Summary Data Atlas of Lake Ontario and Lake Erie

Summarization of Temperature Data and Oxygen Content by Months for Lake Ontario and Lake Erie, 1960-1970

C.C.I.W. PAPER NO. 10

CANADA CENTRE FOR INLAND WATERS
BURLINGTON, ONTARIO, 1973

Environment Canada | Environnement Canada

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INTRODUCTION

This Atlas summarizes temperature and dissolved oxygen data from lake-wide sampling surveys of Lake Ontario and Lake Erie during the years 1960-1970 inclusive. The purpose is to provide information on the ranges of value and average conditions of temperature and oxygen content of the lakes for scientific, engineering, and water management needs.

In order to achieve this, a summary was made of temperature and oxygen data collected by the Great Lakes Institute of the University of Toronto (now the Institute of Environmental Sciences and Engineering, University of Toronto) and the Canada Centre for Inland Waters in a series of surveys of Lake Ontario and Lake Erie from 1960 to 1970. Surface and near bottom values were summarized by machine plotting and hand contouring the data for each cruise. These contoured data were then digitized by hand on a predetermined grid and the gridded values summarized by month for presentation in this Atlas. A regular rectangular grid was made up to fit the lake and the size of the grid was determined by approximately equating the number of grid points that appeared on the lake to the number of actual observations that would be made during a typical survey.

Presented in this Atlas is the near surface temperature, the near bottom temperature, the near bottom percent saturation of oxygen (relative to the mean atmospheric pressure) and the depth of the top of the hypolimnion (the deep, near isothermal layer of the lake). The values given are a summary of monthly gridded values. The first number at any grid point is the minimum value interpolated at that point from all the observations made during that month for the periods included. A whole survey was considered to be in a particular month if more than half of it was observed in that month. The second value at a grid point is the average of all the values interpolated at that point during the month presented. The decimal point of the average value represents the grid point to which the values were interpolated. The third value is the maximum obtained and the fourth and last number is the number of values available for the monthly summarization at the grid point.

The temperature data used were primarily reversing-thermometer data from one metre depth and from a depth within twenty percent of the total depth from the bottom, at each observation point. The reversing thermometer measures temperature to at least an accuracy of ± 0.05°C but real temperatures of near surface waters would not have been measured this accurately because of the water being mixed by the ship taking the observation. Data from mechanical bathythermograph traces were used to supplement missing reversing-thermometer temperatures in a few instances. The bathythermograph data can only be expected to be accurate to ± 0.5°C.

The data concerning the depth of the top of the hypolimnion were extracted from mechanical bathythermograph traces. Normally, during summer months the Great Lakes are divided into three layers defined by the temperature profile from the surface to the bottom of the lake. These layers are known as the epilimnion, mesolimnion and hypolimnion. The epilimnion is the warmer, nearly isothermal layer at the surface of the lake. The hypolimnion is the deepest nearly isothermal layer. The mesolimnion is more often called the thermocline and is the layer between the epilimnion and hypolimnion where a sharp temperature gradient exists. There are many variations of this structure in the lakes but for purposes of this Atlas the depth of the top of the hypolimnion was defined as the depth where the change of gradient of the temperature was greatest at the bottom of the mesolimnion. This point was digitized by persons examining the traces and selecting the depth according to the above definition.

The percent saturation of oxygen indicates eutrophic conditions of the lakes by showing the depression of the oxygen content near the bottom. These charts should be used in conjunction with the depth of the top of the hypolimnion charts to determine the degree of oxygen depletion in the hypolimnion. Generally speaking the epilimnion will be saturated with oxygen. In the winter it has been found that Lake Erie is 93% or more saturated with oxygen from surveys sponsored by the Canada Centre for Inland Waters from the Icebreaker *CGSS McLean* during February and March, 1971.

The percent saturation of oxygen near the bottom of the lakes was calculated from the oxygen content determined from a sample of water and the *in situ* temperature of the lake. The determination of oxygen content using

modified Winkler methods is estimated to be accurate to 0.1 ppm (Rodgers 1972) and the accuracy of the calculation of the percent saturation (Dobson 1968) from the original values of oxygen content and temperature (by reversing thermometers) is estimated to be within 0.3% saturation. The 0.1 ppm error in the oxygen content determination is calculated to produce up to 1.0% saturation error. Hence the total error of percent oxygen saturation can be up to 1.3%. Data for percent oxygen saturation for Lake Erie was obtained by calculating the percent saturation from observed values and then plotting, contouring, digitizing and summarizing these values. However, for Lake Ontario, interpolated gridded values of oxygen content and temperature were used to calculate the percent saturation of oxygen near the bottom of the lake. A comparison of the two methods shows a mean difference of 1.5% saturation at a series of grid points and the standard deviation of these differences was 7.7%. These differences would arise in the interpolation of values at a grid point.

It should be noted that, unlike temperature, oxygen percent saturation is not a climatological parameter. From 1960 to 1970 the oxygen conditions have been changing, particularly in Lake Erie (Gilbertson, Dobson and Lee 1972) depending on progressing eutrophication. These changes are not reflected in the average oxygen percent saturation maps presented here.

As sufficient data become available it is planned to produce further Atlases of other lakes and other parameters.

ACKNOWLEDGMENTS

Individuals responsible for the production of this Data Atlas were D.G. Robertson, R.K. Dolling, R. Gottinger, Mrs. V.A. Jackson, Miss J.E. Bond, Mrs. D.E. Jordan and Miss P. Lloyd-Jones of the Canada Centre for Inland Waters.

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Lake Ontario Cruise 66-4, June 21-25, 1966. Limnological Data Report No. 3. 88 pp.

Lake Ontario Cruise 66-5, June 26-30, 1966. Limnological Data Report No. 4. 113 pp.

Lake Ontario Cruise 66-6, July 4-10, 1966. Limnological Data Report No. 5. 125 pp.

Lake Ontario Cruise 66-7, July 12-15, Cruise 66-8, July 19-24, 1966. Limnological Data Report No. 6. 116 pp.

Lake Ontario Cruise 66-9, July 26-29, Cruise 66-10, August 2-7, 1966. Limnological Data Report No. 7. 113 pp.

Lake Erie Cruise 66-11, August 8-14, 1966. Limnological Data Report No. 8. 105 pp.

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Figure 1. Bathymetry of Lake Ontario

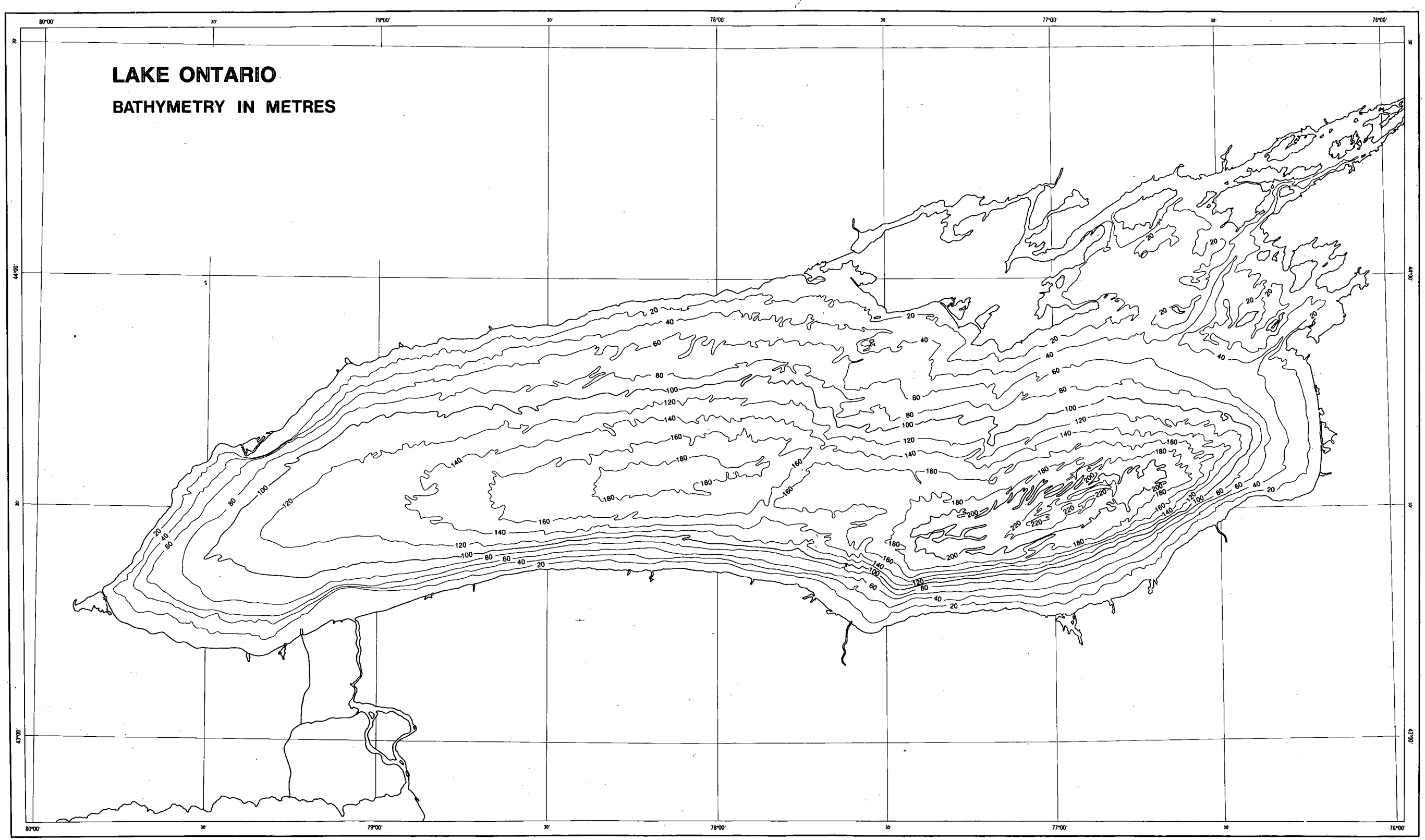

LAKE ONTARIO
BATHYMETRY IN METRES
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 1

Figure 2. Bathymetry of Lake Erie

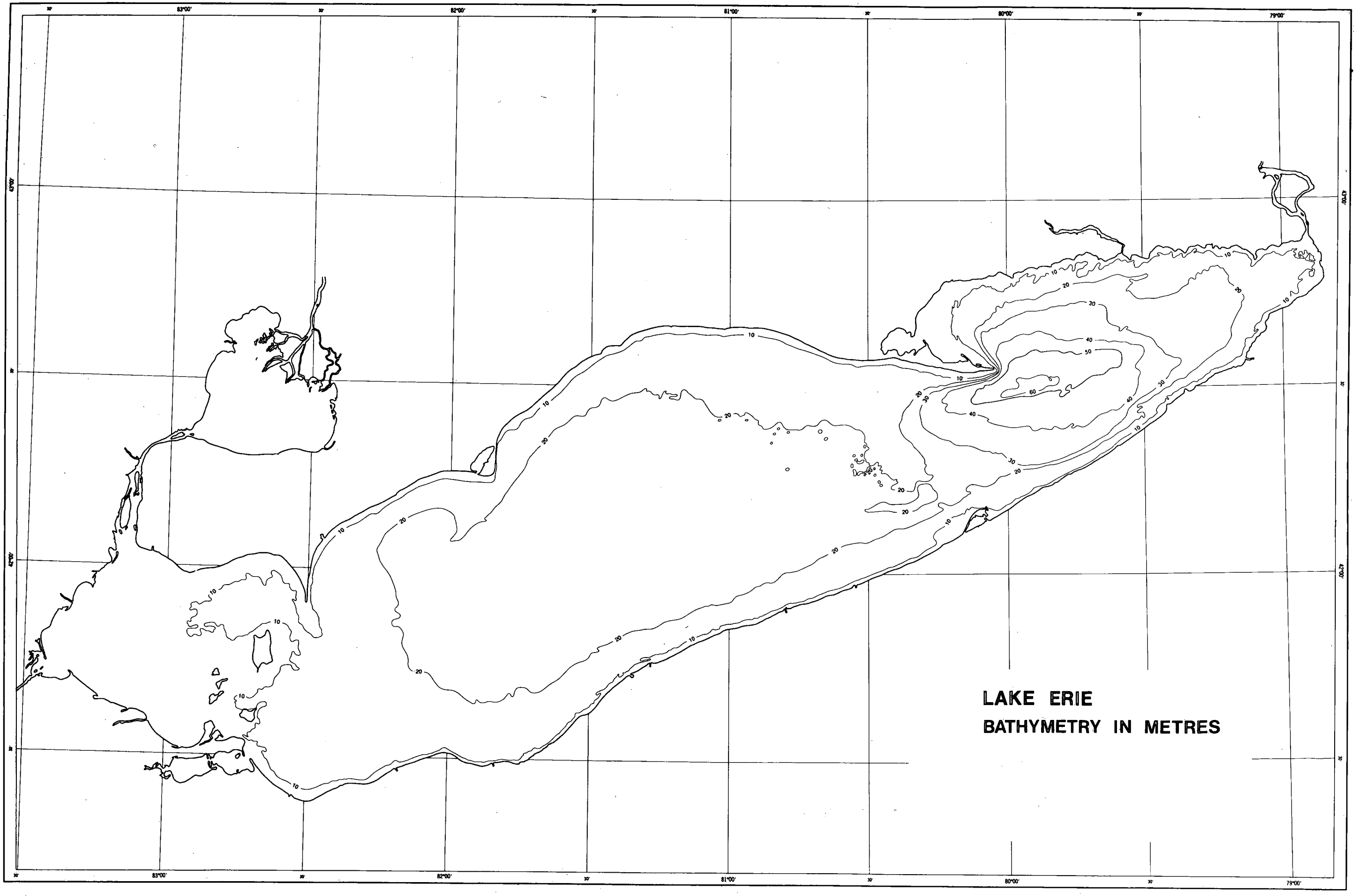

LAKE ERIE
BATHYMETRY IN METRES
83°00'
82°00'
81°00'
80°00'
79°00'
42°00'

Figure 2

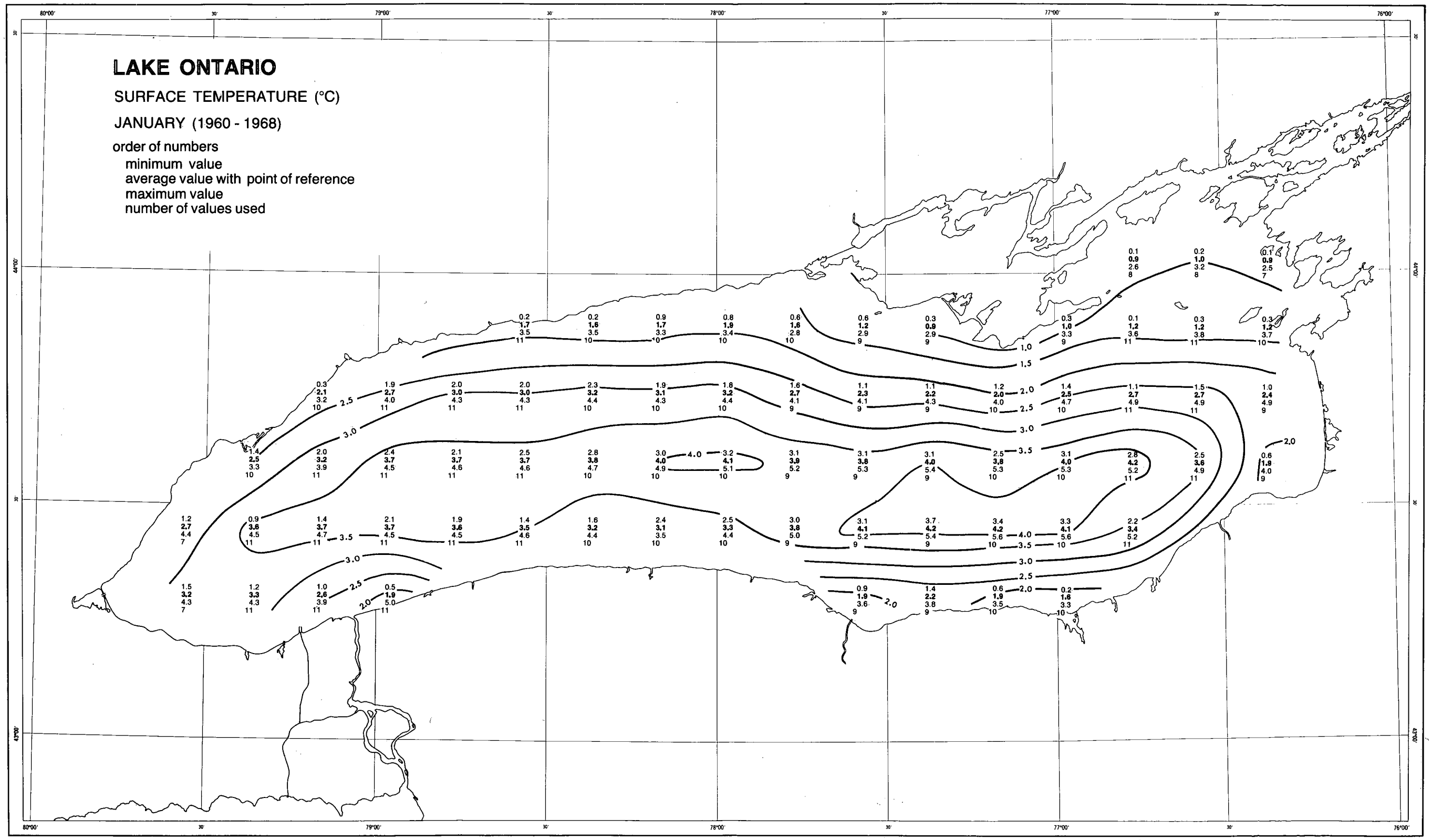
Figures 3 to 14. Surface Temperature (Averages and Extremes) of Lake Ontario, January to December

LAKE ONTARIO

SURFACE TEMPERATURE (°C)

JANUARY (1960 - 1968)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used



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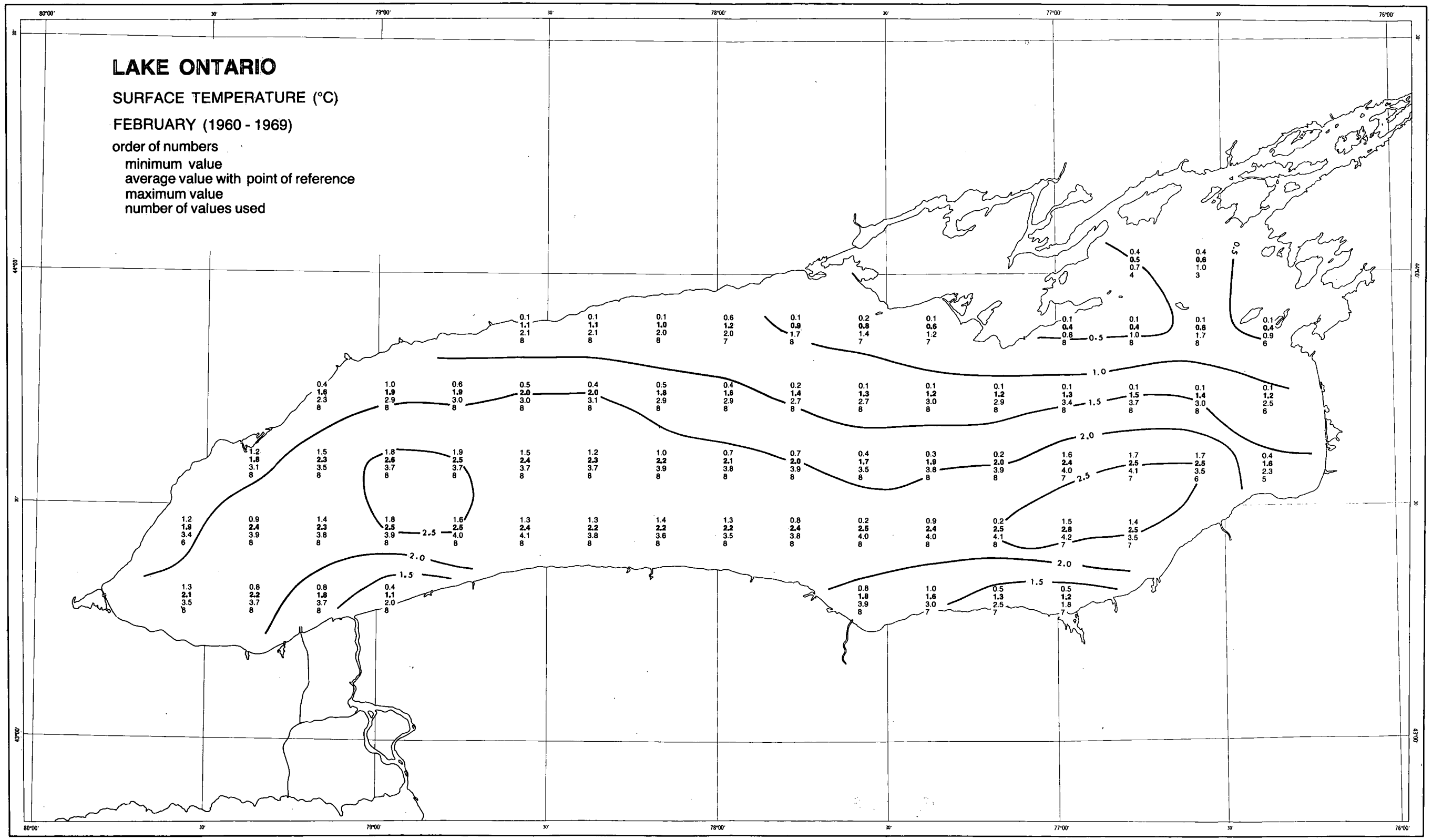

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
FEBRUARY (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'
30'
0.5
1.0
1.5
2.0
2.5

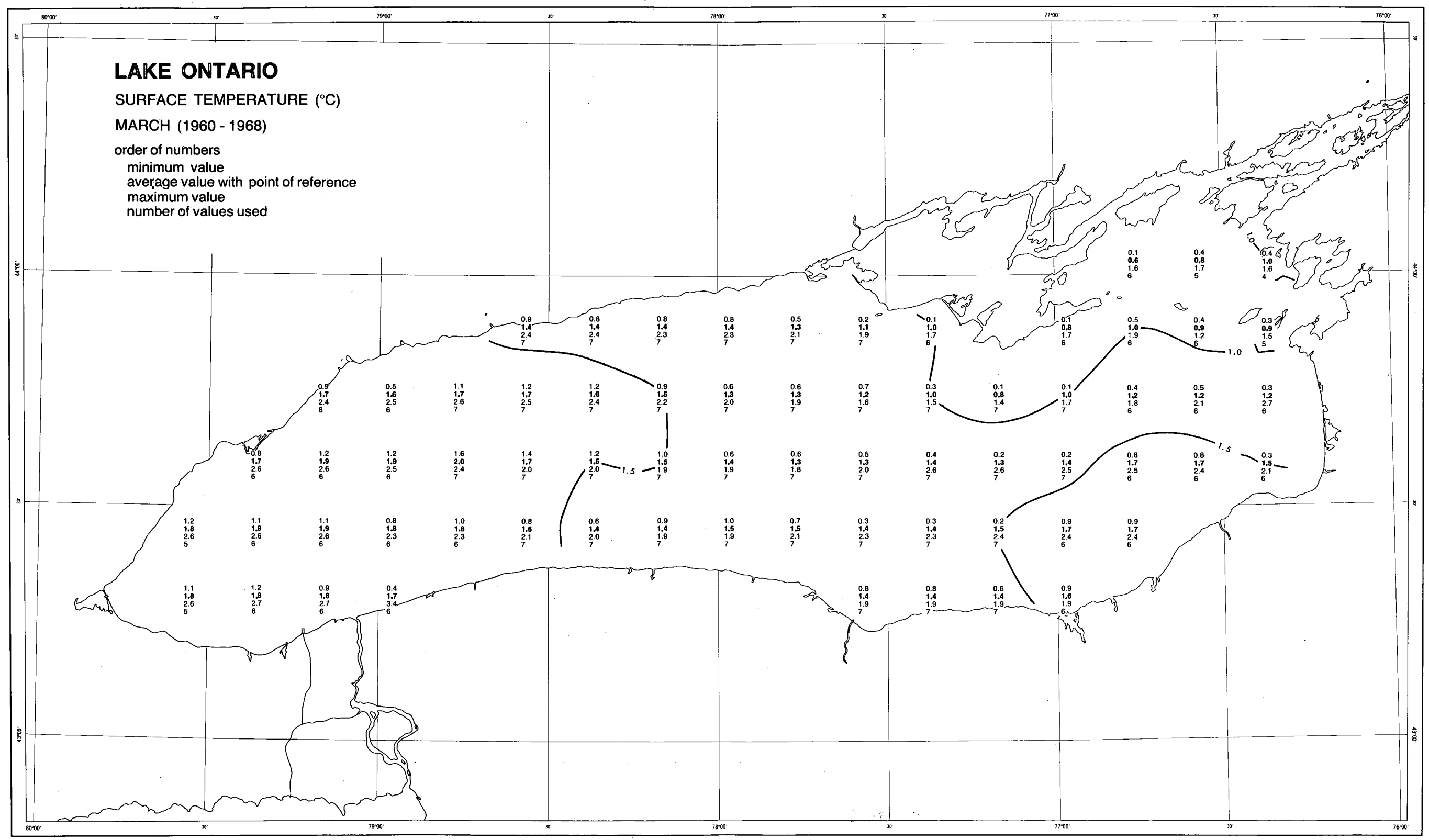
Figure 4

LAKE ONTARIO

SURFACE TEMPERATURE (°C)

MARCH (1960 - 1968)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used



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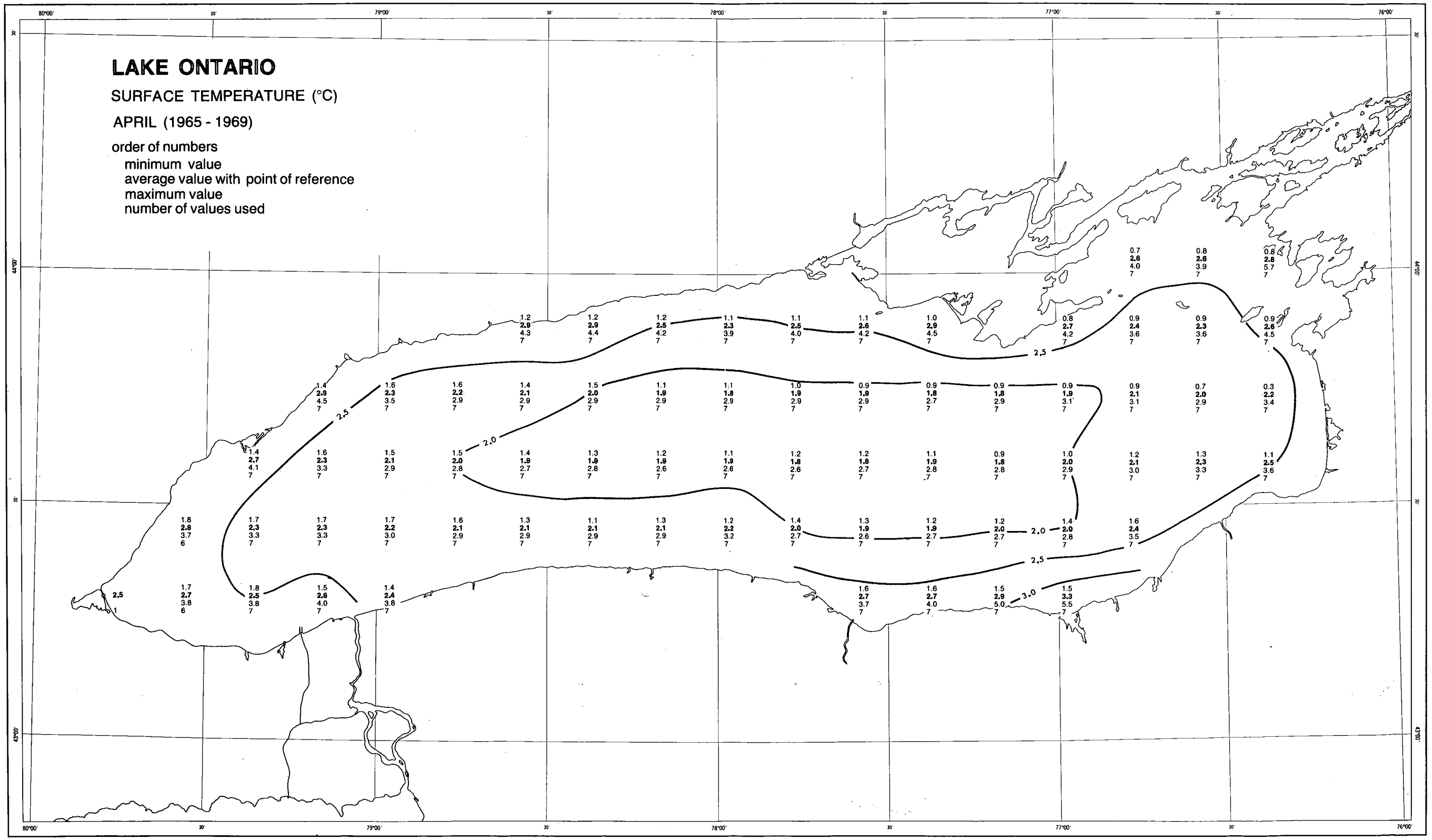

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
APRIL (1965 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'
2.5
2.0
3.0

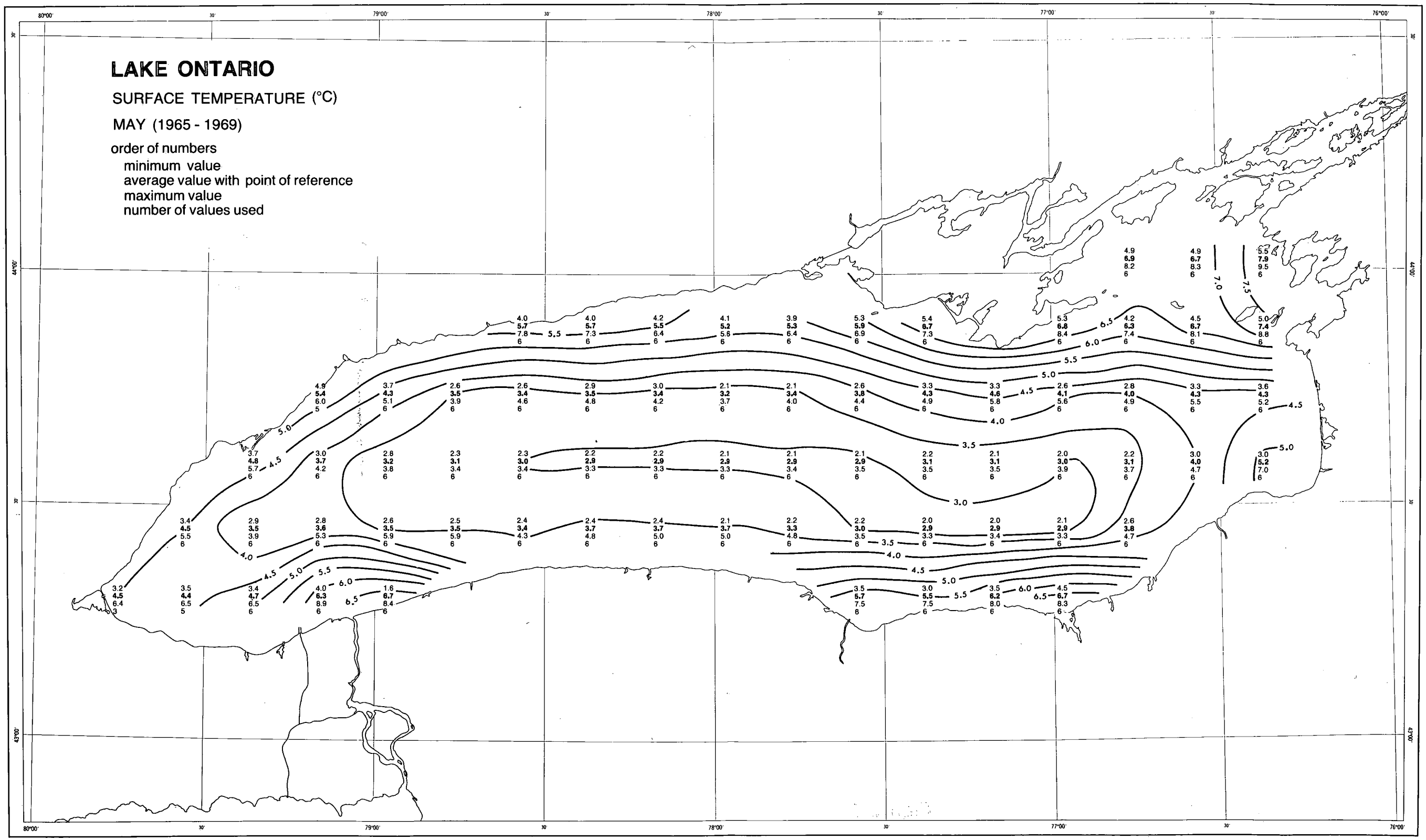
Figure 6

LAKE ONTARIO

SURFACE TEMPERATURE (°C)

MAY (1965 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used



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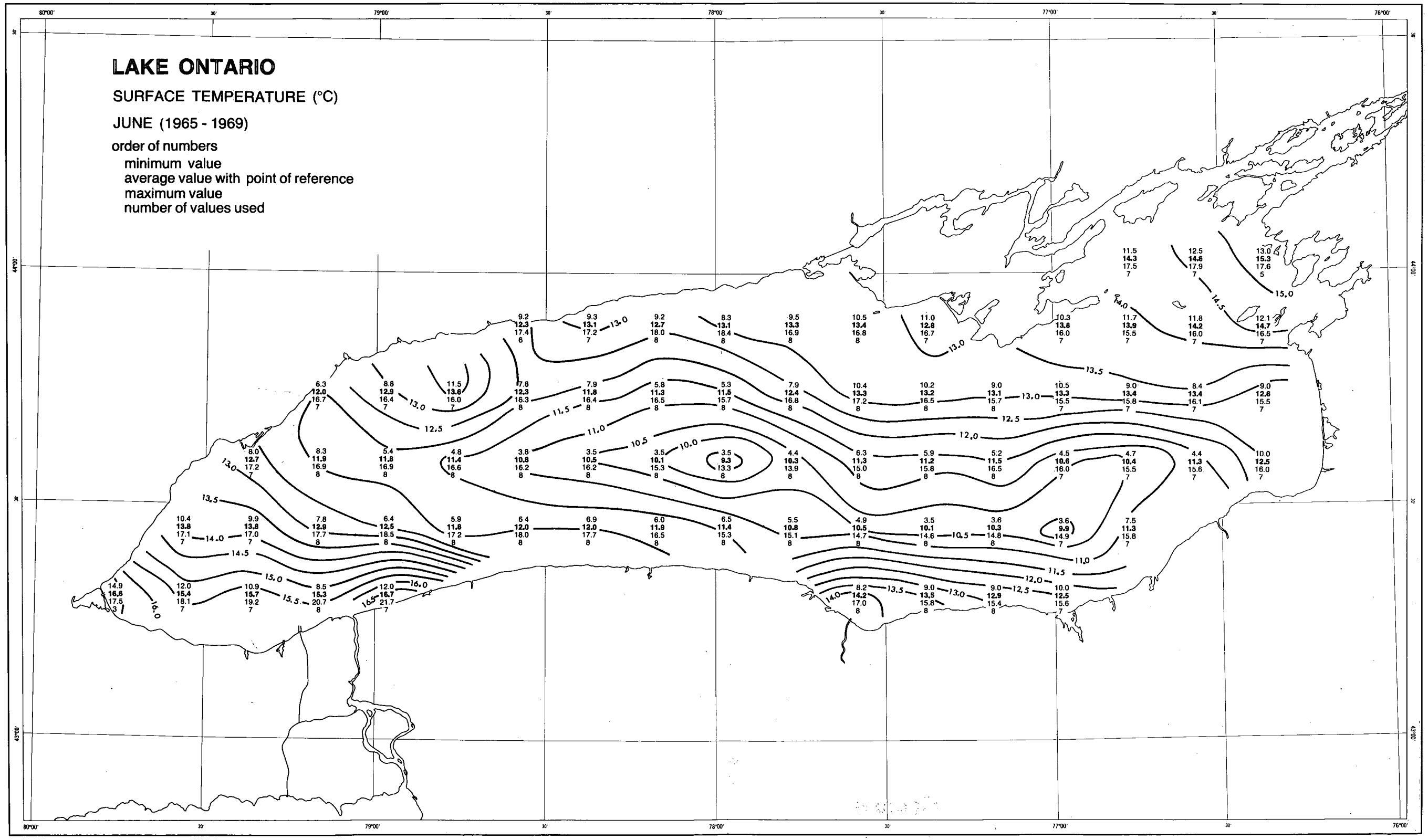

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
JUNE (1965 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

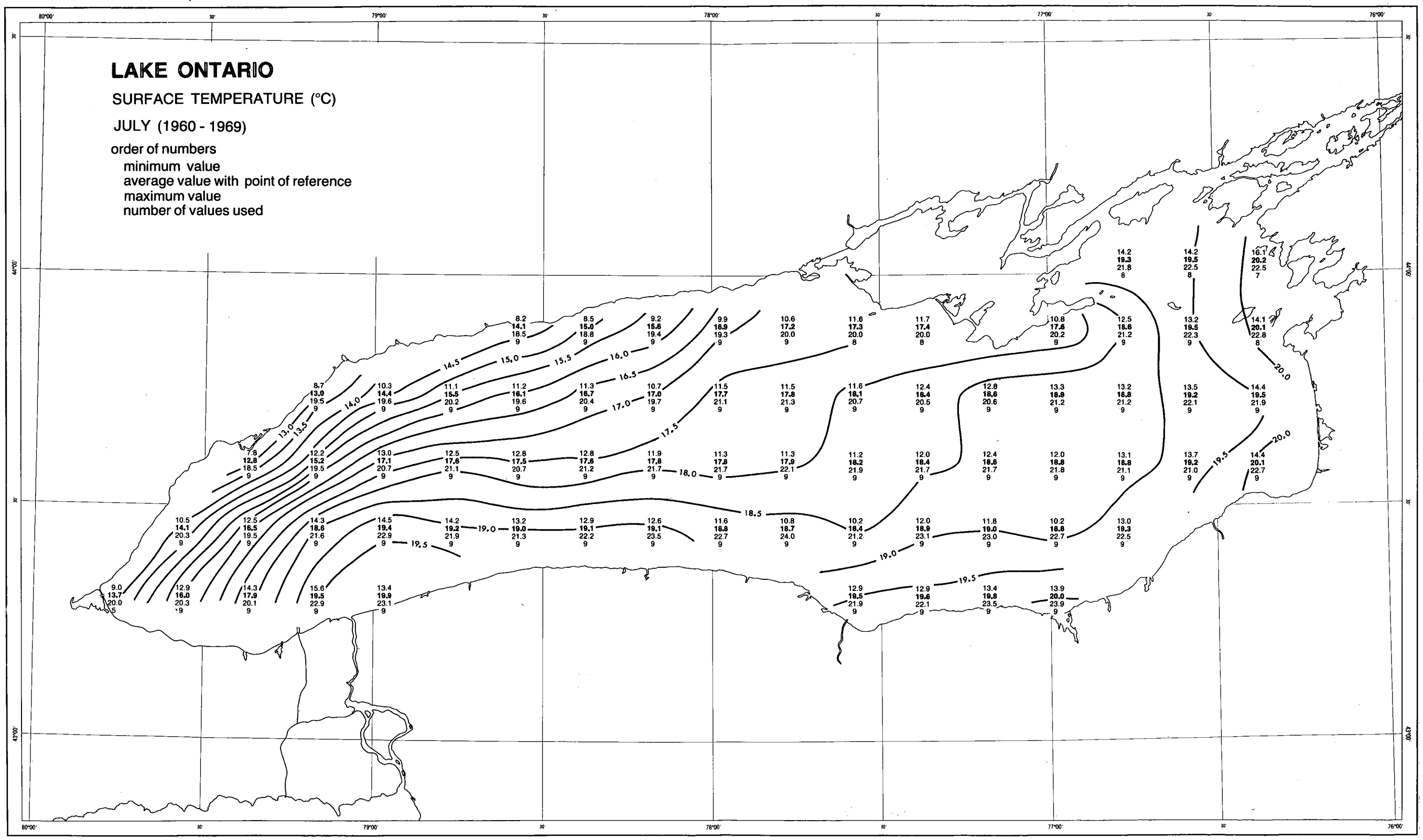
Figure 8

LAKE ONTARIO

SURFACE TEMPERATURE (°C)

JULY (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used



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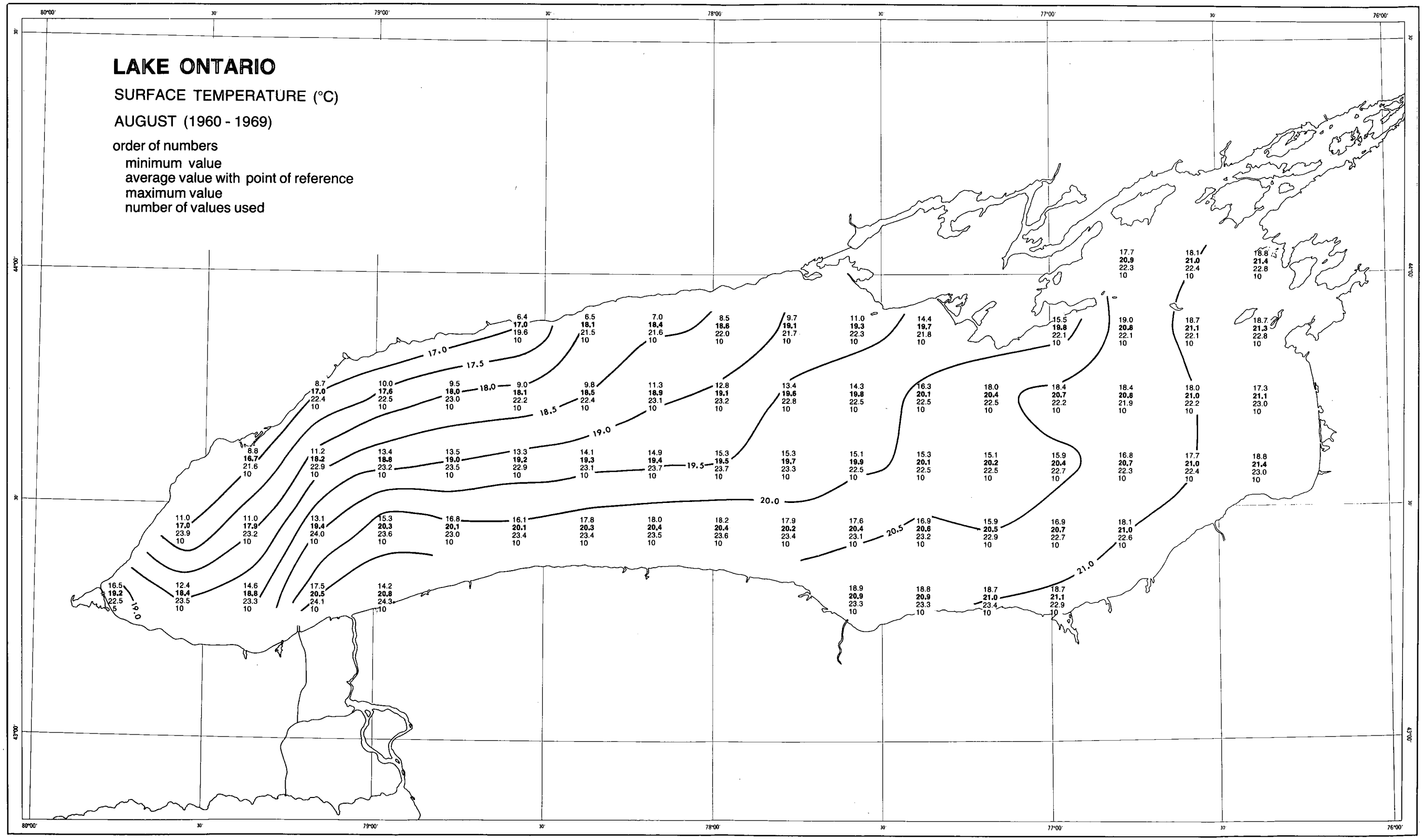

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
AUGUST (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'
17.0
17.5
18.0
18.5
19.0
19.5
20.0
20.5
21.0

Figure 10

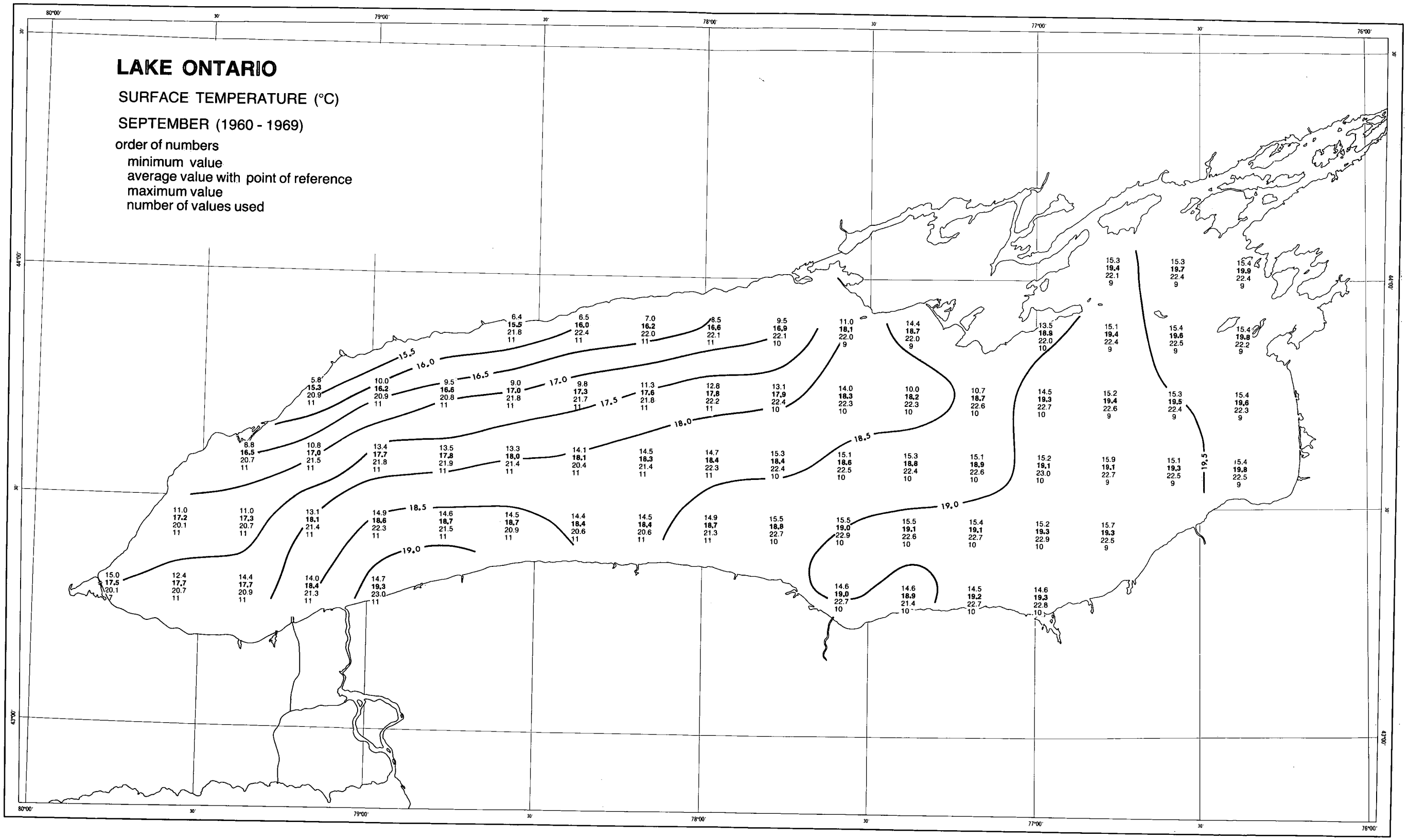

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
SEPTEMBER (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
15.5
16.0
16.5
17.0
17.5
18.0
18.5
19.0
19.5
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 11

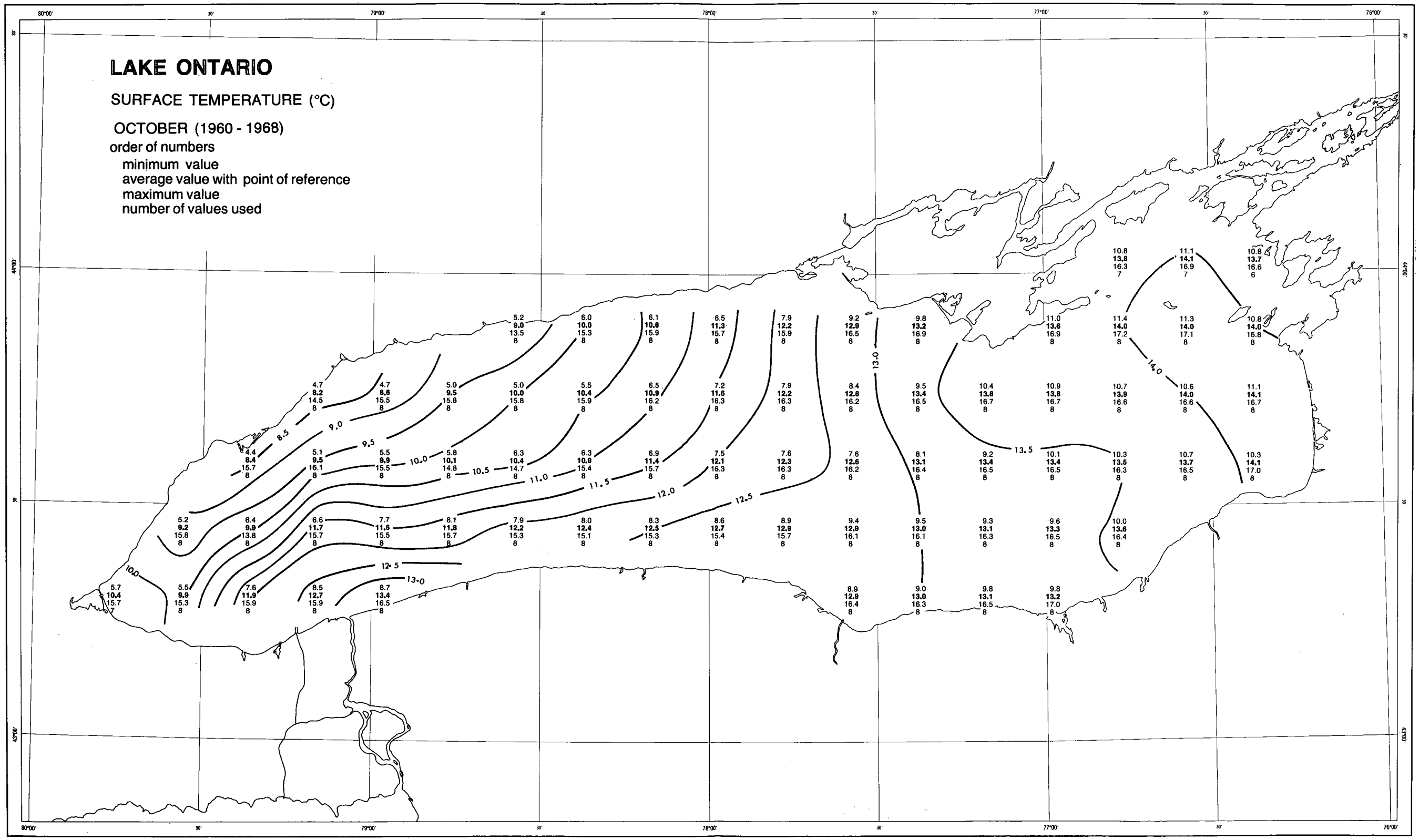

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
OCTOBER (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'
8.5
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0

Figure 12

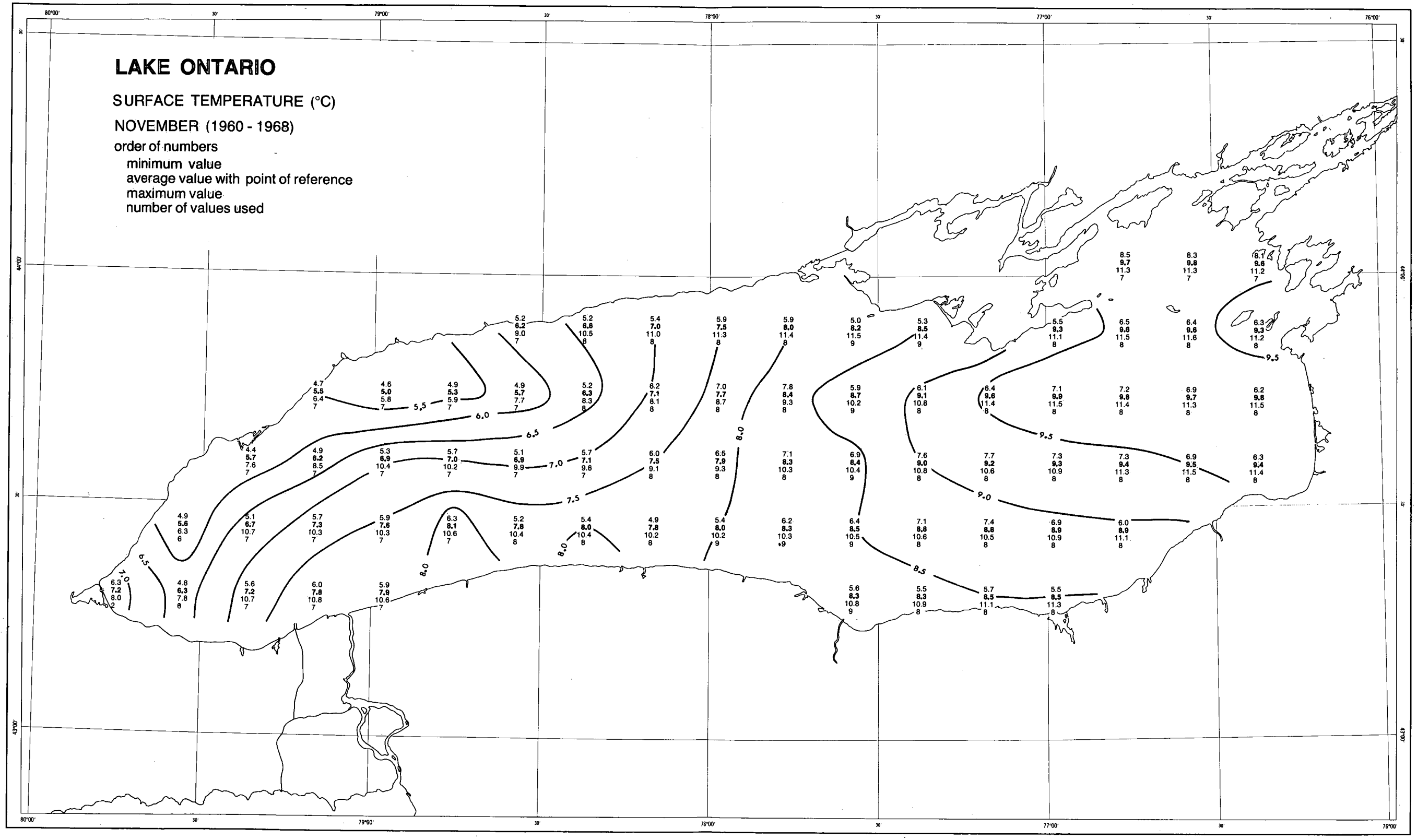

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
NOVEMBER (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5

Figure 13

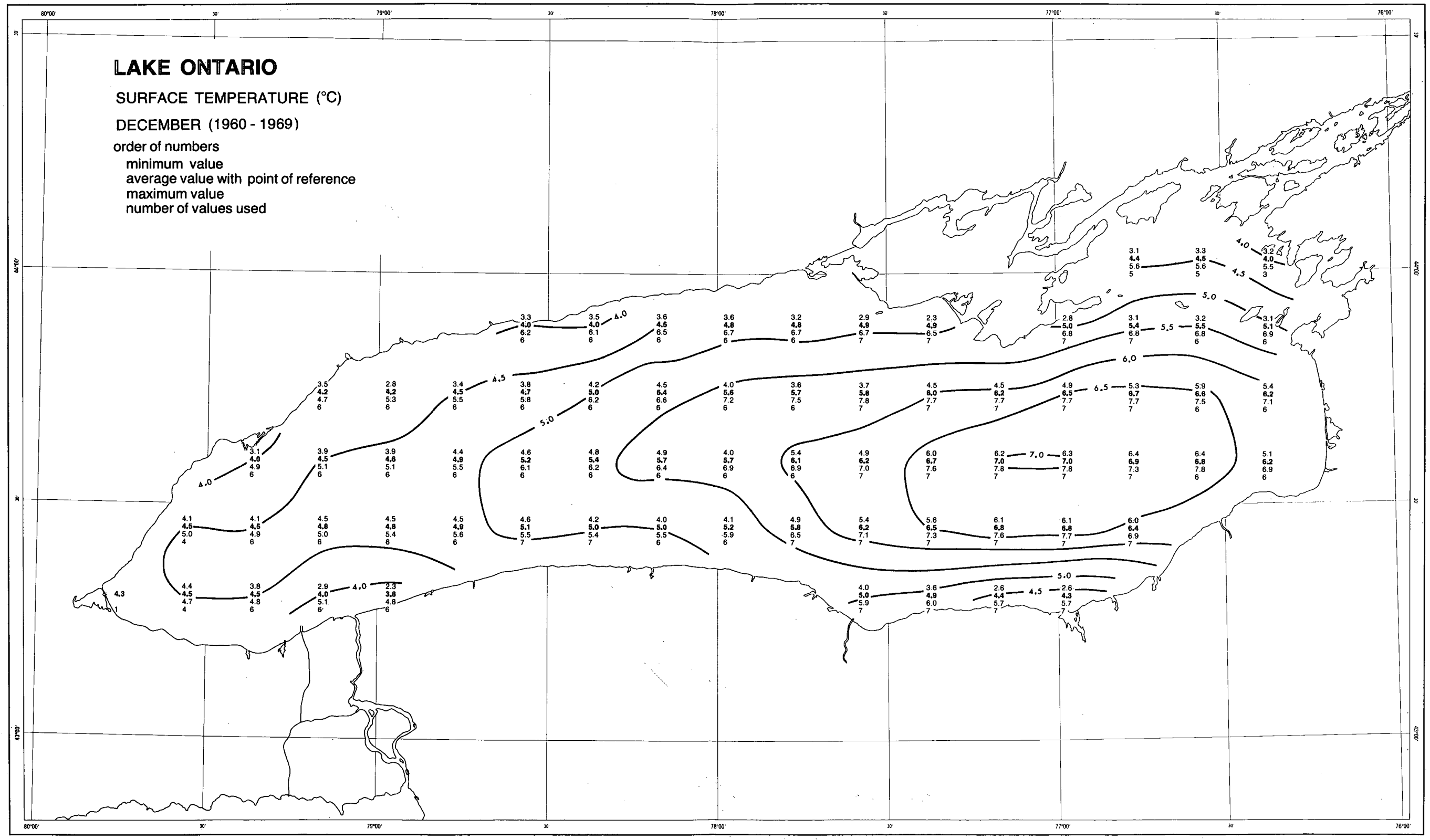

LAKE ONTARIO
SURFACE TEMPERATURE (°C)
DECEMBER (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 14

Figures 15 to 26. Bottom Temperature (Averages and Extremes) of Lake Ontario, January to December

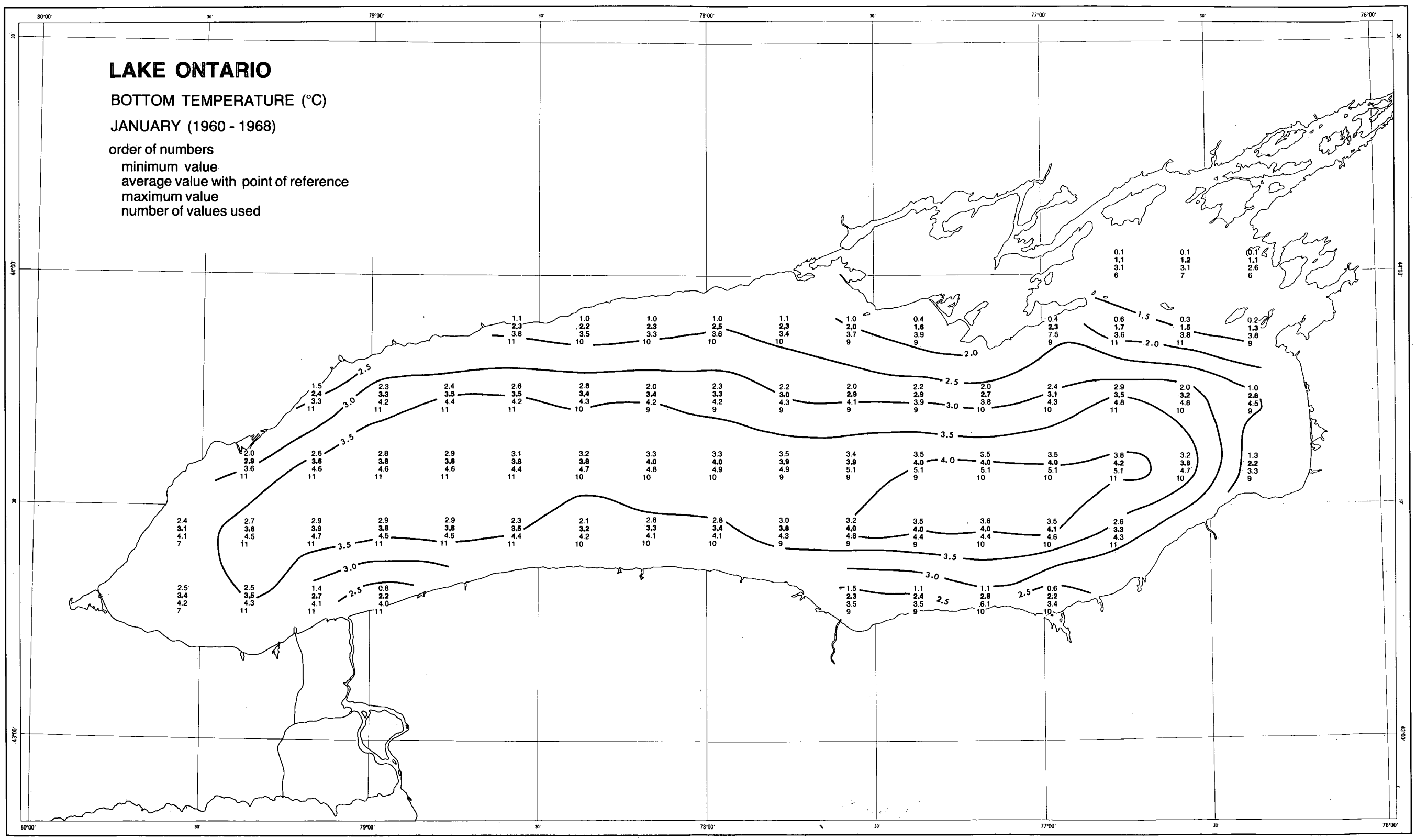

LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
JANUARY (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 15

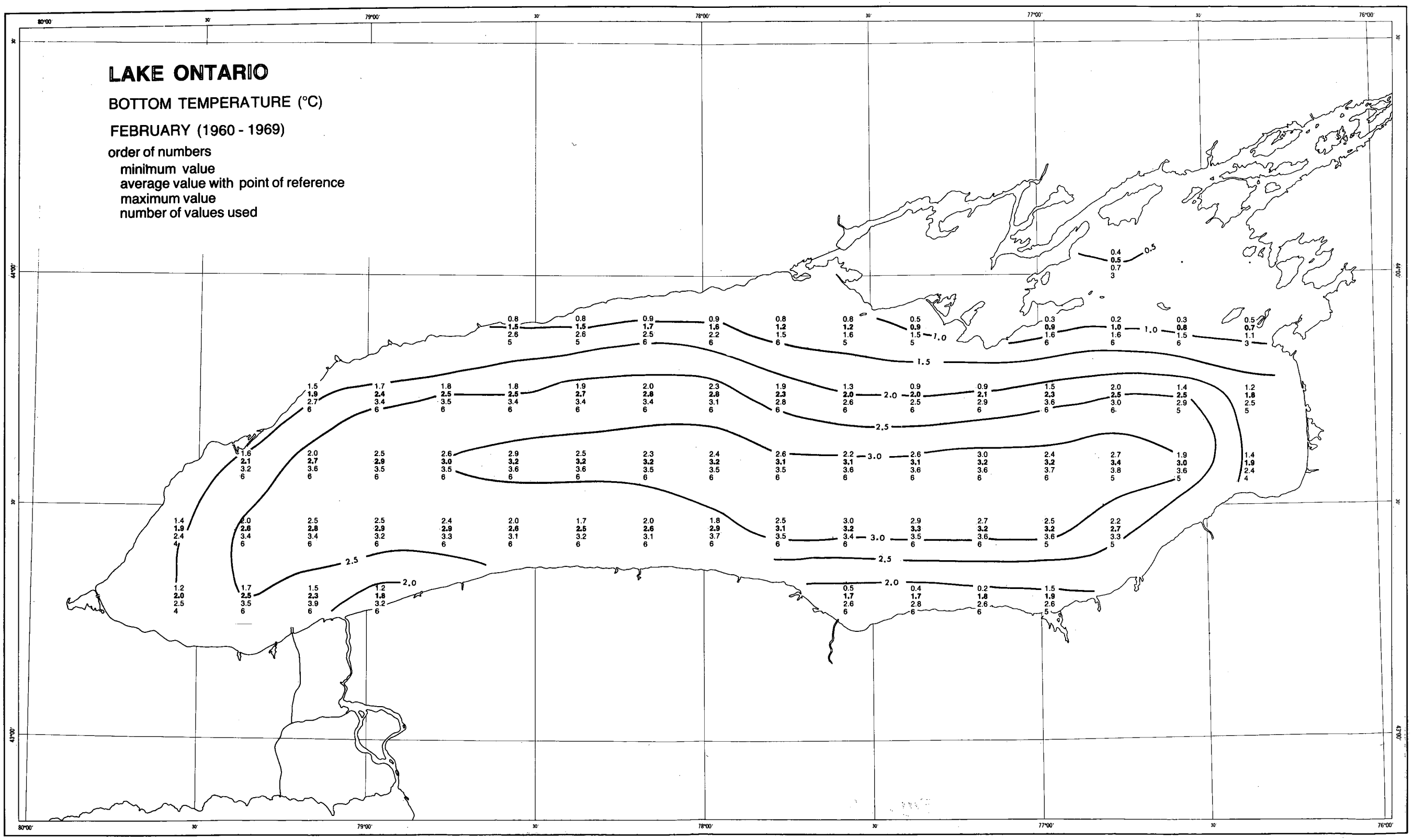

LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
FEBRUARY (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 16

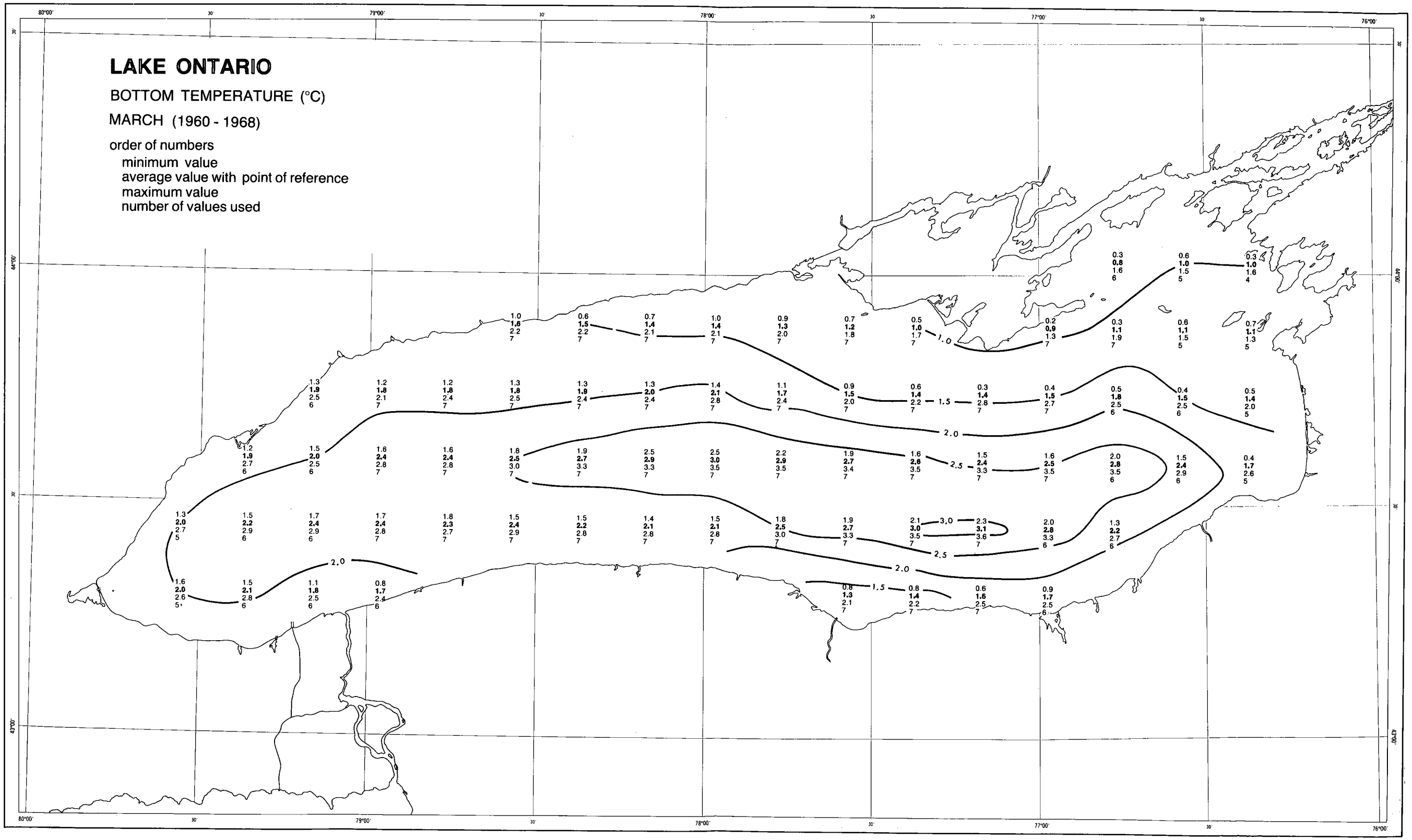

LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
MARCH (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

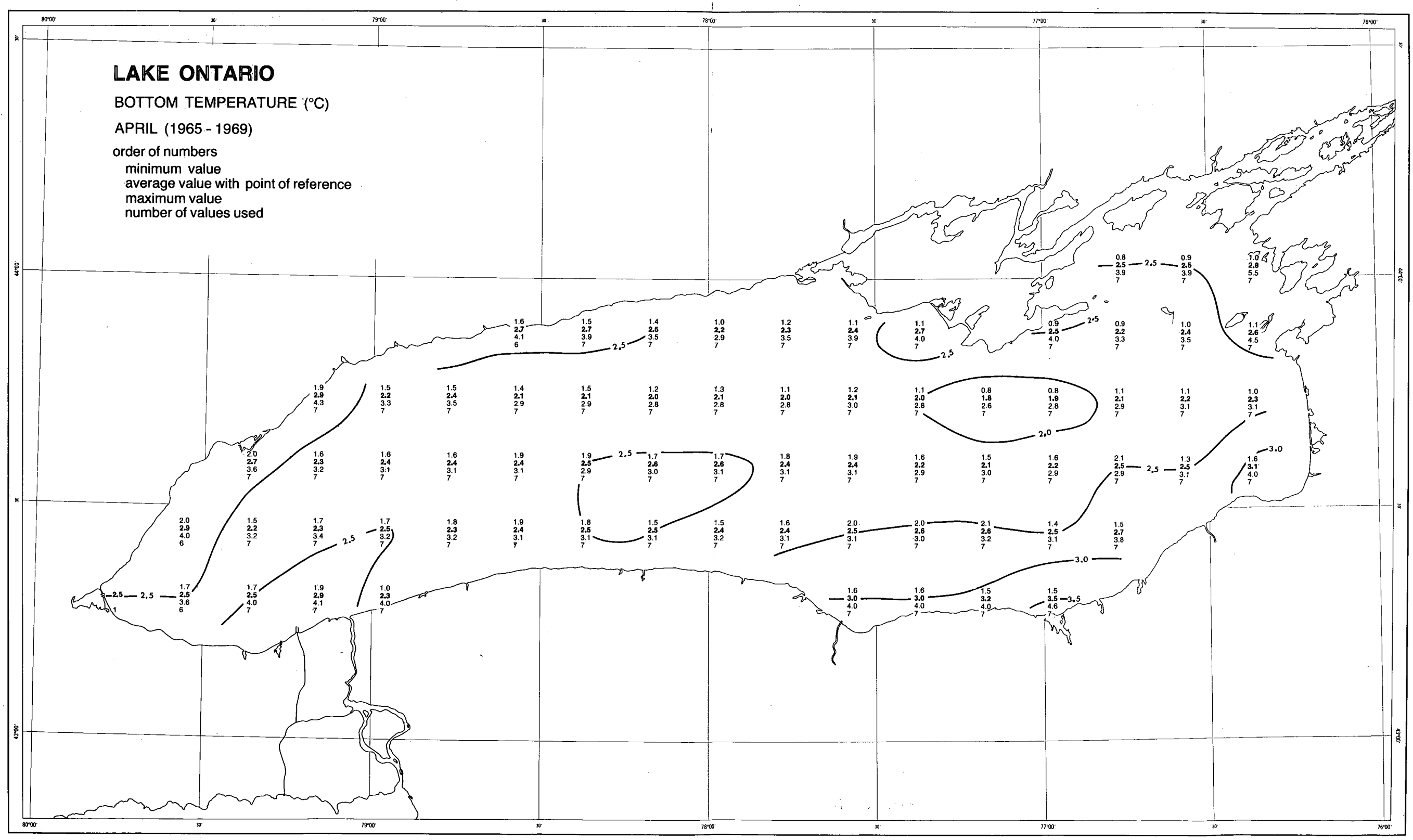
Figure 17

LAKE ONTARIO

BOTTOM TEMPERATURE (°C)

APRIL (1965 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used



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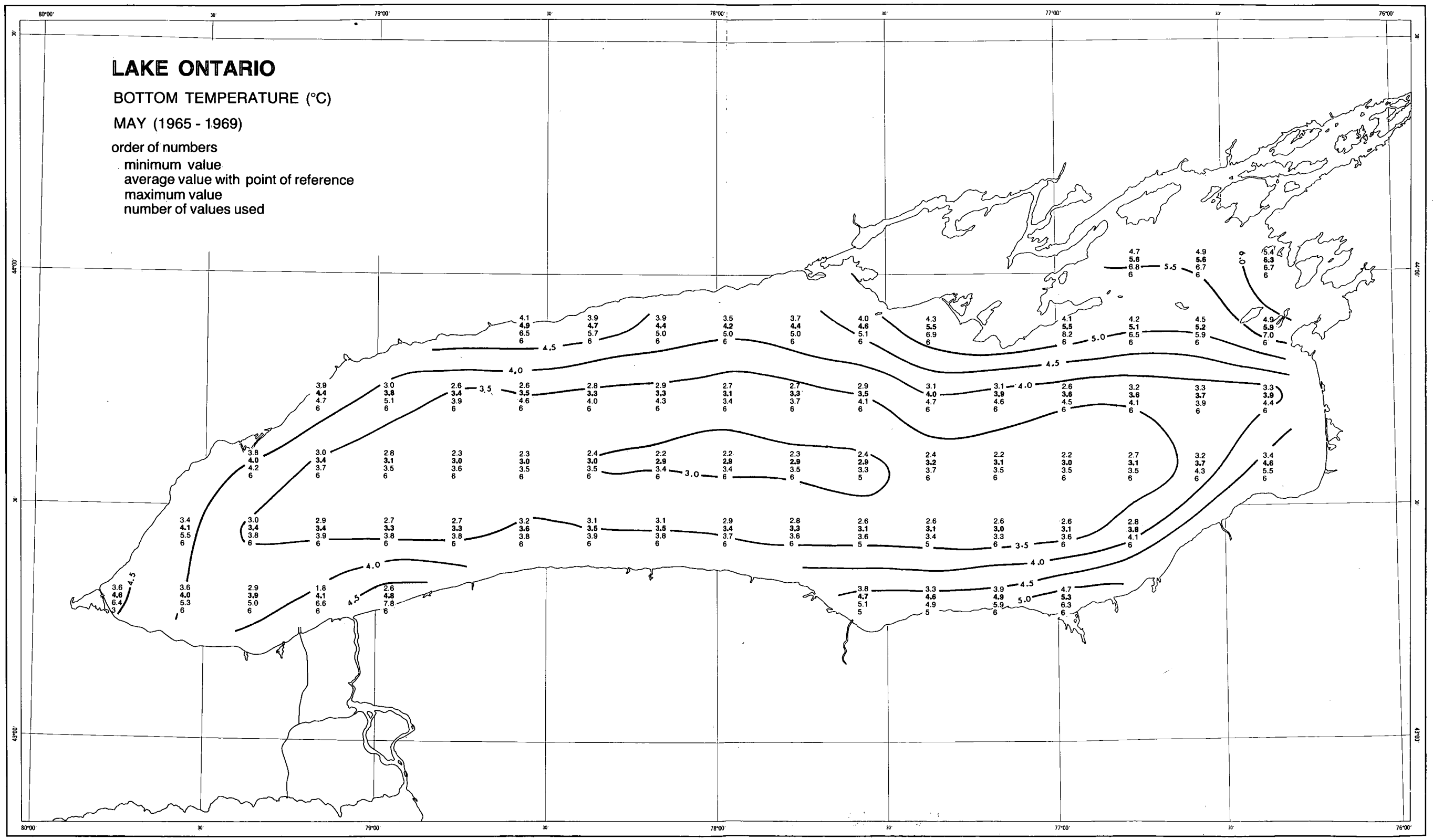
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
MAY (1965 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 19

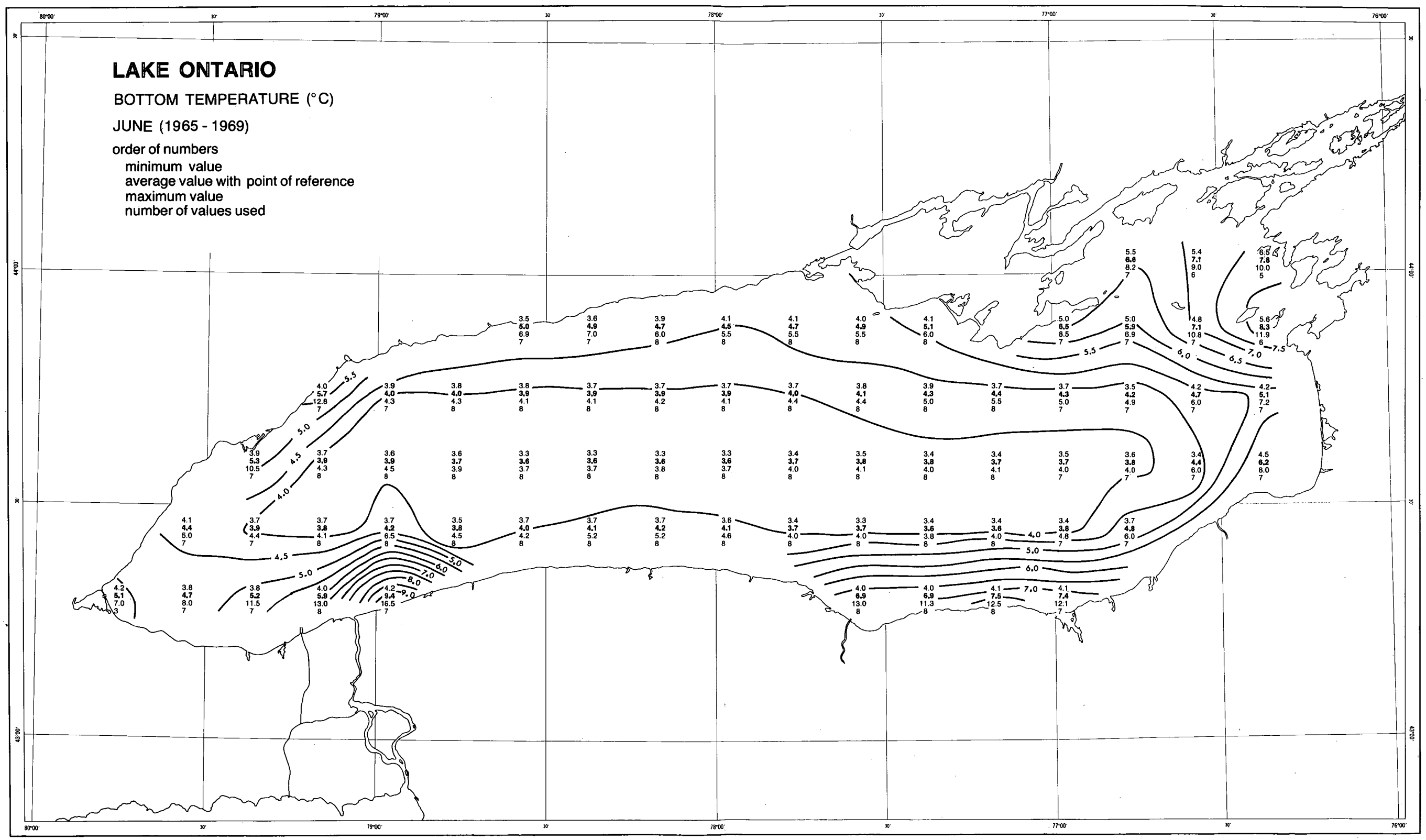
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
JUNE (1965 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 20

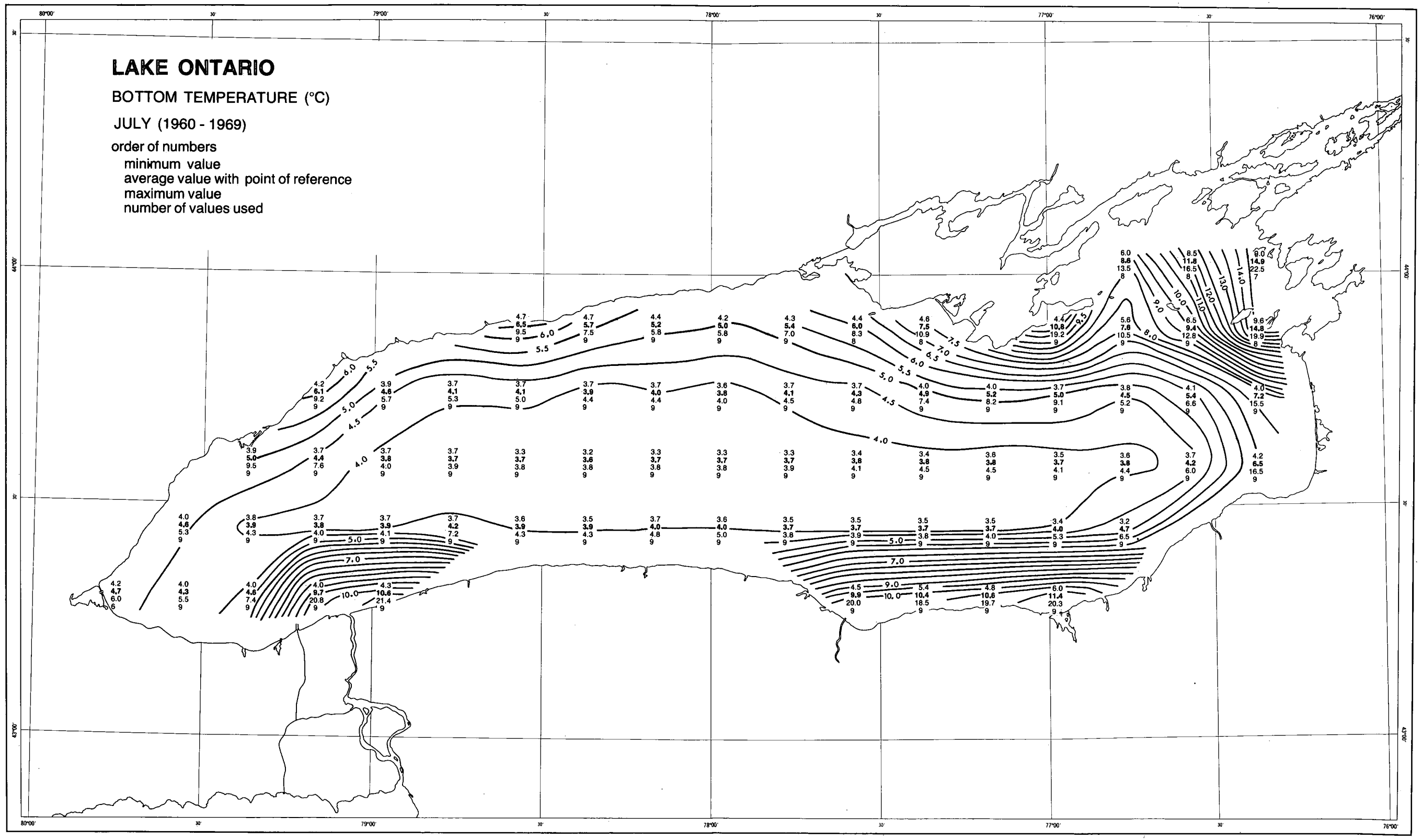
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
JULY (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 21

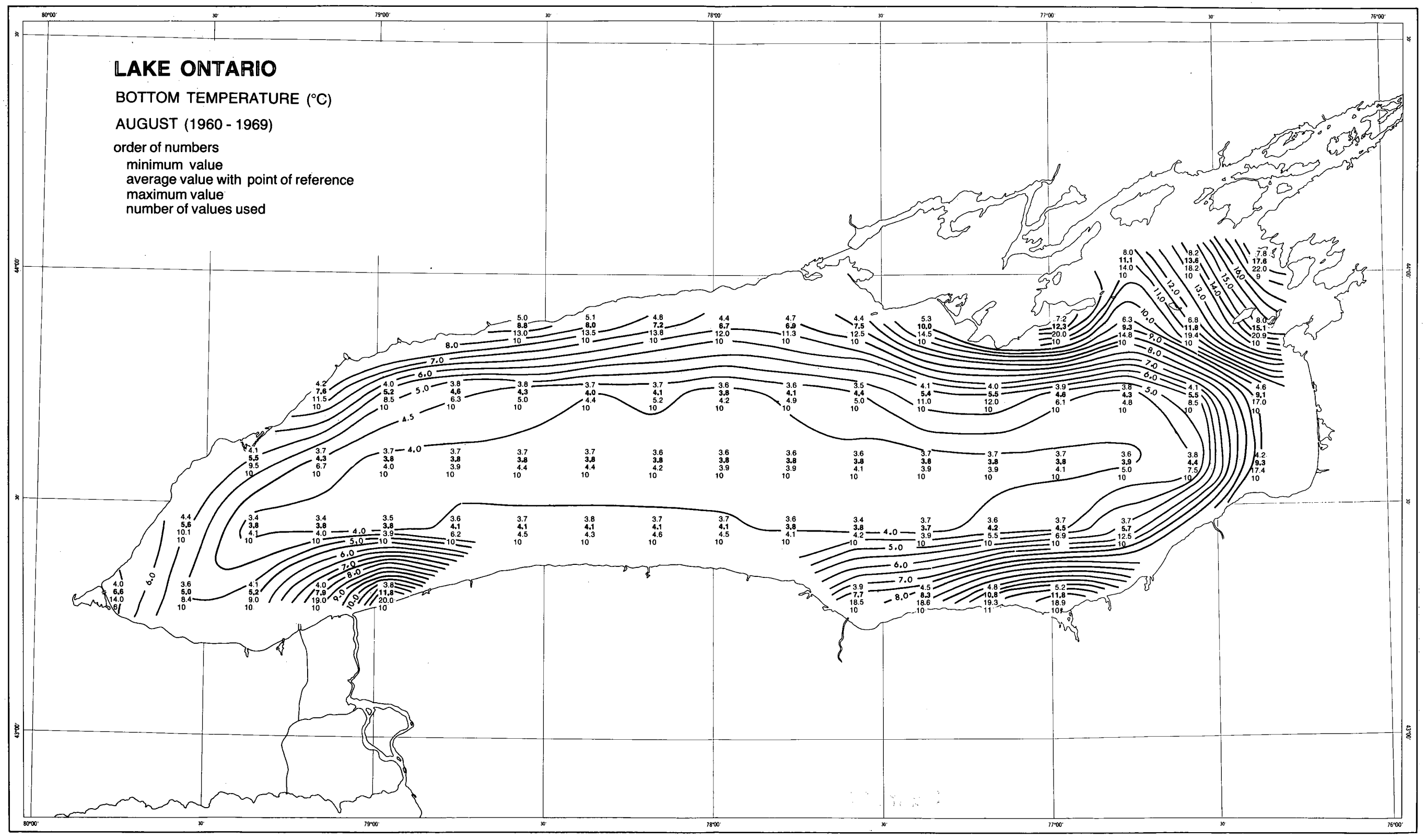
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
AUGUST (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 22

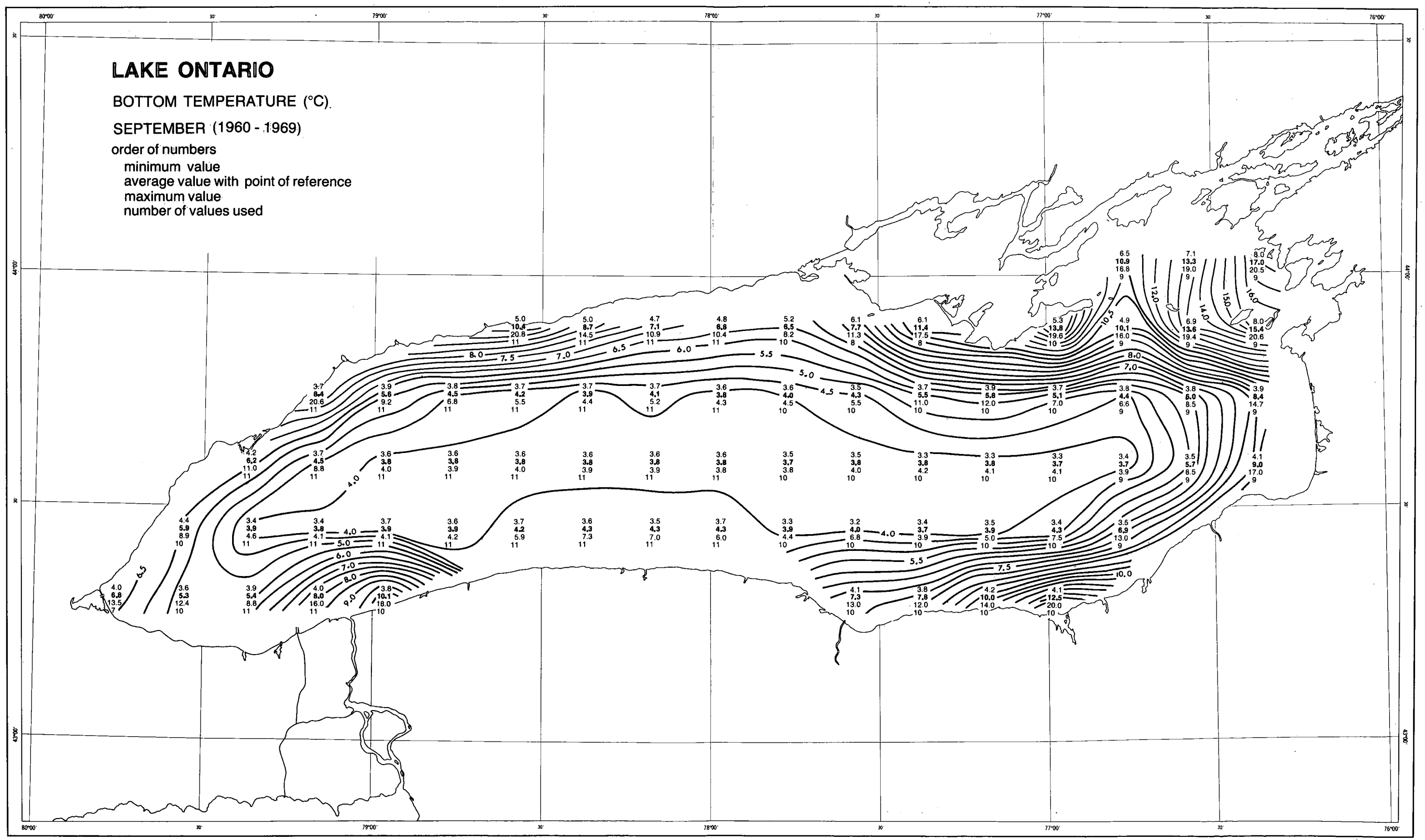
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
SEPTEMBER (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 23

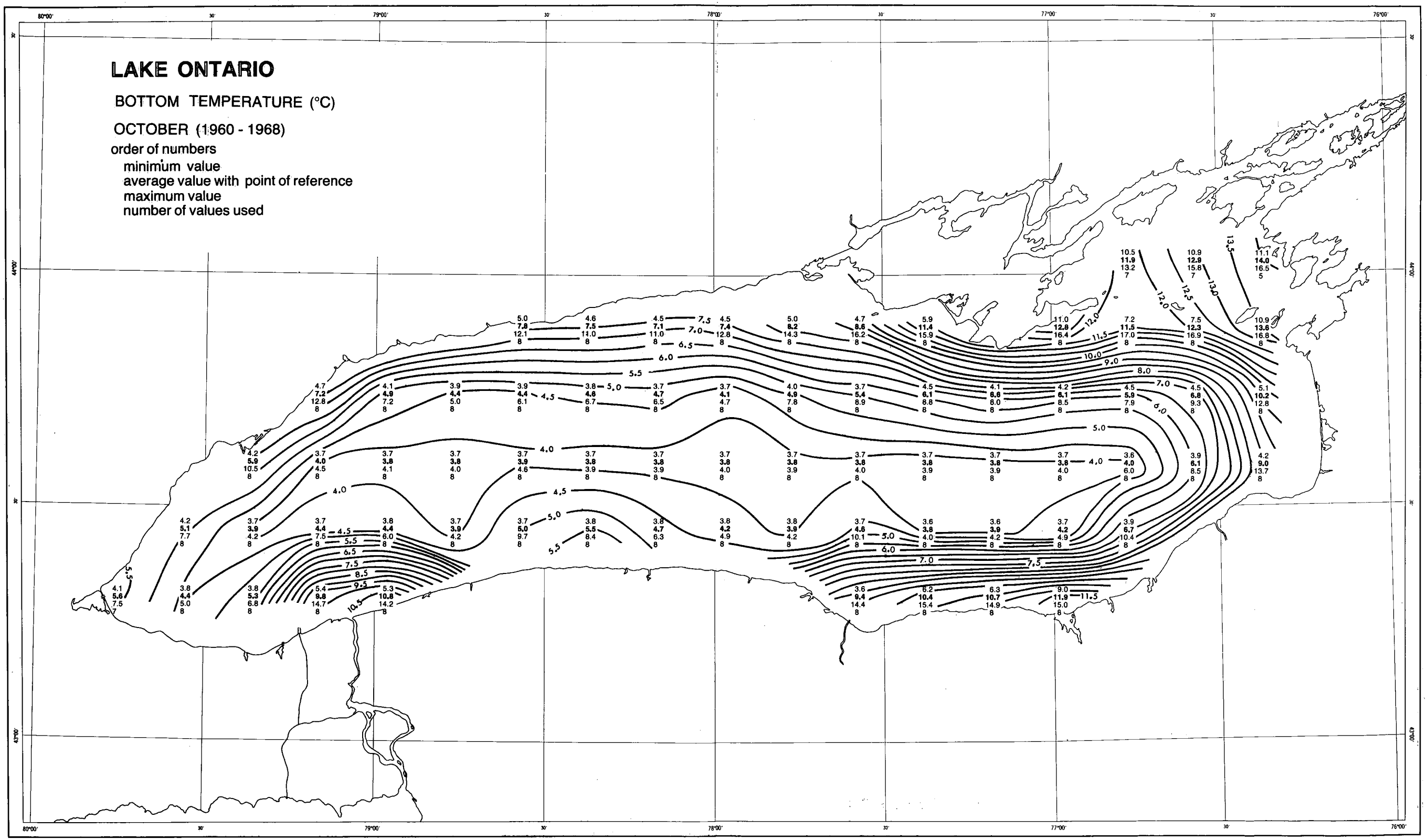
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
OCTOBER (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 24

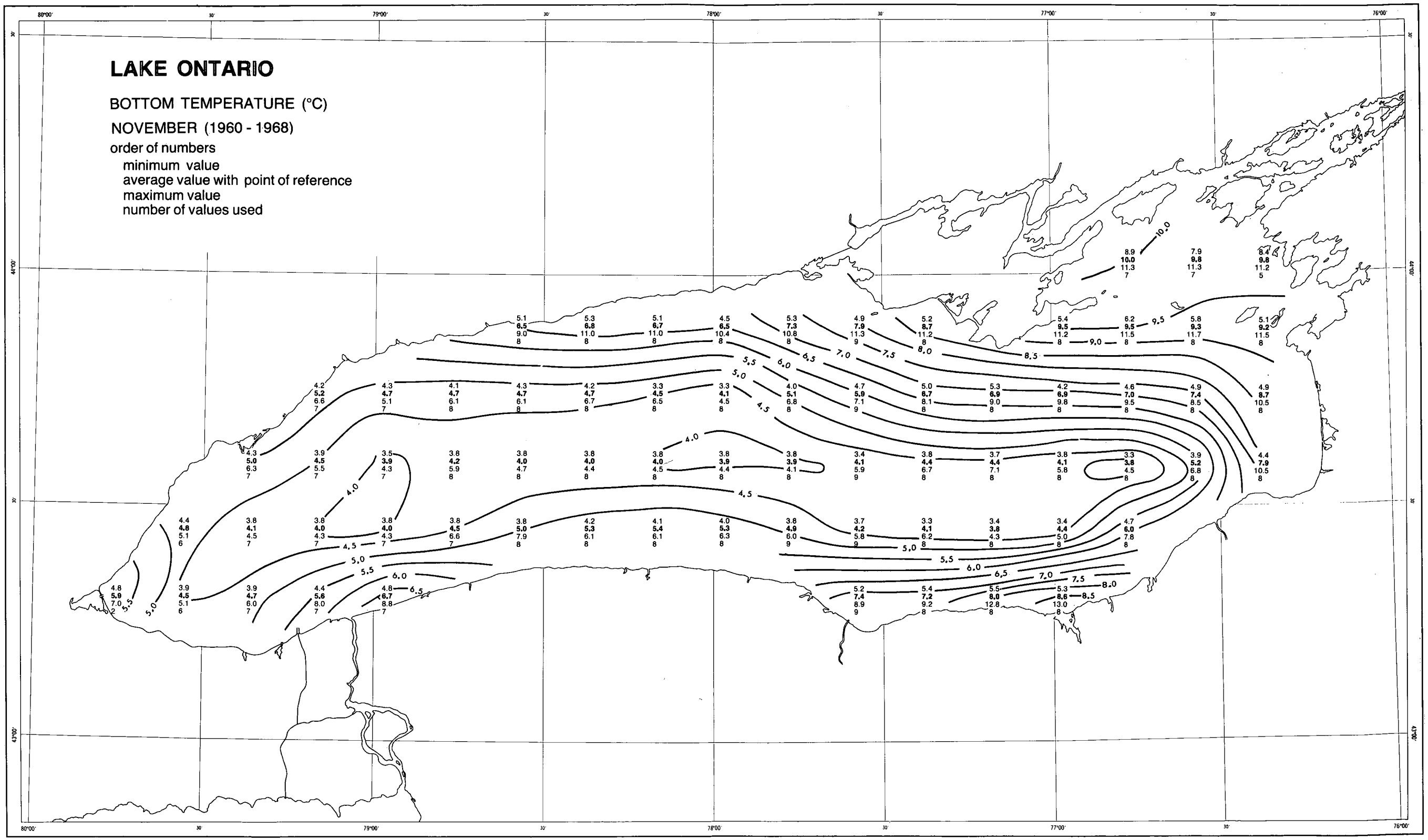
LAKE ONTARIO
BOTTOM TEMPERATURE (°C)
NOVEMBER (1960 - 1968)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 25

LAKE ONTARIO

BOTTOM TEMPERATURE (°C)

DECEMBER (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

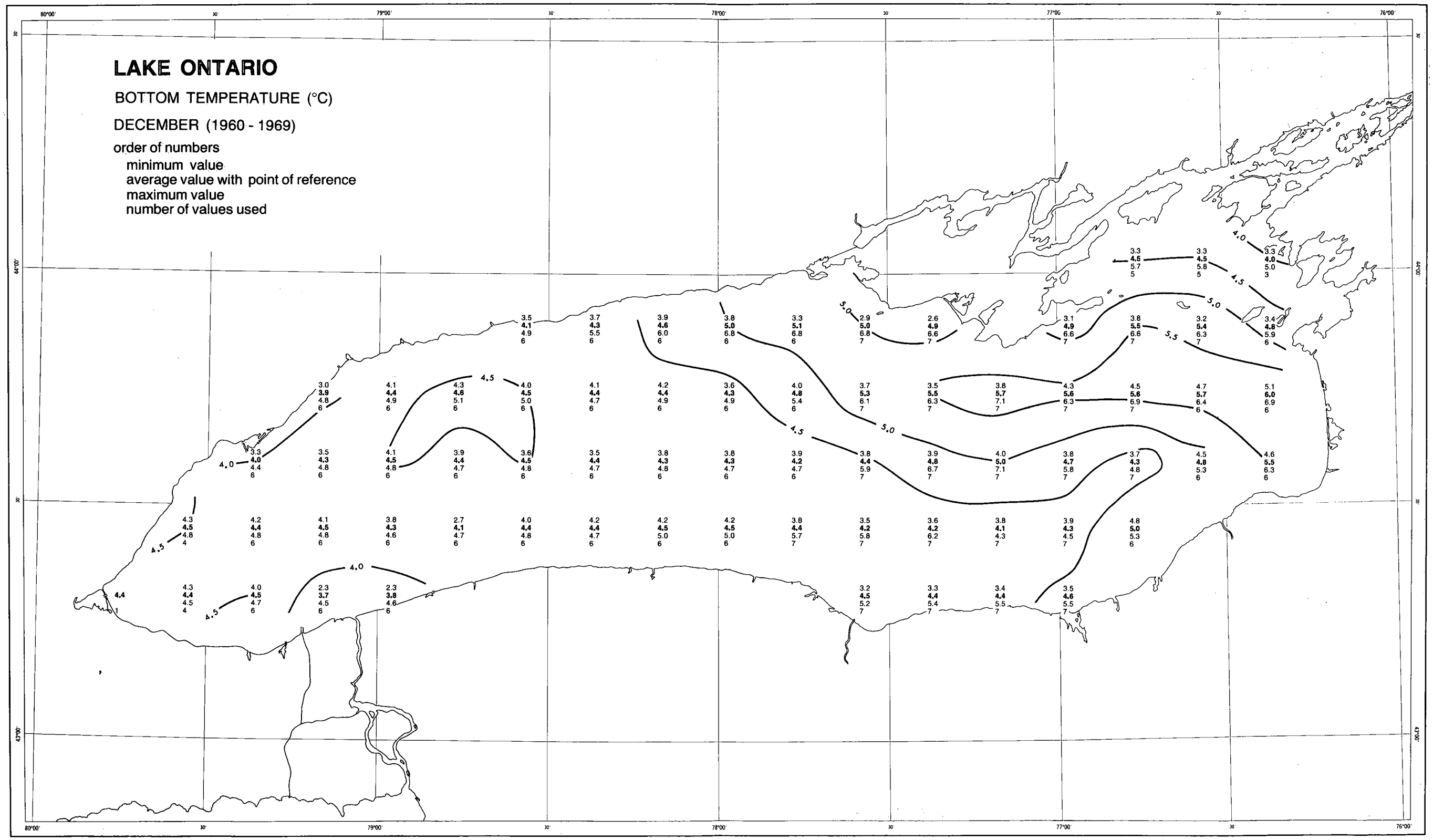

Figure 26

Figures 27 to 30. Depth to the Top of the Hypolimnion (Averages and Extremes), Lake Ontario, June to September

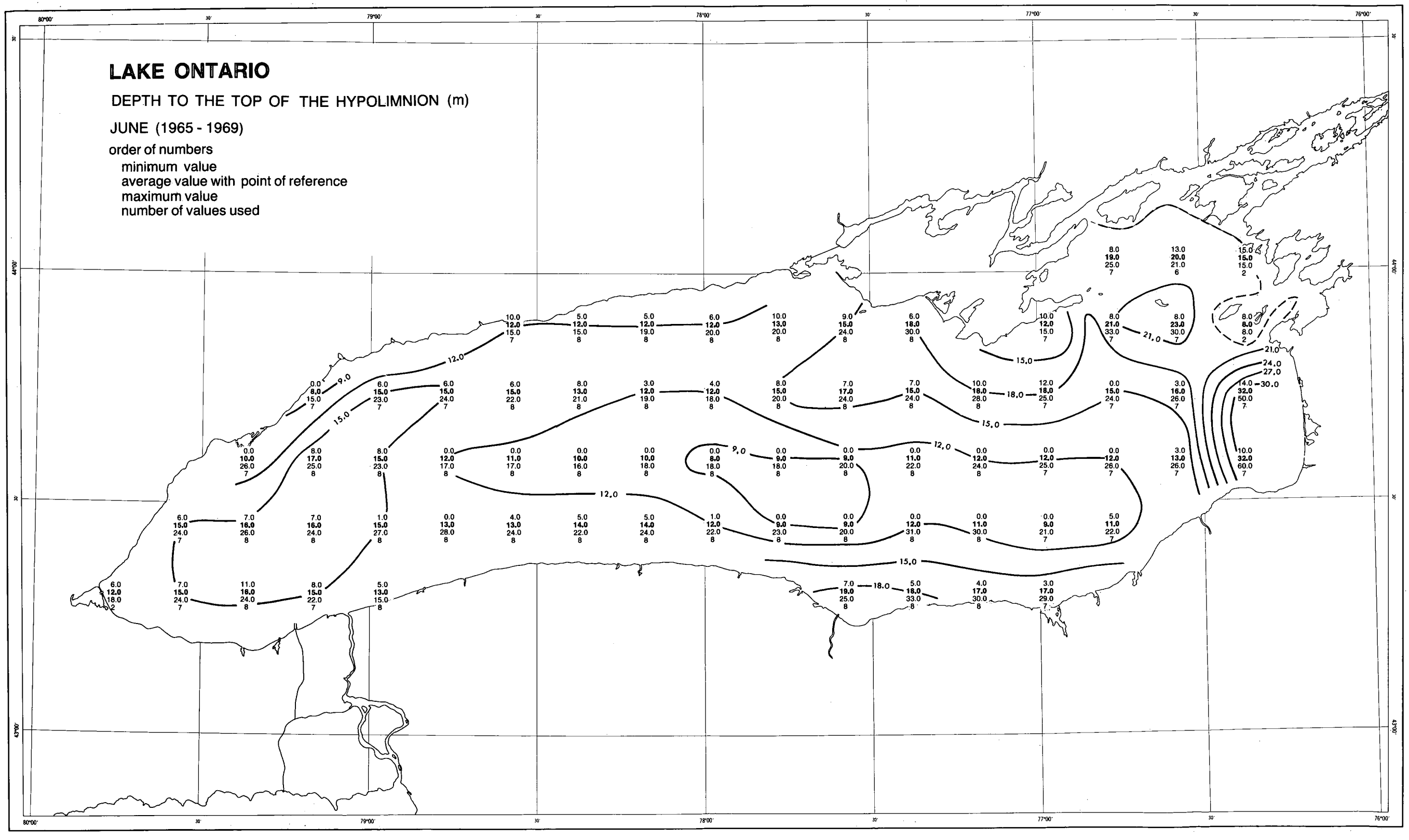
LAKE ONTARIO
DEPTH TO THE TOP OF THE HYPOLIMNION (m)
JUNE (1965 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 27

LAKE ONTARIO

DEPTH TO THE TOP OF THE HYPOLIMNION (m)

JULY (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

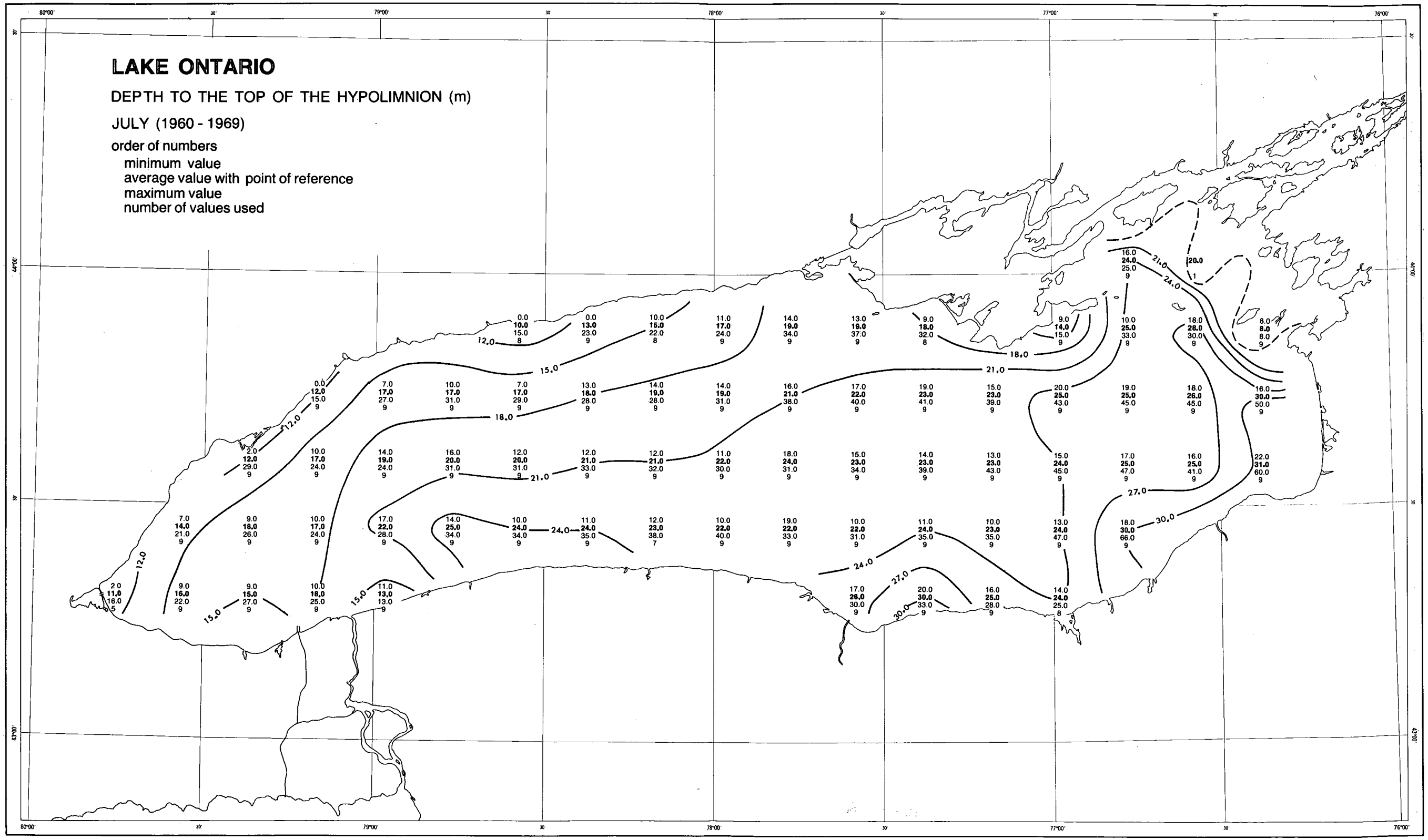

Figure 28

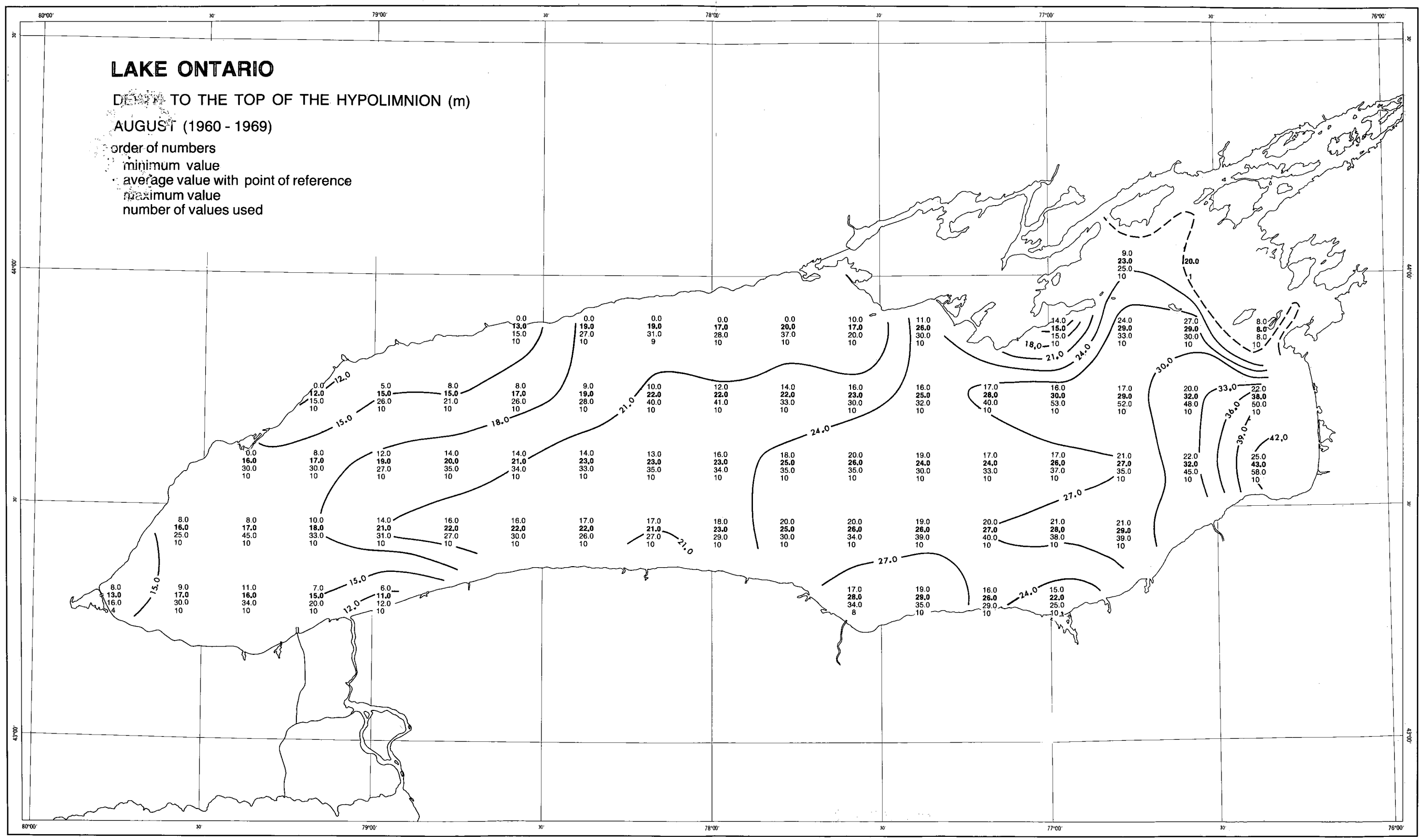
LAKE ONTARIO
DEPTH TO THE TOP OF THE HYPOLIMNION (m)
AUGUST (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 29

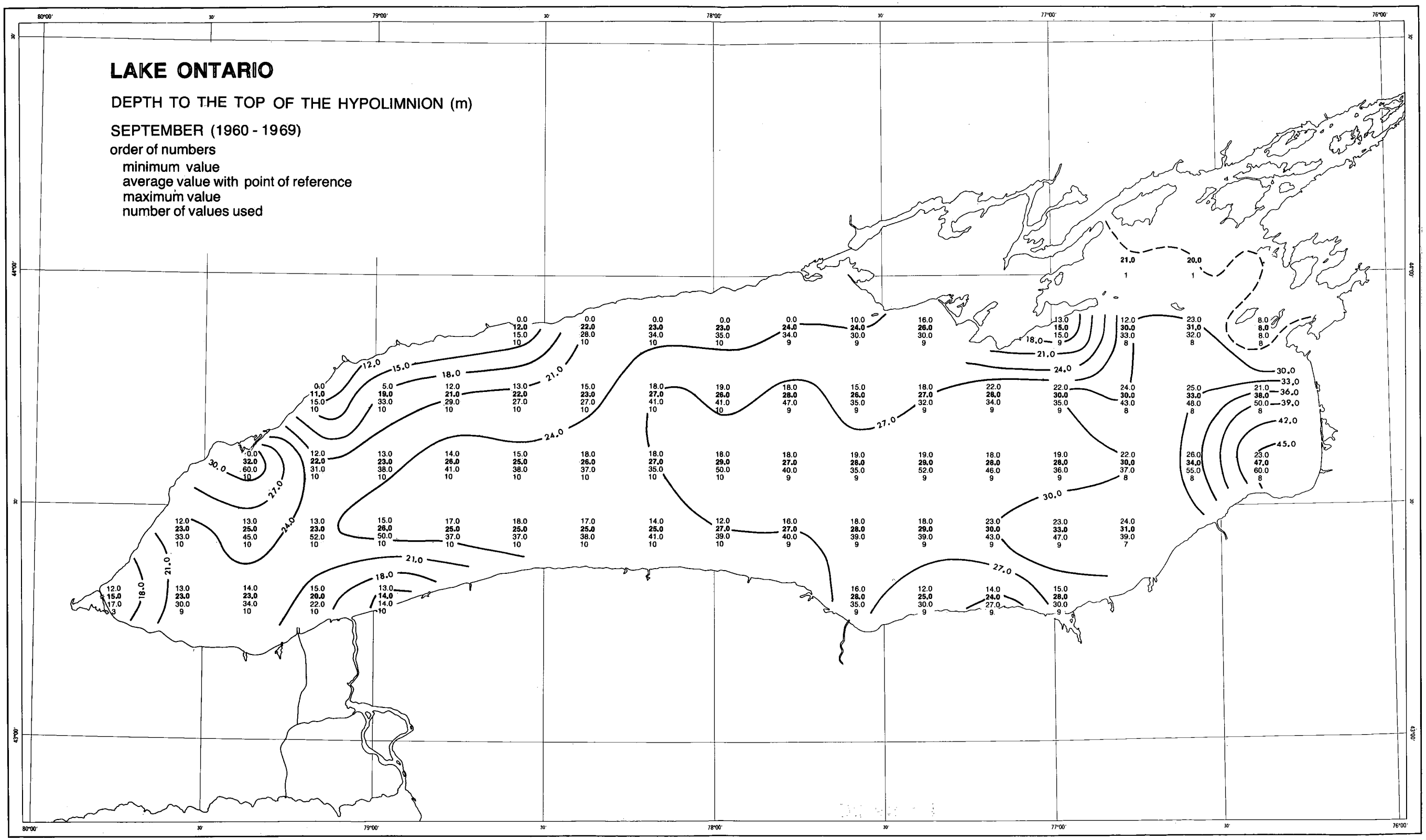
LAKE ONTARIO
DEPTH TO THE TOP OF THE HYPOLIMNION (m)
SEPTEMBER (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 30

Figures 31 to 37. Bottom Percent Saturation of Dissolved Oxygen (Averages and Extremes), Lake Ontario, May to November

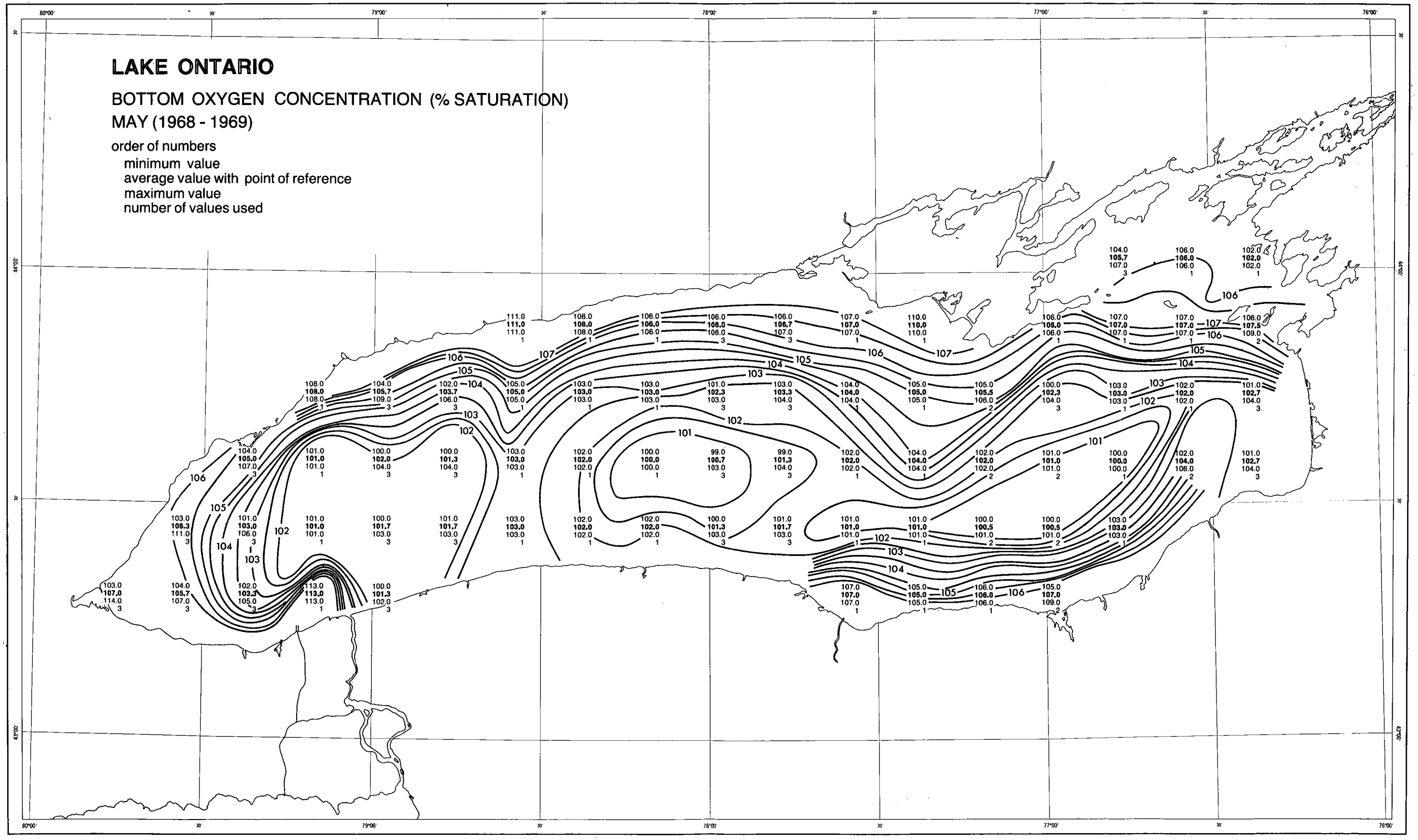
LAKE ONTARIO
BOTTOM OXYGEN CONCENTRATION (% SATURATION)
MAY (1968 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 31

LAKE ONTARIO

BOTTOM OXYGEN CONCENTRATION (% SATURATION)

JUNE (1966 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

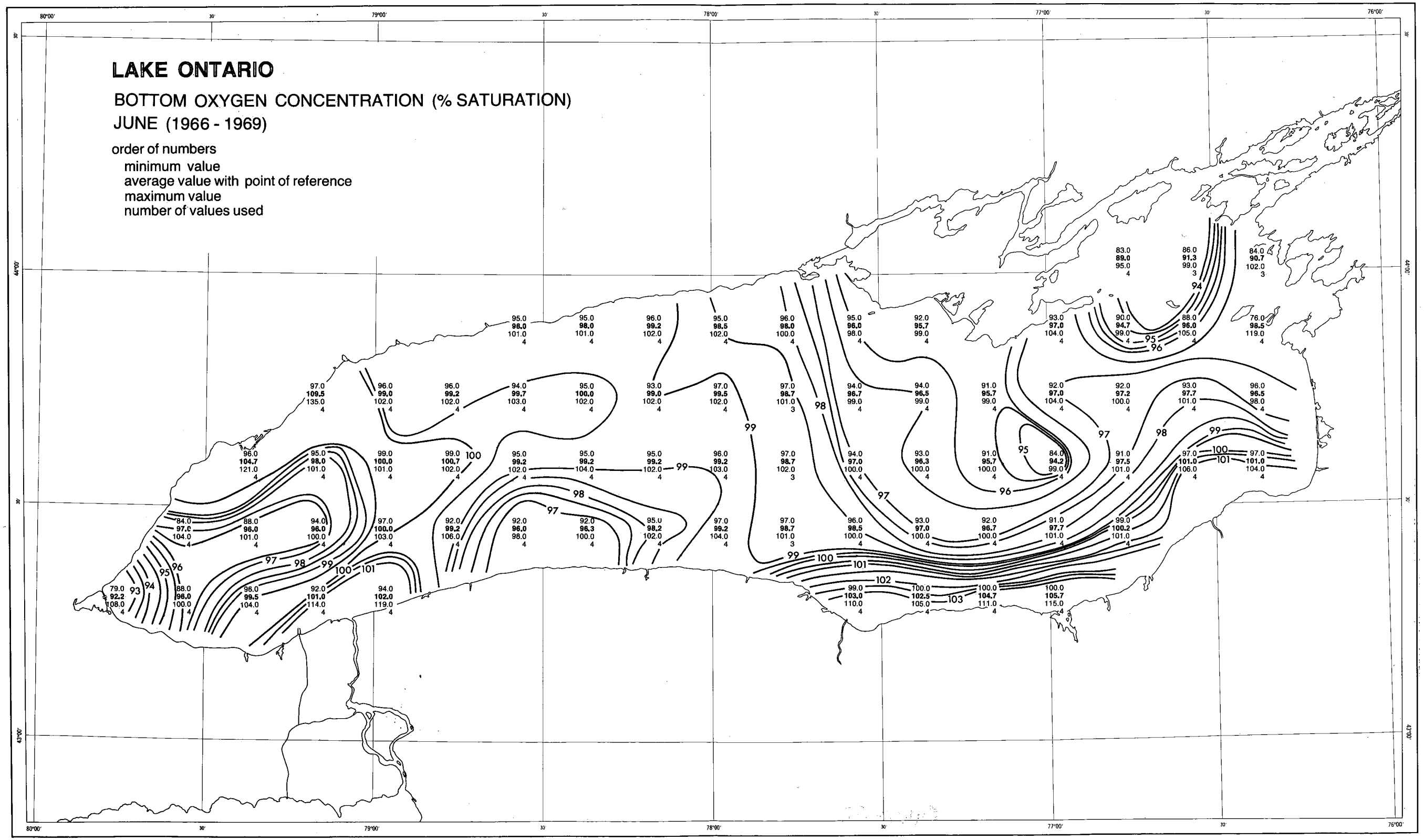

Figure 32

LAKE ONTARIO

BOTTOM OXYGEN CONCENTRATION (% SATURATION)

JULY (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

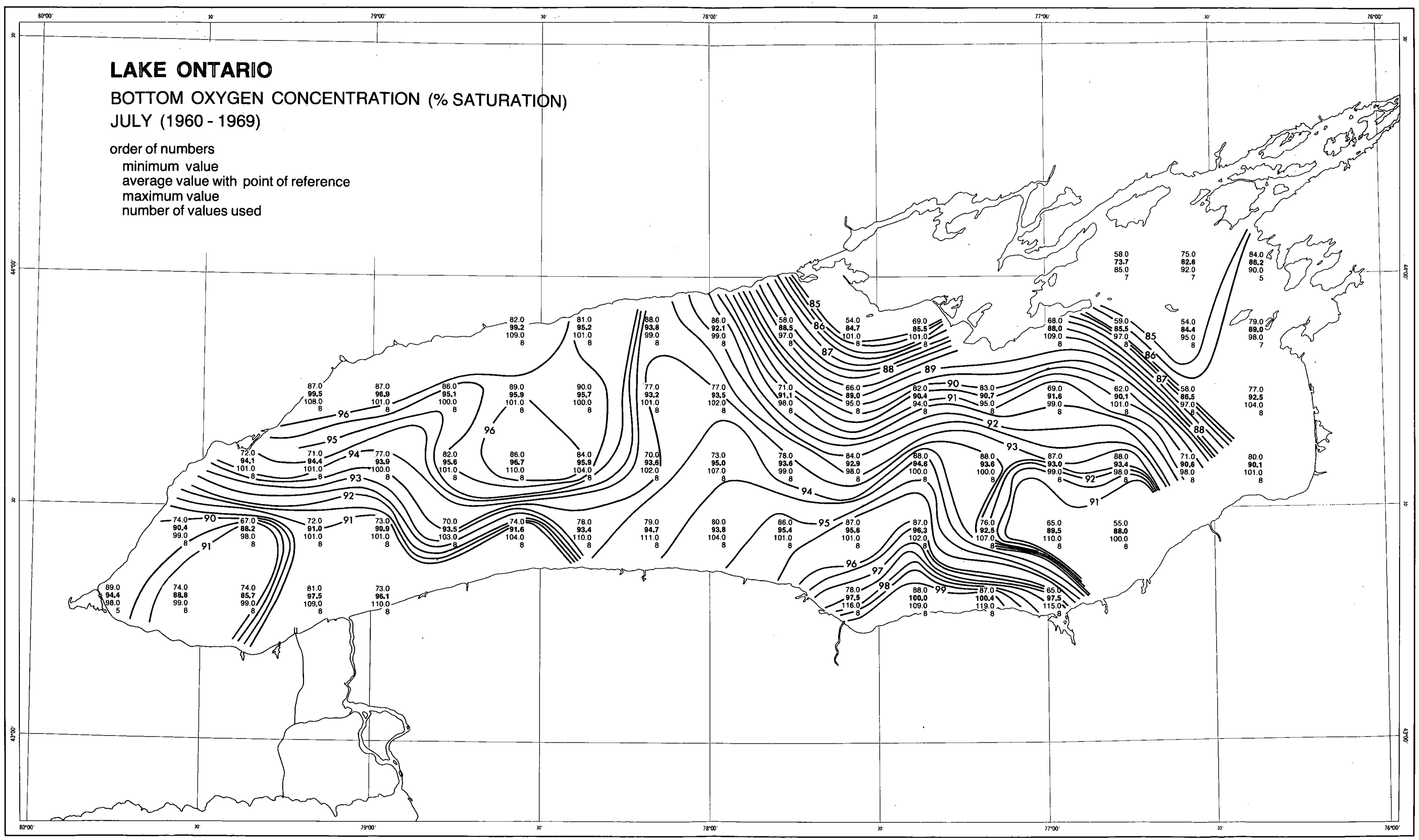

Figure 33

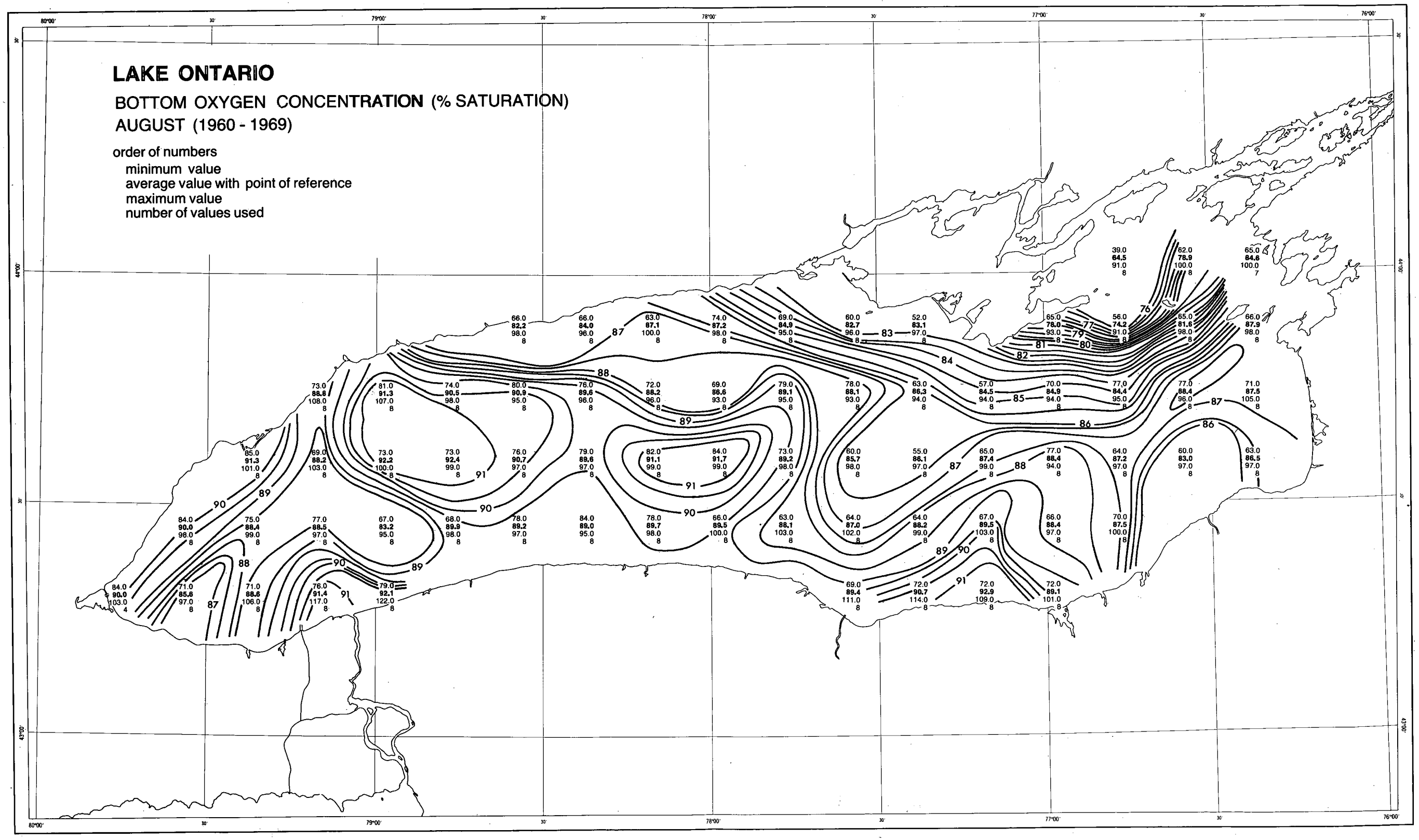
LAKE ONTARIO
BOTTOM OXYGEN CONCENTRATION (% SATURATION)
AUGUST (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 34

LAKE ONTARIO

BOTTOM OXYGEN CONCENTRATION (% SATURATION)

SEPTEMBER (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

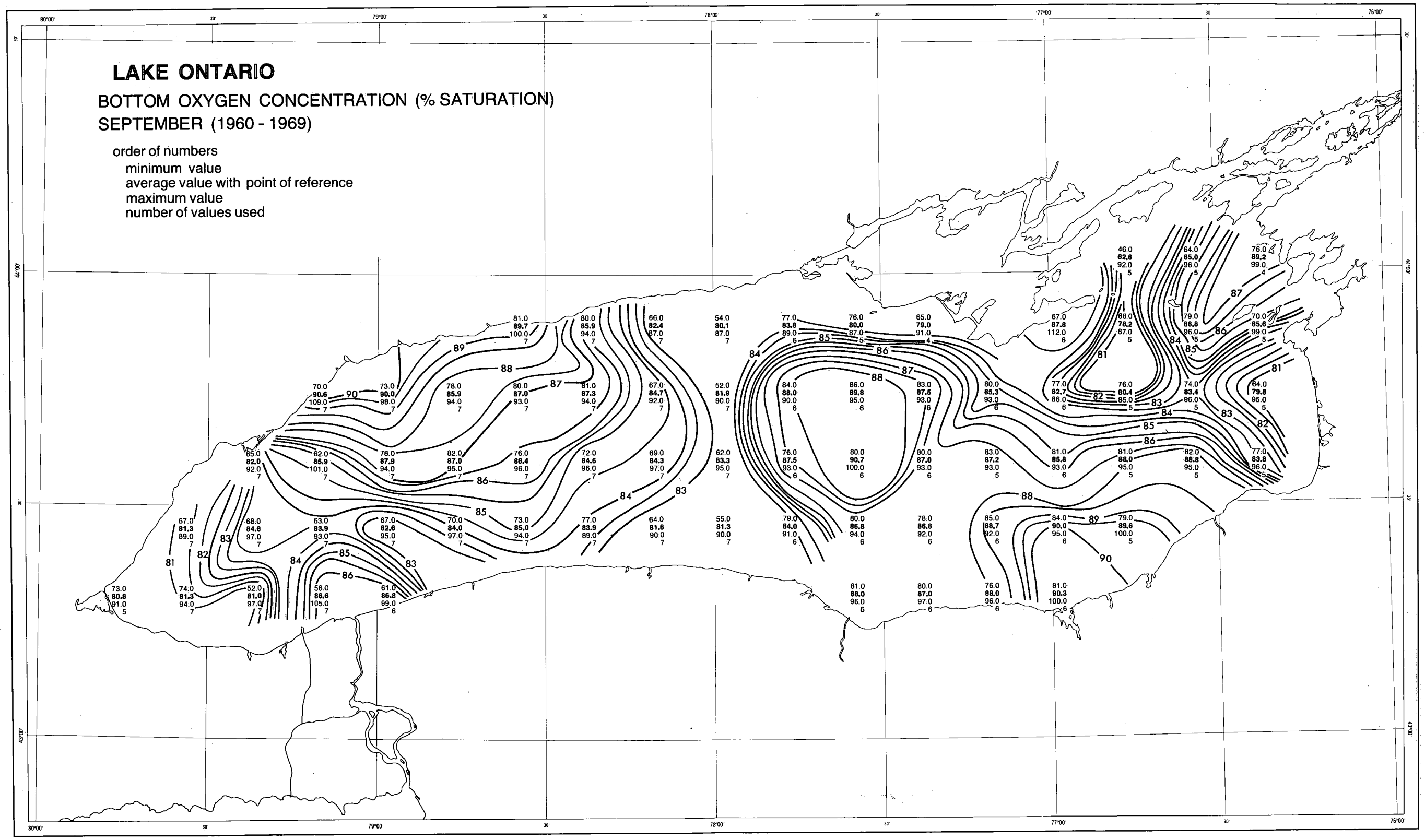

Figure 35

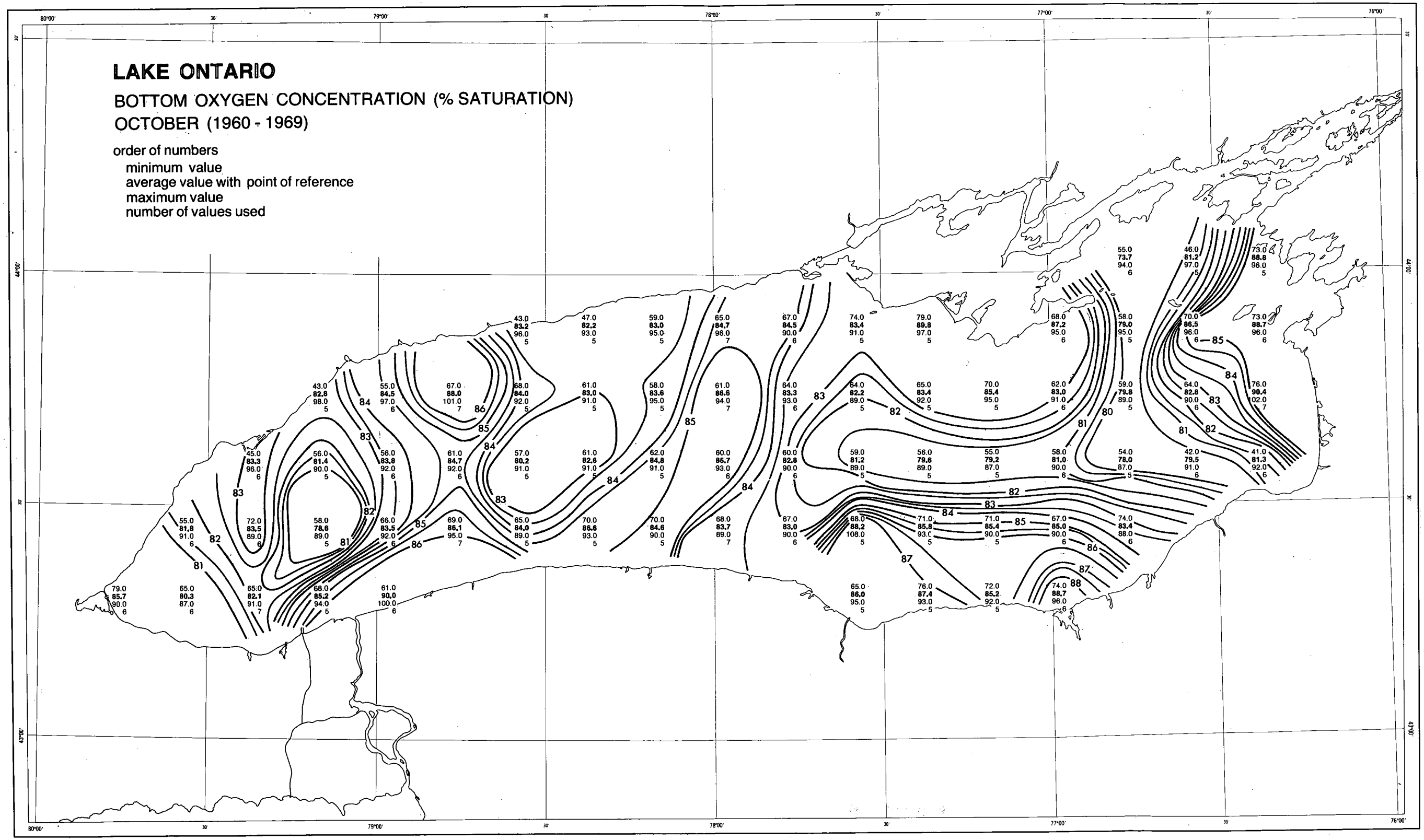
LAKE ONTARIO
BOTTOM OXYGEN CONCENTRATION (% SATURATION)
OCTOBER (1960 - 1969)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used
80°00'
79°00'
78°00'
77°00'
76°00'
44°00'
43°00'

Figure 36

LAKE ONTARIO

BOTTOM OXYGEN CONCENTRATION (% SATURATION)

NOVEMBER (1960 - 1969)

order of numbers
- minimum value
- average value with point of reference
- maximum value
- number of values used

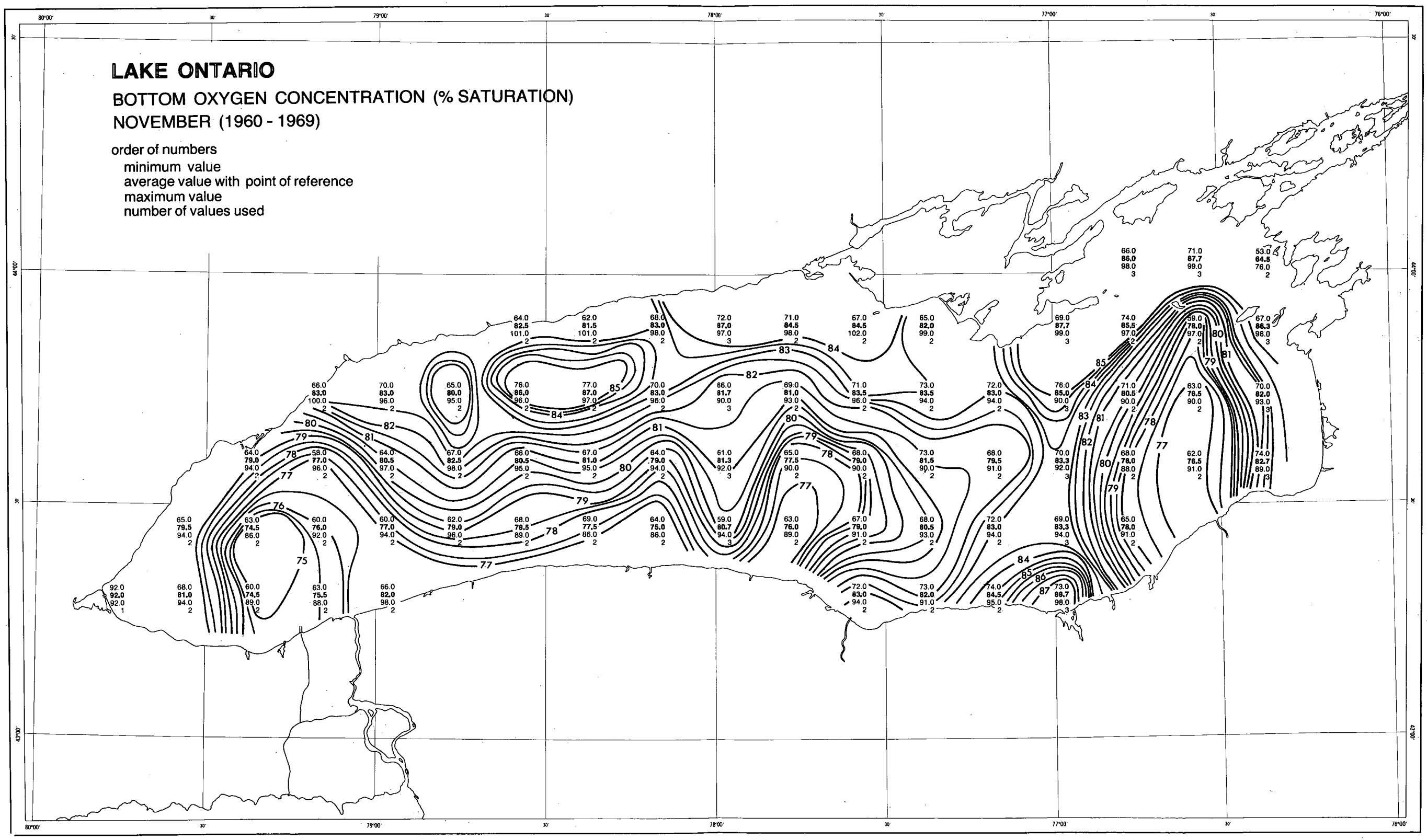

Figure 37

Figures 38 to 46. Surface Temperature (Averages and Extremes) of Lake Erie, April to December

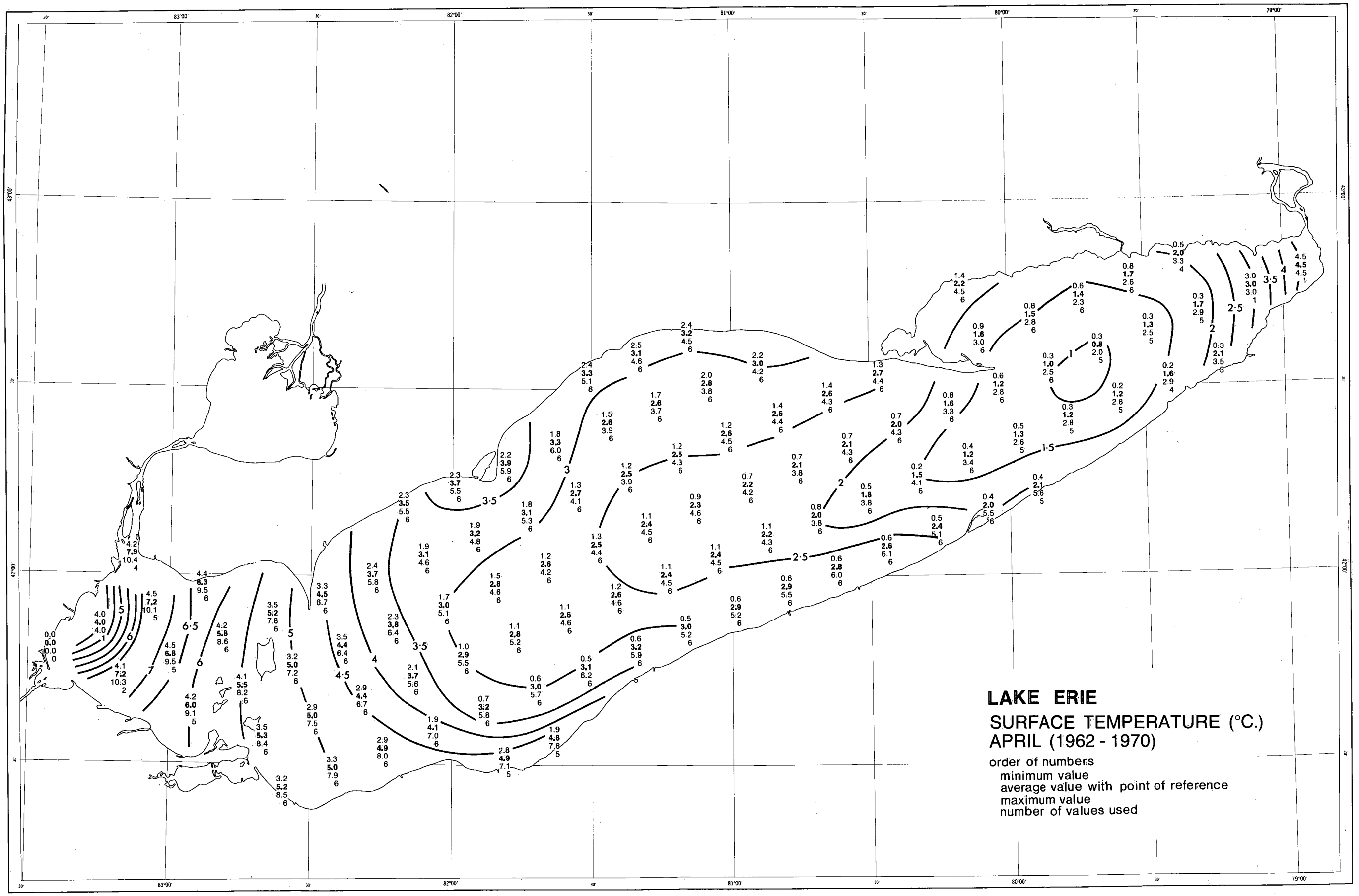
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
APRIL (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 38

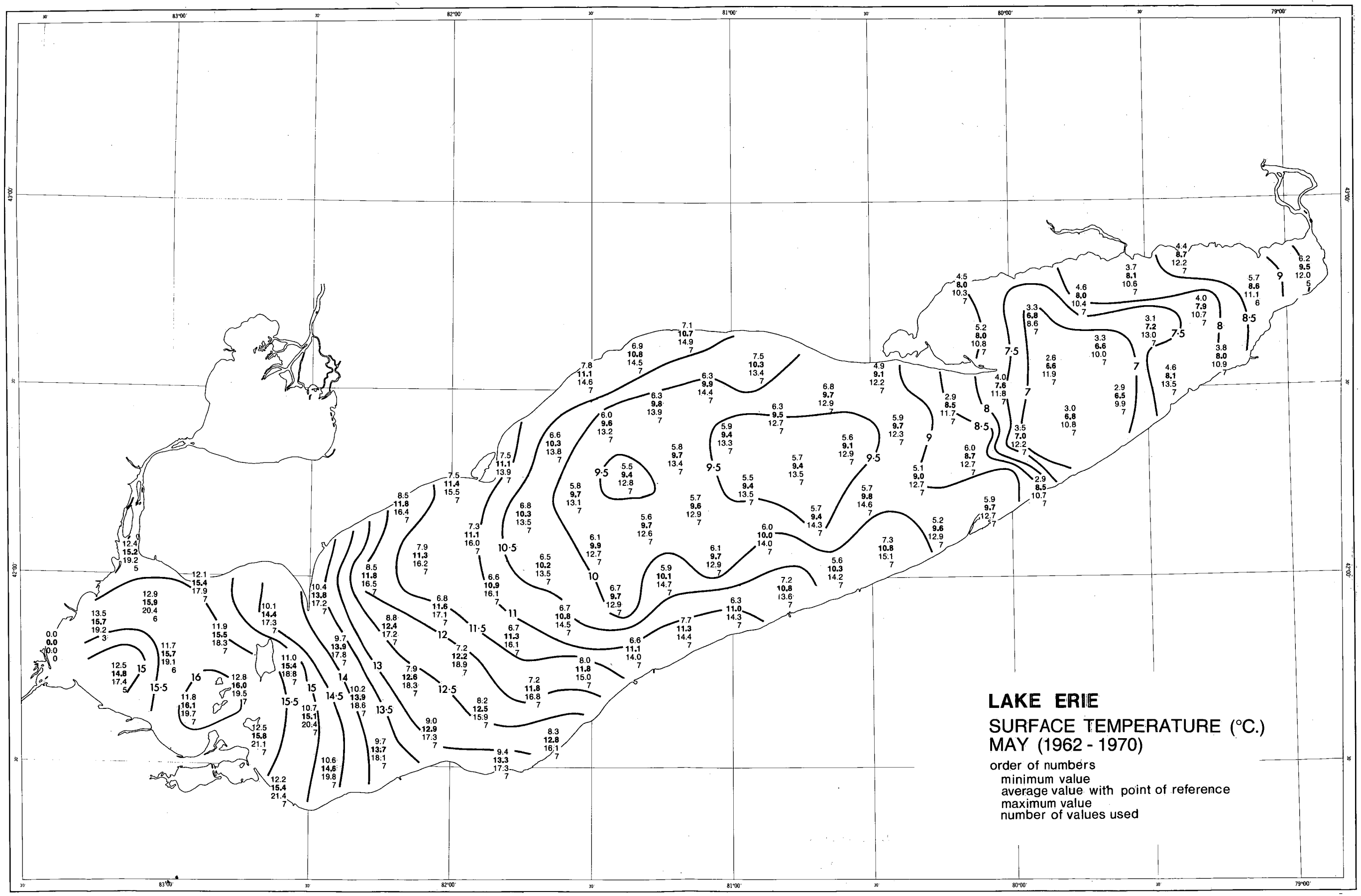
LAKE ERIE
SURFACE TEMPERATURE (°C.)
MAY (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 39

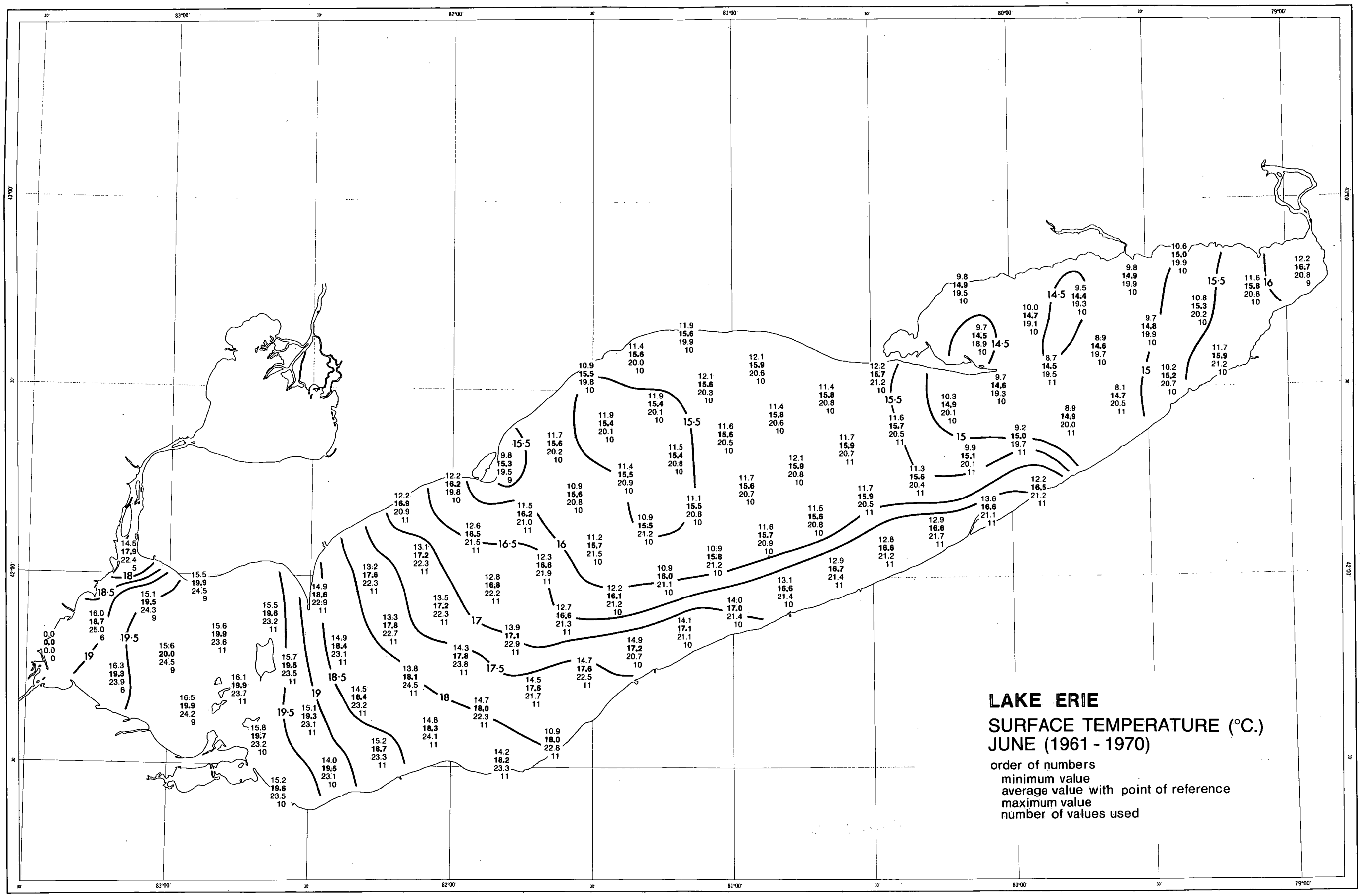
LAKE ERIE
SURFACE TEMPERATURE (°C.)
JUNE (1961 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 40

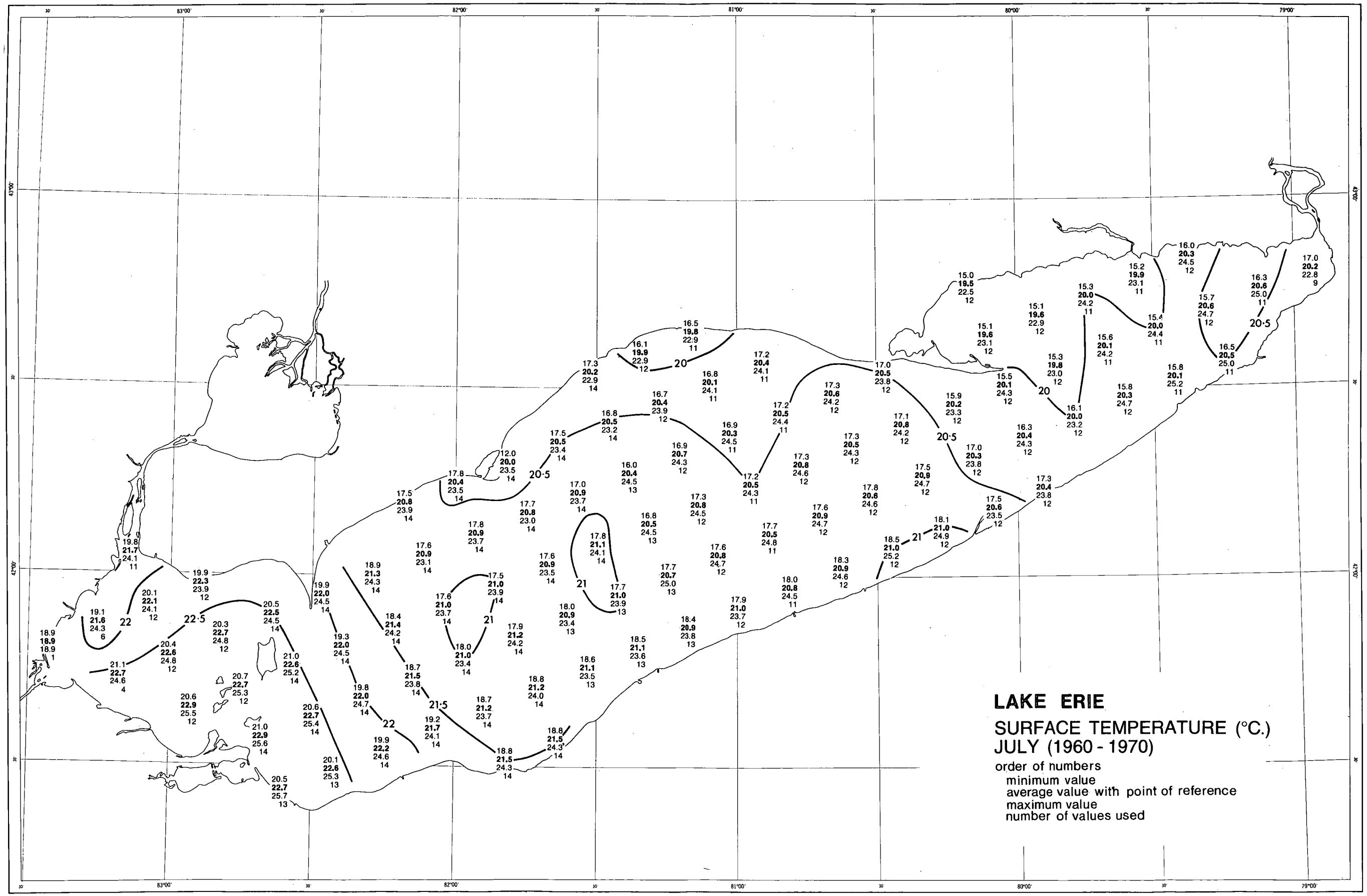
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
JULY (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 41

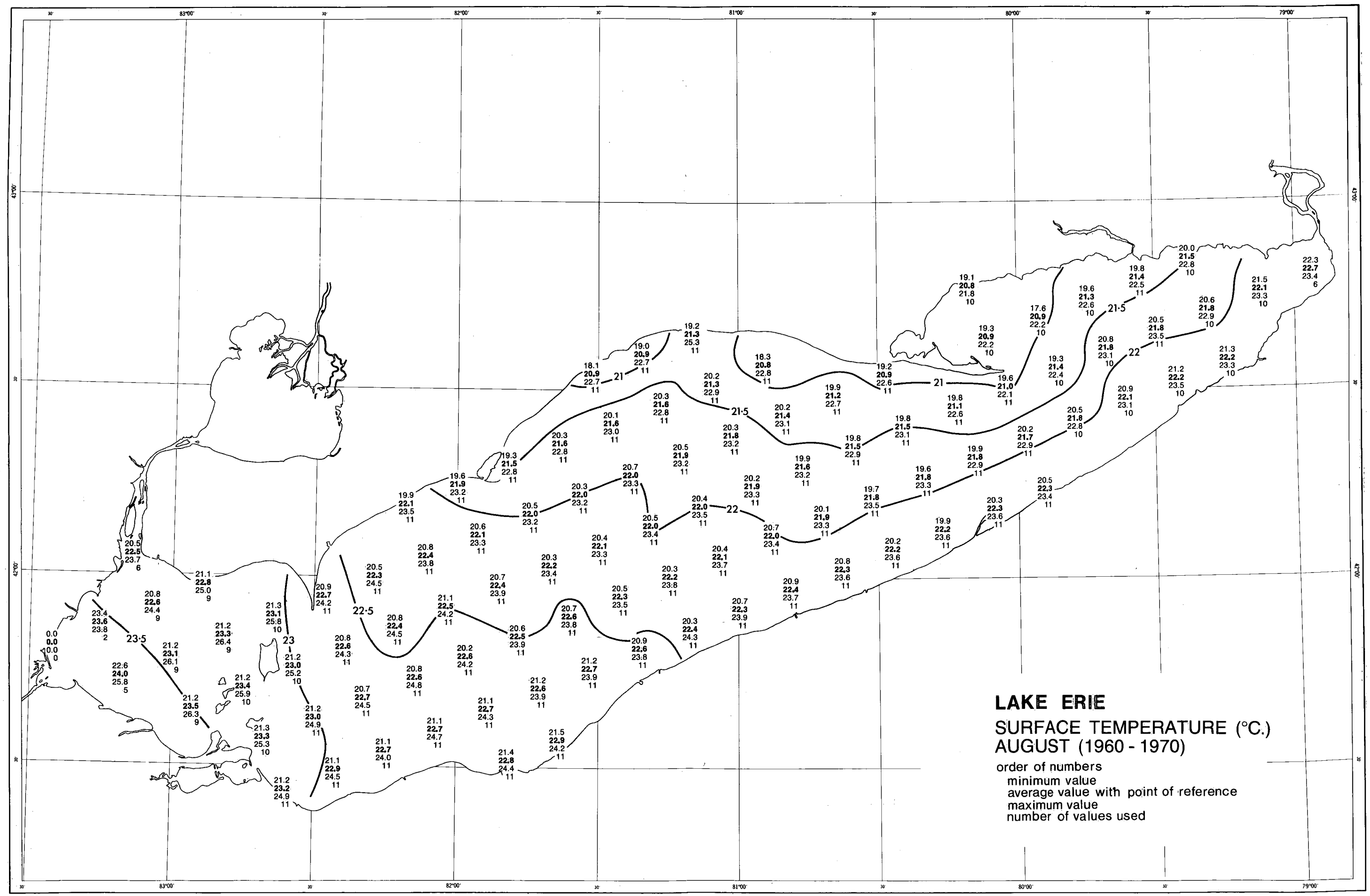
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
AUGUST (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 42

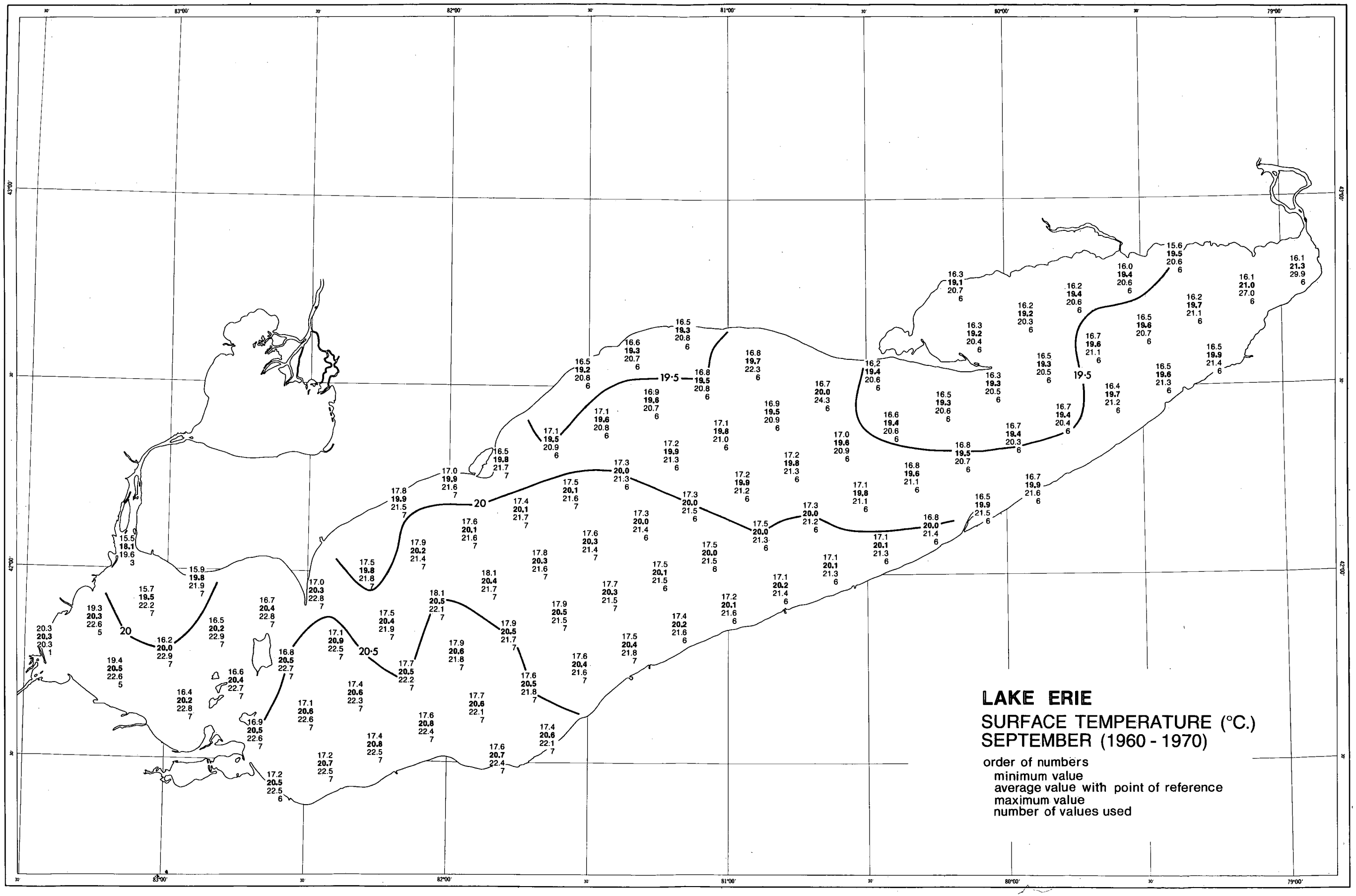
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
19·5
20
20·5
LAKE ERIE
SURFACE TEMPERATURE (°C.)
SEPTEMBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 43

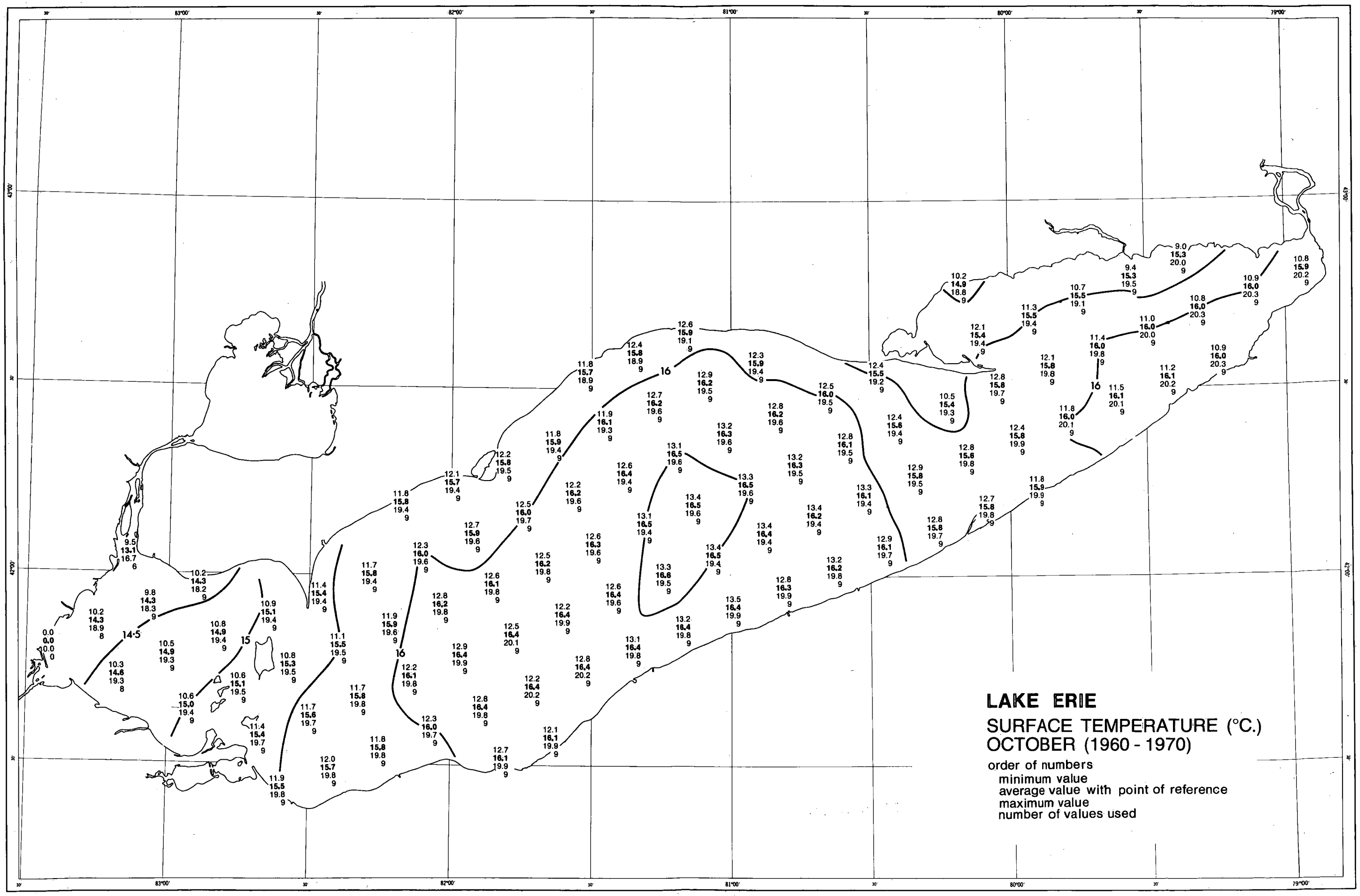
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
OCTOBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 44

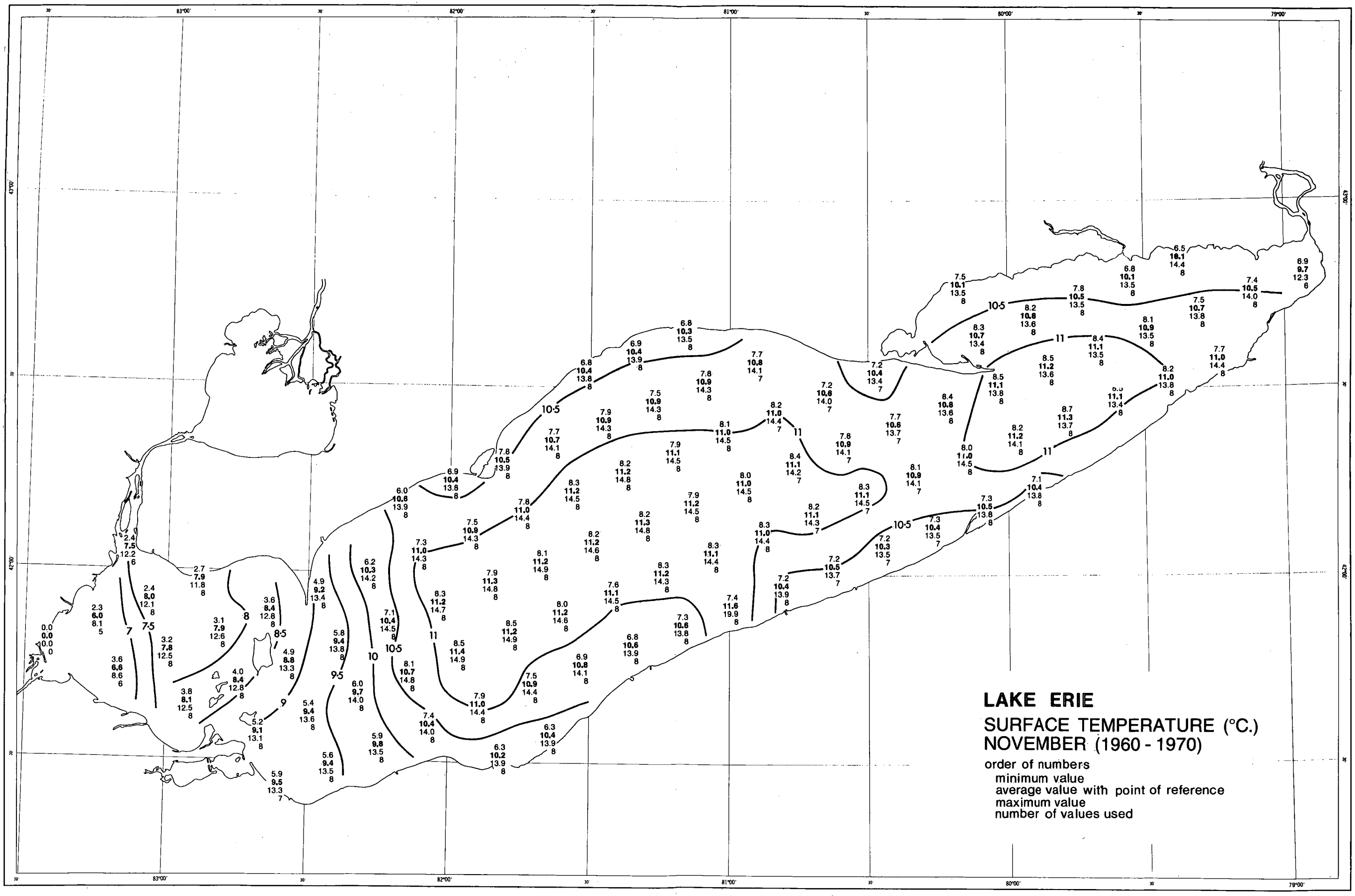
83°00'
82°00'
81°00'
80°00'
79°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
NOVEMBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 45

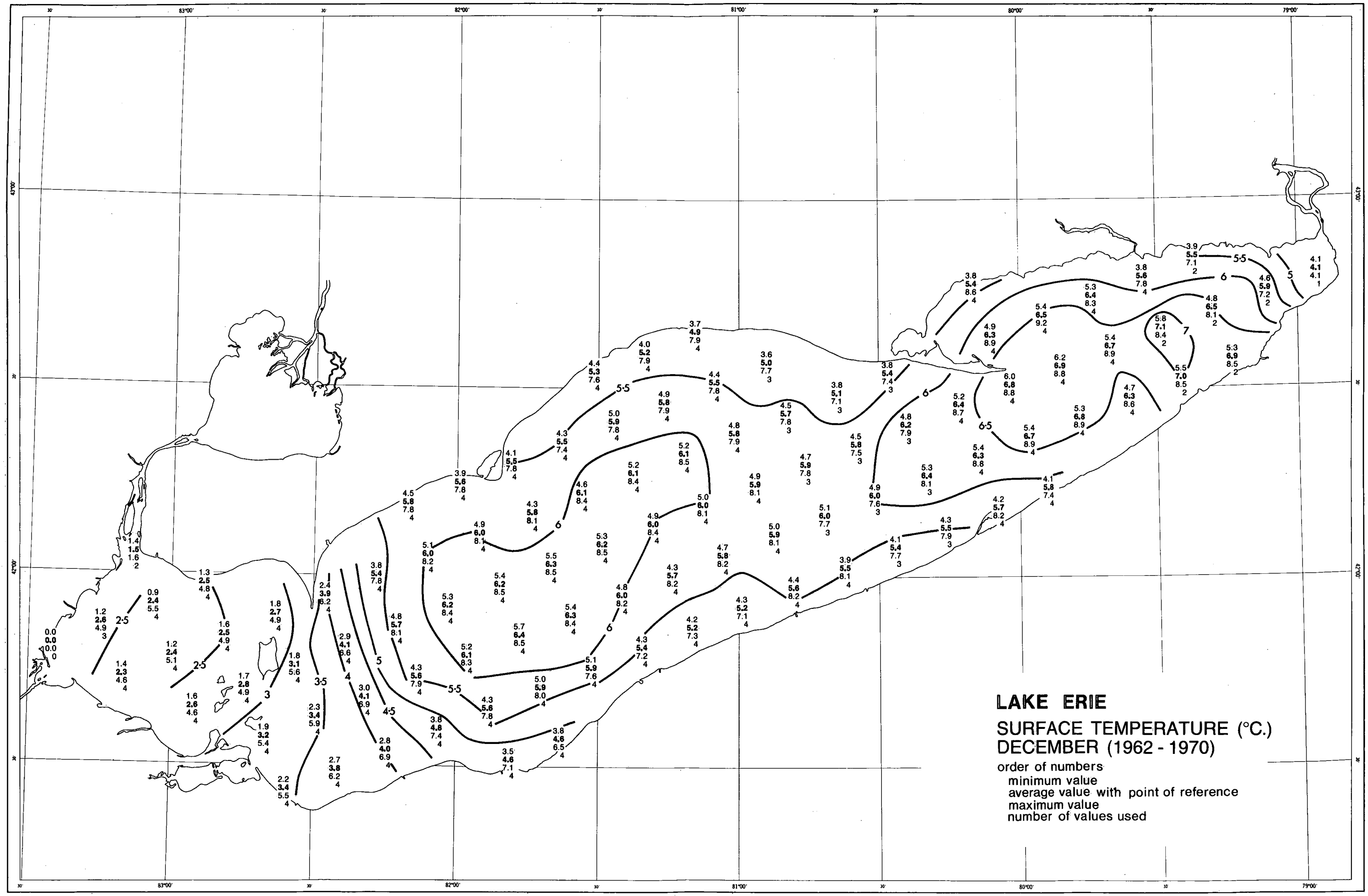
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
SURFACE TEMPERATURE (°C.)
DECEMBER (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 46

Figures 47 to 55. Bottom Temperature (Averages and Extremes) of Lake Erie, April to December

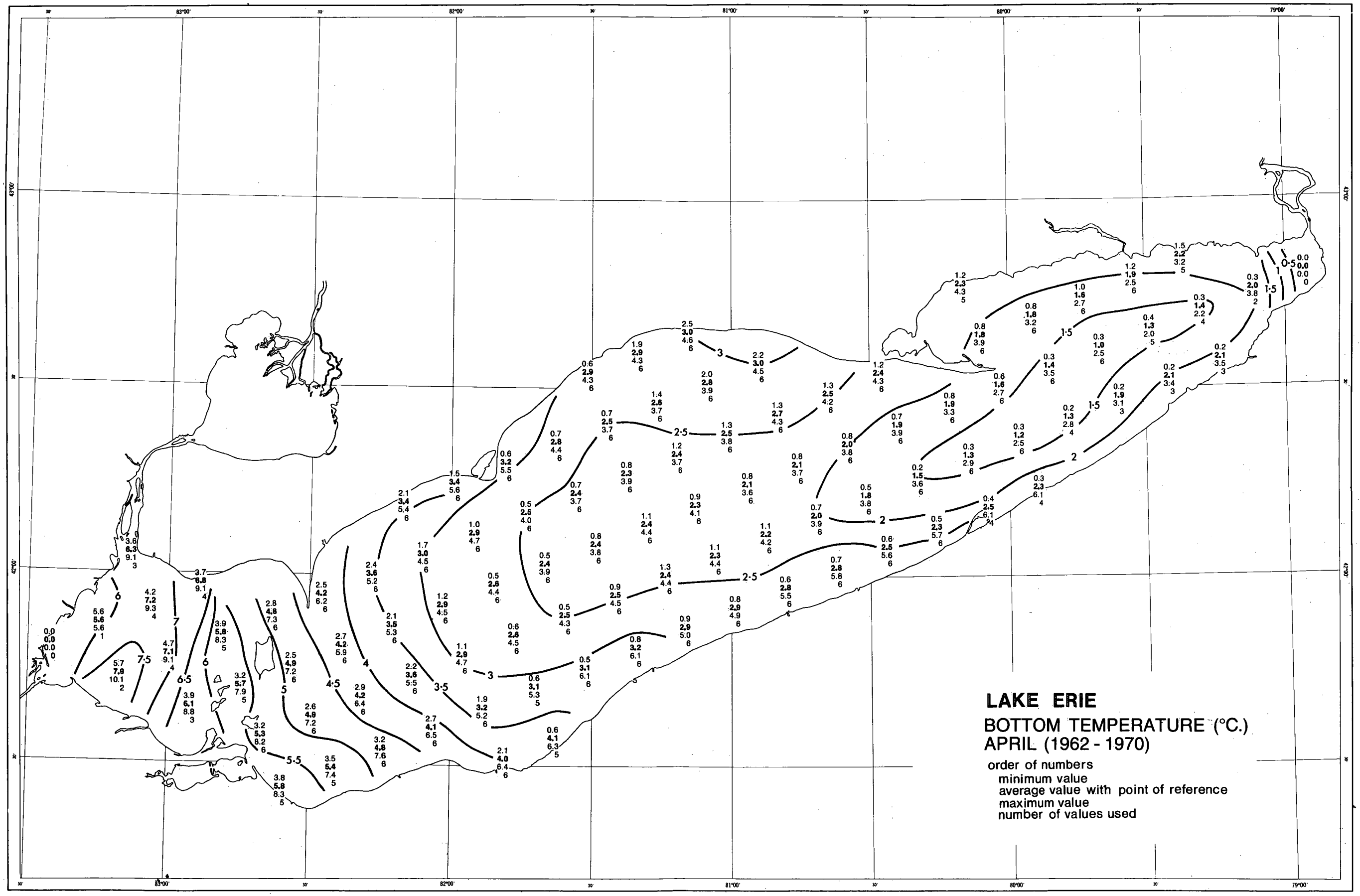
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
APRIL (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 47

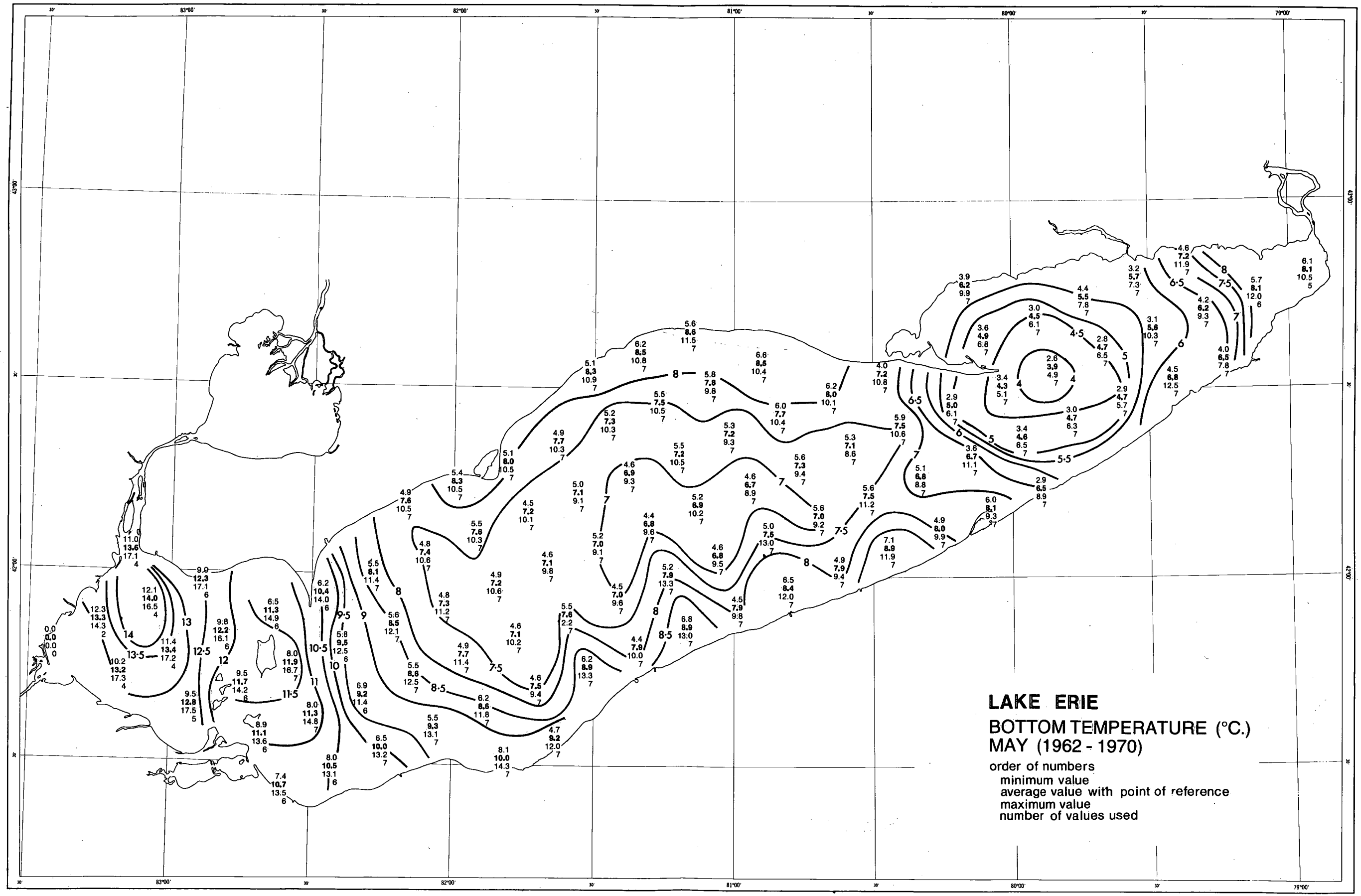
83°00'
82°00'
81°00'
80°00'
79°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
MAY (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 48

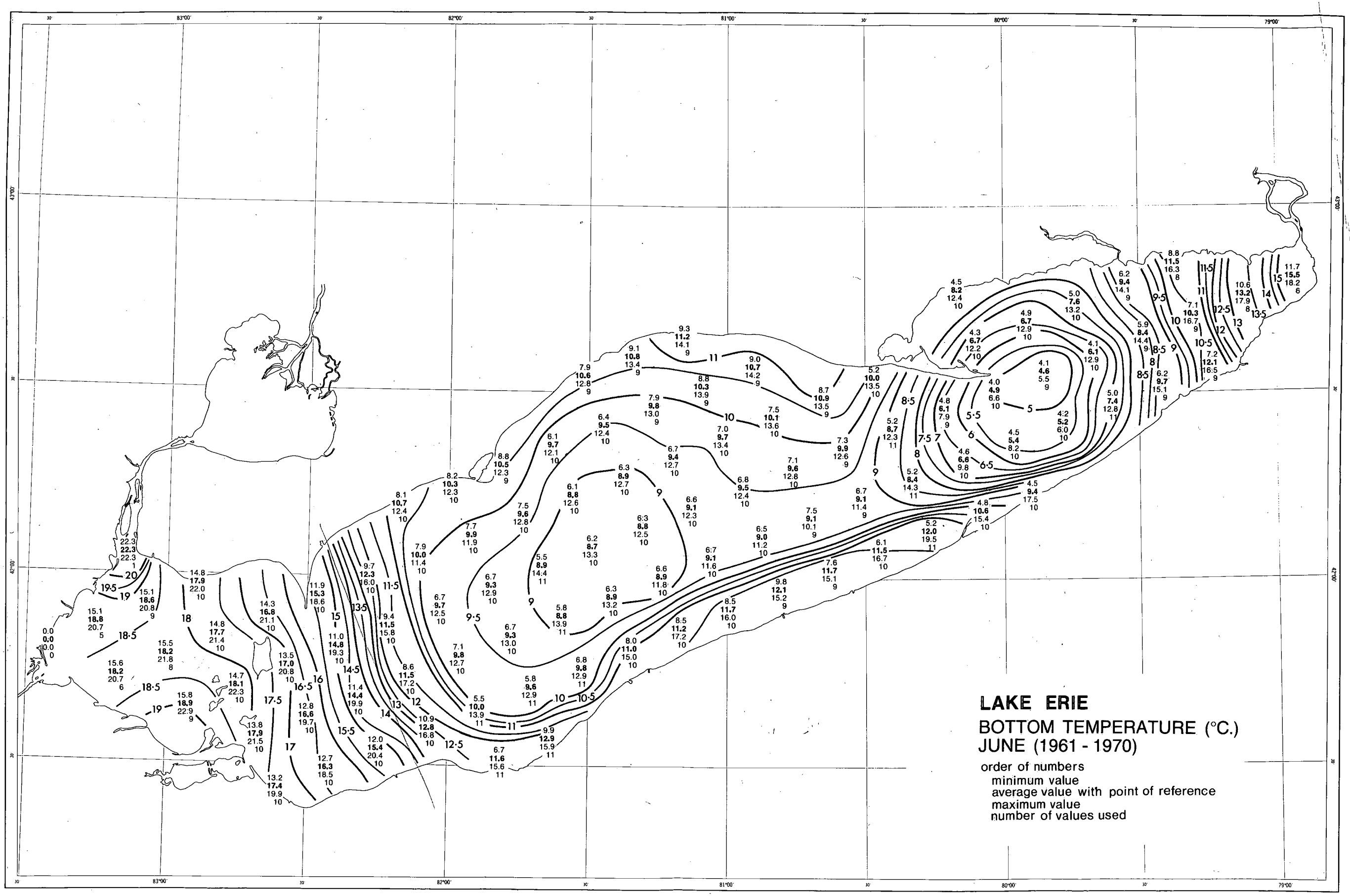
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
JUNE (1961 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 49

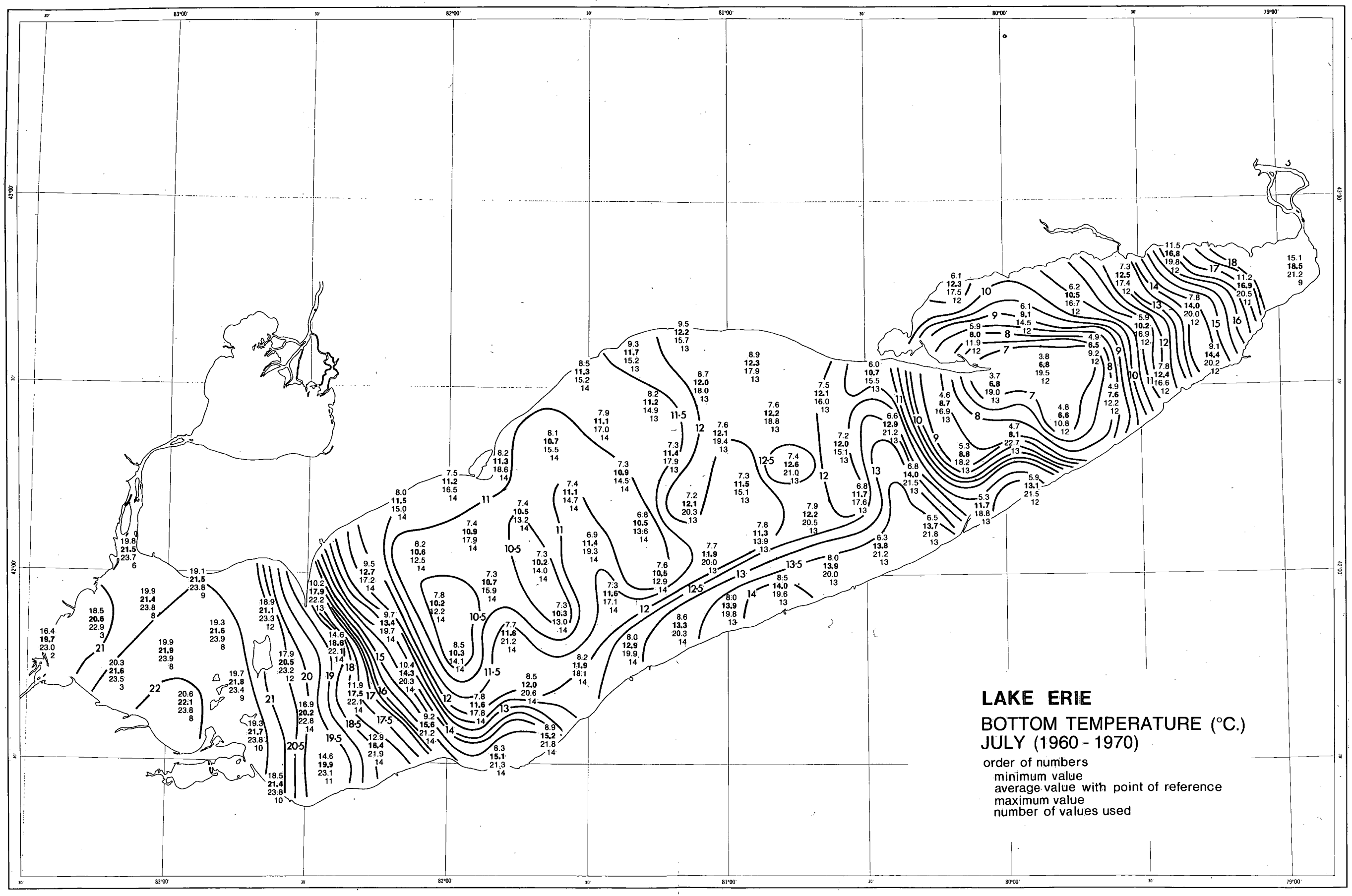
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
JULY (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 50

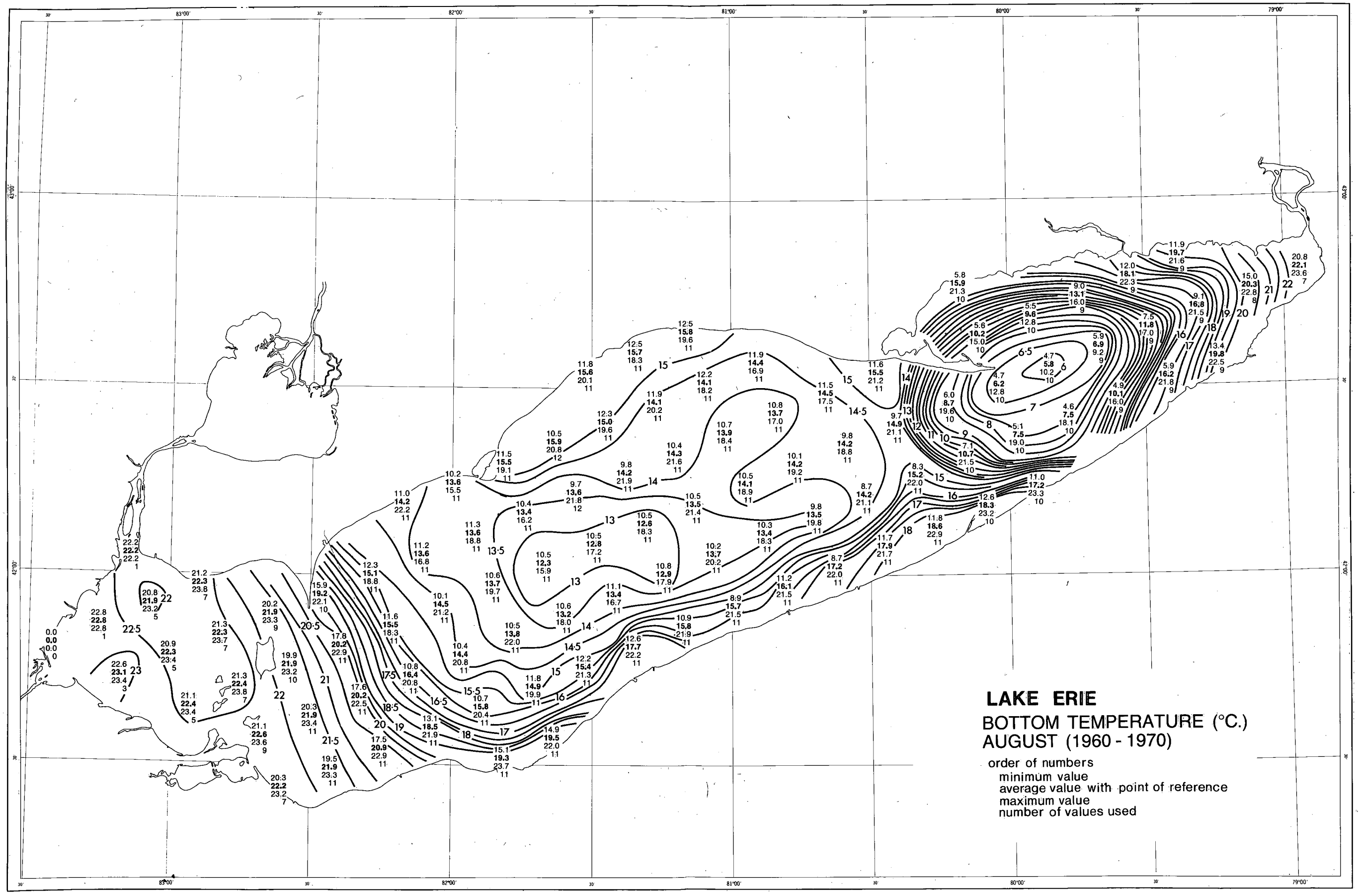
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
AUGUST (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 51

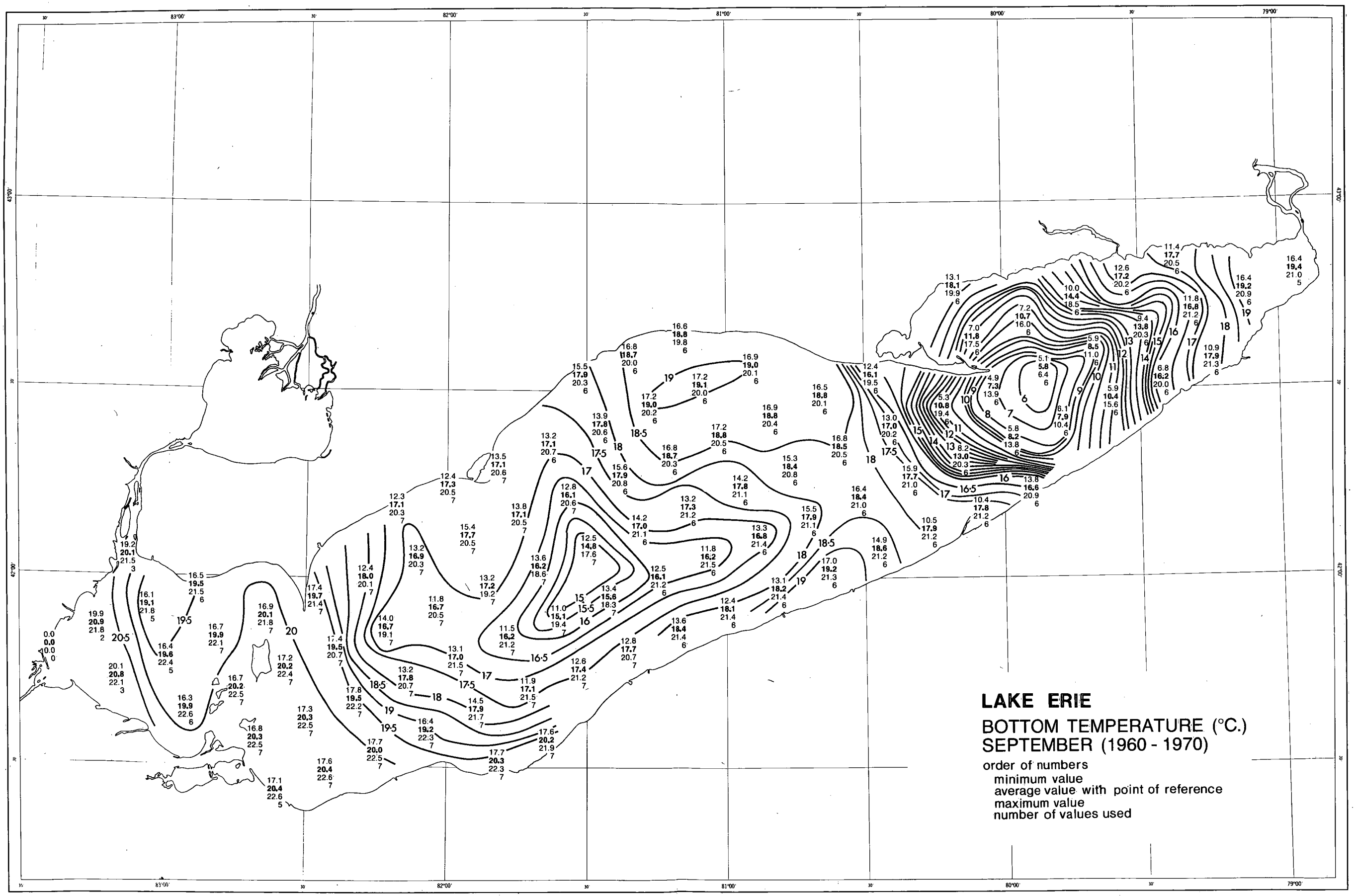
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
SEPTEMBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 52

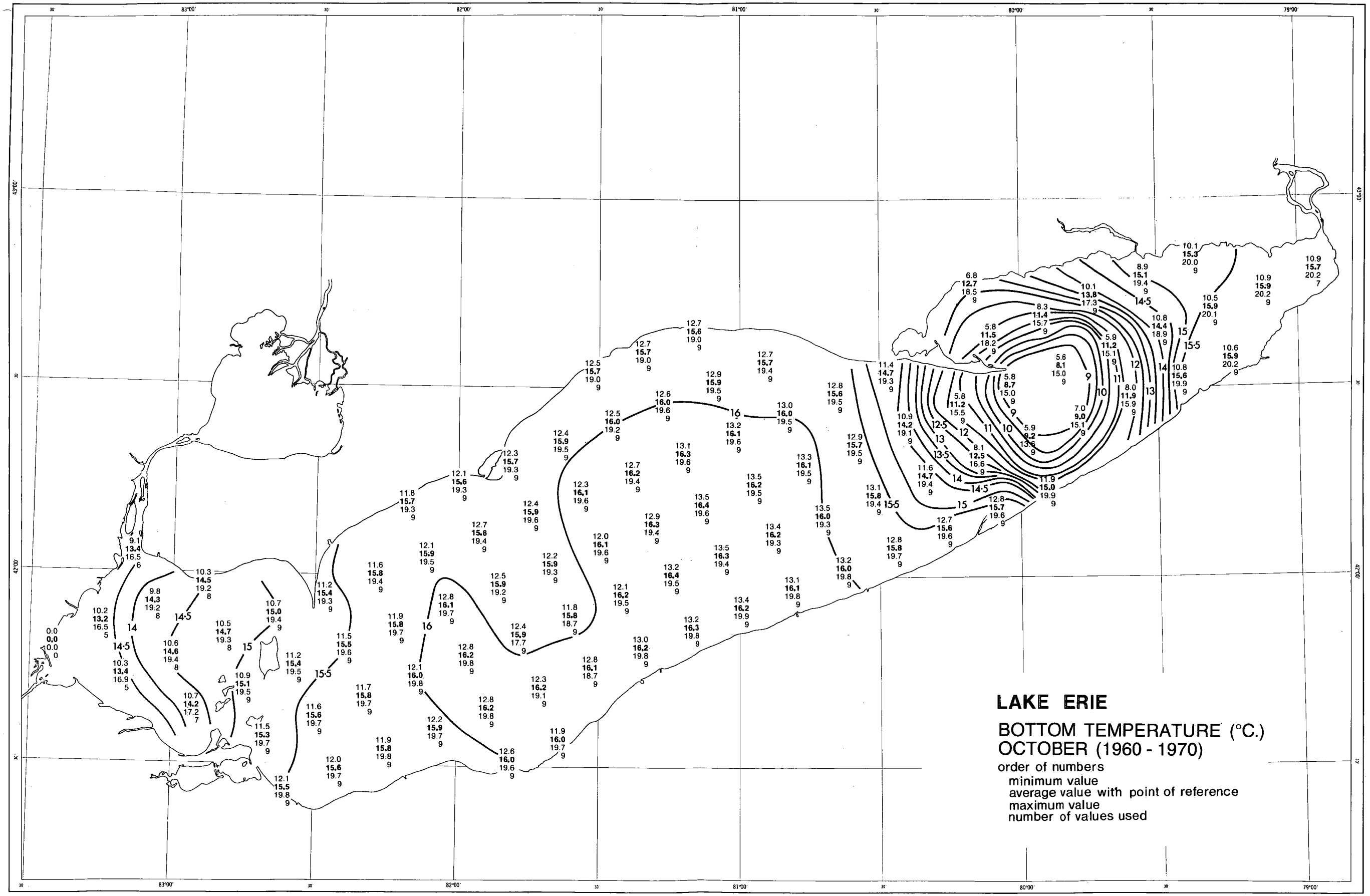
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
OCTOBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 53

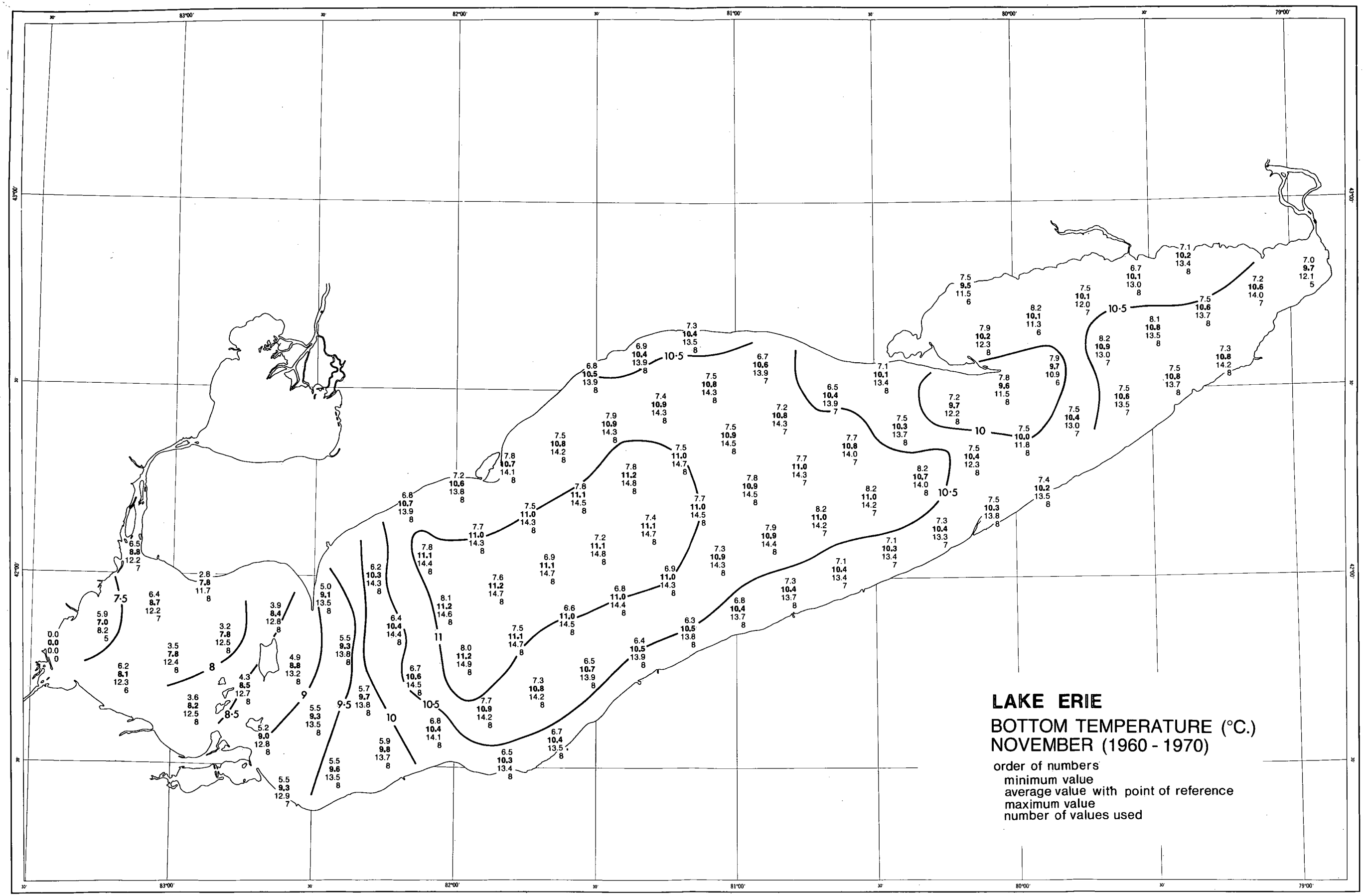
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
NOVEMBER (1960 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 54

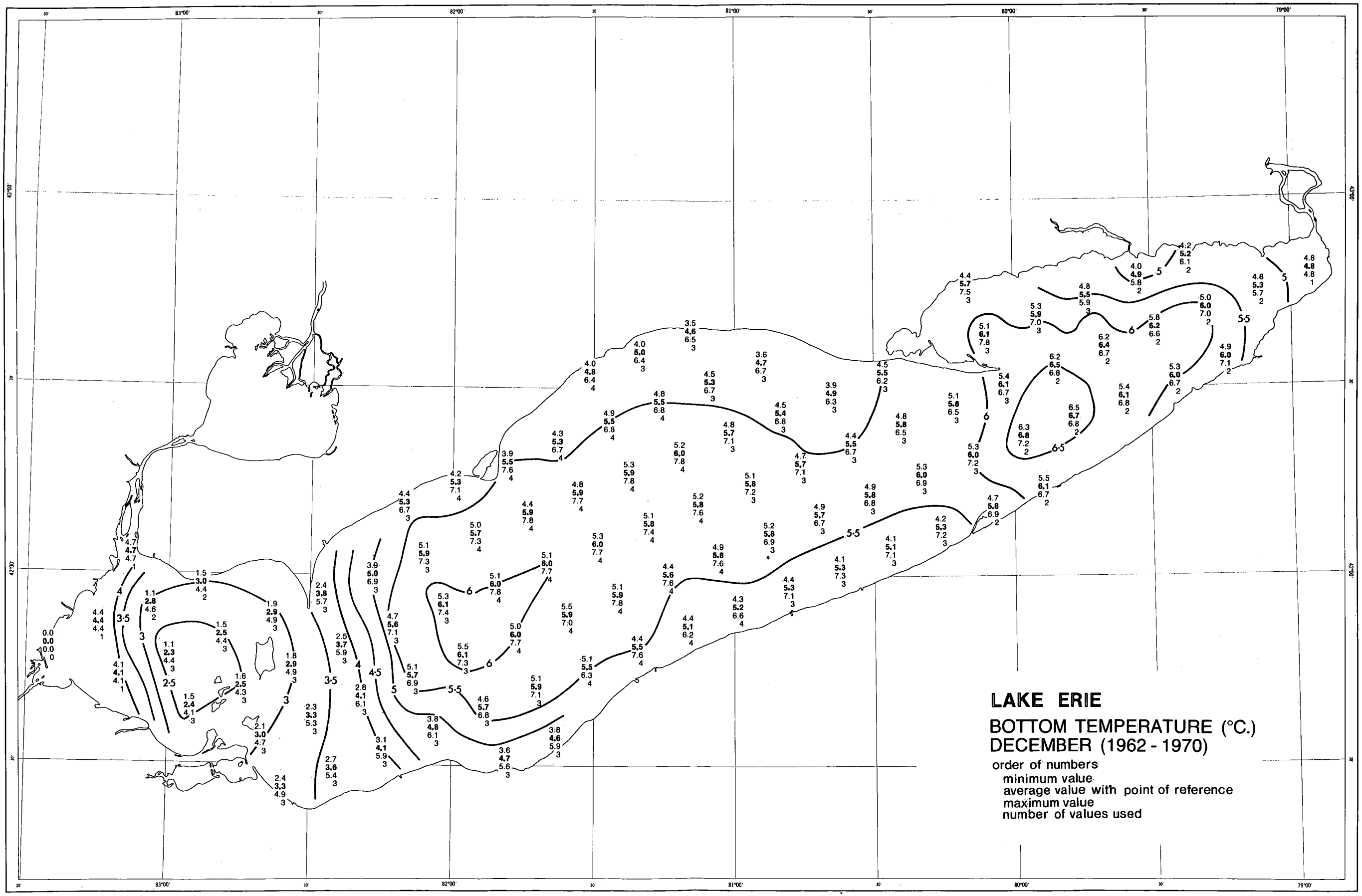
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM TEMPERATURE (°C.)
DECEMBER (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 55

Figures 56 to 60. Depth to the Top of the Hypolimnion (Averages and Extremes), Lake Erie, May to September

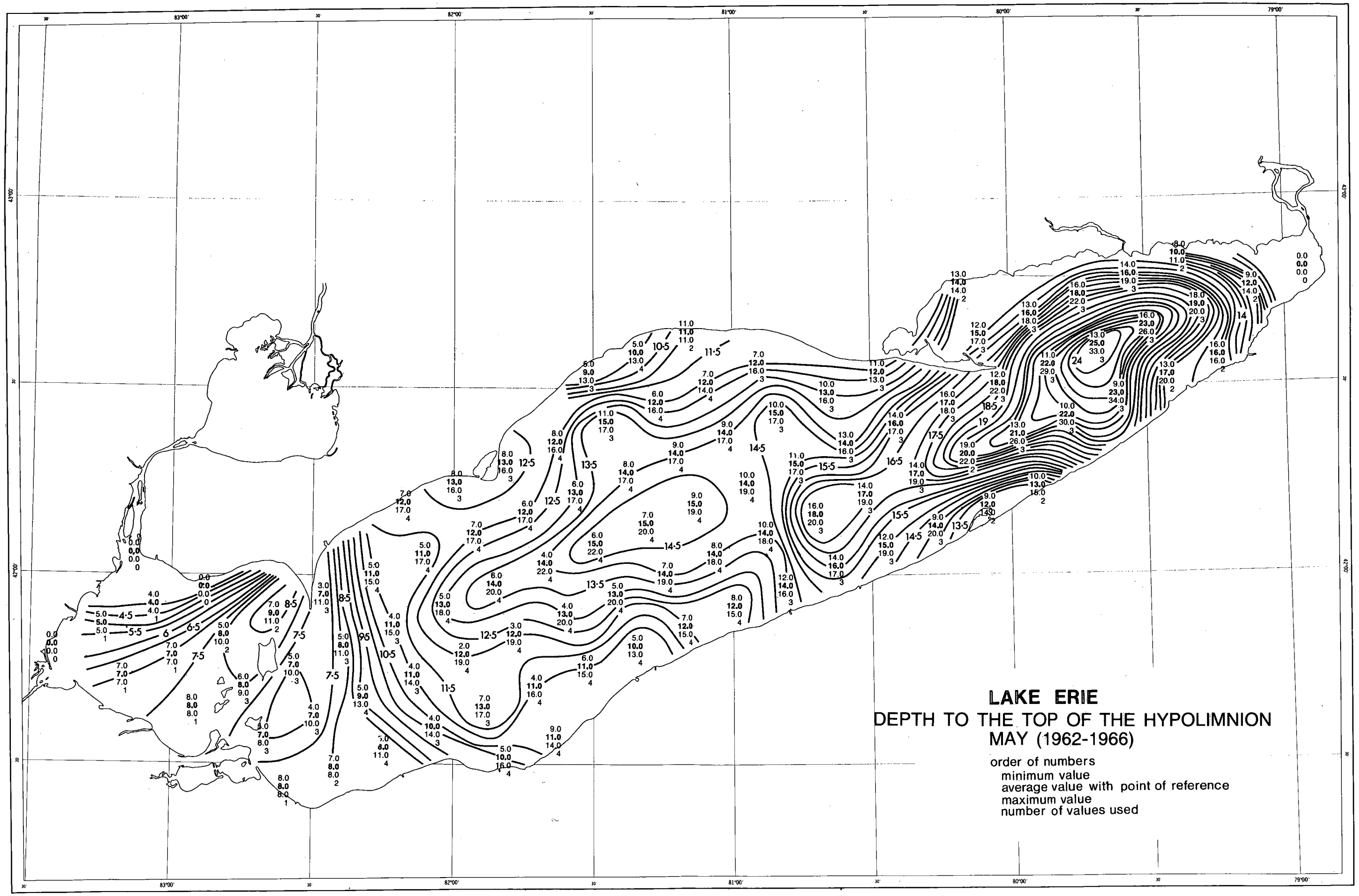
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
DEPTH TO THE TOP OF THE HYPOLIMNION
MAY (1962-1966)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 56

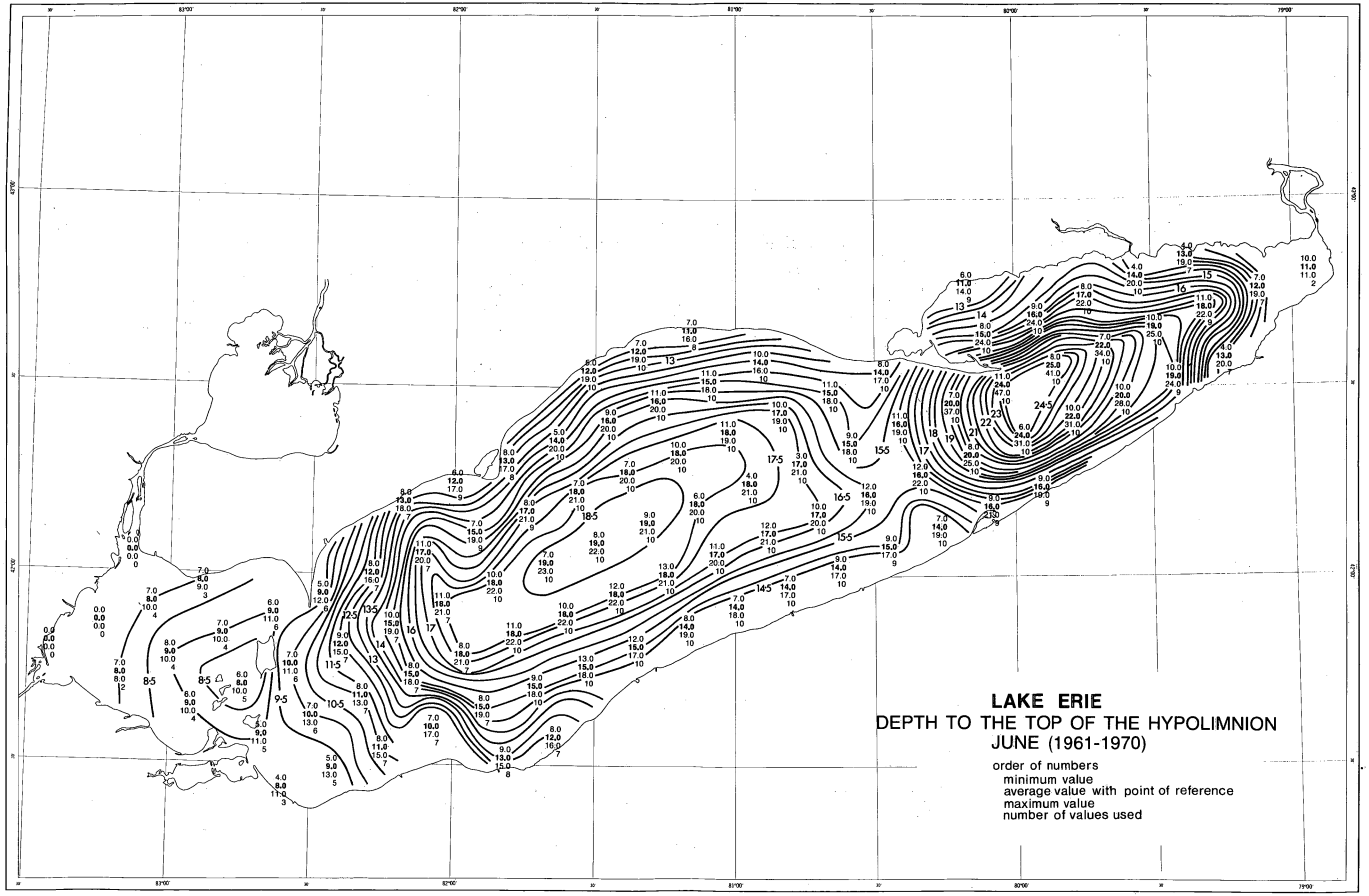
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
DEPTH TO THE TOP OF THE HYPOLIMNION
JUNE (1961-1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 57

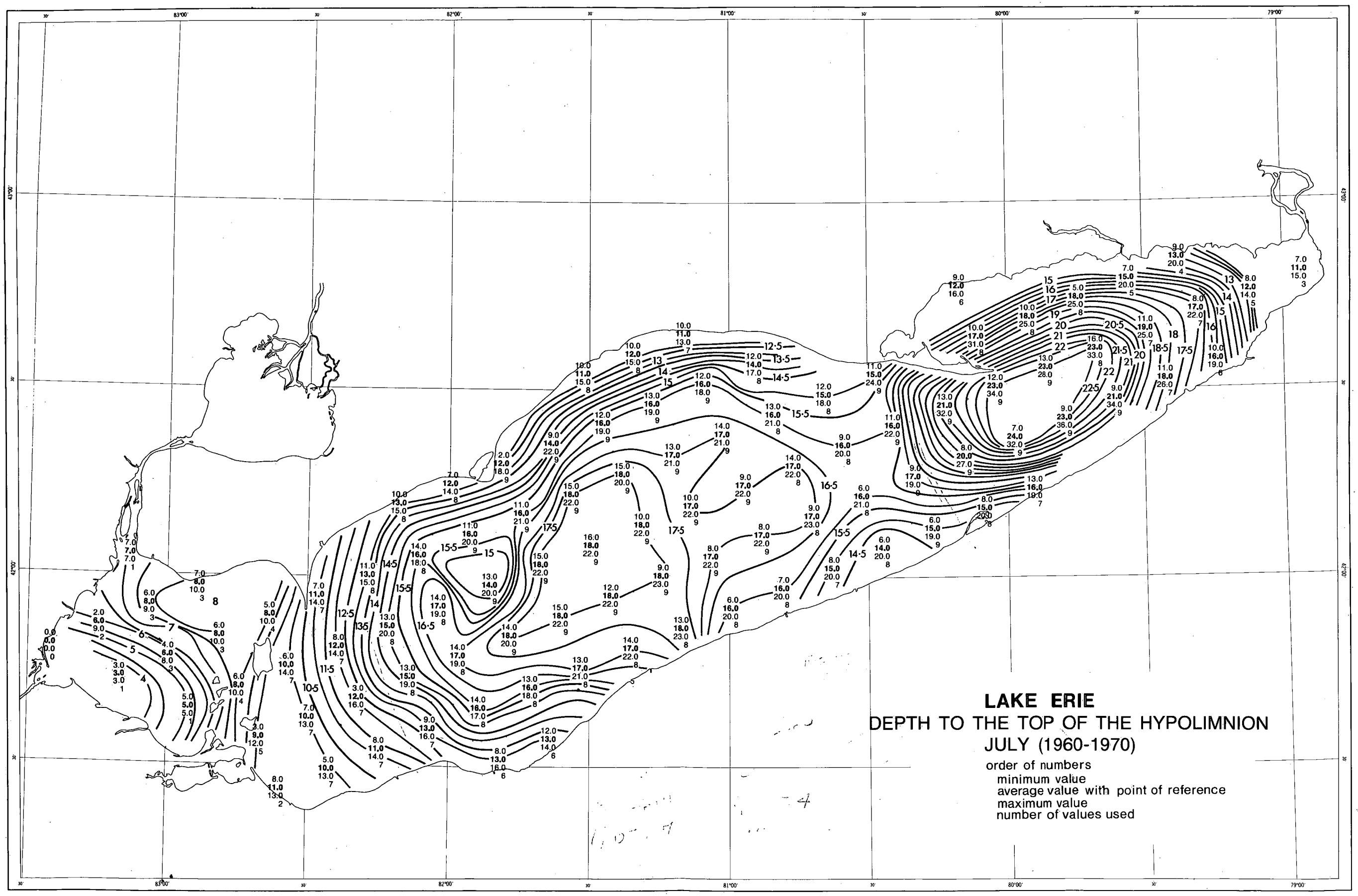
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
DEPTH TO THE TOP OF THE HYPOLIMNION
JULY (1960-1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 58

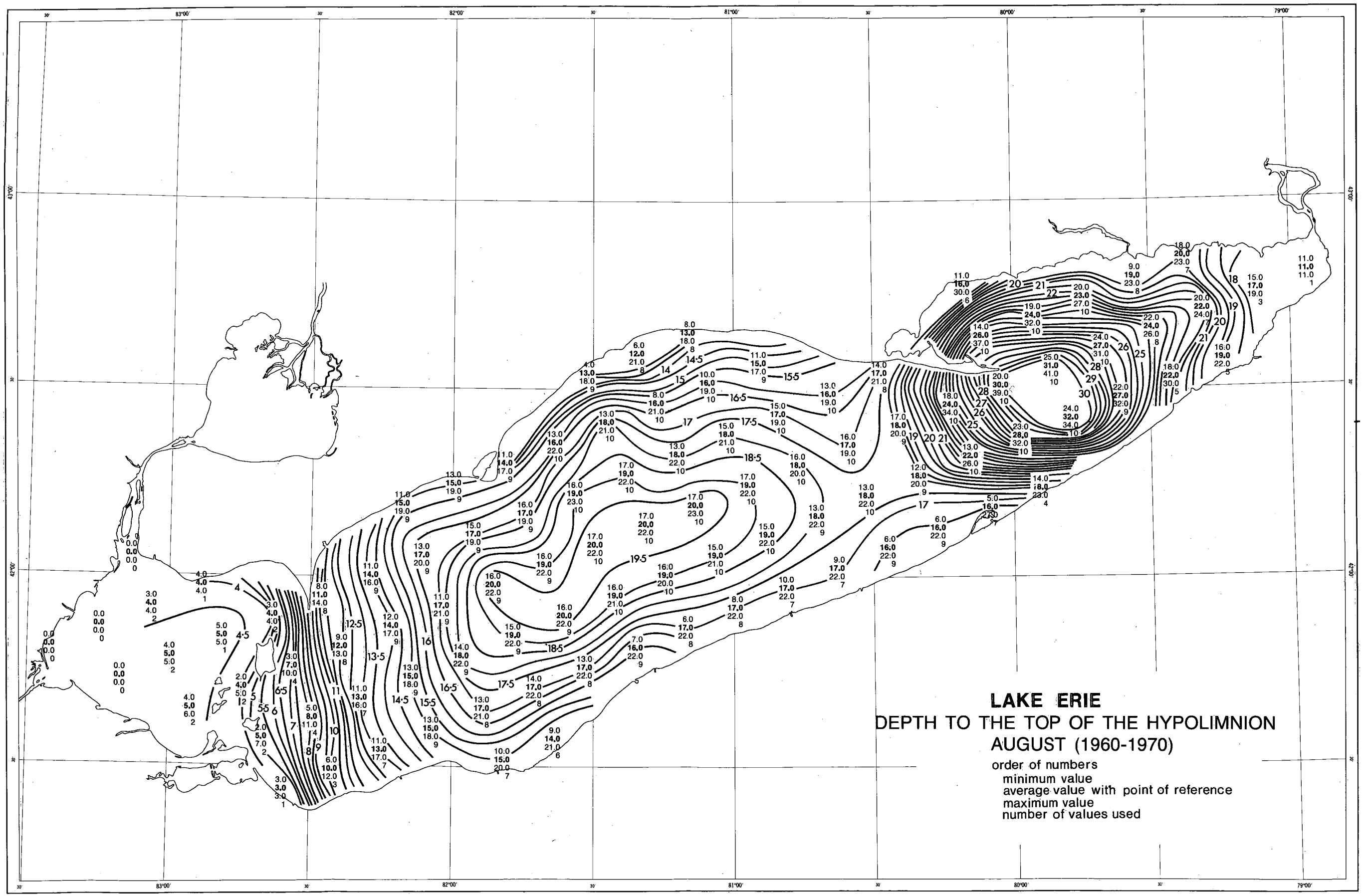
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
DEPTH TO THE TOP OF THE HYPOLIMNION
AUGUST (1960-1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 59

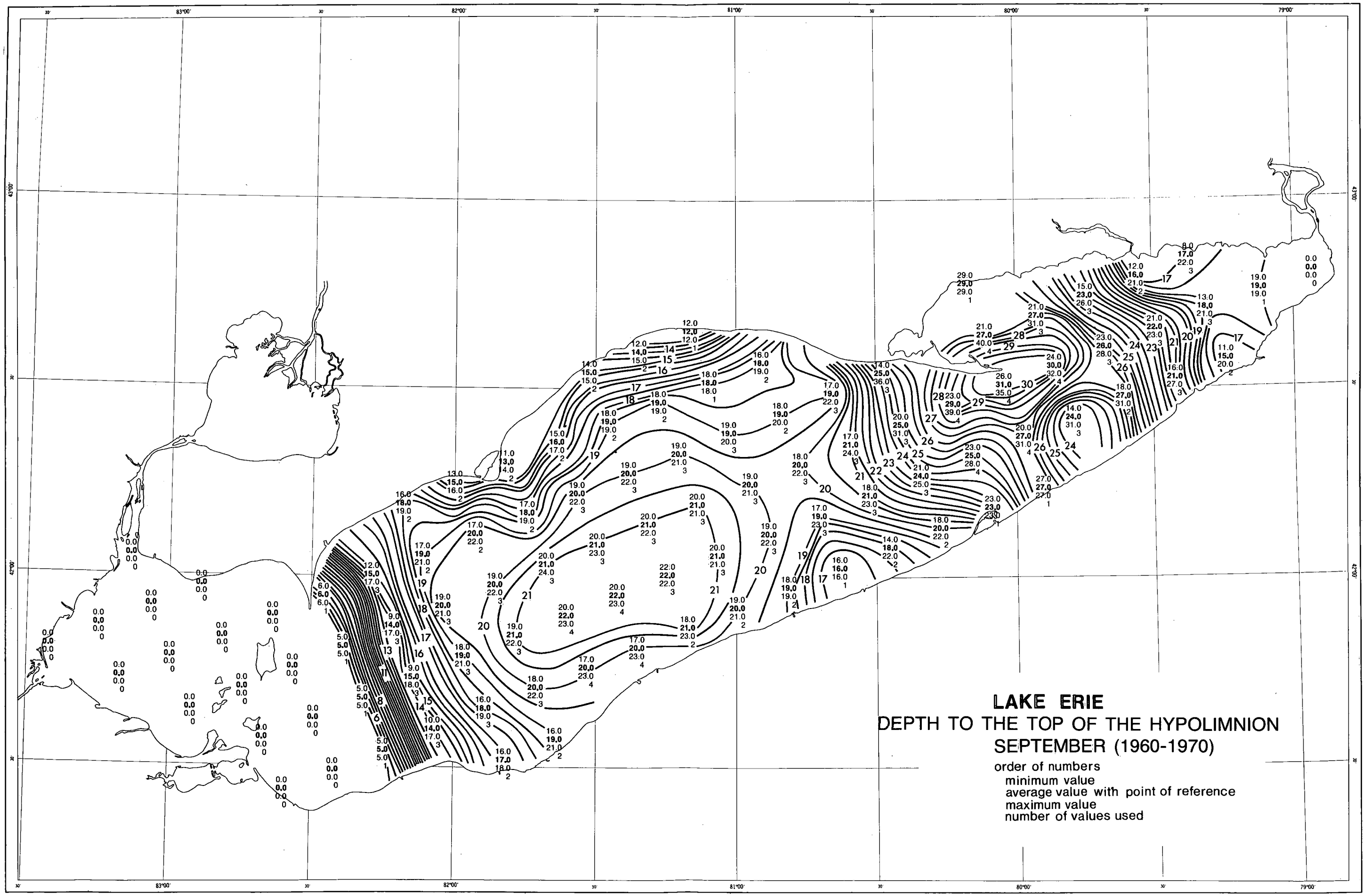
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
DEPTH TO THE TOP OF THE HYPOLIMNION
SEPTEMBER (1960-1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 60

Figures 61 to 69. Bottom Percent Saturation of Dissolved Oxygen (Averages and Extremes), Lake Erie, April to December

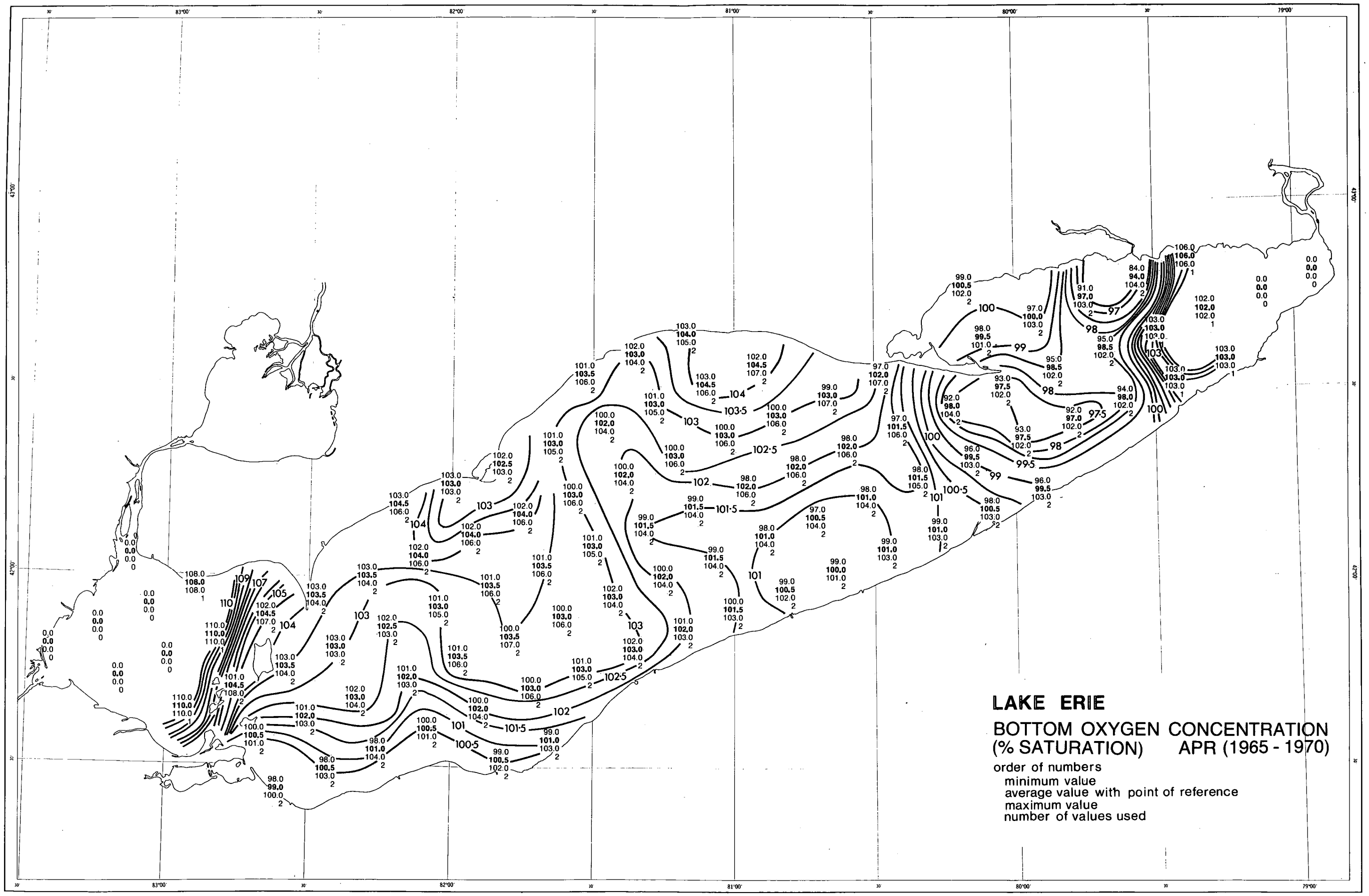
83°00'
82°00'
81°00'
80°00'
79°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) APR (1965 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 61

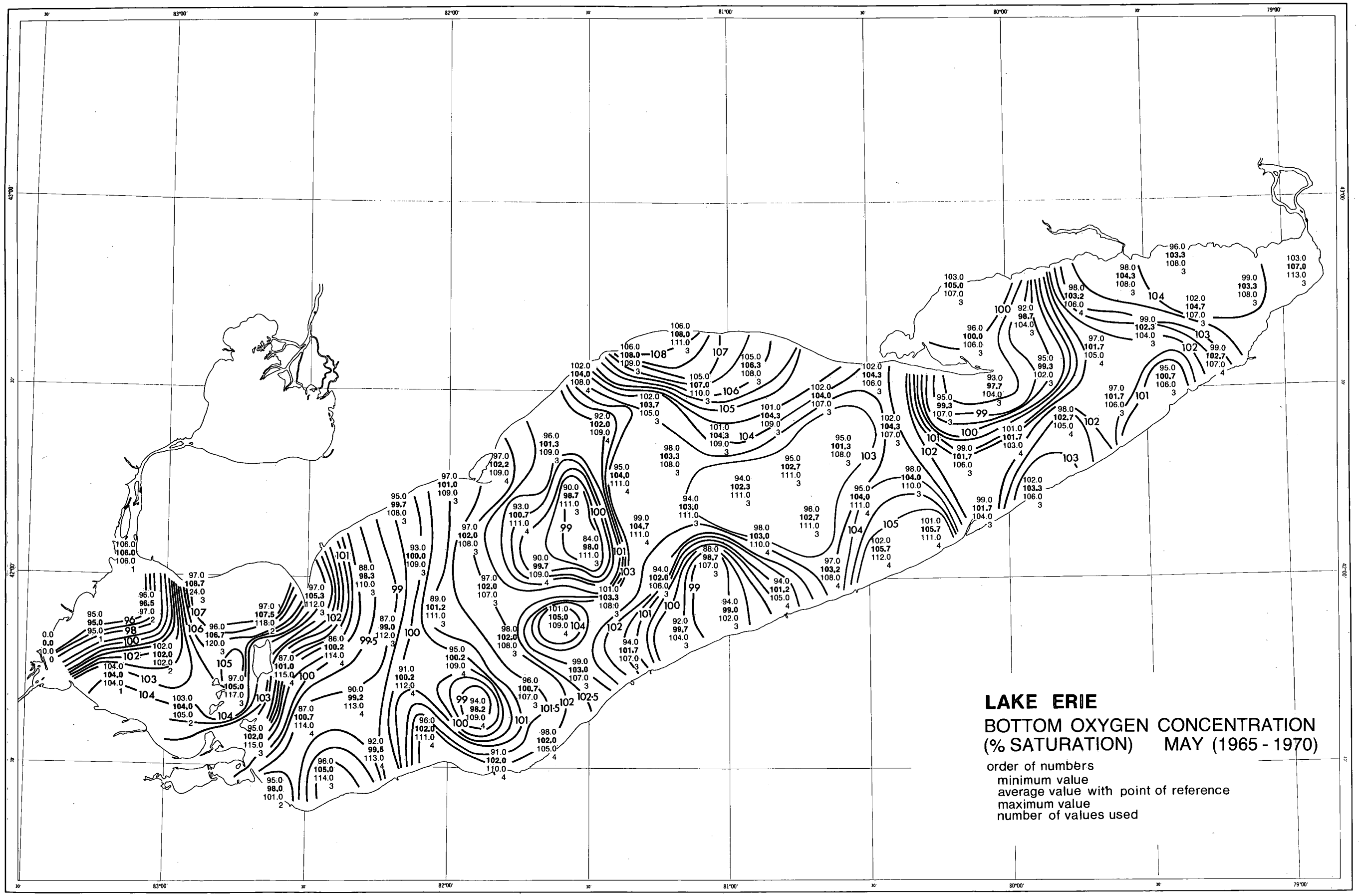
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) MAY (1965 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 62

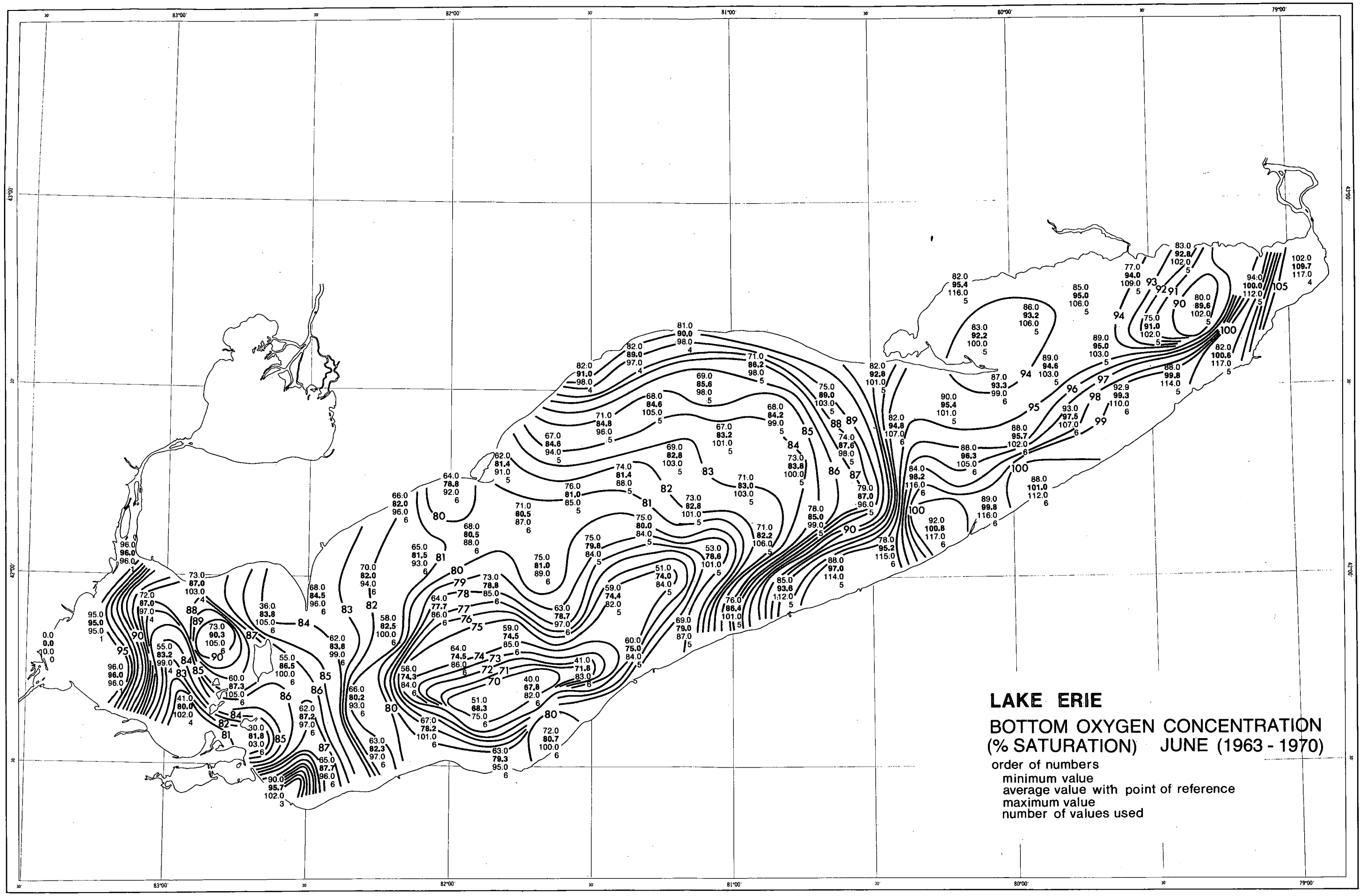
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) JUNE (1963 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 63

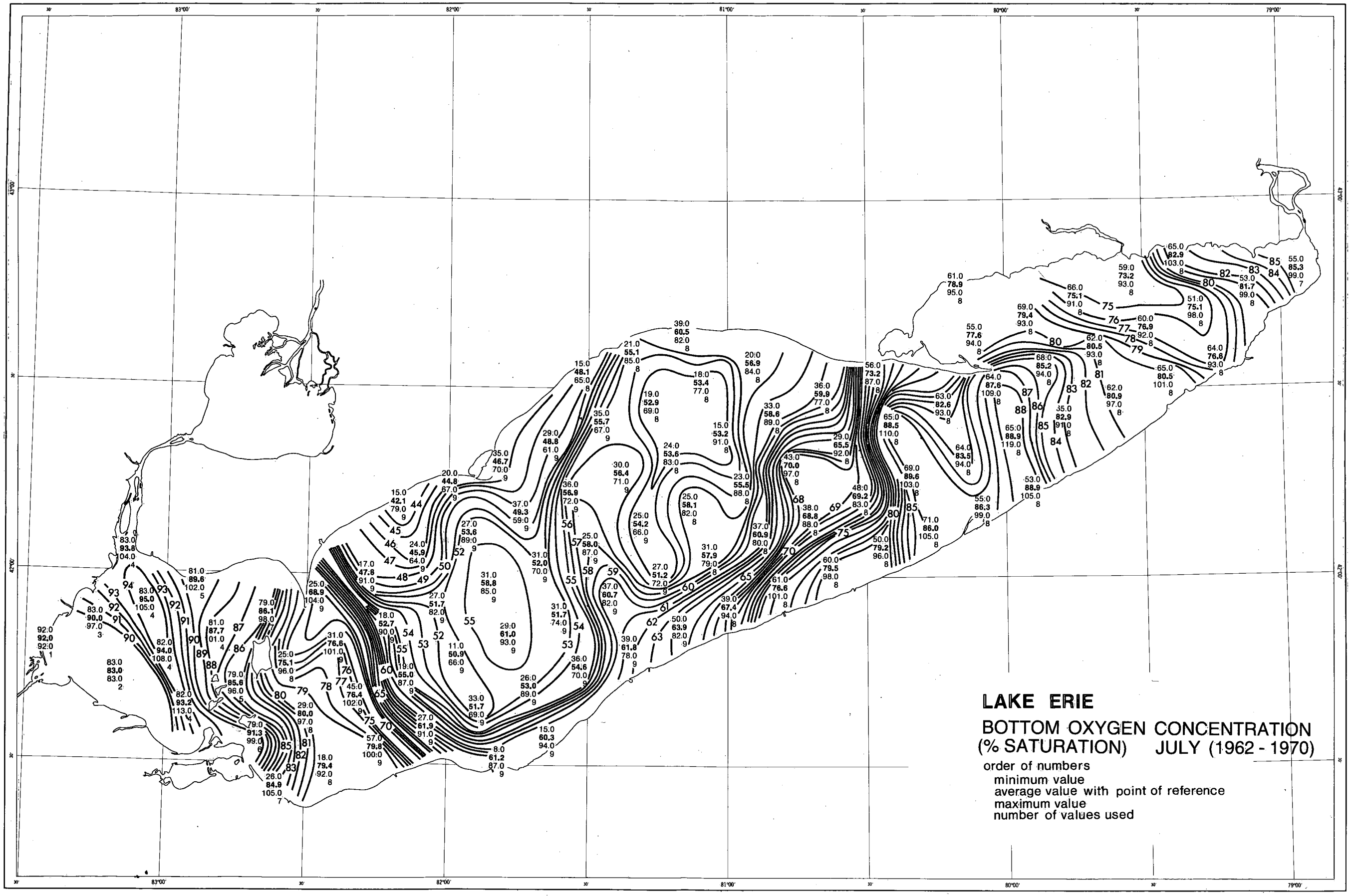
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) JULY (1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 64

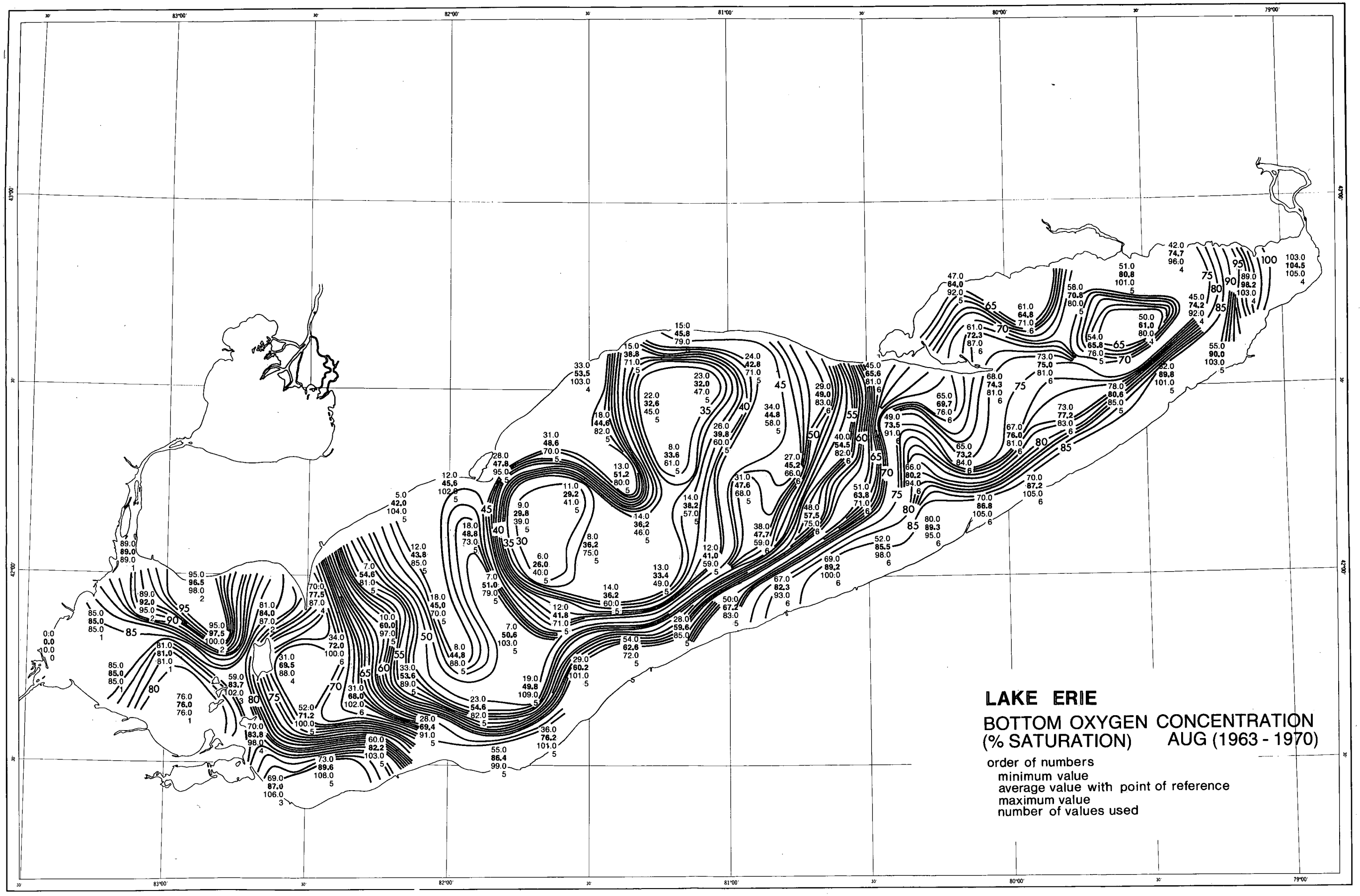
83°00'
82°00'
81°00'
80°00'
79°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) AUG (1963 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 65

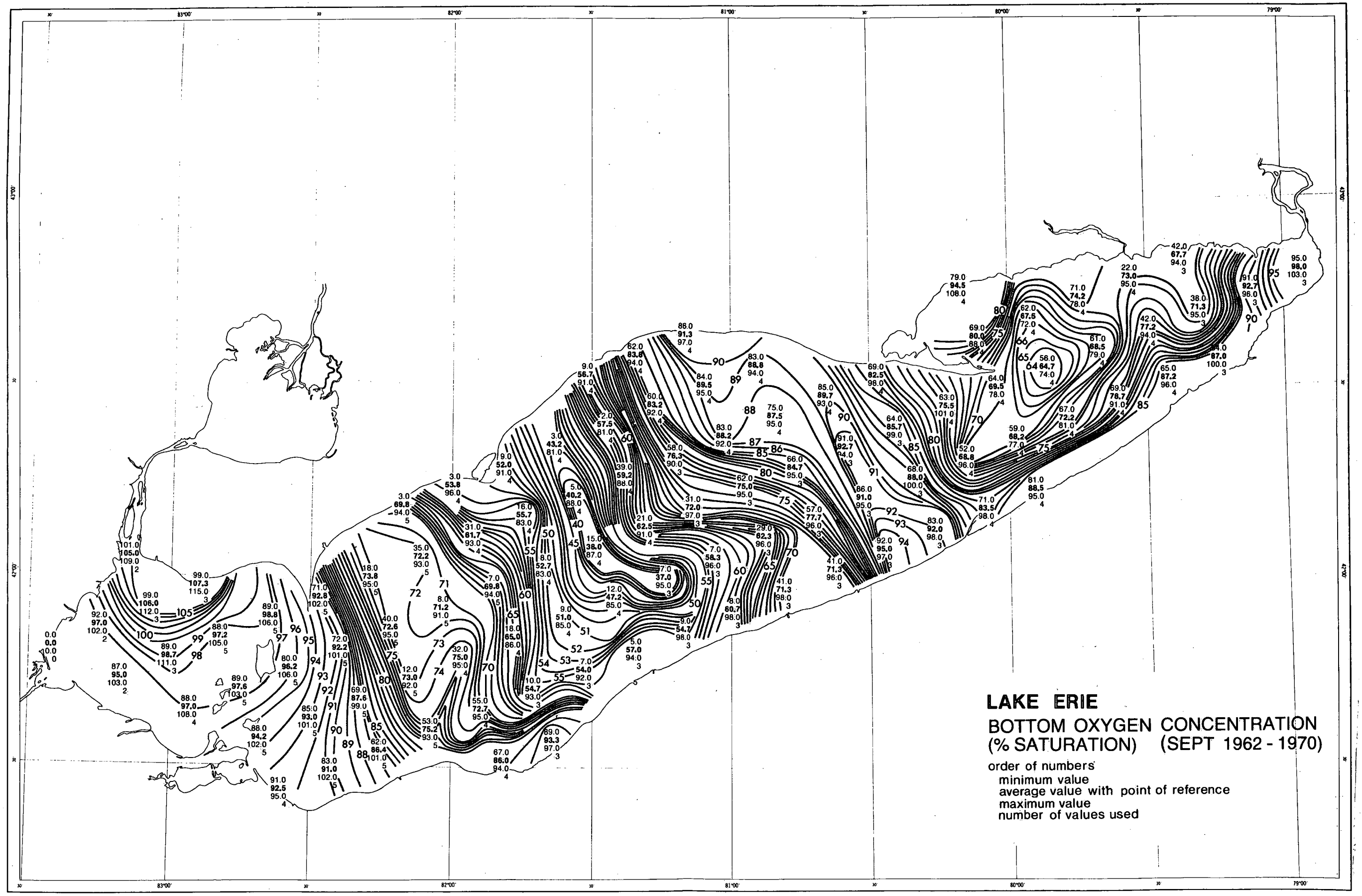
83°00'
82°00'
81°00'
80°00'
79°00'
43°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) (SEPT 1962 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 66

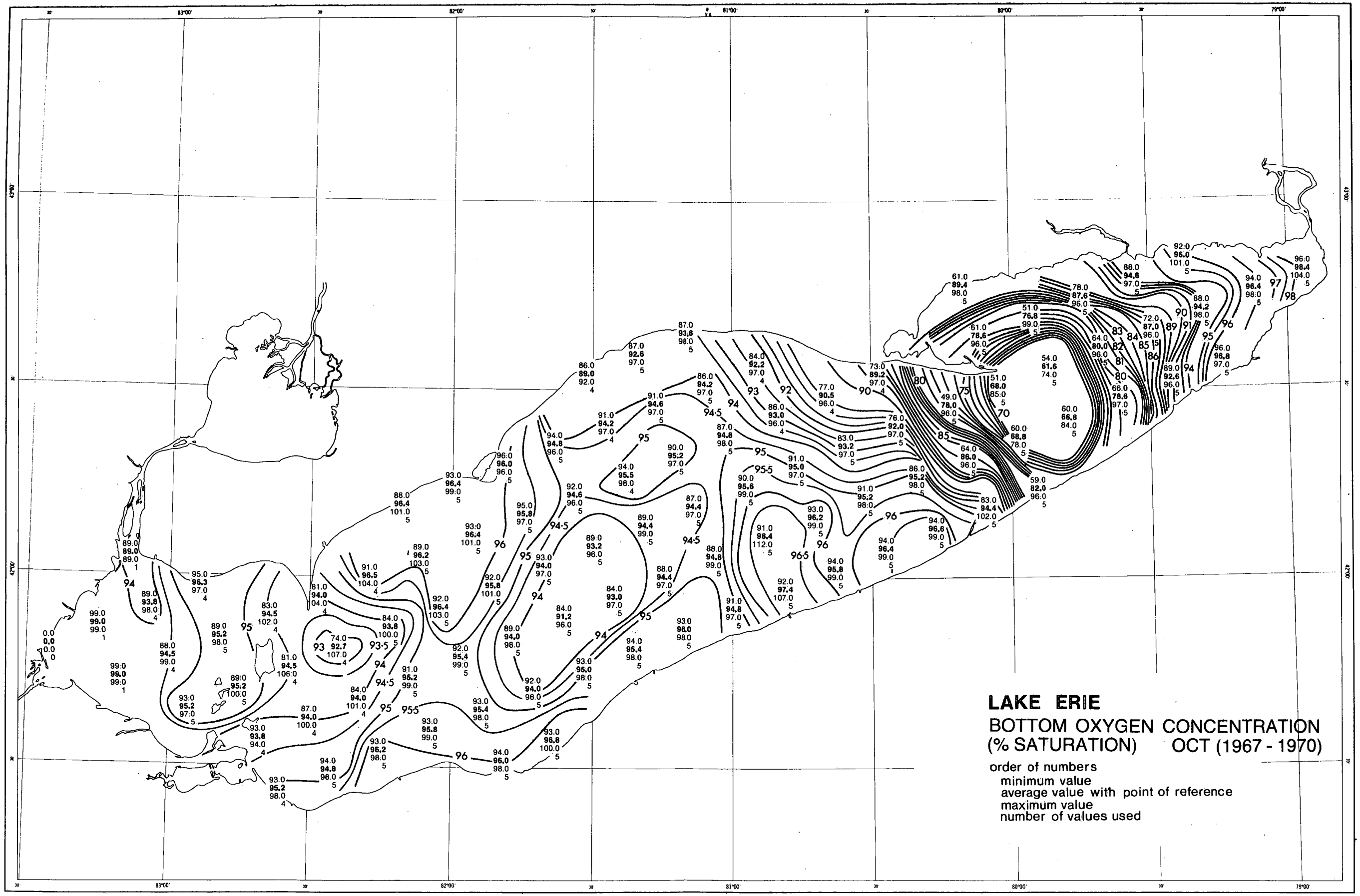
83°00'
82°00'
81°00'
80°00'
79°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) OCT (1967 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 67

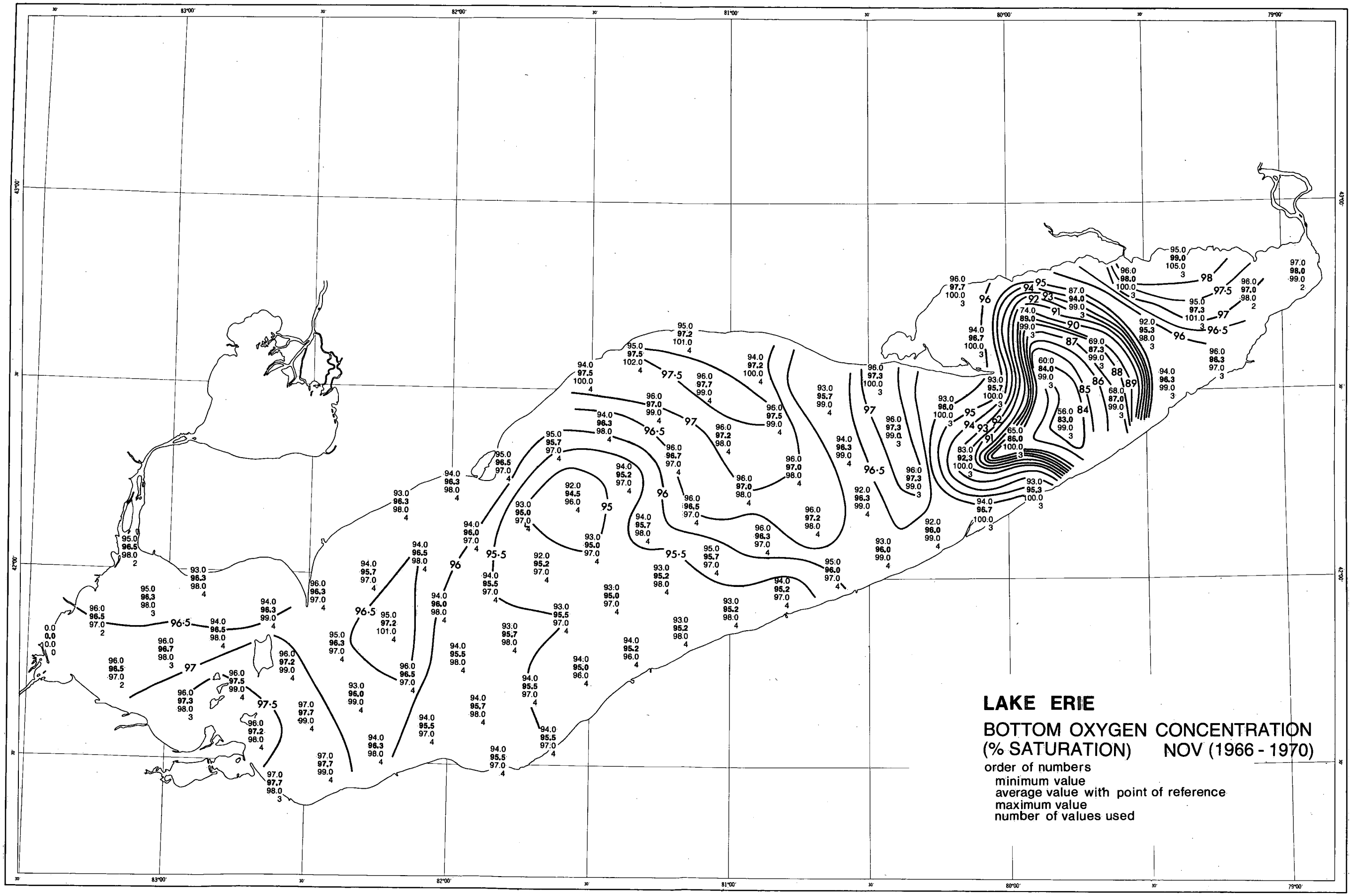
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) NOV (1966 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 68

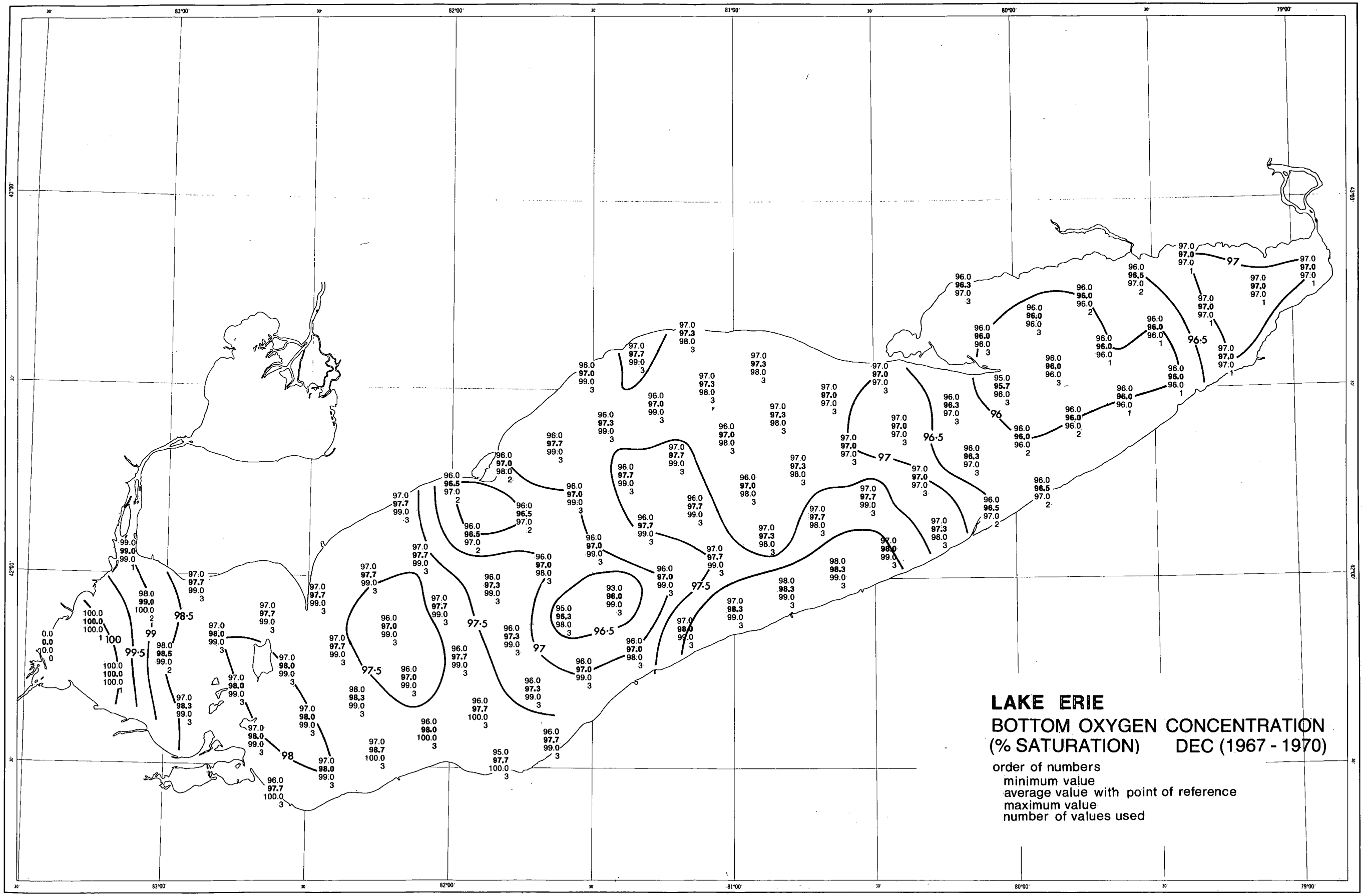
83°00'
82°00'
81°00'
80°00'
79°00'
42°00'
LAKE ERIE
BOTTOM OXYGEN CONCENTRATION
(% SATURATION) DEC (1967 - 1970)
order of numbers
minimum value
average value with point of reference
maximum value
number of values used

Figure 69