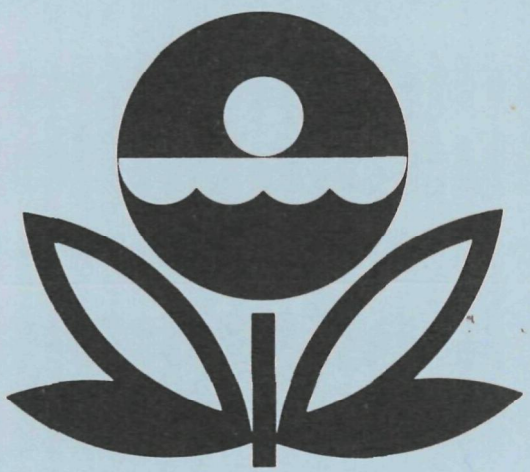
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES



REPORT

ON

CEDAR LAKE

LAKE COUNTY

ILLINOIS

EPA REGION V

WORKING PAPER No. 298

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

☆G.P.O. 699-440

REPORT
ON
CEDAR LAKE
LAKE COUNTY
ILLINOIS
EPA REGION V
WORKING PAPER No. 298

WITH THE COOPERATION OF THE
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
AND THE
ILLINOIS NATIONAL GUARD
JUNE, 1975

CONTENTS

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Illinois Environmental Protection Agency for professional involvement and to the Illinois National Guard for conducting the tributary sampling phase of the Survey.

Dr. Richard H. Briceland, Director of the Illinois Environmental Protection Agency; and Ronald M. Barganz, State Survey Coordinator, and John J. Forneris, Manager of Region III, Field Operations Section of the Division of Water Pollution Control, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

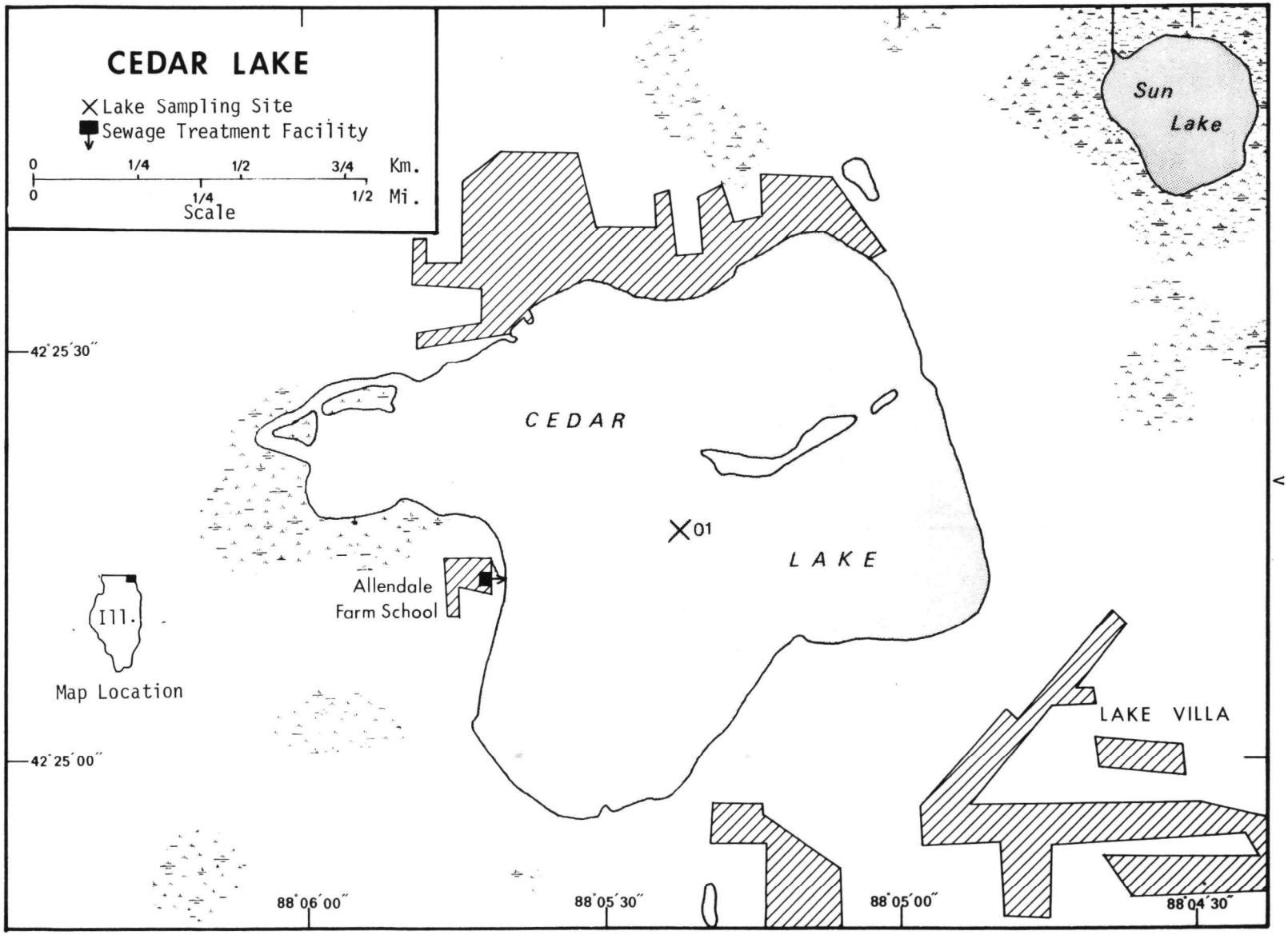
Major General Harold R. Patton, the Adjutant General of Illinois, and Project Officer Colonel Daniel L. Fane, who directed the volunteer efforts of the Illinois National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF ILLINOIS

LAKE NAME	COUNTY
Baldwin	Randolph
Bloomington	McLean
Carlyle	Bond, Clinton, Fayette
Cedar	Lake
Charleston	Coles
Coffeen	Montgomery
Crab Orchard	Jackson, Williamson
Decatur	Macon
DePue	Bureau
East Loon	Lake
Fox	Lake
Grass	Lake
Highland Silver	Madison
Holiday	LaSalle
Horseshoe	Madison
Long	Lake
Lou Yaeger	Montgomery
Marie	Lake
Old Ben Mine	Franklin
Pistakee	Lake, McHenry
Raccoon	Marion
Rend	Franklin, Jefferson
Sangchris	Christian
Shelbyville	Moultrie, Shelby
Slocum	Lake
Springfield	Sangamon
Storey	Knox
Vandalia	Fayette
Vermilion	Vermilion
Wee Ma Tuk	Fulton
Wonder	McHenry


CEDAR LAKE
Lake Sampling Site
Sewage Treatment Facility
0 1/4 1/2 3/4 Km.
0 1/4 1/2 Mi.
Scale
Sun Lake
CEDAR
LAKE
01
Allendale Farm School
Ill.
Map Location
LAKE VILLA
42°25'30"
42°25'00"
88°06'00"
88°05'30"
88°05'00"
88°04'30"

CEDAR LAKE

STORET NO. 1759

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Cedar Lake is mesotrophic. It ranked first in overall trophic quality when the 31 Illinois lakes sampled in 1973 were compared using a combination of six lake parameters*. None of the other lakes had less median total phosphorus, four had less and one had the same median dissolved phosphorus, two had less median inorganic nitrogen, none had less mean chlorophyll a, and none had greater mean Secchi disc transparency. Depression of dissolved oxygen with depth occurred in August, 1972.

Survey limnologists reported the occurrence of rooted aquatic vegetation in the shallow shoreline areas and noted a moderate algal bloom in October.

B. Rate-Limiting Nutrient:

The algal assay results indicate phosphrous limitation. The lake data indicate phosphorus limitation in May and August (the mean N/P ratios were 15/1) and nitrogen limitation in October (the mean N/P ratio was 9/1).

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* See Appendix A.

C. Nutrient Controllability:

1. Point sources--The Allendale School for Boys contributed a total of 190 kg of total phosphorus to the lake during the sampling year, and septic tanks serving shoreline dwellings were estimated to have contributed 15 kg of total phosphorus. To reduce the eutrophication rate of Cedar Lake, the phosphorus input from the Allendale School for Boys should be reduced or eliminated.

2. Non-point sources--Because the lake does not have discrete tributaries or an outlet, no estimate was made of non-point source phosphorus loads, except for direct precipitation (20 kg/yr).

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 1.15 kilometers^2.
2. Mean depth: 1.2 meters.
3. Maximum depth: >10.7 meters.
4. Volume: 1.380×10^6 m^3.
5. Mean hydraulic retention time: not known.

B. Tributary and Outlet:

Cedar Lake has no discrete tributaries or outlet. The immediate drainage area was not determined.

C. Precipitation*:

1. Year of sampling: 112.2 centimeters.
2. Mean annual: 83.3 centimeters.

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† Table of metric conversions--Appendix B.
†† Forneris, 1975.
* See Working Paper No. 175, "...Survey Methods, 1973-1976".

III. LAKE WATER QUALITY SUMMARY

Cedar Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one station on the lake and from a number of depths (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was collected for phytoplankton identification and enumeration; and a similar sample was collected for chlorophyll a analysis. During the first visit, a single 18.9-liter depth-integrated sample was taken for algal assays. The maximum depth sampled was 10.7 meters.

The lake sampling results are presented in full in Appendix C and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR CEDAR LAKE
STORET CODE 1759

	1ST SAMPLING (5/ 9/73)			2ND SAMPLING (8/ 7/73)			3RD SAMPLING (10/16/73)		
	1 SITES			1 SITES			1 SITES		
PARAMETER	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	12.1 - 14.1	13.6	14.0	22.7 - 25.3	24.5	25.2	14.4 - 15.8	15.2	15.3
DISS OXY (MG/L)	7.6 - 9.6	8.9	9.2	2.2 - 8.4	6.8	8.4	6.6 - 7.6	7.2	7.4
CNDCTVY (MCROMO)	430. - 440.	437.	440.	379. - 388.	384.	385.	301. - 303.	302.	303.
PH (STAND UNITS)	8.0 - 8.3	8.2	8.2	8.1 - 8.9	8.7	8.8	8.2 - 8.5	8.4	8.4
TOT ALK (MG/L)	166. - 168.	167.	167.	134. - 142.	137.	135.	136. - 143.	140.	140.
TOT P (MG/L)	0.022 - 0.035	0.029	0.028	0.024 - 0.032	0.026	0.024	0.029 - 0.093	0.053	0.045
ORTHO P (MG/L)	0.011 - 0.014	0.012	0.012	0.011 - 0.018	0.013	0.012	0.017 - 0.035	0.026	0.025
NO2+NO3 (MG/L)	0.090 - 0.100	0.094	0.090	0.070 - 0.130	0.092	0.085	0.020 - 0.020	0.020	0.020
AMMONIA (MG/L)	0.070 - 0.110	0.082	0.080	0.080 - 0.130	0.097	0.090	0.120 - 0.390	0.220	0.185
KJEL N (MG/L)	0.900 - 1.100	1.000	1.000	0.900 - 2.400	1.375	1.100	1.100 - 1.700	1.325	1.250
INORG N (MG/L)	0.160 - 0.200	0.176	0.170	0.160 - 0.260	0.190	0.170	0.140 - 0.410	0.240	0.205
TOTAL N (MG/L)	0.990 - 1.200	1.094	1.090	0.970 - 2.530	1.467	1.185	1.120 - 1.720	1.345	1.270
CHLRPYL A (UG/L)	4.5 - 4.5	4.5	4.5	7.2 - 7.2	7.2	7.2	5.6 - 5.6	5.6	5.6
SECCHI (METERS)	3.0 - 3.0	3.0	3.0	1.8 - 1.8	1.8	1.8	2.8 - 2.8	2.8	2.8

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
05/09/73	1. Dinobryon sp.	440
	2. Dictyosphaerium sp.	119
	3. Flagellates	44
	4. Kirchneriella sp.	28
	5. Cryptomonas sp.	24
	Other genera	154
	Total	809
08/07/73	1. Gomphosphaeria sp.	229
	2. Microcystis sp.	194
	3. Dinobryon sp.	158
	4. Scenedesmus sp.	106
	5. Chroococcus sp.	106
	Other genera	561
	Total	1,354
10/16/73	1. Dinobryon sp.	396
	2. Aphanizomenon sp.	316
	3. Microcystis sp.	264
	4. Merismopedia sp.	237
	5. Chroococcus sp.	237
	Other genera	765
	Total	2,215

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/09/73	01	4.5
08/07/73	01	7.2
10/16/73	01	5.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.010	0.222	0.2
0.050 P	0.060	0.222	7.8
0.050 P + 1.0 N	0.060	1.222	22.2
1.0 N	0.010	1.222	0.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Cedar Lake was relatively low at the time the assay sample was collected. Also, the increase in yield with the addition of orthophosphorus, and the lack of response when only nitrogen was added, indicate the lake was phosphorus limited when the sample was collected (05/09/73).

The lake data indicate phosphorus limitation in August as well (the mean N/P ratio was 15/1) but nitrogen limitation in October (the mean N/P = 9/1).

IV. NUTRIENT LOADINGS
(See Appendix D for effluent data)

Total nutrient loads were not calculated for Cedar Lake because the drainage area is unknown. Estimates of phosphorus and nitrogen inputs from point sources are given below.

The operator of the Allendale School for Boys wastewater treatment plant provided monthly effluent samples and corresponding flow data from which nutrient loadings were determined.

A. Waste Sources:

1. Known muncipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Allendale School for Boys	150	trickling filter	76.9	Cedar Lake

2. Known industrial - None

* Henning, 1973.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr
a. Immediate drainage (non-point load) -	not known
b. Known municipal STP's -	
Allendale School for Boys	190
c. Septic tanks* -	15
d. Known industrial - None	-
e. Direct precipitation** -	20
Sub-total	225
2. Outputs -	unknown

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr
a. Immediate drainage (non-point load) -	not known
b. Known municipal STP's -	
Allendale School for Boys	270
c. Septic tanks* -	555
d. Known industrial - None	-
e. Direct precipitation** -	1,240
Sub-total	2,065
2. Outputs -	unknown

* Estimate based on 52 shoreline dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

E. Yearly Loading Rates:

Cannot be established with available information.

V. LITERATURE REVIEWED

Forneris, John J., 1973. Personal communication (lake morphometry). IL Env. Prot. Agency, Springfield.

Henning, Lester, 1973. Treatment plant questionnaire (Allendale School waste treatment facilities). Lake Villa.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1703	LAKE BLOOMINGTON	0.050	5.730	464.667	26.200	14.800	0.020
1706	LAKE CARLYLE	0.084	1.270	477.889	17.367	11.000	0.032
1708	LAKE CHARLESTON	0.160	4.680	490.667	12.000	8.400	0.065
1711	COFFEEN LAKE	0.032	0.260	456.222	7.700	14.900	0.012
1712	CRAB ORCHARD LAKE	0.082	0.200	482.222	59.867	13.800	0.013
1714	LAKE DECATUR	0.129	3.750	479.571	43.000	14.500	0.062
1725	LONG LAKE	0.704	1.190	482.667	49.333	8.800	0.398
1726	LAKE LOU YAEGER	0.186	1.600	489.583	10.662	11.400	0.076
1727	LAKE MARIE	0.098	0.370	467.667	39.533	14.700	0.057
1733	PISTAKEE LAKE	0.203	0.370	485.667	75.867	7.000	0.062
1735	REND LAKE	0.071	0.210	471.500	23.533	12.700	0.012
1739	LAKE SHELBYVILLE	0.062	3.290	461.333	17.161	14.800	0.019
1740	SILVER LAKE (HIGHLAND)	0.226	0.970	489.500	5.822	14.800	0.057
1742	LAKE SPRINGFIELD	0.108	3.265	483.385	13.013	10.800	0.059
1748	VERMILION LAKE	0.109	4.695	481.500	31.150	14.200	0.050
1750	WONDER LAKE	0.426	0.890	486.000	98.533	7.800	0.132
1751	LAKE STORY	0.072	2.510	459.333	17.250	14.800	0.021
1752	DEPUE LAKE	0.438	4.050	490.000	58.833	7.600	0.276
1753	LAKE SANGCHRIS	0.050	1.970	475.417	19.292	14.500	0.009
1754	LAKE HOLIDAY	0.167	3.135	485.167	51.217	7.200	0.046
1755	FOX LAKE	0.219	0.375	486.167	63.850	8.800	0.083
1756	GRASS LAKE	0.301	0.820	481.000	83.500	5.900	0.093
1757	EAST LOON LAKE	0.076	0.120	450.000	22.300	14.900	0.018
1758	SLOCUM LAKE	0.865	0.200	487.333	221.100	5.800	0.362
1759	CEDAR LAKE	0.029	0.170	400.333	5.767	12.800	0.013
1761	LAKE WEMATUK	0.069	1.770	466.333	7.967	14.500	0.031
1762	RACCOON LAKE	0.106	0.310	484.333	19.217	13.800	0.020
1763	BALDWIN LAKE	0.044	0.140	461.167	11.333	13.200	0.007

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1764	LAKE VANDALIA	0.116	0.480	478.111	11.276	14.800	0.023
1765	OLD BEN MINE RESERVOIR	0.930	0.205	478.333	31.433	11.200	0.575
1766	HORSESHOE LAKE	0.127	0.705	482.833	182.250	6.800	0.018

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1703	LAKE BLOOMINGTON	88 (26)	0 (0)	80 (24)	47 (14)	13 (2)	68 (20)	296
1706	LAKE CARLYLE	63 (19)	40 (12)	63 (19)	63 (19)	63 (19)	53 (16)	345
1708	LAKE CHARLESTON	37 (11)	7 (2)	0 (0)	77 (23)	77 (23)	27 (8)	225
1711	COFFEEN LAKE	97 (29)	77 (23)	93 (28)	93 (28)	2 (0)	92 (27)	454
1712	CRAB ORCHARD LAKE	67 (20)	90 (27)	43 (13)	20 (6)	42 (12)	85 (25)	347
1714	LAKE DECATUR	40 (12)	13 (4)	53 (16)	33 (10)	30 (8)	32 (9)	201
1725	LONG LAKE	7 (2)	43 (13)	40 (12)	30 (9)	72 (21)	3 (1)	195
1726	LAKE LOU YAEGER	30 (9)	37 (11)	7 (2)	87 (26)	57 (17)	23 (7)	241
1727	LAKE MARIE	60 (18)	68 (20)	73 (22)	37 (11)	23 (7)	42 (12)	303
1733	PISTAKEE LAKE	27 (8)	68 (20)	23 (7)	13 (4)	90 (27)	32 (9)	253
1735	REND LAKE	77 (23)	80 (24)	70 (21)	50 (15)	53 (16)	92 (27)	422
1739	LAKE SHELBYVILLE	83 (25)	17 (5)	83 (25)	70 (21)	13 (2)	73 (22)	339
1740	SILVER LAKE (HIGHLAND)	20 (6)	47 (14)	10 (3)	97 (29)	13 (2)	42 (12)	229
1742	LAKE SPRINGFIELD	53 (16)	20 (6)	33 (10)	73 (22)	67 (20)	37 (11)	283
1748	VERMILION LAKE	50 (15)	3 (1)	47 (14)	43 (13)	37 (11)	47 (14)	227
1750	WONDER LAKE	13 (4)	50 (15)	20 (6)	7 (2)	80 (24)	13 (4)	183
1751	LAKE STORY	73 (22)	27 (8)	90 (27)	67 (20)	13 (2)	63 (19)	333
1752	DEPUE LAKE	10 (3)	10 (3)	3 (1)	23 (7)	83 (25)	10 (3)	139
1753	LAKE SANGCHRIS	88 (26)	30 (9)	67 (20)	57 (17)	30 (8)	97 (29)	369
1754	LAKE HOLIDAY	33 (10)	23 (7)	27 (8)	27 (8)	87 (26)	50 (15)	247
1755	FOX LAKE	23 (7)	63 (19)	17 (5)	17 (5)	72 (21)	20 (6)	212
1756	GRASS LAKE	17 (5)	53 (16)	50 (15)	10 (3)	97 (29)	17 (5)	244
1757	EAST LOON LAKE	70 (21)	100 (30)	97 (29)	53 (16)	2 (0)	77 (23)	399
1758	SLOCUM LAKE	3 (1)	87 (26)	13 (4)	0 (0)	100 (30)	7 (2)	210
1759	CEDAR LAKE	100 (30)	93 (28)	100 (30)	100 (30)	50 (15)	85 (25)	528
1761	LAKE WEMATUK	80 (24)	33 (10)	77 (23)	90 (27)	30 (8)	57 (17)	367
1762	RACCOON LAKE	57 (17)	73 (22)	30 (9)	60 (18)	42 (12)	68 (20)	330
1763	BALDWIN LAKE	93 (28)	97 (29)	87 (26)	80 (24)	47 (14)	100 (30)	504

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1764	LAKE VANDALIA	47 (14)	60 (18)	60 (18)	83 (25)	13 (2)	60 (18)	323
1765	OLD BEN MINE RESERVOIR	0 (0)	83 (25)	57 (17)	40 (12)	60 (18)	0 (0)	240
1766	HORSESHOE LAKE	43 (13)	57 (17)	37 (11)	3 (1)	93 (28)	80 (24)	313

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1759	CEDAR LAKE	528
2	1763	BALDWIN LAKE	504
3	1711	COFFEEN LAKE	454
4	1735	REND LAKE	422
5	1757	EAST LOON LAKE	399
6	1753	LAKE SANGCHRIS	369
7	1761	LAKE WEMATUK	367
8	1712	CRAB ORCHARD LAKE	347
9	1706	LAKE CARLYLE	345
10	1739	LAKE SHELBYVILLE	339
11	1751	LAKE STORY	333
12	1762	RACCOON LAKE	330
13	1764	LAKE VANDALIA	323
14	1766	HORSESHOE LAKE	313
15	1727	LAKE MARIE	303
16	1703	LAKE BLOOMINGTON	296
17	1742	LAKE SPRINGFIELD	283
18	1733	PISTAKEE LAKE	253
19	1754	LAKE HOLIDAY	247
20	1756	GRASS LAKE	244
21	1726	LAKE LOU YAEGER	241
22	1765	OLD BEN MINE RESERVOIR	240
23	1740	SILVER LAKE (HIGHLAND)	229
24	1748	VERMILION LAKE	227
25	1708	LAKE CHARLESTON	225
26	1755	FOX LAKE	212
27	1758	SLOCUM LAKE	210
28	1714	LAKE DECATUR	201

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1725	LONG LAKE	195
30	1750	WONDER LAKE	183
31	1752	DEPUE LAKE	139

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/23

175901
42 25 17.0 088 05 22.0
CEDAR LAKE
17097 ILLINOIS

11EPALES 2111202
3 0035 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/09	14 40	0000	14.1		120	440	8.20	166	0.080	1.100	0.090	0.012
	14 40	0006	14.1	9.4		430	8.20	167	0.080	1.100	0.100	0.012
	14 40	0015	14.0	9.6		440	8.30	167	0.070	0.900	0.090	0.012
	14 40	0022	13.9	9.0		435	8.20	167	0.070	0.900	0.100	0.011
	14 40	0031	12.1	7.6		440	8.00	168	0.110	1.000	0.090	0.014
73/08/07	11 15	0000	25.3	8.4	70	388	8.90	135	0.130	2.400	0.130	0.013
	11 15	0005	25.2	8.4		386	8.90	135	0.080	1.100	0.080	0.011
	11 15	0010	25.2			384						
	11 15	0012	25.2	8.4		385	8.80	134	0.090	1.100	0.090	0.012
	11 15	0015	23.3			380						
	11 15	0018	22.7	2.2		379	8.10	142	0.090	0.900	0.070	0.018
73/10/16	15 43	0000	15.8		109	303	8.50	140	0.120	1.400	0.020	0.017
	15 43	0016	15.7	7.6		302	8.50	136	0.130	1.100	0.020	0.025
	15 43	0025	14.9	7.4		301	8.40	140	0.240	1.100	0.020	0.026
	15 43	0035	14.4	6.6		303	8.20	143	0.390	1.700	0.020	0.035

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/09	14 40	0000	0.022	4.5
	14 40	0006	0.035	
	14 40	0015	0.032	
	14 40	0022	0.028	
	14 40	0031	0.027	
73/08/07	11 15	0000	0.024	7.2
	11 15	0005	0.024	
	11 15	0012	0.024	
	11 15	0018	0.032	
73/10/16	15 43	0000	0.049	5.6
	15 43	0016	0.029	
	15 43	0025	0.042	
	15 43	0035	0.093	

APPENDIX D

WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/10/23

175921 TF175921 P000106
42 25 12.0 088 05 45.0
ALLENDALE SCHOOL FOR BOYS
17097 7.5 ANTIOCH
D/CEDAR LAKE
CEDAR LAKE
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/09	09 00		3.600	4.700	0.180	5.700	6.700	0.129	0.120
73/08/13			5.800	14.700	0.200	9.500	19.500		
73/09/07			6.900	8.900	0.160	9.600	11.500	0.009	0.009
73/10/19	00 00		7.800	11.500	0.120	7.500	9.000	0.009	0.008
73/11/08			4.200	11.000	0.094	5.700	9.100	0.009	
73/11/26	10 00		3.400	7.900	0.012	3.000	6.000	0.009	
74/02/02			3.120	8.300	0.087	1.680	8.000	0.009	0.036
74/03/06			1.840	1.000K	0.050K	0.630	0.630	0.009	
74/04/04			2.500	1.500	0.050K	1.600	2.100	0.009	0.009
74/05/08			8.300	6.700	0.110	5.600	8.500	0.009	0.008
74/06/07			4.300	3.500	0.075	3.700	4.100	0.009	0.008
74/07/10	14 30		4.750	3.300	0.050	3.500	6.100	0.009	0.009
74/08/09	15 00		7.100	6.200	0.100	5.800	8.400	0.009	

K VALUE KNOWN TO BE
LESS THAN INDICATED