Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 1999

U.S. GEOLOGICAL SURVEY
Open-File Report 00-89

*Prepared in cooperation with the
State of Wisconsin and local agencies*

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 1999

By Wisconsin District Lake-Studies Team

U.S. GEOLOGICAL SURVEY
Open-File Report 00-89

A report by the Wisconsin District Lake-Studies Team—
D.L. Olson (team leader), J.F. Elder, H.S. Garn, G.L. Goddard,
E.A. Mergener, D.M. Robertson, and W.J. Rose

Prepared in cooperation with
THE STATE OF WISCONSIN AND OTHER AGENCIES

Middleton, Wisconsin
2000

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

For additional information write to:

District Chief
U.S. Geological Survey
8505 Research Way
Middleton, WI 53562

Copies of this report can be purchased from:

U.S. Geological Survey
Earth Science Information Center
Open-File Reports Section
Box 25286, MS 517
Denver Federal Center
Denver, CO 80225

CONTENTS

Introduction	1
Methods of data collection	4
Explanation of physical and chemical characteristics of lakes	8
Water temperature and thermal stratification	8
Specific conductance	10
Water clarity	11
pH	11
Dissolved oxygen	12
Phosphorus	13
Nitrogen	13
Chlorophyll a	14
Classification of lakes	14
References cited	16
Lake data	19
Benedict near Powers Lake, 423201088180800	21
Big Hills (Hills) near Wild Rose (440912089092000	23
Big St. Germain near Lake Tomahawk, 05390750	25
Big Sissabagama	
near Stone Lake, 454724091303600	26
North Site, near Stone Lake, 454800091312900	29
Buffalo	
Center Site, at Packwaukee, 434558089260600	31
East End, at Montello, 434720089201600	33
West End, near Endeavor, 434414089282400	35
Delavan	
near Delavan, 423706088363400	37
at Center near Delavan Lake, 423556088365001	38
at North End near Lake Lawn, 423659088354401	43
at SW End near Delavan Lake, 423526088380101	43
Devils near Baraboo, 05404500	44
Eagle Spring at Eagleville, 425103088261500	45
Fish near Sauk City, 05406050	47
Geneva	
at Lake Geneva, 423525088260400	48
Geneva Bay, at Lake Geneva, 423455088263800	50
Williams Bay, at Williams Bay, 423420088320500	51
Center, near Lake Geneva, 423402088301400	52
East End, near Lake Geneva, 423421088272300	55
West End, near Williams Bay, 423329088323300	61
Green at County Trunk Highway A near Green Lake, 434928088553601	67
Koshkonong near Newville, 05427235	68
Little Arbor Vitae near Woodruff, 455446089370300	69

CONTENTS--Continued

Little Cedar	
North Site, near West Bend, 432255088134700	70
South Site, near West Bend, 432249088134500	72
Little Green, at Center, near Markesan, 43441208859070079	74
Little Muskego at Muskego, 425425088083500	76
Little St. Germain	
near Eagle River, 05390700	79
Northeast Bay, near St. Germain, 455545089262500	80
South Bay, near St. Germain, 455437089270800	82
West Bay, at St. Germain, 455428089282400	84
Little Sand near Mole Lake, 04074651	86
Mendota at Madison, 05428000	87
Middle at Lauderdale, 424621088335500	88
Middle Genesee near Oconomowoc, 430309088284800	90
Monona at Madison, 05429000	92
Muskego (Big Muskego)	
Bass Bay, near Muskego, 425344088070100	93
Muskego, near Wind Lake, 425109088075000	96
Muskego, South Site, near Muskego, 425112088072800	97
Namekagon Lakes	
Garden, near Cable, 461224091030200	99
Jackson, near Cable, 461457091065900	101
Namekagon	
Deep Hole, near Cable, 461308091065100	103
East Basin, near Cable, 461228091044300	105
Northeast Basin, near Cable, 461410091050700	107
Oconomowoc	
No. 1 (Center) at Oconomowoc, 430551088273500	109
No. 2 (off Hewitt Point) at Oconomowoc, 430609088262200	111
Okauchee	
at Okauchee, 430723088252100	113
No. 1, near Okauchee, 430759088244200	115
No. 2, at Okauchee, 430645088264500	115
No. 3, at Okauchee, 430642088252400	116
No. 4, at Okauchee, 430757088261700	116
Potter near Mukwonago, 424905088204000	117
Powers at Powers Lake, 423246088175800	119
Shell at Shell Lake, 05334000	121
Tombeau near Powers Lake, 423153088184800	123
Whitefish	
North Site, near Gordon, 461321091520900	125
South Basin, near Gordon, 461212091523200	127

CONTENTS--Continued

Whitewater near Whitewater, 424608088414800 129

Wind

 at Wind Lake, 424915088083900 130

 Outlet at Wind Lake, 424848088083100. 133

Winnebago

 at Oshkosh, 04082500 134

 near Stockbridge, 04084255 135

Wisconsin District publications pertaining to lakes 136

FIGURE

Figure 1. Map showing location of lake water-quality and lake-stage stations in Wisconsin.....2

TABLES

Table 1. Discontinued lake stations5

2. WATSTORE parameter codes, minimum reporting limits, and laborator identifying codes for chemical parameters commonly measured in lakes, and analyzed at the National Water-Quality Laboratory or the Wisconsin State Laboratory of Hygiene9

CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To Obtain
mile (mi)	1.609	kilometer
pound (lb)	453.6	gram
acre	0.4048	hectare
foot (ft)	0.3048	meter
gallon (gal)	3.785	liter
square mile (mi ²)	2.590	square kilometer

Temperature, in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by use of the following equation:

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32.$$

Sea level: In this report “sea level” refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviated water-quality units: Chemical concentrations and water temperature are given in metric units. Chemical concentration is given in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For water with dissolved-solids concentrations less than 7,000 mg/L, the numerical values for concentrations expressed as mg/L and µg/L are the same as for concentrations in parts per million and parts per billion, respectively.

Specific conductance of water is expressed in microsiemens per centimeter at 25 degrees Celsius (µS/cm). This unit is equivalent to micromhos per centimeter at 25 degrees Celsius (µmho/cm), formerly used by the U.S. Geological Survey.

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 1999

By Wisconsin District Lake-Studies Team

INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with local and other agencies, collects data at selected lakes throughout Wisconsin. These data, accumulated over many years, provide a data base for developing an improved understanding of the water quality of lakes. To make these data available to interested parties outside the USGS, the data are published annually in this report series. The location of water-quality and lake-stage stations in Wisconsin for water year 1999 are shown in figure 1. A water year is the 12-month period from October 1 through September 30. It is designated by the calendar year in which it ends. Thus, the period October 1, 1998 through September 30, 1999 is called "water year 1999."

The purpose of this report is to provide information about the chemical and physical characteristics of Wisconsin lakes. Data that have been collected at specific lakes, and information to aid in the interpretation of those data, are included in this report. Data collected include measurements of in-lake water quality and lake stage. Time series of Secchi depths, surface total phosphorus and chlorophyll *a* concentrations collected during non-frozen periods are usually included for lakes with two or more years of data. Graphs of vertical profiles of temperature, dissolved oxygen, pH, and specific conductance are included for sites where these parameters were measured. Descriptive information for each lake includes: location of the lake, area of the lake's watershed, period for which data are available, revisions to previously published records, and pertinent remarks. Additional data, such as streamflow and water quality in tributary and outlet streams of some of the lakes, are published in another volume: "Water Resources Data-Wisconsin, 1999."

Water-resources data, including stage and discharge data at most streamflow-gaging stations, are available through the World Wide Web on the Internet. The Wisconsin District's home page is at <http://wi.water.usgs.gov/>. Information on the Wisconsin District's Lakes Program is found at wi.water.usgs.gov/lake/index.html.

Figure 1. Location of lake water-quality and lake-stage stations in Wisconsin.

The USGS has done cooperative lake monitoring with local and other agencies since 1983. Cooperators in 1999 included:

Benedict/Tombeau Lake District
Big Muskego Lake District
Buffalo Lake District
City of Muskego
Dane County Department of Public Works
Eagle Spring Lake Management District
Geneva Lake Environmental Agency
Green Lake Sanitary District
Little Cedar Lake Protection and Rehabilitation District
Little Green Lake Protection and Rehabilitation District
Little Muskego Lake Protection and Rehabilitation District
Little St. Germain Lake Protection and Rehabilitation District
Middle Genesee Lake District
Okauchee Lake Management District
Potters Lake Protection and Rehabilitation District
Powers Lake District
Rock County Public Works Department
Town of Auburn
Town of Delavan (Delavan Lake)
Town of Namekagon (Namekagon Lakes Association)
Town of Sand Lake (Big Sissabagama Lake Association)
Town of Wascott (Whitefish Lake Association)
U.S. Army Corps of Engineers
Village of Oconomowoc Lake
Whitewater Lake Management District
Wind Lake Management District
Wisconsin Department of Natural Resources

Lake data-collection sites are identified by a unique identification number. Lake water-quality sites are identified by a 15-digit number that is a concatenation of the site's latitude, longitude, and a two-digit sequence number. The sequence number is used to distinguish between sites located at the same latitude-longitude designation. The site identification number is permanently assigned to the site; actual latitude and longitude of the site are subject to update and are stored separately. For some lakes, which have historical records of lake stage, an eight-to-ten digit number is assigned according to downstream order. Gaps are left in the numerical series to allow for new stations; hence, the numbers are not consecutive. The first two digits of the complete eight-to-ten digit number, such as 04087000 or 054310157, designate the major river basin. For example, "04" designates the St. Lawrence River Basin and "05" designates the Upper Mississippi River Basin.

The water-quality lake stations that were discontinued prior to water year 1999 are listed in table 1. Discontinued lake-stage stations are not included in this table.

This report is the culmination of a concerted effort by a number of people who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. The authors had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to USGS policy and established guidelines. Technicians in charge of the field offices are: T.J. Popowski (Rice Lake), J.J. Hanig (Merrill), and J. Habale (Middleton). The data were collected and processed by G.L. Goddard, B.M. Gray, J.J. Hanig, D.E. Housner, J.A. Jasinski, S.B. Marsh, E.A. Mergener, D.L. Olson, and J.G. Schuler. P.A. Stark assembled, edited, and formatted the report. Additional assistance in preparation of the report was provided by M.M. Greenwood.

METHODS OF DATA COLLECTION

Depth profiles of water temperature, dissolved oxygen, pH, and specific conductance were collected using multi-parameter meters. Prior to measurements, the meters were calibrated using standards for pH and conductance, and dissolved oxygen was calibrated using the air calibration method. Generally, field measurements in profiles were made at 0.5-m intervals if the maximum depth of the lake was 5 m or less and at 1.0-m intervals if the maximum depth was greater than 5 m.

Table 1. Discontinued lake stations

Station name	Site identification number	Period of record
Alma Lake near St. Germain	455426089254700	Oct. 1984–Sept. 1990, May 1992–Sept. 1996
Balsam Lake, off Cedar Island, at Balsam Lake	452755092264600	Feb. 1991–Aug. 1994
off Little Narrows, near Balsam Lake	452858092265300	May 1991–Aug. 1994
off Rock Island, near Balsam Lake	452754092234300	May 1991–Aug. 1994
near Birchwood	453907091345800	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997
Bass Lake near Shawano	445215088300300	Feb. 1990–Aug. 1992
Bear Lake at Deep Hole near Haugen	453754091490900	Mar. 1992–Aug. 1993
Beaver Dam Lake, South end, at Beaver Dam	432814088515000	June–Oct. 1991
North end, near Beaver Dam	433122088545700	June–Oct. 1991
Big Blacksmith Lake near Keshena	445401088334500	Feb. 1990–Aug. 1992
Big Muskego Lake, at North Site, near Muskego	425301088061300	Feb.–Aug. 1988
Research Base, near Muskego	425235088075300	May–June 1994
Big St. Germain Lake near St. Germain	455557089311000	Feb. 1992–Aug. 1996
Booth Lake near East Troy	424800088254800	Feb. 1992–Aug. 1994
Denoon Lake at Wind Lake	425044088100300	Feb. 1991–Aug. 1996
Druid Lake near Hartford	431643088243300	Feb. 1991–Sept. 1996
Eagle Lake near Kansasville	05544500	1936–64, 1975–77, 1979, Feb. 1993–Sept. 1996
Eagle Lake, at Deep Hole, near Kansasville	424207088072400	Feb. 1993–Aug. 1996
Elizabeth Lake near Twin Lakes	423051088155300	Feb. 1995–Sept. 1997
Forest Lake near Dundee	433632088100200	Mar. 1994–Aug. 1996
Fowler Lake, Center, at Oconomowoc	430653088294601	Jan.–Dec. 1984, Oct. 1986–Sept. 1996
Fox Lake Deep Hole at Fox Lake	433458088560600	June 1991–Mar. 1993
Hemlock Lake near Mikana	453421091333700	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997
Hooker Lake at Salem	423335088060300	Feb. 1992–Aug. 1993
Kirby Lake near Cumberland	453554092042101	Nov. 1995–Oct. 1996
Balsam Lake, (Site 1) near Cumberland	453608092035801	Nov. 1995–Nov. 1996
(Site 2) near Cumberland	453601092035301	Nov. 1995–Nov. 1996
(Site 3) near Cumberland	453612092034901	Nov. 1995–Nov. 1996
(Site 4) near Cumberland	453603092035701	Nov. 1995–Nov. 1996
(Site 5) near Cumberland	453608092041201	Nov. 1995–Nov. 1996
(Site 6) near Cumberland	453555092040901	Nov. 1995–Nov. 1996
Lac La Belle, Center, at Oconomowoc	430733088305900	Feb. 1984–Aug. 1985, Feb.–Sept. 1991
NW, at Oconomowoc	430809088313900	Feb. 1984–Aug. 1985
SE at Oconomowoc	430707088301400	Feb. 1984–Aug. 1985
Lake Blass at Lake Delton	433545089482400	Mar. 1989–Aug. 1990
Lake Keesus, East Bay, near Merton	4309570088183400	Apr. 1991–Aug. 1995
North Bay, near Merton	431006088191000	Apr. 1991–Aug. 1995
Lake Morris at Mount Morris	440654089120500	Jun. 1983–Sept. 1989
Lake Nebagamon, Northeast Bay, at Lake Nebagamon	463050091412300	May 1992–Aug. 1995

Table 1. Discontinued lake stations

Station name	Site identification number	Period of record
Southeast Bay, at Lake Nebagamon	462928091413500	Mar. 1992–Sept. 1995
West Bay, at Lake Nebagamon	463034091425300	May 1992–Aug. 1995
Lake Noquebay near Crivitz	451511087550900	Feb. 1987–Aug. 1988, Apr. 1991–Aug. 1994
East End, near Crivitz	451540087525700	Apr. 1991–Aug. 1994
Lamotte Lake near Shawano	445305088361200	Feb. 1990–Aug. 1992
Lauderdale Lakes		
at Lauderdale	424554088332700	Oct. 1993–Oct. 1994
Green near Lauderdale	424652088341500	Nov. 1993–Nov. 1994
Mill at Lauderdale	424555088335700	Nov. 1993–Nov. 1994
Legend Lake (site 1) near Shawano	445342088312700	Feb. 1990–Feb. 1992
Little Rock Lake near Woodruff	455946089415702	Oct. 1983–Sept. 1996
Long (Kee Nong Go-Mong) Lake at Wind Lake	424937088103400	Feb. 1988–Aug. 1989, Feb. 1991–Aug. 1996
Loon Lake near Shawano	445009088303700	Feb. 1991–Aug. 1993
Lost Lake near Beaver Dam	432640088580500	June–Oct. 1991
McKenzie Lakes		
McKenzie (Big McKenzie)		
Deep Hole, near Spooner	455507092013500	Feb. 1987–Aug. 1998
Northern Site, near Spooner	455540092022000	June 1997–Aug. 1998
South Site, near Spooner	455437092022300	June 1997–Aug. 1998
Lower McKenzie, near Webb Lake	455902092011900	June 1997–Aug. 1998
Middle McKenzie, near Spooner	455635092021800	June 1997–Aug. 1998
Mary (Marie) Lake at Twin Lakes	423128088151200	Feb. 1995–Aug. 1997
Max Lake near Woodruff	460128089423501	Mar. 1988–Dec. 1996
Mead Lake, East Bay near Willard	444720090445000	Apr. 1991–Aug. 1995
West Bay near Willard	444733090460100	Feb. 1991–Sept. 1995
Montello Lake at Montello	434748089195800	Feb. 1995–Aug. 1998
Moon Lake near St. Germain	455504089260500	Feb. 1992–Aug. 1996
Morgan Lake near Fence	454622088324801	Oct. 1987–Sept. 1998.
Moshawquit Lake near Shawano	445352088295800	Feb. 1990–Aug. 1992
Park Lake (site 1) at Pardeeville	433239089175800	Feb. 1986–Aug. 1987, May–Nov. 1993
(site 2) at Pardeeville	433226089175500	May–Nov. 1993
(site 3) at Pardeeville	433245089173000	May–Nov. 1993
(site 4) at Pardeeville	433257089165100	May–Nov. 1993
Pretty Lake, at Deep Hole, near Dousman	425722088295000	Feb. 1993–Aug. 1997
Red Cedar Lake, Deep Hole, near Mikana	453725091345100	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997
South End, at Mikana	453519091352500	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997
Rice Lake at Deep Hole near Whitewater	424629088415700	Apr.–Nov. 1991
Round Lake near Shawano	445328088335000	Feb. 1990–Aug. 1992

Table 1. Discontinued lake stations

Station name	Site identification number	Period of record
Sand Lake (Deep Hole) near Keshena	445321088323101	June–Aug. 1992
Silver Lake near Oconomowoc	430436088293300	Apr. 1992–Aug. 1996
Silver Lake near West Bend	432322088125000	Feb. 1996–Aug. 1997
Sinissippi Lake, off Anthony Is., at Hustisford	432113088361100	Feb. 1991–Aug. 1993
off Butternut Is., near Hustisford	432240088363900	Apr. 1991–Aug. 1993
off Sam Point, near Hustisford	432300088374200	Apr. 1991–Aug. 1993
Spirit Lake near Keshena	445400088320100	Apr.–Aug. 1992
Stewart Lake at Mt. Horeb	430117089442701	May 1992–Sept. 1993
Tichigan Lake near Waterford	424854088123300	Mar. 1994–Aug. 1996
Upper Nemahbin Lake, Center, near Delafield	430400088254900	June 1993–Aug. 1995
South Site, near Delafield	430339088254800	June 1993–Aug. 1995
Outlet near Delafield	430334088255400	June 1993–Aug. 1995
Vandercook Lake near Woodruff	455909089405602	Nov. 1980–Aug. 1998
Watosah-skice Lake near Keshena	445330088361400	Feb. 1990–Aug. 1992
Waubeesee Lake at Wind Lake	424857088101500	Feb. 1988–Aug. 1989, Feb. 1991–Aug. 1996
Whitewater Lake, off Heart Prairie, near Whitewater	424533088420100	Apr.–Nov. 1991
near Whitewater	424608088414800	Apr.–Oct. 1991
North Bay, near Whitewater	424625088405500	Apr.–Nov. 1991
South Bay, near Whitewater	424501088422300	Apr.–Nov. 1991
Wind Lake, Northeast Basin, at Wind Lake	424938088080800	Feb. 1997–Aug. 1998
Wolf Lake near Mt. Calvary	435152088123100	Nov. 1983–Sept. 1986, Nov. 1992–Sept. 1997

In most lakes, water samples were collected at two depths - near the surface and near the bottom. Chemical analyses of water samples were performed using standard analytical methods by either the USGS National Water Quality Laboratory (Wershaw and others, 1987; Fishman and Friedman, 1989; Fishman, 1993) or the Wisconsin State Laboratory of Hygiene (Wisconsin State Laboratory of Hygiene, 1993). Analyses for dissolved constituents were performed on samples that were filtered in the field through a 0.45- μ m (micrometer) pore-size filter. Total or total recoverable constituents were determined by analyzing unfiltered water samples. Preservation and shipment of samples followed standard protocols established by the laboratories. Water-quality data were archived in the Water Quality Data Base (QWDATA) of the National Water Information System (NWIS). Additional descriptive information about water-quality data is available in the data report: "Water Resources Data – Wisconsin, 1999". NWIS parameter codes and minimum laboratory reporting limits for chemical constituents are given in table 2.

Records of lake stage are considered complete when one or more manual or automatic measurements were obtained per day. Partial records of lake stage result when measurements were less frequent than daily. A complete description of manual or automatic measurements of lake stage is described by Rantz and others (1982).

EXPLANATION OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF LAKES

Following are brief, generalized explanations of some of the common measurements of water quality and some of the physical processes occurring in lakes that influence these measures of water quality. More detailed explanations of water-quality data and lake processes are given by Wetzel (1983), Hem (1985), and Shaw and others (1993).

Water Temperature and Thermal Stratification

Water temperature in lakes is important because of its role in stratification and because of the temperature dependence of many chemical reactions and life processes of aquatic organisms. The extent of thermal stratification in lakes depends on the interaction between the lake's shape, water clarity, solar heating, and wind-driven mixing. Complete mixing of the lake is usually inhibited by thermal stratification in summer and by ice cover in winter. Thermal stratification affects water quality and the distribution of organisms in the lake. Summer thermal stratification can occur in any lake, but in Wisconsin it commonly occurs in lakes deeper than about 6 m (Shaw and others, 1993).

Table 2. Parameter identification numbers and laboratory reporting levels (LRL) for chemical parameters commonly measured in lakes, and analyzed at the National Water Quality Laboratory (NWQL) or the Wisconsin State Laboratory of Hygiene (WSLH)

Parameter Name	Units	CAS Number (1)	Parameter Code (2)	(NWQL)				(WSLH)	
				Standard Analysis		Low-Level Analysis		MRL	Test Code
				LRL	Lab Code	LRL	Lab Code		
Calcium, diss. (Ca)	mg/L	7440-70-2	00915	0.020	659	0.002	1895	0.02	I230IUD
Magnesium, diss. (Mg)	mg/L	7439-95-4	00925	0.004	663	0.001	1897	0.02	I390IUD
Sodium, diss. (Na)	mg/L	7440-23-5	00930	0.09	675	0.025	1898	0.09	I80IUD
Potassium, diss. (K)	mg/L	7440-09-7	00935	0.24	54	0.01	833	0.3	I540IUD
Sulfate, diss. (SO ₄)	mg/L	14808-79-8	00945	0.31	1572	0.01	1263	1.0	I600DLD
Chloride, diss. (Cl)	mg/L	16887-00-6	00940	0.29	1571	0.01	1259	0.1	I240ELD
Fluoride, diss. (F)	mg/L	16984-48-8	00950	0.100	31	0.01	1260	0.03	I330FLD
Iron, diss. (Fe)	µg/L	7439-89-6	01046	10	645	3	1896	10	I370IUD
Manganese, diss. (Mn)	µg/L	7439-96-5	01056	2.2	648	1	1793	0.4	I400IUD
Silica, diss. (SiO ₂)	mg/L	7631-86-9	00955	0.1	56	0.02	1899	0.008	I560LLD
Nitrogen, NO ₂ +NO ₃ , diss.	mg/L		00631	0.05	1975	0.005	1979	0.01	I460MLD
Nitrogen, ammonia, diss.	mg/L	7664-41-7	00608	0.02	1976	0.002	1980	0.013	I440NLD
Nitrogen, organic, total (3)	mg/L								
Nitrogen, amm.+org., total (4)	mg/L	17778-88-0	00623	0.100	1985			0.2	I470BLT
Nitrogen, total (5)	mg/L								
Phosphorus, total	mg/L	7723-14-0	00665	0.05	1984	0.001	837	0.005	I520PLT
Phosphorus, ortho, diss.	mg/L	14265-44-2	00671	0.01	1262	0.001	1978	0.002	I530CLD
Chlorophyll a, phytoplankton	µg/L	479-61-8	70953	0.1	586				
Chlorophyll a, phytoplankton	µg/L	479-61-8	32210					1	I250UNF

Footnotes:

- 1: CAS (Chemical Abstracting Services) number= unique identification for each constituent
- 2: Parameter Code - unique number for storage of data in database
- 3: Calculated as difference between total ammonia + organic nitrogen and ammonia nitrogen
- 4: Also known as Total Kjeldahl Nitrogen (TKN)
- 5: Calculated as sum of TKN + Nitrogen as (NO₂+NO₃)

The density of water increases with decreasing temperature down to a temperature of 4°C, then decreases with decreasing temperature between 4°C and the freezing point of water (0°C). For a brief period in the spring after the ice is out, water temperature is usually uniform through the entire water column and wind action causes the lake to mix completely. This process is known as “spring turnover.” As the lake absorbs the sun’s energy, the surface water becomes warmer and its density decreases, making it more resistant to complete mixing. The difference in density caused by different water temperatures can prevent warm and cold water from mixing. In most lakes, therefore, a density “barrier” forms between the warmer surface water (epilimnion) and the underlying colder water (hypolimnion). This barrier is often marked by a sharp temperature gradient known as the “thermocline (metalimnion).” During the stratified summer period, these three distinct layers of lake water are often present. As the temperature difference between surface and deep water increases, this “stratified” condition stabilizes and can persist until surface temperatures decrease in the fall, which decreases the stability of the stratification. The mixing of the lake water in the fall is known as “fall turnover.”

Thermal stratification may also occur under ice cover in the winter. In the winter, the coldest water (near 0°C) under the ice at the surface of the lake is less dense than water deeper in the lake with warmer temperatures.

Specific Conductance

Specific conductance is a measure of the ability of water to conduct an electrical current and is an indicator of the concentration of dissolved solids in the water. Because conductance is temperature related, reported values are normalized at 25°C and are termed specific conductance. As the concentration of dissolved minerals increases, specific conductance increases. During winter and summer thermal stratification, concentrations of dissolved constituents near the lake bottom increase due to the decomposition of materials settling from the epilimnion, or release of dissolved materials (such as iron, manganese, and phosphorus) from the bottom sediments during anoxic periods. Therefore, differences in specific conductance with depth indicate differences in concentrations of dissolved solids.

Water Clarity

Water clarity, or transparency, is commonly measured using a Secchi disc. The range of depths within which photosynthetic activity occurs depends largely on depth of light penetration, which is influenced by water clarity. A Secchi disc, most commonly an 20-cm.-diameter disc with alternating black-and-white quadrants, is lowered to a depth at which it is no longer visible. This depth is referred to as the Secchi depth. Clarity can be reduced by algae, zooplankton, water color, and suspended sediment. Algae are often the most dominant influence on clarity in lakes and, therefore, Secchi depth is usually correlated with the algal abundance. Secchi depths are generally the least during summer when algal populations are largest.

pH

The pH is a measure of the acidity of the water. It is defined as the negative logarithm of hydrogen-ion concentration and varies over a 14-unit log scale, with a pH of 7 being neutral. Values less than 7 indicate acidic conditions; the lower the value, the stronger the acidity. Values greater than 7 indicate alkaline conditions. The pH of water is influenced in part by photosynthesis and respiration of planktonic algae and aquatic plants. It is important because it affects the solubility of many chemical constituents, and because aquatic organisms have limited pH tolerances. Planktonic algae and aquatic plants produce oxygen and consume carbon dioxide as they photosynthesize during daytime; they consume oxygen and produce carbon dioxide when they respire at night. Carbon dioxide combines with the water molecule to form carbonic acid; therefore respiration causes a decrease in pH at night and photosynthesis during the day causes an increase in pH. The result is a daily cycle in pH. Because phytoplankton are usually concentrated in the near-surface water, changes in pH in the epilimnion are more extreme than in the hypolimnion, where less photosynthesis usually occurs.

Lakes having good fish populations and productivity generally have a pH between 6.7 and 8.2. Values of pH greater than 8.5 have been shown to cause the release of phosphorus from lake sediments (James and Barko, 1991).

Dissolved Oxygen

Dissolved oxygen is one of the most critical factors affecting a lake ecosystem because it is essential to most aquatic organisms, and it is involved in many chemical reactions. Very low dissolved oxygen concentrations can control some types of chemical reactions. The solubility of oxygen in water is inversely related to temperature—that is, oxygen solubility decreases as water temperature increases. This relation is important because at warmer temperatures the metabolic rate of organisms increases but less oxygen is available for respiration. The primary sources of dissolved oxygen are from the air and from photosynthesis. The minimum dissolved oxygen concentration specified in national water-quality criteria for early life stages of warmwater aquatic life is 5.0 mg/L (U.S. Environmental Protection Agency, 1986).

In early summer, if thermal stratification develops, the metalimnion restricts the surface supply of dissolved oxygen to the hypolimnion. The hypolimnion can become isolated from the atmosphere. Thus, as summer progresses, the dissolved oxygen concentration can decrease in response to decomposition of dead algae that settle from the epilimnion and in response to the biological and chemical oxygen demand of the sediments. The oxygen demand from these processes may completely deplete the oxygen (anoxia) in the water near the lake bottom. The oxygen depletion then progresses upward but usually is confined to the hypolimnion.

Anoxia in the hypolimnion is common in stratified eutrophic (nutrient-rich) lakes in Wisconsin. Complete anoxia, however, is often not detected because of meter constraints. During anoxic conditions, many aquatic organisms cannot survive, but many other species (primarily bacteria) actually function only in such conditions. Therefore, a shift from oxic to anoxic conditions produces a rapid and dramatic change in the biological community and chemical environment. Anoxia also can cause release of phosphorus from the bottom sediments. This phosphorus then mixes throughout the water column during spring and fall turnover.

Phosphorus

Phosphorus is one of the essential nutrients for plant growth. High phosphorus concentrations can cause dense algal populations (blooms) and can therefore be a major cause of eutrophication in lakes. When phosphorus concentrations exceed 0.025 mg/L at the time of spring overturn in lakes and reservoirs, these water bodies may occasionally experience excess or nuisance growth of algae or other aquatic plants (U.S. Environmental Protection Agency, 1986). In many regions of the country, including the upper Midwest, other nutrients, particularly nitrogen, tend to be in abundant supply. Phosphorus is often the nutrient in shortest supply, therefore limiting or controlling plant growth. About 90 percent of the lakes in Wisconsin are limited by phosphorus (Shaw and others, 1993). In water, dissolved orthophosphate is that part of total phosphorus that is most readily available for use by algae.

Internal phosphorus recycling occurs in many lakes. Phosphorus used by algae, aquatic plants, fish, and zooplankton is stored within these organisms. As these organisms die and decompose, this phosphorus is returned to the lake water and sediments. Anoxia in the hypolimnion makes phosphorus more soluble, adding further to the release of phosphorus from the falling particles and the lake sediments. During spring and fall turnover the phosphorus, which was released from the bottom sediments into the hypolimnion during anoxia, is mixed throughout the lake. The phosphorus is then available for algal growth. These phenomena are part of the internal-recycling processes of lakes.

Nitrogen

Nitrogen, like phosphorus, is an essential nutrient for plant and algal growth. Usually in Wisconsin lakes, nitrogen is in abundant supply from the atmosphere and other sources. If phosphorus is abundant relative to algal needs, nitrogen can become the limiting nutrient. In that case, algal blooms are more likely to be triggered by increases in nitrogen than by increases in phosphorus. Some bluegreen algal species can fix nitrogen from the atmosphere (Wetzel, 1983). Therefore, in situations where other types of algae are excluded because of a shortage of nitrogen, the nitrogen-fixing bluegreen algae have a competitive advantage and may be present in abundance.

Lakes with a nitrogen to phosphorus ratio larger than 15 to 1 near the surface may generally be considered phosphorus limited; a ratio from 10 to 1 to 15 to 1 indicates a transition situation; and a ratio smaller than 10 to 1 generally indicates nitrogen limitation. Total nitrogen is the sum of ammonia, organic nitrogen, and nitrate-plus-nitrite nitrogen. The near-surface concentration is commonly used to compute the total nitrogen to phosphorus ratio because most algal species grow near the lake surface.

Chlorophyll *a*

Chlorophyll *a* is a photosynthetic pigment found in algae (Wetzel, 1983) and other green plants. Its concentration, therefore, is commonly used as a measure of the density of the algal population in a lake. Chlorophyll *a* concentrations are generally highest during summer when algal populations are highest. Moderate populations of desirable algae are important in the food chain; however, excessive populations or algal blooms are undesirable. Algal blooms can cause taste and odor problems, and limit light penetration needed to support growth of submerged aquatic plants. Certain species of bluegreen algae can produce toxins (Rapavich and others, 1987).

CLASSIFICATION OF LAKES

Two methods are commonly used to classify and evaluate Wisconsin lakes according to their water quality or trophic state: Lillie and Mason's (1983) water-quality index and a modification of Carlson's (1977) Trophic State Index (TSI) by Lillie and others (1993). Three water-quality measures are used in these classification systems: near-surface concentrations of total phosphorus and chlorophyll *a*, and water clarity as indicated by the Secchi depth.

Lillie and Mason's (1983) water-quality indices for Wisconsin lakes were developed based on random summer measurements of total phosphorus and chlorophyll *a* concentrations, and Secchi depth to classify the lakes' water quality as shown below:

Water-quality index	Total phosphorus range (mg/L)	Chlorophyll <i>a</i> range (µg/L)	Water clarity range (Secchi depth, in meters)
"Excellent"	<0.001	<1.0	>6.0
"Very good"	.001–.009	1.0– 4.9	3.0–6.0
"Good"	.010–.029	5.0– 9.9	2.0–2.9
"Fair"	.030–.049	10.0–14.9	1.5–1.9
"Poor"	.050–.149	15.0–30.0	1.0–1.4
"Very poor"	>.150	>30.0	<1.0

The TSI approach to lake classification assigns numerical ranges to the three trophic conditions generally used to describe the wide range of lake water-quality conditions. Oligotrophic lakes are typically clear, algal populations and phosphorus concentrations are low, and the deepest water is likely to contain oxygen throughout the year. Mesotrophic lakes typically have a moderate supply of nutrients, experience moderate algal blooms, and have occasional oxygen depletions at depth. Eutrophic lakes are nutrient rich with relatively severe water-quality problems, such as frequent seasonal algal blooms, oxygen depletion in lower parts of the lakes, and poor clarity. When eutrophic conditions are very severe, the lake is considered hyper-eutrophic.

The WDNR modified the lakes classification scheme developed by Carlson (1977) to apply specifically to Wisconsin lakes. The WDNR system (Lillie and others, 1993) uses surface total phosphorus and chlorophyll *a* concentrations, and Secchi depth for ice-free periods to calculate values for TSI's. The WDNR has adopted the following TSI ranges to classify Wisconsin lakes: indices of less than 40 define oligotrophic conditions, 40 to 50 define mesotrophic conditions, greater than 50 to define eutrophic conditions, and greater than 70 define hypereutrophic conditions (Wisconsin Department of Natural Resources, 1992). These ranges are used to make relative comparisons in Wisconsin lake trophic-state evaluations by the WDNR and others.

The TSI for a lake can be calculated using the following equations (Lillie and others, 1993):

$$TSI_{\text{Secchi}} = 60.0 - 33.2 \times (\log_{10} \text{ Secchi depth})$$

$$TSI_{\text{chlorophyll } a} = 34.82 + (17.41 \times (\log_{10} \text{ chlorophyll } a \text{ concentration}))$$

$$TSI_{\text{total phosphorus}} = 28.24 + (17.81 \times (\log_{10} \text{ total phosphorus concentration} \times 1,000))$$

where: Secchi depth is in meters,
chlorophyll *a* is in micrograms per liter, and
total phosphorus is in milligrams per liter.

The three trophic conditions are defined with the following boundaries for total phosphorus, Secchi disc, and chlorophyll *a*:

Trophic Level	Trophic State Index	Total phosphorus (mg/L)	Secchi depth (m)	Chlorophyll <i>a</i> (µg/L)
Eutrophic	50	0.017	2.0	7.4
Mesotrophic	40	0.005	4.0	2.0
Oligotrophic				

REFERENCES CITED

- Carlson, R.E., 1977, A trophic state index for lakes: *Limnology and Oceanography*, March, v. 22, no. 2, p. 361-369.
- Fishman, M.J., ed., 1993, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of inorganic and organic constituents in water and fluvial sediments: U.S. Geological Survey Open-File Report 93-125, 217 p.
- Fishman, M.J., and Friedman, L.C., eds., 1989, Methods for determination of inorganic substances in water and fluvial sediments (3d ed.): U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A1, 545 p.
- Hem, J.D., 1985, Study and interpretation of the chemical characteristics of natural water (3rd ed.): U.S. Geological Survey Water-Supply Paper 2254, 263 p.
- James, W.F., and Barko, J.W., 1991, Littoral-pelagic phosphorus dynamics during nighttime convective circulation: *Limnology and Oceanography*, v. 36, no. 5, p. 946-960.
- Lillie, R.A., Graham, S., and Rasmussen, P., 1993, Trophic-State Index equations and regional predictive equations for Wisconsin lakes: Wisconsin Department of Natural Resources Research Management Findings No. 35, 4 p.
- Lillie, R.A., and Mason, J.W., 1983, Limnological characteristics of Wisconsin lakes: Wisconsin Department of Natural Resources Technical Bulletin No. 138, 116 p.
- Rantz, S.E., and others, 1982, Measurement and computation of streamflow: U.S. Geological Survey Water-Supply Paper 2175, 631 p.
- Rapavich, W.M., Sonzogni, W.C., Standridge, J.H., Vennie J.G., and Wedepohl, R.E., 1987, Incidence of algal toxins in Wisconsin water experiencing blue-green algae blooms: Wisconsin State Laboratory of Hygiene and Wisconsin Department of Natural Resources, Informational Paper, 8 p.
- Shaw, B., Mechenich, C., and Klessig, L., 1993, Understanding Lake Data: G3582: University of Wisconsin Extension, Madison, Wis., 19 p.
- U.S. Environmental Protection Agency, 1986, Quality Criteria for Water 1986: U.S. Environmental Protection Agency publication, EPA 440/5-86-001 [variously paged].
- Wershaw, R.L., Fishman, M.J., Grabbe, R.R., and Lowe, L.E., eds., 1987, Methods for the determination of organic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A3, 80 p.
- Wetzel, R.G., 1983, *Limnology* (2d ed.): New York, 767 p.
- Wisconsin Department of Natural Resources, 1992, Wisconsin water quality assessment—Report to Congress, 1992: Wisconsin Department of Natural Resources Publ-WR254-92-REV, 220 p.

Wisconsin State Laboratory of Hygiene, Environmental Sciences Section, 1993, Manual of analytical methods, inorganic chemistry unit: Wisconsin State Laboratory of Hygiene, revised November 1993 [variously paged].

LAKE DATA

423201088180800 BENEDICT LAKE NEAR POWERS LAKE, WI

LOCATION.--Lat 42°32'01", long 88°18'08", in NW 1/4 NW 1/4 sec.19, T.1 N., R.19 E., Kenosha County, Hydrologic Unit 07120006, 1.4 mi southwest of Powers Lake.

PERIOD OF RECORD.--May 1998 to current year.

REMARKS.--Lake sampled near center at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 04, 1999

(Milligrams per liter unless otherwise indicated)

	Feb-19		Apr-15		Jun-10		Jul-7		Aug-4	
Lake stage (ft)	---		825.09		826.26		825.65		825.71	
Secchi-depth (m)	---		1.9		2.3		1.9		1.9	
Chlorophyll a, phytoplankton (µg/L)	---		7.00		1.70		1.64		3.00	
Depth of sample (m)	0.5	11.0	0.5	11.0	0.5	11.0	0.5	11.0	0.5	11.0
Water temperature (°C)	4.5	3.4	11.6	9.2	26.8	9.5	27.5	9.5	27.4	14.0
Specific conductance (µS/cm)	541	679	654	660	612	691	569	695	561	610
pH (units)	7.9	7.7	8.2	8.1	8.2	7.6	8.2	7.5	8.1	8.0
Dissolved oxygen (mg/L)	17.9	11.5	12.0	9.3	9.0	0.7	8.6	0.4	9.5	9.0
Phosphorus, total (as P)	0.014	0.023	0.018	0.021	0.007	0.075	0.010	0.102	0.020	0.030
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	0.004	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.557	---	---	---	0.512	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.353	---	---	---	0.128	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	1.2	---	---	---	0.92	---	---	---
Nitrogen, total (as N)	---	---	1.7	---	---	---	1.4	---	---	---
Color (Pt-Co. scale)	---	---	5	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.5	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	260	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	46	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	36	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	26	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	2.2	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	222	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	34	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	59	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	5.8	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	356	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	0.7	---	---	---	---	---	---	---

2-19-99

4-15-99

6-10-99

7-07-99

8-04-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Benedict Lake near Powers Lake, Wisconsin.

440912089092000 BIG HILLS (HILLS) LAKE NEAR WILD ROSE, WI

LOCATION.--Lat 44°09'12", long 89°09'20", in SW 1/4 NE 1/4 sec.2, T.19 N., R.11 E., Waushara County, Hydrologic Unit 04030202, 4.6 mi southeast of Wild Rose.

DRAINAGE AREA.--0.78 mi².

PERIOD OF RECORD.--June 1983 to August 1984, February to August 1987, February to August 1990, February to August 1993, February to August 1996, and February to August 1999.

REMARKS.--Lake sampled at east end at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 23 TO AUGUST 18, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-23		Apr-28		Jun-17		Jul-23		Aug-18	
Secchi-depth (m)	---		2.3		2.9		3.9		3.86	
Chlorophyll a, phytoplankton (µg/L)	---		8.00		4.50		1.25		0.500	
Depth of sample (m)	0.5	5.5	0.5	5.5	0.5	5.5	0.5	5.5	0.5	5.5
Water temperature (°C)	3.9	4.3	11.7	11.6	21.5	21.0	27.4	25.3	24.0	24.0
Specific conductance (µS/cm)	250	269	233	234	224	232	220	224	229	228
pH (units)	7.1	7.2	8.3	8.3	8.2	7.9	7.3	7.2	7.4	7.3
Dissolved oxygen (mg/L)	7.1	6.6	12.3	12.1	8.7	6.8	6.5	4.3	6.2	5.2
Phosphorus, total (as P)	0.006	0.010	0.008	0.016	0.010	0.015	0.007	0.009	0.013	0.012
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	<0.002	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.113	---	---	---	0.012	<0.010	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.436	---	---	---	0.045	0.096	---	---
Nitrogen, amm. + org., total (as N)	---	---	1.0	---	---	---	0.49	0.58	---	---
Nitrogen, total (as N)	---	---	1.1	---	---	---	0.5	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.1	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	110	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	23	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	13	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	1.8	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	<0.30	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	102	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	5.9	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	5.7	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.7	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	126	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	0.8	---	---	---	---	---	---	---

2-23-99

4-28-99

6-17-99

7-23-99

8-18-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Big Hills Lake near Wild Rose, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

05390750 BIG ST. GERMAIN LAKE NEAR LAKE TOMAHAWK, WI

LOCATION.--Lat 45°55'00", long 89°31'55" in NE 1/4 SE 1/4 sec.30, T.40 N., R.8 E., Vilas County, Hydrologic Unit 07070001, at dam outlet, 7.7 mi northeast of Lake Tomahawk.

DRAINAGE AREA.--73.1 mi².

PERIOD OF RECORD.--October 1991 to current year. Lake stages for previous years were recorded by Wisconsin Valley Improvement Company.

GAGE.--Nonrecording gage. Datum of gage is 1,580 ft, above sea level.

COOPERATION.--Lake stages provided by Wisconsin Valley Improvement Company.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 10.98 ft, May 9, 1999; minimum observed, 8.16 ft, Jan. 26, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 10.98 ft, May 9; minimum observed, 8.84 ft, Jan. 25.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.56	10.46	9.46	---	---	9.10	8.96	10.52	10.50	10.62	10.48	10.48
2	10.56	10.38	---	9.02	9.02	9.05	9.00	10.54	10.50	10.66	10.48	10.48
3	10.58	10.34	---	---	---	---	9.12	10.54	10.48	10.72	10.48	10.48
4	10.56	10.30	9.38	---	---	---	9.26	10.54	10.50	10.72	10.50	10.48
5	10.54	10.26	---	9.00	9.04	9.04	9.32	10.54	10.50	10.78	10.52	10.50
6	10.62	10.20	---	---	---	---	9.40	10.70	10.62	10.80	10.52	10.52
7	10.62	10.12	---	---	---	---	9.50	10.88	10.62	10.76	10.50	10.52
8	10.62	---	9.34	8.98	---	---	9.58	10.92	10.60	10.72	10.50	10.52
9	10.64	---	---	---	9.04	9.03	9.62	10.98	10.60	10.94	10.50	10.52
10	10.64	10.00	---	---	---	---	9.66	10.94	10.60	10.82	10.48	10.52
11	10.64	---	9.28	---	---	---	9.68	10.90	10.62	10.78	10.48	10.54
12	10.64	9.98	---	8.96	9.06	9.01	9.72	10.86	10.62	10.70	10.50	10.56
13	10.64	---	---	---	---	---	9.78	10.80	10.68	10.66	10.70	10.56
14	10.62	9.86	---	---	---	---	9.82	10.76	10.56	10.58	10.67	10.56
15	10.62	---	9.24	8.96	---	---	9.86	10.72	10.52	10.52	10.67	10.58
16	10.62	---	---	---	9.10	8.98	9.90	10.68	10.50	10.54	10.70	10.58
17	10.64	9.82	---	---	---	---	9.94	10.66	10.48	10.54	10.68	10.56
18	10.64	---	9.16	---	---	---	9.98	10.76	10.44	10.52	10.66	10.56
19	10.66	9.74	---	8.92	9.14	8.97	9.98	10.74	10.40	10.54	10.66	10.55
20	10.66	---	---	---	---	---	10.10	10.68	10.42	10.56	10.64	10.56
21	10.68	---	9.12	---	---	---	10.22	10.76	10.42	10.56	10.62	10.56
22	10.70	9.66	---	8.92	---	8.98	10.28	10.76	10.44	10.56	10.62	10.56
23	10.68	---	---	---	9.02	8.96	10.32	10.80	10.46	10.56	10.60	10.56
24	10.66	9.62	9.08	---	---	8.96	10.34	10.72	10.50	10.56	10.58	10.56
25	10.68	---	---	8.84	---	8.98	10.34	10.64	10.52	10.56	10.56	10.56
26	10.66	9.56	---	---	9.10	8.96	10.40	10.56	10.52	10.66	10.54	10.54
27	10.62	---	---	---	---	8.96	10.52	10.52	10.54	10.62	10.54	10.56
28	10.60	---	---	---	---	8.94	10.50	10.52	10.54	10.58	10.50	10.58
29	10.58	9.50	9.04	8.96	---	8.94	10.50	10.50	10.56	10.56	10.50	10.58
30	10.54	---	---	---	---	8.94	10.50	10.50	10.56	10.54	10.48	10.58
31	10.48	---	---	9.00	---	8.94	---	10.50	---	10.54	10.50	---
MEAN	10.62	---	---	---	---	---	9.87	10.69	10.53	10.64	10.56	10.54
MAX	10.70	---	---	---	---	---	10.52	10.98	10.68	10.94	10.70	10.58
MIN	10.48	---	---	---	---	---	8.96	10.50	10.40	10.52	10.48	10.48

454724091303600 BIG SISSABAGAMA LAKE NEAR STONE LAKE, WI

LOCATION.--Lat 45°47'24", long 91°30'36", in NW 1/4 SE 1/4 sec.6, T.38 N., R.9 W., Sawyer County, Hydrologic Unit 07050001, near Stone Lake.

DRAINAGE AREA.--9.47 mi².

LAKE-STAGE RECORDS

PERIOD OF RECORD.--1986 to 1996, and October 1997 to current year, during open-water periods.

GAGE.--Water surface measured from reference point near lake outlet. Measurements were made by Richard Roehrich and James Eary.

EXTREMES FOR PERIOD OF RECORD: Maximum gage height observed, 6.09 ft, May 7 and Sept. 15, 1991; minimum observed, 4.78 ft, Sept. 15, 16, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 5.95 ft, June 11; minimum observed, less than 5.07 ft, Oct. 1-16 (stages below 5.07 ft cannot be measured from reference point).

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	<5.07	5.10	---	---	---	---	---	---	5.78	5.75	5.88	---
2	<5.07	5.08	---	---	---	---	---	---	5.75	5.75	5.86	5.76
3	<5.07	5.08	---	---	---	---	---	---	5.74	5.79	5.91	5.75
4	<5.07	5.08	---	---	---	---	---	---	5.74	5.81	5.90	5.74
5	<5.07	5.08	---	---	---	---	---	---	5.75	5.84	5.87	5.82
6	<5.07	5.08	---	---	---	---	---	---	5.84	5.83	5.87	5.92
7	<5.07	5.73	---	---	---	---	---	---	5.91	5.80	5.91	5.90
8	<5.07	---	---	---	---	---	---	---	5.89	5.84	5.88	5.96
9	<5.07	---	---	---	---	---	---	---	5.88	5.88	5.86	5.94
10	<5.07	---	---	---	---	---	---	5.91	5.88	5.84	5.85	5.91
11	<5.07	5.12	---	---	---	---	---	5.93	5.95	5.83	5.85	5.89
12	<5.07	5.15	---	---	---	---	---	5.91	5.93	5.82	5.84	5.95
13	<5.07	5.12	---	---	---	---	---	5.89	5.91	5.87	5.91	5.92
14	<5.07	5.11	---	---	---	---	---	5.88	5.88	5.84	5.90	5.91
15	<5.07	5.12	---	---	---	---	---	5.87	5.86	5.83	5.88	5.89
16	<5.07	5.13	---	---	---	---	---	5.85	5.84	---	5.86	5.88
17	5.10	5.13	---	---	---	---	---	5.88	5.82	---	5.85	5.88
18	5.13	5.12	---	---	---	---	---	5.90	5.80	---	5.85	5.87
19	5.12	5.12	---	---	---	---	---	5.89	5.77	5.78	5.88	5.87
20	5.11	5.13	---	---	---	---	---	5.91	5.75	5.75	5.87	5.86
21	5.11	5.13	---	---	---	---	---	5.91	5.74	5.75	5.87	5.84
22	5.10	5.14	---	---	---	---	---	5.90	5.74	5.74	5.86	5.83
23	5.10	5.14	---	---	---	---	---	5.91	5.80	5.72	5.86	5.82
24	5.09	5.15	---	---	---	---	---	---	5.78	5.70	5.90	5.80
25	5.11	5.15	---	---	---	---	---	---	5.77	5.70	5.93	5.78
26	5.11	5.16	---	---	---	---	---	5.88	5.72	5.95	5.90	5.76
27	5.11	5.16	---	---	---	---	---	5.84	5.70	5.94	5.88	5.75
28	5.11	5.16	---	---	---	---	---	5.83	5.75	5.92	5.86	5.72
29	5.11	5.17	---	---	---	---	---	5.83	5.74	5.90	5.83	5.69
30	5.10	5.18	---	---	---	---	---	5.82	5.73	5.88	5.81	5.66
31	5.10	---	---	---	---	---	---	5.80	---	5.93	5.79	---
MEAN	5.09	---	---	---	---	---	---	---	5.80	---	5.87	---
MAX	5.13	---	---	---	---	---	---	---	5.95	---	5.93	---
MIN	5.07	---	---	---	---	---	---	---	5.70	---	5.79	---

< Actual value is known to be less than the value shown

454724091303600 BIG SISSABAGAMA LAKE NEAR STONE LAKE, WI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--1986 to 1996, and March 1998 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 04 TO AUGUST 16, 1999
(Milligrams per liter unless otherwise indicated)

	Mar-4		Apr-13		Jun-2		Jul-14		Aug-16		
Lake stage (ft)	---		5.92		5.75		5.84		5.76		
Secchi-depth (m)	---		2.4		1.9		2.6		1.6		
Chlorophyll a, phytoplankton (µg/L)	---		---		9.43		7.55		13.0		
Depth of sample (m)	0.5	13.0	0.5	14.0	0.5	14.0	0.5	13.0	0.5	8.0	15.0
Water temperature (°C)	0.1	4.1	6.6	5.0	16.5	9.3	22.7	11.0	21.3	17.0	12.1
Specific conductance (µS/cm)	72	104	69	69	68	113	68	127	65	102	144
pH (units)	7.4	6.8	7.0	7.0	8.0	6.8	8.0	7.2	7.3	6.8	7.3
Dissolved oxygen (mg/L)	11.8	0.3	11.4	10.2	9.1	0.1	8.0	0.1	7.5	0.5	0.1
Phosphorus, total (as P)	0.008	0.071	0.019	0.020	0.023	0.159	0.021	0.185	0.024	0.079	0.311
Phosphorus, ortho, dissolved (as P)	---	---	0.003	---	---	---	0.003	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.056	---	---	---	<0.010	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.063	---	---	---	0.004	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.47	---	---	---	0.51	---	---	---	---
Nitrogen, total (as N)	---	---	0.53	---	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.4	---	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	33	---	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	8.5	---	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	2.8	---	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	1.6	---	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	0.8	---	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	34	---	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	3	---	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	0.9	---	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	7.1	---	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	56	---	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	220	---	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	140	---	---	---	---	---	---	---	---

3-04-99

4-13-99

6-02-99

7-14-99

8-16-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Big Sissabagama Lake near Stone Lake, Wisconsin.

454800091312900 BIG SISSABAGAMA LAKE, NORTH SITE, NEAR STONE LAKE, WI

LOCATION.--Lat 42°48'00", long 91°31'29", in NE 1/4 SE 1/4 sec.6, T.38 N., R.9 W., Sawyer County, Hydrologic Unit 07050001, near Stone Lake.

DRAINAGE AREA.--9.47 mi².

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled near the deepest part of the North Bay. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 04 TO AUGUST 16, 1999
(Milligrams per liter unless otherwise indicated)

	Mar-4	Apr-13	Jun-2	Jul-14	Aug-16
Lake stage (ft)	---	5.92	5.75	5.84	5.76
Secchi-depth (m)	---	2.6	1.9	2.5	1.6
Chlorophyll a, phytoplankton (µg/L)	---	3.28	5.88	4.94	16.0
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	0.7	8.0	16.1	23.0	21.3
Specific conductance (µS/cm)	76	68	68	69	65
pH (units)	7.5	7.4	7.8	8.1	7.5
Dissolved oxygen (mg/L)	14.0	12.0	8.6	8.1	7.7
Phosphorus, total (as P)	0.014	0.014	0.017	0.022	0.024

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Big Sissabagama Lake, North Site, near Stone Lake, Wisconsin.

434558089260600 BUFFALO LAKE, CENTER SITE, AT PACKWAUKEE, WI

LOCATION.--Lat 43°45'58", long 89°26'06", in NW 1/4 SE 1/4 sec.21, T.15 N., R.9 E., Marquette County, Hydrologic Unit 04030201, 1.1 mi northeast of Packwaukee.

PERIOD OF RECORD.--May 1998 to current year. Data collected 1991-94 by Wisconsin Department of Natural Resources are available.

REMARKS.--Site sampled near center of lake. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 26 TO AUGUST 19, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-26	May-3	Jun-16	Jul-15	Aug-19
Secchi-depth (m)	---	0.7	1.2	1.3	>1.3
Chlorophyll a, phytoplankton (µg/L)	---	18.8	5.67	5.35	3.22
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	0.2	18.7	19.6	25.4	21.9
Specific conductance (µS/cm)	448	371	367	390	386
pH (units)	6.6	8.5	8.3	8.1	7.5
Dissolved oxygen (mg/L)	11.6	13.6	7.2	7.1	5.8
Phosphorus, total (as P)	0.039	0.069	0.110	0.126	0.079
Phosphorus, ortho, dissolved (as P)	---	0.003	---	0.062	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	0.399	---	0.048	---
Nitrogen, ammonia, dissolved (as N)	---	0.021	---	0.001	---
Nitrogen, amm. + org., total (as N)	---	1.2	---	0.56	---
Nitrogen, total (as N)	---	1.6	---	0.61	---
Color (Pt-Co. scale)	---	30	---	---	---
Turbidity (NTU)	---	6.9	---	---	---
Hardness, (as CaCO ₃)	---	190	---	---	---
Calcium, dissolved (Ca)	---	38	---	---	---
Magnesium, dissolved (Mg)	---	22	---	---	---
Sodium, dissolved (Na)	---	4.9	---	---	---
Potassium, dissolved (K)	---	1.2	---	---	---
Alkalinity, (as CaCO ₃)	---	166	---	---	---
Sulfate, dissolved (SO ₄)	---	18	---	---	---
Chloride, dissolved (Cl)	---	10	---	---	---
Silica, dissolved (SiO ₂)	---	2.2	---	---	---
Solids, dissolved, at 180°C	---	230	---	---	---
Iron, dissolved (Fe) µg/L	---	60	---	---	---
Manganese, dissolved (Mn) µg/L	---	4.6	---	---	---

2-26-99

5-03-99

6-16-99

7-15-99

8-19-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Buffalo Lake, Center Site, near Packwaukee, Wisconsin.

434720089201600 BUFFALO LAKE, EAST END, AT MONTELLO, WI

LOCATION.--Lat 43°47'20", long 89°20'16", in SE 1/4 SW 1/4 sec.8, T.15 N., R.10 E., Marquette County, Hydrologic Unit 04030201, at Montello.
 PERIOD OF RECORD.--May 1998 to current year. Data collected 1991-94 by Wisconsin Department of Natural Resources are available.
 REMARKS.--Site sampled at east end of lake. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 26 TO AUGUST 19, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-26	May-3	Jun-16	Jul-15	Aug-19
Secchi-depth (m)	---	0.7	0.9	0.9	0.9
Chlorophyll a, phytoplankton (µg/L)	---	21.7	40	16.9	51.0
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	0.8	17.4	20.2	25.4	22.6
Specific conductance (µS/cm)	433	350	362	371	384
pH (units)	6.9	8.8	8.3	8.2	8.3
Dissolved oxygen (mg/L)	13.8	16.4	9.7	7.6	10.0
Phosphorus, total (as P)	0.068	0.056	0.155	0.136	0.077

2-26-99

5-03-99

6-16-99

7-15-99

8-19-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

pH, IN STANDARD UNITS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Buffalo Lake, East Site, at Montello, Wisconsin.

434414089282400 BUFFALO LAKE, WEST END, NEAR ENDEAVOR, WI

LOCATION.--Lat 43°44'14", long 89°28'24", in NW 1/4 SE 1/4 sec.31, T.15 N., R.9 E., Marquette County, Hydrologic Unit 04030201, 1.5 mi north of Endeavor.

PERIOD OF RECORD.--May 1998 to current year. Data collected 1991-94 by Wisconsin Department of Natural Resources are available.

REMARKS.--Site sampled near west end of lake. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 26 TO AUGUST 19, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-26	May-3	Jun-16	Jul-15	Aug-19
Secchi-depth (m)	---	0.6	0.8	0.5	0.9
Chlorophyll a, phytoplankton (µg/L)	---	43.9	8.86	30.7	11.0
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	0.9	18.2	19.4	26.4	22.1
Specific conductance (µS/cm)	448	398	391	398	393
pH (units)	7.6	8.0	7.9	8.3	7.9
Dissolved oxygen (mg/L)	12.8	9.5	8.3	10.0	10.0
Phosphorus, total (as P)	0.054	0.093	0.090	0.142	0.090

2-26-99

5-03-99

6-16-99

7-15-99

8-19-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

PH, IN STANDARD UNITS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Buffalo Lake, West Site, near Endeavor, Wisconsin.

423706088363400 DELAVAN LAKE NEAR DELAVAN, WI

LOCATION.--Lat 42°36'27", long 88°36'19", in SW 1/4 NE 1/4 sec.28, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, at Delavan Lake Sanitary District Lift Station No. 2 at Delavan Lake Yacht Club, 1.0 mi southeast of outlet, and 2.7 mi southeast of Delavan.

DRAINAGE AREA.--41.4 mi², of which 2.3 mi² is non-contributing. Area of Delavan Lake, 2,072 acres.

PERIOD OF RECORD.--October 1983 to current year. October 1983 to September 1985 data published in Water Resources Investigation series report "Water Quality and Hydrology of Delavan Lake in Southeastern Wisconsin" by S. J. Field and M. D. Duerk (1988).

GAGE.--Water-stage recorder. Datum of gage is 922.92 ft above sea level. Prior to Sept. 5, 1989, staff gage at bridge on North Shore Drive at same datum.

REMARKS.--No estimated daily gage heights. Records good. Lake was ice covered from Dec. 30 to Mar. 21. Lake levels controlled by Delavan Lake Sanitary District. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 6.19 ft, Feb. 21, 1994; minimum daily, -4.44 ft, Nov. 6, 1989 (lake drawn down for lake rehabilitation program).

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.77 ft, June 14; minimum, 4.58 ft, Sept. 26.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.96	4.97	5.03	4.92	4.97	4.92	4.94	4.98	4.99	4.97	4.90	4.83
2	4.95	4.96	5.02	4.96	4.99	4.93	4.95	4.98	5.06	4.94	4.88	4.82
3	5.00	4.94	5.02	5.01	5.04	4.94	4.96	4.98	5.06	4.95	4.86	4.82
4	5.01	4.92	5.01	5.01	5.07	4.93	4.98	4.97	5.05	4.96	4.84	4.81
5	5.06	4.91	5.00	5.02	5.06	4.94	4.98	4.97	5.03	4.96	4.82	4.80
6	5.12	4.91	5.01	5.02	5.03	4.96	4.95	5.00	5.03	4.96	4.80	4.79
7	5.12	4.90	5.06	5.02	4.99	4.96	4.93	5.01	5.04	4.94	4.79	4.78
8	5.09	4.91	5.05	5.02	4.95	4.95	4.94	5.00	5.02	4.92	4.79	4.75
9	5.04	4.91	5.04	5.02	4.92	4.97	5.04	5.00	4.99	4.91	4.78	4.74
10	5.00	5.09	5.03	5.02	4.93	4.98	5.03	5.00	5.01	4.89	4.77	4.71
11	4.96	5.17	5.02	5.03	4.97	4.97	5.02	5.00	5.11	4.87	4.76	4.70
12	4.95	5.12	5.01	5.03	5.06	4.97	5.00	5.09	5.10	4.86	4.78	4.70
13	4.94	5.04	5.00	5.03	5.03	4.96	4.98	5.11	5.33	4.85	4.79	4.72
14	4.93	4.97	4.99	5.02	4.99	4.96	4.97	5.09	5.74	4.83	4.78	4.71
15	4.92	4.95	4.98	5.00	4.95	4.96	4.95	5.06	5.61	4.81	4.77	4.70
16	4.92	4.95	4.98	4.97	4.91	4.96	4.96	5.05	5.41	4.80	4.76	4.70
17	4.98	4.95	4.98	4.96	4.90	4.97	4.94	5.13	5.23	4.84	4.76	4.69
18	5.16	4.95	4.97	4.97	4.88	4.98	4.92	5.19	5.08	4.87	4.75	4.69
19	5.17	4.94	4.97	4.95	4.86	4.97	4.91	5.21	4.99	4.88	4.79	4.68
20	5.12	4.95	4.97	4.93	4.86	4.95	4.91	5.18	4.96	4.89	4.80	4.68
21	5.06	4.95	4.98	4.91	4.87	4.94	4.93	5.13	4.94	4.90	4.79	4.67
22	4.99	4.94	4.97	4.97	4.88	4.94	4.98	5.16	4.94	4.90	4.79	4.66
23	4.93	4.95	4.96	5.07	4.89	4.94	5.34	5.13	4.96	4.92	4.81	4.64
24	4.93	4.96	4.95	5.21	4.89	4.94	5.38	5.09	4.97	4.96	4.87	4.63
25	4.93	4.96	4.94	5.27	4.89	4.94	5.25	5.02	4.97	4.96	4.87	4.62
26	4.94	4.97	4.94	5.24	4.89	4.94	5.15	4.95	4.97	4.96	4.87	4.60
27	4.96	4.97	4.93	5.19	4.90	4.94	5.10	4.95	4.97	4.96	4.87	4.66
28	4.98	4.98	4.93	5.15	4.92	4.94	5.14	4.96	5.05	4.94	4.87	4.93
29	4.97	4.99	4.94	5.12	---	4.94	5.06	4.96	5.03	4.93	4.87	5.04
30	4.98	5.02	4.94	5.07	---	4.94	4.99	4.97	5.00	4.92	4.85	5.00
31	4.98	---	4.94	5.02	---	4.93	---	4.97	---	4.92	4.84	---
MEAN	5.00	4.97	4.99	5.04	4.95	4.95	5.02	5.04	5.09	4.91	4.82	4.74
MAX	5.17	5.17	5.06	5.27	5.07	4.98	5.38	5.21	5.74	4.97	4.90	5.04
MIN	4.92	4.90	4.93	4.91	4.86	4.92	4.91	4.95	4.94	4.80	4.75	4.60

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

LOCATION.--Lat 42°35'56", long 88°36'50", in SE 1/4 SW 1/4 sec.28, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan..

DRAINAGE AREA.--41.4 mi², of which 2.3 mi² is non-contributing.

PERIOD OF RECORD.--October 1983 to current year.

REMARKS.--Lake ice-covered during February measurements. Water-quality analyses done by the U.S. Geological Survey National Water Quality Laboratory. Samples for determination of chlorophyll-a concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, NOVEMBER 17, 1998 TO APRIL 13, 1999

(Milligrams per liter unless otherwise indicated)

	Nov-17		Feb-9		Apr-13	
Lake stage (ft)	4.95		4.92		4.98	
Secchi-depth (m)	4.6		6.7		7.6	
Chlorophyll a, phytoplankton (µg/L)	3.7		0.7		0.2	
Depth of sample (m)	0.5	16.0	0.5	15.5	0.5	15.5
Water temperature (°C)	8.1	8.1	2.0	3.4	9.1	8.0
Specific conductance (µS/cm)	556	558	552	704	580	582
pH (units)	8.1	8.2	7.7	7.4	8.2	8.3
Dissolved oxygen (mg/L)	10.4	10.0	12.1	2.2	10.9	10.2
Phosphorus, total (as P)	0.110	0.110	0.140	0.110	0.065	0.073
Phosphorus, ortho, dissolved (as P)	0.076	0.083	0.12	0.095	0.037	0.035
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.13	---	0.58	---	0.33	0.33
Nitrogen, ammonia, dissolved (as N)	0.118	---	0.186	---	0.061	0.05
Nitrogen, amm. + org., total (as N)	0.8	---	0.7	---	0.7	0.8
Nitrogen, total (as N)	0.93	---	1.3	---	1.0	1.2
Color (Pt-Co. scale)	---	---	---	---	5	5
Turbidity (NTU)	---	---	---	---	2.0	2.4
Hardness, (as CaCO ₃)	---	---	---	---	230	240
Calcium, dissolved (Ca)	---	---	---	---	42	42
Magnesium, dissolved (Mg)	---	---	---	---	32	32
Sodium, dissolved (Na)	---	---	---	---	24	25
Potassium, dissolved (K)	---	---	---	---	3	3
Alkalinity, (as CaCO ₃)	---	---	---	---	185	186
Sulfate, dissolved (SO ₄)	---	---	---	---	27	27
Chloride, dissolved (Cl)	---	---	---	---	56	57
Silica, dissolved (SiO ₂)	---	---	---	---	0.8	0.8
Solids, dissolved, at 180°C	---	---	---	---	336	344
Iron, dissolved (Fe) µg/L	---	---	---	---	<10	<10
Manganese, dissolved (Mn) µg/L	---	---	---	---	E 2.6	E 2.9
Fluoride, dissolved	---	---	---	---	0.140	0.149

11-17-98

2-09-99

4-13-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI--CONTINUED

WATER-QUALITY DATA, MAY 19 TO JULY 13, 1999
(Milligrams per liter unless otherwise indicated)

	May-19				Jun-14				Jul-13			
Lake stage (ft)	5.21				5.74				4.85			
Secchi-depth (m)	8.2				3.5				1.4			
Chlorophyll a, phytoplankton (µg/L)	0.8				6.4				37.6			
Depth of sample (m)	0.5	7.0	13.0	16.0	0.5	6.0	13.0	16.0	0.5	6.0	12.0	15.5
Water temperature (°C)	15.4	15.0	11.9	11.0	22.8	22.4	13.1	12.7	24.9	24.0	14.5	13.1
Specific conductance (µS/cm)	560	562	578	585	527	532	581	583	489	500	590	620
pH (units)	8.5	8.4	8.1	7.8	8.6	8.5	7.6	7.6	8.6	8.5	7.5	7.3
Dissolved oxygen (mg/L)	10.7	10.0	6.6	4.2	9.1	8.4	1.1	0.6	12.4	8.8	0.4	0.4
Phosphorus, total (as P)	0.050	---	---	---	0.038	---	---	---	0.051	0.035	0.310	0.490
Phosphorus, ortho, dissolved (as P)	0.002	---	---	---	0.001	---	---	---	<0.001	<0.001	0.16	0.4
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.19	0.26	0.31	0.26	0.055	0.068	0.22	0.093	0.011	---	---	---
Nitrogen, ammonia, dissolved (as N)	0.011	0.009	0.174	0.48	0.009	0.042	0.236	0.318	0.017	---	---	---
Nitrogen, amm. + org., total (as N)	0.7	---	---	---	0.7	---	---	---	1.1	---	---	---
Nitrogen, total (as N)	0.86	---	---	---	0.77	---	---	---	1.1	---	---	---

5-19-99

6-14-99

7-13-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, AUGUST 17 TO SEPTEMBER 14, 1999
(Milligrams per liter unless otherwise indicated)

	Aug-17								Sep-14		
Lake stage (ft)	4.76								4.71		
Secchi-depth (m)	1.5								1.7		
Chlorophyll a, phytoplankton (µg/L)	18.9								14.1		
Depth of sample (m)	0.5	2.0	5.0	9.0	11.0	13.0	14.0	15.5	0.5	11.0	14.0
Water temperature (°C)	23.2	23.2	23.1	22.9	18.5	14.7	13.9	13.3	20.2	20.0	14.3
Specific conductance (µS/cm)	500	500	501	506	574	616	628	645	515	522	632
pH (units)	8.1	8.2	8.2	8.1	7.4	7.4	7.3	7.3	8.1	7.8	7.1
Dissolved oxygen (mg/L)	7.8	7.7	7.0	5.8	0.7	0.8	0.7	0.7	6.4	3.5	0.1
Phosphorus, total (as P)	0.045	0.041	0.037	0.043	0.150	0.440	0.540	0.670	0.055	0.057	0.670
Phosphorus, ortho, dissolved (as P)	0.001	---	---	<0.001	---	---	0.37	0.58	<0.001	0.004	0.64
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	<0.005	---	---	---	---	---	---	---	0.019	---	---
Nitrogen, ammonia, dissolved (as N)	0.02	---	---	---	---	---	---	---	<0.002	---	---
Nitrogen, amm. + org., total (as N)	0.8	---	---	---	---	---	---	---	0.8	---	---
Nitrogen, total (as N)	---	---	---	---	---	---	---	---	0.87	---	---

8-17-99

9-14-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Delavan Lake at Center near Delavan, Wisconsin.

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI--CONTINUED

ADDITIONAL WATER-QUALITY DATA, OCTOBER 9, 1998 TO SEPTEMBER 24, 1999
(Milligrams per liter unless otherwise indicated)

	<u>Oct. 9</u>	<u>Oct. 18</u>	<u>Oct. 26</u>	<u>May 27</u>	<u>June 3</u>	<u>June 8</u>
Lake stage (ft)	5.04	5.17	4.94	4.95	5.06	5.02
Secchi-depth (meters)	3.8	2.8	3.1	4.9	4.9	4.9
Depth of sample (meters)	0.5	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	17.8	15.5	14.0	16.1	19.4	22.5
Phosphorus, total (as P)	0.084	0.115	0.059	0.047	0.043	0.043

	<u>June 24</u>	<u>July 7</u>	<u>July 22</u>	<u>July 28</u>	<u>Aug. 5</u>	<u>Aug. 11</u>
Lake stage (ft)	4.97	4.94	4.90	4.94	4.82	4.76
Secchi-depth (meters)	2.9	1.4	1.4	1.5	1.7	2.3
Depth of sample (meters)	0.5	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	23.5	25.0	26.5	29.0	26.5	25.0
Phosphorus, total (as P)	0.046	0.054	0.046	0.035	0.031	0.046

	<u>Aug. 26</u>	<u>Sept. 1</u>	<u>Sept. 7</u>	<u>Sept. 14</u>	<u>Sept. 24</u>
Lake stage (ft)	4.87	4.83	4.78	4.71	4.63
Secchi-depth (meters)	1.5	1.4	1.5	1.7	1.7
Depth of sample (meters)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	22.0	25.0	23.0	20.2	21.1
Phosphorus, total (as P)	0.022	0.033	0.035	0.055	0.082

423659088354401 DELAVAN LAKE, AT NORTH END, NEAR LAKE LAWN, WI

LOCATION.--Lat 42°36'59", long 88°35'44", in NW 1/4 SW 1/4, sec.22, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

DRAINAGE AREA.--41.4 mi², of which 2.3 mi² is non-contributing.

PERIOD OF RECORD.--October 1983 to current year.

WATER-QUALITY DATA, APRIL 13 TO AUGUST 17, 1999

	Apr. 13 -----	May 19 -----	June 14 -----	July 13 -----	Aug. 17 -----
Secchi-depth (meters)	7.0	7.6	3.4	1.2	1.8

423526088380101 DELAVAN LAKE, AT SW END, NEAR DELAVAN LAKE, WI

LOCATION.--Lat 42°35'26", long 88°38'01", in SE 1/4 NW 1/4, sec.32, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

DRAINAGE AREA.--41.4 mi², of which 2.3 mi² is non-contributing.

PERIOD OF RECORD.--October 1983 to current year.

WATER-QUALITY DATA, APRIL 13 TO AUGUST 17, 1999

	Apr. 13 -----	May 19 -----	June 14 -----	July 13 -----	Aug. 17 -----
Secchi-depth (meters)	8.2	7.3	3.0	1.2	1.4

05404500 DEVILS LAKE NEAR BARABOO, WI

LOCATION.--Lat 43°25'18", long 89°43'38", in SW 1/4 SE 1/4 sec.13, T.11 N., R.6 E., Sauk County, Hydrologic Unit 07070004, in Devils Lake State Park, 3.5 mi south of Baraboo.

DRAINAGE AREA.--4.79 mi². Area of Devils Lake, 361 acres.

PERIOD OF RECORD.--June 1922 to August 1930, June to August 1932, June 1934 to September 1981 (fragmentary). October 1981 to September 1984, data unpublished in district files. October 1984 to current year.

REVISED RECORDS.--WDR WI-78-1: Drainage area.

GAGE.--Water-stage recorder installed July 17, 1991. Datum of gage is 955.00 ft, above sea level.

REMARKS.--No estimated daily gage heights. Records good. Lake has no surface outlet.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 14.13 ft, July 18, 1993; minimum observed, 1.49 ft Feb. 8, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 11.06 ft, June 11 and 13; minimum recorded, 8.76 ft, Jan. 1.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.53	9.24	9.09	8.77	8.88	9.16	9.12	10.75	10.85	10.68	10.38	9.97
2	9.50	9.21	9.08	8.81	8.89	9.16	9.12	10.74	10.89	10.67	10.34	9.95
3	9.49	9.19	9.07	8.85	8.89	9.15	9.28	10.73	10.87	10.66	10.31	9.93
4	9.48	9.17	9.07	8.84	8.88	9.15	9.48	10.72	10.87	10.66	10.29	9.91
5	9.51	9.15	9.06	8.84	8.88	9.15	9.55	10.72	10.87	10.64	10.26	9.88
6	9.55	9.13	9.06	8.85	8.87	9.15	9.62	10.75	10.87	10.62	10.23	9.86
7	9.53	9.11	9.05	8.84	8.87	9.15	9.65	10.80	10.85	10.59	10.23	9.83
8	9.51	9.10	9.04	8.84	8.87	9.15	9.68	10.81	10.87	10.56	10.21	9.80
9	9.50	9.11	9.02	8.84	8.87	9.18	9.94	10.81	11.02	10.56	10.19	9.77
10	9.48	9.26	9.01	8.84	8.87	9.18	10.07	10.80	11.02	10.52	10.17	9.74
11	9.46	9.26	9.00	8.84	8.94	9.17	10.12	10.79	11.03	10.49	10.15	9.71
12	9.44	9.25	8.99	8.85	9.09	9.17	10.15	10.78	11.04	10.47	10.14	9.69
13	9.41	9.24	8.98	8.86	9.11	9.16	10.17	10.76	11.04	10.44	10.11	9.67
14	9.39	9.23	8.97	8.86	9.13	9.15	10.19	10.75	11.02	10.41	10.09	9.64
15	9.37	9.21	8.95	8.85	9.14	9.15	10.19	10.74	10.99	10.37	10.06	9.61
16	9.36	9.20	8.94	8.85	9.15	9.14	10.20	10.74	10.96	10.36	10.03	9.59
17	9.39	9.20	8.93	8.86	9.16	9.15	10.20	10.89	10.94	10.39	10.00	9.57
18	9.42	9.19	8.92	8.87	9.15	9.16	10.20	10.94	10.91	10.38	9.99	9.54
19	9.40	9.19	8.91	8.87	9.15	9.16	10.20	10.95	10.89	10.43	10.13	9.52
20	9.37	9.16	8.89	8.86	9.15	9.16	10.21	10.95	10.86	10.43	10.13	9.50
21	9.35	9.15	8.89	8.85	9.14	9.16	10.21	10.94	10.84	10.52	10.12	9.48
22	9.33	9.14	8.87	8.89	9.14	9.16	10.30	10.94	10.82	10.51	10.10	9.45
23	9.31	9.12	8.86	8.90	9.13	9.16	10.59	10.95	10.82	10.51	10.11	9.43
24	9.29	9.12	8.85	8.91	9.13	9.15	10.69	10.94	10.82	10.53	10.14	9.41
25	9.28	9.10	8.84	8.92	9.14	9.15	10.73	10.92	10.80	10.51	10.13	9.39
26	9.27	9.09	8.83	8.91	9.14	9.14	10.75	10.90	10.77	10.50	10.11	9.37
27	9.28	9.09	8.82	8.91	9.15	9.14	10.76	10.88	10.75	10.48	10.10	9.45
28	9.29	9.09	8.80	8.90	9.16	9.14	10.76	10.86	10.72	10.45	10.08	9.46
29	9.28	9.09	8.81	8.90	---	9.13	10.76	10.85	10.69	10.43	10.06	9.45
30	9.27	9.09	8.80	8.89	---	9.13	10.76	10.83	10.67	10.41	10.03	9.42
31	9.25	---	8.79	8.89	---	9.13	---	10.84	---	10.41	10.00	---
MEAN	9.40	9.16	8.94	8.86	9.04	9.15	10.12	10.83	10.88	10.50	10.14	9.63
MAX	9.55	9.26	9.09	8.92	9.16	9.18	10.76	10.95	11.04	10.68	10.38	9.97
MIN	9.25	9.09	8.79	8.77	8.87	9.13	9.12	10.72	10.67	10.36	9.99	9.37

425103088261500 EAGLE SPRING LAKE AT EAGLEVILLE, WI

LOCATION.--Lat 42°51'03", long 88°26'15", in SE 1/4 NW 1/4 sec.36, T.5 N., R.17 E., Waukesha County, Hydrologic Unit 07120006, at Eagleville.

DRAINAGE AREA.--33.2 mi².

PERIOD OF RECORD.--April 1991 to current year.

REMARKS.--Lake sampled near southeast end at a lake depth of about 3 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Lake-stage readings from 1991 to 1993 (except 2/4/93 and 4/19/93) were previously reported 1 ft too high.

WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 04, 1999

(Milligrams per liter unless otherwise indicated)

	Feb-19	Apr-7	Jun-11	Jul-7	Aug-4
Lake stage (ft)	9.57	9.56	9.56	9.49	---
Secchi-depth (m)	---	>2.0	2.3	1.5	1.7
Chlorophyll a, phytoplankton (µg/L)	---	17.9	2.09	2.95	3.21
Depth of sample (m)	0.5 2.0	0.5 1.5	0.5	0.5	0.5
Water temperature (°C)	5.0 6.6	11.5 11.5	26.8	28.6	28.0
Specific conductance (µS/cm)	546 565	468 469	457	451	445
pH (units)	7.8 7.6	8.3 8.3	7.9	8.2	8.1
Dissolved oxygen (mg/L)	19.2 19.2	11.5 11.3	8.2	9.3	9.8
Phosphorus, total (as P)	0.01 0.014	0.012 0.012	0.021	0.017	0.038
Phosphorus, ortho, dissolved (as P)	---	0.003	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	0.669	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	0.017	---	---	---
Nitrogen, amm. + org., total (as N)	---	0.57	---	---	---
Nitrogen, total (as N)	---	1.2	---	---	---
Color (Pt-Co. scale)	---	5	---	---	---
Turbidity (NTU)	---	1.0	---	---	---
Hardness, (as CaCO ₃)	---	230	---	---	---
Calcium, dissolved (Ca)	---	46	---	---	---
Magnesium, dissolved (Mg)	---	28	---	---	---
Sodium, dissolved (Na)	---	6.5	---	---	---
Potassium, dissolved (K)	---	1.3	---	---	---
Alkalinity, (as CaCO ₃)	---	212	---	---	---
Sulfate, dissolved (SO ₄)	---	12	---	---	---
Chloride, dissolved (Cl)	---	17.0	---	---	---
Silica, dissolved (SiO ₂)	---	2.0	---	---	---
Solids, dissolved, at 180°C	---	268	---	---	---
Iron, dissolved (Fe) µg/L	---	<10	---	---	---
Manganese, dissolved (Mn) µg/L	---	1.3	---	---	---

2-19-99

4-07-99

6-11-99

7-07-99

8-04-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Eagle Spring Lake at Eagleville, Wisconsin.

(Triangles indicate maximum depth at sampling site. Actual secchi depth on these days was greater than plotted triangles.)

05406050 FISH LAKE NEAR SAUK CITY, WI

LOCATION.--Lat 43°17'27", long 89°39'09" in NE 1/4 SW 1/4 sec.3, T.9 N., R.7 E., Dane County, Hydrologic Unit 07070005, on north side of lake, 0.4 mi southwest of Crystal Lake, and 3.1 mi east of Sauk City.

DRAINAGE AREA.--2.23 mi². Area of Fish Lake, 252 acres.

PERIOD OF RECORD.--November 1966 to September 1981, April 1985 to May 1987, May 1988, April 1989 to October 11, 1990 (fragmentary); continuous record from Oct. 23, 1990 to Nov. 22, 1996; nonrecording gage Nov. 23, 1996 to current year.

REVISED RECORDS.--WDR WI-92-1: Drainage area. WDR WI-87-1: All published values for the 1987 water year are invalid. Two valid values for water years 1987 and 1988 are available: May 7, 1987, water surface 10.52 ft, and May 16, 1988, water surface 10.83 ft.

GAGE.--Nonrecording gage. Datum of gage is 848.07 ft above sea level. Prior to Oct. 23, 1990, nonrecording gage. Local observer, Richard Lillie, reads staff gage 2-3 times per week when lake is ice-free.

REMARKS.--Lake has no surface outlet.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 11.96 ft, July 4, 1999; minimum observed, 3.02 ft, Aug. 29, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 11.96 ft, July 4; minimum observed, 11.07 ft, Jan. 7.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	11.82	11.83	11.95	11.87	---
2	11.23	---	---	---	---	---	---	11.81	11.86	11.94	---	---
3	---	11.19	---	---	---	11.32	11.46	---	---	11.95	---	11.64
4	11.20	---	---	---	---	---	11.51	11.79	11.84	11.96	11.83	---
5	---	---	---	---	---	---	---	11.79	11.83	11.94	11.81	11.62
6	11.35	---	---	---	---	---	---	---	11.82	---	11.79	11.61
7	---	---	---	11.07	---	---	---	---	11.84	11.90	---	11.58
8	---	---	---	---	---	---	11.48	---	11.82	11.86	11.79	11.56
9	11.32	---	---	---	---	---	11.62	11.84	11.84	11.86	11.82	---
10	---	---	---	---	---	---	11.62	---	---	---	11.80	---
11	11.30	---	---	---	---	---	11.65	11.83	---	---	11.79	11.51
12	---	---	---	---	---	---	---	---	---	---	11.79	---
13	---	11.22	---	---	---	---	11.65	11.81	11.85	---	---	---
14	11.28	---	---	---	---	---	---	---	11.84	---	11.77	11.45
15	---	---	---	---	---	---	11.65	11.71	---	---	11.75	11.44
16	11.26	---	---	---	---	---	11.64	11.71	11.82	---	11.74	11.43
17	---	---	---	---	---	---	---	11.88	11.80	---	11.73	---
18	11.30	---	---	---	---	---	11.63	---	11.78	---	---	11.40
19	---	---	---	---	---	---	---	11.90	11.75	---	11.74	11.39
20	---	---	---	---	---	---	---	---	11.74	11.76	11.73	11.37
21	11.28	---	---	---	---	---	---	---	11.73	11.89	---	---
22	---	---	---	---	---	---	---	11.90	---	11.89	11.70	---
23	---	---	---	---	---	---	11.84	11.94	11.75	---	11.77	11.35
24	11.22	---	---	---	---	---	11.86	11.92	11.74	11.88	11.76	11.33
25	11.22	---	---	---	---	---	11.85	11.90	11.73	11.87	---	---
26	---	---	---	---	---	11.28	11.84	---	---	11.89	---	---
27	---	---	---	---	---	---	---	---	---	11.87	---	---
28	---	---	---	---	---	---	11.83	---	---	11.85	11.74	---
29	---	---	---	---	---	11.25	11.82	11.84	---	11.83	---	11.37
30	---	---	---	---	---	---	---	11.83	11.70	---	---	11.45
31	11.26	---	---	---	---	---	---	---	---	11.91	11.66	---

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI

LOCATION.--Lat 42°35'25", long 88°26'04" in SE 1/4 NW 1/4 sec.36, T.2 N., R.17 E., Walworth County, Hydrologic Unit 07120006, at Lake Geneva dam at Center Street at Lake Geneva.

DRAINAGE AREA.--28.7 mi². Area of Lake Geneva, 5,262 acres.

PERIOD OF RECORD.--October 1997 to September 1999.

GAGE.--Water-stage recorder. Datum of gage is 862.08 ft above sea level.

REMARKS.--Estimated daily gage heights: Jan. 10-11, Apr. 9, and May 27, 1998. Recording rain gage and gage-height telemeter at station.

EXTREMES FOR CURRENT PERIOD.--Water year 1998: Maximum gage height observed, 3.02 ft, June 28; minimum gage height observed, 1.86 ft, Jan. 2.

Water year 1999: Maximum gage height observed, 3.23 ft, May 17; minimum gage height observed, 1.84 ft, Sept. 27.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.40	2.31	2.26	2.02	2.06	2.03	2.49	2.65	2.67	2.77	2.35	2.35
2	2.40	2.30	2.26	2.02	2.08	2.04	2.50	2.65	2.65	2.75	2.34	2.32
3	2.39	2.28	2.29	2.03	2.07	2.05	2.49	2.64	2.62	2.73	2.33	2.30
4	2.40	2.28	2.31	2.05	2.06	2.05	2.49	2.63	2.60	2.74	2.34	2.29
5	2.40	2.27	2.30	2.10	2.06	2.06	2.49	2.63	2.57	2.71	2.36	2.29
6	2.38	2.29	2.29	2.12	2.05	2.07	2.49	2.64	2.56	2.71	2.40	2.29
7	2.38	2.30	2.28	2.14	2.05	2.06	2.49	2.73	2.54	2.69	2.41	2.34
8	2.39	2.30	2.28	2.16	2.04	2.08	2.55	2.79	2.52	2.68	2.43	2.31
9	2.41	2.30	2.28	2.24	2.03	2.13	2.59	2.77	2.52	2.66	2.43	2.29
10	2.38	2.29	2.31	2.21	2.03	2.13	2.60	2.75	2.54	2.64	2.42	2.29
11	2.37	2.29	2.31	2.17	2.06	2.13	2.60	2.74	2.57	2.63	2.40	2.28
12	2.37	2.27	2.31	2.14	2.10	2.14	2.60	2.72	2.62	2.61	2.38	2.25
13	2.42	2.25	2.28	2.15	2.09	2.14	2.60	2.76	2.64	2.59	2.37	2.25
14	2.39	2.25	2.26	2.14	2.07	2.12	2.62	2.74	2.62	2.58	2.38	2.30
15	2.36	2.27	2.26	2.14	2.06	2.11	2.60	2.73	2.61	2.57	2.37	2.38
16	2.35	2.28	2.23	2.13	2.05	2.11	2.67	2.77	2.61	2.53	2.36	2.37
17	2.34	2.27	2.21	2.14	2.07	2.12	2.67	2.73	2.61	2.52	2.36	2.37
18	2.34	2.25	2.20	2.13	2.07	2.18	2.66	2.71	2.61	2.51	2.34	2.37
19	2.33	2.24	2.18	2.12	2.06	2.21	2.65	2.69	2.66	2.51	2.33	2.37
20	2.31	2.23	2.17	2.11	2.05	2.21	2.65	2.68	2.63	2.51	2.33	2.37
21	2.30	2.22	2.15	2.11	2.04	2.22	2.68	2.65	2.63	2.55	2.32	2.35
22	2.28	2.24	2.14	2.11	2.02	2.23	2.69	2.61	2.61	2.53	2.32	2.33
23	2.28	2.22	2.13	2.12	2.02	2.24	2.68	2.60	2.60	2.51	2.34	2.32
24	2.29	2.21	2.12	2.11	2.03	2.24	2.67	2.66	2.59	2.48	2.33	2.31
25	2.29	2.22	2.14	2.10	2.01	2.25	2.65	2.67	2.62	2.46	2.36	2.31
26	2.28	2.22	2.13	2.09	2.01	2.29	2.67	2.66	2.75	2.44	2.35	2.33
27	2.31	2.22	2.10	2.08	2.05	2.30	2.67	2.64	2.73	2.44	2.35	2.31
28	2.31	2.23	2.09	2.08	2.04	2.32	2.65	2.68	2.84	2.43	2.37	2.30
29	2.30	2.24	2.08	2.08	---	2.34	2.65	2.71	2.84	2.40	2.38	2.30
30	2.30	2.26	2.07	2.07	---	2.35	2.64	2.68	2.82	2.38	2.36	2.29
31	2.30	---	2.05	2.06	---	2.44	---	2.70	---	2.36	2.35	---
MEAN	2.35	2.26	2.21	2.11	2.05	2.17	2.61	2.69	2.63	2.57	2.36	2.32
MAX	2.42	2.31	2.31	2.24	2.10	2.44	2.69	2.79	2.84	2.77	2.43	2.38
MIN	2.28	2.21	2.05	2.02	2.01	2.03	2.49	2.60	2.52	2.36	2.32	2.25

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI--CONTINUED

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.27	2.40	2.46	2.37	2.57	2.40	2.35	2.74	2.85	2.69	2.44	2.32
2	2.26	2.36	2.45	2.38	2.57	2.40	2.36	2.73	2.89	2.67	2.41	2.31
3	2.28	2.35	2.45	2.45	2.57	2.40	2.36	2.71	2.86	2.69	2.40	2.32
4	2.27	2.34	2.44	2.43	2.56	2.38	2.38	2.69	2.83	2.68	2.37	2.31
5	2.32	2.34	2.45	2.43	2.55	2.37	2.37	2.70	2.83	2.67	2.35	2.31
6	2.38	2.33	2.47	2.43	2.55	2.39	2.43	2.76	2.82	2.63	2.33	2.30
7	2.39	2.32	2.50	2.44	2.54	2.38	2.41	2.77	2.83	2.61	2.32	2.28
8	2.37	2.32	2.50	2.44	2.54	2.36	2.40	2.75	2.79	2.59	2.31	2.27
9	2.37	2.32	2.49	2.45	2.53	2.39	2.48	2.72	2.77	2.58	2.30	2.25
10	2.36	2.58	2.48	2.45	2.52	2.39	2.50	2.70	2.77	2.53	2.29	2.22
11	2.36	2.53	2.48	2.45	2.56	2.37	2.52	2.69	2.85	2.52	2.28	2.19
12	2.36	2.47	2.46	2.45	2.60	2.35	2.52	2.76	2.90	2.51	2.29	2.19
13	2.34	2.46	2.45	2.45	2.58	2.34	2.52	2.75	3.04	2.51	2.31	2.19
14	2.32	2.47	2.45	2.45	2.56	2.33	2.52	2.76	3.15	2.50	2.28	2.17
15	2.31	2.46	2.45	2.45	2.55	2.32	2.52	2.76	3.08	2.47	2.27	2.14
16	2.32	2.45	2.43	2.45	2.55	2.31	2.55	2.79	3.03	2.46	2.27	2.12
17	2.39	2.44	2.42	2.48	2.53	2.33	2.56	2.92	2.97	2.47	2.25	2.12
18	2.50	2.44	2.42	2.53	2.52	2.29	2.57	2.94	2.92	2.48	2.24	2.11
19	2.47	2.47	2.41	2.52	2.51	2.29	2.56	2.93	2.87	2.48	2.29	2.12
20	2.45	2.42	2.40	2.51	2.50	2.30	2.57	2.92	2.84	2.48	2.29	2.10
21	2.43	2.41	2.43	2.51	2.49	2.30	2.58	2.92	2.81	2.48	2.29	2.08
22	2.41	2.43	2.45	2.58	2.47	2.30	2.61	2.99	2.79	2.46	2.29	2.07
23	2.41	2.41	2.41	2.64	2.45	2.31	2.77	3.00	2.77	2.50	2.30	2.06
24	2.40	2.40	2.42	2.66	2.44	2.31	2.80	2.98	2.77	2.53	2.36	2.03
25	2.39	2.40	2.42	2.66	2.43	2.31	2.78	2.96	2.76	2.51	2.36	2.02
26	2.39	2.40	2.41	2.64	2.42	2.31	2.77	2.92	2.74	2.51	2.36	2.03
27	2.40	2.39	2.39	2.63	2.42	2.32	2.75	2.89	2.72	2.50	2.37	2.04
28	2.41	2.40	2.39	2.62	2.42	2.34	2.78	2.86	2.77	2.50	2.37	2.27
29	2.40	2.42	2.39	2.61	---	2.34	2.77	2.84	2.74	2.50	2.35	2.34
30	2.41	2.45	2.39	2.59	---	2.35	2.76	2.82	2.71	2.48	2.32	2.34
31	2.41	---	2.39	2.57	---	2.36	---	2.83	---	2.48	2.32	---
MEAN	2.37	2.41	2.44	2.51	2.52	2.34	2.56	2.82	2.85	2.54	2.32	2.19
MAX	2.50	2.58	2.50	2.66	2.60	2.40	2.80	3.00	3.15	2.69	2.44	2.34
MIN	2.26	2.32	2.39	2.37	2.42	2.29	2.35	2.69	2.71	2.46	2.24	2.02

423455088263800 GENEVA LAKE AT GENEVA BAY AT LAKE GENEVA, WI

LOCATION.--Lat 42°34'55", long 88°26'38", in NE 1/4 NE 1/4, sec.2, T.1 N., R.17 E., Walworth County, Hydrologic Unit 07120006, 0.7 mi southwest of outlet at Lake Geneva.

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--April 1997 to February 1999 (discontinued).

REMARKS.--Lake sampled at a depth of about 15 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll-*a* concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, FEBRUARY 08, 1999
(Milligrams per liter unless otherwise indicated)

	Feb-8	
Lake stage (ft)	2.54	
Secchi-depth (m)	5.6	
Chlorophyll a, phytoplankton (ug/L)	2.31	
Depth of sample (m)	0.5	14.0
Water temperature (°C)	1.9	2.1
Specific conductance (uS/cm)	505	506
pH (units)	8.3	8.4
Dissolved oxygen (mg/L)	13.4	13.1
Phosphorus, total (as P)	<0.005	0.007
Phosphorus, ortho, dissolved (as P)	0.002	0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.087	0.055
Nitrogen, ammonia, dissolved (as N)	0.013	<0.013
Nitrogen, amm. + org., total (as N)	0.42	0.62
Nitrogen, total (as N)	0.51	0.68

02-08-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423420088320500 GENEVA LAKE AT WILLIAMS BAY AT WILLIAMS BAY, WI

LOCATION.--Lat 42°34'20", long 88°32'05", in NE 1/4 SW 1/4, sec.6, T.1 N., R.17 E., Walworth County, Hydrologic Unit 07120006, at Williams Bay.

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--April 1997 to February 1999 (discontinued).

REMARKS.--Lake sampled at a depth of about 18 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll-*a* concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, FEBRUARY 08, 1999
(Milligrams per liter unless otherwise indicated)

	Feb-8	
Lake stage (ft)	2.54	
Secchi-depth (m)	5.8	
Chlorophyll <i>a</i> , phytoplankton (µg/L)	2.66	
Depth of sample (m)	0.5	16.5
Water temperature (°C)	1.8	2.1
Specific conductance (µS/cm)	477	506
pH (units)	8.4	8.4
Dissolved oxygen (mg/L)	13.8	13.4
Phosphorus, total (as P)	<0.005	0.005
Phosphorus, ortho, dissolved (as P)	0.002	0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.053	0.051
Nitrogen, ammonia, dissolved (as N)	<0.013	<0.013
Nitrogen, amm. + org., total (as N)	0.44	0.22
Nitrogen, total (as N)	0.49	0.27

02-08-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423402088301400 GENEVA LAKE AT CENTER NEAR LAKE GENEVA, WI

LOCATION.--Lat 42°34'02", long 88°30'14", in NE 1/4 NE 1/4, sec.8, T.1 N., R.17 E., Walworth County, Hydrologic Unit 07120006, 3.9 mi southwest of outlet at Lake Geneva.

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--April 1997 to March 1999 (discontinued).

REMARKS.--Lake sampled at a depth of about 29 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll-a concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, OCTOBER 13 AND 26, 1998 (Milligrams per liter unless otherwise indicated)

	Oct-13					Oct-26				
Lake stage (ft)										
Secchi-depth (m)										
Chlorophyll a, phytoplankton (µg/L)										
Depth of sample (m)	0.5	14.0	19.0	24.0	28.0	0.5	16.0	19.0	23.0	28.0
Water temperature (°C)	16.7	16.7	9.0	8.2	7.3	14.3	13.9	9.7	8.8	7.8
Specific conductance (µS/cm)	486	486	518	518	522	489	490	516	516	520
pH (units)	8.6	8.5	7.5	7.5	7.5	8.4	8.4	7.6	7.5	7.5
Dissolved oxygen (mg/L)	9.2	8.9	0.7	0.6	0.6	9.4	9.1	1.9	1.2	0.6
Phosphorus, total (as P)	0.006	0.007	0.006	0.008	0.029	<0.005	<0.005	0.007	0.008	0.014
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	0.017	0.002	0.002	<0.002	0.002	0.003
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.019	0.01	0.013	0.134	0.017	<0.010	<0.010	0.021	0.073	0.031
Nitrogen, ammonia, dissolved (as N)	<0.013	<0.013	<0.013	<0.013	0.132	<0.013	<0.013	<0.013	<0.013	0.059
Nitrogen, amm. + org., total (as N)	0.71	0.64	0.58	0.47	0.66	0.51	0.51	0.43	0.51	0.63
Nitrogen, total (as N)	0.73	0.65	0.59	0.60	0.68	---	---	0.45	0.58	0.66

10-13-98

10-26-98

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423402088301400 GENEVA LAKE AT CENTER NEAR LAKE GENEVA, WI--CONTINUED

WATER-QUALITY DATA, NOVEMBER 17, 1998 TO MARCH 22, 1999
(Milligrams per liter unless otherwise indicated)

	Nov-17		Dec-16		Feb-8		Mar-22	
Lake stage (ft)	2.44		2.43		2.54		2.30	
Secchi-depth (m)	5.3		7.3		6.6		5.0	
Chlorophyll a, phytoplankton (µg/L)	1.64		1.73		3.40		3.38	
Depth of sample (m)	0.5	28.0	0.5	28.0	0.5	27.0	0.5	28.0
Water temperature (°C)	9.3	9.1	7.2	7.2	1.7	2.5	2.5	2.6
Specific conductance (µS/cm)	497	499	495	497	500	502	502	503
pH (units)	8.2	8.2	8.2	8.2	8.4	8.3	8.3	8.4
Dissolved oxygen (mg/L)	9.4	9.2	11.3	11.0	13.4	11.4	13.7	13.2
Phosphorus, total (as P)	0.005	0.006	0.014	0.014	0.006	0.014	0.007	0.009
Phosphorus, ortho, dissolved (as P)	0.002	0.002	0.003	0.003	<0.002	0.003	0.001	<0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.035	0.019	0.063	0.031	0.057	0.066	0.057	0.077
Nitrogen, ammonia, dissolved (as N)	0.021	0.026	0.019	0.015	<0.013	<0.013	<0.013	<0.013
Nitrogen, amm. + org., total (as N)	0.40	0.52	0.50	0.63	0.48	0.18	0.46	0.40
Nitrogen, total (as N)	0.44	0.54	0.56	0.66	0.54	0.25	0.52	0.48

11-17-98

12-16-98

02-08-99

03-22-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Geneva Lake, Center Site, near Lake Geneva, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

423421088272300 GENEVA LAKE AT EAST END NEAR LAKE GENEVA, WI

LOCATION.--Lat 42°34'21", long 88°27'23", in NE 1/4 SW 1/4, sec.2, T.1 N., R.17 E., Walworth County, Hydrologic Unit 07120006, 1.6 mi southwest of outlet at Lake Geneva.

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--April 1997 to current year.

REMARKS.--Lake sampled at a depth of about 23 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll-a concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, OCTOBER 13 TO NOVEMBER 17, 1998 (Milligrams per liter unless otherwise indicated)

	Oct-13					Oct-26				Nov-17	
Lake stage (ft)	2.34					2.39				2.44	
Secchi-depth (m)	4.0					5.5				5.0	
Chlorophyll a, phytoplankton (µg/L)	3.37					1.75				1.78	
Depth of sample (m)	0.5	15.0	17.0	19.0	21.0	0.5	18.0	20.0	23.0	0.5	23.0
Water temperature (°C)	16.8	16.6	12.3	9.5	8.6	14.3	13.3	9.1	8.8	8.9	8.7
Specific conductance (µS/cm)	486	486	516	518	518	487	492	517	518	495	497
pH (units)	8.5	8.4	7.6	7.5	7.5	8.4	8.3	7.5	7.5	8.3	8.3
Dissolved oxygen (mg/L)	9.3	8.9	1.4	0.6	1.0	9.5	8.2	0.8	0.6	10.4	9.9
Phosphorus, total (as P)	<0.005	0.006	0.007	0.007	0.008	0.009	0.008	0.010	0.013	0.008	0.008
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	0.002	0.002	0.002	0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.02	0.02	0.02	0.017	0.09	0.014	0.013	0.051	0.056	0.03	0.026
Nitrogen, ammonia, dissolved (as N)	<0.013	<0.013	<0.013	0.031	0.017	<0.013	<0.013	0.013	0.029	0.021	0.025
Nitrogen, amm. + org., total (as N)	0.57	0.51	0.53	0.52	0.45	0.64	0.61	0.58	0.59	0.45	0.46
Nitrogen, total (as N)	0.59	0.53	0.55	0.54	0.54	0.65	0.62	0.63	0.65	0.48	0.49

10-13-98

10-26-98

11-17-98

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, DECEMBER 16, 1998 TO APRIL 13, 1999
(Milligrams per liter unless otherwise indicated)

	Dec-16		Feb-8		Mar-22		Apr-13	
Lake stage (ft)	2.43		2.54		2.30		2.52	
Secchi-depth (m)	6.5		5.8		4.9		6.7	
Chlorophyll a, phytoplankton (µg/L)	2.55		2.64		2.9		1.02	
Depth of sample (m)	0.5	22.0	0.5	20.5	0.5	21.0	0.5	21.5
Water temperature (°C)	6.7	6.7	1.7	2.3	3.1	3.0	7.5	5.1
Specific conductance (µS/cm)	496	497	499	512	500	500	508	509
pH (units)	8.3	8.3	8.4	8.3	8.3	8.4	8.4	8.3
Dissolved oxygen (mg/L)	11.7	11.4	13.5	11.7	13.6	13.0	12.8	12.2
Phosphorus, total (as P)	0.012	0.013	<0.005	0.026	0.008	0.008	0.005	0.008
Phosphorus, ortho, dissolved (as P)	0.003	0.003	<0.002	0.003	0.001	<0.002	<0.002	<0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.052	0.049	0.016	0.085	0.079	0.072	0.077	0.077
Nitrogen, ammonia, dissolved (as N)	0.023	0.022	<0.013	0.014	<0.013	<0.013	<0.013	0.014
Nitrogen, amm. + org., total (as N)	0.61	0.54	0.41	0.25	0.39	0.5	0.47	0.49
Nitrogen, total (as N)	0.66	0.59	0.43	0.34	0.47	0.57	0.55	0.57
Color (Pt-Co. scale)	---	---	---	---	---	---	<5	---
Turbidity (NTU)	---	---	---	---	---	---	0.3	---
Hardness, (as CaCO ₃)	---	---	---	---	---	---	220	---
Calcium, dissolved (Ca)	---	---	---	---	---	---	33	---
Magnesium, dissolved (Mg)	---	---	---	---	---	---	33	---
Sodium, dissolved (Na)	---	---	---	---	---	---	17	---
Potassium, dissolved (K)	---	---	---	---	---	---	1.9	---
Alkalinity, (as CaCO ₃)	---	---	---	---	---	---	186	---
Sulfate, dissolved (SO ₄)	---	---	---	---	---	---	31	---
Chloride, dissolved (Cl)	---	---	---	---	---	---	35	---
Silica, dissolved (SiO ₂)	---	---	---	---	---	---	0.3	---
Solids, dissolved, at 180°C	---	---	---	---	---	---	272	---
Iron, dissolved (Fe) µg/L	---	---	---	---	---	---	<10	---
Manganese, dissolved (Mn) µg/L	---	---	---	---	---	---	0.5	---

12-16-98

2-08-99

3-22-99

04-13-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423421088272300 GENEVA LAKE AT EAST END NEAR LAKE GENEVA, WI--CONTINUED

WATER-QUALITY DATA, MAY 19 TO JUNE 14, 1999
(Milligrams per liter, unless otherwise indicated)

	May-19					Jun-14				
Lake stage (ft)	2.93					3.15				
Secchi-depth (m)	5.0					4.9				
Chlorophyll a, phytoplankton (µg/L)	0.43					0.26				
Depth of sample (m)	0.5	11.0	16.0	18.0	21.0	0.5	6.0	13.0	18.0	22.0
Water temperature (°C)	14.2	12.3	9.0	8.6	8.6	21.4	21.2	14.1	9.8	9.0
Specific conductance (µS/cm)	497	499	505	505	505	479	479	499	504	506
pH (units)	8.4	8.4	8.3	8.3	8.3	8.4	8.4	8.4	8.2	8.1
Dissolved oxygen (mg/L)	10.8	10.7	10.8	10.9	10.9	8.6	8.4	9.4	8.6	8.1
Phosphorus, total (as P)	<0.005	0.005	0.005	<0.005	<0.005	0.008	<0.005	<0.005	0.008	<0.005
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	0.004	0.003	0.003	0.003
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.092	0.076	0.079	0.083	0.081	0.071	0.079	0.066	0.079	0.076
Nitrogen, ammonia, dissolved (as N)	0.003	<0.013	0.006	0.009	0.014	0.027	0.017	0.017	0.043	0.069
Nitrogen, amm. + org., total (as N)	0.56	0.56	0.5	0.56	0.57	0.65	0.65	0.6	0.55	0.58
Nitrogen, total (as N)	0.65	0.64	0.58	0.64	0.65	0.72	0.73	0.67	0.63	0.66

5-19-99

6-14-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, JULY 13 TO AUGUST 17, 1999
(Milligrams per liter unless otherwise indicated)

	Jul-13					Aug-17				
Lake stage (ft)			2.51					2.25		
Secchi-depth (m)			5.5					4.6		
Chlorophyll a, phytoplankton (µg/L)			1.78					1.65		
Depth of sample (m)	0.5	9.0	13.0	18.0	23.0	0.5	11.0	15.0	18.0	22.5
Water temperature (°C)	24.8	23.0	13.8	10.5	9.3	23.7	22.9	11.8	10.1	9.5
Specific conductance (µS/cm)	487	492	505	508	513	492	494	512	514	516
pH (units)	8.4	8.3	8.1	8.0	7.9	8.3	8.3	7.8	7.7	7.6
Dissolved oxygen (mg/L)	9.1	7.9	8.1	7.6	6.0	8.6	7.5	4.9	3.6	2.8
Phosphorus, total (as P)	<0.005	<0.005	0.009	<0.005	0.011	0.009	0.010	0.008	0.011	0.010
Phosphorus, ortho, dissolved (as P)	0.002	0.003	0.002	0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	<0.010	0.018	0.073	0.083	0.066	<0.005	<0.005	0.138	0.184	0.225
Nitrogen, ammonia, dissolved (as N)	<0.013	0.017	0.022	0.053	0.098	0.012	<0.002	<0.002	<0.002	0.006
Nitrogen, amm. + org., total (as N)	0.39	0.37	0.57	0.53	0.65	0.45	0.41	0.46	0.39	0.43
Nitrogen, total (as N)	---	0.39	0.64	0.61	0.72	---	---	0.6	0.57	0.65

7-13-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

PH, IN STANDARD UNITS

WATER-QUALITY DATA, SEPTEMBER 15, 1999
(Milligrams per liter unless otherwise indicated)

Sep-15					
Lake stage (ft)			2.14		
Secchi-depth (m)			4.6		
Chlorophyll a, phytoplankton (µg/L)			0.56		
Depth of sample (m)	0.5	12.0	16.0	19.0	22.0
Water temperature (°C)	20.4	20.2	10.5	10.1	10.1
Specific conductance (µS/cm)	490	491	497	494	497
pH (units)	8.3	8.2	7.5	7.5	7.5
Dissolved oxygen (mg/L)	8.3	8.1	2.1	1.7	1.9
Phosphorus, total (as P)	0.008	0.008	0.009	0.009	0.009
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	<0.010	<0.010	0.16	0.164	0.174
Nitrogen, ammonia, dissolved (as N)	0.004	0.001	0.012	0.027	0.013
Nitrogen, amm. + org., total (as N)	0.43	0.48	0.54	0.40	0.49
Nitrogen, total (as N)	---	---	0.70	0.56	0.66

9-15-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Geneva Lake, East End, near Lake Geneva, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LOCATION.--Lat 42°33'29", long 88°32'33", in NE 1/4 SE 1/4, sec.12, T.1 N., R.16 E., Walworth County, Hydrologic Unit 07120006, 1.3 mi south of Williams Bay.

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--April 1997 to current year.

REMARKS.--Lake sampled at deep hole at a depth of about 43 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll-*a* concentration are collected from the top 1.5 ft of the lake.

WATER-QUALITY DATA, OCTOBER 13 AND 26, 1998 (Milligrams per liter unless otherwise indicated)

	Oct-13						Oct-26					
Lake stage (ft)	2.34						2.39					
Secchi-depth (m)	4.1						5.5					
Chlorophyll a, phytoplankton (µg/L)	---						1.97					
Depth of sample (m)	0.5	14.0	22.0	33.0	38.0	43.0	0.5	17.0	30.0	34.0	38.0	43.0
Water temperature (°C)	16.7	16.2	8.9	7.2	6.9	6.8	14.0	13.7	7.6	7.2	7.0	6.9
Specific conductance (µS/cm)	487	491	515	520	525	529	491	494	518	522	525	527
pH (units)	8.5	8.4	7.6	7.5	7.5	7.5	8.4	8.3	7.5	7.5	7.5	7.5
Dissolved oxygen (mg/L)	9.4	7.9	3.7	1.3	0.6	0.6	9.2	8.3	1.2	0.6	0.6	0.6
Phosphorus, total (as P)	0.005	0.007	<0.005	<0.005	0.043	0.061	0.009	0.013	<0.005	0.014	0.041	0.067
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	0.03	0.047	<0.002	<0.002	0.002	0.011	0.037	0.066
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.025	0.025	0.045	0.247	0.03	<0.010	<0.010	<0.010	0.179	0.012	<0.010	<0.010
Nitrogen, ammonia, dissolved (as N)	<0.013	<0.013	<0.013	<0.013	0.228	0.27	<0.013	<0.013	<0.013	0.102	0.238	0.355
Nitrogen, amm. + org., total (as N)	0.57	0.69	0.53	0.48	1.6	1.1	0.44	0.54	0.66	0.56	0.81	1.2
Nitrogen, total (as N)	0.6	0.71	0.57	0.73	1.7	---	---	---	0.84	0.57	---	---

10-13-98

10-26-98

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI--CONTINUED

WATER-QUALITY DATA, NOVEMBER 17, 1998 TO MARCH 22, 1999
(Milligrams per liter unless otherwise indicated)

	Nov-17			Dec-16			Feb-8			Mar-22	
Lake stage (ft)	2.44			2.43			2.54			2.30	
Secchi-depth (m)	5.5			6.2			6.7			4.9	
Chlorophyll a, phytoplankton (µg/L)	1.04			2.92			2.24			3.87	
Depth of sample (m)	0.5	40.0	43.0	0.5	44.0	0.5	10.0	30.0	42.0	0.5	43.0
Water temperature (°C)	9.3	8.5	8.0	7.4	7.4	1.0	2.0	2.7	3.3	2.3	2.4
Specific conductance (µS/cm)	501	510	517	496	498	480	505	504	549	504	503
pH (units)	8.1	7.7	7.5	8.1	8.1	8.4	8.4	8.2	7.8	7.6	8.3
Dissolved oxygen (mg/L)	8.5	2.6	0.6	11.2	10.6	13.9	13.4	10.7	6.0	13.8	13.1
Phosphorus, total (as P)	0.006	0.023	0.054	0.014	0.015	0.005	0.005	0.007	0.025	0.007	0.008
Phosphorus, ortho, dissolved (as P)	0.003	0.013	0.02	0.003	0.003	<0.002	0.002	0.002	0.019	0.002	<0.00
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.037	0.042	0.006	0.061	0.066	0.052	0.052	0.071	0.154	0.076	0.077
Nitrogen, ammonia, dissolved (as N)	0.037	0.104	0.203	0.012	0.011	<0.013	<0.013	<0.013	0.113	<0.013	<0.01
Nitrogen, amm. + org., total (as N)	0.42	0.50	0.69	0.51	0.52	0.36	0.28	0.31	0.44	0.42	0.50
Nitrogen, total (as N)	0.46	0.54	0.70	0.57	0.59	0.41	0.33	0.38	0.59	0.50	0.58

11-17-98

12-16-98

2-08-99

3-22-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, APRIL 13 TO MAY 19, 1999
(Milligrams per liter unless otherwise indicated)

	Apr-13		May-19				
Lake stage (ft)	2.52				2.93		
Secchi-depth (m)	6.7				7.3		
Chlorophyll a, phytoplankton (µg/L)	1.28				0.51		
Depth of sample (m)	0.5	43.0	0.5	7.0	34.0	39.0	43.0
Water temperature (°C)	6.6	5.1	13.0	12.3	6.8	6.6	6.6
Specific conductance (µS/cm)	510	509	500	500	507	508	510
pH (units)	8.2	8.3	8.3	8.3	8.2	8.1	8.0
Dissolved oxygen (mg/L)	13.4	12.1	11.5	11.0	10.7	9.8	8.8
Phosphorus, total (as P)	0.006	0.010	<0.005	0.008	0.006	0.008	0.011
Phosphorus, ortho, dissolved (as P)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.083	0.079	0.077	0.081	0.072	0.074	0.062
Nitrogen, ammonia, dissolved (as N)	0.017	<0.013	0.001	<0.013	0.025	0.049	0.085
Nitrogen, amm. + org., total (as N)	0.45	0.49	0.44	0.49	0.49	0.57	0.69
Nitrogen, total (as N)	0.53	0.57	0.52	0.57	0.56	0.64	0.75
Color (Pt-Co. scale)	5	5	---	---	---	---	---
Turbidity (NTU)	0.4	0.5	---	---	---	---	---
Hardness, (as CaCO ₃)	220	220	---	---	---	---	---
Calcium, dissolved (Ca)	34	34	---	---	---	---	---
Magnesium, dissolved (Mg)	34	33	---	---	---	---	---
Sodium, dissolved (Na)	17	17	---	---	---	---	---
Potassium, dissolved (K)	2.0	1.7	---	---	---	---	---
Alkalinity, (as CaCO ₃)	185	185	---	---	---	---	---
Sulfate, dissolved (SO ₄)	31	31	---	---	---	---	---
Chloride, dissolved (Cl)	35	35	---	---	---	---	---
Silica, dissolved (SiO ₂)	0.38	0.50	---	---	---	---	---
Solids, dissolved, at 180°C	272	274	---	---	---	---	---
Iron, dissolved (Fe) µg/L	<10	<10	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	<0.40	<0.40	---	---	---	---	---

04-13-99

05-19-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI--CONTINUED

WATER-QUALITY DATA, JUNE 14 TO JULY 13, 1999
(Milligrams per liter unless otherwise indicated)

	Jun-14						Jul-13					
Lake stage (ft)	3.15						2.51					
Secchi-depth (m)	4.6						5.5					
Chlorophyll a, phytoplankton (µg/L)	0.39						2.45					
Depth of sample (m)	0.5	7.0	22.0	34.0	39.0	43.0	0.5	8.0	28.0	33.0	38.0	42.5
Water temperature (°C)	21.5	21.3	9.2	7.2	7.1	6.9	24.6	23.8	8.1	7.4	7.1	7.0
Specific conductance (µS/cm)	483	484	503	505	507	509	488	488	510	513	514	516
pH (units)	8.3	8.3	8.2	8.1	8.1	8.0	8.3	8.3	8.0	7.8	7.8	7.7
Dissolved oxygen (mg/L)	8.9	8.8	9.5	8.6	8.0	7.1	9.4	9.4	7.8	6.3	5.0	4.1
Phosphorus, total (as P)	0.006	0.007	0.007	0.007	<0.005	0.009	<0.005	<0.005	0.005	<0.005	0.008	0.017
Phosphorus, ortho, dissolved (as P)	0.003	0.003	0.003	0.003	0.004	0.008	0.002	0.002	0.002	0.002	0.003	0.006
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	0.072	0.071	0.075	0.069	0.077	0.073	<0.010	<0.010	0.089	0.084	0.075	0.066
Nitrogen, ammonia, dissolved (as N)	<0.013	0.009	0.042	0.071	0.11	0.169	<0.013	<0.013	0.061	0.147	0.2	0.275
Nitrogen, amm. + org., total (as N)	0.75	0.56	0.56	0.70	0.74	0.81	0.38	0.32	0.43	0.5	0.82	0.76
Nitrogen, total (as N)	0.82	0.63	0.63	0.77	0.82	0.88	---	---	0.52	0.58	0.89	0.83
Biochemical oxygen demand (5 day)	1.5	---	1.6	---	---	1.7	---	---	---	---	---	---

6-14-99

7-13-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, AUGUST 17 TO SEPTEMBER 15, 1999
(Milligrams per liter unless otherwise indicated)

	Aug-17						Sep-15					
Lake stage (ft)	2.25						2.14					
Secchi-depth (m)	4.6						4.6					
Chlorophyll a, phytoplankton (µg/L)	2.24						1.45					
Depth of sample (m)	0.5	10.0	17.0	33.0	38.0	42.5	0.5	12.0	25.0	34.0	39.0	42.5
Water temperature (°C)	23.4	23.2	10.8	7.6	7.3	7.2	20.0	19.9	9.1	7.6	7.2	7.2
Specific conductance (µS/cm)	493	494	512	514	517	520	490	491	490	492	498	498
pH (units)	8.3	8.3	8.1	7.7	7.5	7.5	8.1	8.1	7.7	7.5	7.4	7.4
Dissolved oxygen (mg/L)	8.7	8.3	7.4	4.4	1.6	0.8	8.2	8.0	5.3	1.8	0.1	0.1
Phosphorus, total (as P)	0.009	0.011	0.007	0.009	0.032	0.057	0.008	0.008	0.008	0.006	0.059	0.085
Phosphorus, ortho, dissolved (as P)	0.002	<0.002	<0.002	0.004	0.023	0.044	0.002	0.002	<0.002	<0.002	0.046	0.072
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	<0.010	<0.010	0.078	0.319	0.357	0.143	<0.010	0.01	0.204	0.305	0.12	<0.010
Nitrogen, ammonia, dissolved (as N)	0.003	0.002	0.021	0.002	0.074	0.277	0.009	0.006	0.004	0.003	0.256	0.38
Nitrogen, amm. + org., total (as N)	0.49	0.47	0.45	0.35	0.51	0.89	0.62	0.54	0.52	0.49	0.73	0.94
Nitrogen, total (as N)	---	---	0.53	0.67	0.87	1.00	---	0.55	0.72	0.80	0.85	---

8-17-99

9-15-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll *a* concentrations, Secchi depths, and TSI data for Geneva Lake, West End, near Williams Bay, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

434928088553601 GREEN LAKE AT COUNTY TRUNK HIGHWAY A NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'28", long 88°55'36" in NE 1/4 SE 1/4 SE 1/4 sec.27, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, on left bank at downstream side of County Trunk Highway A, 2.3 mi southeast of Green Lake.

DRAINAGE AREA.--103 mi².

PERIOD OF RECORD.--October 1993 to current year.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft above sea level.

REMARKS.--Estimated daily gage heights: Apr. 3-6. Records good except those for estimated daily gage heights, which are fair. Lake level regulated by dam at outlet at Green Lake. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 7.03 ft, June 20, 1996; minimum recorded, 5.41 ft, Jan. 17, 1995.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 7.00 ft, July 21, 22, and 23; minimum recorded, 5.79 ft, Oct. 5 and Nov. 10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.90	5.88	6.05	5.94	6.19	6.37	6.37	6.58	6.54	6.51	6.69	6.36
2	5.88	5.85	6.04	5.94	6.20	6.38	6.38	6.56	6.64	6.53	6.64	6.35
3	5.83	5.83	6.05	5.99	6.20	6.38	6.45	6.54	6.66	6.56	6.60	6.35
4	5.81	5.83	6.05	5.98	6.20	6.37	6.55	6.51	6.64	6.60	6.60	6.35
5	5.82	5.82	6.06	5.97	6.19	6.38	6.65	6.52	6.65	6.61	6.58	6.33
6	5.90	5.82	6.07	5.97	6.19	6.37	6.68	6.57	6.65	6.63	6.55	6.32
7	5.91	5.81	6.06	5.96	6.19	6.36	6.63	6.61	6.66	6.61	6.54	6.30
8	5.90	5.81	6.06	5.96	6.19	6.36	6.62	6.61	6.62	6.58	6.51	6.30
9	5.89	5.82	6.06	5.96	6.20	6.38	6.68	6.59	6.60	6.68	6.48	6.28
10	5.89	6.00	6.06	5.96	6.20	6.37	6.68	6.56	6.59	6.64	6.50	6.25
11	5.89	6.04	6.05	5.97	6.24	6.37	6.73	6.55	6.58	6.62	6.49	6.22
12	5.89	5.96	6.04	5.98	6.31	6.36	6.77	6.54	6.58	6.61	6.47	6.22
13	5.87	5.96	6.04	6.00	6.32	6.36	6.75	6.52	6.57	6.58	6.47	6.22
14	5.83	5.97	6.05	6.00	6.33	6.36	6.73	6.52	6.56	6.58	6.44	6.20
15	5.82	5.96	6.05	6.00	6.34	6.35	6.71	6.51	6.52	6.56	6.43	6.18
16	5.83	5.99	6.04	6.01	6.36	6.36	6.69	6.52	6.49	6.56	6.43	6.16
17	5.85	6.00	6.03	6.02	6.36	6.38	6.67	6.63	6.48	6.61	6.42	6.15
18	5.92	6.01	6.03	6.06	6.36	6.36	6.65	6.68	6.46	6.62	6.40	6.14
19	5.88	6.07	6.03	6.06	6.36	6.36	6.64	6.67	6.43	6.68	6.42	6.13
20	5.85	6.02	6.02	6.06	6.35	6.37	6.62	6.66	6.42	6.67	6.43	6.13
21	5.82	6.01	6.05	6.06	6.34	6.37	6.60	6.65	6.41	6.95	6.43	6.11
22	5.82	6.01	6.04	6.10	6.33	6.36	6.62	6.65	6.40	6.99	6.43	6.10
23	5.82	6.03	6.01	6.14	6.33	6.37	6.68	6.67	6.42	6.99	6.43	6.09
24	5.81	6.00	6.00	6.18	6.33	6.36	6.68	6.68	6.43	6.98	6.43	6.08
25	5.81	6.01	5.98	6.19	6.34	6.36	6.67	6.65	6.43	6.93	6.43	6.06
26	5.81	6.01	5.97	6.19	6.34	6.36	6.66	6.62	6.42	6.95	6.43	6.06
27	5.84	6.00	5.97	6.19	6.37	6.36	6.64	6.62	6.42	6.91	6.44	6.07
28	5.87	6.01	5.96	6.19	6.38	6.37	6.62	6.61	6.43	6.86	6.44	6.08
29	5.86	6.03	5.97	6.19	---	6.37	6.61	6.59	6.45	6.81	6.42	6.10
30	5.89	6.06	5.96	6.19	---	6.36	6.60	6.55	6.44	6.76	6.38	6.11
31	5.89	---	5.96	6.19	---	6.37	---	6.55	---	6.75	6.37	---
MEAN	5.86	5.95	6.03	6.05	6.29	6.37	6.63	6.59	6.52	6.71	6.47	6.19
MAX	5.92	6.07	6.07	6.19	6.38	6.38	6.77	6.68	6.66	6.99	6.69	6.36
MIN	5.81	5.81	5.96	5.94	6.19	6.35	6.37	6.51	6.40	6.51	6.37	6.06

05427235 LAKE KOSHKONONG NEAR NEWVILLE, WI

LOCATION.--Lat 42°51'27", long 88°56'27", in NW 1/4 NE 1/4 sec.34, T.5 N., R.13 E., Jefferson County, Hydrologic Unit 07090001, 80 ft east of Pottawatomi Trail Bridge at Bingham Point Estates, and 4.5 mi northeast of Newville.

DRAINAGE AREA.--2,560 mi², at lake outlet. Area of Lake Koshkonong, 16.3 mi².

PERIOD OF RECORD.--July 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 770.00 ft above sea level.

REMARKS.--No estimated daily gage heights. Records good except those for July 14 to Aug. 3, which are fair. Lake level regulated by dam at Indianford. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 12.23 ft, Apr. 25, 1993; minimum recorded, 5.40 ft, Dec. 26, 27, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 9.73 ft, Apr. 28; minimum recorded, 5.48 ft, Jan. 5.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.28	5.99	6.28	5.52	6.93	7.24	6.30	9.61	8.13	7.16	7.80	6.30
2	6.25	5.93	6.28	5.52	7.02	7.19	6.28	9.54	8.10	7.07	7.84	6.24
3	6.27	5.86	6.28	5.53	7.11	7.15	6.29	9.44	7.99	6.99	7.86	6.18
4	6.27	5.84	6.26	5.51	7.20	7.10	6.39	9.33	7.89	6.95	7.89	6.11
5	6.37	5.80	6.24	5.49	7.29	7.06	6.39	9.22	7.80	6.88	7.90	6.05
6	6.45	5.77	6.25	5.52	7.35	7.05	6.58	9.16	7.73	6.83	7.90	5.97
7	6.46	5.74	6.24	5.55	7.39	6.97	6.68	9.07	7.71	6.72	7.90	5.89
8	6.46	5.72	6.22	5.61	7.42	6.90	6.80	9.01	7.68	6.60	7.91	5.94
9	6.45	5.69	6.20	5.65	7.43	6.85	6.96	8.91	7.64	6.55	7.87	6.00
10	6.45	5.80	6.20	5.69	7.45	6.77	7.14	8.79	7.59	6.45	7.89	6.03
11	6.43	5.97	6.16	5.75	7.50	6.71	7.35	8.67	7.55	6.39	7.85	6.07
12	6.43	6.01	6.14	5.78	7.59	6.66	7.54	8.56	7.54	6.34	7.81	6.13
13	6.41	6.12	6.11	5.82	7.66	6.62	7.70	8.43	7.64	6.29	7.79	6.18
14	6.35	6.27	6.08	5.85	7.71	6.57	7.82	8.31	7.86	6.27	7.72	6.22
15	6.31	6.36	6.07	5.86	7.77	6.53	7.90	8.19	8.05	6.24	7.64	6.23
16	6.28	6.44	6.05	5.86	7.81	6.51	7.98	8.09	8.24	6.22	7.56	6.21
17	6.32	6.49	6.03	5.87	7.85	6.56	7.98	8.31	8.36	6.32	7.51	6.17
18	6.46	6.50	5.97	5.89	7.84	6.55	7.97	8.53	8.39	6.39	7.43	6.13
19	6.47	6.59	5.98	5.85	7.83	6.50	7.96	8.71	8.38	6.40	7.37	6.12
20	6.48	6.60	5.95	5.81	7.78	6.48	7.93	8.84	8.33	6.45	7.28	6.12
21	6.47	6.55	5.94	5.78	7.71	6.52	7.93	8.92	8.26	6.50	7.16	6.07
22	6.42	6.53	5.87	5.80	7.64	6.48	7.97	8.98	8.17	6.52	7.04	6.05
23	6.39	6.55	5.83	5.86	7.58	6.48	8.34	8.97	8.08	6.71	6.94	6.09
24	6.34	6.49	5.79	5.97	7.51	6.48	8.68	8.93	8.03	6.85	6.88	6.10
25	6.30	6.46	5.76	6.10	7.46	6.45	9.06	8.86	7.90	7.02	6.79	6.11
26	6.25	6.43	5.72	6.22	7.39	6.43	9.36	8.77	7.76	7.11	6.71	6.12
27	6.21	6.39	5.68	6.36	7.33	6.41	9.54	8.69	7.62	7.27	6.65	6.26
28	6.18	6.36	5.63	6.49	7.29	6.39	9.67	8.60	7.50	7.37	6.59	6.38
29	6.12	6.31	5.60	6.62	---	6.40	9.69	8.49	7.36	7.49	6.51	6.41
30	6.09	6.33	5.56	6.75	---	6.37	9.67	8.36	7.23	7.59	6.41	6.39
31	6.04	---	5.54	6.85	---	6.32	---	8.24	---	7.72	6.35	---
MEAN	6.34	6.20	6.00	5.89	7.49	6.67	7.80	8.79	7.88	6.76	7.38	6.14
MAX	6.48	6.60	6.28	6.85	7.85	7.24	9.69	9.61	8.39	7.72	7.91	6.41
MIN	6.04	5.69	5.54	5.49	6.93	6.32	6.28	8.09	7.23	6.22	6.35	5.89

455446089370300 LITTLE ARBOR VITAE LAKE NEAR WOODRUFF, WI

LOCATION.--Lat 45°54'46" long 89°37'03", in SW 1/4 SE 1/4 sec.28, T.40 N., R.7 E., Vilas County, Hydrologic Unit 07070001, 4 mi north-east of Woodruff.

PERIOD OF RECORD.--February 1991 to current year.

GAGE.--Staff gage read by Glyn A. Roberts.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 8.02 ft, May 7, 1999; minimum observed, 7.72 ft, Feb. 28, June 12, 1991, Oct. 13, 1994, Sept.. 1-30, and Oct. 4, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 8.02 ft, May 7; minimum observed, 7.72 ft, Oct. 4.

**GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES**

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	7.78	---	---	7.82	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	7.86	---	---
3	---	---	---	---	---	---	---	---	---	---	7.84	7.78
4	7.72	---	---	---	---	---	---	---	---	---	7.88	---
5	---	7.82	---	---	---	---	7.84	---	---	---	---	---
6	---	---	7.80	7.82	7.88	7.80	---	7.84	7.82	---	---	---
7	---	---	---	---	---	---	---	8.02	---	7.86	---	---
8	---	---	---	---	---	---	---	---	---	---	---	7.78
9	---	7.76	---	---	---	---	---	---	---	---	---	---
10	7.74	---	7.78	7.82	---	7.80	7.84	7.90	---	---	7.80	---
11	---	---	---	---	7.90	---	---	---	7.80	---	---	---
12	---	---	---	---	---	---	---	---	---	7.84	---	---
13	---	---	---	---	---	---	---	7.84	---	---	---	---
14	---	7.80	---	---	---	7.80	---	---	---	---	---	---
15	7.76	---	---	---	7.94	---	7.82	---	---	---	---	7.76
16	---	---	---	7.84	---	---	---	---	---	---	---	---
17	---	---	7.80	---	---	---	---	---	7.80	7.86	7.80	---
18	---	---	---	---	---	---	---	7.88	---	---	---	---
19	7.78	---	---	---	---	7.82	---	---	---	---	---	---
20	---	7.82	---	---	---	---	7.80	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	7.84	7.82	---	---	---	7.86	7.82	---	---
23	---	---	---	---	---	---	---	---	---	---	---	7.76
24	7.76	---	7.80	---	---	7.80	---	7.86	---	---	7.80	---
25	---	7.82	---	---	---	---	7.80	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	7.82	---	---	7.86	---	7.80	---	---	7.88	7.78	---	---
28	---	---	---	---	7.82	---	---	---	---	---	---	---
29	---	---	---	---	---	7.82	---	---	---	---	---	---
30	---	7.80	---	---	---	---	7.80	7.82	7.90	---	---	7.74
31	7.88	---	7.82	7.88	---	7.82	---	---	---	---	7.80	---

432255088134700 LITTLE CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'55", long 88°13'47", in NW 1/4 NE 1/4 sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.6 mi southwest of West Bend.

PERIOD OF RECORD.--February 1997 to current year.

REMARKS.--Lake sampled at center of northern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 18, 1998 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-29		Jun-17		Jul-22		Aug-18		
Lake stage (ft)	8.19		8.48		8.70		9.23		8.25		
Secchi-depth (m)	---		2.0		4.3		2.7		1.1		
Chlorophyll a, phytoplankton (µg/L)	---		7.71		1.49		3.87		43.0		
Depth of sample (m)	0.5	7.0	0.5	7.5	0.5	7.5	0.5	8.0	0.5	6.0	7.5
Water temperature (°C)	3.0	3.6	10.9	7.9	21.1	13.6	25.6	14.1	22.5	17.2	15.3
Specific conductance (µS/cm)	507	551	501	510	482	519	450	521	471	534	551
pH (units)	7.8	7.7	8.4	7.8	8.0	7.4	8.4	7.3	8.6	7.2	7.2
Dissolved oxygen (mg/L)	15.3	9.0	12.4	8.0	7.6	0.5	8.6	0.0	9.3	0.0	0.0
Phosphorus, total (as P)	0.011	0.046	0.024	0.023	0.014	0.101	0.016	0.105	0.040	0.194	0.361
Phosphorus, ortho, dissolved (as P)	---	---	---	---	---	---	0.004	---	---	---	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	---	---	---	---	<0.010	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	---	---	---	---	0.008	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	---	---	---	---	0.6	---	---	---	---

2-10-99

4-29-99

6-17-99

7-22-99

8-18-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little Cedar Lake, North Site, near West Bend, Wisconsin.

432249088134500 LITTLE CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'49", long 88°13'45", in NW 1/4 SE 1/4 sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.8 mi southwest of West Bend.

PERIOD OF RECORD.--February 1997 to current year.

REMARKS.--Lake sampled in southern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 18, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-29		Jun-17		Jul-22		Aug-18		
Lake stage (ft)	8.19		8.48		8.70		9.23		8.25		
Secchi-depth (m)	---		4.5		4.1		4.1		1.6		
Chlorophyll a, phytoplankton (µg/L)	---		4.71		1.82		1.92		9.00		
Depth of sample (m)	0.5	15.5	0.5	16.0	0.5	17.0	0.5	17.0	0.5	8.0	16.0
Water temperature (°C)	2.4	3.6	10.8	8.3	21.9	8.5	25.5	8.6	22.7	14.0	8.8
Specific conductance (µS/cm)	435	527	498	504	464	514	452	510	468	508	532
pH (units)	7.9	7.6	8.2	8.0	8.2	7.4	8.2	7.5	8.2	7.4	7.4
Dissolved oxygen (mg/L)	15.2	7.8	11.8	9.0	9.2	0.6	8.5	0.0	8.7	0.0	0.0
Phosphorus, total (as P)	0.009	0.125	0.017	0.038	0.011	0.168	0.010	0.251	0.019	0.026	0.249
Phosphorus, ortho, dissolved (as P)	---	---	0.003	---	---	---	0.005	---	---	---	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	0.071	---	---	---	0.012	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.073	---	---	---	<0.013	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.67	---	---	---	0.52	---	---	---	---
Nitrogen, total (as N)	---	---	0.74	---	---	---	0.53	---	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	6.6	---	---	---	---	---	---	---	---
Hardness, (as CaCO3)	---	---	210	---	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	34	---	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	31	---	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	18	---	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	1.7	---	---	---	---	---	---	---	---
Alkalinity, (as CaCO3)	---	---	185	---	---	---	---	---	---	---	---
Sulfate, dissolved (SO4)	---	---	20	---	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	41	---	---	---	---	---	---	---	---
Silica, dissolved (SiO2)	---	---	0.3	---	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	286	---	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	9.4	---	---	---	---	---	---	---	---

2-10-99

4-29-99

6-17-99

7-22-99

8-18-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little Cedar Lake, South Site, near West Bend, Wisconsin.

434412088590700 LITTLE GREEN LAKE, AT CENTER, NEAR MARKESAN, WI

LOCATION--Lat 43°44'12", long 88°59'07", in SW 1/4 SW 1/4 sec.29, T.15 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, 2 mi north of Markesan.

PERIOD OF RECORD.--February 1991 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 23 TO JUNE 16, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-23		Apr-28		Jun-16		Jul-15		Aug-19	
Lake stage (ft)	5.80		6.07		6.36		6.44		6.66	
Secchi-depth (m)	---		1.1		1.3		0.3		0.3	
Chlorophyll a, phytoplankton (µg/L)	---		9.64		32.5		89.8		90.0	
Depth of sample (m)	0.5	7.5	0.5	7.5	0.5	7.0	0.5	7.5	0.5	7.5
Water temperature (°C)	1.5	4.4	10.9	10.6	20.9	16.1	25.5	18.0	22.2	22.0
Specific conductance (µS/cm)	320	423	324	327	284	326	283	366	271	273
pH (units)	7.3	7.3	8.3	8.4	9.1	8.2	9.1	7.7	8.9	9.0
Dissolved oxygen (mg/L)	19.4	0.9	12.0	11.3	8.1	0.6	9.6	0.0	6.8	5.6
Phosphorus, total (as P)	0.026	0.283	0.045	0.051	0.081	0.276	0.201	0.759	0.411	0.396
Phosphorus, ortho, dissolved (as P)	---	---	0.003	---	---	---	0.069	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	<0.010	---	---	---	<0.010	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	<0.013	---	---	---	0.029	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	1	---	---	---	2	---	---	---
Nitrogen, total (as N)	---	---	1.0	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	5.3	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	140	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	24	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	20	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	7.3	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	3.1	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	132	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	7.6	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	1.7	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.4	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	186	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	1.4	---	---	---	---	---	---	---

2-23-99

4-28-99

6-16-99

7-15-99

8-18-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little Green Lake near Markesan, Wisconsin.

425425088083500 LITTLE MUSKEGO LAKE AT MUSKEGO, WI

LOCATION.--Lat 42°54'25", long 88°08'35", in SE 1/4 NW 1/4 sec.9, T.5 N., R.20 E., Waukesha County, Hydrologic Unit 07120006, at Muskego.

DRAINAGE AREA.--11.6 mi².

PERIOD OF RECORD.--October 1986 to current year.

LAKE-STAGE GAGE.--Datum of gage is 693.40 ft above sea level.

REMARKS.--Lake sampled at the deep hole about 1,000 ft north-northwest of dam at outlet. Lake ice-covered during February sampling. An aeration system was operated from April to November for the years 1987-91. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Prior to October 1987, published under station number 425450088083500.

WATER-QUALITY DATA, FEBRUARY 11 TO JUNE 08, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-11		Apr-8		Jun-8	
Lake stage (ft)	97.90		97.70		98.90	
Secchi-depth (m)	---		1.1		3.1	
Chlorophyll a, phytoplankton (µg/L)	---		19.6		4.68	
Depth of sample (m)	0.5	20.0	0.5	19.5	0.5	20.0
Water temperature (°C)	3.7	2.8	9.8	5.8	8.8	8.8
Specific conductance (µS/cm)	722	880	804	815	820	820
pH (units)	7.8	7.4	8.2	8.0	7.6	7.6
Dissolved oxygen (mg/L)	13.6	8.0	11.3	9.6	0.5	0.5
Phosphorus, total (as P)	0.018	0.173	0.028	0.031	0.017	0.140
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.379	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.022	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.71	---	---	---
Nitrogen, total (as N)	---	---	1.1	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---
Turbidity (NTU)	---	---	2.6	---	---	---
Hardness, (as CaCO ₃)	---	---	260	---	---	---
Calcium, dissolved (Ca)	---	---	51	---	---	---
Magnesium, dissolved (Mg)	---	---	33	---	---	---
Sodium, dissolved (Na)	---	---	58	---	---	---
Potassium, dissolved (K)	---	---	2.4	---	---	---
Alkalinity, (as CaCO ₃)	---	---	197	---	---	---
Sulfate, dissolved (SO ₄)	---	---	45	---	---	---
Chloride, dissolved (Cl)	---	---	120	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.04	---	---	---
Solids, dissolved, at 180°C	---	---	458	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	<0.40	---	---	---

2-11-99

4-08-99

6-08-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

425425088083500 LITTLE MUSKEGO LAKE AT MUSKEGO, WI

WATER-QUALITY DATA, JULY 06 TO AUGUST 05, 1999 (Milligrams per liter unless otherwise indicated)

	Jul-6		Aug-5				
Lake stage (ft)	98.80		98.60				
Secchi-depth (m)	0.9		1.1				
Chlorophyll a, phytoplankton (µg/L)	13.8		8.00				
Depth of sample (m)	0.5	17.5	0.5	4.0	7.0	18.0	20.0
Water temperature (°C)	26.9	9.1	26.1	24.4	15.3	9.1	9.0
Specific conductance (µS/cm)	617	823	650	657	764	801	805
pH (units)	8.4	7.5	8.2	8.1	7.4	7.4	7.3
Dissolved oxygen (mg/L)	9.2	0.4	7.4	3.6	0.1	0.0	0.0
Phosphorus, total (as P)	0.022	0.129	0.031	0.027	0.019	0.233	0.277

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little Muskego Lake at Muskego, Wisconsin.

05390700 LITTLE ST. GERMAIN LAKE NEAR EAGLE RIVER, WI

LOCATION--Lat 45°53'55", long 89°27'10", in SW 1/4 SE 1/4 sec.35, T.40 N., R.8 E., Vilas County, Hydrologic Unit 07070001, 9.6 mi west of Eagle River.

DRAINAGE AREA.--19.0 mi².

PERIOD OF RECORD.--October 1990 to current year.

GAGE.--Staff gage mounted on the dam wall at lake outlet. Datum of gage is 1,600 ft, above sea level.

REMARKS.--Lake level regulated by dam at outlet.

COOPERATION.--Gage readings furnished by Wisconsin Valley Improvement Company.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 14.00 ft, June 6, 1997; minimum observed, 12.00 ft, Jan. 3 and Feb. 3, 1992.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 13.88, July 9; minimum observed, 12.02 ft, Feb. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999.

DAILY MEAN VALUE												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.06	13.00	12.62	---	---	12.40	12.52	12.84	13.76	13.56	13.78	13.64
2	13.04	12.94	---	12.26	---	12.36	12.56	12.84	13.76	13.56	13.74	13.62
3	13.06	12.94	---	---	---	---	12.58	12.82	13.74	13.56	13.72	13.60
4	13.06	12.94	12.58	12.24	---	---	12.62	12.82	13.72	13.64	13.72	13.60
5	13.04	12.92	---	12.22	12.10	12.32	12.66	12.80	13.72	13.64	13.72	13.62
6	13.08	12.90	---	---	---	---	12.74	12.98	13.86	13.70	13.72	13.60
7	13.10	12.88	---	---	---	---	12.76	12.98	13.82	13.68	13.70	13.60
8	13.12	---	12.48	12.22	---	---	12.76	13.16	13.80	13.66	13.70	13.62
9	13.12	---	---	---	12.02	12.38	12.80	13.34	13.78	13.88	13.68	13.60
10	13.14	12.98	---	---	---	---	12.80	13.38	13.78	13.84	13.70	13.58
11	13.14	---	12.40	---	---	---	12.80	13.40	13.76	13.80	13.68	13.60
12	13.16	12.88	---	12.18	12.18	12.40	12.80	13.40	13.78	13.78	13.68	13.62
13	13.16	---	---	---	---	---	12.80	13.38	13.72	13.74	13.80	13.62
14	13.16	12.84	---	---	---	---	12.82	13.38	13.72	13.72	13.80	13.60
15	13.18	---	12.30	12.14	---	---	12.84	13.36	13.70	13.70	13.78	13.60
16	13.18	---	---	---	12.28	12.40	12.86	13.36	13.68	13.68	13.76	13.60
17	13.20	12.86	---	---	---	---	12.88	13.44	13.66	13.70	13.74	13.58
18	13.22	---	12.20	---	---	---	12.86	13.56	13.64	13.70	13.70	13.58
19	13.26	12.94	---	12.14	12.32	12.45	12.86	13.56	13.62	13.70	13.72	13.58
20	13.24	---	---	---	---	---	12.86	13.56	13.62	13.68	13.72	13.62
21	13.24	---	12.14	---	---	12.48	12.88	13.68	13.62	13.70	13.72	13.60
22	13.22	12.84	---	12.10	---	12.46	12.90	13.72	13.60	13.68	13.72	13.60
23	13.22	---	---	---	12.34	12.48	12.90	13.82	13.62	13.70	13.72	13.60
24	13.20	12.82	12.10	---	---	12.46	12.86	13.80	13.62	13.70	13.72	13.58
25	13.18	---	---	---	---	12.46	12.86	13.78	13.60	13.68	13.72	13.58
26	13.18	12.80	---	12.12	12.28	12.48	12.86	13.70	13.60	13.76	13.72	13.54
27	13.14	---	---	---	---	12.48	12.86	13.74	13.60	13.76	13.72	13.56
28	13.10	---	---	---	---	12.48	12.86	13.74	13.60	13.74	13.70	13.58
29	13.08	12.70	12.30	12.14	---	12.50	12.84	13.76	13.58	13.76	13.68	13.58
30	13.06	---	---	---	---	12.50	12.84	13.74	13.56	13.76	13.66	13.56
31	13.02	---	---	12.10	---	12.52	---	13.72	---	13.84	13.64	---
MEAN	13.14	---	---	---	---	---	12.79	13.41	13.69	13.71	13.72	13.60
MAX	13.26	---	---	---	---	---	12.90	13.82	13.86	13.88	13.80	13.64
MIN	13.02	---	---	---	---	---	12.52	12.80	13.56	13.56	13.64	13.54

455545089262500 LITTLE ST. GERMAIN LAKE, NORTHEAST BAY, NEAR ST. GERMAIN, WI

LOCATION.--Lat 45°55'45", long 89°26'25", in SW 1/4 SE 1/4 sec.24, T.40 N., R.8 E., Vilas County, Hydrologic Unit 07070001, near St. Germain.

PERIOD OF RECORD.--April 1991 to August 1994, August 1996 to August 1997, March to October 1999.

REMARKS.--Lake sampled in northeast bay at a lake depth of about 4 m. Lake ice-covered during March sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 18 TO OCTOBER 06, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-18	May-13	Jun-15	Jul-22	Oct-06
Lake stage (ft)	---	13.38	13.70	13.68	13.50
Secchi-depth (m)	---	1.7	1.4	0.8	1.6
Chlorophyll a, phytoplankton (µg/L)	---	4.1	8.89	31.1	15.0
Depth of sample (m)	0.5	2.5	0.5	0.5	3.0
Water temperature (°C)	0.3	3.6	14.7	25.4	23.6
Specific conductance (µS/cm)	98	93	74	79	72
pH (units)	7.3	6.7	7.4	9.3	8.3
Dissolved oxygen (mg/L)	7.2	0.8	9.5	12.5	8.4
Phosphorus, total (as P)	0.054	0.034	0.030	0.033	0.039
Phosphorus, ortho, dissolved (as P)	---	---	---	0.003	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	---	0.154	---
Nitrogen, ammonia, dissolved (as N)	---	---	---	0.062	---
Nitrogen, amm. + org., total (as N)	---	---	---	1.1	---
Nitrogen, total (as N)	---	---	---	1.3	---

3-18-99

5-13-99

6-15-99

7-22-99

10-06-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little St. Germain Lake, NE Bay, at St. Germain, Wisconsin.

455437089270800 LITTLE ST. GERMAIN LAKE, SOUTH BAY, NEAR ST. GERMAIN, WI

LOCATION.--Lat 45°54'37", long 89°27'08", in NW 1/4 NE 1/4 sec.35, T.40 N., R.8 E., Vilas County, Hydrologic Unit 07070001, 1.7 mi east of St. Germain.

PERIOD OF RECORD.--April 1991 to August 1994, August 1996 to August 1997, March to October 1999.

REMARKS.--Lake sampled in south bay at a lake depth of about 7 m. Lake ice-covered during March sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 18 TO OCTOBER 06, 1999
(Milligrams per liter unless otherwise indicated)

	Mar-18	May-13	Jun-15	Jul-22	Oct-06
Lake stage (ft)	---	13.38	13.70	13.68	13.50
Secchi-depth (m)	---	2.1	2.5	2.4	2.8
Chlorophyll a, phytoplankton (µg/L)	---	4.99	9.30	7.26	5.00
Depth of sample (m)	0.5 5.5	0.5	0.5	0.5 5.5	0.5 5.8
Water temperature (°C)	0.4 5.0	14.5	20.0	25.7 19.2	11.1 10.5
Specific conductance (µS/cm)	99 149	77	73	71 72	79 78
pH (units)	6.6 6.9	7.9	8.0	8.7 6.7	8.1 8.0
Dissolved oxygen (mg/L)	1.8 0.5	10.4	8.8	9.7 5.5	10.5 9.8
Phosphorus, total (as P)	0.029 0.045	0.027	0.028	0.021 0.092	0.022 0.026
Phosphorus, ortho, dissolved (as P)	---	---	---	0.002	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	---	0.029	---
Nitrogen, ammonia, dissolved (as N)	---	---	---	0.012	---
Nitrogen, amm. + org., total (as N)	---	---	---	0.57	---
Nitrogen, total (as N)	---	---	---	0.60	---

3-18-99

5-13-99

6-15-99

7-22-99

10-06-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll *a* concentrations, Secchi depths, and TSI data for Little St. Germain Lake, South Bay, at St. Germain, Wisconsin.

455428089282400 LITTLE ST. GERMAIN LAKE, WEST BAY, AT ST. GERMAIN, WI

LOCATION.--Lat 45°54'28", long 89°28'24", in SW 1/4 NE 1/4 sec.34, T.40 N., R.8 E., Vilas County, Hydrologic Unit 07070001, at St. Germain.

PERIOD OF RECORD.--April 1991 to August 1994, August 1996 to August 1997, March to October 1999.

REMARKS.--Lake sampled in west bay at a lake depth of about 18 m. Lake ice-covered during March sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 18 TO OCTOBER 06, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-18		May-13		Jun-15		Jul-22		Oct-06	
Lake stage (ft)	---		13.38		13.70		13.68		13.50	
Secchi-depth (m)	---		3.4		2.8		2.9		3.4	
Chlorophyll a, phytoplankton (µg/L)	---		2.01		4.30		2.84		5.00	
Depth of sample (m)	0.5	13.0	0.5	15.5	0.5	15.0	0.5	15.5	0.5	15.5
Water temperature (°C)	0.4	3.6	13.9	5.6	20.0	6.0	25.3	6.3	12.3	6.9
Specific conductance (µS/cm)	87	80	74	76	73	83	71	99	76	125
pH (units)	7.1	6.5	7.7	6.5	8.1	6.4	7.8	6.7	7.4	7.0
Dissolved oxygen (mg/L)	12.8	0.9	10.5	4.5	9.2	0.1	8.7	0.1	8.5	0.1
Phosphorus, total (as P)	0.013	0.019	0.015	0.044	0.015	0.030	0.009	0.145	0.014	0.322

3-18-99

5-13-99

6-15-99

7-22-99

10-06-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Little St. Germain Lake, West Bay, at St. Germain, Wisconsin.

04074651 LITTLE SAND LAKE NEAR MOLE LAKE, WI

LOCATION.--Lat 45°28'26" long 88°54'41" (revised), in SW 1/4 NE 1/4 sec.31, T.35 N., R.13 E., Forest County, Hydrologic Unit 04030202, on left bank 1 mi upstream of outlet, 3 mi southeast of Mole Lake.

PERIOD OF RECORD.--May 1996 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,587.32 ft above sea level.

REMARKS.--Recorder removed during period of ice, Nov. 20, 1998 to Apr. 28, 1999. Gage heights are obtained from reference point during this period.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.97 ft, May 25, 1997; minimum observed, 3.78 ft, Nov. 7-9, 1999.

EXTREMES FOR CURRENT YEAR.-- Maximum gage height observed, 5.01 ft, July 23, 24, 26; minimum observed, 3.78 ft, Nov. 7-9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.88	3.81	---	---	---	---	---	4.13	4.25	4.63	4.87	4.62
2	3.87	3.80	---	---	---	---	---	4.11	4.21	4.61	4.86	4.61
3	3.86	3.80	---	---	---	---	---	4.10	4.20	4.63	4.85	4.59
4	3.85	3.80	---	---	---	---	---	4.10	4.21	4.63	4.81	4.56
5	3.84	3.80	---	---	---	---	---	4.10	4.21	4.62	4.81	4.55
6	3.86	3.79	---	---	---	---	---	4.15	4.39	4.60	4.79	4.53
7	3.86	3.78	---	---	---	---	---	4.29	4.43	4.58	4.78	4.50
8	3.86	3.78	---	---	---	---	---	4.32	4.46	4.64	4.76	4.45
9	3.85	3.78	---	---	---	---	---	4.30	4.60	4.81	4.74	4.46
10	3.85	3.85	---	---	---	---	---	4.32	4.68	4.84	4.74	4.42
11	3.85	3.87	---	---	---	---	---	4.30	4.69	4.84	4.73	4.43
12	3.84	3.85	---	---	---	---	---	4.29	4.71	4.83	4.73	4.45
13	3.83	3.85	---	---	---	---	---	4.25	4.68	4.83	4.84	4.42
14	3.82	3.84	---	---	---	---	4.27	4.23	4.67	4.84	4.83	4.40
15	3.81	3.85	---	---	---	---	---	4.21	4.68	4.82	4.83	4.39
16	3.81	3.85	---	---	---	---	---	4.22	4.68	4.86	4.85	4.39
17	3.82	3.85	---	---	---	---	---	4.27	4.66	4.93	4.83	4.39
18	3.87	3.87	---	---	---	---	---	4.31	4.64	4.94	4.83	4.36
19	3.85	3.92	---	---	---	---	---	4.25	4.62	4.95	4.82	4.39
20	3.84	---	---	3.92	---	---	---	4.26	4.62	4.96	4.80	4.41
21	3.83	---	---	---	---	---	---	4.28	4.60	4.97	4.79	4.37
22	3.82	---	---	---	---	---	---	4.27	4.59	4.99	4.78	4.35
23	3.81	---	---	---	---	---	---	4.31	4.61	5.01	4.77	4.33
24	3.81	---	---	---	---	---	---	4.32	4.63	5.01	4.74	4.32
25	3.80	---	---	---	---	---	---	4.31	4.59	4.96	4.73	4.31
26	3.80	---	---	---	---	---	---	4.27	4.58	5.01	4.75	4.31
27	3.80	---	---	---	---	---	---	4.26	4.58	4.98	4.73	4.33
28	3.79	---	---	---	---	---	---	4.26	4.59	4.94	4.70	4.34
29	3.79	---	---	---	---	---	4.12	4.25	4.63	4.92	4.67	4.32
30	3.80	---	---	---	---	---	4.12	4.24	4.61	4.89	4.65	4.31
31	3.80	---	---	---	---	---	---	4.23	---	4.91	4.62	---
MEAN	3.83	---	---	---	---	---	---	4.24	4.54	4.84	4.78	4.42
MAX	3.88	---	---	---	---	---	---	4.32	4.71	5.01	4.87	4.62
MIN	3.79	---	---	---	---	---	---	4.10	4.20	4.58	4.62	4.31

05428000 LAKE MENDOTA AT MADISON, WI

LOCATION.--Lat 43°05'42", long 89°22'12", in SE 1/4 sec.12, T.7 N., R.9 E., Dane County, Hydrologic Unit 07090001, in city boat house at dam at outlet, in Madison.

DRAINAGE AREA.--233 mi². Area of Lake Mendota, 15.2 mi².

PERIOD OF RECORD.--December 1902 to May 1903, January 1916 to current year (incomplete).

REVISED RECORDS.--WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, at datum 7.82 ft higher; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--No estimated daily gage heights. Records are good. Lake level regulated by concrete dam with two 12-foot gates and 20-foot lock at outlet. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 12.20 ft, July 14–15, 1993; minimum observed, 8.02 ft, Feb. 24 to Mar. 10, 1920, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 10.83 ft, May 18; minimum recorded, 9.10 ft, Mar. 2.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.14	9.73	9.43	9.29	9.45	9.16	9.43	10.52	10.26	10.41	10.37	9.99
2	10.12	9.68	9.44	9.33	9.44	9.15	9.43	10.51	10.31	10.40	10.33	9.97
3	10.14	9.62	9.44	9.36	9.44	9.16	9.46	10.49	10.28	10.39	10.30	9.96
4	10.14	9.57	9.44	9.37	9.43	9.17	9.55	10.48	10.27	10.40	10.29	9.94
5	10.20	9.52	9.44	9.37	9.43	9.19	9.56	10.48	10.28	10.40	10.26	9.94
6	10.31	9.47	9.46	9.37	9.42	9.21	9.61	10.56	10.30	10.41	10.23	9.92
7	10.33	9.42	9.45	9.37	9.40	9.22	9.60	10.59	10.38	10.38	10.23	9.89
8	10.30	9.38	9.44	9.38	9.38	9.23	9.61	10.61	10.40	10.34	10.23	9.88
9	10.27	9.34	9.43	9.39	9.37	9.28	9.77	10.60	10.42	10.35	10.20	9.85
10	10.25	9.47	9.43	9.39	9.36	9.29	9.82	10.59	10.43	10.31	10.22	9.81
11	10.22	9.51	9.41	9.41	9.39	9.30	9.85	10.57	10.45	10.28	10.20	9.78
12	10.20	9.51	9.40	9.41	9.47	9.31	9.87	10.56	10.46	10.26	10.19	9.77
13	10.16	9.51	9.40	9.43	9.48	9.33	9.87	10.53	10.51	10.23	10.20	9.76
14	10.11	9.53	9.39	9.43	9.47	9.34	9.87	10.48	10.53	10.19	10.16	9.74
15	10.07	9.52	9.38	9.44	9.46	9.35	9.86	10.43	10.49	10.17	10.13	9.72
16	10.04	9.52	9.39	9.44	9.44	9.36	9.86	10.40	10.48	10.16	10.11	9.70
17	10.06	9.51	9.38	9.46	9.43	9.38	9.85	10.62	10.45	10.26	10.11	9.69
18	10.14	9.50	9.37	9.49	9.41	9.40	9.83	10.67	10.44	10.28	10.09	9.67
19	10.11	9.52	9.38	9.49	9.39	9.42	9.83	10.64	10.41	10.29	10.09	9.67
20	10.08	9.50	9.37	9.48	9.36	9.43	9.82	10.60	10.40	10.31	10.08	9.66
21	10.04	9.46	9.39	9.47	9.33	9.46	9.83	10.56	10.38	10.38	10.07	9.64
22	10.00	9.45	9.36	9.52	9.30	9.46	9.96	10.55	10.37	10.39	10.05	9.63
23	9.97	9.47	9.34	9.56	9.28	9.47	10.27	10.55	10.39	10.38	10.06	9.62
24	9.94	9.45	9.34	9.59	9.26	9.48	10.41	10.54	10.42	10.38	10.12	9.62
25	9.91	9.44	9.32	9.60	9.24	9.49	10.47	10.50	10.41	10.36	10.11	9.61
26	9.89	9.44	9.32	9.58	9.21	9.49	10.50	10.44	10.38	10.39	10.10	9.60
27	9.88	9.43	9.32	9.56	9.20	9.48	10.51	10.41	10.37	10.38	10.10	9.66
28	9.88	9.43	9.31	9.54	9.18	9.47	10.54	10.38	10.38	10.36	10.09	9.72
29	9.84	9.43	9.32	9.52	---	9.47	10.53	10.35	10.39	10.35	10.06	9.75
30	9.82	9.46	9.30	9.50	---	9.45	10.53	10.31	10.35	10.33	10.02	9.74
31	9.78	---	9.29	9.48	---	9.42	---	10.28	---	10.38	10.00	---
MEAN	10.08	9.49	9.38	9.45	9.37	9.35	9.93	10.51	10.39	10.33	10.15	9.76
MAX	10.33	9.73	9.46	9.60	9.48	9.49	10.54	10.67	10.53	10.41	10.37	9.99
MIN	9.78	9.34	9.29	9.29	9.18	9.15	9.43	10.28	10.26	10.16	10.00	9.60

424621088335500 MIDDLE LAKE AT LAUDERDALE, WI

LOCATION.--Lat 42°46'21", long 88°33'55", in SE 1/4 SE 1/4 sec.26, T.4 N., R.16 E., Walworth County, Hydrologic Unit 07120006, at Lauderdale

PERIOD OF RECORD.--November 1993 to November 1994, and February to August 1999.

REMARKS.--Lake sampled near east end of lake at lake depth of about 52 ft. Lake ice-covered during February sampling. Water-quality analyse done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 11, 1999

(Milligrams per liter unless otherwise indicated)

	Feb-19		Apr-14		Jun-15		Jul-14		Aug-11	
Secchi-depth (m)	---		9.8		1.9		2.0		2.9	
Chlorophyll a, phytoplankton (µg/L)	---		0.330		4.13		4.47		3.00	
Depth of sample (m)	0.5	13.5	0.5	14.0	0.5	14.0	0.5	14.0	0.5	14.0
Water temperature (°C)	5.0	3.7	11.0	9.0	24.0	9.5	25.4	9.6	25.2	11.4
Specific conductance (µS/cm)	431	618	535	539	446	490	465	483	450	478
pH (units)	8.1	7.6	8.1	8.1	8.3	7.8	8.0	7.6	8.1	7.5
Dissolved oxygen (mg/L)	16.1	9.1	10.8	9.9	8.9	2.5	8.4	0.0	8.8	0.0
Phosphorus, total (as P)	0.006	0.008	0.006	0.009	0.010	0.016	0.010	0.022	0.010	0.018
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	1.11	---	---	---	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.244	---	---	---	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.7	---	---	---	---	---	---	---
Nitrogen, total (as N)	---	---	1.8	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	5	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	0.5	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	250	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	47	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	33	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	7.6	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	1.9	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	217	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	35	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	22	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	3.8	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	298	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	0.8	---	---	---	---	---	---	---

2-19-99

4-14-99

6-15-99

7-14-99

8-11-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Lauderdale Lake (Middle) near Lauderdale, Wisconsin.

430309088284800 MIDDLE GENESEE LAKE NEAR OCONOMOWOC, WI

LOCATION.--Lat 43°03'09", long 88°28'48", in NW 1/4 SW 1/4 sec.22, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, 1.8 mi south of Oconomowoc.

PERIOD OF RECORD.--February 1996 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 03, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-7		Jun-2		Jul-6		Aug-3	
Lake stage (ft)	865.46		865.48		866.86		867.02		866.91	
Secchi-depth (m)	---		4.0		5.7		3.7		3.3	
Chlorophyll a, phytoplankton (µg/L)	---		2.14		1.49		2.07		1.15	
Depth of sample (m)	0.5	11.0	0.5	11.5	0.5	11.0	0.5	11.5	0.5	11.0
Water temperature (°C)	4.5	4.1	9.2	8.5	20.2	11.3	26.7	12.7	27.7	13.1
Specific conductance (µS/cm)	357	450	416	415	408	432	415	463	399	461
pH (units)	7.7	7.8	8.2	8.3	8.1	7.7	8.2	7.7	8.3	7.5
Dissolved oxygen (mg/L)	13.8	8.1	11.7	10.9	9.0	0.5	8.0	0.4	8.5	0.0
Phosphorus, total (as P)	<0.005	0.01	0.013	0.016	0.008	0.011	0.007	0.023	0.015	0.041
Phosphorus, ortho, dissolved (as P)	---	---	0.002	---	---	---	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.023	---	---	---	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.141	---	---	---	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.84	---	---	---	---	---	---	---
Nitrogen, total (as N)	---	---	0.86	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	5	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	0.6	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	180	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	29	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	26	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	10	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	1.7	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	164	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	17	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	25	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	1.6	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	228	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	1.0	---	---	---	---	---	---	---

2-10-99

4-07-99

6-02-99

7-06-99

8-03-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Middle Genesee Lake near Oconomowoc, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

05429000 LAKE MONONA AT MADISON, WI

LOCATION.--Lat 43°03'48", long 89°23'49', in SW 1/4 sec.23, T.7 N., R.9 E., Dane County, Hydrologic Unit 07090001, in Brittingham Park, in Madison.

DRAINAGE AREA.--279 mi². Area of Lake Monona, 5.3 mi².

PERIOD OF RECORD.--September 1915 to current year (fragmentary) in reports of the Geological Survey. For 1856 to March 1917 in reports of Wisconsin Railroad Commission, volume 19.

REVISED RECORDS.--WSP 1338: Lake area. WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, datum 3.61 ft higher; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--No estimated daily gage heights. Records good. Lake level regulated by concrete dam with four 12-foot stop-log sections and 12-foot lock at outlet of Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.28 ft, June 19, 1996; minimum observed, 3.22 ft, Jan. 20, 1965, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 5.99 ft, June 13, 14, July 25-27, and 31; minimum recorded, 3.79 ft, Mar. 26.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.93	5.20	4.46	4.00	4.65	4.88	4.07	5.47	5.56	5.83	5.94	5.76
2	4.90	5.20	4.44	4.03	4.68	4.85	4.10	5.41	5.62	5.82	5.89	5.75
3	4.90	5.18	4.42	4.07	4.71	4.74	4.20	5.35	5.61	5.81	5.86	5.74
4	4.89	5.15	4.41	4.07	4.73	4.66	4.31	5.31	5.60	5.79	5.86	5.73
5	4.97	5.14	4.39	4.07	4.75	4.61	4.38	5.26	5.58	5.77	5.84	5.71
6	5.06	5.12	4.38	4.07	4.76	4.54	4.43	5.27	5.60	5.75	5.81	5.68
7	5.06	5.12	4.38	4.07	4.77	4.47	4.48	5.27	5.64	5.71	5.83	5.67
8	5.11	5.12	4.36	4.07	4.78	4.43	4.57	5.21	5.65	5.69	5.82	5.64
9	5.14	5.14	4.34	4.07	4.79	4.40	4.86	5.15	5.68	5.68	5.80	5.60
10	5.17	5.33	4.31	4.07	4.80	4.34	5.00	5.11	5.72	5.64	5.82	5.55
11	5.19	5.35	4.29	4.07	4.87	4.30	5.03	5.09	5.83	5.61	5.81	5.52
12	5.20	5.28	4.28	4.07	4.99	4.25	5.05	5.11	5.86	5.59	5.83	5.49
13	5.19	5.20	4.27	4.07	5.00	4.21	5.08	5.10	5.95	5.56	5.83	5.44
14	5.19	5.13	4.26	4.06	5.02	4.18	5.12	5.10	5.97	5.54	5.81	5.39
15	5.20	5.07	4.24	4.06	5.02	4.14	5.14	5.14	5.95	5.52	5.80	5.36
16	5.20	5.02	4.20	4.06	5.01	4.11	5.13	5.21	5.93	5.50	5.79	5.33
17	5.26	4.96	4.17	4.07	4.99	4.05	5.12	5.62	5.90	5.76	5.78	5.31
18	5.33	4.92	4.16	4.09	4.98	4.01	5.12	5.73	5.90	5.84	5.78	5.28
19	5.31	4.84	4.12	4.09	4.97	3.99	5.13	5.78	5.89	5.85	5.80	5.25
20	5.28	4.79	4.10	4.12	4.95	3.96	5.14	5.80	5.86	5.87	5.80	5.22
21	5.25	4.75	4.06	4.14	4.94	3.91	5.18	5.81	5.84	5.91	5.79	5.17
22	5.23	4.72	4.04	4.23	4.93	3.88	5.37	5.79	5.83	5.89	5.78	5.12
23	5.21	4.67	4.05	4.31	4.92	3.86	5.82	5.76	5.89	5.88	5.81	5.08
24	5.19	4.64	4.05	4.37	4.91	3.83	5.92	5.70	5.90	5.88	5.88	5.04
25	5.18	4.60	4.05	4.40	4.91	3.81	5.89	5.65	5.87	5.89	5.88	5.01
26	5.16	4.56	4.04	4.45	4.91	3.80	5.83	5.62	5.85	5.98	5.87	4.98
27	5.18	4.53	4.04	4.50	4.90	3.85	5.78	5.59	5.83	5.99	5.86	5.04
28	5.20	4.51	4.04	4.54	4.89	3.89	5.73	5.57	5.82	5.97	5.86	5.10
29	5.20	4.49	4.03	4.58	---	3.92	5.64	5.56	5.82	5.94	5.85	5.09
30	5.18	4.48	4.01	4.60	---	3.96	5.55	5.56	5.79	5.93	5.81	5.03
31	5.19	---	4.01	4.63	---	4.02	---	5.55	---	5.97	5.78	---
MEAN	5.15	4.94	4.21	4.20	4.88	4.19	5.07	5.44	5.79	5.79	5.83	5.37
MAX	5.33	5.35	4.46	4.63	5.02	4.88	5.92	5.81	5.97	5.99	5.94	5.76
MIN	4.89	4.48	4.01	4.00	4.65	3.80	4.07	5.09	5.56	5.50	5.78	4.98

425344088070100 BIG MUSKEGO LAKE, BASS BAY, NEAR MUSKEGO, WI

LOCATION.--Lat 42°53'44", long 88°07'01", in SW 1/4 NE 1/4 sec.15, T.5 N., R.20 E., Waukesha County, Hydrologic Unit 07120006, 1.3 mi southeast of Muskego.

PERIOD OF RECORD.--February 1988 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 11 TO JUNE 08, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-11		Apr-21		Jun-8	
Lake stage (ft)	11.87		11.68		11.82	
Secchi-depth (m)	---		4.6		3.4	
Chlorophyll a, phytoplankton (µg/L)	---		2.27		1.83	
Depth of sample (m)	0.5	7.0	0.5	7.0	0.5	7.0
Water temperature (°C)	4.7	3.6	10.0	9.8	25.2	14.9
Specific conductance (µS/cm)	600	715	671	671	583	633
pH (units)	7.7	7.5	8.0	8.0	8.6	7.5
Dissolved oxygen (mg/L)	12.8	9.6	10.7	10.0	8.7	0.6
Phosphorus, total (as P)	0.034	0.060	0.019	0.013	0.013	0.030
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.558	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.078	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.86	---	---	---
Nitrogen, total (as N)	---	---	1.4	---	---	---
Color (Pt-Co. scale)	---	---	20	---	---	---
Turbidity (NTU)	---	---	0.9	---	---	---
Hardness, (as CaCO ₃)	---	---	260	---	---	---
Calcium, dissolved (Ca)	---	---	54	---	---	---
Magnesium, dissolved (Mg)	---	---	30	---	---	---
Sodium, dissolved (Na)	---	---	26	---	---	---
Potassium, dissolved (K)	---	---	2.8	---	---	---
Alkalinity, (as CaCO ₃)	---	---	183	---	---	---
Sulfate, dissolved (SO ₄)	---	---	65	---	---	---
Chloride, dissolved (Cl)	---	---	61	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.31	---	---	---
Solids, dissolved, at 180°C	---	---	432	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	6.8	---	---	---

2-11-99

4-21-99

6-08-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

pH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

WATER-QUALITY DATA, JULY 06 TO AUGUST 04, 1999
(Milligrams per liter unless otherwise indicated)

	Jul-6		Aug-4						
Lake stage (ft)	11.69		11.48						
Secchi-depth (m)	1.2		1.0						
Chlorophyll a, phytoplankton ($\mu\text{g/L}$)	26.8		17.0						
Depth of sample (m)	0.5	7.5	0.5	2.0	4.0	6.0	7.0		
Water temperature ($^{\circ}\text{C}$)	27.5	15.4	27.7	27.6	24.8	17.3	15.8		
Specific conductance ($\mu\text{S/cm}$)	523	645	522	523	550	642	670		
pH (units)	8.4	7.3	8.4	8.2	7.4	7.0	7.0		
Dissolved oxygen (mg/L)	9.9	0.4	8.3	8.4	0.5	0.2	0.2		
Phosphorus, total (as P)	0.030	0.150	0.026	0.028	0.033	0.037	0.078		

7-06-99

8-04-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELCIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELCIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Big Muskego Lake, Bass Bay, near Muskego, Wisconsin.

425109088075000 BIG MUSKEGO LAKE NEAR WIND LAKE, WI

LOCATION.--Lat 42°51'09", long 88°07'50", in SE 1/4 NE 1/4 sec.33, T.5 N., R.20 E., Waukesha County, Hydrologic Unit 07120006, on left bank 8 ft upstream of dam outlet of Muskego Lake, 700 ft north of Muskego Dam Drive, 2 mi northeast of Wind Lake.

DRAINAGE AREA.--28.3 mi².

PERIOD OF RECORD.--October 1987 to September 1989, January 1991 to current year.

GAGE.--Water-stage recorder. Datum of gage is 760.00 ft above sea level. October to December 1987 and January 1991 to September 1995, nonrecording gage at the same datum. December 1987 through September 1989, data collected using water-stage recorder at the same datum.

REMARKS.--Estimated daily gage heights: Dec. 17-20, May 20-26, and June 4, 5. Lake levels regulated by concrete dam with one 5-ft lift gate. Prior to October 1993, published as Muskego Lake Outlet near Wind Lake, WI.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed gage height, 12.60 ft, Oct. 7, 1991 and Aug. 8, 1994; minimum instantaneous, less than 8.72 ft, July 12, 1996 to Feb. 18, 1997, due to drawdown of lake.

EXTREMES FOR CURRENT YEAR.--Maximum observed gage-height, 12.49 ft, June 15; minimum observed, 11.01 ft, Sept. 26.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.61	11.68	11.66	11.67	11.95	11.77	11.74	11.96	11.87	11.83	11.54	11.34
2	11.60	11.71	11.67	11.71	11.95	11.78	11.73	11.90	11.81	11.82	11.52	11.33
3	11.64	11.68	11.68	11.74	11.95	11.79	11.76	11.86	11.82	11.70	11.48	11.32
4	11.65	11.64	11.71	11.73	11.97	11.78	11.76	11.84	11.81	11.68	11.48	11.32
5	11.68	11.63	11.70	11.72	11.96	11.80	11.76	11.82	11.79	11.68	11.47	11.30
6	11.71	11.62	11.72	11.72	11.94	11.82	11.66	11.86	11.77	11.69	11.45	11.30
7	11.72	11.61	11.76	11.71	11.92	11.78	11.68	11.85	11.81	11.68	11.44	11.27
8	11.73	11.62	11.74	11.71	11.88	11.78	11.77	11.92	11.82	11.65	11.47	11.25
9	11.72	11.63	11.73	11.71	11.87	11.80	11.97	11.93	11.79	11.65	11.43	11.22
10	11.71	11.57	11.74	11.71	11.86	11.81	11.86	11.92	11.79	11.65	11.47	11.20
11	11.70	11.81	11.71	11.71	11.87	11.81	11.85	11.90	11.85	11.61	11.47	11.21
12	11.69	11.88	11.72	11.71	11.95	11.81	11.81	12.00	11.92	11.59	11.46	11.19
13	11.68	11.86	11.73	11.72	11.96	11.81	11.79	12.00	12.15	11.56	11.47	11.19
14	11.68	11.84	11.72	11.71	11.94	11.81	11.76	11.94	12.40	11.52	11.47	11.18
15	11.66	11.82	11.70	11.71	11.93	11.80	11.74	11.88	12.47	11.51	11.43	11.19
16	11.67	11.81	11.72	11.71	11.91	11.81	11.79	11.86	12.43	11.49	11.40	11.19
17	11.69	11.78	11.72	11.72	11.88	11.78	11.68	11.91	12.35	11.58	11.41	11.17
18	11.77	11.74	11.72	11.75	11.84	11.87	11.64	11.99	12.26	11.60	11.41	11.16
19	11.81	11.67	11.71	11.74	11.81	11.88	11.63	12.03	12.18	11.61	11.45	11.15
20	11.81	11.69	11.71	11.73	11.77	11.85	11.63	12.02	12.11	11.61	11.43	11.21
21	11.81	11.68	11.70	11.73	11.73	11.88	11.68	11.99	12.04	11.61	11.41	11.19
22	11.77	11.63	11.70	11.85	11.69	11.84	11.82	11.96	11.98	11.61	11.40	11.16
23	11.72	11.66	11.70	11.95	11.67	11.80	12.14	11.93	11.93	11.62	11.41	11.16
24	11.68	11.69	11.69	12.00	11.69	11.83	12.18	11.90	11.90	11.61	11.45	11.17
25	11.65	11.68	11.69	12.02	11.71	11.81	12.22	11.87	11.90	11.61	11.45	11.15
26	11.64	11.68	11.69	12.02	11.73	11.78	12.22	11.84	11.87	11.60	11.43	11.10
27	11.64	11.68	11.68	12.02	11.75	11.76	12.21	11.80	11.86	11.60	11.41	11.17
28	11.66	11.68	11.68	12.02	11.76	11.72	12.19	11.79	11.84	11.57	11.41	11.45
29	11.65	11.65	11.68	12.01	---	11.74	12.09	11.77	11.84	11.54	11.42	11.51
30	11.66	11.68	11.68	11.99	---	11.71	12.01	11.75	11.84	11.54	11.37	11.49
31	11.67	---	11.67	11.97	---	11.66	---	11.73	---	11.54	11.35	---
MEAN	11.69	11.70	11.70	11.80	11.85	11.80	11.86	11.89	11.97	11.62	11.44	11.24
MAX	11.81	11.88	11.76	12.02	11.97	11.88	12.22	12.03	12.47	11.83	11.54	11.51
MIN	11.60	11.57	11.66	11.67	11.67	11.66	11.63	11.73	11.77	11.49	11.35	11.10

425212088072800 BIG MUSKEGO LAKE, SOUTH SITE, NEAR MUSKEGO, WI

LOCATION.--Lat 42°52'12", long 88°07'28", in NW 1/4 NW 1/4 sec.27, T.5 N., R.20 E., Waukesha County. Hydrologic Unit 07120006, near Muskego.

DRAINAGE AREA.--33.9 mi².

PERIOD OF RECORD.--February 1988 to current year.

REMARKS.--Lake sampled at south end of lake at a depth of about 1 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 11 TO AUGUST 04, 1999

(Milligrams per liter unless otherwise indicated)

	Feb-11	Apr-21	Jun-8	Jul-6	Aug-4
Lake stage (ft)	11.87	11.68	11.82	11.69	11.48
Secchi-depth (m)	---	>1.00	>1.00	>1.00	>1.00
Chlorophyll a, phytoplankton (µg/L)	---	14.50	1.27	5.52	3.40
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	10.0	26.8	29.0	26.7	26.8
Specific conductance (µS/cm)	624	556	522	559	557
pH (units)	7.9	8.0	7.8	8.1	8.1
Dissolved oxygen (mg/L)	10.7	5.3	6.7	9.8	9.8
Phosphorus, total (as P)	0.024	0.032	0.033	0.027	0.035
Phosphorus, ortho, dissolved (as P)	---	<0.002	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	0.02	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	0.105	---	---	---
Nitrogen, amm. + org., total (as N)	---	1.3	---	---	---
Nitrogen, total (as N)	---	1.4	---	---	---
Color (Pt-Co. scale)	---	30	---	---	---
Turbidity (NTU)	---	3.7	---	---	---
Hardness, (as CaCO ₃)	---	240	---	---	---
Calcium, dissolved (Ca)	---	55	---	---	---
Magnesium, dissolved (Mg)	---	25	---	---	---
Sodium, dissolved (Na)	---	25	---	---	---
Potassium, dissolved (K)	---	2.6	---	---	---
Alkalinity, (as CaCO ₃)	---	202	---	---	---
Sulfate, dissolved (SO ₄)	---	39	---	---	---
Chloride, dissolved (Cl)	---	54	---	---	---
Silica, dissolved (SiO ₂)	---	1.5	---	---	---
Solids, dissolved, at 180°C	---	368	---	---	---
Iron, dissolved (Fe) µg/L	---	10	---	---	---
Manganese, dissolved (Mn) µg/L	---	20	---	---	---
	2-11-99	4-21-99	6-08-99	7-06-99	8-04-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Big Muskego Lake, South Site, near Muskego, Wisconsin.
(Triangles indicate maximum depth at sampling site. Actual Secchi depth on these days was greater than plotted triangles.)

461224091033200 NAMEKAGON LAKES, GARDEN LAKE, NEAR CABLE, WI

LOCATION.--Lat 46°12'24", long 91°03'32", in NW 1/4 SE 1/4 sec.13, T.43 N., R.6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of Garden Lake. Lake ice-covered during March measurements. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 04 TO AUGUST 17, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-4		Apr-20		Jun-2		Jul-7		Aug-17	
Lake stage (ft)	---	---	8.75	---	8.43	---	8.75	---	8.80	---
Secchi-depth (m)	---	---	2.2	---	1.8	---	1.8	---	1.1	---
Chlorophyll a, phytoplankton (µg/L)	---	---	2.25	---	3.53	---	4.11	---	3.17	---
Depth of sample (m)	0.5	6.0	0.5	6.0	0.5	6.0	0.5	5.5	0.5	6.0
Water temperature (°C)	0.2	4.7	6.6	6.4	15.6	13.7	22.4	19.9	20.5	19.9
Specific conductance (µS/cm)	100	126	91	91	89	92	87	91	83	83
pH (units)	7.2	6.8	7.1	7.1	7.7	7.0	7.9	7.2	7.4	7.2
Dissolved oxygen (mg/L)	11.7	2.9	10.3	10.6	8.3	3.4	8.1	4.2	7.4	5.5
Phosphorus, total (as P)	0.020	0.121	0.022	0.021	0.026	0.028	0.033	0.027	0.045	0.054
Phosphorus, ortho, dissolved (as P)	---	---	0.007	---	---	---	0.004	---	---	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	0.127	---	---	---	0.012	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.013	---	---	---	0.019	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.39	---	---	---	0.59	---	---	---
Nitrogen, total (as N)	---	---	0.52	---	---	---	0.6	---	---	---
Color (Pt-Co. scale)	---	---	50	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	2	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	45	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	12	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	3.6	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	1.9	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	0.9	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	41	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	<45	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	1.9	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	14	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	80	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	330	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	180	---	---	---	---	---	---	---

3-04-99

4-20-99

6-02-99

7-07-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lake (Garden) near Cable, Wisconsin.

461457091065900 NAMEKAGON LAKES, JACKSON LAKE, NEAR CABLE, WI

LOCATION.--Lat 46°14'57", long 91°06'59", in NE 1/4 SE 1/4 sec.33, T.44 N., R.6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of Jackson Lake. Lake ice-covered during March measurements. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 03 TO AUGUST 17, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-3		Apr-20		Jun-2		Jul-7		Aug-17	
Lake stage (ft)	---	---	8.75	---	8.43	---	8.75	---	8.80	---
Secchi-depth (m)	---	---	1.3	---	1.3	---	1.4	---	0.8	---
Chlorophyll a, phytoplankton (mg/L)	---	---	9.97	---	5.62	---	15.9	---	18.0	---
Depth of sample (m)	0.5	3.0	0.5	3.0	0.5	3.5	0.5	3.5	0.5	3.5
Water temperature (oC)	0.0	4.6	8.4	7.1	15.4	14.0	23.9	22.0	20.6	20.3
Specific conductance (mS/cm)	84	112	66	66	62	62	64	72	60	61
pH (units)	6.4	6.6	7.0	6.8	7.2	6.9	7.4	6.7	7.2	7.0
Dissolved oxygen (mg/L)	6.9	0.4	9.1	8.3	7.7	6.5	7.4	1.6	6.9	6.3
Phosphorus, total (as P)	0.039	0.061	0.041	0.039	0.044	0.039	0.034	0.037	0.062	0.054
Phosphorus, ortho, dissolved (as P)	---	---	0.006	---	---	---	0.004	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.143	---	---	---	<0.010	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.023	---	---	---	0.016	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.72	---	---	---	0.81	---	---	---
Nitrogen, total (as N)	---	---	0.86	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	60	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	3.9	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	30	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	8	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	2.5	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	2.3	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	0.7	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	27	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	4.5	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	2.7	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	9	---	---	---	---	---	---	---
Solids, dissolved, at 180oC	---	---	68	---	---	---	---	---	---	---
Iron, dissolved (Fe) mg/L	---	---	880	---	---	---	---	---	---	---
Manganese, dissolved (Mn) mg/L	---	---	78	---	---	---	---	---	---	---

3-03-99

4-20-99

6-02-99

7-07-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

PH, IN STANDARD UNITS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lake (Jackson) near Cable, Wisconsin.

461308091065100 NAMEKAGON LAKE, DEEP HOLE, NEAR CABLE, WI

LOCATION.--Lat 46°13'08", long 91°06'51", in NE 1/4 SE 1/4 sec.9, T.43 N., R.6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled near center of the lake at the deep hole. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 04 TO AUGUST 17, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-3		Apr-20		Jun-2		Jul-7		Aug-17		
	-----		-----		-----		-----		-----		
Lake stage (ft)	---		8.75		8.43		8.75		8.80		
Secchi-depth (m)	---		3.2		3.8		2.3		1.6		
Chlorophyll a, phytoplankton (µg/L)	---		2.34		2.81		4.03		12.0		
Depth of sample (m)	0.5	9.5	0.5	14.0	0.5	14.0	0.5	14.0	0.5	10.0	14.0
Water temperature (°C)	0.2	3.8	6.0	5.5	15.1	10.0	22.1	13.0	20.7	16.7	14.3
Specific conductance (µS/cm)	98	109	97	98	95	108	93	126	91	119	146
pH (units)	7.1	5.2	7.3	7.1	7.6	6.7	7.8	7.1	7.6	6.9	7.2
Dissolved oxygen (mg/L)	12.1	5.3	10.2	8.9	8.4	0.3	8.2	0.1	7.8	0.3	0.1
Phosphorus, total (as P)	0.018	0.018	0.011	0.015	0.017	0.045	0.024	0.152	0.031	0.046	0.035
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	0.003	---	---	---	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	0.09	---	---	---	<0.010	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.015	---	---	---	<0.013	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.33	---	---	---	0.46	---	---	---	---
Nitrogen, total (as N)	---	---	0.42	---	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	15	---	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.1	---	---	---	---	---	---	---	---
Hardness, (as CaCO3)	---	---	45	---	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	12	---	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	3.6	---	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	2.4	---	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	0.6	---	---	---	---	---	---	---	---
Alkalinity, (as CaCO3)	---	---	55	---	---	---	---	---	---	---	---
Sulfate, dissolved (SO4)	---	---	<4.5	---	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	2.8	---	---	---	---	---	---	---	---
Silica, dissolved (SiO2)	---	---	12	---	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	72	---	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	70	---	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	45	---	---	---	---	---	---	---	---

3-03-99

4-20-99

6-02-99

7-07-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lake, Deep Hole, near Cable, Wisconsin.

461228091044300 NAMEKAGON LAKE, EAST BASIN, NEAR CABLE, WI

LOCATION.--Lat 46°12'28", long 91°04'43", in NW 1/4 SE 1/4 sec.14, T.43 N., R.6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of the eastern basin. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 04 TO AUGUST 17, 1999
(Milligrams per liter unless otherwise indicated)

	Mar-4	Apr-20	Jun-2	Jul-7	Aug-17
Lake stage (ft)	---	8.75	8.43	8.75	8.80
Secchi-depth (m)	---	2.0	2.5	2.1	1.3
Chlorophyll a, phytoplankton (µg/L)	---	7.11	4.7	6.95	18.0
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5
Water temperature (°C)	0.1	6.5	15.3	22.4	14.5
Specific conductance (µS/cm)	103	94	94	92	133
pH (units)	7.0	7.3	7.5	7.8	7.2
Dissolved oxygen (mg/L)	10.6	10.5	8.3	7.8	0.1
Phosphorus, total (as P)	0.026	0.021	0.021	0.020	0.040

3-04-99

4-20-99

6-02-99

7-07-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lake, East Basin, near Cable, Wisconsin.

461410091050700 NAMEKAGON LAKE, NORTHEAST BASIN, NEAR CABLE, WI

LOCATION.--Lat 46°14'10", long 91°05'07", in SE 1/4 NW 1/4 sec.2, T.43 N., R.6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of the northeast bay. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 03 TO AUGUST 17, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-3		Apr-20		Jun-2		Jul-7		Aug-17	
Lake stage (ft)	---		8.75		8.43		8.75		8.80	
Secchi-depth (m)	---		2.3		3.0		2.4		1.3	
Chlorophyll a, phytoplankton (µg/L)	---		5.04		3.16		5.21		18	
Depth of sample (m)	0.5	11.5	0.5	11.5	0.5	10.0	0.5	11.0	0.5	10.0
Water temperature (°C)	0.4	4.6	6.9	15.7	9.0	22.9	11.3	21.1	12.8	12.8
Specific conductance (µS/cm)	97	140	89	92	102	89	123	85	139	139
pH (units)	7.0	7.2	7.2	7.5	6.6	7.6	7.1	7.7	7.1	7.1
Dissolved oxygen (mg/L)	11.6	0.7	10.3	8.2	0.3	7.5	0.1	8.0	0.2	0.2
Phosphorus, total (as P)	0.015	0.032	0.018	0.019	0.034	0.130	0.164	0.038	0.265	0.265

3-03-99

4-20-99

6-02-99

7-07-99

8-17-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lake, Northeast Basin, near Cable, Wisconsin.

430551088273500 OCONOMOWOC LAKE NO. 1 (CENTER) AT OCONOMOWOC, WI

LOCATION.--Lat 43°05'51", long 88°27'35", in NW 1/4 SE 1/4 sec.2, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

PERIOD OF RECORD.--March 1986 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 09, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-20		Jun-17		Jul-12		Aug-9	
Lake stage (ft)	7.10		8.17		8.04		7.99		8.04	
Secchi-depth (m)	---		2.0		3.1		2.1		1.9	
Chlorophyll a, phytoplankton (mg/L)	---		5.73		1.52		1.94		2.62	
Depth of sample (m)	0.5	18.0	0.5	17.5	0.5	17.5	0.5	18.0	0.5	11.0
Water temperature (°C)	3.6	2.9	9.3	7.1	22.0	8.7	26.6	8.6	24.4	11.5
Specific conductance (mS/cm)	550	664	565	572	517	566	528	579	500	567
pH (units)	7.7	7.8	8.4	8.0	8.0	7.5	8.2	7.6	8.1	7.6
Dissolved oxygen (mg/L)	13.8	10.3	13.0	9.1	9.3	0.9	8.8	0.0	8.3	0.4
Phosphorus, total (as P)	<0.005	0.010	0.010	0.009	0.009	0.045	0.008	0.029	0.016	0.020
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.241	---	---	---	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	<0.013	---	---	---	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.54	---	---	---	---	---	---	---
Nitrogen, total (as N)	---	---	0.78	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.4	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	240	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	44	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	31	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	15	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	2	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	221	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	25	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	36	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	5.3	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	318	---	---	---	---	---	---	---
Iron, dissolved (Fe) mg/L	---	---	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) mg/L	---	---	<0.40	---	---	---	---	---	---	---

2-10-99

4-20-99

6-17-99

7-12-99

8-09-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Oconomowoc Lake, No. 1 (Center) at Oconomowoc, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

430609088262200 OCONOMOWOC LAKE NO. 2 (OFF HEWITT POINT) AT OCONOMOWOC, WI

LOCATION.--Lat 43°06'09", long 88°26'22", in NW 1/4 NW 1/4 sec.1, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

PERIOD OF RECORD.--March 1986 to current year.

REMARKS.--Lake sampled at the deepest point in northeast bay near Hewitt Point. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 09, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-20		Jun-17		Jul-12		Aug-9	
Lake stage (ft)	7.10		8.17		8.04		7.99		8.04	
Secchi-depth (m)	---		4.5		2.7		2.7		2.1	
Chlorophyll a, phytoplankton (µg/L)	---		1.05		0.94		1.73		3.22	
Depth of sample (m)	0.5	14.0	0.5	14.5	0.5	14.5	0.5	14.5	0.5	14.0
Water temperature (°C)	3.0	3.4	9.5	7.8	22.1	8.7	26.4	8.8	24.2	10.7
Specific conductance (µS/cm)	551	615	606	612	544	614	563	630	538	599
pH (units)	8.1	7.8	8.2	8.0	8.2	7.4	8.2	7.5	8.3	7.6
Dissolved oxygen (mg/L)	14.4	9.3	11.6	9.1	9.4	0.6	8.5	0.0	8.5	0.2
Phosphorus, total (as P)	<0.005	0.010	<0.005	0.009	0.008	0.041	0.006	0.053	0.012	0.018
Phosphorus, ortho, dissolved (as P)	---	---	---	---	---	---	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.225	---	---	---	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.09	---	---	---	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.55	---	---	---	---	---	---	---
Nitrogen, total (as N)	---	---	0.77	---	---	---	---	---	---	---

2-10-99

4-20-99

6-17-99

7-12-99

8-09-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Oconomowoc Lake, No. 2 (Hewitt Pt.) at Oconomowoc, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

430723088252100 OKAUCHEE LAKE AT OKAUCHEE, WI

LOCATION.--Lat 43°07'23", long 88°25'21", in SE 1/4 SE 1/4, sec.25, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.
DRAINAGE AREA.--80.7 mi².
PERIOD OF RECORD.--February 1984 to current year.
LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above sea level.
REMARKS.--A detailed water quality management plan has been developed for Okauchee Lake by Southeastern Wisconsin Regional Planning Commission; previous water-quality data are available in this report. Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 10 TO AUGUST 09, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-10		Apr-20		Jun-18		Jul-12		Aug-9		
Lake stage (ft)	4.35		4.65		4.79		4.76		4.78		
Secchi-depth (m)	---		1.7		1.9		1.3		1.3		
Chlorophyll a, phytoplankton (µg/L)	---		13.1		5.08		5.20		7.00		
Depth of sample (m)	0.5	27.5	0.5	28.5	0.5	28	0.5	27.5	0.5	11	26.5
Water temperature (°C)	2.7	2.6	8.9	6.6	21.6	7.5	25.6	7.5	24.4	10.8	7.6
Specific conductance (µS/cm)	740	569	568	577	517	569	541	576	517	562	570
pH (units)	7.9	7.9	8.4	8.1	8.2	7.5	8.0	7.6	8.0	7.7	7.6
Dissolved oxygen (mg/L)	14.5	8.7	13.9	9.8	8.7	0.6	8.4	0.0	7.4	1.0	0.0
Phosphorus, total (as P)	0.007	0.101	0.014	0.014	0.012	0.024	0.012	0.029	0.023	0.018	0.034
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	---	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.378	---	---	---	---	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	<0.013	---	---	---	---	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.66	---	---	---	---	---	---	---	---
Nitrogen, total (as N)	---	---	1.0	---	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	10	---	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	1.3	---	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	260	---	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	50	---	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	32	---	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	13	---	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	1.9	---	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	234	---	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	25	---	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	32	---	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	3.1	---	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	328	---	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	<0.40	---	---	---	---	---	---	---	---

2-10-99

4-20-99

6-18-99

7-12-99

8-09-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake at Okauchee, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

430759088244200 OKAUCHEE LAKE, NO. 1, NEAR OKAUCHEE, WI

LOCATION.--Lat 43°07'59", long 88°24'42", in NE 1/4 NW 1/4 sec.30, T.8 N., R.18 E., Waukesha County, Hydrologic Unit 07090001, near Okauchee.

PERIOD OF RECORD.--April 1986 to current year.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above sea level.

REMARKS.--Lake sampled in Crane's Nest Bay, in the northeast part of the lake, at an approximate depth of 2 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 20 TO AUGUST 09, 1999
(Milligrams per liter unless otherwise indicated)

	Apr-20	Jun-18	Jul-12	Aug-9
Lake stage (ft)	4.65	4.79	4.76	4.78
Secchi-depth (m)	1.4	1.9	1.1	1.5
Chlorophyll a, phytoplankton (µg/L)	15.3	2.69	3.58	10
Depth of sample (m)	0.5	0.5	0.5	0.5
Water temperature (°C)	9.0	21.9	25.9	24.4
Specific conductance (µS/cm)	594	518	547	517
pH (units)	8.6	8.3	8.2	8.3
Dissolved oxygen (mg/L)	14.8	9.0	8.4	7.6
Phosphorus, total (as P)	0.021	0.012	0.011	0.022

430645088264500 OKAUCHEE LAKE, NO. 2, AT OKAUCHEE, WI

LOCATION.--Lat 43°06'45", long 88°26'45", in SE 1/4 NE 1/4 sec.35, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--April 1986 to current year.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above sea level.

REMARKS.--Lake sampled in Lower Okauchee Lake, at an approximate depth of 5 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 20 TO AUGUST 09, 1999
(Milligrams per liter unless otherwise indicated)

	Apr-20	Jun-18	Jul-12	Aug-9
Lake stage (ft)	4.65	4.79	4.76	4.78
Secchi-depth (m)	1.1	1.4	1.6	2.1
Chlorophyll a, phytoplankton (µg/L)	10.5	2.44	4.34	4.10
Depth of sample (m)	0.5	0.5	0.5	0.5
Water temperature (°C)	10.4	22.3	26.5	24.5
Specific conductance (µS/cm)	563	504	520	498
pH (units)	8.5	8.3	8.2	8.1
Dissolved oxygen (mg/L)	13.4	8.7	9.0	7.5
Phosphorus, total (as P)	0.012	0.013	0.013	0.025

430642088252400 OKAUCHEE LAKE, NO. 3, AT OKAUCHEE, WI

LOCATION.--Lat 43°06'42", long 88°25'24", in NE 1/4 SE 1/4 sec.36, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--April 1986 to current year.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above sea level.

REMARKS.--Lake sampled in Ice House Bay, in the southern part of the lake, at an approximate depth of 4 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 20 TO AUGUST 09, 1999
(Milligrams per liter unless otherwise indicated)

	Apr-20	Jun-18	Jul-12	Aug-9
Lake stage (ft)	4.65	4.79	4.76	4.78
Secchi-depth (m)	1.3	1.3	1.3	1.5
Chlorophyll a, phytoplankton (µg/L)	9.61	5.59	6	7.00
Depth of sample (m)	0.5	0.5	0.5	0.5
Water temperature (°C)	9.6	21.7	26.1	24.1
Specific conductance (µS/cm)	560	502	525	500
pH (units)	8.6	8.3	8.2	8.2
Dissolved oxygen (mg/L)	13.4	9.1	8.6	7.6
Phosphorus, total (as P)	0.011	0.019	0.015	0.026

430757088261700 OKAUCHEE LAKE, NO. 4, AT OKAUCHEE, WI

LOCATION.--Lat 43°07'57", long 88°26'17", in NW 1/4 NW 1/4 sec.25, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--June 1986 to current year.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above sea level.

REMARKS.--Lake sampled near McDowell (Crazyman's) Island, in the northwest bay of the lake, at an approximate depth of 2 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 20 TO AUGUST 09, 1999
(Milligrams per liter unless otherwise indicated)

	Apr-20	Jun-18	Jul-12	Aug-9
Lake stage (ft)	4.65	4.79	4.76	4.78
Secchi-depth (m)	1.3	1.7	1.1	1.3
Chlorophyll a, phytoplankton (µg/L)	8.90	2.62	4.42	6.00
Depth of sample (m)	0.5	0.5	0.5	0.5
Water temperature (°C)	9.1	21.9	26.4	23.9
Specific conductance (µS/cm)	569	517	540	513
pH (units)	8.5	8.3	8.1	8.4
Dissolved oxygen (mg/L)	13.1	8.5	7.7	8.1
Phosphorus, total (as P)	0.011	0.015	0.011	0.021

424905088204000 POTTER LAKE NEAR MUKWONAGO, WI

LOCATION.--Lat 42°49'05", long 88°20'40", in NW 1/4 SW 1/4 sec.11, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, 3.3 mi south of Mukwonago.

PERIOD OF RECORD.--February 1993 to current year.

REMARKS.--Lake sampled at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 11 TO AUGUST 05, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-11		Apr-21		Jun-11		Jul-8		Aug-5	
Lake stage (ft)	8.31		8.13		8.27		7.96		7.64	
Secchi-depth (m)	---		3.2		1.1		0.7		1.1	
Chlorophyll a, phytoplankton (µg/L)	---		1.91		7.74		19.6		8.00	
Depth of sample (m)	0.5	6.5	0.5	7.0	0.5	7.0	0.5	7.0	0.5	7.0
Water temperature (°C)	5.4	4.7	11.2	10.7	26.9	15.8	26.8	15.9	26.9	21.5
Specific conductance (µS/cm)	452	508	486	487	445	513	444	531	479	564
pH (units)	7.6	7.4	8.1	8.0	8.3	7.4	8.1	6.9	8.1	6.7
Dissolved oxygen (mg/L)	10.6	4.5	11.2	10.7	9.1	0.6	8.2	0.5	7.8	0.2
Phosphorus, total (as P)	0.051	0.228	0.017	0.034	0.022	0.047	0.046	0.062	0.041	0.048
Phosphorus, ortho, dissolved (as P)	---	---	0.011	---	---	---	0.018	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.048	---	---	---	0.021	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.196	---	---	---	0.048	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	1.3	---	---	---	1.7	---	---	---
Nitrogen, total (as N)	---	---	1.3	---	---	---	1.8	---	---	---
Color (Pt-Co. scale)	---	---	15	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	0.90	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	180	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	40	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	20	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	20	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	2.2	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	171	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	7.6	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	45	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.16	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	272	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	20	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	4.9	---	---	---	---	---	---	---

2-11-99

4-21-99

6-11-99

7-08-99

8-05-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll *a* concentrations, Secchi depths, and TSI data for Potter Lake near Mukwonago, Wisconsin.

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LOCATION.--Lat 42°32'46", long 88°17'58", in NW 1/4 SE 1/4 sec.13, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at Powers Lake.

DRAINAGE AREA.--3.42 mi².

PERIOD OF RECORD.--March 1986 to August 1996, and April 1998 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 04, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-19		Apr-14		Jun-10		Jul-7		Aug-4		
Lake stage (ft)	10.13		10.00		10.23		10.22		9.83		
Secchi-depth (m)	---		6.1		3.1		3.3		1.9		
Chlorophyll a, phytoplankton (µg/L)	---		2.57		2.77		3.12		2.81		
Depth of sample (m)	0.5	9.0	0.5	10.0	0.5	10.0	0.5	10.0	0.5	8.0	9.5
Water temperature (°C)	4.9	3.8	11.9	9.4	25.6	13.7	26	14	27.1	19.3	14.6
Specific conductance (µS/cm)	415	518	507	511	482	528	446	524	455	490	530
pH (units)	7.8	7.9	8.2	8.1	8.2	7.5	8.2	7.5	8.1	7.3	7.2
Dissolved oxygen (mg/L)	18.6	15.1	10.7	9.4	9.2	0.6	8.2	0.4	8.1	0.6	0.0
Phosphorus, total (as P)	0.011	0.009	0.010	0.013	0.012	0.024	0.013	0.084	0.019	0.024	0.061
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	0.002	---	---	---	---
Nitrogen, NO2 + NO3, diss. (as N)	---	---	0.07	---	---	---	<0.010	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.037	---	---	---	0.016	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.6	---	---	---	0.58	---	---	---	---
Nitrogen, total (as N)	---	---	0.67	---	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	5	---	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	0.5	---	---	---	---	---	---	---	---
Hardness, (as CaCO3)	---	---	220	---	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	36	---	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	31	---	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	17	---	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	2.3	---	---	---	---	---	---	---	---
Alkalinity, (as CaCO3)	---	---	183	---	---	---	---	---	---	---	---
Sulfate, dissolved (SO4)	---	---	31	---	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	38	---	---	---	---	---	---	---	---
Silica, dissolved (SiO2)	---	---	5.8	---	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	282	---	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	1.9	---	---	---	---	---	---	---	---

2-19-99

4-14-99

6-10-99

7-07-99

8-04-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Powers Lake at Powers Lake, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

05334000 SHELL LAKE AT SHELL LAKE, WI

LOCATION--Lat 45°44'46", long 91°55'00", in NE 1/4 sec.25, T.38 N., R.13 W., Washburn County, Hydrologic Unit 07030001, 500 ft east of Peterson Boat Factory in the village of Shell Lake.

DRAINAGE AREA.--26.0 mi². Area of Shell Lake, 3,200 acres.

PERIOD OF RECORD.--August 1936 to September 1999.

REVISED RECORD.--WDR WI-80-1: Drainage area.

GAGE.--Nonrecording gage. Datum of gage is 1,215.88 ft ft, National Geodetic Vertical Datum of 1929. May 3, 1952 to Apr. 21, 1961, 2.3 mi southeast of village of Shell Lake at same datum.

REMARKS.--Stage measured on the west side of lake intermittently by an observer from 1936 to 1998. In 1998-99 water year, stage was continuously measured during non-freezing periods.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 6.31 ft, June 27, 1998; minimum observed, -0.92 ft, Nov. 28, 1949.

EXTREMES FOR CURRENT PERIOD.--1998 water year: Maximum gage height observed, 6.31, June 27; minimum observed, 5.32 ft, Sept. 24. 1999 water year: Maximum gage height observed, 5.34, Oct. 1; minimum observed, 3.40 ft, Sept. 29, 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998 DAILY MEAN VALUE

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	6.22	6.24	5.79	5.70
2	---	---	---	---	---	---	6.28	---	6.22	6.24	5.77	5.68
3	---	---	---	---	---	---	---	---	6.20	6.23	5.78	5.67
4	---	---	---	---	---	---	---	---	6.18	6.21	5.78	5.64
5	---	---	---	---	---	---	---	6.18	6.16	6.19	5.77	5.62
6	5.90	---	---	---	---	---	---	6.17	6.14	6.21	5.77	5.61
7	---	---	---	---	---	---	---	6.17	6.13	6.22	5.77	5.59
8	---	---	---	---	---	---	---	6.16	6.12	6.21	5.79	5.57
9	---	---	---	---	---	---	---	6.15	6.11	6.20	5.78	5.55
10	---	---	---	---	---	---	6.34	6.14	6.10	6.19	5.76	5.53
11	---	---	---	---	---	---	---	6.13	6.11	6.18	5.74	5.50
12	---	5.67	---	---	---	---	---	6.12	6.14	6.16	5.72	5.50
13	5.96	---	---	---	---	---	---	6.12	6.14	6.15	5.71	5.49
14	---	---	---	---	---	---	---	6.11	6.13	6.14	5.69	5.48
15	---	---	---	---	---	---	---	6.12	6.13	6.17	5.67	5.47
16	---	---	---	---	---	---	---	6.16	6.12	6.15	5.65	5.45
17	---	5.65	---	---	---	---	---	6.15	6.11	6.13	5.83	5.44
18	---	---	---	---	---	---	---	6.16	6.14	6.11	5.83	5.42
19	---	---	---	---	---	---	---	6.22	6.21	6.09	5.80	5.41
20	5.84	---	---	---	5.79	---	6.38	6.21	6.24	6.07	5.83	5.41
21	---	---	---	---	---	---	---	6.20	6.25	6.05	5.82	5.38
22	5.78	---	---	---	---	---	---	6.18	6.23	6.03	5.83	5.37
23	---	---	---	---	---	---	---	6.16	6.22	5.99	5.85	5.34
24	---	---	---	---	---	---	---	6.14	6.23	5.95	5.84	5.32
25	---	---	---	---	---	---	---	6.12	6.26	5.93	5.82	5.34
26	---	---	---	---	---	---	---	6.12	6.26	5.91	5.80	5.40
27	---	---	---	---	---	---	6.30	6.11	6.31	5.90	5.79	5.39
28	5.72	---	---	---	---	---	---	6.10	6.29	5.88	5.78	5.38
29	---	---	---	---	---	---	---	6.09	6.27	5.85	5.76	5.36
30	---	---	---	---	---	---	---	6.14	6.25	5.82	5.74	5.36
31	---	---	---	---	---	---	---	6.25	---	5.80	5.72	---
TOTAL	---	---	---	---	---	---	---	---	185.62	188.60	178.98	164.37
MEAN	---	---	---	---	---	---	---	---	6.19	6.08	5.77	5.48
MAX	---	---	---	---	---	---	---	---	6.31	6.24	5.85	5.70
MIN	---	---	---	---	---	---	---	---	6.10	5.80	5.65	5.32

05334000 SHELL LAKE AT SHELL LAKE, WI--CONTINUED

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.34	5.23	5.19	---	4.78	4.62	4.44	4.27	4.09	3.92	3.74	3.56
2	5.32	5.22	5.18	---	4.77	4.61	4.44	4.26	4.09	3.91	3.74	3.56
3	5.30	5.21	5.18	---	4.77	4.61	4.43	4.26	4.08	3.91	3.73	3.55
4	5.28	5.19	5.18	---	4.76	4.60	4.42	4.25	4.07	3.90	3.72	3.55
5	5.27	5.19	5.24	5.19	4.76	4.60	4.42	4.25	4.07	3.90	3.72	3.54
6	5.30	5.18	5.24	---	4.75	4.59	4.41	4.24	4.06	3.89	3.71	3.53
7	5.29	5.17	5.24	---	4.75	4.59	4.41	4.24	4.06	3.88	3.71	3.53
8	5.28	5.16	5.23	---	4.74	4.58	4.40	4.23	4.05	3.88	3.70	3.52
9	5.26	5.15	5.22	---	4.73	4.57	4.40	4.22	4.05	3.87	3.70	3.52
10	5.25	5.20	5.22	5.20	4.73	4.57	4.39	4.22	4.04	3.87	3.69	3.51
11	5.24	5.21	5.21	---	4.72	4.56	4.38	4.21	4.03	3.86	3.68	3.51
12	5.23	5.21	---	---	4.72	4.56	4.38	4.21	4.03	3.86	3.68	3.50
13	5.22	5.20	---	---	4.71	4.55	4.37	4.20	4.02	3.85	3.67	3.49
14	5.21	5.19	---	---	4.71	4.55	4.37	4.19	4.02	3.84	3.67	3.49
15	5.18	5.18	---	---	4.70	4.54	4.36	4.19	4.01	3.84	3.66	3.48
16	5.21	5.18	---	---	4.69	4.53	4.36	4.18	4.01	3.83	3.66	3.48
17	5.31	5.17	---	5.20	4.69	4.53	4.35	4.18	4.00	3.83	3.65	3.47
18	5.33	5.19	---	---	4.68	4.52	4.34	4.17	3.99	3.82	3.64	3.47
19	5.32	5.21	---	---	4.68	4.52	4.34	4.17	3.99	3.82	3.64	3.46
20	5.31	5.21	---	---	4.67	4.51	4.33	4.16	3.98	3.81	3.63	3.45
21	5.31	5.21	---	---	4.67	4.50	4.33	4.15	3.98	3.80	3.63	3.45
22	5.29	5.20	---	---	4.66	4.50	4.32	4.15	3.97	3.80	3.62	3.44
23	5.27	5.20	---	---	4.65	4.49	4.32	4.14	3.97	3.79	3.61	3.44
24	5.26	5.20	---	5.23	4.65	4.49	4.31	4.14	3.96	3.79	3.61	3.43
25	5.27	5.20	---	---	4.64	4.48	4.30	4.13	3.95	3.78	3.60	3.43
26	5.26	5.20	---	---	4.64	4.48	4.30	4.13	3.95	3.78	3.60	3.42
27	5.26	5.20	---	---	4.63	4.47	4.29	4.12	3.94	3.77	3.59	3.41
28	5.26	5.19	---	---	4.63	4.46	4.29	4.11	3.94	3.76	3.59	3.41
29	5.25	5.19	---	---	---	4.46	4.28	4.11	3.93	3.76	3.58	3.40
30	5.25	5.19	---	---	---	4.45	4.28	4.10	3.93	3.75	3.57	3.40
31	5.25	---	---	5.26	---	4.45	---	4.10	---	3.75	3.57	---
TOTAL	163.38	155.83	---	---	131.68	140.54	130.76	129.68	120.26	118.82	113.31	104.40
MEAN	5.27	5.19	---	---	4.70	4.53	4.36	4.18	4.01	3.83	3.66	3.48
MAX	5.34	5.23	---	---	4.78	4.62	4.44	4.27	4.09	3.92	3.74	3.56
MIN	5.18	5.15	---	---	4.63	4.45	4.28	4.10	3.93	3.75	3.57	3.40

423153088184800 TOMBEAU LAKE NEAR POWERS LAKE, WI

LOCATION.--Lat 42°31'53", long 88°18'48", in SE 1/4 NE 1/4 sec.24, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, 1.5 mi south-west of Powers Lake.

PERIOD OF RECORD.--May 1998 to current year.

REMARKS.--Lake sampled near center at deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 15 TO AUGUST 04, 1999 (Milligrams per liter unless otherwise indicated)

	Apr-15		Jun-10		Jul-7		Aug-4	
Lake stage (ft)	825.09		826.26		825.65		825.71	
Secchi-depth (m)	2.4		2.3		1.7		2.3	
Chlorophyll a, phytoplankton (µg/L)	6.46		4.94		6.72		6.00	
Depth of sample (m)	0.5	8.0	0.5	8.0	0.5	8.5	0.5	8.0
Water temperature (°C)	11.6	7.1	27.8	8.1	27.8	8.0	27.2	9.9
Specific conductance (µS/cm)	637	647	563	668	529	672	542	655
pH (units)	8.2	7.6	8.2	7.8	8.3	7.3	8.3	7.4
Dissolved oxygen (mg/L)	12.1	4.6	9.5	0.7	9.8	0.4	10.8	0.1
Phosphorus, total (as P)	0.028	0.101	0.021	0.014	0.025	0.024	0.024	0.147
Phosphorus, ortho, dissolved (as P)	0.002	---	---	---	0.003	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	1.22	---	---	---	0.283	---	---	---
Nitrogen, ammonia, dissolved (as N)	0.053	---	---	---	0.019	---	---	---
Nitrogen, amm. + org., total (as N)	0.84	---	---	---	0.82	---	---	---
Nitrogen, total (as N)	2.1	---	---	---	1.1	---	---	---
Color (Pt-Co. scale)	15	---	---	---	---	---	---	---
Turbidity (NTU)	1.2	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	280	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	56	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	34	---	---	---	---	---	---	---
Sodium, dissolved (Na)	16	---	---	---	---	---	---	---
Potassium, dissolved (K)	2.5	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	230	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	42	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	41	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	6.8	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	358	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	<10	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	3.6	---	---	---	---	---	---	---

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Tombeau Lake near Powers Lake, Wisconsin.

461321091520900 WHITEFISH LAKE, NORTH SITE, NEAR GORDON, WI

LOCATION.--Lat 46°13'21", long 91°52'09", in NW 1/4 SE 1/4 sec.9, T.43 N., R.12 W., Douglas County, Hydrologic Unit 07030002, near Gordon.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of northern basin. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 03 TO AUGUST 16, 1999

(Milligrams per liter unless otherwise indicated)

	Mar-3	Apr-14	Jun-2	Jul-14	Aug-16	
Lake stage (ft)	---	4.81	4.75	5.08	5.41	
Secchi-depth (m)	---	9.1	8.6	6.4	6.9	
Chlorophyll a, phytoplankton (µg/L)	---	0.53	1.81	1.25	0.74	
Depth of sample (m)	0.5	0.5	0.5	0.5	0.5	16.0
Water temperature (°C)	0.6	7.2	16.4	23.5	22.0	12.4
Specific conductance (µS/cm)	41	38	38	39	37	64
pH (units)	7.4	6.9	7.8	8.1	7.7	6.6
Dissolved oxygen (mg/L)	13.6	13.0	9.4	8.7	8.8	0.1
Phosphorus, total (as P)	<0.005	<0.005	<0.005	<0.005	<0.005	0.044

3-03-99

4-14-99

6-02-99

7-14-99

8-16-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Whitefish Lake, North Site, near Gordon, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

46121091523200 WHITEFISH LAKE, SOUTH BASIN, NEAR GORDON, WI

LOCATION.--Lat 46°12'12", long 91°52'32", in SE 1/4 SW 1/4 sec.16, T.43 N., R.12 W., Douglas County, Hydrologic Unit 07030002, near Gordon.

PERIOD OF RECORD.--March 1998 to current year.

REMARKS.--Lake sampled at deepest part of southern basin. Lake ice-covered during March sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 03 TO AUGUST 16, 1999 (Milligrams per liter unless otherwise indicated)

	Mar-3		Apr-14		Jun-2		Jul-14		Aug-16	
Lake stage (ft)	---	---	4.81	---	4.75	---	5.08	---	5.41	---
Secchi-depth (m)	---	---	9.2	---	9.7	---	7.3	---	6.3	---
Chlorophyll a, phytoplankton (µg/L)	---	---	0.49	---	1.43	---	0.64	---	0.95	---
Depth of sample (m)	0.5	28.0	0.5	27.0	0.5	27.0	0.5	29.0	0.5	13.0
Water temperature (°C)	0.4	3.8	6.7	4.2	15.8	6.3	23.0	6.5	21.8	12.4
Specific conductance (µS/cm)	42	66	37	---	38	40	39	44	37	38
pH (units)	7.1	6.6	6.8	6.6	7.6	6.5	7.9	6.4	7.8	7.3
Dissolved oxygen (mg/L)	14.6	0.7	12.6	10.7	9.2	6.5	8.7	1.1	8.6	9.5
Phosphorus, total (as P)	<0.005	0.149	0.005	0.011	<0.005	0.011	<0.005	0.210	<0.005	0.008
Phosphorus, ortho, dissolved (as P)	---	---	0.004	---	---	---	0.003	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.045	---	---	---	<0.010	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.03	---	---	---	0.005	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	0.29	---	---	---	0.32	---	---	---
Nitrogen, total (as N)	---	---	0.34	---	---	---	---	---	---	---
Color (Pt-Co. scale)	---	---	<5	---	---	---	---	---	---	---
Turbidity (NTU)	---	---	0.7	---	---	---	---	---	---	---
Hardness, (as CaCO ₃)	---	---	18	---	---	---	---	---	---	---
Calcium, dissolved (Ca)	---	---	5	---	---	---	---	---	---	---
Magnesium, dissolved (Mg)	---	---	1.3	---	---	---	---	---	---	---
Sodium, dissolved (Na)	---	---	0.93	---	---	---	---	---	---	---
Potassium, dissolved (K)	---	---	0.6	---	---	---	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	18	---	---	---	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	<2.0	---	---	---	---	---	---	---
Chloride, dissolved (Cl)	---	---	0.5	---	---	---	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.9	---	---	---	---	---	---	---
Solids, dissolved, at 180°C	---	---	28	---	---	---	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	30	---	---	---	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	5.7	---	---	---	---	---	---	---

3-03-99

4-14-99

6-02-99

7-14-99

8-16-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Whitefish Lake, South Site, near Gordon, Wisconsin.

(Circles on the first three plots indicate laboratory detection limit for selected analyses. Actual concentrations for these particular analyses are less than the plotted circles.)

424608088414800 WHITEWATER LAKE NEAR WHITEWATER, WI

LOCATION.--Lat 42°46'08", long 88°41'48", in NW 1/4 NW 1/4 sec.35, T.4 N., R.15 E., Walworth County, Hydrologic Unit 07090001, at outlet, 5.0 mi southeast of Whitewater and 10.0 mi north of Delavan.

DRAINAGE AREA.--10.9 mi², of which 8.5 mi² is non-contributing.

PERIOD OF RECORD.--November 1990 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.00 ft above sea level, revised, (Wisconsin Department of Natural Resources).

REMARKS.--No estimated daily gage heights. Records good. Point of zero flow of dam crest is 10.97 ft. Rainfall data published in 1991 under this station number are now stored under station number 424559088420300.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 11.42 ft, June 18, 19, 1996; minimum daily gage height, 8.89 ft, Oct. 2, 3, 1991.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 11.41 ft, Apr. 24, 25; minimum daily gage height, 10.53 ft, Sept. 25, 26.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999**DAILY MEAN VALUES**

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.92	10.95	11.07	11.08	11.05	11.18	11.06	11.28	11.14	10.95	10.95	10.77
2	10.91	11.00	11.08	11.08	11.05	11.18	11.06	11.32	11.15	10.95	10.92	10.76
3	10.93	11.01	11.08	11.07	11.04	11.16	11.09	11.29	11.19	11.09	10.90	10.76
4	10.94	11.01	11.08	11.07	11.04	11.16	11.14	11.29	11.19	11.10	10.88	10.75
5	10.94	11.00	11.08	11.07	11.04	11.15	11.13	11.27	11.19	11.07	10.87	10.73
6	10.99	11.00	11.09	11.07	11.04	11.17	11.13	11.28	11.19	11.05	10.85	10.72
7	10.98	11.00	11.12	11.07	11.05	11.16	11.12	11.28	11.21	11.05	10.83	10.70
8	11.02	10.94	11.13	11.07	11.05	11.16	11.12	11.25	11.19	11.05	10.83	10.69
9	11.02	10.93	11.12	11.08	11.08	11.17	11.14	11.24	11.17	11.04	10.82	10.67
10	11.03	11.12	11.11	11.08	11.19	11.17	11.19	11.22	11.20	11.02	10.82	10.64
11	11.04	11.13	11.11	11.08	11.22	11.17	11.18	11.21	11.28	11.00	10.81	10.63
12	11.04	11.12	11.11	11.08	11.26	11.17	11.17	11.23	11.25	10.99	10.83	10.62
13	11.02	11.11	11.11	11.08	11.25	11.16	11.16	11.22	11.33	10.98	10.83	10.61
14	11.02	11.11	11.10	11.08	11.24	11.16	11.16	11.20	11.34	10.96	10.82	10.60
15	11.01	11.11	11.10	11.08	11.23	11.16	11.15	11.19	11.30	10.91	10.81	10.58
16	11.01	11.10	11.10	11.08	11.23	11.16	11.16	11.19	11.27	10.90	10.79	10.57
17	10.95	11.05	11.09	11.07	11.22	11.16	11.15	11.25	11.04	10.94	10.78	10.56
18	11.05	10.98	11.10	11.07	11.22	11.14	11.14	11.28	10.99	10.95	10.78	10.56
19	11.05	11.02	11.08	11.07	11.21	11.13	11.13	11.28	10.99	10.94	10.78	10.55
20	11.07	11.02	11.08	11.07	11.20	11.12	11.13	11.26	10.98	10.95	10.78	10.57
21	11.07	11.01	11.08	11.07	11.19	11.12	11.14	11.23	10.98	10.95	10.78	10.57
22	11.06	11.05	11.07	11.07	11.18	11.11	11.20	11.19	10.97	10.95	10.77	10.56
23	11.06	11.05	11.07	11.07	11.17	11.11	11.35	11.18	10.97	10.98	10.77	10.55
24	11.05	11.05	11.07	11.07	11.17	11.10	11.38	11.18	10.97	10.97	10.77	10.54
25	11.05	11.05	11.07	11.07	11.18	11.09	11.36	11.19	10.96	10.97	10.76	10.53
26	11.05	11.05	11.07	11.07	11.18	11.08	11.38	11.17	10.96	10.98	10.76	10.53
27	11.06	11.05	11.06	11.07	11.18	11.08	11.37	11.16	10.96	10.99	10.76	10.55
28	11.06	11.05	11.06	11.07	11.18	11.08	11.36	11.15	10.96	10.98	10.76	10.67
29	11.06	11.05	11.07	11.06	---	11.07	11.33	11.14	10.95	10.98	10.77	10.71
30	11.06	11.07	11.08	11.05	---	11.06	11.32	11.14	10.95	10.97	10.77	10.71
31	11.03	---	11.08	11.05	---	11.07	---	11.14	---	10.97	10.77	---
MEAN	11.02	11.04	11.09	11.07	11.15	11.13	11.20	11.22	11.11	10.99	10.81	10.63
MAX	11.07	11.13	11.13	11.08	11.26	11.18	11.38	11.32	11.34	11.10	10.95	10.77
MIN	10.91	10.93	11.06	11.05	11.04	11.06	11.06	11.14	10.95	10.90	10.76	10.53

424915088083900 WIND LAKE AT WIND LAKE, WI

LOCATION.--Lat 42°49'15", long 88°08'39", in NW 1/4 SW 1/4 sec.9, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

PERIOD OF RECORD.--February 1985 to current year.

REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, FEBRUARY 11 TO JUNE 23, 1999 (Milligrams per liter unless otherwise indicated)

	Feb-11		Apr-8		Jun-23		
Lake stage (ft)	7.23		7.28		8.44		
Secchi-depth (m)	---		1.2		1.7		
Chlorophyll a, phytoplankton (µg/L)	---		10.7		9.61		
Depth of sample (m)	0.5	12.5	0.5	14.5	0.5	5.0	14.0
Water temperature (°C)	4.9	3.1	10.8	10.2	23.5	19.7	13.6
Specific conductance (µS/cm)	605	791	669	680	574	599	665
pH (units)	7.7	7.4	8.2	8.2	7.8	7.2	7.3
Dissolved oxygen (mg/L)	13.5	8.1	10.5	9.5	8.4	1.8	0.4
Phosphorus, total (as P)	0.029	---	0.032	---	0.030	0.036	0.107
Phosphorus, ortho, dissolved (as P)	---	---	<0.002	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	0.31	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	0.122	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	1.2	---	---	---	---
Nitrogen, total (as N)	---	---	1.5	---	---	---	---
Color (Pt-Co. scale)	---	---	20	---	---	---	---
Turbidity (NTU)	---	---	4.4	---	---	---	---
Hardness, (as CaCO ₃)	---	---	250	---	---	---	---
Calcium, dissolved (Ca)	---	---	54	---	---	---	---
Magnesium, dissolved (Mg)	---	---	28	---	---	---	---
Sodium, dissolved (Na)	---	---	38	---	---	---	---
Potassium, dissolved (K)	---	---	3.4	---	---	---	---
Alkalinity, (as CaCO ₃)	---	---	191	---	---	---	---
Sulfate, dissolved (SO ₄)	---	---	47	---	---	---	---
Chloride, dissolved (Cl)	---	---	78	---	---	---	---
Silica, dissolved (SiO ₂)	---	---	0.03	---	---	---	---
Solids, dissolved, at 180°C	---	---	392	---	---	---	---
Iron, dissolved (Fe) µg/L	---	---	<10	---	---	---	---
Manganese, dissolved (Mn) µg/L	---	---	0.7	---	---	---	---

2-11-99

4-08-99

6-23-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELSIUS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS

424915088083900 WIND LAKE AT WIND LAKE, WI--CONTINUED

WATER-QUALITY DATA, JULY 27 TO AUGUST 25, 1999
(Milligrams per liter unless otherwise indicated)

	Jul-27					Aug-25				
Lake stage (ft)	8.13					7.81				
Secchi-depth (m)	1.1					1.1				
Chlorophyll a, phytoplankton (µg/L)	6.00					11.0				
Depth of sample (m)	0.5	2.0	7.0	11.0	15.0	0.5	7.0	10.0	12.0	14.0
Water temperature (°C)	28.0	27.8	20.8	14.2	13.8	22.1	21.3	15.0	14.0	13.8
Specific conductance (µS/cm)	572	571	605	648	658	577	585	657	671	680
pH (units)	8.1	8.2	7.3	7.2	7.2	8.1	7.7	7.0	7.0	7.0
Dissolved oxygen (mg/L)	8.5	8.4	0.0	0.0	0.0	7.6	2.3	0.0	0.0	0.0
Phosphorus, total (as P)	0.033	0.033	0.038	0.100	0.132	0.031	0.034	0.063	0.097	0.113
Phosphorus, ortho, dissolved (as P)	---	---	---	---	---	0.003	---	---	---	---
Nitrogen, NO ₂ + NO ₃ , diss. (as N)	---	---	---	---	---	<0.010	---	---	---	---
Nitrogen, ammonia, dissolved (as N)	---	---	---	---	---	0.009	---	---	---	---
Nitrogen, amm. + org., total (as N)	---	---	---	---	---	1.3	---	---	---	---

7-27-99

8-25-99

DISSOLVED OXYGEN (D.O.), IN MILLIGRAMS PER LITER

WATER TEMPERATURE (W.T.), IN DEGREES CELCIUS

PH, IN STANDARD UNITS

SPECIFIC CONDUCTANCE (S.C.), IN MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELCIUS

Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Wind Lake, Deep Hole, at Wind Lake, Wisconsin.

424848088083100 WIND LAKE OUTLET AT WIND LAKE, WI

LOCATION.--Lat 42°48'48" long 88°08'31", in NE 1/4 NW 1/4 sec.16, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

DRAINAGE AREA.--39.6 mi².

PERIOD OF RECORD.--March 1985 to current year.

REVISED RECORDS.--WDR WI-91-1: 1988(m).

GAGE.--Water-stage recorder and concrete dam. Datum of gage is 760.30 ft above sea level. Prior to Oct. 2, 1987, nonrecording gage at same site and datum.

REMARKS.--No estimated daily gage heights. Records good. Lake level regulated by dam with two 10-foot gates at outlet. Lake ice-covered Dec. 27 to Mar. 17. Prior to October 1987, published as Wind Lake at Wind Lake, Wis.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 8.93 ft, June 15, 1999; minimum recorded, 5.95 ft, Jan. 2, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 8.93 ft, June 15; minimum recorded, 7.07 ft, Mar. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.15	8.19	8.12	7.35	7.33	7.26	7.12	8.21	8.22	8.34	8.05	7.70
2	8.13	8.20	7.98	7.42	7.36	7.30	7.15	8.21	8.24	8.34	8.01	7.69
3	8.15	8.21	7.85	7.51	7.41	7.35	7.20	8.20	8.19	8.34	7.98	7.68
4	8.18	8.21	7.73	7.53	7.42	7.35	7.26	8.13	8.22	8.34	7.96	7.67
5	8.21	8.21	7.60	7.55	7.36	7.35	7.28	8.09	8.25	8.32	7.94	7.66
6	8.26	8.20	7.50	7.58	7.29	7.35	7.30	8.22	8.29	8.30	7.91	7.64
7	8.27	8.19	7.45	7.59	7.20	7.30	7.29	8.31	8.35	8.26	7.90	7.61
8	8.25	8.19	7.34	7.61	7.14	7.27	7.28	8.33	8.37	8.23	7.90	7.60
9	8.20	8.19	7.24	7.63	7.13	7.26	7.44	8.32	8.38	8.22	7.88	7.57
10	8.18	8.34	7.18	7.63	7.14	7.25	7.51	8.28	8.41	8.20	7.89	7.54
11	8.18	8.33	7.18	7.61	7.23	7.22	7.48	8.22	8.47	8.18	7.88	7.52
12	8.19	8.24	7.17	7.61	7.41	7.19	7.36	8.27	8.46	8.17	7.87	7.51
13	8.21	8.16	7.19	7.61	7.41	7.17	7.25	8.31	8.58	8.14	7.88	7.52
14	8.20	8.15	7.20	7.60	7.34	7.17	7.19	8.32	8.82	8.12	7.86	7.50
15	8.22	8.11	7.21	7.58	7.27	7.16	7.22	8.30	8.91	8.09	7.83	7.49
16	8.31	8.04	7.22	7.53	7.22	7.15	7.40	8.30	8.91	8.08	7.81	7.47
17	8.41	8.06	7.23	7.49	7.18	7.21	7.53	8.36	8.84	8.13	7.81	7.46
18	8.41	8.06	7.22	7.44	7.14	7.28	7.64	8.29	8.71	8.15	7.79	7.45
19	8.30	8.08	7.24	7.36	7.14	7.30	7.74	8.24	8.55	8.15	7.82	7.45
20	8.25	8.16	7.24	7.27	7.15	7.34	7.76	8.17	8.40	8.15	7.81	7.46
21	8.24	8.18	7.26	7.22	7.19	7.37	7.79	8.11	8.29	8.15	7.80	7.44
22	8.26	8.18	7.23	7.27	7.19	7.34	7.90	8.15	8.28	8.15	7.79	7.42
23	8.28	8.20	7.24	7.40	7.19	7.31	8.32	8.23	8.44	8.16	7.79	7.41
24	8.29	8.20	7.26	7.61	7.14	7.25	8.51	8.33	8.48	8.16	7.81	7.40
25	8.27	8.21	7.27	7.73	7.15	7.18	8.52	8.38	8.41	8.15	7.81	7.38
26	8.24	8.22	7.28	7.71	7.17	7.12	8.46	8.35	8.32	8.14	7.79	7.37
27	8.17	8.22	7.30	7.60	7.20	7.11	8.37	8.29	8.26	8.13	7.78	7.40
28	8.16	8.21	7.30	7.52	7.24	7.10	8.30	8.25	8.30	8.11	7.78	7.66
29	8.15	8.19	7.33	7.41	---	7.10	8.21	8.20	8.34	8.08	7.76	7.72
30	8.16	8.18	7.34	7.29	---	7.09	8.20	8.18	8.33	8.07	7.73	7.70
31	8.17	---	7.35	7.29	---	7.09	---	8.18	---	8.07	7.71	---
MEAN	8.23	8.18	7.36	7.50	7.24	7.24	7.67	8.25	8.43	8.18	7.85	7.54
MAX	8.41	8.34	8.12	7.73	7.42	7.37	8.52	8.38	8.91	8.34	8.05	7.72
MIN	8.13	8.04	7.17	7.22	7.13	7.09	7.12	8.09	8.19	8.07	7.71	7.37

04082500 LAKE WINNEBAGO AT OSHKOSH, WI

LOCATION.--Lat 44°00'35", long 88°31'38", in NE 1/4 NE 1/4 sec.25, T.18 N., R.16 E., Winnebago County, Hydrologic Unit 04030203, at 905 Bay Shore Drive, 800 ft east of mouth of the upper Fox River.

DRAINAGE AREA.--5,880 mi², at lake outlet at Menasha Dam. Area of Lake Winnebago, 215 mi².

PERIOD OF RECORD.--October 1938 to current year in reports of Geological Survey. Records from 1882 to 1938 in files of Geological Survey and U.S. Army Corps of Engineers. A report on Fox River by U.S. Army Corps of Engineers, published as House Document No. 146, 67th Congress, 2nd session, contains semi-monthly records of inflow of Lake Winnebago for the period 1896-1917.

REVISED RECORD.--WDR WI-83-1: Drainage area.

GAGE.--Water-stage recorder. Nonrecording gage read once daily October 1938 to October 1978. Datum of gage is 745.05 ft above mean tide at New York City (levels by U.S. Army Corps of Engineers). Datum of Deuchman gage is 745.00 ft above mean tide at New York City.

REMARKS.--No estimated daily gage heights. Records good. Lake elevations controlled by dams at Menasha and Neenah, which are operated in the interest of navigation. Crests of both dams are at elevation 746.73 ft. Present limits of regulation are from 21 1/4 in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Oshkosh staff gage gives true level of lake, while Deuchman gage readings are affected by loss of head in the channel between lake and dam. Data-collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.33 ft (Deuchman gage) Nov. 8, 1881; minimum observed, -2.00 ft (Deuchman gage) Nov. 28, 1891.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.22 ft, July 22; minimum recorded, 1.65 ft, Feb. 11 and Mar. 28.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.62	2.79	2.46	2.11	1.85	1.91	1.96	2.63	3.04	2.94	3.04	2.92
2	2.63	2.82	2.45	2.12	1.83	1.89	1.98	2.63	3.06	2.98	3.03	2.93
3	2.67	2.75	2.43	2.15	1.81	1.90	2.11	2.62	3.09	3.00	3.01	2.92
4	2.63	2.69	2.42	2.15	1.80	1.89	2.19	2.62	3.06	3.02	3.01	2.92
5	2.65	2.69	2.40	2.14	1.77	1.86	2.29	2.61	3.00	3.02	3.03	2.90
6	2.65	2.66	2.38	2.14	1.75	1.85	2.13	2.62	2.99	3.07	3.00	2.91
7	2.70	2.66	2.40	2.13	1.73	1.84	2.32	2.64	2.95	3.08	2.94	2.89
8	2.73	2.65	2.36	2.11	1.72	1.84	2.40	2.71	2.98	3.07	2.95	2.83
9	2.71	2.66	2.35	2.10	1.71	1.82	2.52	2.78	2.97	3.03	2.89	2.82
10	2.73	2.51	2.33	2.09	1.70	1.83	2.50	2.78	2.96	3.07	2.87	2.79
11	2.74	2.57	2.31	2.08	1.72	1.83	2.49	2.78	2.99	3.05	2.89	2.81
12	2.69	2.70	2.31	2.08	1.79	1.83	2.52	2.85	2.98	3.01	2.89	2.76
13	2.72	2.68	2.30	2.08	1.80	1.83	2.60	2.85	3.01	2.96	2.93	2.75
14	2.75	2.66	2.27	2.07	1.82	1.82	2.64	2.83	3.00	2.90	2.95	2.74
15	2.74	2.68	2.26	2.05	1.83	1.82	2.67	2.86	2.97	2.89	2.93	2.75
16	2.71	2.69	2.24	2.03	1.85	1.82	2.71	2.87	2.97	2.86	2.89	2.75
17	2.74	2.71	2.24	2.03	1.88	1.79	2.67	3.01	2.95	2.91	2.91	2.74
18	2.67	2.71	2.20	2.05	1.89	1.84	2.68	3.05	2.93	2.88	2.94	2.72
19	2.74	2.55	2.19	2.04	1.88	1.83	2.68	3.12	2.90	2.96	2.96	2.69
20	2.75	2.67	2.21	2.02	1.89	1.82	2.66	3.09	2.87	3.05	2.95	2.73
21	2.75	2.66	2.09	1.99	1.89	1.84	2.64	3.08	2.85	3.19	2.97	2.71
22	2.74	2.60	2.12	2.00	1.89	1.87	2.71	3.10	2.82	3.22	2.97	2.68
23	2.74	2.56	2.15	2.03	1.88	1.85	2.70	3.04	2.82	3.17	2.99	2.70
24	2.73	2.61	2.14	2.04	1.88	1.90	2.61	3.08	2.85	3.12	3.01	2.69
25	2.75	2.55	2.13	2.03	1.89	1.91	2.60	3.05	2.86	3.09	3.02	2.66
26	2.76	2.56	2.13	2.01	1.88	1.91	2.59	3.04	2.84	3.00	3.02	2.64
27	2.77	2.54	2.12	1.98	1.89	1.92	2.60	3.01	2.86	2.97	3.01	2.73
28	2.79	2.52	2.12	1.96	1.90	1.89	2.60	3.01	2.95	2.94	3.01	2.77
29	2.78	2.50	2.12	1.93	---	1.91	2.58	3.00	2.95	2.96	3.04	2.77
30	2.75	2.43	2.12	1.90	---	1.95	2.60	2.99	2.93	2.98	2.97	2.71
31	2.78	---	2.12	1.88	---	1.94	---	2.97	---	3.00	2.92	---
MEAN	2.72	2.63	2.25	2.05	1.83	1.86	2.50	2.88	2.95	3.01	2.97	2.78
MAX	2.79	2.82	2.46	2.15	1.90	1.95	2.71	3.12	3.09	3.22	3.04	2.93
MIN	2.62	2.43	2.09	1.88	1.70	1.79	1.96	2.61	2.82	2.86	2.87	2.64

04084255 LAKE WINNEBAGO NEAR STOCKBRIDGE, WI

LOCATION.--Lat 44°04'17", long 88°19'52", Stockbridge Indian Reservation, Calumet County, Hydrologic Unit 04030203, on east shore of Lake Winnebago, 300 ft south of County Highway E and 1.6 mi west of Stockbridge.

DRAINAGE AREA.--5,880 mi², at lake outlet at Menasha Dam. Area of Lake Winnebago, 215 mi².

PERIOD OF RECORD.--November 1982 to current year.

GAGE.--Water-stage recorder. Datum of gage is 745.05 ft above mean tide of New York City (levels by U. S. Army Corps of Engineers).

REMARKS.--No estimated daily gage heights. Records good. Lake elevations controlled by dams at Menasha and Neenah, which are operated in the interest of navigation. Crests of both dams are at elevation 746.73 ft. Present limits of regulation are from 21 1/4 in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily mean gage height, 3.85 ft, July 9, 11, 1993; minimum observed, 0.30 ft, Mar. 1, 1986.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.21 ft, July 9; minimum recorded, 1.60 ft, Feb. 8.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.63	2.67	2.50	2.07	1.80	1.87	1.91	2.59	2.96	2.99	3.01	2.88
2	2.58	2.55	2.42	2.09	1.79	1.85	1.93	2.59	3.02	3.01	3.00	2.89
3	2.48	2.57	2.39	2.13	1.76	1.87	2.00	2.56	3.04	3.03	3.01	2.88
4	2.49	2.63	2.37	2.11	1.77	1.84	2.12	2.53	3.00	3.09	3.03	2.87
5	2.48	2.64	2.36	2.10	1.73	1.82	2.15	2.49	2.98	3.13	3.02	2.88
6	2.65	2.65	2.38	2.10	1.71	1.81	2.27	2.65	2.98	3.20	2.95	2.87
7	2.72	2.62	2.37	2.08	1.69	1.80	2.32	2.80	3.02	3.17	2.90	2.85
8	2.68	2.62	2.38	2.07	1.67	1.78	2.29	2.76	2.97	3.08	2.85	2.86
9	2.69	2.59	2.36	2.06	1.68	1.77	2.21	2.74	2.95	3.21	2.86	2.89
10	2.70	2.91	2.37	2.06	1.66	1.79	2.33	2.69	2.97	3.18	2.86	2.86
11	2.69	2.89	2.36	2.04	1.68	1.80	2.38	2.70	3.00	3.17	2.85	2.75
12	2.74	2.71	2.29	2.04	1.77	1.79	2.54	2.68	3.00	3.15	2.85	2.75
13	2.78	2.66	2.26	2.04	1.77	1.79	2.59	2.68	3.00	3.14	2.86	2.82
14	2.69	2.67	2.28	2.02	1.77	1.78	2.61	2.76	2.99	3.13	2.89	2.79
15	2.65	2.70	2.27	2.00	1.79	1.78	2.61	2.81	3.01	3.06	2.90	2.72
16	2.67	2.63	2.23	1.99	1.82	1.77	2.55	2.84	2.97	3.03	2.93	2.69
17	2.73	2.68	2.24	1.99	1.84	1.79	2.61	2.99	2.96	3.03	2.91	2.69
18	2.85	2.63	2.17	2.02	1.84	1.84	2.65	3.09	2.94	3.02	2.86	2.70
19	2.81	2.78	2.19	2.00	1.84	1.78	2.65	3.08	2.89	3.09	2.88	2.69
20	2.79	2.73	2.14	1.97	1.85	1.78	2.63	3.06	2.86	3.07	2.91	2.66
21	2.71	2.66	2.20	1.95	1.85	1.82	2.56	3.06	2.84	3.17	2.94	2.65
22	2.73	2.64	2.19	1.96	1.84	1.84	2.40	3.03	2.84	3.19	2.96	2.69
23	2.73	2.65	2.11	2.00	1.83	1.87	2.44	3.12	2.86	3.17	2.94	2.65
24	2.73	2.58	2.11	2.00	1.83	1.84	2.56	3.13	2.87	3.12	2.91	2.62
25	2.71	2.54	2.08	1.99	1.85	1.85	2.57	3.11	2.88	3.06	2.95	2.61
26	2.72	2.55	2.09	1.96	1.83	1.87	2.55	3.03	2.87	3.01	2.97	2.64
27	2.74	2.50	2.08	1.94	1.85	1.87	2.46	3.00	2.87	2.95	2.98	2.68
28	2.75	2.48	2.08	1.92	1.88	1.91	2.43	2.98	2.92	2.95	3.00	2.68
29	2.70	2.46	2.09	1.89	---	1.95	2.52	2.98	3.00	2.98	2.92	2.74
30	2.72	2.50	2.09	1.86	---	1.93	2.57	2.97	2.97	2.97	2.89	2.79
31	2.72	---	2.08	1.83	---	1.94	---	2.98	---	3.05	2.88	---
MEAN	2.69	2.64	2.24	2.01	1.79	1.83	2.41	2.85	2.95	3.08	2.92	2.76
MAX	2.85	2.91	2.50	2.13	1.88	1.95	2.65	3.13	3.04	3.21	3.03	2.89
MIN	2.48	2.46	2.08	1.83	1.66	1.77	1.91	2.49	2.84	2.95	2.85	2.61

WISCONSIN DISTRICT PUBLICATIONS PERTAINING TO LAKES

The reports published in a U.S. Geological Survey series are for sale by the U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225. Prepayment is required. Remittance should be sent by check or money order payable to the U.S. Geological Survey. Prices can be obtained by writing to the above address or by calling (303) 236-7476. Reprints of journal articles may be obtained by writing directly to the author at U.S. Geological Survey, 8505 Research Way, Middleton, WI 53562.

1999

- Lathrop, R.C., Carpenter, S.R., and Robertson, D.M., 1999, Summer water clarity responses to phosphorus, *Daphnia* grazing, and internal mixing in Lake Mendota, *Limnology and Oceanography*, Vol. 44 (1), p. 137-146.
- Krohelski, J.T., Feinstein, D.T., and Lenz, B.N., 1999, Simulation of stage and hydrologic budget for Shell Lake, Washburn County, Wisconsin, U.S. Geological Survey Water-Resources Investigations Report 99-4209, 23 p.
- Panuska, J.C., and Robertson, D.M., 1999, Estimating phosphorus concentrations following alum treatment using apparent settling velocities, *Lakes and Reservoir Management*, Vol. 15 (1), p. 28-38.

1998

- Hunt, R.J., Anderson, M.P., and Kelson, V.A., 1998, Improving a complex finite-difference ground water flow model through the use of an analytic element screening model, *Ground Water*, Vol. 36, No. 6, p. 1011-1017.
- Hunt, R.J., Anderson, M.P., and Kelson, V.A., 1998, Linking an analytic element flow code to MODFLOW - Implementation and benefits. p. 477-504 in *MODFLOW'98: Proceedings of the 3rd International Conference of the International Ground Water Center*. Golden, CO: Colorado School of Mines.
- Krabbenhof, D.P., Gilmour, C.C., Benoit, J.M., Babiarz, C.L., Andren, A.W., and Hurley, J.P., 1998, Methyl mercury dynamics in littoral sediments of a temperate lake, *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 55, p. 835-844.
- Robertson, D.M., Elder, J.F., Goddard, G.L., and James, W.F., 1998, Dynamics in phosphorus retention in wetlands upstream of Delavan Lake, Wisconsin, *Lakes and Reservoir Management*, Vol. 14, No. 4, p. 466-477.
- Rose, W.J., and Robertson, D.M., 1998, Hydrology, water quality, and phosphorus loading of Kirby Lake, Barron County, Wisconsin, U.S. Geological Survey Fact Sheet FS-066-98, 4 p.
- Walker, J.F. and Krabbenhof, D.P., 1998, Groundwater and surface-water interactions in riparian and lake-dominated systems, in Kendall, C. and McDonnell, J.J. eds., *Isotope tracers in catchment hydrology*, Elsevier Publishing, New York, 839 P.

1997

- Elder, J.F., Manion, B.J., and Goddard, G.L., 1997, Mesocosm experiments to assess factors affecting phosphorus retention and release in an extended Wisconsin wetland: U.S. Geological Survey Water-Resources Investigations Report 97-4272, 14 p.
- Goddard, G.L., and Elder, J.F., 1997, Retention of sediments and nutrients in Jackson Creek Wetland near Delavan Lake, Wisconsin, 1993-95, U.S. Geological Survey Water-Resources Investigations Report 97-4014, 22 p.

Hornewer, N.J., Johnson, G.P., Robertson, D.M. and Hondzo, M., 1997, Field-scale tests for determining mixing patterns associated with coarse-bubble air diffuser configurations, Egan Quarry, Illinois, In: Environmental and Coastal Hydraulics: Protecting the Aquatic Habitat, Proceedings of the International Association of Hydraulic Research, San Francisco, CA, USA, p. 57-63.

Robertson, D.M., 1997, Regionalized loads of sediment and phosphorus to Lakes Michigan and Superior - High flow and long-term average, *Journal of Great Lakes Research*, Vol. 23, p. 416-439.

1996

Anderson, W.L., Robertson, D.M., and Magnuson, J.J., 1996, Evidence of recent warming and El Nino-related variation in ice breakup of Wisconsin lakes, *Limnology and Oceanography*, Vol. 41, p. 815-821.

Elder, J.F. and Goddard, G.L., 1996, Sediment and nutrient trapping efficiency of a constructed wetland near Delavan Lake, Wisconsin, 1993-1995: U.S. Geological Survey Fact Sheet FS-232-96.

Garn, H.S., Olson, D.L., Seidel, T.L., and Rose, W.J., 1996, Hydrology and water quality of Lauderdale Lakes, Walworth County, Wisconsin, 1993-94: U.S. Geological Survey Water-Resources Investigations Report 96-4235, 29 p.

Hunt, R.J. and Krohelski, J.T., 1996, The application of an analytical element model to investigate groundwater-lake interactions at Pretty Lake, Wisconsin, *Lake and Reservoir Management*, Vol. 12, p. 487-495.

Imberger, J., Robertson, D.M., and Boland, K., 1996, Lake Number: A quantitative indicator of mixing to be used in water quality management. *Scientific Impeller*, Solna, Sweden, No. 4, p. 9-15.

Kammerer, P.A., Jr., 1996, Hydrology and water quality of Park Lake, South-central Wisconsin: U.S. Geological Survey Fact Sheet FS-197-96.

Robertson, D.M., Field, S.J., Elder, J.F., Goddard, G.L., and James, W.F., 1996, Phosphorus dynamics of Delavan Lake Inlet in southeastern Wisconsin. U.S. Geological Survey Water-Resources Investigations Report 96-4160, 18 p.

1995

Assel, R.A. and Robertson, D.M. 1995, Changes in winter air temperatures near Lake Michigan during 1851 - 1993, as determined from regional lake-ice records, *Limnology and Oceanography*, v. 40, p 165-176.

Assel, R.A., Robertson, D.M., Hoff, M.H., and Selgeby, J.H., 1995, Climatic-change implications from long-term (1823-1994) ice records near the Laurentian Great Lakes: *Annals of Glaciology*, v. 21, p. 383-386.

Krabbenhoft, D.P., and Webster, K.E., 1995, Transient hydrogeological controls on the chemistry of a seepage lake: *Water Resources Research*, v. 31, no. 9, p. 2295-2305.

Krohelski, J.T. and Batten, W.G., 1995, Simulation of stage and the hydrologic budget of Devils Lake, Sauk County, Wisconsin: U.S. Geological Survey Open-File Report 94-348, 22 p.

Wentz, D.A., Rose, W.J., and Webster, K.E., 1995, Long-term hydrologic and biogeochemical responses of a soft water seepage lake in north central Wisconsin: *Water Resources Research*, v. 31, no. 1, p 199-212.

1994

- Elder, J.F., 1994, Distribution and grain-size partitioning of metals in bottom sediments of an experimentally acidified lake: *Water Resources Bulletin*, v. 30, no. 2, p. 251-259.
- Goddard, G.L., and Field, S.J., 1994, Hydrology and water quality of Whitewater and Rice Lakes in southeastern Wisconsin, 1990-91: U.S. Geological Survey Water-Resources Investigations Report 94-4101, 36 p.
- Greb, S.R., and Wentz, D.A., 1994, Chemical budgets, in Klepinger, K.E., ed., RILWAS 1983-86: Wisconsin Regional Integrated Lake Watershed Acidification Study, Volume 1: Madison, Wisconsin Department of Natural Resources, PUBL-RS-909-94, Chapter 7, 20 p.
- Hurley, J.P., Krabbenhoft, D.P., Babiarz, C.L., and Andren, A.W., 1994, Cycling processes of mercury across sediment/water interfaces in seepage lakes, in Baker, L.A. ed., *Environmental Chemistry of Lakes and Reservoirs: Advances in Chemistry Series*, American Chemical Society, Washington, D.C., p. 426-449.
- Krabbenhoft, D.P., Bowser, C.J., Kendall, C., and Gat, J.R., 1994, Use of oxygen-19 and deuterium to assess the hydrology of ground-water/lake systems, in Baker, L.A. ed., *Environmental Chemistry of Lakes and Reservoirs: Advances in Chemistry Series*, American Chemical Society, Washington, D.C., p. 67-90.
- Robertson, D.M., Anderson, W., and Magnuson, J.J., 1994, Relations between El Nino/Southern Oscillation events and the climate and ice cover of lakes in Wisconsin. P 48-57, in Greenland, D. ed., *El Nino and Long-Term Ecological Research (LTER) Sites: Publication No. 18*. LTER Network Office: University of Washington, Seattle, WA, USA., 57 p.
- Robertson, D.M. and Imberger, J. 1994, Lake Number, a quantitative indicator of mixing used to estimate changes in dissolved oxygen, *Internationale Revue der gesamten Hydrobiologie*, v. 79, p. 159-176.
- Watras, C.J., Bloom, N.S., Hurley, J.P., Fitzgerald, W.F., Andren, A.W., Krabbenhoft, D.P., and Porcella, D.B., 1994, Sources and fates of mercury and methylmercury in Wisconsin lakes, in Watras and Huckabee eds., *Mercury as a Global Pollutant: Intergration and Synthesis*, Lewis Pub., Chelsea, MI., p 153-177.
- Wentz, D.A., 1994, Chemistry of snowpack and ground water, in Klepinger, K.E., ed., RILWAS 1983-86: Wisconsin Regional Integrated Lake Watershed Acidification Study, Volume 1: Madison, Wisconsin Department of Natural Resources, PUBL-RS-909-94, Chapter 6, 45 p.
- Wentz, D.A., Krohelski, J.T., and Rose, W.J., 1994, Hydrology, in Klepinger, K.E., ed., RILWAS 1983-86: Wisconsin Regional Integrated Lake Watershed Acidification Study, Volume 1: Madison, Wisconsin Department of Natural Resources, PUBL-RS-909-94, Chapter 7, 74 p.

1993

- Field, S.J., 1993, Hydrology and water quality of Powers Lake, southeastern Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 90-4126, 36 p.
- Field, S.J., 1993, Hydrology and water quality of Wind Lake in southeastern Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 91-4107, 61 p.
- House, L.B., 1993, Simulation of the effects of hypothetical residential development on water levels in Graber Pond, Middleton, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 92-4029, 10 p.

- House, L.B., Waschbusch, R.J., and Hughes, P.E., 1993, Water quality of an urban wet detention pond in Madison, Wisconsin, 1987-88: U.S. Geological Survey Open-File Report 93-172, 57 p.
- Hughes, P.E., 1993, Hydrology, water quality, trophic status, and aquatic plants of Fowler Lake, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 91-4076, 44 p.
- Rose, W.J., 1993, Hydrology of Little Rock Lake in Vilas County, north-central Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 93-4139, 22 p.
- Rose, W.J., 1993, Water and phosphorus budgets and trophic state, Balsam Lake, northwestern Wisconsin, 1987-1989: U.S. Geological Survey Water-Resources Investigations Report 91-4125, 28 p.

1992

- Elder, J.F., Krabbenhoft, D.P., and Walker, J.F., 1992, Water, energy, and biogeochemical budgets (WEBB) program: Data availability and research at the northern temperate lakes site, Wisconsin: U.S. Geological Survey Open-File Report 92-48, 15 p.
- Krabbenhoft, D.P., and Babiarz, C.L., 1992, Role of groundwater transport in aquatic mercury cycling: Water Resources Research, vol. 28, no. 12, p. 3119-3128.
- Krabbenhoft, D.P., and Krohelski, J.T., 1992, Data on water quality, lake sediment, and lake-level fluctuation, St. Croix Indian Reservation, Wisconsin, 1981-87: U.S. Geological Survey Open-File Report 92-26, 53 p.
- Robertson, D.M., Ragotzkie, R.A., and Magnuson, J.J. 1992, Lake ice records used to detect historical and future climatic changes: Climatic Change, v. 21, p. 407-427.

1991

- Wentz, D.A., and Rose, W.J., 1991, Hydrology of Lakes Clara and Vandercook in North-Central Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 89-4204, 24 p.
- Watras, C.J., Andre, A.W., Bloom, N.S., Fitzgerald, W.F., Hurley, J.P., Krabbenhoft, D.P., Rada, R.G., Wiener, J.G., 1991, Mercury in temperate lakes: a mechanistic field study: Verhandlungen Internat. Verein. Limnologie, 24, p. 2199-2202.

Pre-1990

- Walker, J.F., Pickard, S.A., and Sonzogni, W.C., 1989 Spreadsheet watershed modeling for non-point-source pollution management in a Wisconsin basin: Water Resources Bulletin, v. 25, no. 1, p. 139-147.
- Wentz, D.A., Garrison, P.J., and Bockheim, J.G., 1989, Section 7—Chemical input-output budgets, in Knauer, D., and Brouwer, S.A., eds., The Wisconsin Regional Integrated Lake-Watershed Acidification Study (RILWAS): 1981-1983: Palo Alto, California, Electric Power Research Institute Report EA-6214, p. 7-1 to 7-30.
- Wentz, D.A., and Rose, W.J., 1989, Interrelationships among hydrologic-budget components of a northern Wisconsin seepage lake and implications for acid-deposition modeling: Archives of Environmental Contamination and Toxicology, v. 18, p. 147-155.
- Wentz, D.A., Rose, W.J., and Krohelski, J.T., 1989, Section 5—Hydrologic component, in Knauer, D., and Brouwer, S.A., eds., The Wisconsin Regional Integrated Lake-Watershed Acidification Study (RILWAS): 1981-1983: Palo Alto, California, Electric Power Research Institute Report EA-6214, p. 5-1 to 5-77.

- Field, S.J., and Duerk, M.D., 1988, Hydrology and water quality of Delavan Lake in southeastern Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 87-4168, 61 p.
- Krug, W.R., Ostenso, N.A., and Krohelski, J.T., 1988, Prediction of the effects of mine dewatering on four lakes near Crandon, Wisconsin, by use of a water-budget model: U.S. Geological Survey Open-File Report 87-471, 63 p.
- Wentz, D.A., Krohelski, J.T., Rose, W.J., Bockheim, J.G., Garrison, P.J., Knauer, D.R., and Goldstein, R.A., 1987, Hydrologic and chemical budgets of Wisconsin lakes, in Perry, R., Harrison, R.M., Bel, J.N.B., and Lester, J.N., eds., *Acid Rain: Scientific and Technical Advances*, Selper Ltd., London, p. 309-316.
- House, L.B., 1986, Stage fluctuations of Wisconsin Lakes: Wisconsin Geological and Natural History Survey Information Circular No. 49, 84 p.
- House, L.B., 1984, Effects of urbanization on three ponds in Middleton, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 84-4051, 17 p.
- Krug, W.R., and House, L.B., 1984, Evaluation of alternative reservoir-management practices in the Rock River basin, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 83-4186, 21 p.
- House, L.B., 1981, An assessment of streamflow, water quality, and the effects of construction on impoundment on Bridge Creek at Augusta, Wisconsin: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-1192, 25 p.
- Krug, W.R., 1981, Hydrologic effects of proposed changes in management practices, Winnebago Pool, Wisconsin: U.S. Geological Survey Water-Resources Investigations 80-107, 19 p.
- Batten, W.G., and Hindall, S.M., 1980, Sediment deposition in the White River Reservoir, northwestern Wisconsin: U.S. Geological Survey Water-Supply Paper 2069, 30 p.
- Novitzki, R.P., and Holmstrom, B.K., 1979, Monthly and annual water budgets of Lake Wingra, Madison, Wisconsin, 1971-77: U.S. Geological Survey Water-Resources Investigations 79-100, 31 p.
- Rose, W.J., 1977, Hydrologic considerations associated with dredging spring ponds in Wisconsin: U.S. Geological Survey Water-Resources Investigations 77-18, 35 p.
- Oakes, E.L., Hendrickson, G.E., and Zuehls, E.E., 1975, Hydrology of the Lake Wingra basin, Dane County, Wisconsin: U.S. Geological Survey Water-Resources Investigations 17-75, 31 p.
- Novitzki, R.P., 1971, Hydrologic investigations of Heart Lake, Green Lake County, Wisconsin: U.S. Geological Survey Administrative Report, 9 p.