.65	570.33

* IGLD - International Great Lakes Datum

Table A.15. Lake Erie Beginning-of-Month Levels (IGLD* 1955)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1900	569.57	569.69	569.78	570.21	570.44	570.54	570.51	570.46	570.34	569.91	569.70	569.71
1901	569.52	569.21	568.83	569.27	569.29	569.63	569.96	570.03	570.06	569.65	569.34	569.14
1902	569.36	569.01	568.63	569.44	569.72	570.02	570.40	571.07	570.56	570.61	570.21	569.97
1903	569.80	569.66	569.86	570.54	571.32	571.14	571.05	571.04	570.93	570.39	570.03	569.83
1904	569.53	569.51	569.63	570.76	571.39	571.61	571.52	571.39	571.04	570.80	570.37	569.97
1905	569.74	569.45	569.19	569.70	570.24	570.75	571.20	571.11	570.92	570.61	570.20	570.19
1906	570.16	570.31	569.83	570.06	570.39	570.55	570.77	570.76	570.65	570.48	570.38	570.35
1907	570.45	570.91	570.37	570.81	570.92	571.16	571.43	571.36	570.90	570.87	570.62	570.48
1908	570.71	570.48	570.42	571.15	571.50	571.78	571.52	571.37	571.02	570.58	570.27	569.81
1909	569.67	569.72	569.83	569.94	570.56	571.18	571.30	571.05	570.80	570.27	569.68	569.79
1910	569.46	569.34	569.32	569.96	570.52	570.78	570.58	570.51	570.21	569.99	569.69	569.79
1911	569.15	569.16	569.09	569.38	569.91	570.04	570.00	569.65	569.63	569.59	569.50	569.27
1912	569.55	569.30	569.18	569.90	570.64	570.74	570.75	570.63	570.54	570.34	570.24	569.84
1913	569.62	570.70	570.33	571.77	572.14	571.97	571.75	571.49	571.06	570.63	570.33	570.39
1914	570.23	569.92	569.61	569.96	570.54	571.18	570.97	570.72	570.56	570.19	569.80	569.50
1915	569.27	569.23	569.55	569.42	569.55	569.78	569.96	570.20	570.27	570.19	569.77	569.41
1916	569.53	570.12	569.92	570.27	570.73	571.20	571.38	571.17	570.62	570.21	569.83	569.64
1917	569.65	569.58	569.35	569.99	570.68	571.32	571.76	571.86	571.45	571.18	571.09	570.89
1918	570.34	569.66	569.99	570.36	570.03	570.43	570.65	570.66	570.54	570.40	570.40	570.13
1919	570.49	570.38	570.09	571.02	571.35	571.94	571.69	571.37	571.08	570.69	570.58	570.00
1920	569.68	569.14	568.67	569.23	570.26	570.39	570.69	570.70	570.65	570.44	570.05	570.06
1921	569.97	570.05	569.75	570.57	571.19	571.18	571.08	570.75	570.36	570.01	569.91	569.86
1922	569.90	569.33	569.22	569.99	570.64	570.93	570.84	570.68	570.37	570.14	569.62	569.22
1923	569.15	569.06	568.72	569.33	569.66	570.02	570.04	569.94	569.58	569.55	569.12	568.99
1924	569.60	569.40	569.14	569.55	570.04	570.27	570.63	570.42	570.01	569.94	569.38	569.18
1925	568.92	568.46	568.77	569.34	569.38	569.26	569.21	569.15	569.08	568.86	568.52	568.62
1926	568.25	568.14	567.94	568.28	569.14	569.23	569.35	569.24	569.23	569.71	569.67	569.68
1927	569.48	569.07	568.98	569.47	569.81	570.26	570.24	570.23	569.86	569.57	569.25	569.68
1928	570.17	569.88	569.80	569.68	570.12	570.21	570.72	570.73	570.46	569.96	569.85	570.02
1929	570.06	570.22	570.23	571.27	572.14	572.43	572.30	572.08	571.64	571.19	570.93	571.11
1930	570.90	571.48	571.48	571.86	572.12	571.90	571.76	571.34	570.93	570.58	570.19	569.84
1931	569.79	569.41	568.99	568.89	569.40	569.61	569.75	569.65	569.41	569.23	569.01	569.00
1932	568.87	569.75	569.74	569.58	569.73	569.98	569.89	569.71	569.45	569.08	568.71	568.61
1933	568.81	568.95	568.75	569.33	569.87	570.25	570.02	569.67	569.26	568.98	568.46	568.25
1934	568.20	567.91	567.55	567.79	568.40	568.44	568.51	568.31	568.20	568.22	567.79	567.77
1935	567.72	567.61	567.61	568.12	568.40	568.77	568.88	568.95	568.71	568.40	568.16	568.09
1936	567.99	567.58	567.75	568.80	569.12	569.26	569.21	569.00	568.76	568.69	568.46	568.22
1937	568.38	569.44	569.43	569.33	570.23	570.30	570.78	570.60	570.26	569.53	569.23	568.92
1938	568.81	568.64	569.57	569.94	570.23	570.29	570.36	570.48	570.10	569.83	569.44	569.22
1939	569.08	569.10	569.37	569.69	570.45	570.40	570.53	570.48	570.08	569.72	569.49	569.22
1940	569.16	568.63	568.65	569.00	569.82	570.19	570.43	570.24	570.16	569.86	569.58	569.36
1941	569.77	569.60	569.15	569.17	569.45	569.59	569.72	569.64	569.34	568.90	568.82	568.70
1942	568.78	568.62	568.66	569.48	570.08	570.45	570.60	570.67	570.37	570.09	569.99	570.06
1943	570.21	570.05	570.02	570.41	570.99	572.03	572.03	572.09	571.63	571.19	570.92	570.72
1944	570.36	569.87	569.89	570.24	571.15	571.48	571.48	571.05	570.76	570.54	570.11	570.03
1945	569.93	569.56	569.63	570.57	570.95	571.43	571.86	571.71	571.30	571.33	571.20	570.93
1946	570.68	570.58	570.22	570.78	570.77	571.16	571.64	571.35	570.89	570.52	570.26	569.97
1947	569.78	569.94	569.59	570.01	571.46	572.09	572.33	572.02	571.85	571.25	571.00	570.60
1948	570.52	570.26	570.43	571.30	571.64	571.97	571.99	571.66	571.26	570.76	570.33	570.18
1949	570.04	570.35	570.59	570.52	570.70	570.82	570.77	570.57	570.18	569.75	569.46	569.20
1950	569.34	570.34	570.48	570.95	571.50	571.30	571.14	571.01	570.68	570.41	570.25	570.36
1951	570.46	570.56	570.98	571.62	571.95	572.04	572.04	571.81	571.43	571.00	570.79	570.87
1952	571.08	571.88	572.04	572.44	572.77	572.82	572.62	572.30	572.07	571.70	570.98	570.81
1953	570.89	571.18	571.10	571.47	571.58	572.03	572.10	571.90	571.67	571.17	570.79	570.66
1954	570.43	570.25	570.53	571.14	571.90	571.75	571.72	571.53	571.29	570.95	571.43	571.32
1955	571.29	571.31	571.42	572.01	572.27	572.06	571.84	571.60	571.39	570.89	570.67	570.39
1956	570.15	569.50	569.49	570.26	570.83	571.60	571.55	571.44	571.45	570.86	570.46	569.95
1957	570.04	569.77	569.88	570.05	570.95	571.05	571.26	571.17	570.65	570.37	569.94	569.76
1958	570.12	569.60	569.27	569.46	569.66	569.68	570.00	570.15	570.02	569.85	569.36	569.13
1959	568.81	568.98	569.33	569.84	570.43	570.63	570.41	570.20	569.95	569.53	569.52	569.40

* IGLD - International Great Lakes Datum

Table A.15. Lake Erie Beginning-of-Month Levels (IGLD^{*} 1955) (continued)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1960	569.81	570.01	570.03	570.18	570.76	571.11	571.38	571.31	571.19	570.81	570.31	570.07
1961	569.68	569.52	569.93	570.52	571.53	571.46	571.41	571.30	571.10	570.64	570.12	569.91
1962	569.70	569.59	569.57	570.13	570.30	570.30	570.42	570.26	570.11	569.85	569.61	569.62
1963	569.40	569.07	568.85	569.69	569.99	570.01	569.88	569.71	569.47	569.15	568.92	568.72
1964	568.46	568.50	568.50	569.08	569.71	569.64	569.57	569.33	569.24	568.82	568.42	568.19
1965	568.38	568.51	568.81	569.31	569.78	569.86	569.79	569.58	569.47	569.34	569.13	569.09
1966	569.41	569.36	569.56	569.94	570.38	570.47	570.51	570.33	570.14	569.69	569.17	569.50
1967	569.96	569.90	569.79	570.22	570.69	570.90	571.01	570.94	570.66	570.41	570.22	570.23
1968	570.61	570.71	570.73	571.04	571.10	571.40	571.54	571.34	571.09	570.81	570.38	570.50
1969	570.76	570.87	570.95	571.03	571.82	572.23	572.29	572.58	572.06	571.54	570.95	571.01
1970	570.93	570.41	570.41	570.83	571.37	571.53	571.59	571.65	571.28	571.11	570.98	570.88
1971	570.96	570.66	571.05	571.45	571.59	571.77	571.82	571.63	571.47	571.33	571.07	570.76
1972	571.01	570.92	570.94	571.52	572.08	572.25	572.41	572.31	572.15	572.19	571.85	572.18
1973	572.46	572.50	572.31	573.24	573.28	573.30	573.51	573.18	572.82	572.28	572.00	571.83
1974	571.96	572.32	572.43	572.99	573.13	573.31	573.20	572.86	572.53	572.09	571.62	571.73

* IGLD - International Great Lakes Datum

Table A.16. Lake Erie Monthly Change in Storage in TCFS-Months*

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1900	12	10	44	24	10	-3	-5	-12	-46	-22	1	-18
1901	-32	-43	45	2	35	35	7	3	-44	-32	-21	23
1902	-36	-43	84	30	31	40	69	-53	5	-41	-26	-18
1903	-14	23	70	83	-19	-10	-1	-11	-58	-37	-21	-31
1904	-2	13	117	67	23	-10	-13	-36	-26	-44	-43	-24
1905	-30	-30	53	58	53	48	-9	-20	-33	-42	-1	-3
1906	16	-55	24	35	16	23	-1	-11	-18	-10	-3	10
1907	47	-62	45	12	25	29	-7	-47	-3	-26	-15	24
1908	-24	-7	75	37	29	-28	-16	-36	-47	-32	-49	-14
1909	5	13	11	66	64	13	-26	-26	-56	-61	12	-34
1910	-12	-2	66	60	27	-21	-7	-31	-23	-31	11	-66
1911	1	-8	30	56	13	-4	-36	-2	-4	-9	-24	35
1912	-26	-13	74	79	10	1	-12	-9	-21	-10	-43	-23
1913	111	-42	148	39	-18	-23	-27	-44	-46	-31	6	-16
1914	-32	-35	36	62	66	-22	-26	-16	-39	-40	-32	-24
1915	-4	36	-13	14	24	19	25	7	-8	-43	-38	12
1916	61	-22	36	49	48	19	-22	-57	-44	-39	-20	1
1917	-7	-26	66	74	66	47	10	-42	-29	-9	-21	-57
1918	-70	38	38	-35	41	23	1	-12	-15	0	-29	37
1919	-11	-33	96	35	61	-27	-33	-30	-42	-11	-62	-33
1920	-56	-52	58	110	13	32	1	-5	-22	-40	1	-9
1921	8	-34	85	66	-1	-11	-34	-40	-37	-10	-5	4
1922	-59	-13	79	69	30	-10	-16	-32	-24	-54	-43	-7
1923	-9	-39	63	35	37	2	-10	-37	-3	-44	-14	63
1924	-21	-29	42	52	24	38	-22	-42	-8	-58	-21	-27
1925	-47	35	59	4	-12	-5	-6	-7	-23	-35	11	-38
1926	-11	-23	35	92	9	13	-11	-1	51	-4	1	-20
1927	-42	-10	50	36	46	-2	-1	-38	-31	-33	46	50
1928	-30	-9	-12	47	9	54	1	-28	-53	-11	18	4
1929	16	1	107	93	30	-14	-23	-45	-48	-27	19	-22
1930	60	0	39	28	-23	-15	-43	-42	-37	-40	-37	-5
1931	-39	-48	-10	54	22	15	-10	-25	-19	-23	-1	-13
1932	91	-1	-16	16	26	-10	-19	-27	-39	-38	-11	21
1933	14	-23	60	58	39	-24	-36	-42	-30	-54	-22	-5
1934	-30	-41	25	65	4	8	-21	-11	2	-44	-2	-5
1935	-11	0	53	30	38	12	7	-25	-33	-25	-8	-10
1936	-42	19	108	34	14	-5	-22	-25	-8	-24	-26	16
1937	109	-1	-10	96	7	51	-19	-35	-78	-31	-33	-11
1938	-18	106	38	31	6	8	12	-39	-29	-40	-23	-14
1939	2	31	33	81	-5	14	-5	-41	-38	-24	-29	-6
1940	-55	2	36	87	38	26	-20	-8	-32	-29	-23	42
1941	-18	-51	2	30	14	14	-8	-31	-47	-8	-13	8
1942	-16	5	85	64	38	16	7	-31	-30	-10	8	16
1943	-16	-3	40	62	107	0	6	-47	-47	-28	-21	-37
1944	-50	2	36	97	34	0	-44	-30	-23	-44	-8	-10
1945	-38	8	97	40	50	46	-16	-42	3	-13	-29	-26
1946	-10	-41	58	-1	40	51	-30	-47	-39	-27	-31	-20
1947	16	-40	43	155	65	26	-32	-18	-64	-26	-43	-8
1948	-27	19	90	36	34	2	-34	-41	-53	-44	-16	-14
1949	32	27	-7	19	12	-5	-21	-40	-46	-30	-28	14
1950	103	16	48	59	-21	-17	-13	-34	-29	-16	12	8
1951	10	48	66	35	9	0	-24	-39	-46	-22	8	22
1952	82	18	41	35	5	-21	-33	-24	-39	-74	-18	8
1953	30	-9	38	12	46	8	-21	-24	-53	-39	-14	-24
1954	-19	32	63	81	-16	-3	-20	-25	-36	50	-12	-3
1955	2	13	61	28	-22	-23	-25	-22	-53	-23	-30	-25
1956	-67	-1	75	61	79	-5	-11	1	-63	-41	-54	9
1957	-28	13	18	96	10	22	-9	-54	-30	-44	-19	37
1958	-54	-38	20	21	2	34	16	-13	-18	-50	-24	-33
1959	18	40	53	63	21	-23	-22	-26	-45	-1	-13	43

*TCFS-Months - thousands of cubic feet per second months

Table A.16. Lake Erie Monthly Change in Storage in TCFS-Months* (continued)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1960	21	2	16	62	36	29	-7	-12	-40	-52	-26	-40
1961	-16	47	61	108	-7	-5	-11	-21	-49	-54	-22	-22
1962	-11	-2	58	18	0	13	-16	-16	-28	-25	1	-23
1963	-34	-25	87	32	2	-14	-18	-25	-34	-24	-21	-27
1964	4	0	60	67	-7	-8	-25	-9	-45	-41	-24	20
1965	13	34	52	50	8	-8	-22	-11	-14	-22	-4	33
1966	-5	23	39	47	9	4	-19	-20	-48	-54	35	50
1967	-6	-13	44	50	22	12	-7	-29	-27	-20	1	39
1968	10	2	32	6	31	15	-21	-26	-30	-44	13	26
1969	11	9	8	84	42	6	30	-54	-55	-61	6	-8
1970	-54	0	43	58	16	6	6	-38	-18	-13	-11	8
1971	-31	44	41	15	19	5	-20	-16	-15	-27	-33	26
1972	-9	2	60	60	18	17	-10	-16	4	-35	35	29
1973	4	-27	96	4	2	22	-34	-37	-58	-29	-18	13
1974	37	13	58	15	19	-12	-35	-34	-47	-48	12	13

*TCFS-Months - thousands of cubic feet per second months

Environmental Research LABORATORIES

The mission of the Environmental Research Laboratories is to study the oceans, inland waters, the lower and upper atmosphere, the space environment, and the Earth, in search of the understanding needed to provide more useful services in improving man's prospects for survival as influenced by the physical environment. The following laboratories contribute to this mission.

MESA	<i>Marine EcoSystems Analysis Program Office.</i> Plans and coordinates regional programs of basic and applied research directed toward the solution of environmental problems which involve the functioning, health and restoration of marine ecosystems.	GLERL	<i>Great Lakes Environmental Research Laboratory.</i> Research areas include: physical, chemical, and biological limnology; lake-air interactions, lake hydrology, lake level forecasting, and lake ice studies (Ann Arbor, Michigan).
OCSEA	<i>Outer Continental Shelf Environmental Assessment Program Office.</i> Plans and directs assessments of the primary environmental impact of energy development along broad areas of the outer continental shelf of the United States; coordinates related research activities of federal, state and private institutions.	GFDL	<i>Geophysical Fluid Dynamics Laboratory.</i> Research areas include: dynamics and physics of geophysical fluid systems; development of a theoretical basis, through mathematical modeling and computer simulation, for the behavior and properties of the atmosphere and the oceans (Princeton, New Jersey).
W/M	<i>Weather Modification Program Office.</i> Plans and directs ERL weather modification research for precipitation enhancement and severe storms mitigation; operates ERL's research aircraft.	APCL	<i>Atmospheric Physics and Chemistry Laboratory.</i> Research areas include: processes of cloud and precipitation physics; chemical composition and nucleating substances in the lower atmosphere; laboratory and field experiments toward developing feasible methods of weather modification.
NHEML	<i>National Hurricane and Experimental Meteorology Laboratory.</i> Develops techniques for more effective understanding and forecasting of tropical weather. Research areas include: hurricanes and tropical cumulus systems; experimental methods for their beneficial modification.	NSSL	<i>National Severe Storms Laboratory.</i> Research is directed toward improved methods of predicting and detecting tornadoes, squall lines, thunderstorms, and other severe local convective phenomena (Norman, Oklahoma).
RFC	<i>Research Facilities Center.</i> Provides aircraft and related instrumentation for environmental research programs. Maintains liaison with user and provides required operations or measurement tools, logged data, and related information for airborne or selected surface research programs.	WPL	<i>Wave Propagation Laboratory.</i> Research areas include: theoretical research on radio waves, optical waves, and acoustic gravity waves; experimental research and development on new forms of remote sensing.
(CIRES)	<i>Theoretical Studies Group.</i> Provides NOAA participation in the Cooperative Institute for Research in Environmental Sciences (CIRES), a joint activity with the University of Colorado. Conducts cooperative research studies of a theoretical nature on environmental problems.	ARL	<i>Air Resources Laboratories.</i> Research areas include: diffusion, transport, and dissipation of atmospheric contaminants; development of methods for prediction and control of atmospheric pollution; geophysical monitoring for climatic change (Silver Spring, Maryland).
AOML	<i>Atlantic Oceanographic and Meteorological Laboratories.</i> Research areas include: geology and geophysics of ocean basins and borders, oceanic processes, sea-air interactions and remote sensing of ocean processes and characteristics (Miami, Florida).	AL	<i>Aeronomy Laboratory.</i> Research areas include: theoretical, laboratory, rocket, and satellite studies of the physical and chemical processes controlling the ionosphere and exosphere of the Earth and other planets, and of the dynamics of their interactions with high-altitude meteorology.
PMEL	<i>Pacific Marine Environmental Laboratory.</i> Research areas include: environmental processes with emphasis on monitoring and predicting the effects of man's activities on estuarine, coastal, and near-shore marine processes (Seattle, Washington).	SEL	<i>Space Environment Laboratory.</i> Research areas include: solar-terrestrial physics, service and technique development in the areas of environmental monitoring and forecasting.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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