

Prepared in cooperation with the State of Wisconsin and local agencies

Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Years 2008–2011



Open-File Report 2012–1238

Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Years 2008–2011

A report by the Wisconsin Water Science Center Lake-Studies Team—
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Prepared in cooperation with the State of Wisconsin
and with other agencies

Open-File Report 2012–1238

**U.S. Department of the Interior
U.S. Geological Survey**

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SALLY JEWELL, Secretary

U.S. Geological Survey
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Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 2008

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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
meter (m)	3.281	foot
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 (mmho/cm) at 25 degrees Celsius, formerly used by the U.S. Geological Survey.

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 2008

By Wisconsin Water Science Center 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 locations of water-quality and lake-stage stations in Wisconsin for water year 2008 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, 2007 through September 30, 2008 is called "water year 2008."

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 included for all lakes. 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, 2008."

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 Water Science Center's home page is at <http://wi.water.usgs.gov/>. Information on the Wisconsin Water Science Center's Lakes Program is found at <http://wi.water.usgs.gov/lakes/index.html> and <http://wi.water.usgs.gov/projects/index.html>.



Figure 1. Location of USGS 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 2008 included:

Big Cedar Lake Protection and Rehabilitation District

Dane County

Delavan Lake Sanitary District

Geneva Lake Environmental Agency

Green Lake Sanitary District

Lake Beulah Management District

Little Cedar Lake Protection and Rehabilitation District

Middle Genesee Lake District

Mercer School District (Mercer Lake Association)

Powers Lake District

Rock County Public Works Department

U.S. Army Corps of Engineers

Village of Oconomowoc Lake

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 2008 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: B.W. Olson (Merrill), and S.A. March (Middleton). The data were collected and processed by G.L. Goddard, S.B. Manteufel, B.W. Olson, D.L. Olson, P.C. Reneau, J.G. Schuler, and B.J. Siebers. S.B. Manteufel assembled, edited, and formatted the report. Additional assistance in preparation of the report was provided by M.M. Greenwood, L.L. Nelson, and D.L. Olson.

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
Balsam Lake near Birchwood	453907091345800	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
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
Benedict Lake near Powers Lake	423201088180800	May 1998–Aug. 2000
Big Blacksmith Lake near Keshena	445401088334500	Feb. 1990–Aug. 1992
Big Hills (Hills) Lake near Wild Rose	440912089092000	June 1983–Aug. 1984, Feb.–Aug. 1987, Feb.–Aug. 1990, Feb.–Aug. 1993, Feb.–Aug. 1996, Feb.–Aug. 1999
Big Muskego Lake, at North Site, near Muskego	425301088061300	Feb.–Aug. 1988
Research Base, near Muskego	425235088075300	May–June 1994
Big Round Lake near Milltown	453142092180100	Feb.–Sept. 2001
Big St. Germain Lake, near St. Germain	455557089311000	Feb. 1992–Aug. 1996
near Lake Tomahawk	05390750	1991–2001
Big Sand Lake, Deep Hole, near Hertel	454910092134000	Feb.–Sept. 2001
East Site, near Hertel	454921092124300	Feb.–Sept. 2001
Big Sissabagama Lake, near Stone Lake	454724091303600	Apr. 1986–Sept. 1996, Oct. 1997–Sept. 2002
North Site, near Stone Lake	454800091312900	Mar. 1998–Sept. 2001
Booth Lake near East Troy	424800088254800	Feb. 1992–Aug. 1994, Feb. 2001–Aug. 2003
Buffalo Lake, Center Site, at Packwaukee	434558089260600	May 1998–Sept. 2001
East End, at Montello	434720089201600	May 1998–Sept. 2001
West End, near Endeavor	434414089282400	May 1998–Sept. 2001

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Butternut Lake, near Park Falls	455854090310300	Oct. 2002–Oct. 2004
Deep Hole, near Park Falls	455803090310800	Mar. 2003–Sept. 2004
North Site, near Butternut	455904090303400	Mar. 2003–Sept. 2004
Far South Site, near Park Falls	455651090312700	Mar. 2003–Sept. 2004
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
Eagle Spring Lake at Eagleville	425103088261500	Apr. 1991–Sept. 2001
Elizabeth Lake near Twin Lakes	423051088155300	Feb. 1995–Sept. 1997
Fish Lake near Sauk City	05406050	Nov. 1966–Sept. 1981, Apr. 1985–May 1987, May 1988, Apr. 1989– Oct. 1990, Oct. 1990– Nov. 1996, Nov. 1996– Sept. 2004
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
Geneva Lake, Geneva Bay, at Lake Geneva	423455088263800	Apr. 1997–Feb. 1999
Williams Bay, at Williams Bay	423420088320500	Apr. 1997–Feb. 1999
Center, near Lake Geneva	423402088301400	Apr. 1997–Mar. 1999
East End, near Lake Geneva	423421088272300	Apr. 1997–May 2000
Hemlock Lake near Mikana	453421091333700	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
Hooker Lake at Salem	423335088060300	Feb. 1992–Aug. 1993
Kawaguesaga, Deep Hole, near Minocqua	455208089435800	May–Sept. 2003
South Site, near Minocqua	455145089442600	May–Sept. 2003
Kirby Lake near Cumberland	453554092042101	Nov. 1995–Oct. 1996
(Site 1) near Cumberland	453608092035801	Nov. 1995–Nov. 1996
(Site 2) near Cumberland	453601092035301	Nov. 1995–Nov. 1996

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
(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 at Oconomowoc	430733088305900	Feb. 1984–Aug. 1985, Apr. –Aug. 1991, Feb. 2001–Aug. 2003
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 Desair near Rice Lake	453446091465100	Aug. 2004
Lake Keesus, East Bay, near Merton	430957088183400	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
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 Mill, at Lauderdale	424554088332700 424555088335700	Oct. 1993–Oct. 1994 Nov. 1993–Nov. 1994, Aug. 2002
Green, Auxiliary, Number 1, near Lauderdale	424640088341900	June 1999–Sept. 2000
Green, near Lauderdale	424652088341500	Nov. 1993–Nov. 1994, Aug. 2002
Legend Lake (site 1) near Shawano	445342088312700	Feb. 1990–Feb. 1992
Little Arbor Vitae near Woodruff	455446089370300	Feb. 1991–Sept. 2002
Little Green Lake, at Center, near Markesan	434412088590700	Feb. 1991–Aug. 2003
Little Muskego Lake at Muskego	425425088083500	Oct. 1986–Aug. 2002
Little Rock Lake near Woodruff	455946089415702	Oct. 1983–Sept. 1996
Little St. Germain Lake, near Eagle River	05390700	(a)
Upper East Bay, at St. Germain	455532089253900	Dec. 1996–Mar. 97, Mar. 1999, Mar. 2000–Aug. 2003

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Northeast Bay, near St. Germain	455545089262500	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
South Bay, near St. Germain	455437089270800	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
West Bay, at St. Germain	455428089282400	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
Little Sand Lake - Site No. 2 - near Mole Lake	452826088544101	May 1996–Sept. 2003
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
Minocqua Lake		
Deep Hole, at Minocqua	455214089412800	May–Sept. 2003
North Bay, at Minocqua	455232089424100	May–Sept. 2003
South Bay, at Minocqua	455206089425200	May–Sept. 2003
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
Muskego (Big Muskego)		
Auxiliary Number 1, near Muskego	425329088054000	June 1996–Aug. 2000
Bass Bay, near Muskego	425344008807010	Feb. 1988–Aug. 2002

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
near Wind Lake	425109088075000	Oct. 1987–Sept. 1989, Jan. 1991–Sept. 2002
South Site, near Muskego	425212088072800	Feb. 1988–Aug. 2002
Muskellunge Lake near Eagle River	455700089224900	June 2000–Aug. 2001
Muskellunge Lake, near Lake Outlet near Eagle River	455706089232400	Nov. 2000–Oct. 2001
Nagawicka Lake, at Deep Hole, at Delafield	430417088230300	Feb. 2003–Sept. 2004
Namekagon Lakes		
Garden, near Cable	461224091033200	Mar. 1998–Aug. 1999
Jackson, near Cable	461457091065900	Mar. 1998–Aug. 1999
Namekagon		
Deep Hole, near Cable	461308091065100	Mar. 1998–Aug. 1999
East Basin, near Cable	461228091044300	Mar. 1998–Aug. 1999
Northeast Basin, near Cable	461410091050700	Mar. 1998–Aug. 1999
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
Pike Lake near Hartford	431916088200501	Dec. 1998–Dec. 2000
Pike Lake-QW Site-near Hartford	431835088200600	Feb.–Aug. 2000
Potter Lake near Mukwonago	423246088175800	Feb. 1993–Sept. 2007
Pretty Lake, at Deep Hole, near Dousman	425722088295000	Feb. 1993–Aug. 1997
Puckaway Lake, West Basin, near Marquette	434515089124000	Apr. 2005–Sept. 2007
East Basin, near Marquette	43454208907300	Apr. 2005–Sept. 2007
River site, near Marquette	434824089083200	Apr. 2005–Sept. 2007
Red Cedar Lake, at Mikana	453522091360600	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Oct. 2000–Sept. 2001
Deep Hole, near Mikana	453725091345100	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
South End, at Mikana	453519091352500	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
Rice Lake at Deep Hole near Whitewater	424629088415700	Apr.–Nov. 1991
Round Lake near Shawano	445328088335000	Feb. 1990–Aug. 1992
Sand Lake (Deep Hole) near Keshena	445321088323101	June–Aug. 1992

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Shell Lake at Shell Lake	05334000	Aug. 1936–Sept. 1999
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
Spooner Lake, Deep Hole, near Spooner	455034091493300	June 2002–Aug. 2004
Southeast Site, near Spooner	454945091483900	June 2002–Aug. 2004
Stewart Lake at Mt. Horeb	430117089442701	May 1992–Sept. 1993
Tichigan Lake near Waterford	424854088123300	Mar. 1994–Aug. 1996, Apr. 2003–Aug. 2004
Tombeau Lake near Powers Lake	423153088184800	May 1998–Aug. 2000
Twin Lake, East Twin, near Westfield	435430089350700	June 2002–Aug. 2004
West Twin, near Westfield	435438089352300	June 2002–Aug. 2004

(a) Wisconsin Valley Improvement Co. currently collects stage data for this site.

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-mm (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, 2008". NWIS parameter codes and minimum laboratory reporting levels for chemical constituents are given in table 2. The parameter code for turbidity has changed from 00076 to 63675 or 63676 because the method of testing has changed.

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).

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		LRL	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. (SO4)	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. (SiO2)	mg/L	7631-86-9	00955	0.1	56	0.02	1899	0.008	I560LLD
Nitrogen, NO2+NO3, 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, amm.+org., total ⁴	mg/L	17778-88-0	00625	0.100	1985	--	--	0.2	I470BLT
Nitrogen, amm.+org.,diss.	mg/L	--	00623	--	--	--	--	--	I470DLD
Nitrogen, total ⁵	mg/L	--	00600	--	--	--	--	--	--
Nitrogen, dissolved	mg/L	--	00602	--	--	--	--	--	--
Phosphorus, total	mg/L	7723-14-0	00665	0.05	1984	0.004	2333	0.005	I520PLT
Phosphorus, ortho, diss.	mg/L	14265-44-2	00671	0.01	1262	0.002	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	--	--	--	--	0.26	I250UNF

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)

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).

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 Carlson's (1977) trophic state index (TSI). In previous USGS data reports, a modification of Carlson's trophic state index for Wisconsin lakes by Lillie and others (1993) had been used; however, this approach did not properly classify oligotrophic and highly eutrophic lakes and, therefore, was discontinued.

Lillie and Mason's (1983) water quality indices for Wisconsin lakes were developed based on summer measurements of total phosphorus and chlorophyll *a* concentrations, and Secchi depth from a random set of lakes in Wisconsin. These data were used to classify the lakes's 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

Carlson's (1977) 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 hypereutrophic.

Carlson's (1977) TSI values are also based on near-surface total phosphorus and chlorophyll *a* concentrations, and Secchi depths. The indices were developed to place these three characteristics on similar scales to allow comparison of different lakes. TSI values based on phosphorus concentrations (TSI_P), Secchi depths (TSI_{SD}), and chlorophyll *a* concentrations (TSI_C) typically are computed only for measurements collected during the open-water period.

TSI values for a lake can be calculated using the following equations (Carlson, 1977):

$$TSI_P = 4.15 + 14.42 \times (\ln [\text{total phosphorus concentration} \times 1,000])$$

$$TSI_{SD} = 60.0 - 14.41 \times (\ln \text{Secchi depth})$$

$$TSI_C = 30.6 + 9.81 \times (\ln \text{chlorophyll } a \text{ concentration})$$

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

The three main 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 a (µg/L)
Eutrophic	-----50-----	-----0.024-----	-----2.0-----	-----7.2-----
Mesotrophic	-----40-----	-----0.012-----	-----4.0-----	-----2.6-----
Oligotrophic				

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LAKE DATA

Remarks codes and symbols used in the following tables:

[<, less than; --, not available; E, estimated]

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LOCATION.--Lat 42°48'40", long 88°24'16", in SW ¼ NW ¼ NW ¼ sec.17, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to current year.

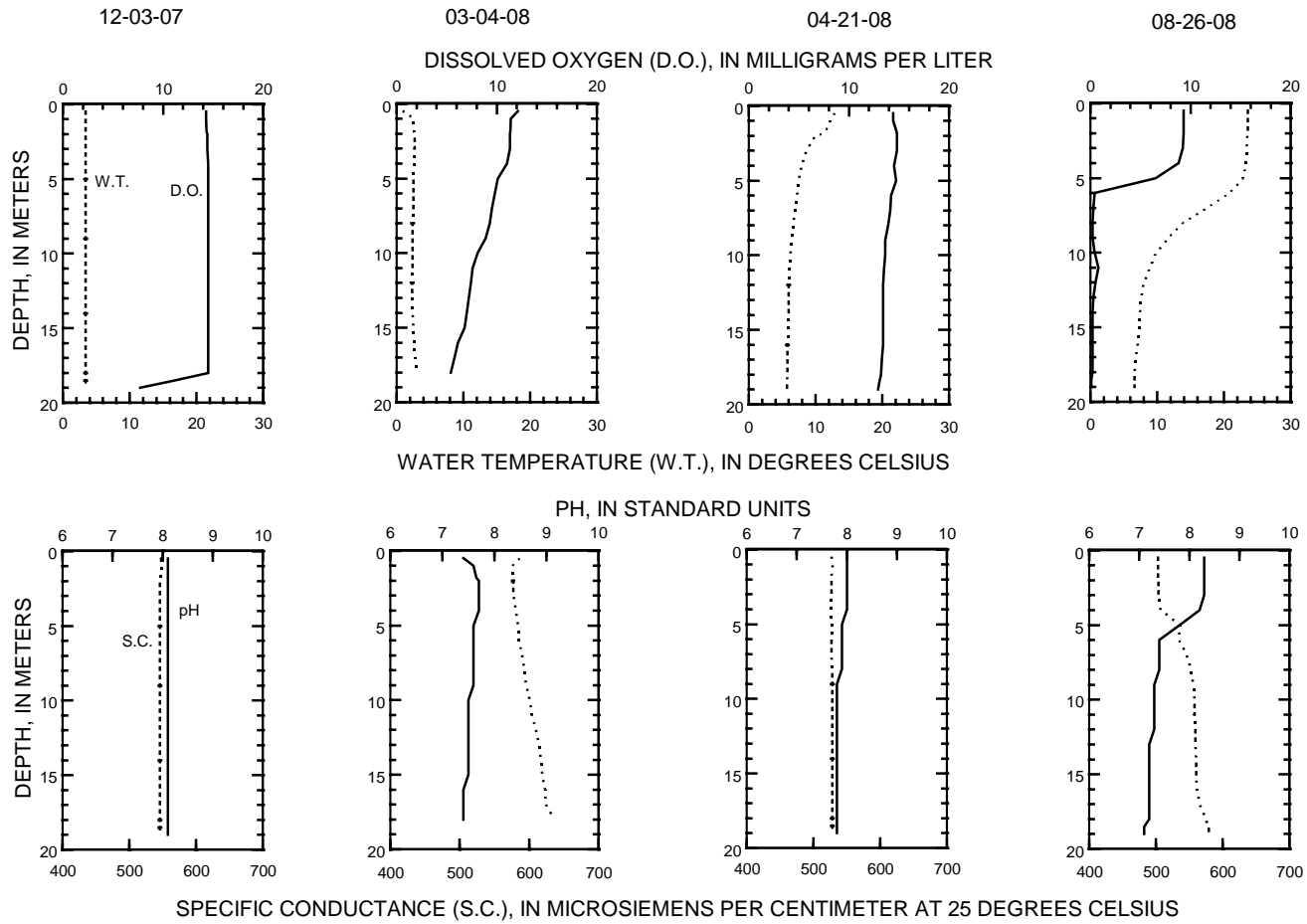
REMARKS.--Lake sampled at the deep hole at a depth of 19 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, DECEMBER 3, 2007 – AUGUST 26, 2008
(Milligrams per liter unless otherwise indicated)

Date	Dec. 3	Mar. 4				Apr. 21	Aug. 26				
00078 Secchi-depth (m)	5.2		--		3.8			2.6			
00098 Sampling depth (m)	0.5	0.5	9.0	17	1.8	2.0	8.0	14	17	18	
00010 Water Temperature (°C)	3.4	0.9	2.4	2.8	11.3	23.5	13.8	7.4	6.8	6.6	
00400 pH (standard units)	8.1	7.4	7.6	7.4	8	8.3	7.4	7.2	7.2	7.2	
00095 Specific conductance (µS/cm)	548	586	596	624	527	504	553	560	565	575	
00300 Dissolved oxygen	14.3	12.1	8.9	5.8	14.8	9.3	0.2	0.2	0.2	0.2	
32210 Chlorophyll a, phytoplankton (µg/L)	1.41	--	--	--	5.00	7.45	--	--	--	--	
00665 Phosphorus, Total (as P)	0.017	0.011	0.011	0.030	0.022	0.012	0.012	0.011	0.029	0.026	
00671 Orthophosphate, dissolved (as P)	0.006	0.003	0.003	0.016	<.002	<.002	<.002	<.002	<.002	<.002	
00600 Total nitrogen	0.91	1.1	1.5	2.0	1.6	--	1.0	1.4	1.1	--	
00631 Nitrate + nitrite, dissolved (as N)	0.285	0.67	0.986	1.42	1.1	<.019	0.361	0.986	0.16	<.019	
00608 Ammonia, dissolved (as N)	0.189	0.046	0.14	0.219	0.055	<.015	0.144	0.026	0.412	0.792	
00625 Ammonia + organic nitrogen, total (as N)	0.62	0.45	0.52	0.57	0.49	0.58	0.66	0.42	0.94	1.4	
00900 Hardness (as CaCO ₃)	280	300	310	320	280	250	280	280	290	290	
00417 Acid neutralizing capacity (as CaCO ₃)	232	244	250	262	237	218	234	244	249	257	
00915 Calcium, dissolved (Ca)	55.2	62.5	64.9	69.7	61	47.6	55.6	60.8	61	62.5	
00925 Magnesium, dissolved (Mg)	33.6	35.5	35.2	36.1	32	32.5	33.2	32.1	32.3	32.5	
00930 Sodium, dissolved (Na)	9.4	10	9.8	9.7	8.9	8.9	8.9	9.0	9.0	9.1	
00935 Potassium, dissolved (K)	1.8	1.9	1.8	1.8	1.7	1.4	1.6	1.7	1.8	1.8	
00940 Chloride, dissolved (Cl)	22.1	23.7	23.4	23.8	21.5	20.9	21.1	21.3	21.4	22.1	
00945 Sulfate, dissolved (SO ₄)	28.2	29.5	30.4	31.4	28.3	26.3	27.6	28.1	27.9	23.7	
00955 Silica, dissolved (SiO ₂)	15.7	15.2	16	17.1	13.6	10.3	11.3	16	17.7	19.7	
01046 Iron (µg/L)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
01056 Manganese (µg/L)	<.5	<1.6	<1.6	40	<1.6	<.5	20	100	330	630	
00081 Apparent color (PCU)	--	--	--	--	10	--	--	--	--	--	
63675 Turbidity (NTU)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
70300 Solids, dissolved (at 180 C°)	--	--	--	--	320	298	308	336	334	342	

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, DECEMBER 3, 2007 TO AUGUST 26, 2008



424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LOCATION.--Lat 42°49'29", long 88°23'13", in SE ¼ NE ¼ NE ¼ sec.8, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to current year.

REMARKS.--Lake sampled at a depth of 15 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

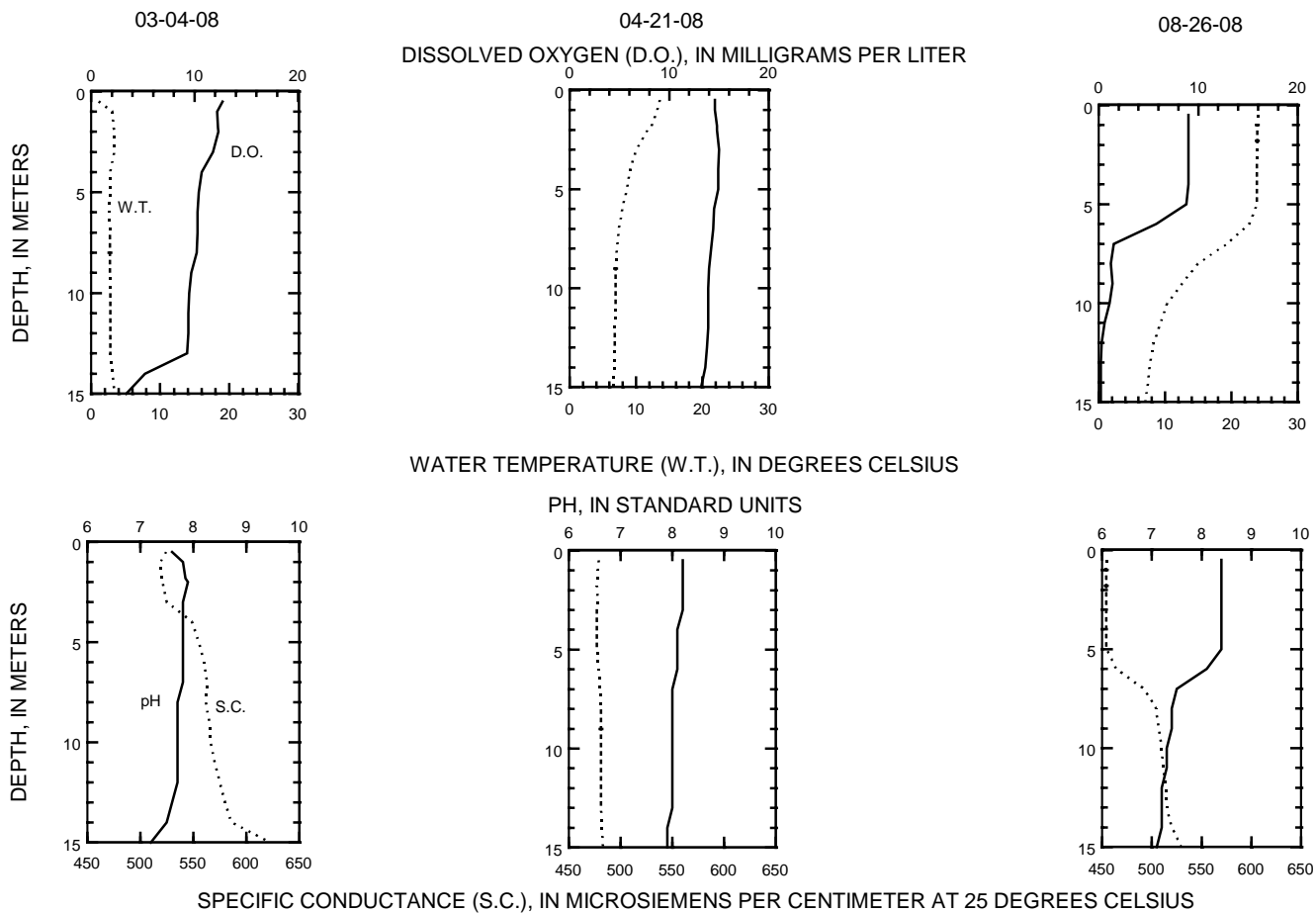
WATER-QUALITY DATA, MARCH 4 – AUGUST 26, 2008

(Milligrams per liter unless otherwise indicated)

Date	March 4			April 21	August 26				
00078 Secchi-depth (m)		--		4.0			4.2		
00098 Sampling depth (m)	0.5	8.0	15	1.8	2.0	9.0	12	14	15
00010 Water Temperature (°C)	1.1	2.7	3.4	12.3	23.9	12.5	8.3	7.4	7
00400 pH (standard units)	7.6	7.7	7.2	8.2	8.4	7.4	7.2	7.2	7.1
00095 Specific conductance (µS/cm)	524	562	622	477	454	507	514	520	529
00300 Dissolved oxygen	12.7	10.2	3.4	14.8	9.0	1.4	0.3	0.2	0.2
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	--	2.66	3.98	--	--	--	--
00665 Phosphorus, Total (as P)	0.013	0.011	0.029	0.022	0.009	0.008	0.014	0.026	0.031
00671 Orthophosphate, dissolved (as P)	0.003	0.003	0.006	<.002	<.002	<.002	<.002	<.002	<.002
00600 Total nitrogen	0.82	1.1	0.98	0.85	--	0.76	0.86	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.101	0.42	0.138	0.38	<.019	0.242	0.135	<.019	<.019
00608 Ammonia, dissolved (as N)	0.219	0.133	0.294	0.1	<.015	0.085	0.268	0.482	0.748
00625 Ammonia + organic nitrogen, total (as N)	0.72	0.67	0.84	0.47	0.52	0.52	0.73	1.1	1.4
00900 Hardness (as CaCO3)	260	290	290	250	220	240	250	260	260
00417 Acid neutralizing capacity (as CaCO3)	209	235	235	206	181	208	218	220	225
00915 Calcium, dissolved (Ca)	47	57.1	55.6	49	35.1	47.1	50.3	50.9	50.9
00925 Magnesium, dissolved (Mg)	34.9	34.7	36.5	30.8	31.6	30.8	30.9	31.6	31.5
00930 Sodium, dissolved (Na)	11.9	10.4	17.6	10.5	11.3	10.6	10.4	10.6	9.9
00935 Potassium, dissolved (K)	2	1.9	2.4	1.7	1.6	1.7	1.8	1.8	1.6
00940 Chloride, dissolved (Cl)	27.2	24.4	40.4	24.5	25.7	24.3	24.2	23.9	24.6
00945 Sulfate, dissolved (SO4)	27.5	28.4	27.4	25.3	24.9	25.5	25.4	24.8	22.3
00955 Silica, dissolved (SiO2)	14.6	14.7	15.3	9.59	10.5	11.3	14.4	15.8	17.4
01046 Iron (µg/L)	<100	<100	<100	<100	<100	<100	<100	<100	<100
01056 Manganese (µg/L)	<.5	<.5	80	<.5	<1.6	<1.6	110	190	250
00081 Apparent color (PCU)	--	--	--	10	--	--	--	--	--
63675 Turbidity (NTU)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.8
70300 Solids, dissolved (at 180 C°)	--	--	--	286	268	294	300	300	308

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, MARCH 4 TO AUGUST 26, 2008



424934088220400 LAKE BEULAH NEAR EAST SHORE ROAD AT EAST TROY, WI

LOCATION.--Lat 42°49'34", long 88°22'04", in SE ¼ NE ¼ NE ¼ sec.9, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--December 2007.

REMARKS.--Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, DECEMBER 3, 2007

(Milligrams per liter unless otherwise indicated)

Date	Dec. 3
00078 Secchi-depth (m)	--
00098 Sampling depth (m)	0.5
00010 Water Temperature (°C)	0.6
00400 pH (standard units)	8.2
00095 Specific conductance (µS/cm)	514
00300 Dissolved oxygen	17
32210 Chlorophyll a, phytoplankton (µg/L)	0.98
00665 Phosphorus, Total (as P)	0.017
00671 Orthophosphate, dissolved (as P)	0.005
00600 Total nitrogen	0.83
00631 Nitrate + nitrite, dissolved (as N)	0.039
00608 Ammonia, dissolved (as N)	0.277
00625 Ammonia + organic nitrogen, total (as N)	0.79
00900 Hardness (as CaCO ₃)	220
00417 Acid neutralizing capacity (as CaCO ₃)	192
00915 Calcium, dissolved (Ca)	39.2
00925 Magnesium, dissolved (Mg)	30.8
00930 Sodium, dissolved (Na)	13.2
00935 Potassium, dissolved (K)	1.8
00940 Chloride, dissolved (Cl)	31.6
00945 Sulfate, dissolved (SO ₄)	25.9
00955 Silica, dissolved (SiO ₂)	15.2
01046 Iron (µg/L)	<100
01056 Manganese (µg/L)	<1.6
00081 Apparent color (PCU)	--
63675 Turbidity (NTU)	<1.0
70300 Solids, dissolved (at 180 C°)	--

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°24'09", long 88°15'16", in NE ¼ SW ¼ sec. 20, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

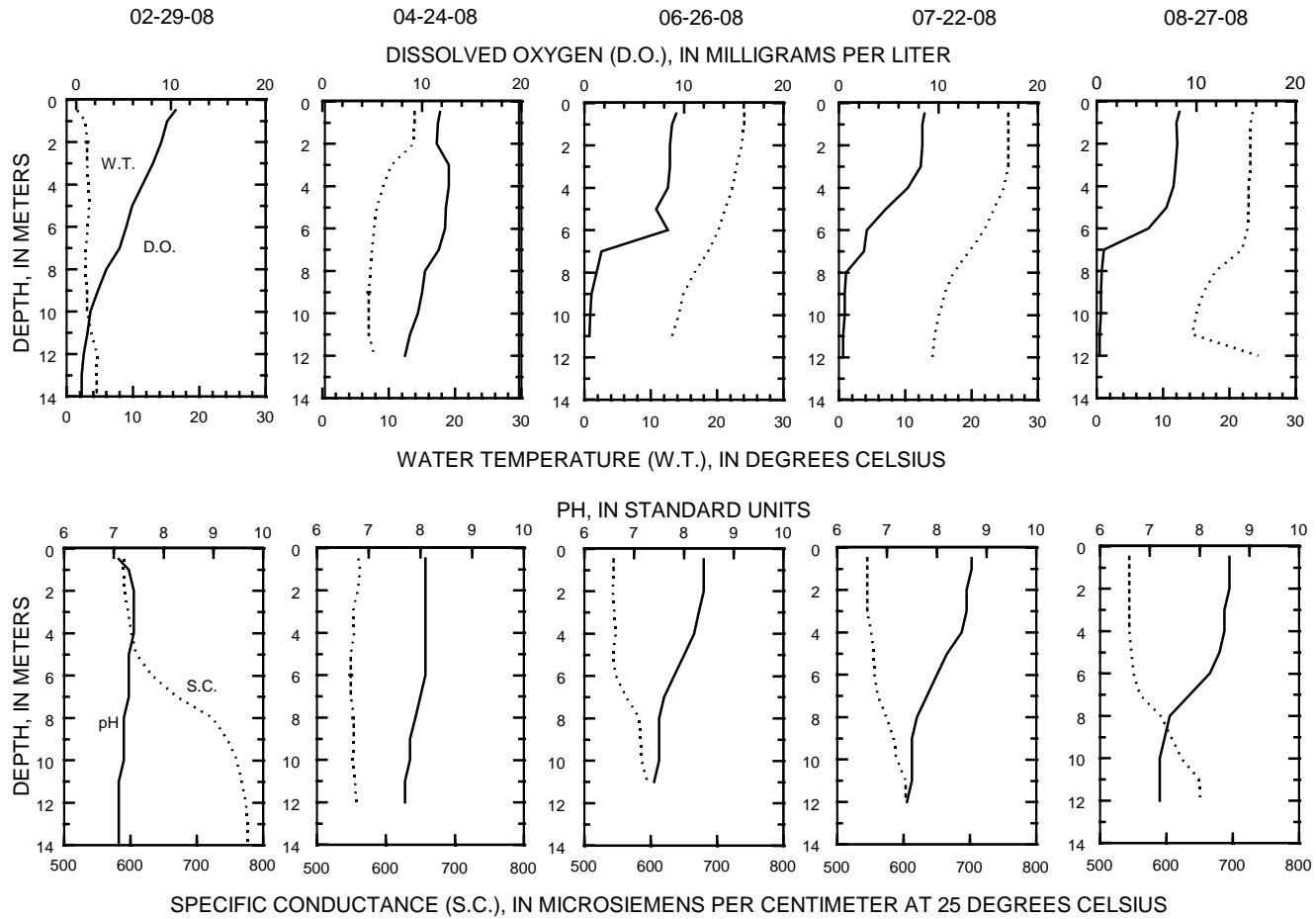
REMARKS.--Lake sampled on north side at a depth of 12 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

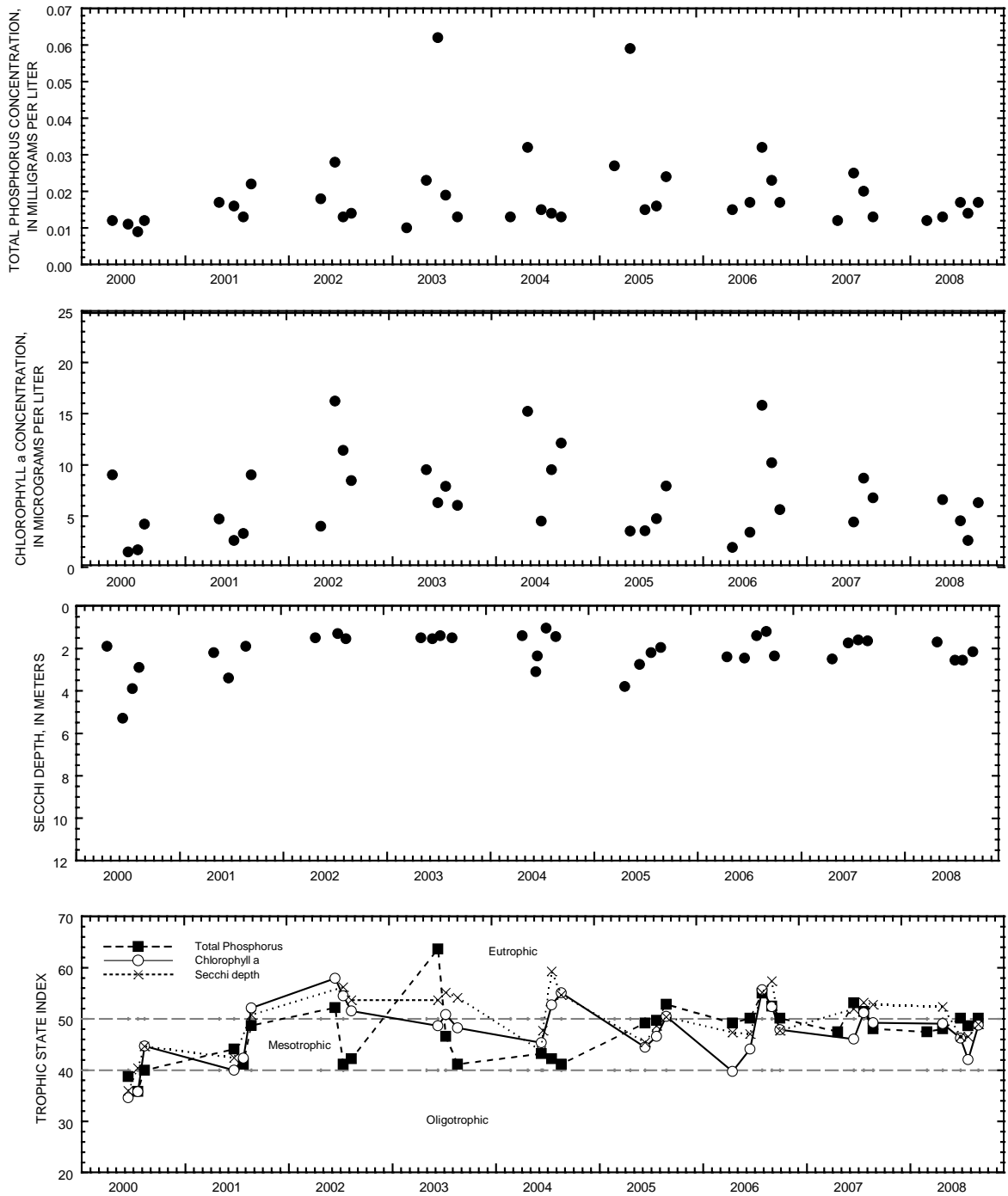
WATER-QUALITY DATA, FEBRUARY 29 TO AUGUST 27, 2008
(Milligrams per liter unless otherwise indicated)

Date	Feb. 29		Apr. 24		Jun. 26		Jul. 22		Aug. 27	
00078 Secchi-depth (m)	--		1.7		2.6		2.6		2.2	
00098 Sampling depth (m)	0.5	13	0.5	12	0.5	11	0.5	11.5	0.5	11.5
00010 Water Temperature (°C)	1.6	4.5	13.9	7.8	24.1	13.2	25.5	14.1	23.5	24.3
00400 pH (standard units)	7.1	7.1	8.1	7.7	8.4	7.4	8.7	7.4	8.6	7.2
00095 Specific conductance (µS/cm)	590	776	560	557	544	595	545	603	544	651
00300 Dissolved oxygen	10.5	0.6	11.8	8.3	9.2	0.5	8.6	0.4	8.3	0.3
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	6.6	--	4.52	--	2.6	--	6.31	--
00665 Phosphorus, Total (as P)	0.012	0.034	0.013	0.013	0.017	0.044	0.014	0.040	0.017	0.042

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 29 TO AUGUST 27, 2008





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

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'24", long 88°15'49", in NE ¼ SE ¼ sec.31, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

REMARKS.--Lake sampled on south side at deep hole. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

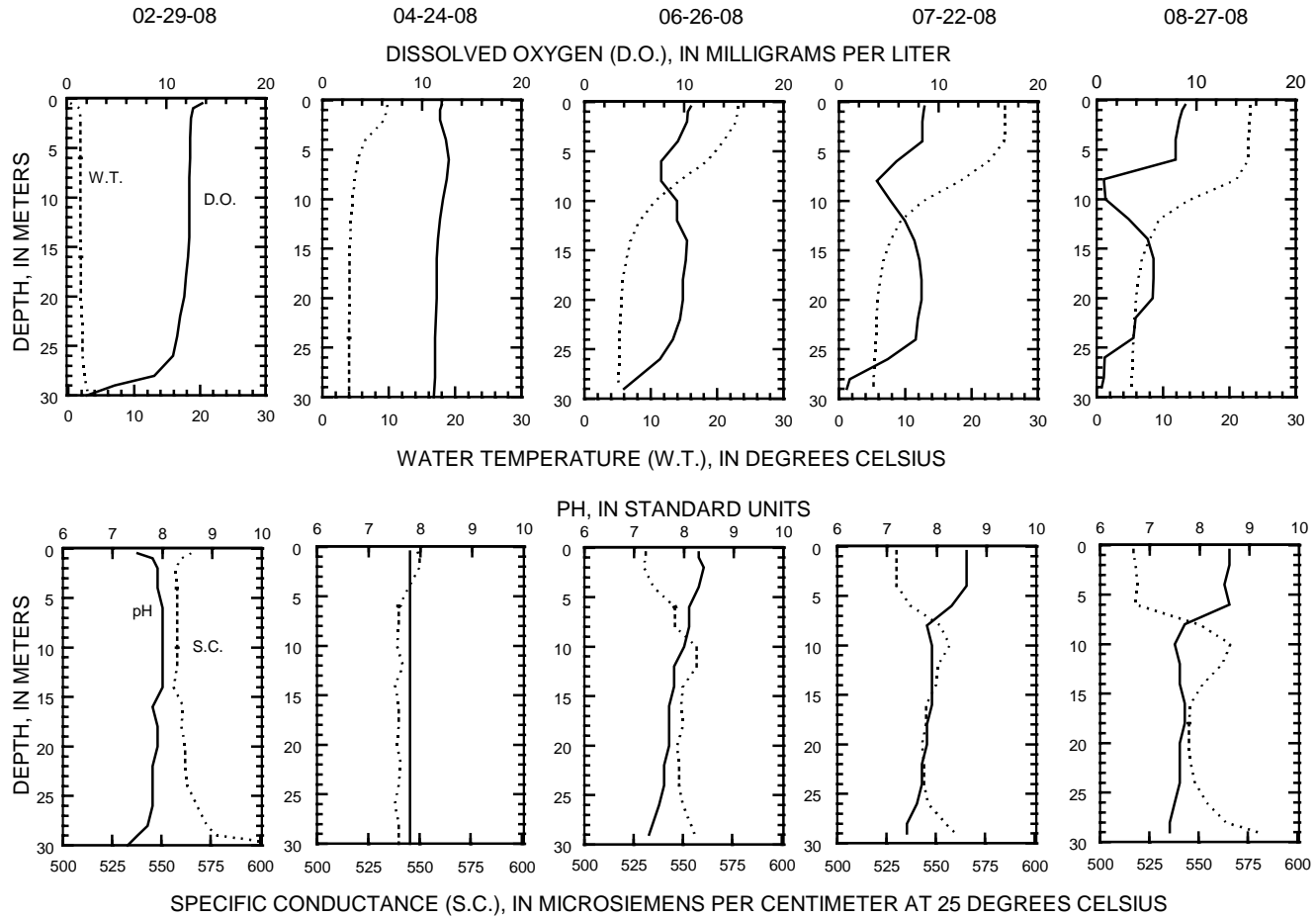
WATER-QUALITY DATA, FEBRUARY 29 TO AUGUST 27, 2008

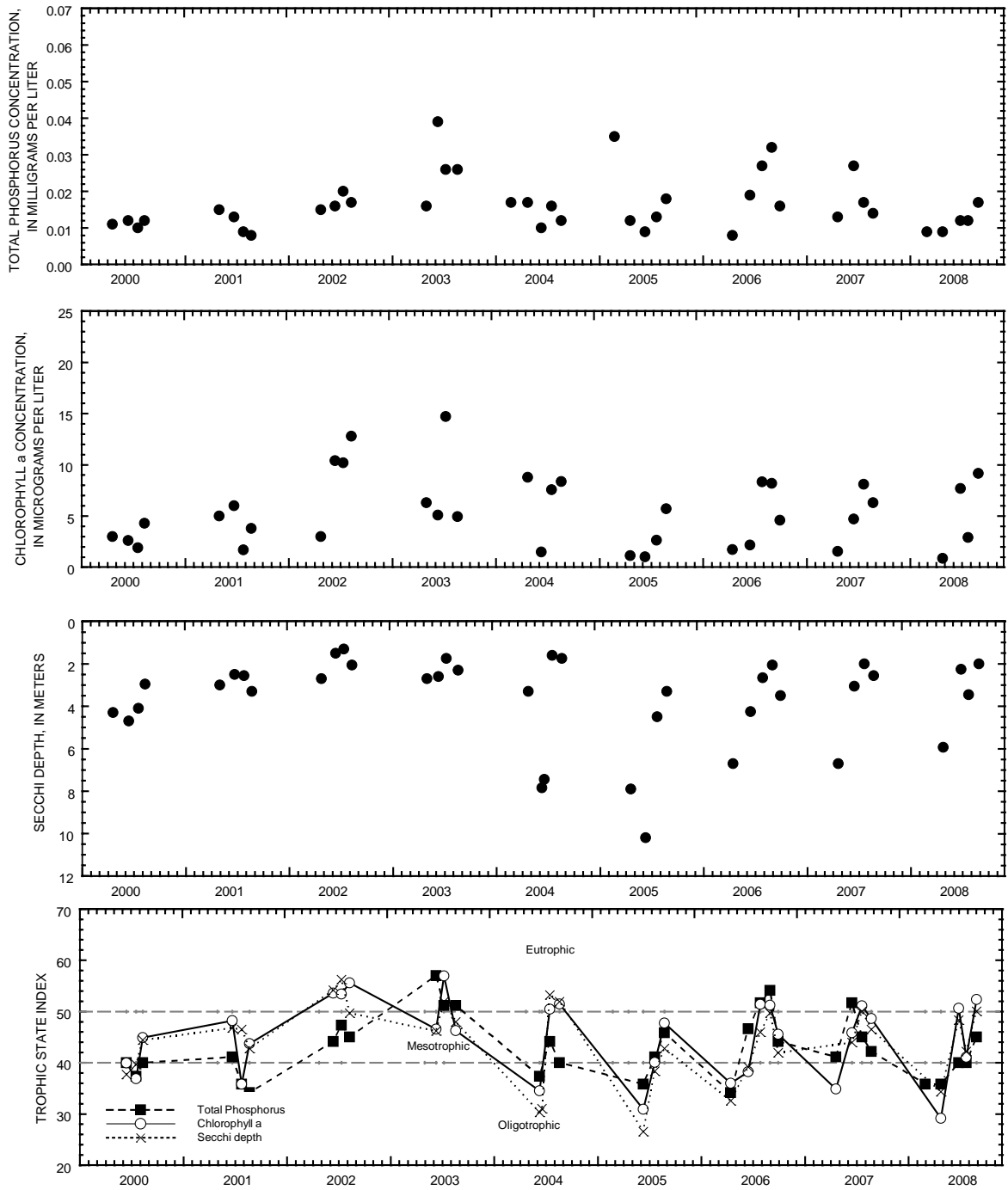
(Milligrams per liter unless otherwise indicated)

Date	Feb. 29		Apr. 24		Jun. 26		Jul. 22		Aug. 27	
00078 Secchi-depth (m)	--		5.9		2.3		3.5		2.0	
00098 Sampling depth (m)	0.5	29	0.5	30	0.5	29	0.5	29.5	0.5	29
00010 Water Temperature (°C)	0.2	2.7	9.8	4.0	23.2	5.1	25	5.2	23.2	5.2
00400 pH (standard units)	7.5	7.5	7.8	7.8	8.3	7.3	8.6	7.4	8.6	7.4
00095 Specific conductance (µS/cm)	565	578	549	540	531	556	530	560	517	580
00300 Dissolved oxygen	13.6	4.8	12	11.2	10.7	4.0	8.6	0.8	8.9	0.5
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	0.86	--	7.7	--	2.91	--	9.15	--
00665 Phosphorus, Total (as P)	0.009	0.12	0.009	0.012	0.012	0.072	0.012	0.076	0.017	0.044
00671 Orthophosphate, dissolved (as P)	--	--	0.006	--	--	--	0.006	--	--	--
00600 Total nitrogen	--	--	1	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	0.478	--	--	--	0.201	--	--	--
00608 Ammonia, dissolved (as N)	--	--	0.02	--	--	--	<.015	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	0.54	--	--	--	--	--	--	--
00623 Ammonia + organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.51	--	--	--
00900 Hardness (as CaCO ₃)	--	--	240	--	--	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO ₃)	--	--	190	--	--	--	--	--	--	--
00915 Calcium, dissolved (Ca)	--	--	38.3	--	--	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	--	--	35	--	--	--	--	--	--	--
00930 Sodium, dissolved (Na)	--	--	23.4	--	--	--	--	--	--	--
00935 Potassium, dissolved (K)	--	--	1.8	--	--	--	--	--	--	--
00940 Chloride, dissolved (Cl)	--	--	50.3	--	--	--	--	--	--	--
00945 Sulfate, dissolved (SO ₄)	--	--	21.5	--	--	--	--	--	--	--
00955 Silica, dissolved (SiO ₂)	--	--	3.61	--	--	--	--	--	--	--
01046 Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056 Manganese (µg/L)	--	--	<1.6	--	--	--	--	--	--	--
00081 Apparent color (PCU)	--	--	5	--	--	--	--	--	--	--
63675 Turbidity (NTU)	--	--	<1.0	--	--	--	--	--	--	--
70300 Solids, dissolved (at 180 C°)	--	--	306	--	--	--	--	--	--	--

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 29 TO AUGUST 27, 2008





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

423706088363400 DELAVAN LAKE NEAR DELAVAN, WI

LOCATION.--Lat 42°36'27", long 88°36'19" referenced to North American Datum of 1927, in SW ¼ NE ¼ sec.28, T.2 N., R.16 E., Walworth County, WI, 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.

SURFACE AREA.--3.24 mi².

DRAINAGE AREA.--41.4 mi², of which 2.30 mi² probably is noncontributing.

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 Stephen J. Field and Marvin D. Duerk.

GAGE.--Water-stage recorder. Datum of gage is 922.92 ft above NGVD of 1929. Prior to Sept. 5, 1989, staff gage at bridge on North Shore Drive at same datum.

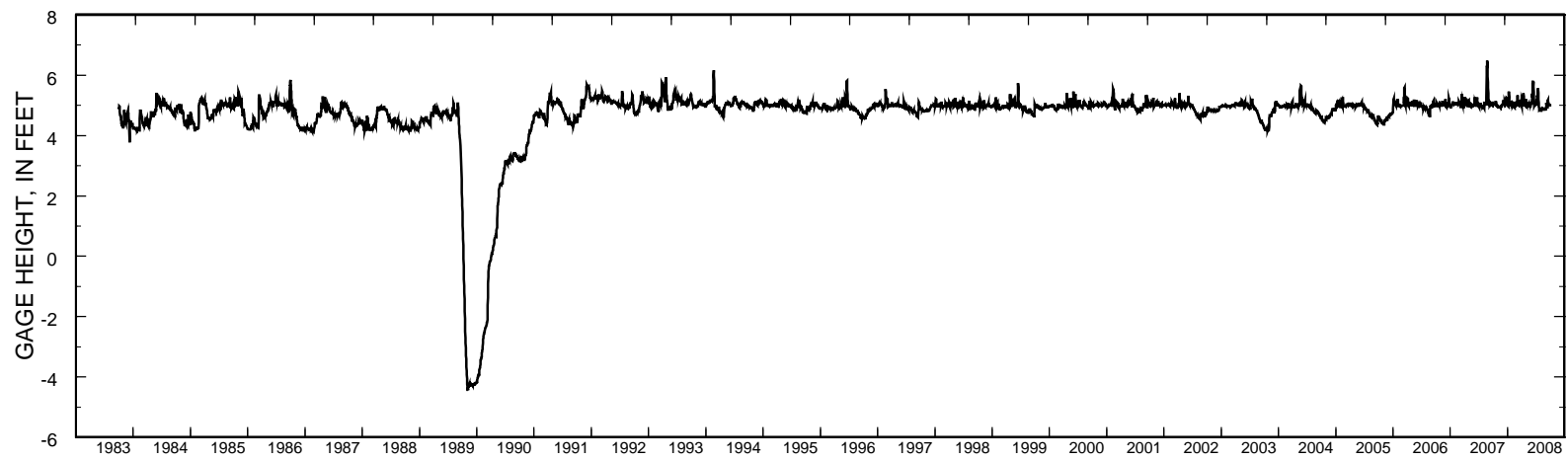
REMARKS.--Lake was ice covered from Jan. 17 to Mar. 25. Lake levels controlled by Delavan Lake Sanitary District.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 6.53 ft, Aug. 27, 2007; minimum daily, -4.44 ft, Nov. 6, 1989 (lake drawn down for lake rehabilitation program).

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.89 ft, June 9 and 13; minimum, 4.77 ft, Aug. 2.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.03	4.94	5.02	5.11	5.02	5.05	5.14	4.99	5.09	5.07	4.83	4.86
2	5.05	4.94	5.09	5.08	4.99	5.04	5.09	5.00	5.08	5.08	4.83	4.86
3	5.04	4.94	5.13	5.04	4.98	5.23	5.03	5.02	5.06	5.17	4.83	4.87
4	5.03	4.96	5.13	5.01	5.01	5.33	5.07	5.01	5.04	5.19	4.88	4.98
5	5.02	4.95	5.13	4.97	5.03	5.22	5.04	4.99	5.22	5.19	4.92	e5.08
6	5.03	4.95	5.11	4.96	5.08	5.09	5.03	5.00	5.39	5.17	4.93	5.04
7	5.04	4.93	5.09	5.07	5.07	5.06	5.05	5.02	5.29	5.16	4.92	4.99
8	5.04	4.94	5.09	5.38	5.06	5.04	5.05	5.02	5.28	5.34	4.90	4.97
9	5.05	4.94	5.10	5.46	5.03	5.02	5.19	5.02	5.74	5.25	4.89	4.96
10	5.03	4.93	5.09	5.37	5.00	5.02	5.17	5.02	5.82	5.15	4.88	4.95
11	5.02	4.94	5.11	5.28	4.96	5.00	5.40	5.04	5.67	5.25	4.87	4.94
12	5.00	4.94	5.14	5.18	4.94	5.01	5.38	5.05	5.51	5.53	4.87	4.94
13	4.99	4.95	5.12	5.06	4.93	5.08	5.29	5.03	5.77	5.57	4.87	5.07
14	5.02	4.94	5.13	4.97	4.93	5.19	5.16	5.01	5.79	5.42	4.88	5.16
15	5.05	4.93	5.09	4.99	4.92	5.16	5.08	4.98	5.63	5.30	4.88	5.19
16	5.11	4.92	5.09	5.02	4.93	5.07	5.02	4.96	5.44	5.20	4.87	5.14
17	5.11	4.93	5.04	5.06	5.01	5.00	5.01	4.96	5.24	5.09	4.87	5.09
18	5.12	4.94	5.00	5.07	5.07	5.01	5.01	4.96	5.08	5.00	4.87	5.08
19	5.10	4.95	5.00	5.09	5.09	5.02	5.01	4.96	4.97	4.95	4.86	5.06
20	5.08	e4.97	5.02	5.12	5.09	5.03	5.00	4.97	4.98	4.91	4.86	5.05
21	5.04	4.98	5.01	5.11	5.07	5.06	4.99	4.97	5.00	4.85	4.86	5.05
22	5.01	4.98	5.00	5.12	5.07	5.10	5.01	4.98	5.01	4.86	4.89	5.04
23	5.00	4.98	5.09	5.09	5.06	5.08	5.02	4.98	5.02	4.87	4.89	5.03
24	4.99	4.97	5.17	5.07	5.03	5.07	5.02	4.98	5.02	4.87	4.89	5.02
25	4.99	4.99	5.20	5.06	5.01	5.04	5.09	4.98	5.03	4.86	4.89	5.01
26	4.98	4.98	5.21	5.05	5.02	5.07	5.21	5.08	5.03	4.85	4.88	5.01
27	4.97	5.00	5.24	5.01	5.00	5.11	5.18	5.08	5.04	4.85	4.88	5.00
28	4.97	5.00	5.23	5.00	5.02	5.10	5.11	5.05	5.06	4.85	4.88	5.00
29	4.96	5.00	5.20	4.99	5.06	5.03	5.07	5.04	5.08	4.85	4.88	5.00
30	4.96	4.99	5.17	5.01	---	4.97	5.02	5.09	5.08	4.84	4.87	5.00
31	4.95	---	5.14	5.00	---	5.01	---	5.11	---	4.84	4.86	---
Mean	5.03	4.96	5.11	5.09	5.02	5.07	5.10	5.01	5.25	5.08	4.88	5.01
Max	5.12	5.00	5.24	5.46	5.09	5.33	5.40	5.11	5.82	5.57	4.93	5.19
Min	4.95	4.92	5.00	4.96	4.92	4.97	4.99	4.96	4.97	4.84	4.83	4.86



Stage hydrograph for Delavan Lake, 1983 – 2008.

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

LOCATION.--Lat 42°35'56", long 88°36'50", in SE ¼ SW ¼ sec.28, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA.--3.24 mi².

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 0.5 m of the lake and analyzed by the Wisconsin State Laboratory of Hygiene. A "*" indicates data collected by the Delavan Lake Sanitary District.

WATER-QUALITY DATA, OCTOBER 3, 2007 TO JANUARY 9, 2008
(Milligrams per liter unless otherwise indicated)

Date	Oct. 3*	Oct. 12*	Oct. 17*	Oct. 24*	Nov. 1*	Nov. 13*	Nov. 13		Jan. 9*
00078 Secchi-depth (m)	1.5	1.2	1.5	1.2	1.2	2.6	2.4		4.3
00098 Sampling depth (m)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	16	0.5
00010 Water Temperature (°C)	19	17	16	15.1	13	10	10	9.8	0.0
00400 pH (standard units)	--	--	--	--	--	--	8.5	8.6	--
00095 Specific conductance (µS/cm)	--	--	--	--	--	--	540	542	--
00300 Dissolved oxygen	--	--	--	--	--	--	11.8	11.2	--
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	--	--	7.36	--	--
00665 Phosphorus, Total (as P)	0.07	0.09	0.09	0.11	0.10	0.06	0.066	0.06	0.065
00671 Orthophosphate, dissolved (as P)	--	--	--	--	--	--	0.035	0.038	--
00600 Total nitrogen	--	--	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	--	--	--	--	<.016	--	--
00608 Ammonia, dissolved (as N)	--	--	--	--	--	--	0.025	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	--	--	--	--	0.65	--	--

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, MAY 4 TO MAY 15, 2008
(Milligrams per liter unless otherwise indicated)

Date	Mar. 4		Apr. 9*	Apr. 15*	Apr. 21*	Apr. 21		May 6*	May 15*
00078 Secchi-depth (m)	--		1.8	1.5	2.0	1.6		3.4	4.9
00098 Sampling depth (m)	0.5	16	0.5	0.5	0.5	0.5	16	0.5	0.5
00010 Water Temperature (°C)	0.7	3.3	2.0	4.5	10	11.3	5.6	11	15.6
00400 pH (standard units)	8.4	7.4	--	--	--	8.6	8.1	--	--
00095 Specific conductance (µS/cm)	582	972	--	--	--	532	545	--	--
00300 Dissolved oxygen	15.8	3.5	--	--	--	18.3	13.2	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	12.6	--	--	--	--	7.62	--	--	--
00665 Phosphorus, Total (as P)	0.052	0.111	0.06	0.05	0.04	0.044	0.079	0.03	0.04
00671 Orthophosphate, dissolved (as P)	0.013	0.087	--	--	--	E.003	0.037	--	--
00600 Total nitrogen	0.87	--	--	--	--	1.2	1.3	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.209	--	--	--	--	0.42	0.416	--	--
00608 Ammonia, dissolved (as N)	0.037	--	--	--	--	0.039	0.228	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.67	--	--	--	--	0.73	0.91	--	--
00900 Hardness (as CaCO3)	--	--	--	--	--	230	230	--	--
00410 Acid neutralizing capacity (as CaCO3)	--	--	--	--	--	190	192	--	--
00915 Calcium, dissolved (Ca)	--	--	--	--	--	42.4	41.2	--	--
00925 Magnesium, dissolved (Mg)	--	--	--	--	--	30.9	30.2	--	--
00930 Sodium, dissolved (Na)	--	--	--	--	--	30.1	30.2	--	--
00935 Potassium, dissolved (K)	--	--	--	--	--	2.96	2.96	--	--
00940 Chloride, dissolved (Cl)	--	--	--	--	--	59.3	60.3	--	--
00950 Fluoride, dissolved (F)	--	--	--	--	--	0.19	0.18	--	--
00945 Sulfate, dissolved (SO4)	--	--	--	--	--	21.5	21.2	--	--
00955 Silica, dissolved (SiO2)	--	--	--	--	--	0.9	2.2	--	--
01046 Iron (µg/L)	--	--	--	--	--	<8	<8	--	--
01056 Manganese (µg/L)	--	--	--	--	--	1.4	115	--	--
00080 Apparent color (PCU)	--	--	--	--	--	18	20	--	--
63676 Turbidity (NTU)	--	--	--	--	--	2.4	2.5	--	--
70300 Solids, dissolved (at 180 C°)	--	--	--	--	--	334	332	--	--

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, MAY 19 TO JULY 23, 2008

(Milligrams per liter unless otherwise indicated)

Date	May 19				May 28*	June 4*	June 10*	June 17*
00078 Secchi-depth (m)	8.8				2.4	3.0	5.8	3.2
00098 Sampling depth (m)	0.5	11	14	16	0.5	0.5	0.5	0.5
00010 Water Temperature (°C)	14	12.9	10.8	10.3	14.5	17	19	20
00400 pH (standard units)	8.3	8.2	7.8	7.6	--	--	--	--
00095 Specific conductance (µS/cm)	578	578	584	592	--	--	--	--
00300 Dissolved oxygen	9.8	9.0	4.9	0.8	--	--	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	0.59	--	--	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.04	0.051	0.106	0.198	0.04	0.03	0.04	0.06
00671 Orthophosphate, dissolved (as P)	0.02	0.03	0.076	0.149	--	--	--	--
00600 Total nitrogen	1.1	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.416	--	--	--	--	--	--	--
00608 Ammonia, dissolved (as N)	0.133	--	--	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.66	--	--	--	--	--	--	--

Date	June 23				July 1*	July 9*	July 16*	July 23*
00078 Secchi-depth (m)	2.0				2.1	3.0	2.1	2.1
00098 Sampling depth (m)	0.5	8	11	16	0.5	0.5	0.5	0.5
00010 Water Temperature (°C)	22.7	20.2	15.5	14.2	22	24	24	24.5
00400 pH (standard units)	8.7	8	7.6	7.5	--	--	--	--
00095 Specific conductance (µS/cm)	541	560	586	593	--	--	--	--
00300 Dissolved oxygen	12.7	6.6	1.8	0.2	--	--	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	15.8	--	--	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.063	0.046	0.161	0.263	0.04	0.04	0.04	0.03
00671 Orthophosphate, dissolved (as P)	<.006	<.006	0.071	0.179	--	--	--	--
00600 Total nitrogen	1.5	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.686	--	--	--	--	--	--	--
00608 Ammonia, dissolved (as N)	0.027	--	--	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.86	--	--	--	--	--	--	--

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, JULY 23 TO SEPTEMBER 2, 2008

(Milligrams per liter unless otherwise indicated)

Date	July 23				July 30*	Aug. 6*
00078 Secchi-depth (m)	1.9				1.8	1.5
00098 Sampling depth (m)	0.5	5	13	16	0.5	0.5
00010 Water Temperature (°C)	25.8	25.1	15.4	14.3	26	25
00400 pH (standard units)	8.6	8.6	7.3	7.2	--	--
00095 Specific conductance (µS/cm)	526	527	599	612	--	--
00300 Dissolved oxygen	12.6	11.7	0.1	0.1	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	4.9	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.038	0.037	0.32	0.53	0.046	0.049
00671 Orthophosphate, dissolved (as P)	E.004	E.004	0.301	0.505	--	--
00600 Total nitrogen	0.98	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.252	--	--	--	--	--
00608 Ammonia, dissolved (as N)	0.104	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.73	--	--	--	--	--

Date	Aug. 18								Aug. 19*	Aug. 27*	Sept. 2*
00078 Secchi-depth (m)	1.5								1.5	1.4	1.5
00098 Sampling depth (m)	0.5	7	8	10	12	14	15	16	0.5	0.5	0.5
00010 Water Temperature (°C)	24.6	24	23	18.7	16.1	14.5	14.2	14	24	23	24
00400 pH (standard units)	8.6	8.4	7.6	7.4	7.3	7.1	7	7	--	--	--
00095 Specific conductance (µS/cm)	492	497	516	569	587	608	620	626	--	--	--
00300 Dissolved oxygen	9.8	7	0.7	0.3	0.2	0.2	0.2	0.2	--	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	45.8	--	--	--	--	--	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.043	0.041	0.044	0.182	0.39	0.57	0.64	0.7	0.043	0.053	0.04
00671 Orthophosphate, dissolved (as P)	E.003	E.003	--	--	--	0.514	--	0.639	--	--	--
00600 Total nitrogen	--	--	--	--	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	<.016	--	--	--	--	--	--	--	--	--	--
00608 Ammonia, dissolved (as N)	0.031	--	--	--	--	--	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.75	--	--	--	--	--	--	--	--	--	--

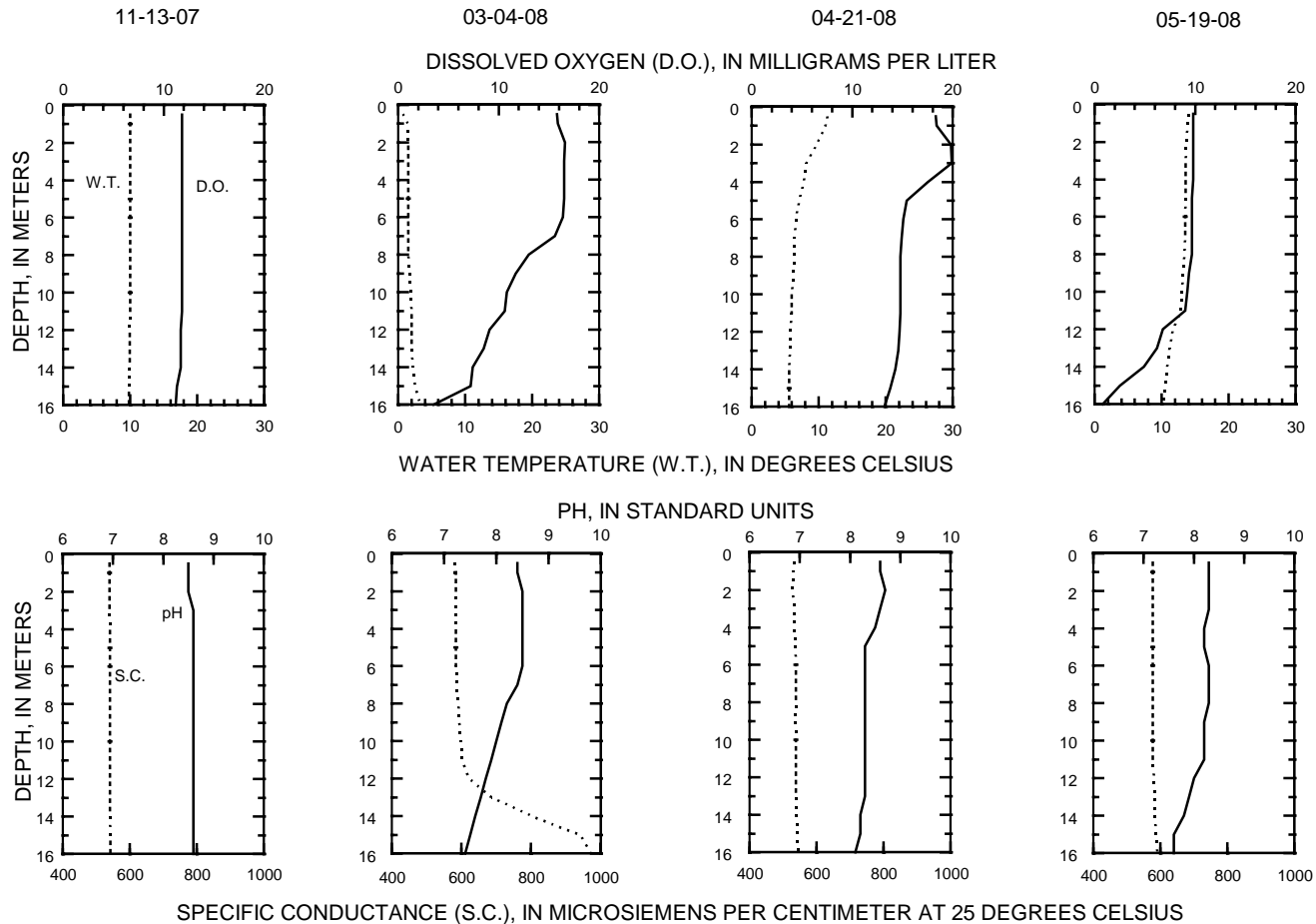
423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, SEPTEMBER 10 TO SEPTEMBER 23, 2008
(Milligrams per liter unless otherwise indicated)

Date	Sept. 10*	Sept. 17			Sept. 23*	
00078 Secchi-depth (m)	1.8	1.7			2.4	
00098 Sampling depth (m)	0.5	0.5	11	14	16	0.5
00010 Water Temperature (°C)	21	21.4	19.7	14.8	13.9	21
00400 pH (standard units)	--	8.2	7.6	7.0	6.7	--
00095 Specific conductance (µS/cm)	--	514	528	637	682	--
00300 Dissolved oxygen	--	9.0	4.2	0.1	0.1	--
32210 Chlorophyll a, phytoplankton (µg/L)	--	19.5	--	--	--	--
00665 Phosphorus, Total (as P)	0.047	0.057	0.084	0.52	0.86	0.045
00671 Orthophosphate, dissolved (as P)	--	<.006	0.049	0.459	0.79	--
00600 Total nitrogen	--	E.69	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	E.015	--	--	--	--
00608 Ammonia, dissolved (as N)	--	<.020	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	0.68	--	--	--	--

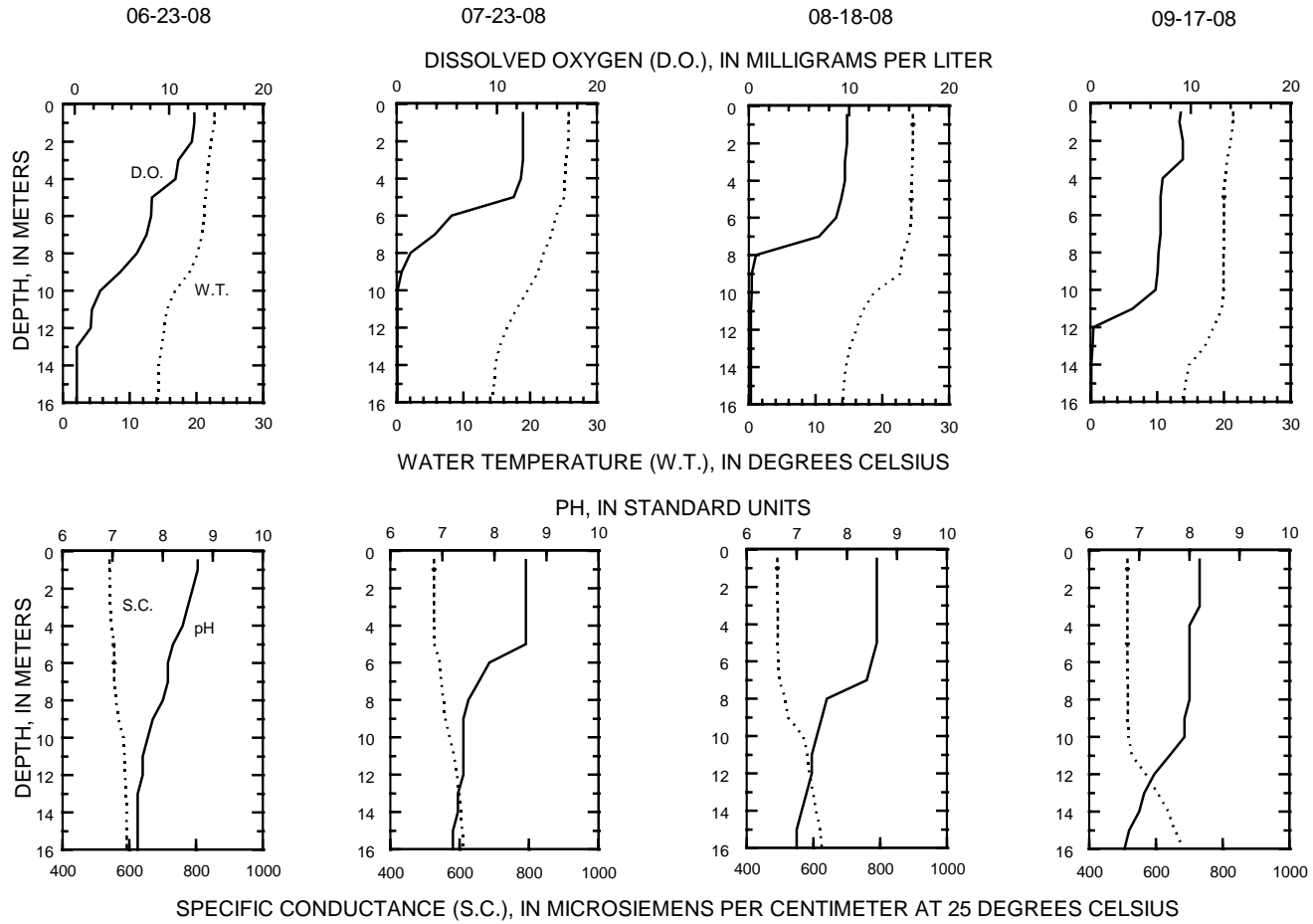
423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

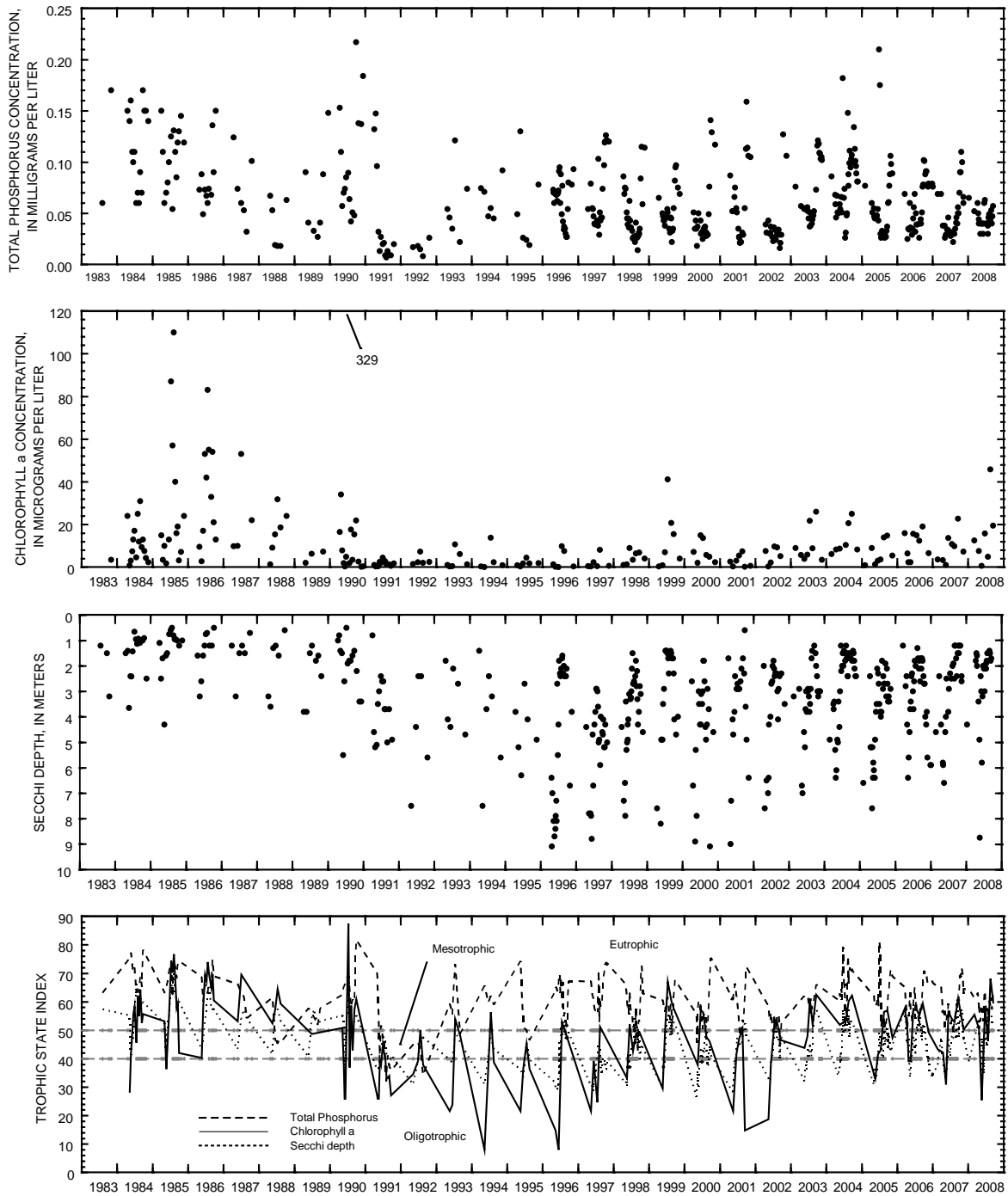
LAKE-DEPTH PROFILES, NOVEMBER 13, 2007 TO MAY 19, 2008



423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

LAKE-DEPTH PROFILES, JUNE 23 TO SEPTEMBER 17, 2008





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

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

LOCATION.--Lat 42°36'59", long 88°35'44", in NW ¼ SW ¼ sec.22, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA--3.24 mi².

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

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

Date	<u>Apr. 21</u>	<u>May 19</u>	<u>June 23</u>	<u>July 23</u>	<u>Aug. 18</u>
00078 Secchi-depth (m)	2.0	7.9	3.8	2.2	1.5

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

LOCATION.--Lat 42°35'26", long 88°38'01", in SE ¼ NW ¼ sec.32, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA--3.24 mi².

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

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

Date	<u>Apr. 21</u>	<u>May 19</u>	<u>June 23</u>	<u>July 23</u>	<u>Aug. 18</u>
00078 Secchi-depth (m)	2.6	8.0	2.3	1.9	2.0

05404500 DEVILS LAKE NEAR BARABOO, WI

LOCATION.--Lat 43°25'35", long 89°43'40" referenced to North American Datum of 1927, in SW ¼ SE ¼ sec.13, T.11 N., R.6 E., Sauk County, WI, Hydrologic Unit 07070004, in Devils Lake State Park, 3.5 mi south of Baraboo.

SURFACE AREA.--0.56 mi².

DRAINAGE AREA.--4.79 mi².

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 NGVD of 1929.

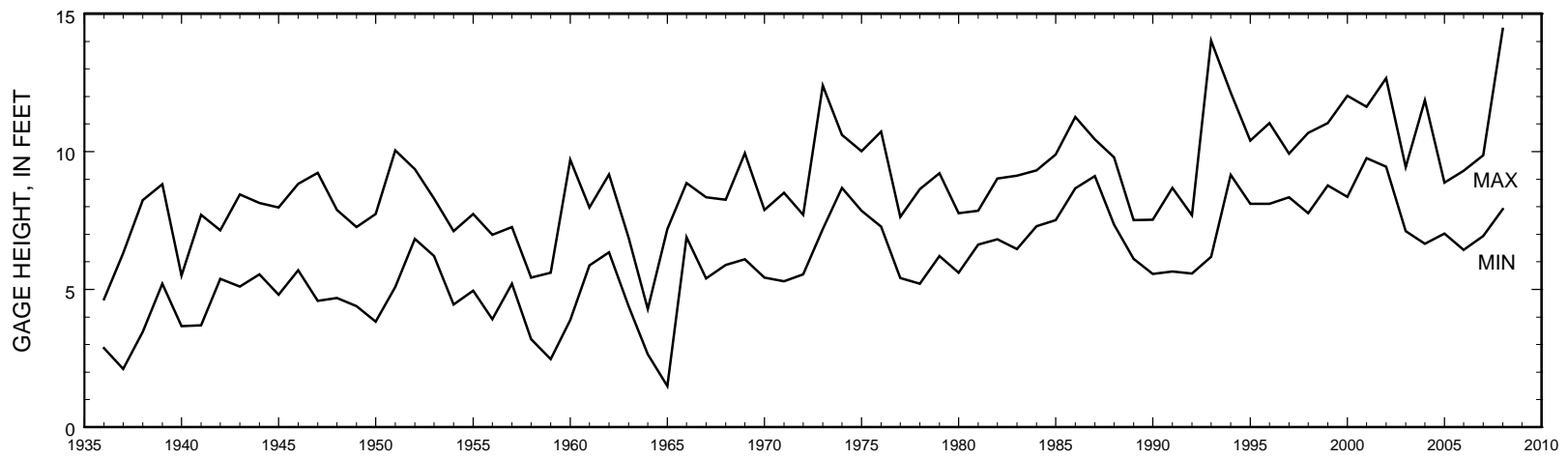
REMARKS.--Lake normally has no surface outlet. However, during and after extreme rainfall in June, water spilled out of the north end of the lake. Water removed from lake by siphon October 1-25, April 17-May 29, and June 5-September 30.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 14.83 ft, June 12, 2008; minimum observed, 1.49 ft, Feb. 8, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 14.83 ft, June 12, 2008; minimum recorded, 7.90 ft, Nov. 30 and Dec. 1.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.71	8.38	7.97	8.15	8.60	8.83	9.65	11.80	11.32	12.96	12.22	10.84
2	8.70	8.37	8.06	8.15	8.61	8.84	9.71	11.84	11.30	12.91	12.17	10.79
3	8.79	8.35	8.05	8.15	8.61	8.91	9.77	11.88	11.32	12.85	12.12	10.72
4	8.76	8.34	8.05	8.15	8.62	8.94	9.82	11.88	11.31	12.80	12.14	10.71
5	8.73	8.31	8.06	8.14	8.63	8.96	9.90	11.86	11.68	12.74	12.13	10.70
6	8.72	8.29	8.06	8.16	8.68	8.96	10.02	11.85	11.84	12.68	12.08	10.66
7	8.70	8.27	8.07	8.19	8.71	8.97	10.12	11.89	11.92	12.65	12.02	10.62
8	8.69	8.26	8.07	8.26	8.71	8.98	10.20	11.87	12.50	12.69	11.97	10.57
9	8.64	8.24	8.07	8.33	8.71	8.98	10.35	11.84	12.87	12.65	11.92	10.52
10	8.59	8.23	8.06	8.36	8.70	8.98	10.47	11.82	13.00	12.61	11.86	10.48
11	8.55	8.22	8.07	8.41	8.71	8.99	10.78	11.82	13.57	13.01	11.81	10.44
12	8.51	8.21	8.08	8.43	8.71	8.99	10.91	11.82	13.93	13.18	11.77	10.41
13	8.48	8.20	8.07	8.46	8.71	9.00	10.97	11.80	14.45	13.15	11.73	10.41
14	8.47	8.15	8.07	8.48	8.73	9.02	10.99	11.79	14.11	13.11	11.68	10.39
15	8.45	8.11	8.07	8.49	8.74	9.06	11.01	11.78	13.93	13.07	11.63	10.37
16	8.48	8.09	8.06	8.49	8.74	9.08	11.03	11.74	13.79	13.02	11.58	10.33
17	8.47	8.06	8.06	8.52	8.79	9.09	11.04	11.70	13.70	12.98	11.54	10.29
18	8.55	8.05	8.06	8.54	8.83	9.12	11.10	11.67	13.65	12.93	11.50	10.25
19	8.59	8.04	8.05	8.54	8.84	9.14	11.13	11.64	13.59	12.89	11.46	10.21
20	8.58	8.03	8.05	8.54	8.83	9.17	11.14	11.61	13.54	12.87	11.41	10.17
21	8.57	8.03	8.05	8.55	8.83	9.25	11.14	11.58	13.47	12.82	11.36	10.14
22	8.55	8.03	8.05	8.57	8.83	9.32	11.15	11.55	13.41	12.78	11.32	10.10
23	8.52	8.02	8.11	8.57	8.83	9.34	11.16	11.51	13.36	12.74	11.28	10.06
24	8.49	8.00	8.13	8.57	8.83	9.35	11.15	11.46	13.30	12.66	11.22	10.03
25	8.47	7.99	8.13	8.58	8.83	9.36	11.39	11.43	13.24	12.61	11.17	9.99
26	8.46	7.98	8.12	8.59	8.83	9.38	11.77	11.41	13.19	12.55	11.12	9.95
27	8.45	7.96	8.13	8.59	8.83	9.41	11.81	11.37	13.14	12.49	11.07	9.91
28	8.44	7.96	8.14	8.59	8.83	9.43	11.83	11.33	13.13	12.44	11.02	9.87
29	8.43	7.94	8.15	8.59	8.83	9.45	11.83	11.30	13.07	12.38	10.98	9.84
30	8.42	7.92	8.15	8.60	---	9.47	11.81	11.34	13.01	12.33	10.93	9.79
31	8.40	---	8.15	8.60	---	9.53	---	11.33	---	12.28	10.89	---
Mean	8.56	8.13	8.08	8.43	8.75	9.14	10.84	11.66	12.99	12.77	11.58	10.32
Max	8.79	8.38	8.15	8.60	8.84	9.53	11.83	11.89	14.45	13.18	12.22	10.84
Min	8.40	7.92	7.97	8.14	8.60	8.83	9.65	11.30	11.30	12.28	10.89	9.79



Annual minimum and maximum water levels for Devils Lake, 1936-2008.

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI

LOCATION.--Lat 42°35'25", long 88°26'04" referenced to North American Datum of 1927, in SE ¼ NW ¼ sec.36, T.2 N., R.17 E., Walworth County, WI, Hydrologic Unit 07120006, at Geneva Lake dam at Center Street at Lake Geneva.

SURFACE AREA.--8.22 mi².

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--October 1997 to August 2002, December 2002 to current year.

GAGE.--Water-stage recorder. Datum of gage is 862.08 ft above NGVD of 1929. Intermittent staff-gage readings January to March.

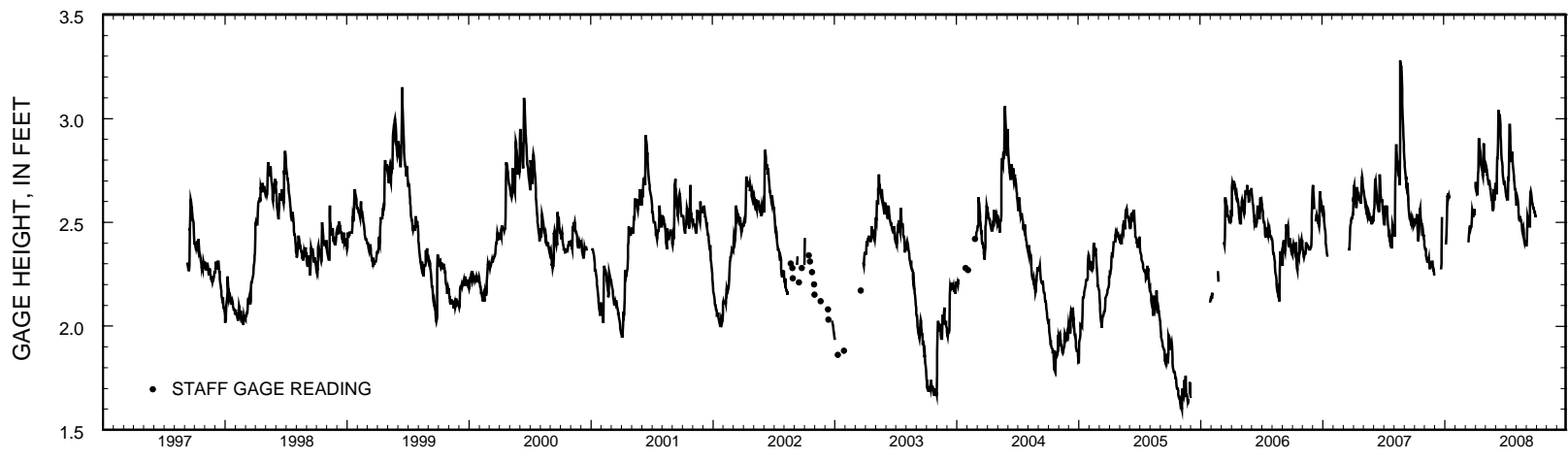
REMARKS.--Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.35 ft, Aug. 20, 2007; minimum gage height, 1.44 ft, Nov. 5, 2005 (affected by wind).

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.25 ft (affected by wind), June 15; minimum gage height, 2.11 ft (affected by wind), Nov. 28, but may have been lower during period when the float was frozen in the well.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES
 [e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.49	2.39	---	---	---	---	2.69	2.74	2.67	2.64	2.61	2.39
2	2.50	2.38	---	---	---	---	2.67	2.76	2.66	2.63	2.59	2.39
3	2.52	2.37	---	e2.53	---	---	2.66	2.77	2.64	2.64	2.58	2.39
4	2.50	2.37	---	---	---	---	2.68	2.76	2.64	2.63	2.61	2.45
5	2.50	2.37	---	e2.40	---	---	2.66	2.75	2.72	2.62	2.62	2.53
6	2.50	2.34	---	2.44	---	---	2.64	2.73	2.81	2.61	2.61	2.52
7	2.51	2.33	---	2.51	---	---	2.63	2.73	2.81	2.61	2.59	2.51
8	2.52	2.32	---	2.61	---	---	2.64	2.71	2.88	2.72	2.57	2.50
9	2.54	2.31	---	2.63	---	---	2.73	2.70	3.04	2.70	2.55	2.50
10	2.48	2.31	---	2.62	---	---	2.75	2.68	3.02	2.71	2.52	2.49
11	2.45	2.31	---	2.64	---	e2.41	2.90	2.70	2.97	2.81	2.51	2.48
12	2.43	2.32	---	2.62	---	2.44	2.90	2.70	2.94	2.97	2.51	2.48
13	2.41	2.32	---	2.63	---	2.46	2.89	2.70	3.02	2.97	2.51	2.58
14	2.43	2.33	---	e2.62	---	2.47	2.87	2.68	3.00	2.91	2.53	2.64
15	2.45	2.30	---	---	---	2.48	2.85	2.66	2.97	2.88	2.51	2.65
16	2.51	2.29	---	---	---	2.48	2.84	2.66	2.92	2.84	2.51	2.64
17	2.51	2.28	---	---	---	2.47	2.80	2.65	2.89	2.82	2.50	2.62
18	2.56	2.28	---	---	---	2.48	2.78	2.63	2.83	2.79	2.49	2.60
19	2.57	2.29	---	---	---	2.48	2.77	2.61	2.80	2.82	2.46	2.59
20	2.52	2.29	e2.28	---	---	2.48	2.76	2.61	2.79	2.84	2.46	2.59
21	2.51	2.30	2.30	---	---	2.51	2.75	2.59	2.77	2.82	2.45	2.58
22	2.49	2.31	2.36	---	e2.56	2.56	2.74	2.58	2.75	2.78	2.46	2.57
23	2.49	2.31	2.52	---	---	2.55	2.73	2.56	2.72	2.76	2.47	2.57
24	2.47	2.31	---	---	---	2.53	2.72	2.56	2.71	2.74	2.45	2.57
25	2.44	2.31	---	---	---	2.53	2.78	2.57	2.69	2.72	2.43	2.56
26	2.44	2.28	---	---	---	2.53	2.88	2.66	2.69	2.71	2.41	2.55
27	2.45	2.28	---	---	---	2.55	2.81	2.62	2.68	2.69	2.40	2.55
28	2.43	2.27	---	---	---	2.56	2.80	2.61	2.70	2.66	2.41	2.53
29	2.44	2.27	---	---	---	2.56	2.79	2.61	2.68	2.66	2.41	2.53
30	2.42	e2.25	---	---	---	2.54	2.76	2.67	2.66	2.65	2.40	2.53
31	2.41	---	---	---	---	---	---	2.69	---	2.63	2.39	---
Mean	2.48	2.31	---	---	---	---	2.76	2.67	2.80	2.74	2.50	2.54
Max	2.57	2.39	---	---	---	---	2.90	2.77	3.04	2.97	2.62	2.65
Min	2.41	2.25	---	---	---	---	2.63	2.56	2.64	2.61	2.39	2.39



Stage hydrograph for Geneva Lake, 1997-2008.

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LOCATION.--Lat 42°33'29", long 88°32'33", in NE ¼ SE ¼ sec.12, T.1 N., R.16 E., Walworth County, Hydrologic Unit 07120006, 1.3 mi south of Williams Bay.

SURFACE AREA.--8.22 mi².

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. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll a concentration are collected from the top 0.5 m of the lake.

WATER-QUALITY DATA, NOVEMBER 13, 2007 TO JUNE 23, 2008
(Milligrams per liter unless otherwise indicated)

Date	Nov. 13				Apr. 23		June 23						
	4.3				6.6		4.9						
00078 Secchi-depth (m)													
00098 Sampling depth (m)	0.5	22	30	42	0.5	41.5	0.5	7.0	14	34	39	42.5	
00010 Water Temperature (°C)	11	10.8	7.9	7.2	7.2	3.7	20.2	19.6	12.5	6.8	6.4	6.2	
00400 pH (standard units)	8.2	8.4	7.6	7.6	8.3	8.3	8.5	8.5	8.3	8.0	7.9	7.8	
00095 Specific conductance (µS/cm)	518	518	529	532	519	529	518	518	521	525	527	528	
00300 Dissolved oxygen	10.7	10.2	1.6	0.1	15.2	13.9	10.3	10.3	10.8	10.1	9.5	8.8	
32210 Chlorophyll a, phytoplankton (µg/L)	8.36	--	--	--	1.68		3.24	--	--	--	--	--	
00665 Phosphorus, Total (as P)	0.010	0.007	0.036	0.052	0.024	0.017	0.008	0.010	0.009	0.008	0.013	0.018	
00671 Orthophosphate, dissolved (as P)	<.002	--	--	--	0.004	<.002	<.002	--	--	--	--	--	
00600 Total nitrogen	--	--	--	--	0.43	0.61	--	--	--	--	--	--	
00631 Nitrate + nitrite, dissolved (as N)	<.019	--	--	--	0.079	0.096	<.019	--	--	--	--	--	
00608 Ammonia, dissolved (as N)	<.015	--	--	--	0.016	0.019	<.015	--	--	--	--	--	
00625 Ammonia + organic nitrogen, total (as N)	0.42	--	--	--	0.35	0.51	0.45	--	--	--	--	--	
00900 Hardness (as CaCO3)	--	--	--	--	230	230	--	--	--	--	--	--	
00417 Acid neutralizing capacity (as CaCO3)	--	--	--	--	181	183	--	--	--	--	--	--	
00915 Calcium, dissolved (Ca)	--	--	--	--	35.7	35.9	--	--	--	--	--	--	
00925 Magnesium, dissolved (Mg)	--	--	--	--	34.8	35.2	--	--	--	--	--	--	
00930 Sodium, dissolved (Na)	--	--	--	--	20.4	20.6	--	--	--	--	--	--	
00935 Potassium, dissolved (K)	--	--	--	--	1.9	2	--	--	--	--	--	--	
00940 Chloride, dissolved (Cl)	--	--	--	--	40.4	41.3	--	--	--	--	--	--	
00955 Silica, dissolved (SiO2)	--	--	--	--	1.83	2.36	--	--	--	--	--	--	
01046 Iron (µg/L)	--	--	--	--	<100	<100	--	--	--	--	--	--	
01056 Manganese (µg/L)	--	--	--	--	<.5	<.5	--	--	--	--	--	--	
00081 Apparent color (PCU)	--	--	--	--	5	5	--	--	--	--	--	--	
63675 Turbidity (NTU)	--	--	--	--	<1.0	<1.0	--	--	--	--	--	--	
70300 Solids, dissolved (at 180 C°)	--	--	--	--	280	276	--	--	--	--	--	--	

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

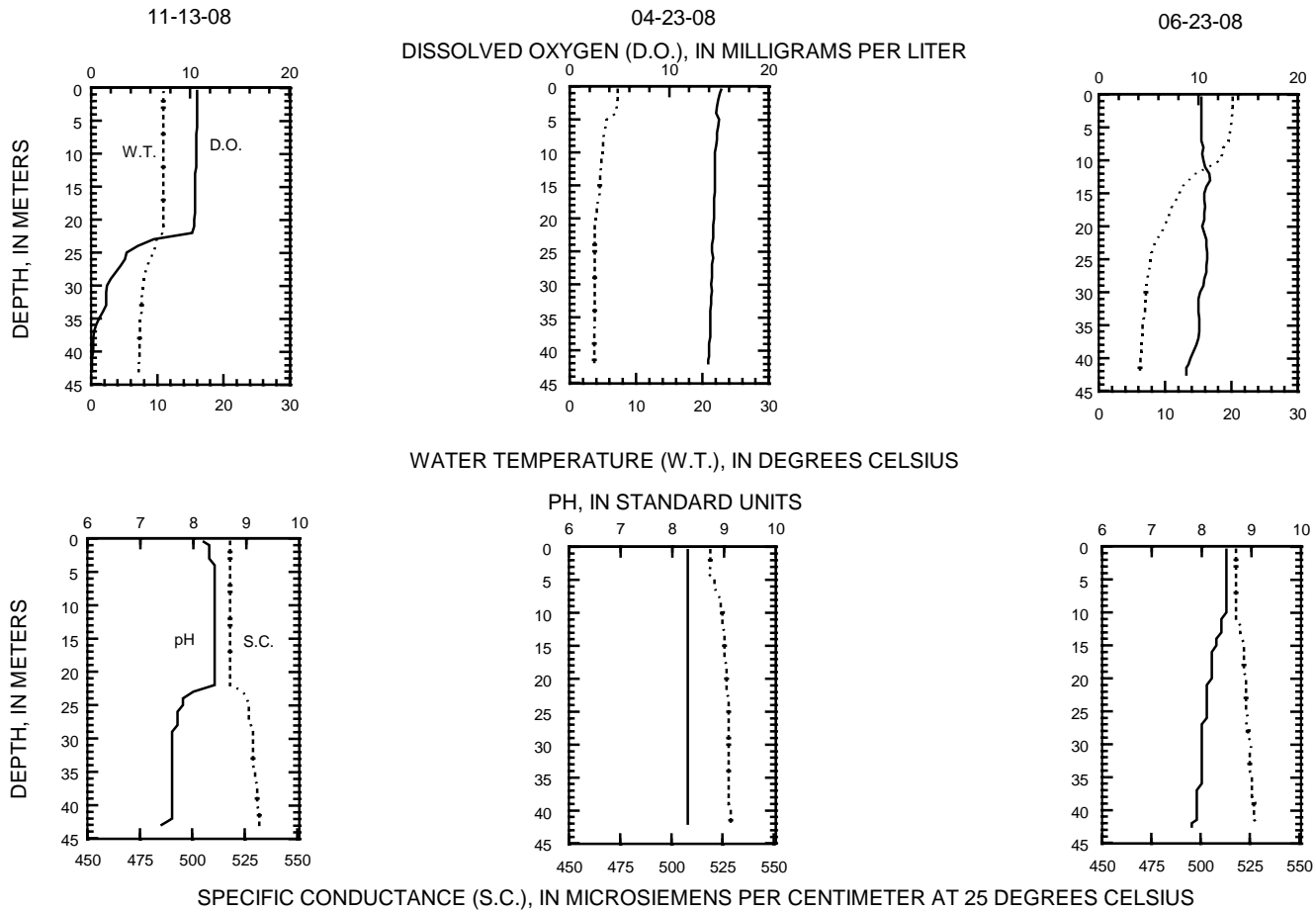
WATER-QUALITY DATA, JULY 23 TO SEPTEMBER 17, 2008
(Milligrams per liter unless otherwise indicated)

Date	July 23						Aug. 18					
	3.3						4.0					
00078 Secchi-depth (m)												
00098 Sampling depth (m)	0.5	7.0	15	33	38	43	0.5	9.0	15	33	38	42
00010 Water Temperature (°C)	24.8	24.4	11.8	6.9	6.5	6.4	24.4	22.9	11.9	7.1	6.6	6.4
00400 pH (standard units)	8.4	8.5	8.0	7.8	7.6	7.6	8.5	8.3	7.7	7.6	7.5	7.4
00095 Specific conductance (µS/cm)	514	514	525	528	531	532	506	511	513	516	518	521
00300 Dissolved oxygen	9.3	9.4	9.3	9.2	7.1	6.4	8.6	6.7	5.8	6.6	4.4	1.8
32210 Chlorophyll a, phytoplankton (µg/L)	1.99	--	--	--	--	--	2.32	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.010	0.010	0.012	0.005	0.015	0.033	0.015	0.015	0.012	0.012	0.02	0.058
00671 Orthophosphate, dissolved (as P)	<.002	--	--	--	--	--	0.002	--	--	--	--	--
00600 Total nitrogen	--	--	--	--	--	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	<.019	--	--	--	--	--	<.019	--	--	--	--	--
00608 Ammonia, dissolved (as N)	<.015	--	--	--	--	--	<.015	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.46	--	--	--	--	--	0.4	--	--	--	--	--

Date	Sept. 17					
	4.1					
00078 Secchi-depth (m)						
00098 Sampling depth (m)	0.5	12	17	33	38	42
00010 Water Temperature (°C)	20.6	20	10.9	7.0	6.7	6.6
00400 pH (standard units)	8.3	8.3	7.6	7.5	7.3	7.3
00095 Specific conductance (µS/cm)	516	517	526	528	531	532
00300 Dissolved oxygen	9.0	8.2	4.9	5.0	1.8	0.2
32210 Chlorophyll a, phytoplankton (µg/L)	4.38	--	--	--	--	--
00665 Phosphorus, Total (as P)	0.011	0.011	0.009	0.010	0.024	0.064
00671 Orthophosphate, dissolved (as P)	<.002	<.002	<.002	0.006	0.015	0.048
00600 Total nitrogen	--	--	0.44	0.59	0.68	0.6
00631 Nitrate + nitrite, dissolved (as N)	<.019	<.019	0.107	0.275	0.335	0.254
00608 Ammonia, dissolved (as N)	0.015	<.015	<.015	<.015	<.015	0.097
00625 Ammonia + organic nitrogen, total (as N)	0.28	0.35	0.33	0.32	0.34	0.35

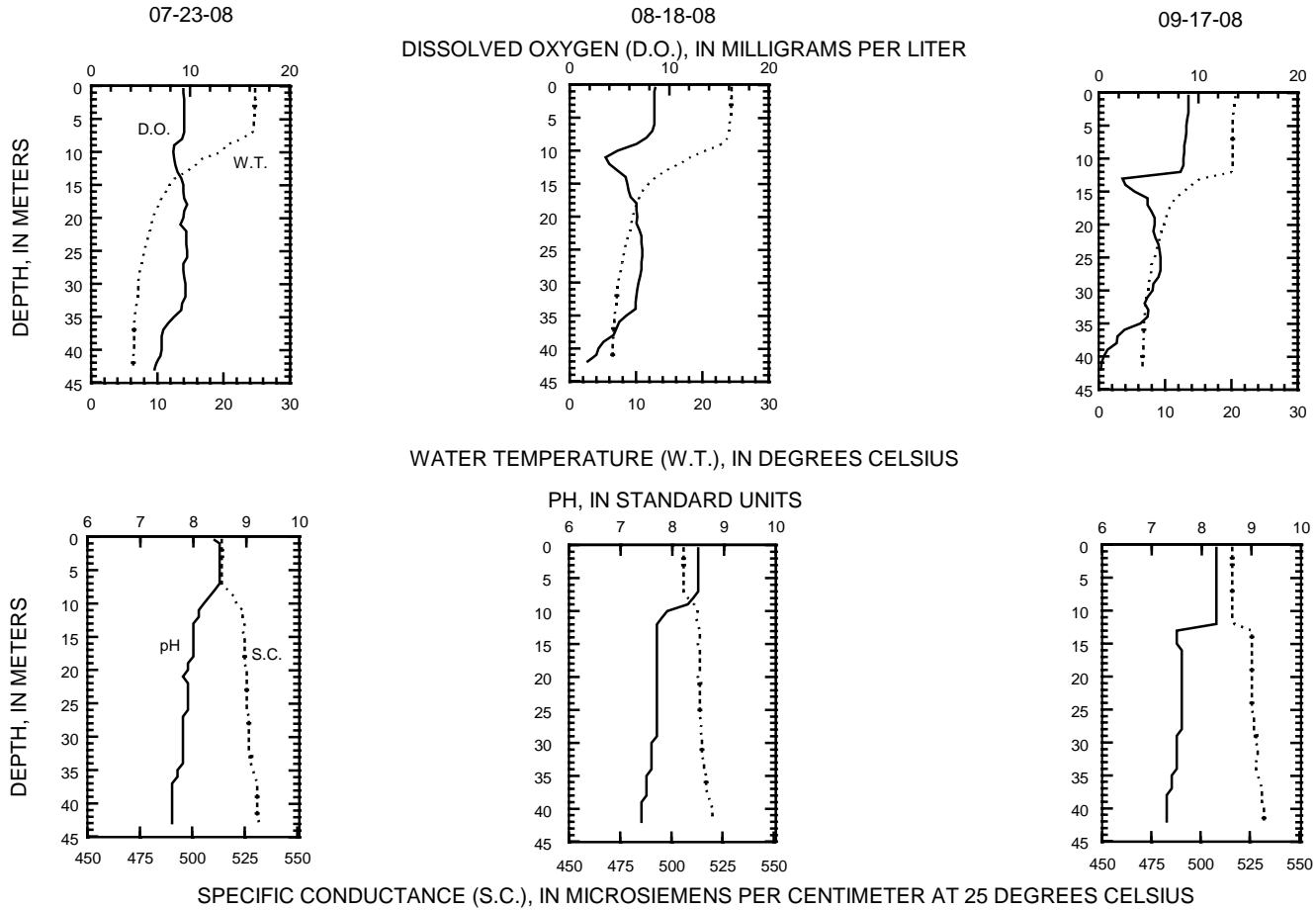
423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

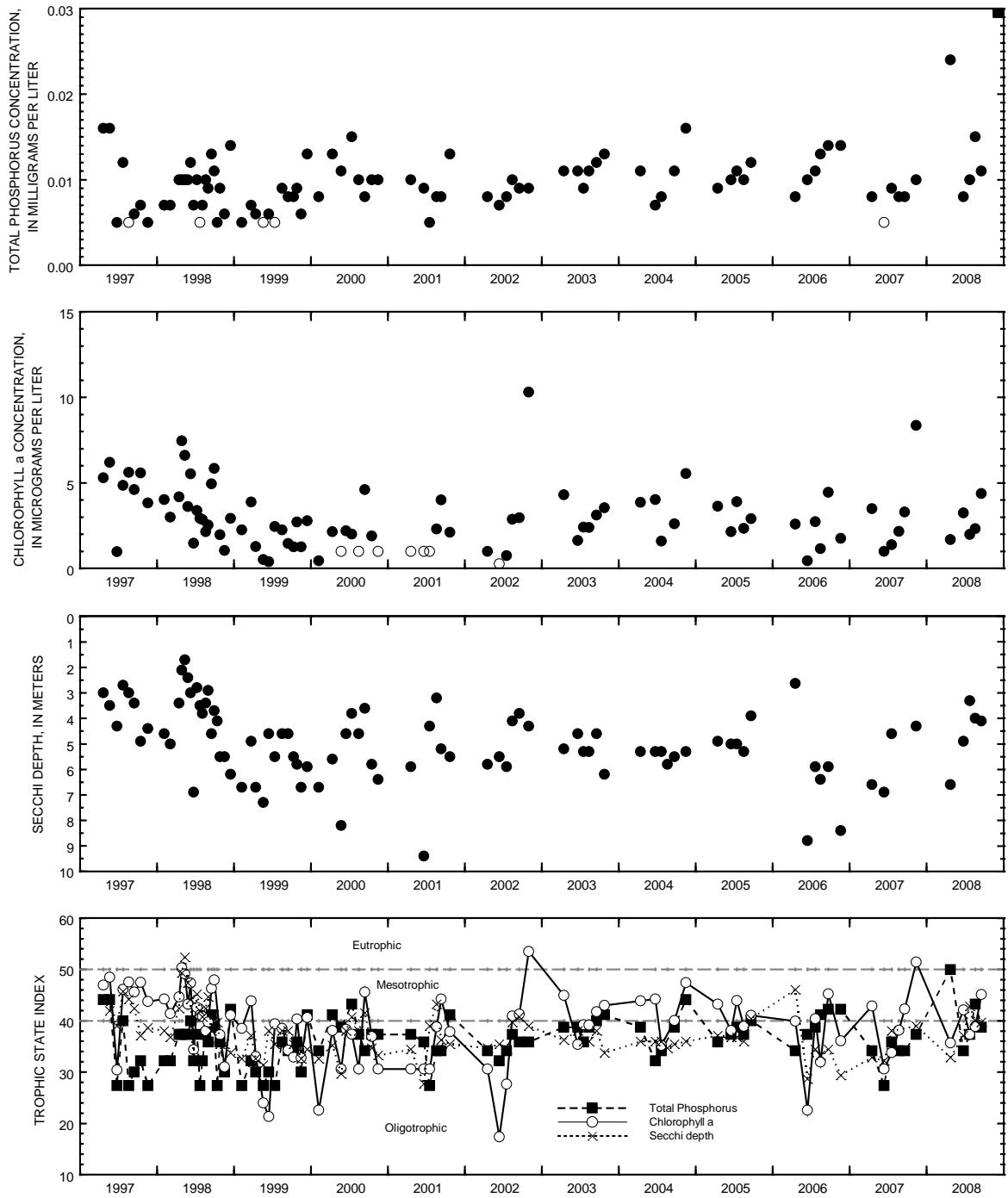
LAKE-DEPTH PROFILES, NOVEMBER 13, 2007 TO JUNE 23, 2008



423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LAKE-DEPTH PROFILES, JULY 23 TO SEPTEMBER 17, 2008





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

(Open circles on the first two 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" referenced to North American Datum of 1927, in NE ¼ SE ¼ SE ¼ sec.27, T.16 N., R.13 E., Green Lake County, WI, Hydrologic Unit 04030201, on left bank at downstream side of County Trunk Highway A, 2.3 mi southeast of Green Lake.

SURFACE AREA.--11.48 mi².

DRAINAGE AREA.--103 mi²; Area of Green Lake, 7,346 acres.

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

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

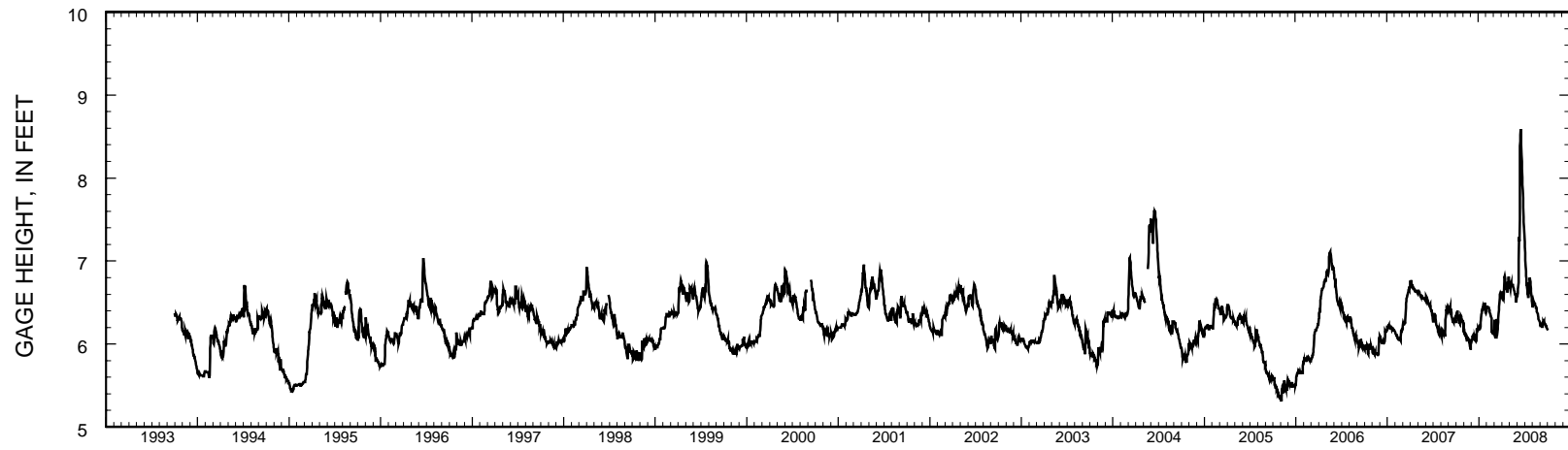
REMARKS.--Lake level regulated by dam at outlet at Green Lake. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 8.67 ft, June 15, 2008; minimum recorded, 5.27 ft, Nov. 5, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 8.67 ft, June 15; minimum recorded gage height, 5.80 ft, Nov. 29.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES**
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.32	6.20	e6.01	6.20	e6.43	6.12	6.63	6.76	6.59	7.23	6.48	6.25
2	6.32	6.19	e6.03	6.19	e6.41	e6.11	6.61	6.73	6.60	7.17	6.46	6.25
3	6.36	6.18	e6.04	6.18	e6.38	e6.10	6.60	6.72	6.61	7.10	6.44	6.22
4	6.38	6.18	e6.05	6.18	e6.36	6.10	6.60	6.69	6.62	7.01	6.48	6.22
5	6.38	6.12	e6.07	6.18	e6.34	6.10	6.58	6.66	6.68	6.94	6.52	6.24
6	6.39	6.11	e6.09	6.19	e6.33	6.09	6.56	6.66	6.72	6.88	6.52	6.24
7	6.39	6.13	e6.10	6.21	e6.31	6.09	6.55	6.71	6.76	6.82	6.50	6.23
8	6.36	6.13	6.07	6.26	e6.30	6.08	6.54	6.73	7.03	6.79	6.50	6.23
9	6.32	6.12	6.07	6.30	e6.28	6.08	6.63	6.72	7.31	6.74	6.50	6.22
10	6.30	6.11	6.07	6.31	e6.27	6.08	6.63	6.72	7.32	6.70	6.48	6.21
11	6.29	6.11	6.07	6.36	e6.26	e6.08	6.75	6.72	7.29	6.74	6.48	6.21
12	6.27	6.11	6.06	6.37	e6.25	e6.10	6.80	6.71	7.54	6.73	6.48	6.25
13	6.26	6.10	6.07	6.40	e6.24	e6.11	6.82	6.71	8.25	6.68	6.47	6.26
14	6.26	6.03	6.06	6.42	e6.23	e6.14	6.79	6.71	8.50	6.62	6.46	6.26
15	6.25	6.05	6.06	6.42	e6.22	e6.18	6.76	6.71	8.57	6.57	6.45	6.27
16	6.30	6.09	6.07	6.42	e6.22	e6.22	6.72	6.70	8.60	e6.57	6.44	6.26
17	6.30	6.07	6.05	6.45	e6.21	e6.26	6.69	6.68	8.50	e6.59	6.44	6.27
18	6.35	6.06	6.05	6.45	e6.21	e6.31	6.70	6.67	8.40	e6.63	6.43	6.25
19	6.30	6.06	6.04	6.43	e6.19	e6.37	6.71	6.66	8.28	e6.67	6.39	6.25
20	6.33	6.06	6.03	6.43	e6.18	e6.41	6.71	6.65	8.18	e6.73	6.38	6.25
21	6.34	6.06	6.03	6.44	e6.17	e6.45	6.68	6.64	8.06	e6.77	6.38	6.24
22	6.33	6.06	6.04	6.46	6.15	e6.50	6.65	6.62	7.94	6.80	6.37	6.24
23	6.31	6.05	6.19	6.46	6.15	e6.56	6.63	6.61	7.83	6.77	6.36	6.24
24	6.30	6.01	6.17	e6.45	6.15	e6.60	6.63	6.61	7.75	6.75	6.35	6.23
25	6.29	6.01	6.16	e6.43	6.14	6.61	6.71	6.60	7.64	6.71	6.32	6.22
26	6.29	6.02	6.16	e6.41	6.14	6.61	6.71	6.61	7.63	6.67	6.30	6.22
27	6.27	5.99	6.17	e6.39	6.13	6.60	6.78	6.56	7.53	6.63	6.29	6.21
28	6.27	6.00	6.18	e6.38	6.13	6.59	6.80	6.52	7.47	6.59	6.28	6.20
29	6.25	5.93	6.20	e6.37	6.12	6.58	6.80	6.51	7.40	6.56	6.28	6.19
30	6.25	e6.00	6.19	e6.39	---	6.57	6.78	6.58	7.32	6.52	6.27	6.18
31	6.19	---	6.20	e6.43	---	6.59	---	6.58	---	6.49	6.26	---
Mean	6.31	6.08	6.09	6.35	6.24	6.30	6.68	6.66	7.56	6.75	6.41	6.23
Max	6.39	6.20	6.20	6.46	6.43	6.61	6.82	6.76	8.60	7.23	6.52	6.27
Min	6.19	5.93	6.01	6.18	6.12	6.08	6.54	6.51	6.59	6.49	6.26	6.18



Stage hydrograph for Green Lake, 1993-2008.

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LOCATION.--Lat 43°47'56", long 89°02'05", in NW ¼ SE ¼ sec.2, T.15 N., R.12 E., Green Lake County, Hydrologic Unit 04030201, about 5 miles southwest of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 to current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "***" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, OCTOBER 27, 2007 TO JUNE 24, 2008
(Milligrams per liter unless otherwise indicated)

Date	Oct. 27*	Apr. 29		May 6*	May 15*	May 28*	June 1*	June 24	
00078 Secchi-depth (m)	7.6	5.5		5.9	1.8	1.7	1.4	5.1	
00098 Sampling depth (m)	0.1	0.5	67	0.1	0.1	0.1	0.1	0.5	67.5
00010 Water Temperature (°C)	13.3	4.1	3.8	11.7	10.0	12.2	17.2	21.2	4.4
00400 pH (standard units)	--	8.1	8.0	--	--	--	--	8.8	7.4
00095 Specific conductance (µS/cm)	--	513	517	--	--	--	--	484	525
00300 Dissolved oxygen	--	14.7	14.4	--	--	--	--	11.1	2.0
32210 Chlorophyll a, phytoplankton (µg/L)	--	2.19	--	--	--	--	--	0.45	--
00665 Phosphorus, Total (as P)	--	0.053	0.053	--	--	--	--	0.029	0.090
00671 Orthophosphate, dissolved (as P)	--	0.023	--	--	--	--	--	--	--
00600 Total nitrogen	--	0.61	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	0.303	--	--	--	--	--	--	--
00608 Ammonia, dissolved (as N)	--	<.015	--	--	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	0.31	--	--	--	--	--	--	--
00900 Hardness (as CaCO3)	--	230	--	--	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO3)	--	180	--	--	--	--	--	--	--
00915 Calcium, dissolved (Ca)	--	33.9	--	--	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	--	35	--	--	--	--	--	--	--
00930 Sodium, dissolved (Na)	--	19.3	--	--	--	--	--	--	--
00935 Potassium, dissolved (K)	--	3.5	--	--	--	--	--	--	--
00940 Chloride, dissolved (Cl)	--	38.8	--	--	--	--	--	--	--
00945 Sulfate, dissolved (SO4)	--	--	--	--	--	--	--	--	--
00955 Silica, dissolved (SiO2)	--	0.461	--	--	--	--	--	--	--
01046 Iron (µg/L)	--	<100	--	--	--	--	--	--	--
01056 Manganese (µg/L)	--	<.5	--	--	--	--	--	--	--
00081 Apparent color (PCU)	--	5	--	--	--	--	--	--	--
63675 Turbidity (NTU)	--	<1.0	--	--	--	--	--	--	--
70300 Solids, dissolved (at 180 C°)	--	282	--	--	--	--	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

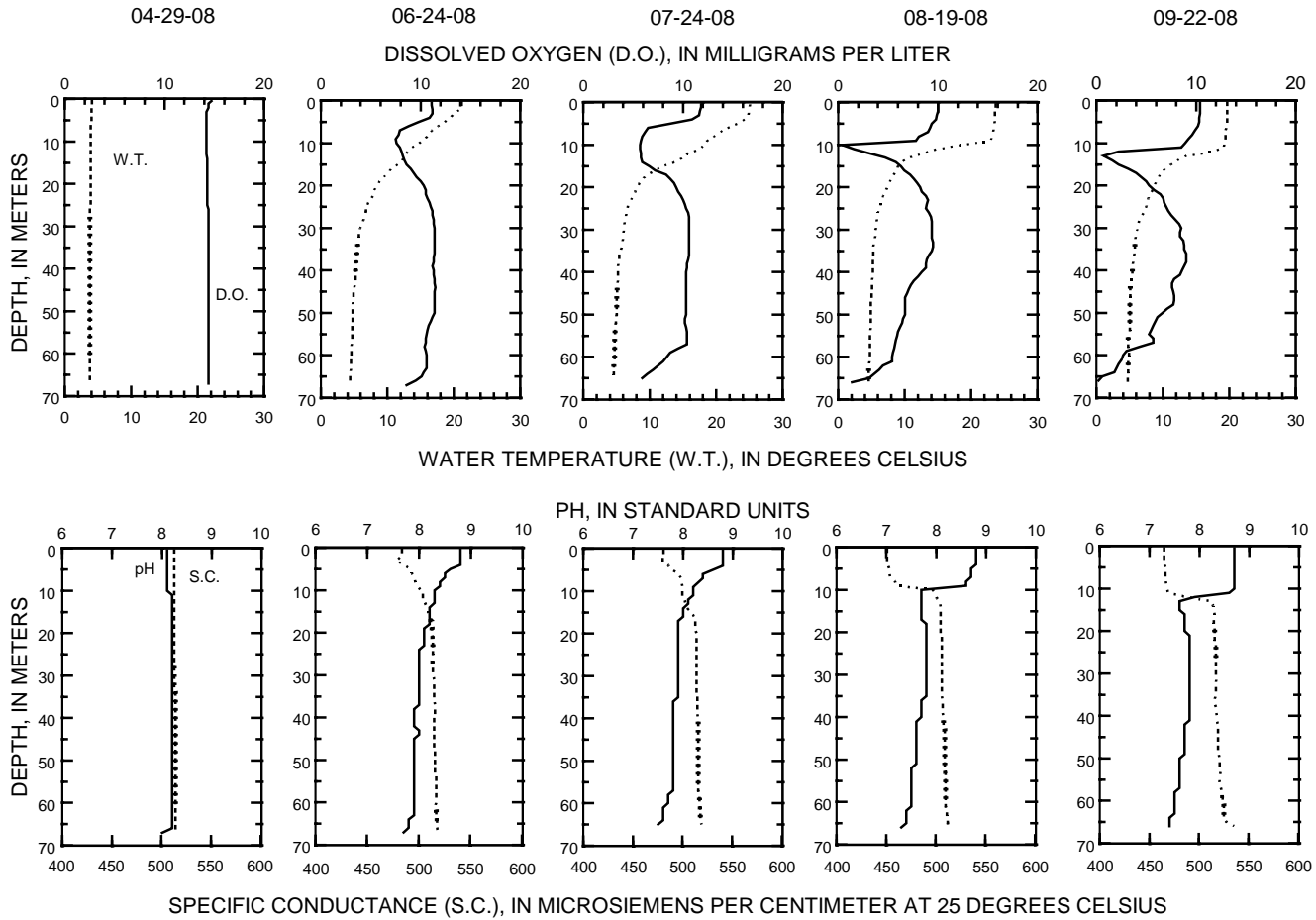
WATER-QUALITY DATA, JUNE 30 TO SEPTEMBER 25, 2008
(Milligrams per liter unless otherwise indicated)

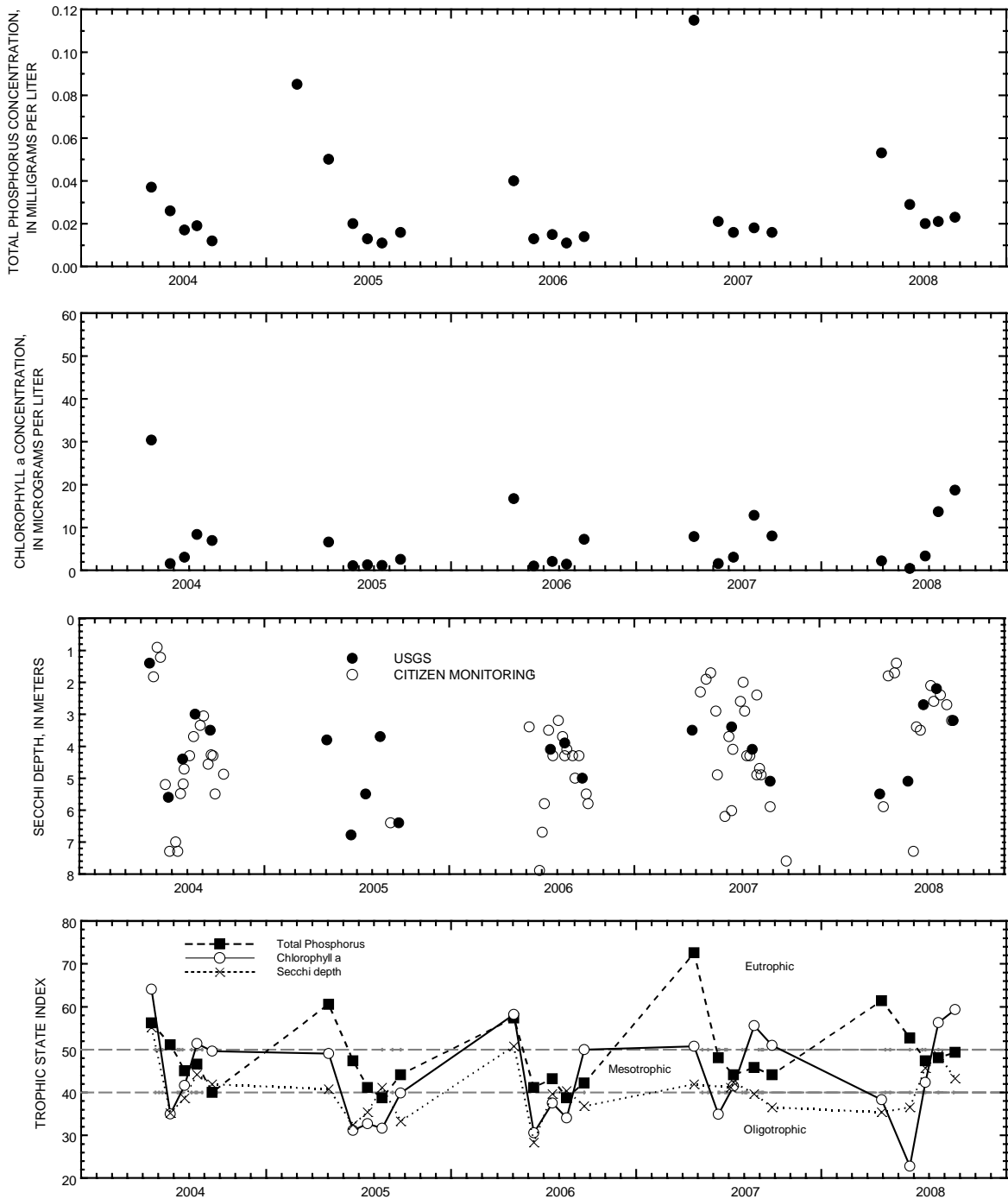
Date	June 30*	July 4*	July 10*	July 18*	July 24		Aug. 8*	Aug. 14*
00078 Secchi-depth (m)	6.4	7.3	3.4	3.5	2.7		2.1	2.6
00098 Sampling depth (m)	0.1	0.1	0.1	0.1	0.5	67	0.1	0.1
00010 Water Temperature (°C)	21.7	23.3	23.9	23.3	25.1	4.5	25.6	24.4
00400 pH (standard units)	--	--	--	--	8.8	7.4	--	--
00095 Specific conductance (µS/cm)	--	--	--	--	481	521	--	--
00300 Dissolved oxygen	--	--	--	--	11.8	5.5	--	--
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	3.31	--	--	--
00665 Phosphorus, Total (as P)	--	--	--	--	0.02	0.124	--	--

Date	Aug. 19			Aug. 27*	Aug. 30*	Sept. 9*	Sept. 19*	Sept. 22			Sept. 25*
00078 Secchi-depth (m)	2.2			2.4	2.4	2.7	3.2	3.2			4.1
00098 Sampling depth (m)	0.5	14	66	0.1	2.0	0.1	0.1	0.5	15	66	0.1
00010 Water Temperature (°C)	23.7	9.5	4.6	23.9	25	21.1	20	19.7	11.2	4.7	20
00400 pH (standard units)	8.8	7.7	7.3	--	--	--	--	8.7	7.6	7.4	--
00095 Specific conductance (µS/cm)	451	505	514	--	--	--	--	465	515	535	--
00300 Dissolved oxygen	10	5.8	1.4	--	--	--	--	10.4	2.2	0.2	--
32210 Chlorophyll a, phytoplankton (µg/L)	13.7	--	--	--	--	--	--	18.7	--	--	--
00665 Phosphorus, Total (as P)	0.021	0.012	0.15	--	--	--	--	0.023	0.016	0.189	--
00671 Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	<.002	--	--	--
00600 Total nitrogen	--	--	--	--	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	--	--	--	--	--	<.019	--	--	--
00608 Ammonia, dissolved (as N)	--	--	--	--	--	--	--	<.015	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.41	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 29 TO SEPTEMBER 22, 2008





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

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'28", long 88°57'00", in SE ¼ SE ¼ sec.28, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "*" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, OCTOBER 27, 2007 TO AUGUST 19, 2008
(Milligrams per liter unless otherwise indicated)

Date	Oct. 27*	Apr. 29		May 6*	May 15*	May 28*	June 1*	June 24	
00078 Secchi-depth (m)	5.5	4.0		4.9	1.7	1.8	1.4	3.7	
00098 Sampling depth (m)	--	0.5	33	0.1	0.1	0.1	0.1	0.5	33
00010 Water Temperature (°C)	12.8	5.0	4.0	9.4	10	13.3	17.8	22	5.2
00400 pH (standard units)	--	7.8	8.2	--	--	--	--	8.8	7.8
00095 Specific conductance (µS/cm)	--	512	514	--	--	--	--	472	518
00300 Dissolved oxygen	--	15.0	14.3	--	--	--	--	10.8	10.0
32210 Chlorophyll a, phytoplankton (µg/L)	--	2.48		--	--	--	--	0.64	--
00665 Phosphorus, Total (as P)	--	0.051	0.052	--	--	--	--	0.054	0.093

Date	June 30*	July 4*	July 10*	July 18*	July 24		Aug. 8*	Aug. 14*	Aug. 19		
00078 Secchi-depth (m)	4.3	5.5	3.4	2.3	2.3		1.2	1.8	1.6		
00098 Sampling depth (m)	0.1	0.1	0.1	0.1	0.5	33	0.1	0.1	0.5	16	33
00010 Water Temperature (°C)	21.7	23.3	24.4	24.4	25.4	5.9	25.6	24.4	24.4	13.5	5.7
00400 pH (standard units)	--	--	--	--	8.9	7.8	--	--	8.9	7.6	7.6
00095 Specific conductance (µS/cm)	--	--	--	--	487	516	--	--	447	501	509
00300 Dissolved oxygen	--	--	--	--	12.1	9.1	--	--	11.3	1.9	7.0
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	7.82	--	--	--	25.2	--	--
00665 Phosphorus, Total (as P)	--	--	--	--	0.020	0.075	--	--	0.029	0.021	0.075

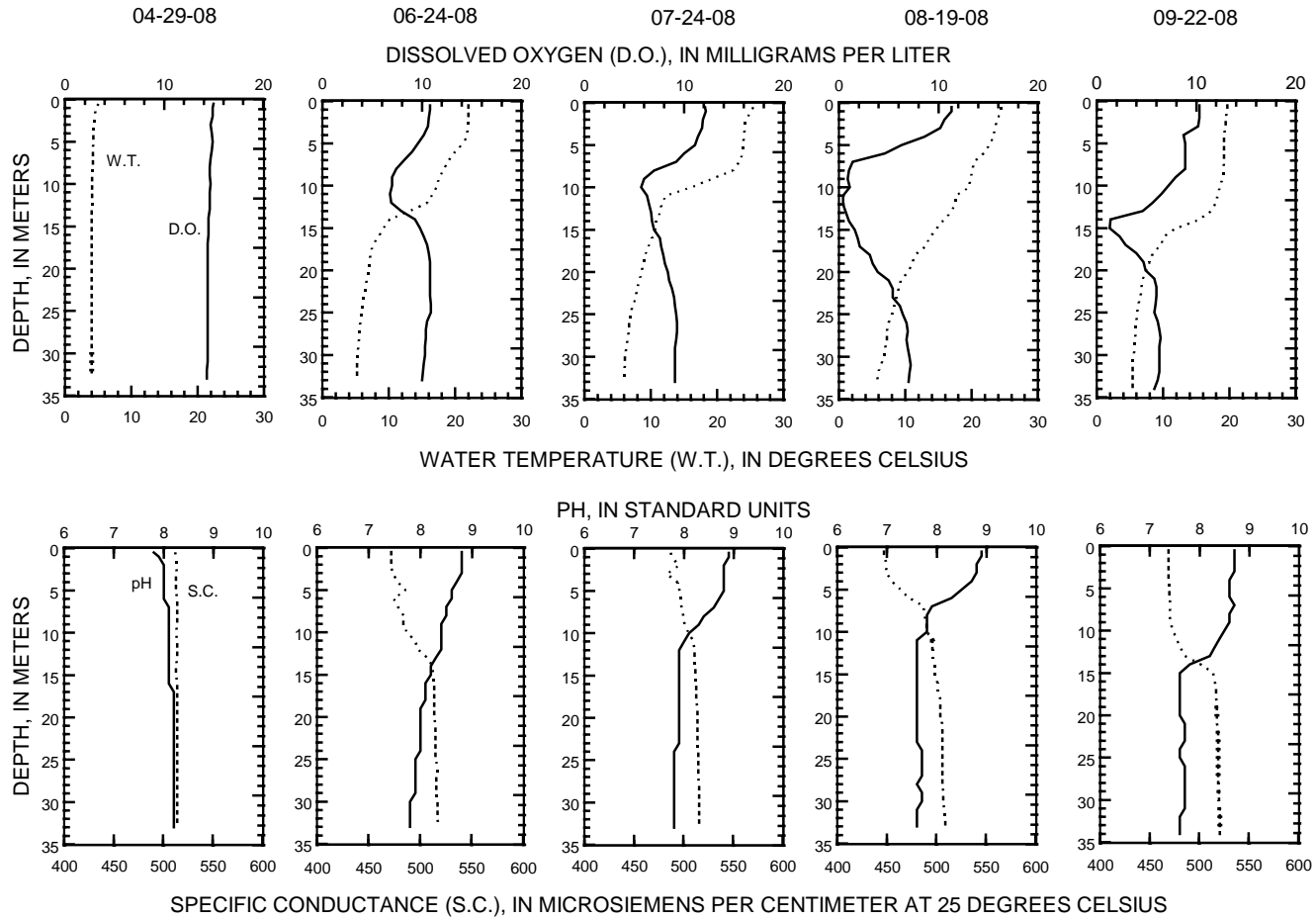
434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

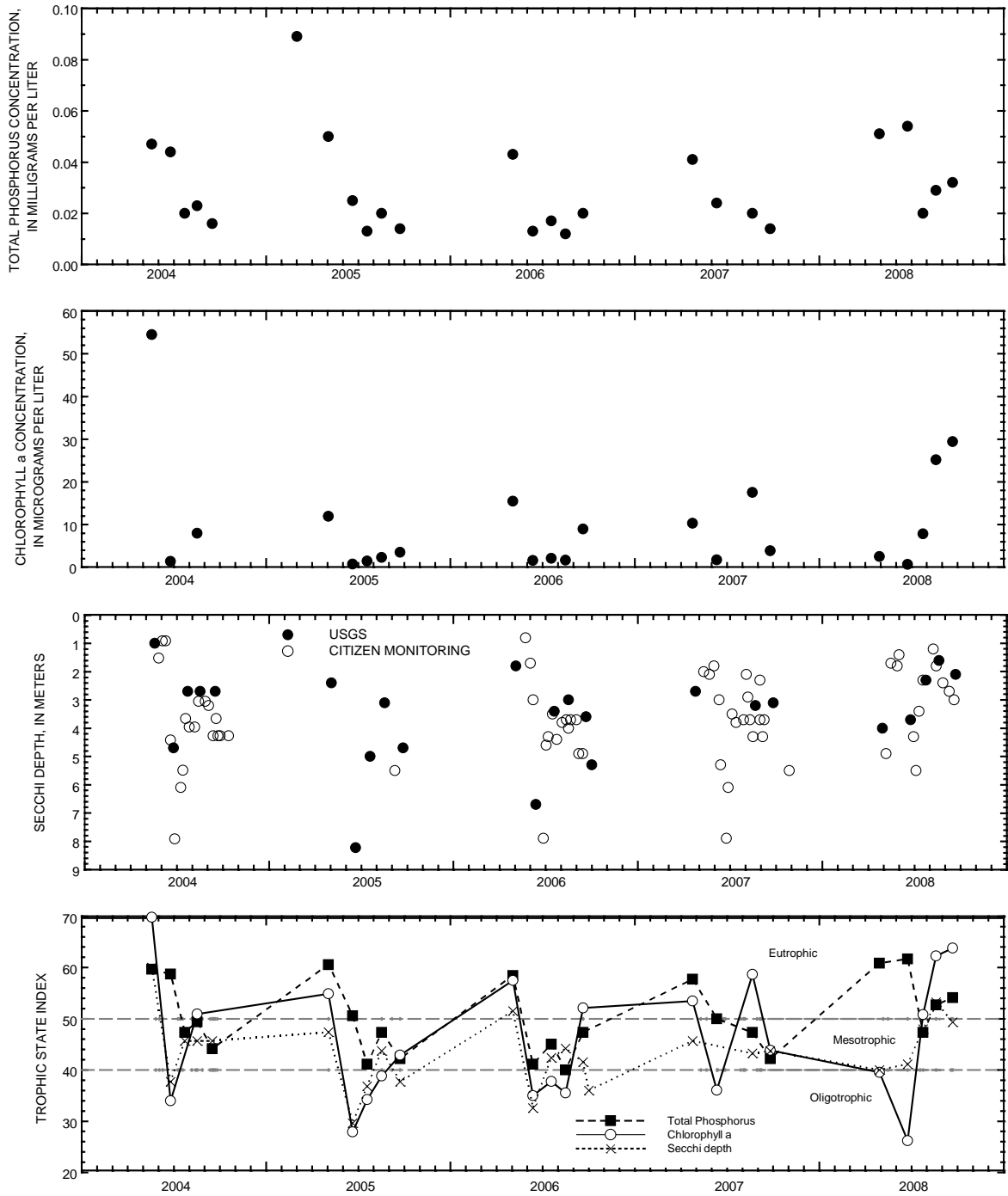
WATER-QUALITY DATA, AUGUST 27 TO SEPTEMBER 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Aug. 27*	Aug. 30*	Sept. 9*	Sept. 19*	Sept. 22			Sept. 25*
00078 Secchi-depth (m)	2.4	2.3	2.7	3.0	2.1			3.4
00098 Sampling depth (m)	0.1	2.0	0.1	0.1	0.5	16	34	0.1
00010 Water Temperature (°C)	22.8	24	21.1	21.1	19.7	10.1	5.4	21.1
00400 pH (standard units)	--	--	--	--	8.7	7.6	7.6	--
00095 Specific conductance (µS/cm)	--	--	--	--	469	516	521	--
00300 Dissolved oxygen	--	--	--	--	10.3	2.3	5.8	--
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	29.4	--	--	--
00665 Phosphorus, Total (as P)	--	--	--	--	0.032	0.018	0.091	--

43492808857000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 29 TO SEPTEMBER 22, 2008





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

435009088550100 GREEN LAKE INLET, SITE 1, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°50'09", long 88°55'01", in NE ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29, 2007 TO SEPTEMBER 22, 2008
(Milligrams per liter unless otherwise indicated)

Date	<u>Apr. 29</u>	<u>June 24</u>	<u>July 24</u>	<u>Aug. 19</u>	<u>Sept. 22</u>
00078 Secchi-depth (m)	1.0	1.0	1.0	0.8	0.8
00098 Sampling depth (m)	0.5	0.5	0.5	0.5	0.5
00010 Water Temperature (°C)	9.7	22.2	22.9	24.9	21.7
00400 pH (standard units)	8.0	7.6	7.8	8.1	8.2
00095 Specific conductance (µS/cm)	675	576	663	857	948
00300 Dissolved oxygen	16.7	6.1	7.3	9.1	12
00665 Phosphorus, Total (as P)	0.083	0.24	0.245	0.143	0.084

434948088552200 GREEN LAKE INLET, SITE 2, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'48", long 88°55'22", in SW ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA APRIL 29 TO SEPTEMBER 22, 2008
(Milligrams per liter unless otherwise indicated)

Date	<u>Apr. 29</u>	<u>June 24</u>	<u>July 24</u>	<u>Aug. 19</u>	<u>Sept. 22</u>
00078 Secchi-depth (m)	0.8	0.9	0.8	1.0	1.0
00098 Sampling depth (m)	0.5	0.5	0.5	0.5	0.5
00010 Water Temperature (°C)	10.3	21.7	23.9	24.4	21.4
00400 pH (standard units)	8.0	7.6	7.8	8.2	8.1
00095 Specific conductance (µS/cm)	666	541	660	824	890
00300 Dissolved oxygen	13.3	6.5	6.9	10.2	10.5
00665 Phosphorus, Total (as P)	0.076	0.23	0.252	0.142	0.064

425715089164700 LAKE KEGONSA AT BARBER DRIVE NEAR STOUGHTON, WI

LOCATION.--Lat 42°57'15", long 89°16'47" referenced to North American Datum of 1927, in SW ¼ NE ¼ NE ¼ sec.26, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on downstream side of bridge on Barber Drive, 3.5 mi northwest of Stoughton.

SURFACE AREA.--1.05 mi².

DRAINAGE AREA.--386 mi².

PERIOD OF RECORD.--October 2003 to current year.

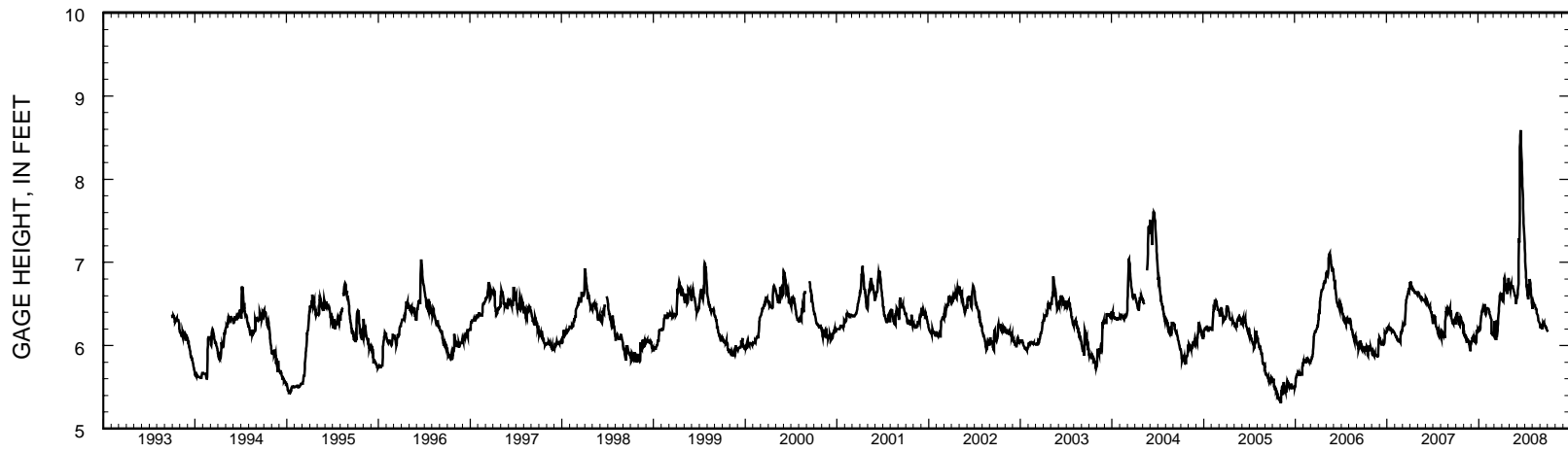
GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level (levels from Wisconsin Department of Transportation benchmark).

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.73 ft, June 16, 2008; minimum observed, 2.07 ft, Jan.27, 2006.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed,5.73 ft,June 16; minimum observed, 2.74 ft, Nov. 29.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	3.53	3.10	2.90	3.28	2.96	3.00	3.43	4.41	3.57	4.77	3.89	3.04
2	3.54	3.07	2.98	3.21	2.96	2.99	3.44	4.37	3.56	4.71	3.82	3.06
3	3.55	3.05	2.99	3.19	2.96	3.04	3.45	4.33	3.56	4.66	3.75	3.08
4	3.54	3.03	2.99	3.16	2.97	3.08	3.45	4.27	3.53	4.59	3.75	3.15
5	3.52	2.99	3.00	3.13	2.99	3.12	3.44	4.22	3.63	4.53	3.72	3.21
6	3.50	2.98	3.02	3.11	3.03	3.15	3.43	4.17	3.71	4.45	3.65	3.22
7	3.48	2.97	3.06	3.14	3.03	3.16	3.41	4.14	3.78	4.41	3.58	3.21
8	3.45	2.96	3.08	3.23	3.05	3.15	3.44	4.10	3.97	4.41	3.52	3.21
9	3.40	2.95	3.10	3.34	3.06	3.15	3.53	4.06	4.31	4.38	3.46	3.21
10	3.34	2.94	3.11	3.42	3.04	3.14	3.66	4.02	4.52	4.36	3.40	3.19
11	3.30	2.93	3.15	3.49	3.04	3.13	3.82	4.00	4.71	4.53	3.32	3.17
12	3.26	2.93	3.18	3.52	3.02	3.11	3.95	3.98	4.93	4.64	3.26	3.16
13	3.23	2.91	3.19	3.54	3.01	3.12	4.02	3.93	5.40	4.67	3.22	3.25
14	3.23	2.89	3.18	3.53	3.00	3.16	4.07	3.91	5.57	4.69	3.19	3.31
15	3.23	2.88	3.18	3.49	2.98	3.24	4.08	3.87	5.69	4.68	3.14	3.33
16	3.25	2.87	3.19	3.46	2.97	3.31	4.07	3.83	5.72	4.68	3.08	3.31
17	3.25	2.87	3.19	3.43	3.03	3.36	4.08	3.80	5.69	4.66	3.03	3.30
18	3.32	2.86	3.18	3.38	3.08	3.38	4.09	3.77	5.64	4.63	3.00	3.28
19	3.32	2.85	3.17	3.34	3.09	3.38	4.13	3.74	5.58	4.60	2.97	3.24
20	3.33	2.86	3.16	3.30	3.11	3.38	4.13	3.71	5.50	4.58	2.95	3.20
21	3.33	2.87	3.16	3.27	3.11	3.42	4.12	3.68	5.42	4.54	2.92	3.17
22	3.34	2.86	3.17	3.24	3.10	3.43	4.10	3.66	5.35	4.49	2.92	3.14
23	3.32	2.85	3.26	3.20	3.09	3.41	4.09	3.63	5.28	4.43	2.91	3.10
24	3.31	2.83	3.26	3.16	3.08	3.38	4.07	3.60	5.21	4.36	2.90	3.07
25	3.29	2.82	3.29	3.12	3.07	3.35	4.23	3.57	5.15	4.29	2.89	3.05
26	3.26	2.82	3.31	3.09	3.06	3.35	4.32	3.62	5.09	4.24	2.87	3.03
27	3.24	2.81	3.33	3.05	3.04	3.39	4.41	3.61	5.03	4.18	2.86	3.03
28	3.22	2.79	3.34	3.01	3.02	3.40	4.46	3.55	4.96	4.13	2.89	3.03
29	3.19	2.79	3.35	2.99	3.02	3.38	4.47	3.52	4.89	4.06	2.94	3.02
30	3.16	2.85	3.33	2.98	---	3.35	4.44	3.55	4.83	4.00	2.97	3.01
31	3.12	---	3.31	2.97	---	3.39	---	3.56	---	3.95	3.01	---
Mean	3.33	2.91	3.16	3.25	3.03	3.25	3.93	3.88	4.79	4.46	3.22	3.16
Max	3.55	3.10	3.35	3.54	3.11	3.43	4.47	4.41	5.72	4.77	3.89	3.33
Min	3.12	2.79	2.90	2.97	2.96	2.99	3.41	3.52	3.53	3.95	2.86	3.01



Stage hydrograph for Lake Kegonsa, 1993-2008.

05427235 LAKE KOSHKONONG NEAR NEWVILLE, WI

LOCATION.--Lat 42°51'27", long 88°56'27" referenced to North American Datum of 1927, in NW ¼ NE ¼ sec.34, T.5 N., R.13 E., Jefferson County, WI, Hydrologic Unit 07090001, 80 ft east of Pottawatomi Trail Bridge at Bingham Point Estates, and 4.5 mi northeast of Newville.

SURFACE AREA.—16.34 mi²

DRAINAGE AREA.--2,560 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 770.00 ft above NGVD of 1929 (Wisconsin Department of Transportation bench mark).

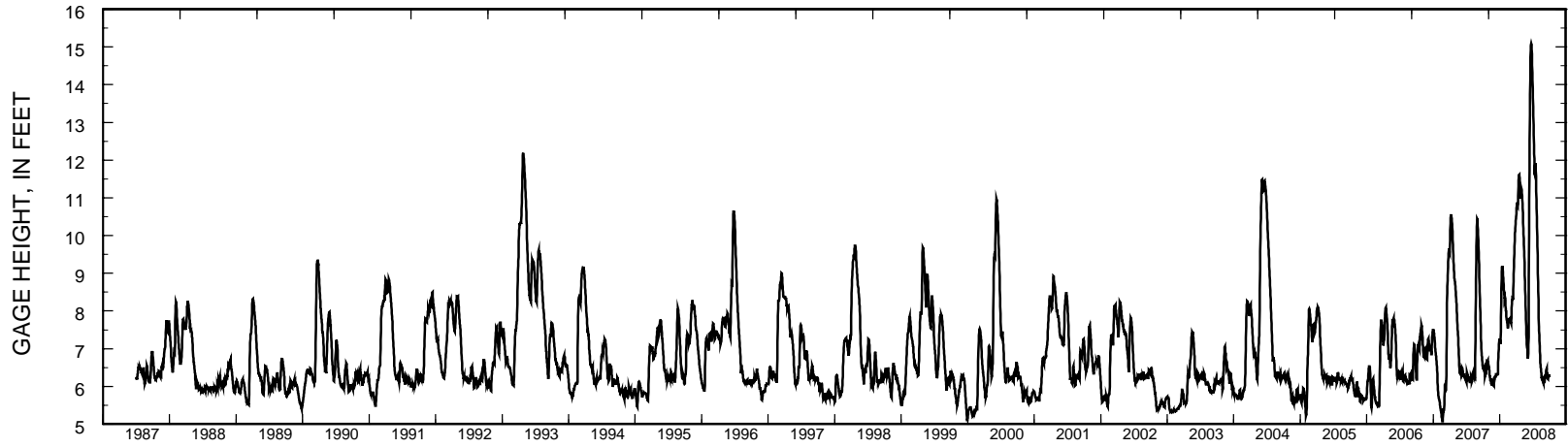
REMARKS.--Lake level regulated by dam at Indianford. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 15.13 ft, June 21, 22, 2008; minimum recorded, 5.06 ft, Feb. 22, 2007.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 15.13 ft, June 21, 22; minimum recorded gage height, 6.00 ft, Nov. 25.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.51	6.56	6.08	7.27	8.30	7.70	10.67	11.13	6.92	13.66	8.05	6.10
2	6.47	6.52	6.15	7.25	8.21	7.67	10.73	11.05	6.87	13.42	7.81	6.11
3	6.50	6.50	6.16	7.22	8.13	7.73	10.79	10.97	6.80	13.18	7.58	6.12
4	6.49	6.44	6.19	7.17	8.06	7.83	10.85	10.85	6.74	12.93	7.47	6.14
5	6.49	6.46	6.23	7.14	8.00	7.96	10.85	10.73	6.88	12.67	7.36	6.24
6	6.50	6.42	6.24	7.13	7.99	8.08	10.83	10.60	7.10	12.40	7.21	6.26
7	6.51	6.31	6.25	7.21	7.93	8.19	10.79	10.48	7.30	12.16	7.07	6.28
8	6.51	6.27	6.26	7.45	7.85	8.28	10.77	10.34	7.81	12.04	6.93	6.31
9	6.53	6.25	6.26	7.84	7.79	8.32	10.80	10.19	8.91	11.85	6.82	6.30
10	6.50	6.20	6.26	8.24	7.77	8.34	10.83	10.03	10.03	11.65	6.72	6.27
11	6.39	6.17	6.31	8.59	7.74	8.33	11.05	9.93	10.95	11.61	6.63	6.23
12	6.30	6.17	6.32	8.85	7.70	8.31	11.30	9.76	11.71	11.80	6.56	6.22
13	6.26	6.14	6.32	9.05	7.66	8.32	11.47	9.58	12.53	11.91	6.51	6.32
14	6.30	6.18	6.31	9.19	7.62	8.42	11.56	9.46	13.19	11.92	6.46	6.44
15	6.33	6.15	6.30	9.17	7.57	8.57	11.60	9.29	13.74	11.85	6.40	6.47
16	6.37	6.08	6.31	9.13	7.54	8.77	11.61	9.11	14.16	11.73	6.34	6.39
17	6.35	6.07	6.31	9.19	7.57	8.98	11.62	8.95	14.48	11.57	6.25	6.33
18	6.34	6.05	6.31	9.15	7.61	9.17	11.58	8.77	14.72	11.38	6.25	6.29
19	6.43	6.05	6.31	9.04	7.66	9.35	11.53	8.57	14.91	11.17	6.24	6.32
20	6.47	6.05	6.31	8.94	7.71	9.52	11.46	8.38	15.03	10.96	6.22	6.29
21	6.52	6.09	6.31	8.87	7.74	9.71	11.39	8.17	15.09	10.73	6.21	6.20
22	6.60	6.07	6.32	8.79	7.77	9.86	11.25	7.96	15.09	10.49	6.20	6.19
23	6.63	6.05	6.49	8.69	7.79	9.97	11.12	7.78	15.04	10.23	6.21	6.24
24	6.66	6.04	6.64	8.61	7.80	10.05	10.98	7.59	14.94	9.97	6.20	6.29
25	6.65	6.05	6.77	8.56	7.80	10.12	11.01	7.43	14.82	9.72	6.16	6.31
26	6.67	6.07	6.88	8.51	7.78	10.20	11.10	7.38	14.68	9.48	6.12	6.31
27	6.69	6.08	7.00	8.44	7.75	10.30	11.20	7.25	14.51	9.23	6.09	6.32
28	6.65	6.06	7.11	8.37	7.74	10.39	11.25	7.12	14.32	9.00	6.10	6.29
29	6.64	6.06	7.20	8.32	7.72	10.46	11.25	7.02	14.12	8.76	6.14	6.27
30	6.60	6.04	7.24	8.36	---	10.49	11.20	7.02	13.90	8.54	6.13	6.27
31	6.60	---	7.26	8.36	---	10.58	---	7.00	---	8.30	6.12	---
Mean	6.50	6.19	6.46	8.33	7.80	9.03	11.15	9.03	11.91	11.17	6.60	6.27
Max	6.69	6.56	7.26	9.19	8.30	10.58	11.62	11.13	15.09	13.66	8.05	6.47
Min	6.26	6.04	6.08	7.13	7.54	7.67	10.67	7.00	6.74	8.30	6.09	6.10



Stage hydrograph for Lake Koshkonong, 1987-2008.

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

LOCATION.--Lat 43°22'55", long 88°13'47", in NW ¼ NE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.6 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

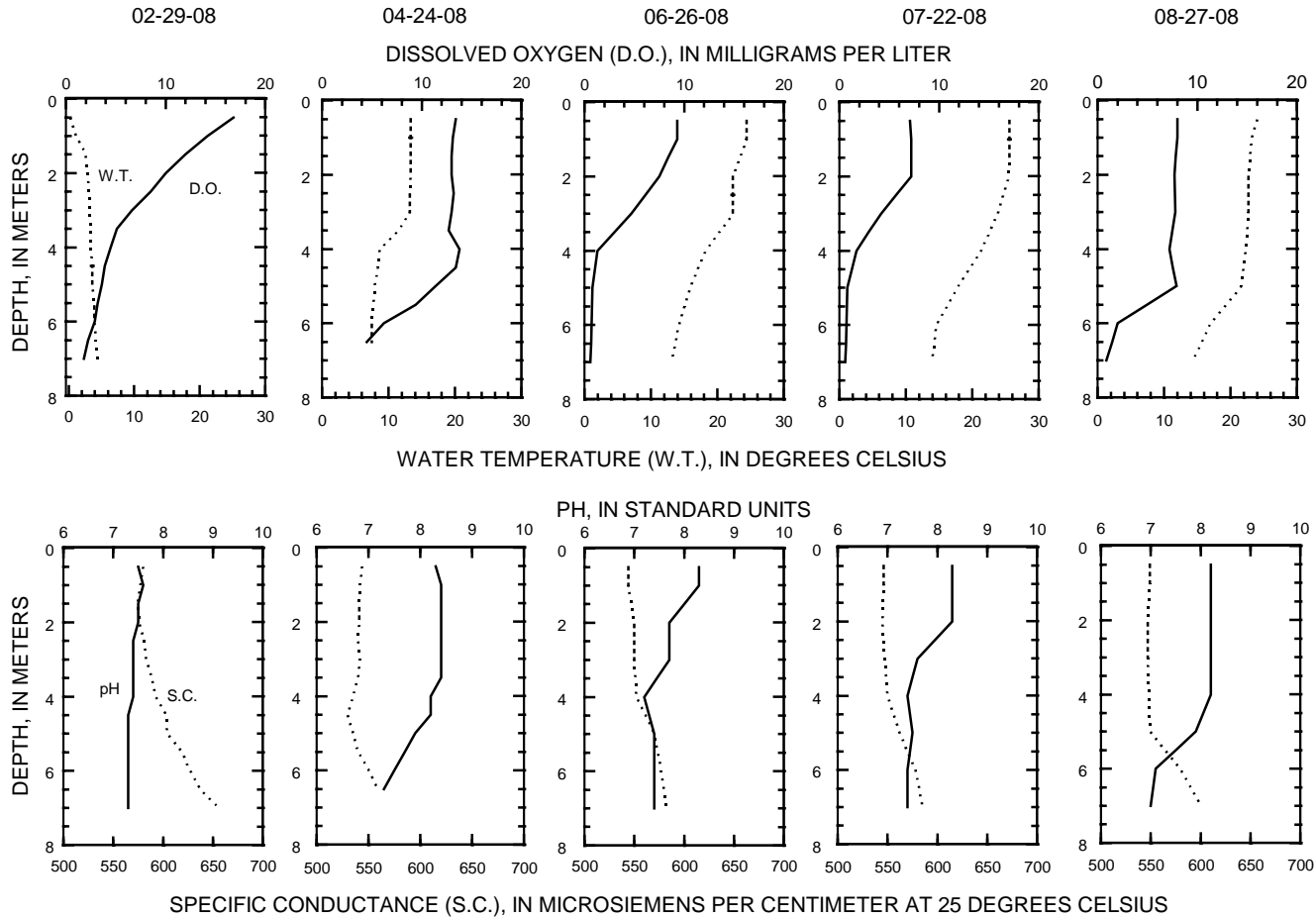
REMARKS.--Lake sampled at center of northern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

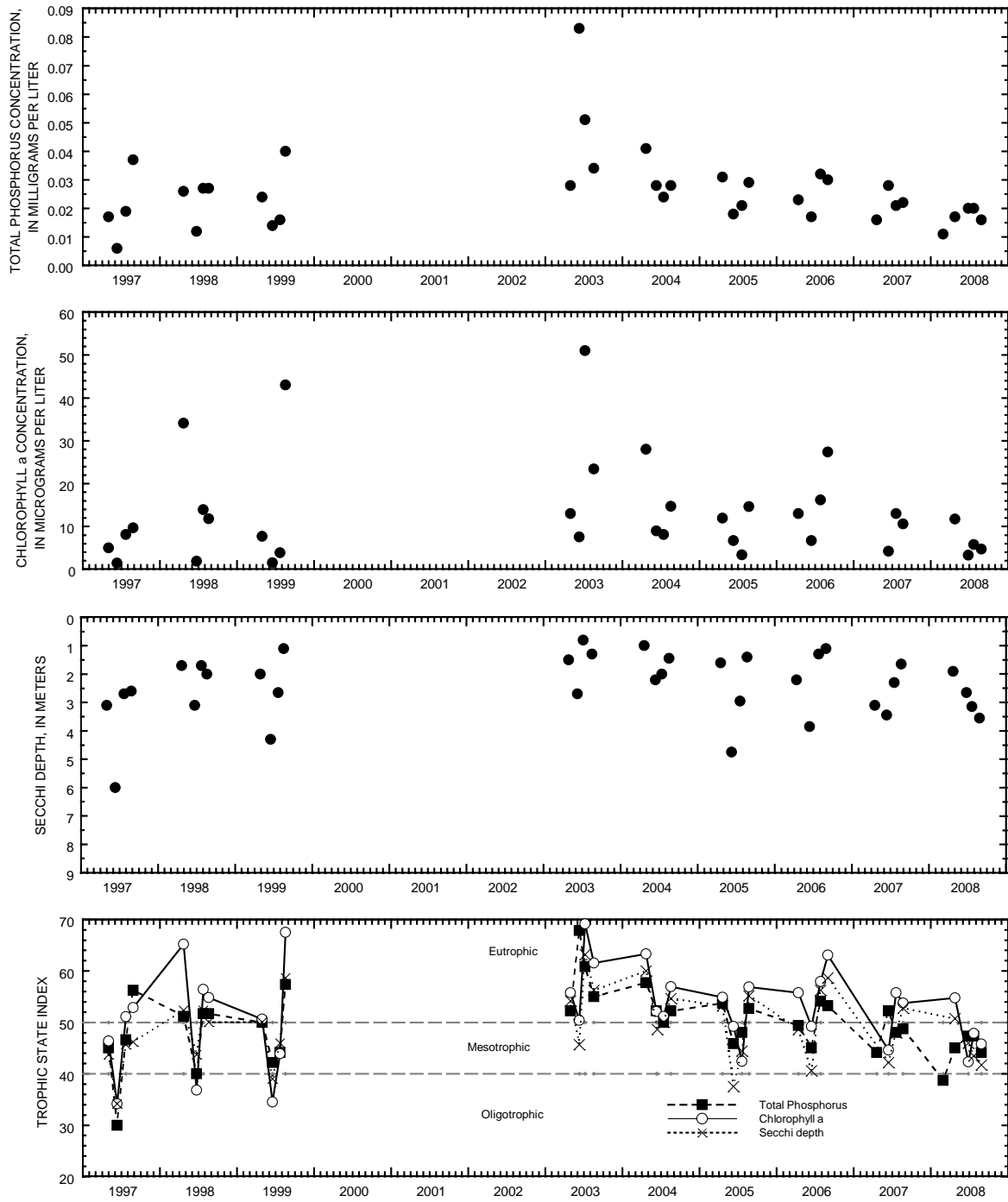
WATER-QUALITY DATA, FEBRUARY 29 TO AUGUST 27, 2008
(Milligrams per liter unless otherwise indicated)

Date	Feb. 29		Apr. 24		Jun. 26		Jul. 22		Aug. 27	
00078 Secchi-depth (m)	--		1.9		2.6		3.2		3.6	
00098 Sampling depth (m)	0.5	6.5	0.5	7.0	0.5	7.0	0.5	7.0	0.5	7.0
00010 Water Temperature (°C)	0.2	4.2	13.3	7.5	24.4	13.1	25.6	13.9	24	14.3
00400 pH (standard units)	7.5	7.3	8.3	7.3	8.3	7.4	8.3	7.4	8.2	7.0
00095 Specific conductance (µS/cm)	580	637	544	559	544	582	546	585	549	600
00300 Dissolved oxygen	16.8	2.2	13.4	4.5	9.3	0.6	7.1	0.6	8.0	0.9
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	11.7	--	3.3	--	5.8	--	4.7	--
00665 Phosphorus, Total (as P)	0.011	0.029	0.017	0.032	0.020	0.101	0.020	0.089	0.016	0.075

43225088134700 LITTLE CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 29 TO AUGUST 27, 2008





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 ¼ SE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.8 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

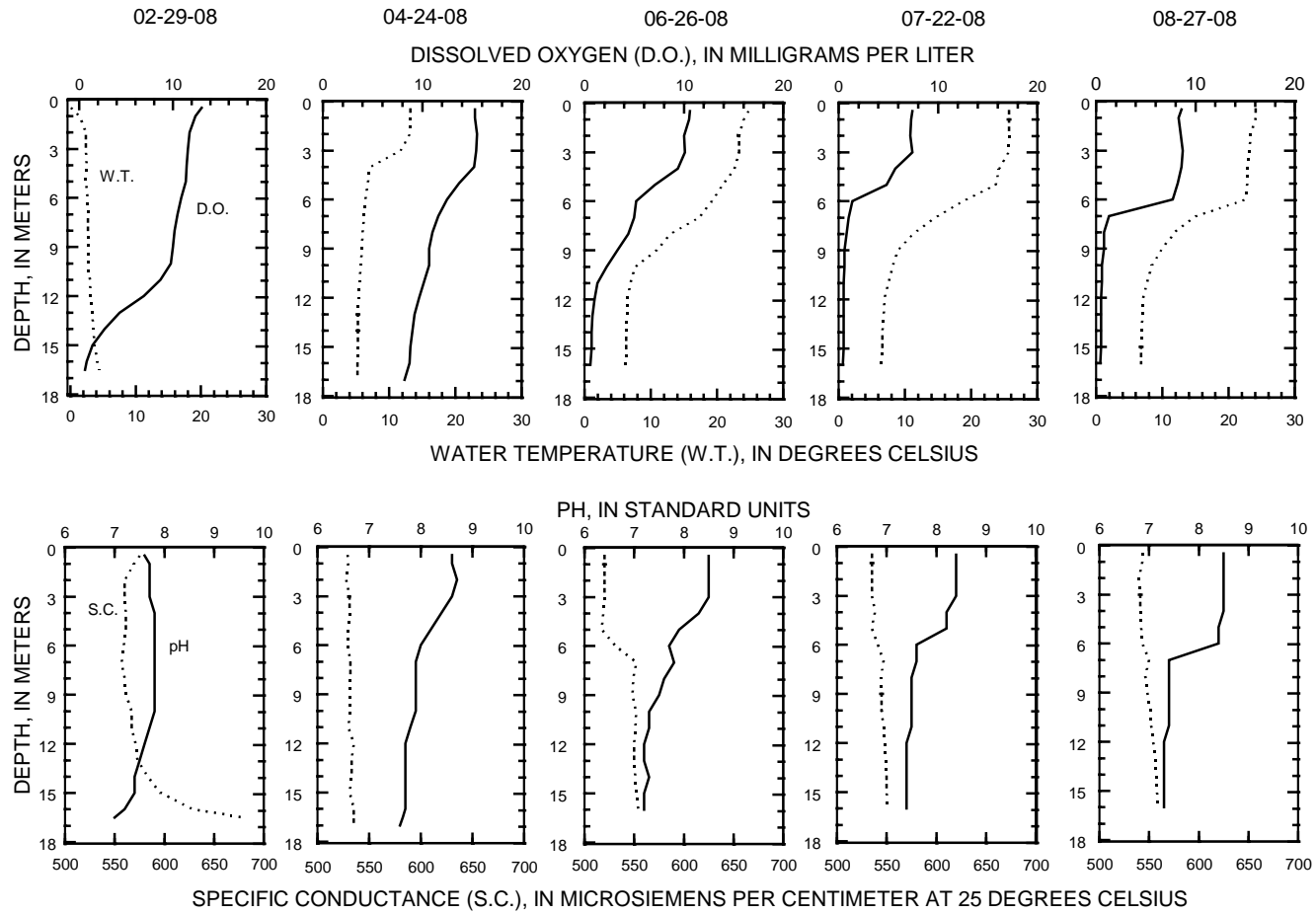
REMARKS.--Lake sampled in southern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

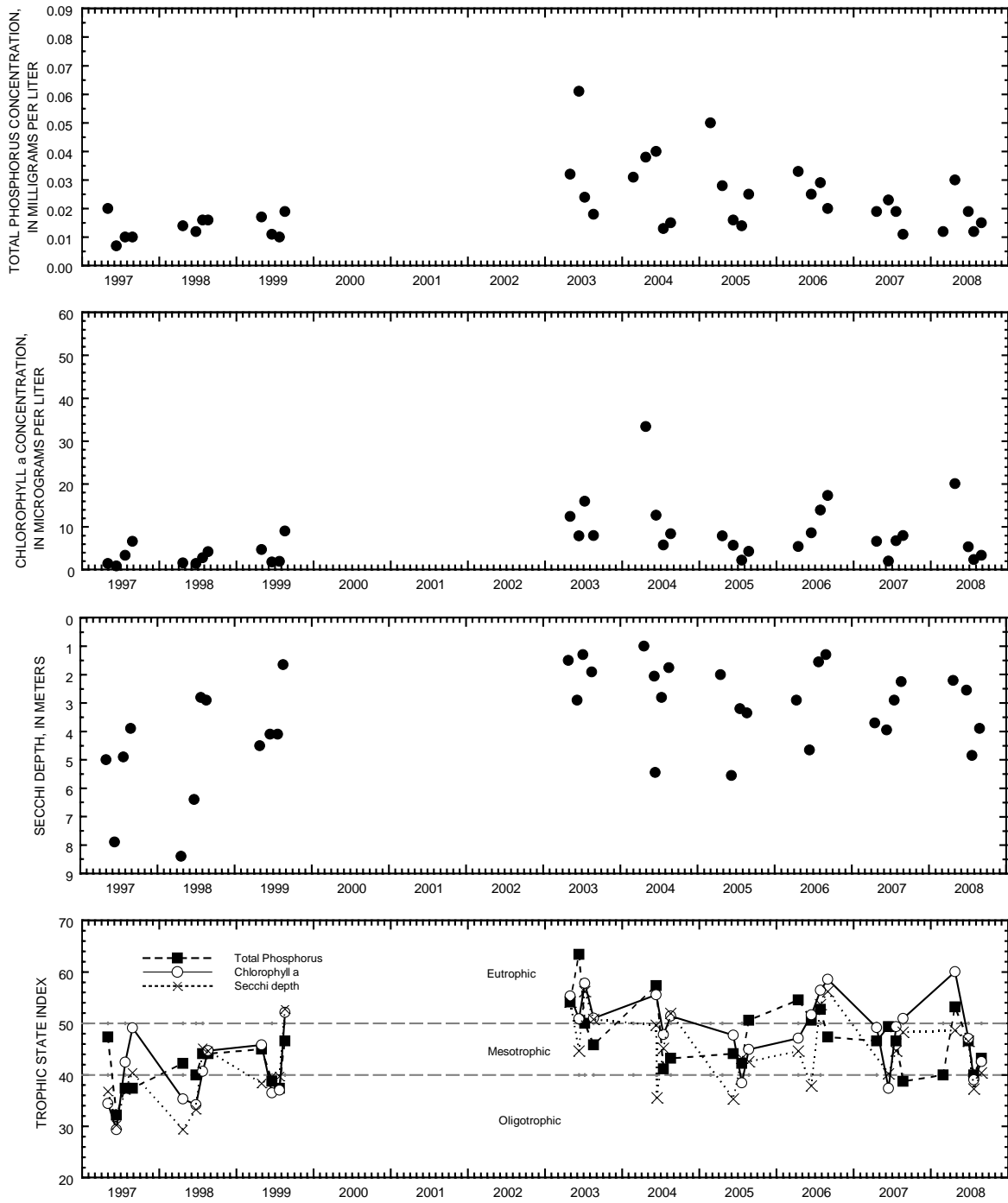
WATER-QUALITY DATA, FEBRUARY 29 TO AUGUST 27, 2008
(Milligrams per liter unless otherwise indicated)

Date	Feb. 29		Apr. 24		Jun. 26		Jul. 22		Aug. 27	
00078 Secchi-depth (m)	--		2.2		2.6		4.8		3.9	
00098 Sampling depth (m)	0.5	16	0.5	17	0.5	16	0.5	16	0.5	16
00010 Water Temperature (°C)	0.1	4.1	13.2	5.2	24.7	6.2	25.7	6.5	24.1	6.8
00400 pH (standard units)	7.6	7.2	8.6	7.6	8.5	7.2	8.4	7.4	8.5	7.3
00095 Specific conductance (µS/cm)	575	628	529	535	520	554	535	551	544	559
00300 Dissolved oxygen	13.1	0.8	15.3	8.2	10.6	0.6	7.4	0.4	8.6	0.4
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	20.1	--	5.36	--	2.36	--	3.38	--
00665 Phosphorus, Total (as P)	0.012	0.262	0.03	0.031	0.019	0.124	0.012	0.121	0.015	0.115
00671 Orthophosphate, dissolved (as P)	--	--	0.008	--	--	--	0.004	--	--	--
00600 Total nitrogen	--	--	1.1	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	0.529	--	--	--	<.019	--	--	--
00608 Ammonia, dissolved (as N)	--	--	<.015	--	--	--	<.015	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	0.58	--	--	--	--	--	--	--
00623 Ammonia + organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.49	--	--	--
00900 Hardness (as CaCO3)	--	--	230	--	--	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO3)	--	--	186	--	--	--	--	--	--	--
00915 Calcium, dissolved (Ca)	--	--	37.6	--	--	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	--	--	33.5	--	--	--	--	--	--	--
00930 Sodium, dissolved (Na)	--	--	23.9	--	--	--	--	--	--	--
00935 Potassium, dissolved (K)	--	--	1.8	--	--	--	--	--	--	--
00940 Chloride, dissolved (Cl)	--	--	50.9	--	--	--	--	--	--	--
00945 Sulfate, dissolved (SO4)	--	--	18.1	--	--	--	--	--	--	--
00955 Silica, dissolved (SiO2)	--	--	1.89	--	--	--	--	--	--	--
01046 Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056 Manganese (µg/L)	--	--	<1.6	--	--	--	--	--	--	--
00081 Apparent color (PCU)	--	--	10	--	--	--	--	--	--	--
63675 Turbidity (NTU)	--	--	<1.0	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 29 TO AUGUST 27, 2008





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

05428000 LAKE MENDOTA AT MADISON, WI

LOCATION.--Lat 43°05'42", long 89°22'12" referenced to North American Datum of 1927, in NW ¼ SE ¼ sec.12, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in county boat house at dam at outlet, in Madison.

SURFACE AREA.—15.2 mi².

DRAINAGE AREA.--233 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--January 1916 to January 1985 (incomplete), February 1985 to current year.

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

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, gage datum was 847.82 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 12.75 ft, June 5, 2000; minimum observed, 8.02 ft, Feb. 24 to Mar. 10, 1920, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 12.45 ft, June 14; minimum recorded, 8.76 ft, Dec. 21-22.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES**
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	10.52	10.05	9.14	8.89	9.29	9.44	10.30	11.13	10.11	11.36	11.18	10.19
2	10.55	10.0	9.25	8.87	9.29	9.43	10.31	11.10	10.10	11.32	11.15	10.15
3	10.60	9.97	9.21	8.87	9.29	9.53	10.32	11.10	10.09	11.29	11.10	10.13
4	10.60	9.94	9.17	8.86	9.30	9.57	10.33	11.05	10.07	11.27	11.15	10.13
5	10.60	9.93	9.17	8.85	9.31	9.59	10.32	11.00	10.16	11.24	11.18	10.15
6	10.60	9.88	9.13	8.86	9.36	9.60	10.32	10.95	10.22	11.20	11.16	10.14
7	10.60	9.81	9.12	8.92	9.38	9.61	10.31	10.95	10.24	11.23	11.13	10.11
8	10.60	9.79	9.07	9.03	9.38	9.60	10.34	10.90	e10.76	11.37	11.09	10.10
9	10.59	9.76	9.05	9.12	9.38	9.60	10.43	10.84	e11.27	11.39	11.07	10.08
10	10.54	9.71	9.02	9.18	9.37	9.59	10.49	10.79	11.64	11.39	11.03	10.05
11	10.46	9.69	9.03	9.23	9.37	9.59	10.80	10.77	11.84	11.64	11.00	10.03
12	10.42	9.68	9.01	9.26	9.38	9.59	10.96	10.70	11.95	11.91	10.98	10.04
13	10.39	9.64	8.99	9.27	9.38	9.59	11.01	10.64	12.20	12.00	10.96	10.11
14	10.37	9.64	8.95	9.28	9.38	9.64	11.00	10.60	12.32	11.99	10.94	10.16
15	10.36	9.59	8.93	9.29	9.37	9.70	10.96	10.54	12.38	11.97	10.91	10.16
16	10.39	9.54	8.91	9.29	9.37	9.76	10.92	10.48	12.35	11.93	10.87	10.15
17	10.36	9.52	8.87	9.29	9.42	9.81	10.90	10.44	12.28	11.88	10.83	10.14
18	10.44	9.49	8.85	9.29	9.46	9.86	10.95	10.38	12.20	11.82	10.79	10.12
19	10.47	9.47	8.82	9.29	9.47	9.89	10.98	10.31	12.12	11.74	10.75	10.11
20	10.44	9.46	8.80	9.28	9.47	9.93	10.98	10.27	12.04	11.71	10.71	10.11
21	10.41	9.45	8.78	9.28	9.47	10.01	10.95	10.20	11.97	11.66	10.67	10.11
22	10.40	9.43	8.79	9.30	9.47	10.06	10.91	10.14	11.87	11.59	10.63	10.09
23	10.36	9.39	8.88	9.30	9.47	10.07	10.86	10.08	11.78	11.52	10.61	10.08
24	10.33	9.35	8.87	9.30	9.48	10.08	10.82	10.05	11.70	11.46	10.57	10.08
25	10.28	9.32	8.87	9.30	9.47	10.09	11.04	10.02	11.64	11.40	10.51	10.08
26	10.26	9.31	8.87	9.30	9.46	10.12	11.18	10.06	11.59	11.36	10.46	10.07
27	10.24	9.28	8.88	9.30	9.45	10.16	11.20	10.03	11.53	11.32	10.40	10.06
28	10.19	9.23	8.90	9.28	9.45	10.17	11.21	10.0	11.50	11.28	10.36	10.04
29	10.15	9.21	8.91	9.28	9.44	10.18	11.19	9.98	11.46	11.24	10.34	10.03
30	10.11	9.16	8.90	9.28	---	10.18	11.16	10.07	11.40	11.23	10.29	10.01
31	10.09	---	8.90	9.29	---	10.24	---	10.13	---	11.21	10.24	---
Mean	10.41	9.59	8.97	9.18	9.40	9.82	10.78	10.51	11.43	11.51	10.81	10.10
Max	10.60	10.05	9.25	9.30	9.48	10.24	11.21	11.13	12.38	12.00	11.18	10.19
Min	10.09	9.16	8.78	8.85	9.29	9.43	10.30	9.98	10.07	11.20	10.24	10.01

460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

LOCATION.--Lat 46°09'37", long 90°03'31", in SW ¼ SE ¼ NW ¼ sec.36, T.43 N., R.3 E., Iron County, Hydrologic Unit 07050002, at Minocqua.

SURFACE AREA.—0.29 mi².

PERIOD OF RECORD.—March to September 2008.

REMARKS.--Lake sampled in the east basin at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 20 TO JULY 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Mar. 20		May 5		June 17		July 10		July 25	
00078 Secchi-depth (m)	--		2.1		3.1		2.7		3.8	
00098 Sampling depth (m)	1.0	5.0	0.5	6.0	0.5	5.5	0.5	6.0	0.5	6.0
00010 Water Temperature (°C)	2.1	4.5	7.2	7.1	17.8	14.3	22.6	13.6	23.3	15.4
00400 pH (standard units)	7.1	7.1	6.2	6.9	7.7	6.7	8.3	7.2	8.1	6.6
00095 Specific conductance (µS/cm)	230	298	222	220	187	212	173	237	188	255
00300 Dissolved oxygen	2.6	0.7	10.7	10.6	8.7	2.0	8.8	0.4	9.7	0.5
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	8.89	--	4.67	--	1.95	--	--	--
00665 Phosphorus, Total (as P)	0.012	0.015	0.026	0.026	0.023	0.018	0.025	0.066	0.070	0.018
00671 Orthophosphate, dissolved (as P)	--	--	0.006	--	--	--	--	--	--	--
00600 Total nitrogen	--	--	--	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	<.019	--	--	--	--	--	--	--
00608 Ammonia, dissolved (as N)	--	--	<.015	--	--	--	--	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	0.43	--	--	--	--	--	--	--
00900 Hardness (as CaCO ₃)	--	--	88	--	--	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO ₃)	--	--	79	--	--	--	--	--	--	--
00915 Calcium, dissolved (Ca)	--	--	25.1	--	--	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	--	--	6.2	--	--	--	--	--	--	--
00930 Sodium, dissolved (Na)	--	--	5.7	--	--	--	--	--	--	--
00935 Potassium, dissolved (K)	--	--	1.1	--	--	--	--	--	--	--
00940 Chloride, dissolved (Cl)	--	--	12.6	--	--	--	--	--	--	--
00945 Sulfate, dissolved (SO ₄)	--	--	<4.5	--	--	--	--	--	--	--
00955 Silica, dissolved (SiO ₂)	--	--	14.8	--	--	--	--	--	--	--
01046 Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056 Manganese (µg/L)	--	--	200	--	--	--	--	--	--	--
00081 Apparent color (PTU)	--	--	15	--	--	--	--	--	--	--
63675 Turbidity (NTU)	--	--	<1.0	--	--	--	--	--	--	--
70300 Solids, dissolved (at 180 C°)	--	--	124	--	--	--	--	--	--	--

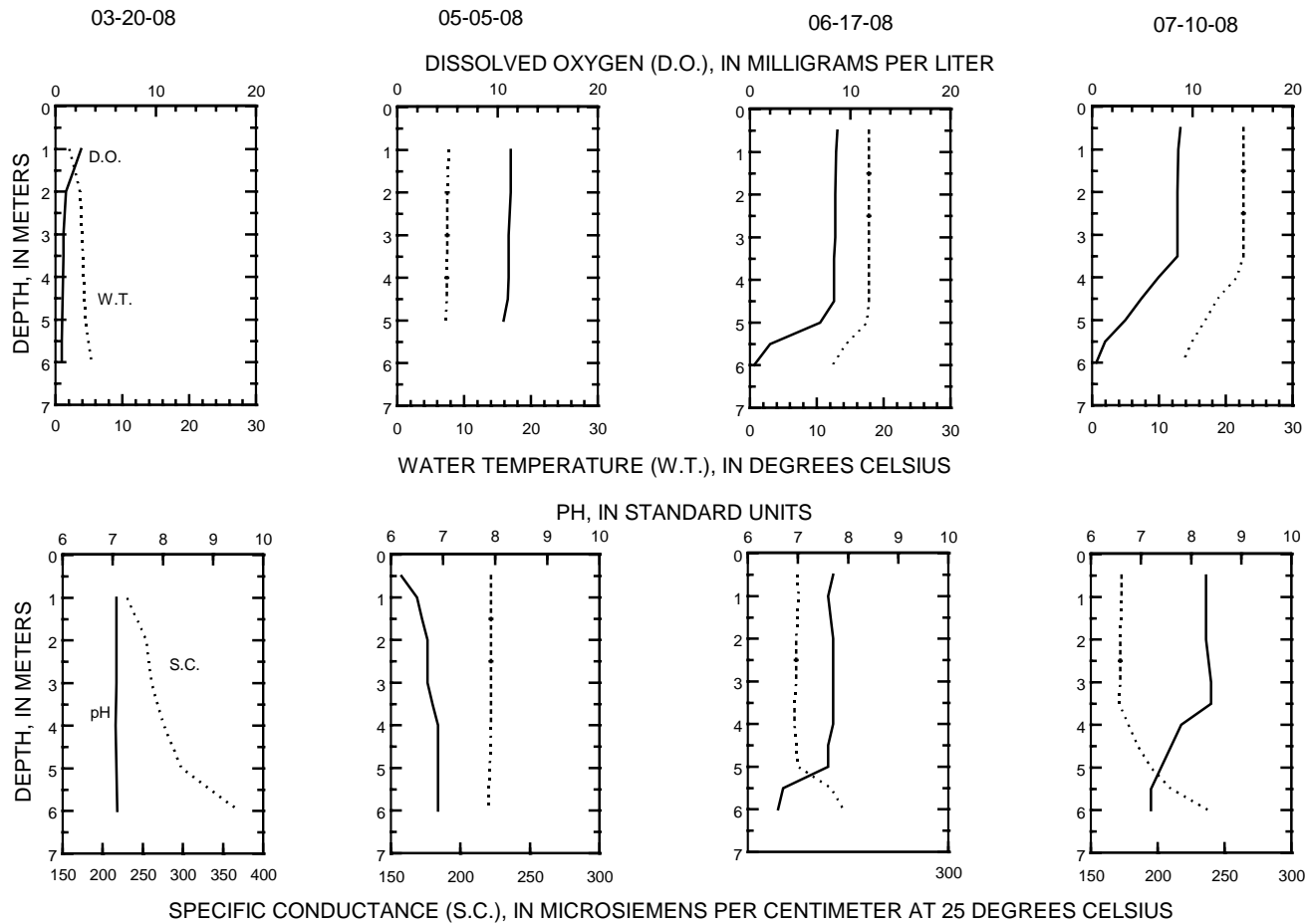
460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

WATER-QUALITY DATA, AUGUST 14 TO SEPTEMBER 16, 2008
(Milligrams per liter unless otherwise indicated)

Date	Aug. 14		Aug. 31		Sept. 16	
00078 Secchi-depth (m)	3.8		3.0		2.6	
00098 Sampling depth (m)	0.5	6.5	0.5	6.5	0.5	5.5
00010 Water Temperature (°C)	22.6	14.8	21.6	16.2	17.0	16.1
00400 pH (standard units)	8.2	6.9	7.8	6.4	7.4	7.4
00095 Specific conductance (µS/cm)	160	259	182	290	180	180
00300 Dissolved oxygen	10.8	0.4	9.8	0.2	9.6	8.6
32210 Chlorophyll a, phytoplankton (µg/L)	2.12	--	1.62	--	3.33	--
00665 Phosphorus, Total (as P)	0.047	0.110	0.016	0.105	0.046	0.020

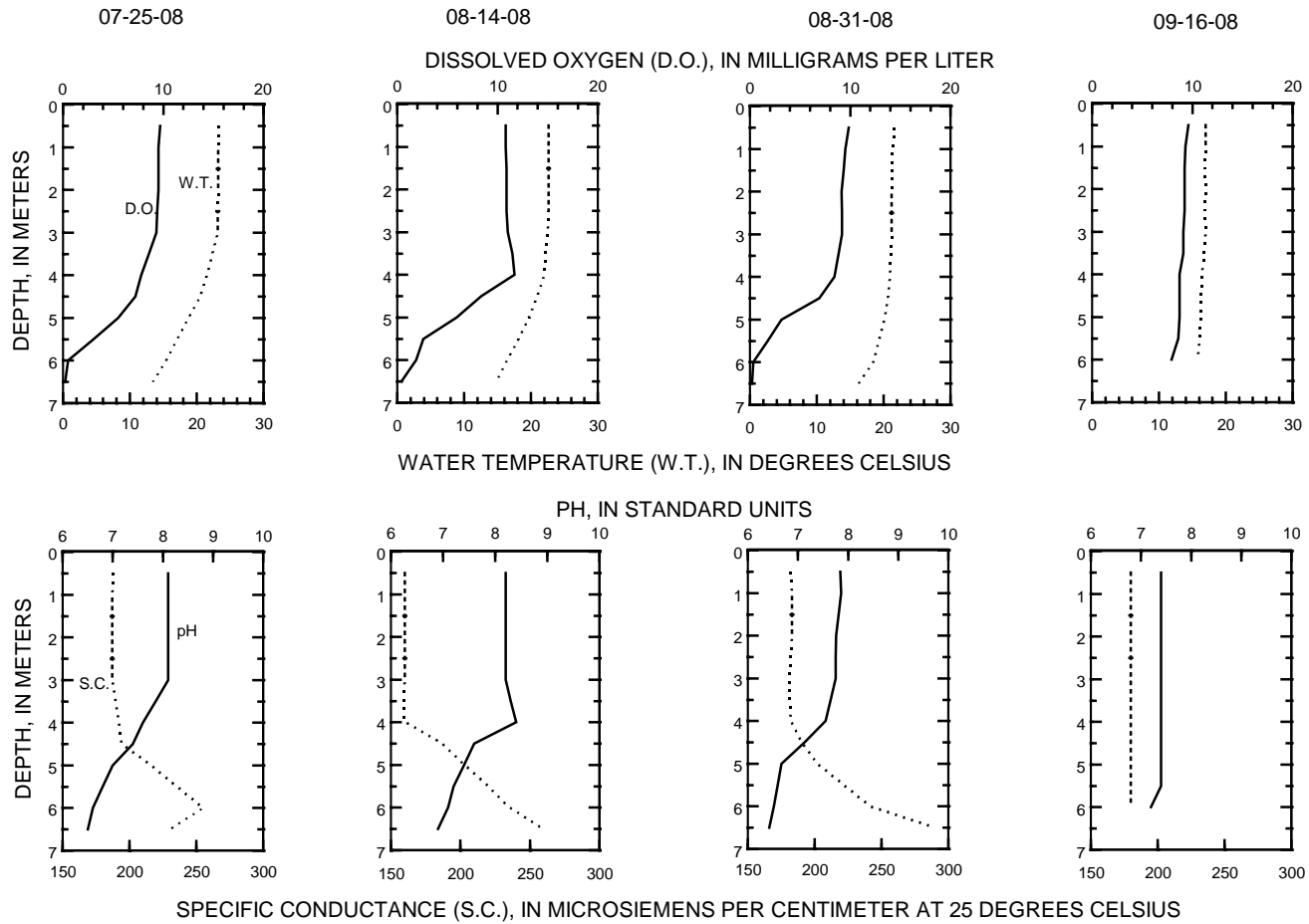
460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

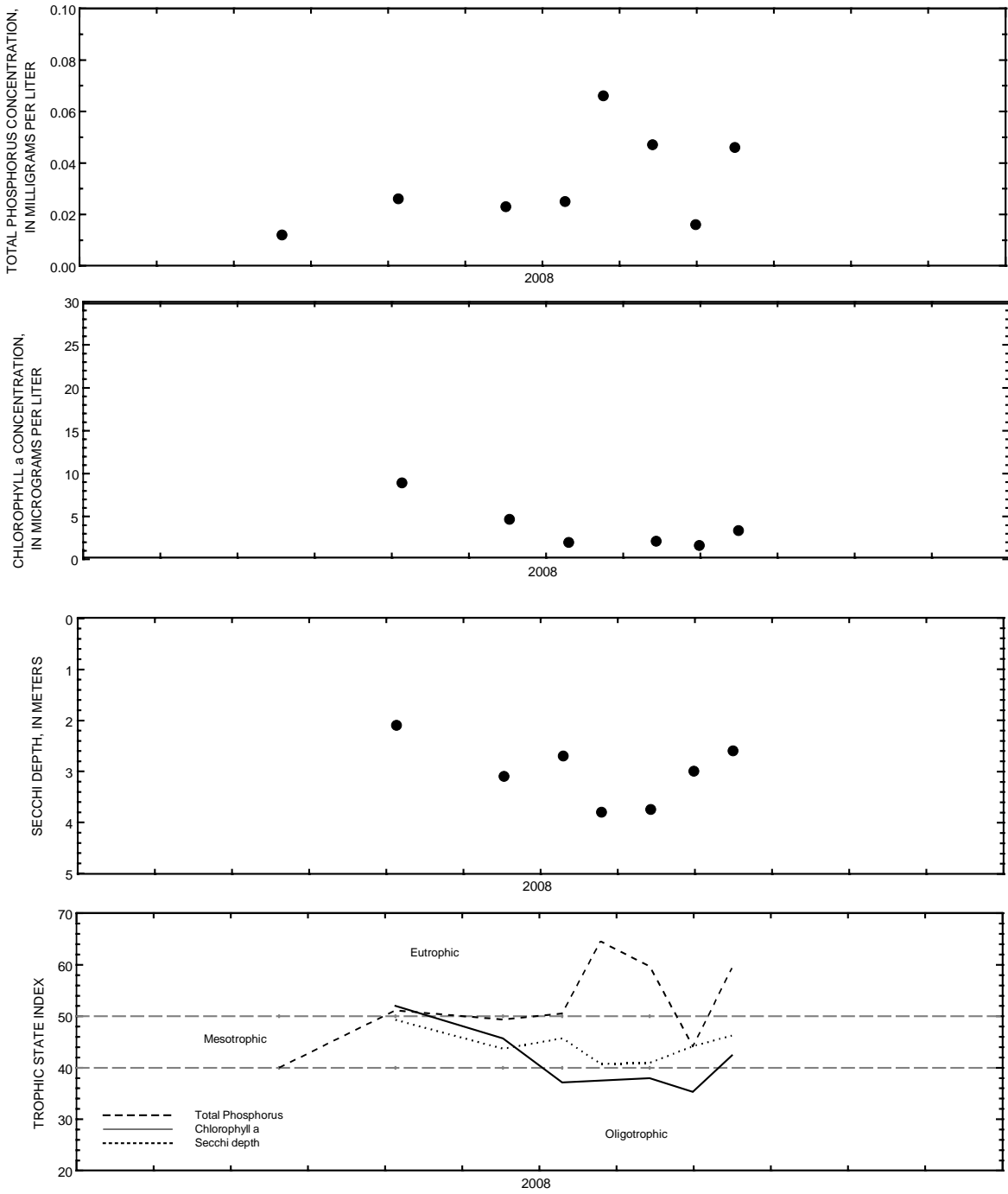
LAKE-DEPTH PROFILES, MARCH 20 TO JULY 10, 2008



460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

LAKE-DEPTH PROFILES, JULY 25 TO SEPTEMBER 16, 2008





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

460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

LOCATION.--Lat 46°09'45", long 90°04'06", in SW ¼ SE ¼ NW ¼ sec.36, T.43 N., R.3 E., Iron County, Hydrologic Unit 07050002, at Mercer.

SURFACE AREA.—0.29 mi².

PERIOD OF RECORD.—March to September 2008.

REMARKS.--Lake sampled in the west basin. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

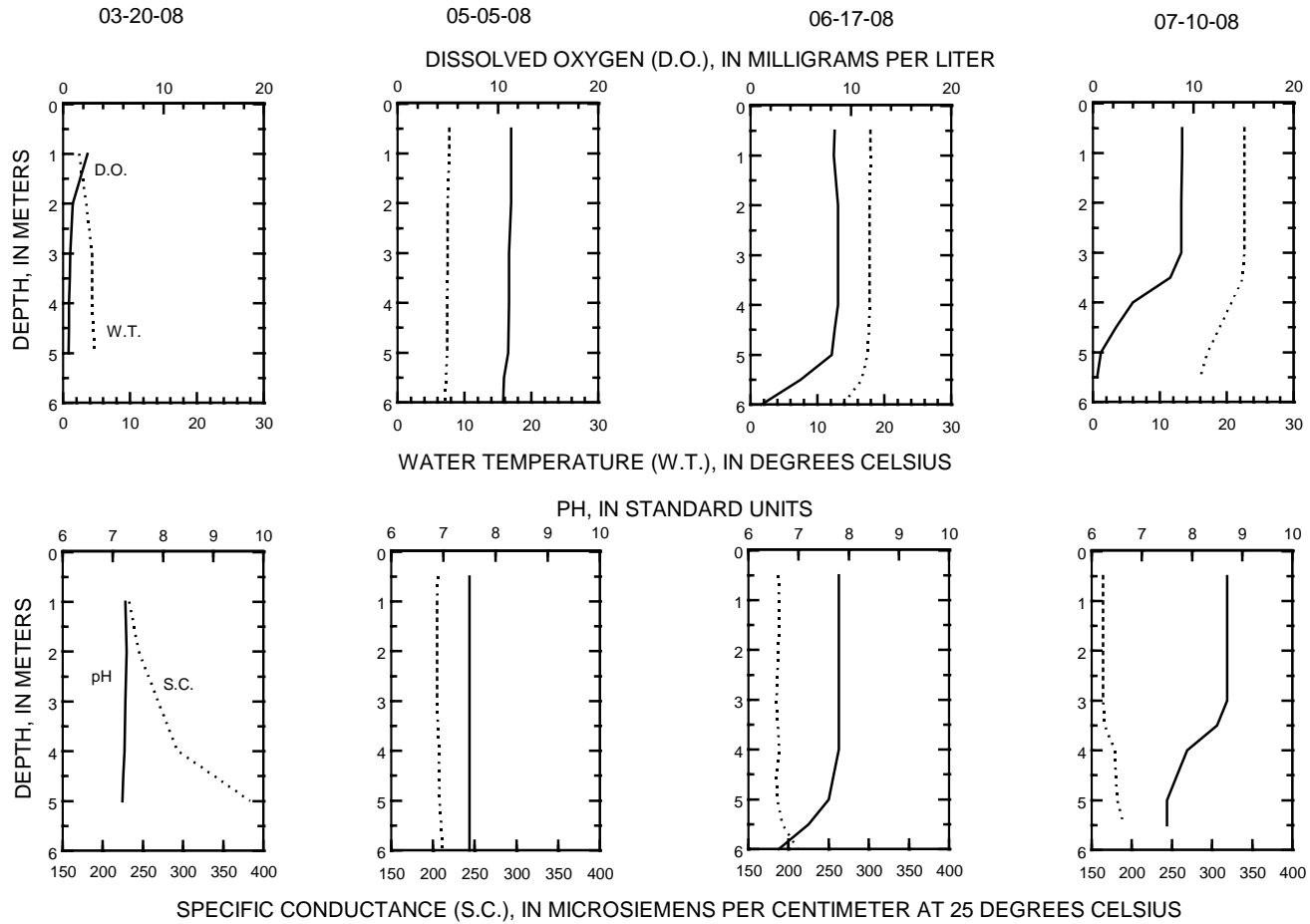
WATER-QUALITY DATA, MARCH 20 TO SEPTEMBER 16, 2008
(Milligrams per liter unless otherwise indicated)

Date	Mar. 20		May 5		June 17		July 10		July 25	
00078 Secchi-depth (m)	--		2.2		3.2		3.0		3.4	
00098 Sampling depth (m)	1.0	5.0	0.5	6.0	0.5	6.0	0.5	5.5	0.5	5.0
00010 Water Temperature (°C)	2.4	4.7	7.7	7.1	17.9	13.7	22.6	16	23.2	19.1
00400 pH (standard units)	7.2	7.2	7.5	7.5	7.8	6.6	8.7	7.5	8.1	6.8
00095 Specific conductance (µS/cm)	233	383	206	211	187	211	164	190	177	193
00300 Dissolved oxygen	2.4	0.6	11.3	10.5	8.4	1.1	8.9	0.4	10.2	5.2
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	7.6	--	4.39	--	0.86	--	--	--
00665 Phosphorus, Total (as P)	0.013	0.084	0.027	0.026	0.020	0.018	0.027	0.035	0.022	0.018

Date	Aug. 14		Aug. 31		Sept. 16	
00078 Secchi-depth (m)	3.4		3.4		2.9	
00098 Sampling depth (m)	0.5	5.5	0.5	5.5	0.5	5.5
00010 Water Temperature (°C)	22.8	20.4	21.9	20	16.9	15.9
00400 pH (standard units)	8.4	7.3	8.1	6.5	7.7	7.7
00095 Specific conductance (µS/cm)	156	178	178	195	170	170
00300 Dissolved oxygen	11.2	3.6	10.2	1.0	11.3	9.9
32210 Chlorophyll a, phytoplankton (µg/L)	1.52	--	2.32	--	2.3	--
00665 Phosphorus, Total (as P)	0.040	0.041	0.015	0.028	0.022	0.018

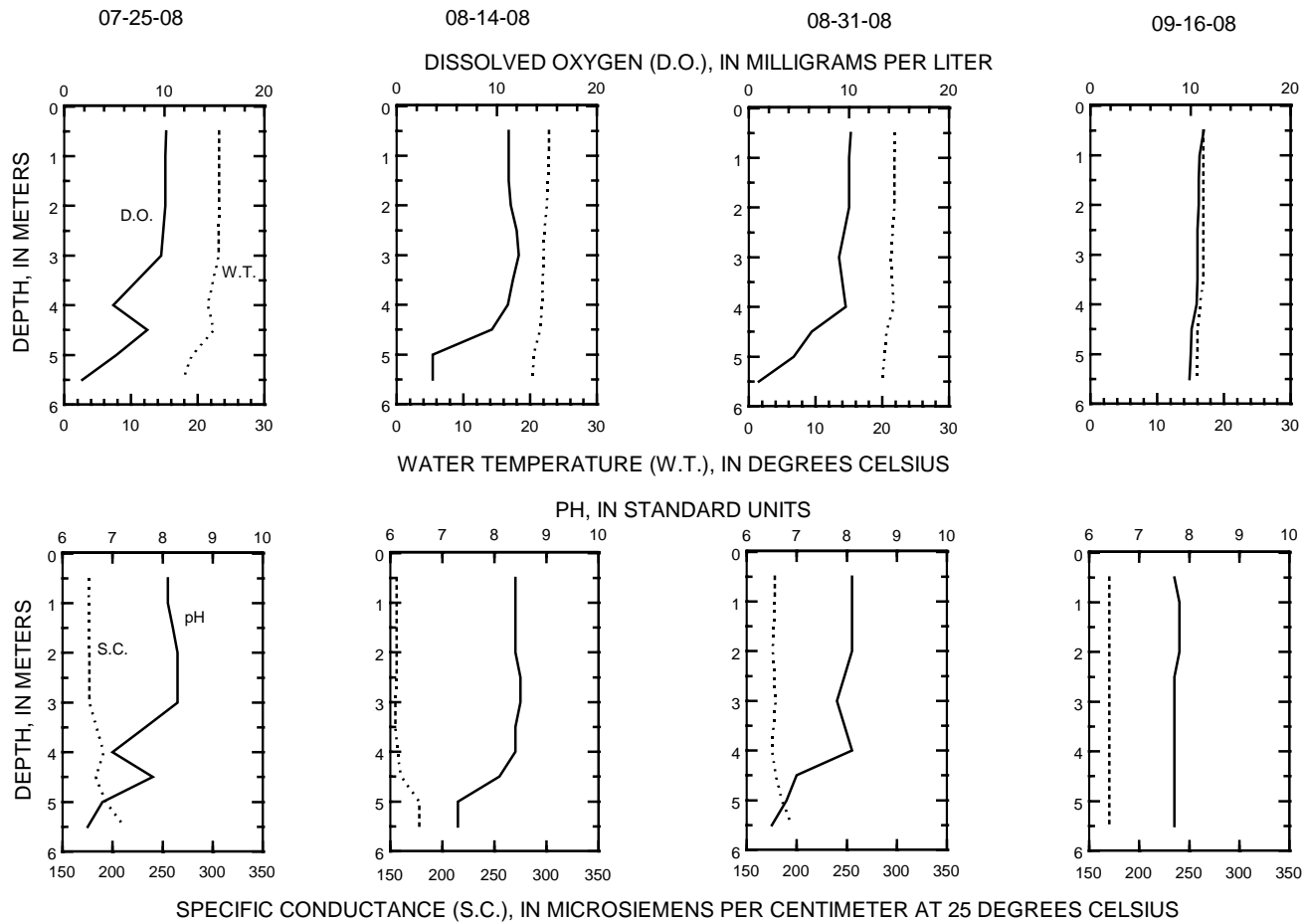
460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

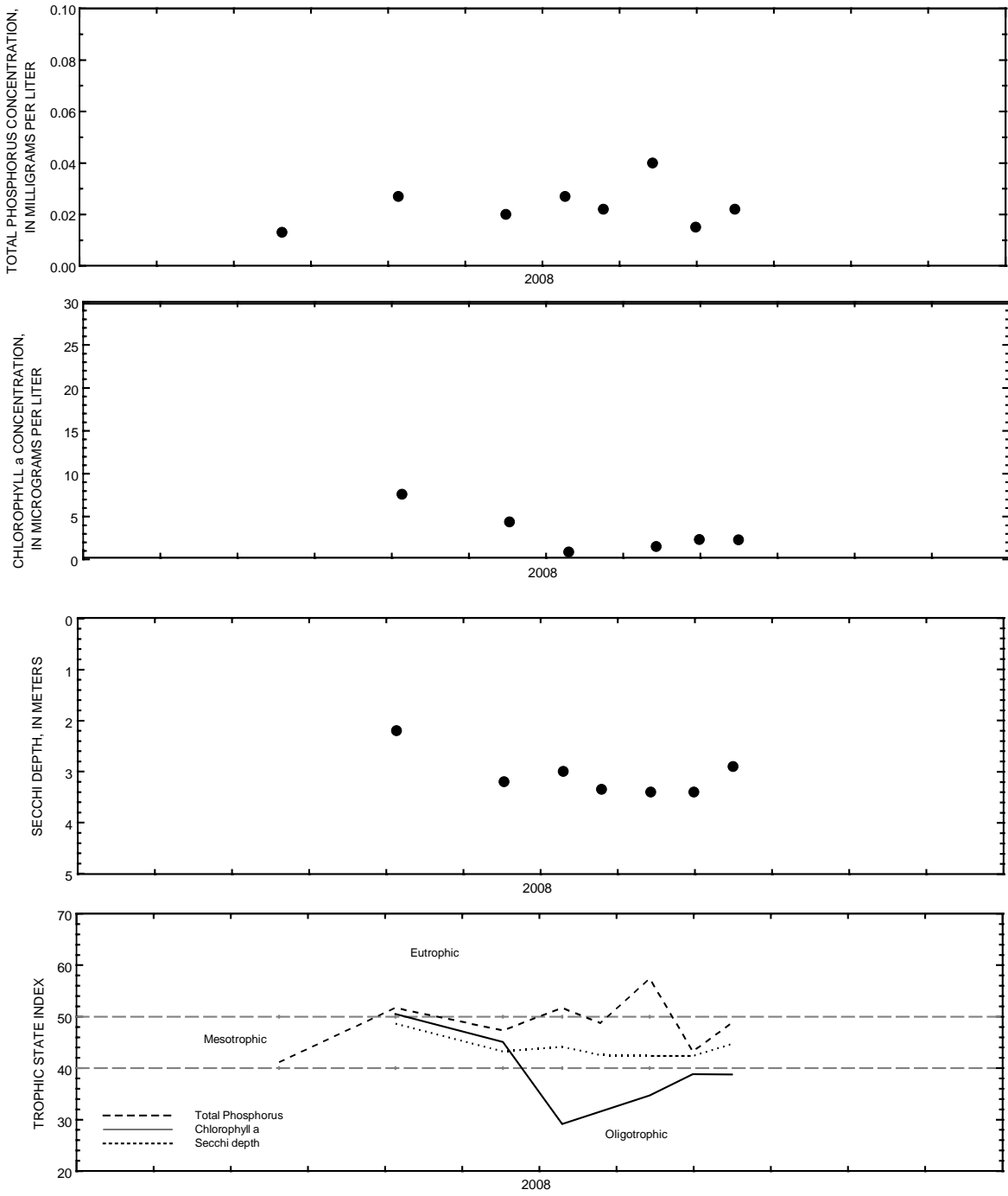
LAKE-DEPTH PROFILES, MARCH 20 TO JUNE 10, 2008



460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

LAKE-DEPTH PROFILES, JULY 25 TO SEPTEMBER 16, 2008





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

430251088284700 MIDDLE GENESEE LAKE, AT GENESEE LAKE ROAD, NEAR OCONOMOWOC, WI

LOCATION.--Lat 43°02'51", long 88°28'47", in SW ¼ SW ¼ SW ¼ sec.22, T. 7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at the southwest side of the lake about 2 miles south of Oconomowoc.

SURFACE AREA.--0.17 mi².

DRAINAGE AREA.--Unknown.

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

GAGE.--Staff gage. Local observer, Tom Schubring provided most readings of gage. Datum of gage is about 0.0 ft above NGVD of 1929.

EXTREMES FOR THE PERIOD OF RECORD.--Maximum observed gage height, 869.65 ft, July 12, 2008; minimum observed, 863.88 ft, Oct. 31, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum observed gage height, 869.65 ft, July 12; minimum observed, 866.33 ft, Sept. 22.

GAGE HEIGHT, FEET			
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008			
Date	Gage Height, ft	Date	Gage Height, ft
October 3	866.84	July 10	869.49
16	866.82	11	869.61
26	866.76	12	869.65
31	866.70	14	869.59
November 1	866.70	15	869.57
8	866.64	17	869.53
13	866.60	18	869.51
16	866.58	20	869.49
20	866.58	21	869.47
April 29	868.12	23	869.39
May 4	868.27	24	869.37
6	868.29	25	869.35
19	868.24	26	869.29
24	868.16	27	869.25
29	868.10	28	869.21
June 1	868.14	29	869.17
5	868.20	30	869.09
8	868.58	31	869.05
9	868.84	August 1	868.99
10	868.92	2	868.89
11	868.96	3	868.83
29	869.50	4	868.83
July 9	869.51	5	868.77

August 6	868.69	September 8	867.01
7	868.61	9	866.94
8	868.57	10	866.88
10	868.55	11	866.83
11	868.37	12	866.73
12	868.31	13	866.78
13	868.27	14	866.83
16	868.11	15	866.78
17	868.01	16	866.72
20	867.81	17	866.63
22	867.71	18	866.55
26	867.47	19	866.50
28	867.36	20	866.45
29	867.31	21	866.40
30	867.31	22	866.33
31	867.31	23	866.35
September 1	867.29	24	866.38
2	867.23	25	866.38
3	867.15	26	866.39
4	867.17	27	866.39
5	867.15	28	866.39
6	867.13	29	866.39
7	867.05	30	866.41

05429000 LAKE MONONA AT MADISON, WI

LOCATION.--Lat 43°03'48", long 89°23'49" referenced to North American Datum of 1927, in SE ¼ SW ¼ sec.23, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in Brittingham Park, in Madison.

SURFACE AREA.--5.3 mi².

DRAINAGE AREA.--279 mi² of which 36.6 mi² probably is noncontributing.

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 NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, datum 843.61 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 7.92 ft, June 15, 2008; minimum observed, 3.22 ft, Jan. 20, 1965, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 7.92 ft, June 15; minimum recorded, 4.65 ft, Feb. 16.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.24	5.32	4.85	4.76	4.70	4.69	5.19	6.18	5.59	7.37	6.96	6.52
2	6.21	5.29	4.95	4.76	4.69	4.69	5.23	6.17	5.56	7.34	6.89	6.50
3	6.18	5.26	4.95	4.74	4.67	4.82	5.25	6.14	5.56	7.29	6.84	6.42
4	6.12	5.23	4.98	4.72	4.68	4.86	5.28	6.10	5.51	7.19	6.89	6.40
5	6.07	5.18	5.00	4.70	4.70	4.86	5.28	6.09	5.65	7.11	6.88	6.40
6	6.03	5.12	5.00	4.69	4.73	4.86	5.29	6.07	5.73	7.06	6.83	6.35
7	5.98	5.10	5.01	4.79	4.75	4.84	5.28	6.10	5.82	7.05	6.78	6.31
8	5.93	5.08	4.99	4.95	4.74	4.84	5.31	6.08	6.21	7.16	6.74	6.28
9	5.86	5.06	4.99	5.02	4.73	e4.81	5.44	6.05	6.92	7.11	6.70	6.25
10	5.79	5.05	4.97	5.05	4.72	e4.77	5.55	6.04	7.09	7.06	6.66	6.21
11	5.75	5.04	5.00	5.06	4.72	e4.70	5.86	6.03	7.19	7.37	6.63	6.19
12	5.72	5.03	5.00	5.05	4.70	e4.68	5.94	6.01	7.34	e7.40	6.60	6.16
13	5.69	5.01	4.99	5.03	4.69	e4.67	5.95	6.00	7.71	e7.41	6.60	6.24
14	5.69	4.96	4.97	5.00	4.68	e4.71	5.96	5.98	7.83	e7.42	6.59	6.26
15	5.68	4.93	4.96	4.98	4.67	4.76	5.97	5.96	7.90	7.45	6.57	6.23
16	5.72	4.92	4.95	4.95	4.66	4.79	5.98	5.94	7.89	7.47	6.56	6.19
17	5.72	4.91	4.93	4.93	4.74	4.80	5.97	5.92	7.86	7.46	6.56	6.16
18	5.80	4.89	4.93	4.91	4.79	4.82	5.96	5.90	7.84	7.49	6.56	6.13
19	5.78	4.89	4.91	4.88	4.79	4.84	5.97	5.88	7.83	7.52	6.56	6.08
20	5.76	4.89	4.90	4.85	4.78	4.85	5.95	5.86	7.81	7.51	6.56	6.05
21	5.74	4.89	4.89	4.82	4.76	4.91	5.95	5.85	7.79	7.48	6.55	6.03
22	5.70	4.86	4.86	4.82	4.75	4.95	5.97	5.85	7.77	7.45	6.55	6.00
23	5.66	4.84	4.94	4.80	4.74	4.95	5.98	5.83	7.74	7.40	6.53	5.97
24	5.61	4.82	4.94	4.78	4.73	4.96	5.99	5.74	7.72	7.35	6.51	5.94
25	5.57	4.81	4.92	4.76	4.72	4.97	6.25	5.68	7.68	e7.33	6.50	5.91
26	5.53	4.80	4.90	4.75	4.71	4.98	6.33	5.68	7.63	7.30	6.50	5.88
27	5.49	4.80	4.88	4.73	4.70	5.02	6.31	5.64	7.60	7.24	6.50	5.85
28	5.46	4.81	4.86	4.72	4.69	5.03	6.26	5.57	7.53	7.20	6.52	5.83
29	5.42	4.80	4.85	4.72	4.70	5.04	6.22	5.53	7.48	7.14	6.53	5.79
30	5.40	4.79	4.82	4.72	---	5.04	6.20	5.62	7.43	7.09	6.52	5.74
31	5.36	---	4.79	4.71	---	5.10	---	5.62	---	7.03	6.52	---
Mean	5.76	4.98	4.93	4.84	4.72	4.86	5.80	5.91	7.11	7.30	6.64	6.14
Max	6.24	5.32	5.01	5.06	4.79	5.10	6.33	6.18	7.90	7.52	6.96	6.52
Min	5.36	4.79	4.79	4.69	4.66	4.67	5.19	5.53	5.51	7.03	6.50	5.74

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

LOCATION.--Lat 43°05'51", long 88°27'35", in NW ¼ SE ¼ sec.2, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.--1.20 mi².

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

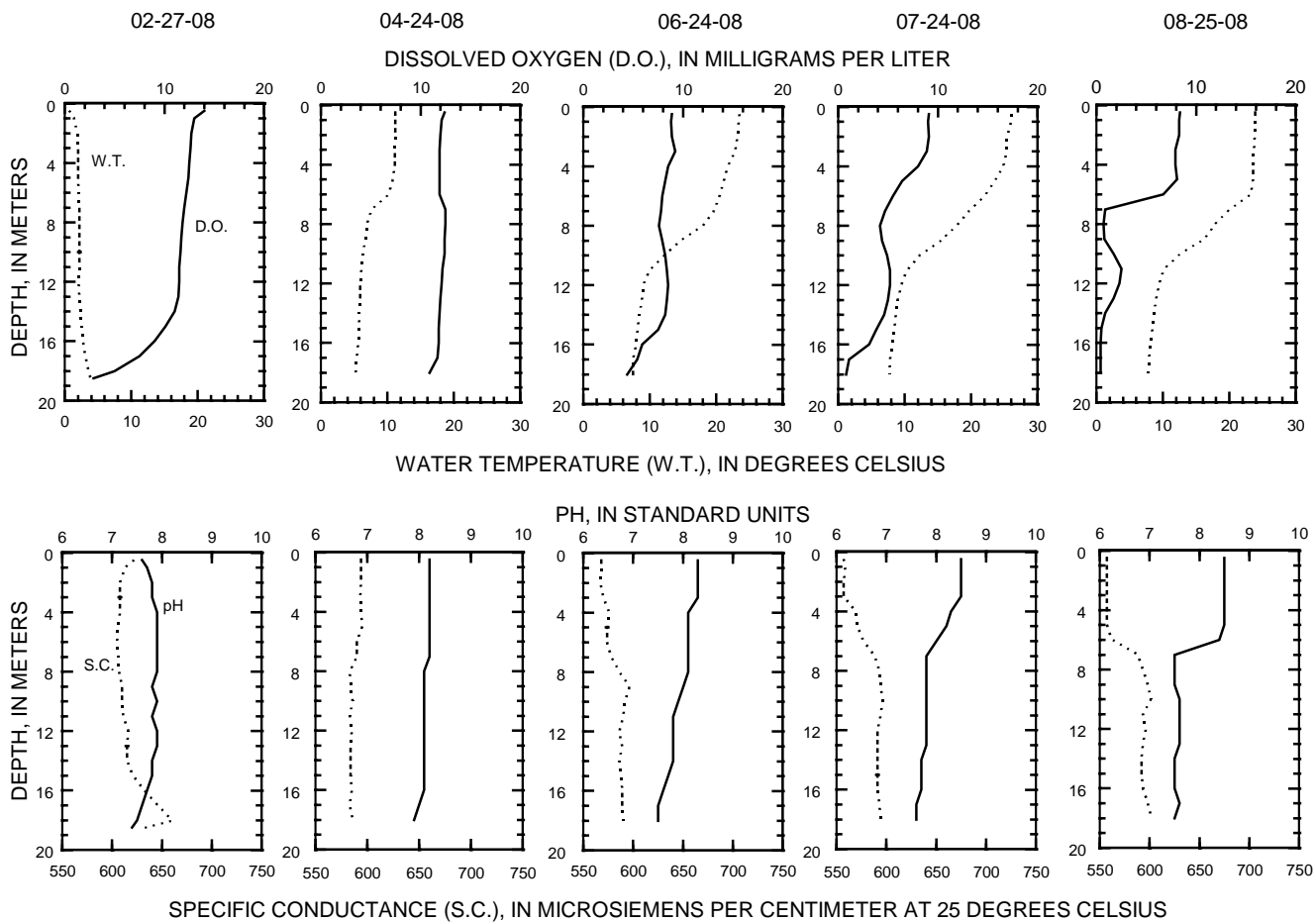
REMARKS.--Lake sampled near center at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

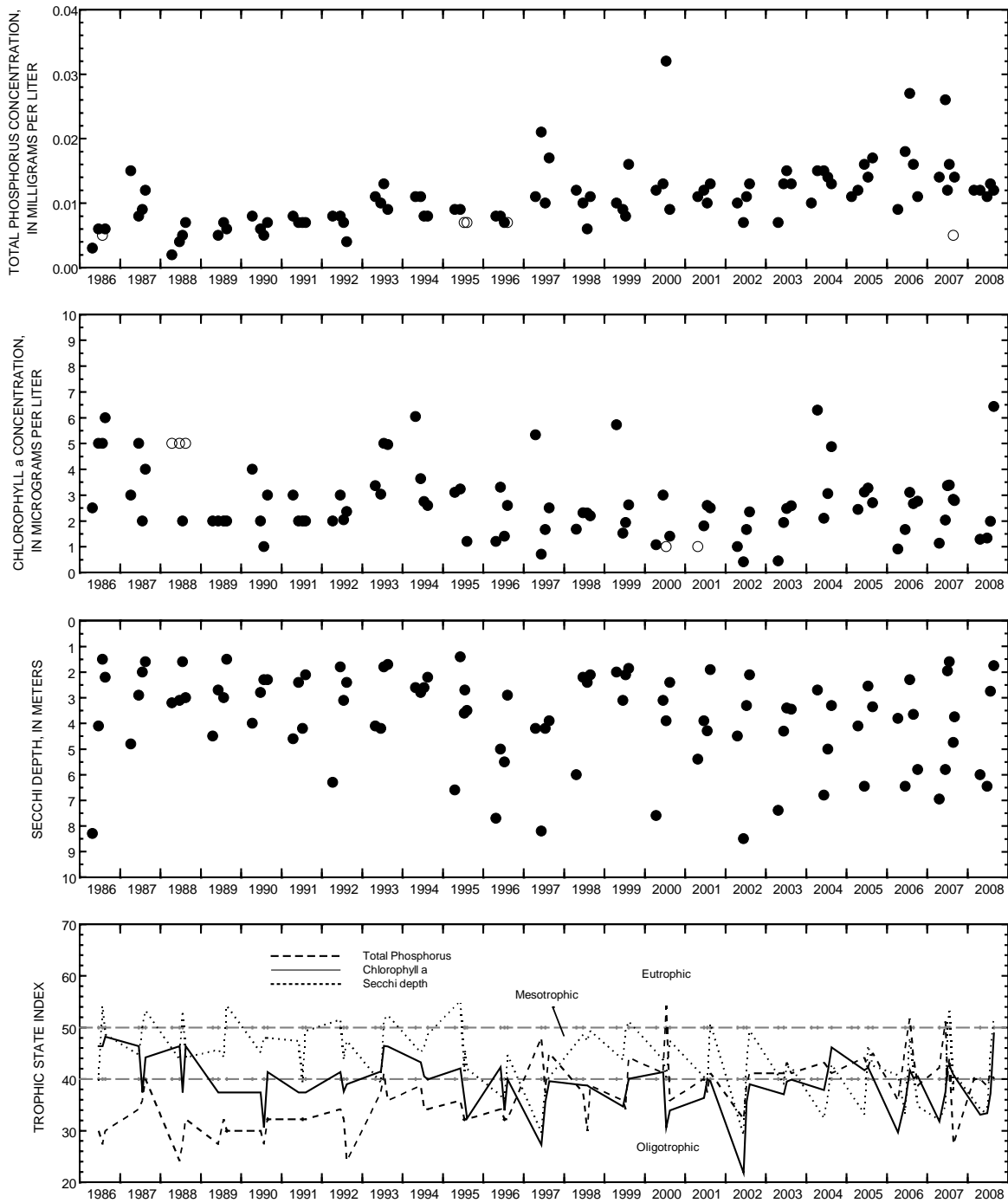
WATER-QUALITY DATA, FEBRUARY 27 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Feb. 27		Apr. 24		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	--		6.0		6.4		2.8		1.8	
00098 Sampling depth (m)	0.5	18	0.5	18	0.5	18	0.5	18	0.5	18
00010 Water Temperature (°C)	0.6	3.6	11.2	5.2	23.5	7.5	26.1	7.7	23.9	7.7
00400 pH (standard units)	7.6	7.5	8.2	7.9	8.3	7.5	8.5	7.6	8.5	7.5
00095 Specific conductance (µS/cm)	622	660	594	586	568	590	557	594	557	602
00300 Dissolved oxygen	14	5.0	12.4	10.9	8.9	4.4	9.1	0.8	8.4	0.4
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	1.29	--	1.33	--	1.98	--	6.43	--
00665 Phosphorus, Total (as P)	0.012	0.028	0.012	0.010	0.011	0.013	0.013	0.033	0.012	0.025
00671 Orthophosphate, dissolved (as P)			0.006							
00600 Total nitrogen			0.59							
00631 Nitrate + nitrite, dissolved (as N)			0.147							
00608 Ammonia, dissolved (as N)			<.015							
00625 Ammonia + organic nitrogen, total (as N)			0.44							
00623 Ammonia + organic nitrogen, dissolved (as N)			--							
00900 Hardness (as CaCO ₃)			280							
00417 Acid neutralizing capacity (as CaCO ₃)			213							
00915 Calcium, dissolved (Ca)			53.6							
00925 Magnesium, dissolved (Mg)			35.3							
00930 Sodium, dissolved (Na)			21.1							
00935 Potassium, dissolved (K)			2.4							
00940 Chloride, dissolved (Cl)			47.1							
00945 Sulfate, dissolved (SO ₄)			29.8							
00955 Silica, dissolved (SiO ₂)			7.51							
01046 Iron (µg/L)			<100							
01056 Manganese (µg/L)			<.5							
00081 Apparent color (PCU)			15							
63675 Turbidity (NTU)			1							
70300 Solids, dissolved (at 180 C°)			334							

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

LAKE-DEPTH PROFILES, FEBRUARY 27 TO AUGUST 25, 2008





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

(Open circles on the first two 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 ¼ NW ¼ sec.1, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.—1.20 mi².

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

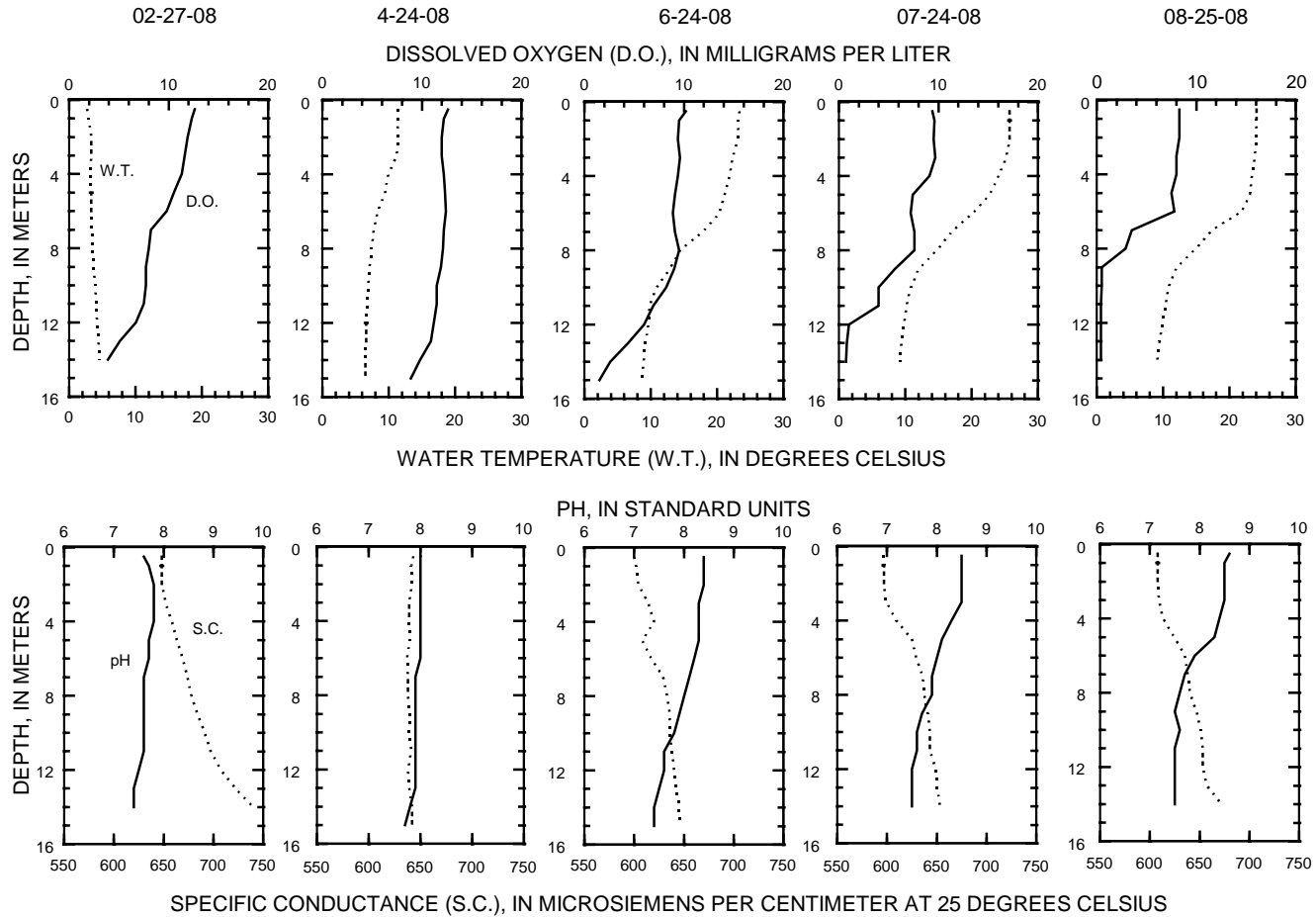
REMARKS.--Lake sampled at the deepest point in northeast bay near Hewitt Point. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

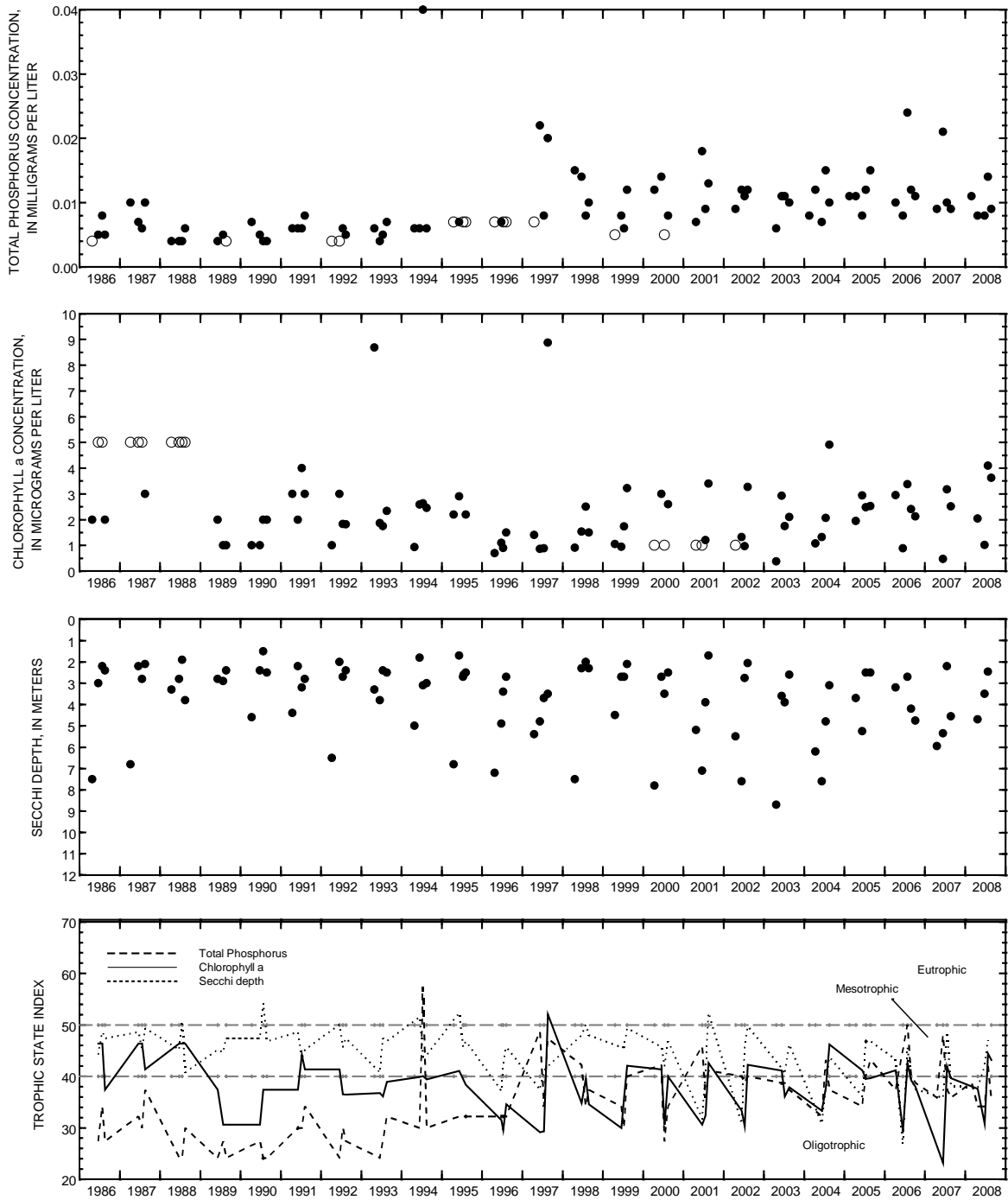
WATER-QUALITY DATA, FEBRUARY 27 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Feb. 27		Apr. 24		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	--		4.7		11.6		2.4		--	
00098 Sampling depth (m)	0.5	14	0.5	15	0.5	15	0.5	14	0.5	14
00010 Water Temperature (°C)	2.7	4.6	11.4	6.5	23.4	8.7	25.7	9.2	24.1	9.1
00400 pH (standard units)	7.6	7.4	8.0	7.7	8.4	7.4	8.5	7.5	8.6	7.5
00095 Specific conductance (µS/cm)	648	740	643	642	600	646	596	653	608	672
00300 Dissolved oxygen	12.6	3.9	12.6	8.9	10.2	1.5	9.4	0.7	8.3	0.4
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	2.04	--	1.02	--	4.1	--	3.62	--
00665 Phosphorus, Total (as P)	0.011	0.012	0.008	0.011	0.008	0.020	0.014	0.017	0.009	0.030

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

LAKE-DEPTH PROFILES, FEBRUARY 27 TO AUGUST 25, 2008





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

(Open circles on the first two 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 ¼ SE ¼ 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 September 2006, April to August 2008.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above NGVD of 1929.

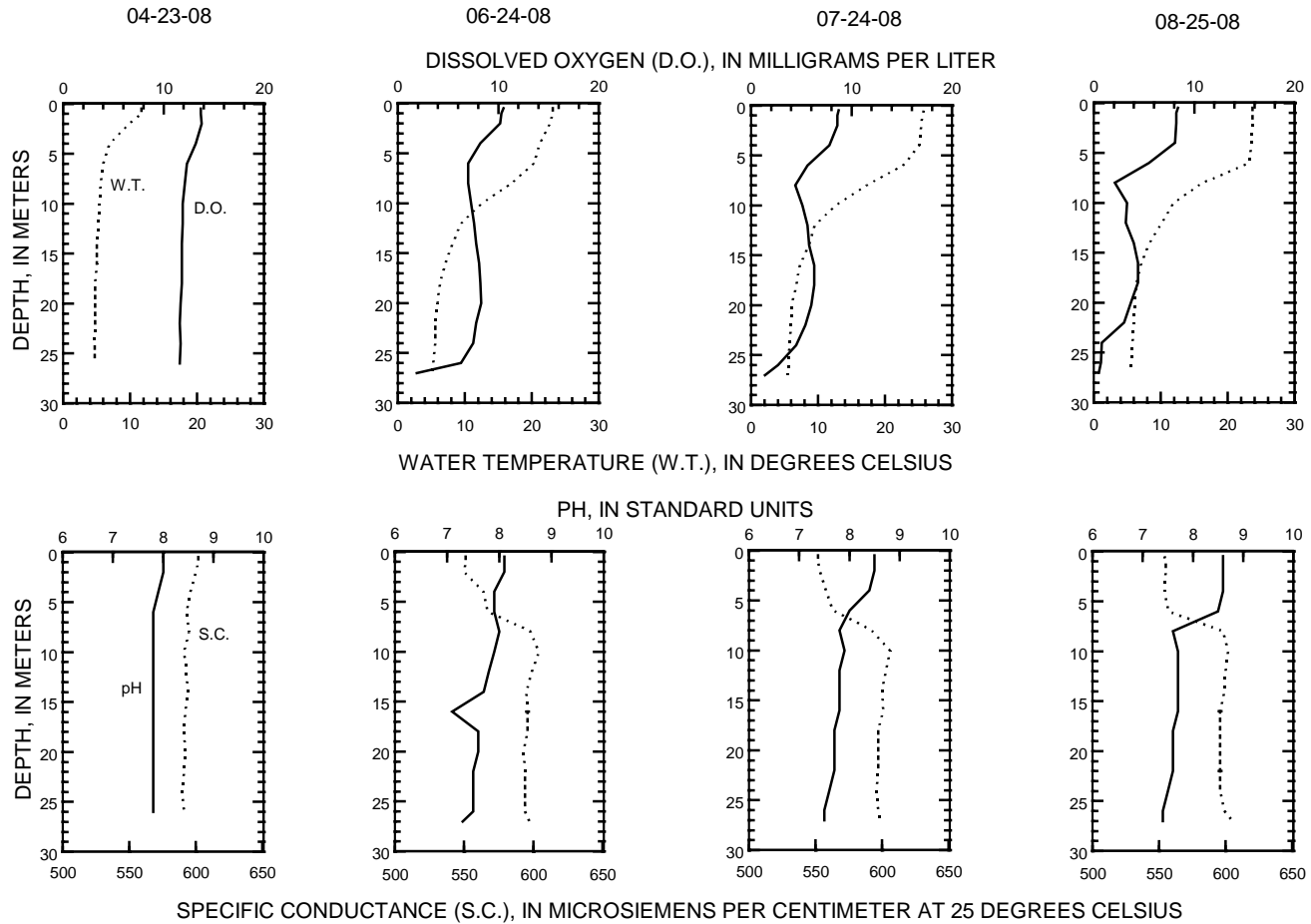
REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

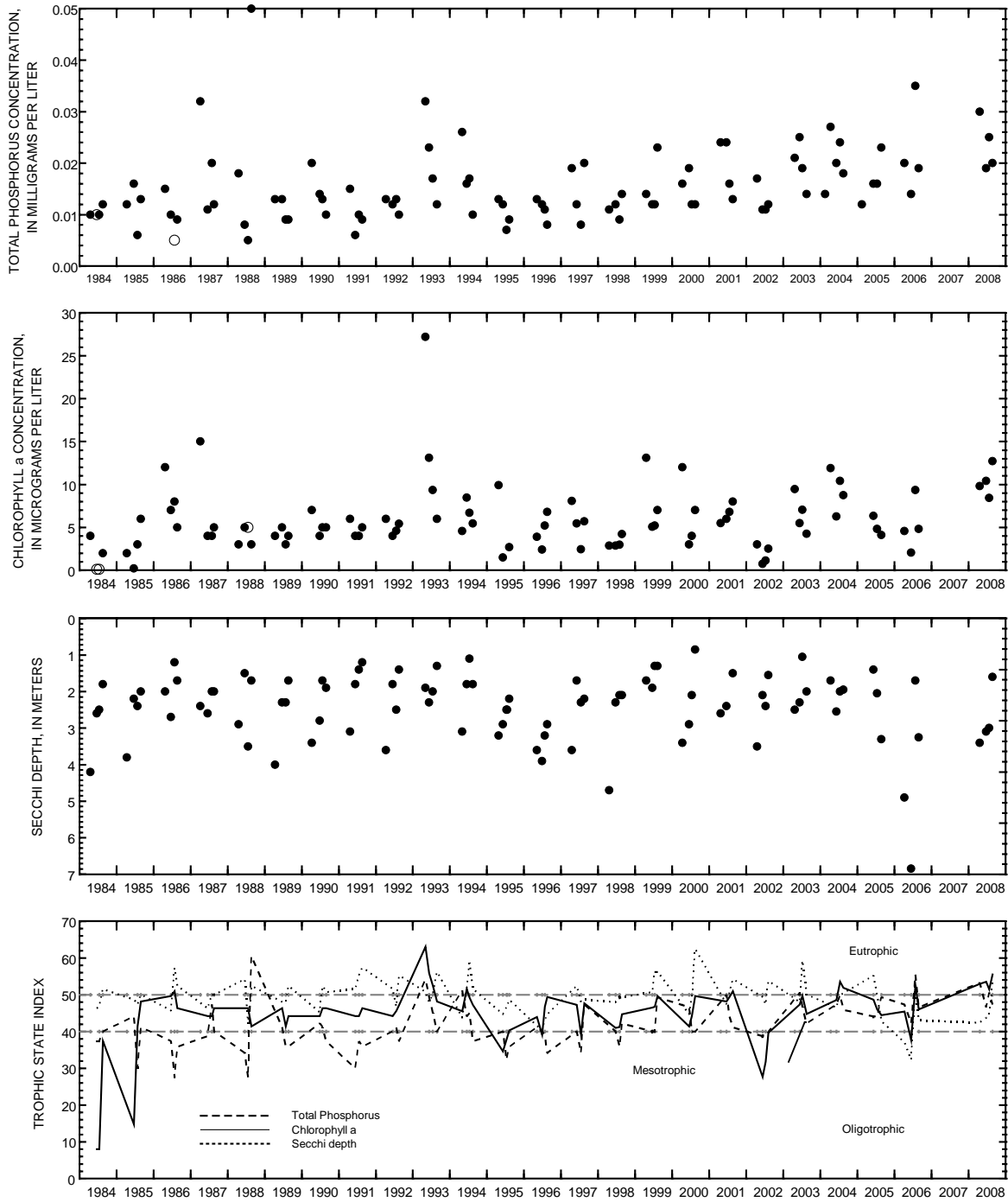
WATER-QUALITY DATA, APRIL 23 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Apr. 23		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	3.4		3.1		3.0		1.6	
00098 Sampling depth (m)	0.5	28	0.5	27	0.5	27	0.5	27
00010 Water Temperature (°C)	11.7	4.6	23.1	5.2	25.8	5.5	23.7	5.5
00400 pH (standard units)	8.0	7.8	8.1	7.3	8.5	7.5	8.6	7.4
00095 Specific conductance (µS/cm)	602	591	551	597	552	598	554	605
00300 Dissolved oxygen	13.7	11.3	10.5	1.9	8.7	1.4	8.4	0.5
32210 Chlorophyll a, phytoplankton (µg/L)	9.8	--	10.4	--	8.42	--	12.7	--
00665 Phosphorus, Total (as P)	0.030	0.023	0.019	0.015	0.025	0.043	0.02	0.041
00671 Orthophosphate, dissolved (as P)	0.003	--	--	--	0.004	--	--	--
00600 Total nitrogen	1.3	--	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	0.738	--	--	--	0.268	--	--	--
00608 Ammonia, dissolved (as N)	<.015	--	--	--	<.015	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	0.61	--	--	--	--	--	--	--
00623 Ammonia + organic nitrogen, dissolved (as N)	--	--	--	--	0.67	--	--	--
00900 Hardness (as CaCO ₃)	290	--	--	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO ₃)	227	--	--	--	--	--	--	--
00915 Calcium, dissolved (Ca)	59.6	--	--	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	34.2	--	--	--	--	--	--	--
00930 Sodium, dissolved (Na)	18.2	--	--	--	--	--	--	--
00935 Potassium, dissolved (K)	2.3	--	--	--	--	--	--	--
00940 Chloride, dissolved (Cl)	41.9	--	--	--	--	--	--	--
00945 Sulfate, dissolved (SO ₄)	29.2	--	--	--	--	--	--	--
00955 Silica, dissolved (SiO ₂)	6.19	--	--	--	--	--	--	--
01046 Iron (µg/L)	<100	--	--	--	--	--	--	--
01056 Manganese (µg/L)	<.5	--	--	--	--	--	--	--
00081 Apparent color (PTU)	20	--	--	--	--	--	--	--
63675 Turbidity (NTU)	<1.0	--	--	--	--	--	--	--
70300 Solids, dissolved (at 180 C°)	342	--	--	--	--	--	--	--

430723088252100 OKAUCHEE LAKE AT OKAUCHEE, WI

LAKE-DEPTH PROFILES, APRIL 23 10 TO AUGUST 25, 2008





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

(Open circles on the first two 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 ¼ NW ¼ sec.30, T.8 N., R.18 E., Waukesha County, Hydrologic Unit 07090001, near Okauchee.

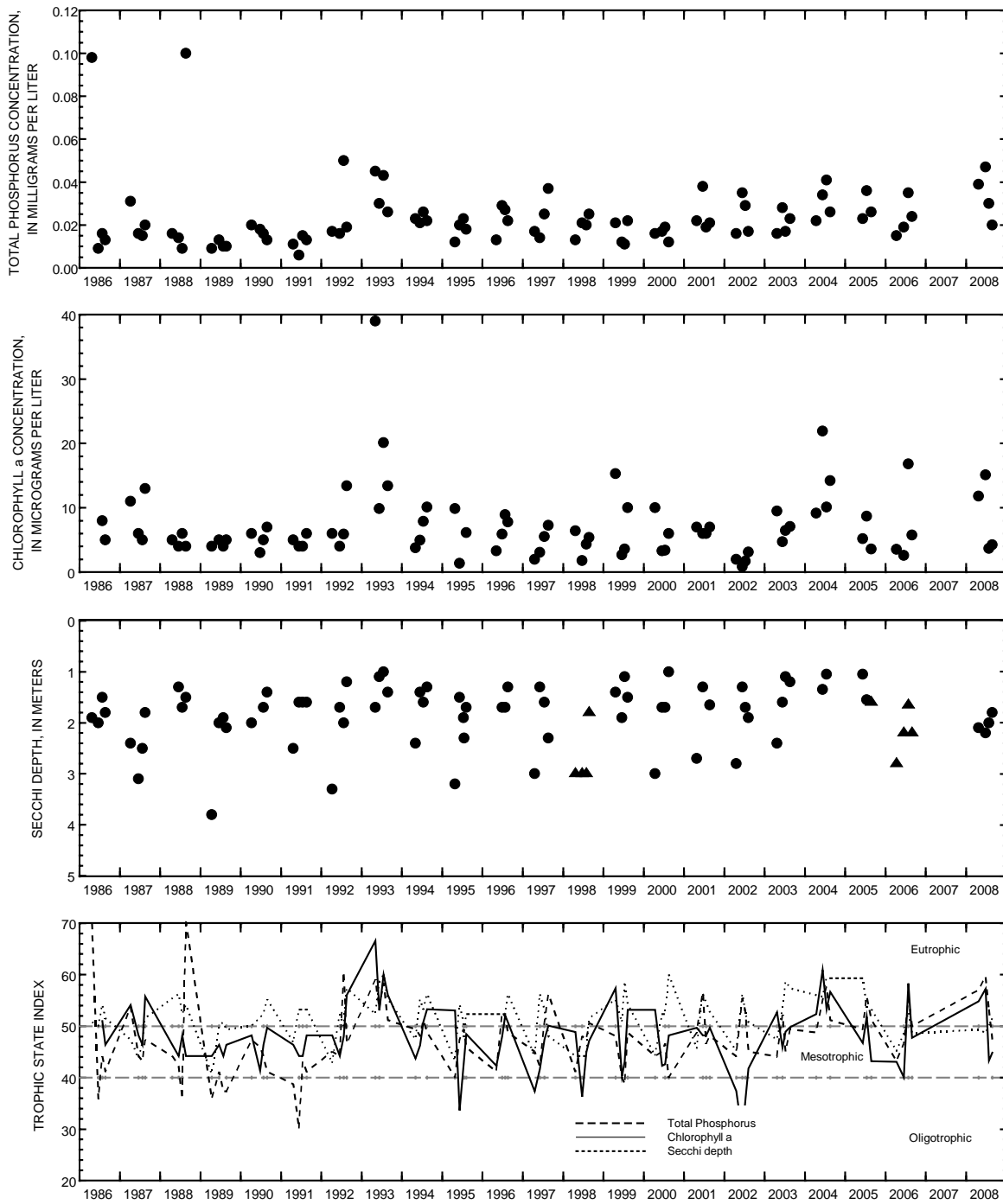
PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above NGVD of 1929.

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 23 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Apr. 23		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	2.1		2.2		2.0		1.8	
00098 Sampling depth (m)	0.5	3.0	0.5	2.0	0.5	1.5	0.5	1.5
00010 Water Temperature (°C)	12.1	10.0	23.1	21.7	25.5	24.3	23.0	23.0
00400 pH (standard units)	8.1	8.1	8.2	7.8	8.3	8.3	8.5	8.5
00095 Specific conductance (µS/cm)	618	601	526	527	574	578	608	605
00300 Dissolved oxygen	12.2	14.1	10.7	7.3	8.3	9.1	8.8	8.8
32210 Chlorophyll a, phytoplankton (µg/L)	11.8	--	15.1	--	3.66	--	4.27	--
00665 Phosphorus, Total (as P)	0.039	0.038	0.047	0.042	0.030	0.026	0.020	0.021



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 1, near Okauchee, Wisconsin.

(Triangles in Secchi plot indicate maximum depth at sampling site. Actual Secchi depth on these days was greater than the plotted triangles.)

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

LOCATION.--Lat 43°06'45", long 88°26'45", in SE ¼ NE ¼ sec.35, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008.

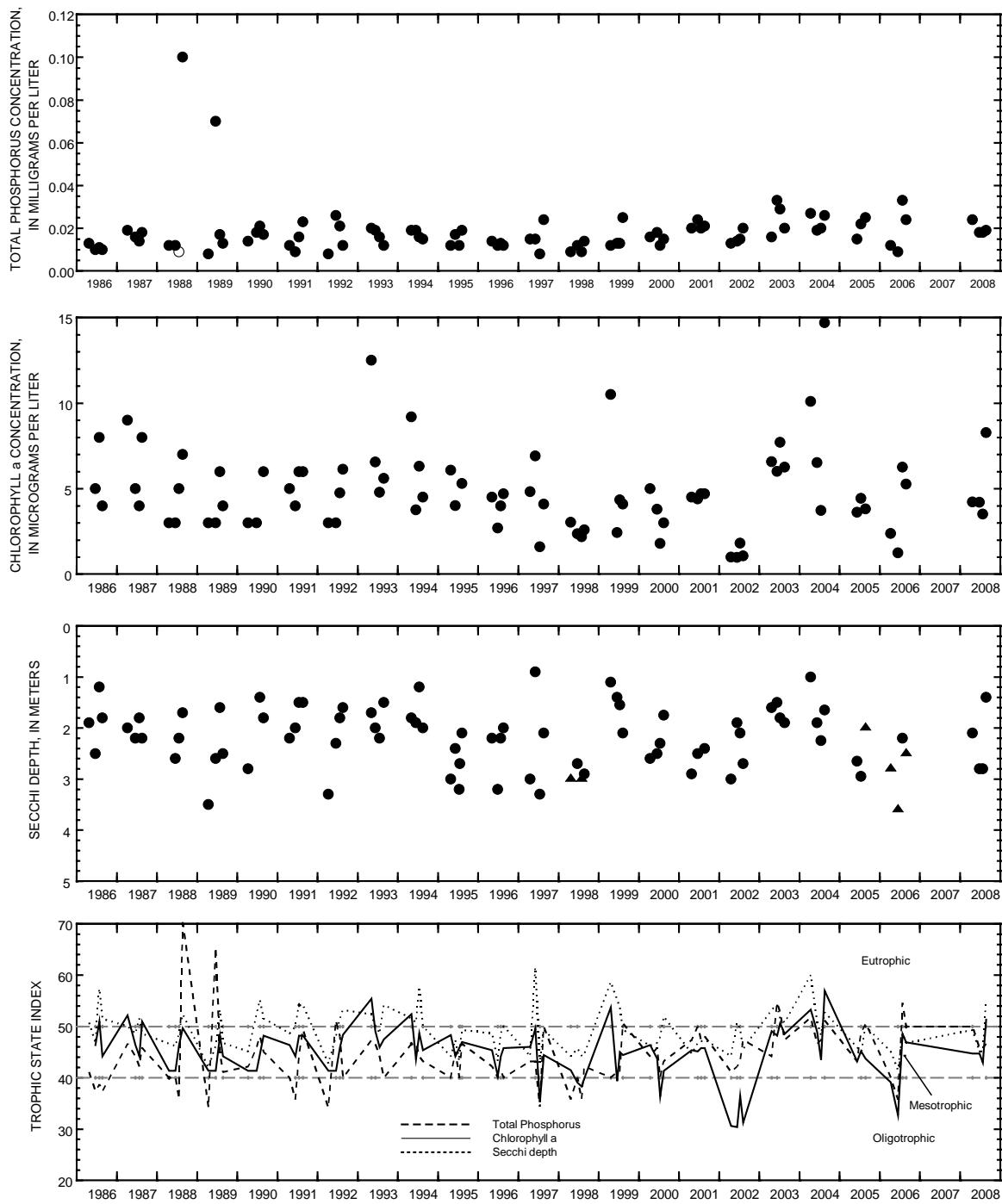
LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above NGVD Of 1929.

REMARKS.--Lake sampled in Lower Okauchee Lake, at an approximate depth of 3 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 23 TO AUGUST 25, 2008

(Milligrams per liter unless otherwise indicated)

Date	Apr. 23		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	2.1		2.8		2.8		1.4	
00098 Sampling depth (m)	0.5	2.0	0.5	2.5	0.5	2.5	0.5	2.5
00010 Water Temperature (°C)	13.5	11.9	23.3	22.9	26.2	25.6	24.1	23.9
00400 pH (standard units)	8.2	8.2	7.9	8.0	8.4	8.4	8.6	8.6
00095 Specific conductance (µS/cm)	592	592	555	555	539	539	530	529
00300 Dissolved oxygen	14.4	14.4	10.1	9.5	8.8	9.0	8.9	8.3
32210 Chlorophyll a, phytoplankton (µg/L)	4.22	--	4.21	--	3.52	--	8.27	--
00665 Phosphorus, Total (as P)	0.024	0.033	0.018	0.016	0.018	0.016	0.019	0.021



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 2, near Okauchee, Wisconsin.

(Open circles on the first two plots indicate laboratory detection limit for selected analyses.

Actual concentrations for these particular analyses are less than the plotted circles.)

(Triangles in Secchi plot indicate maximum depth at sampling site.

Actual Secchi depth on these days was greater than the plotted triangles.)

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

LOCATION.--Lat 43°06'42", long 88°25'24", in NE ¼ SE ¼ sec.36, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

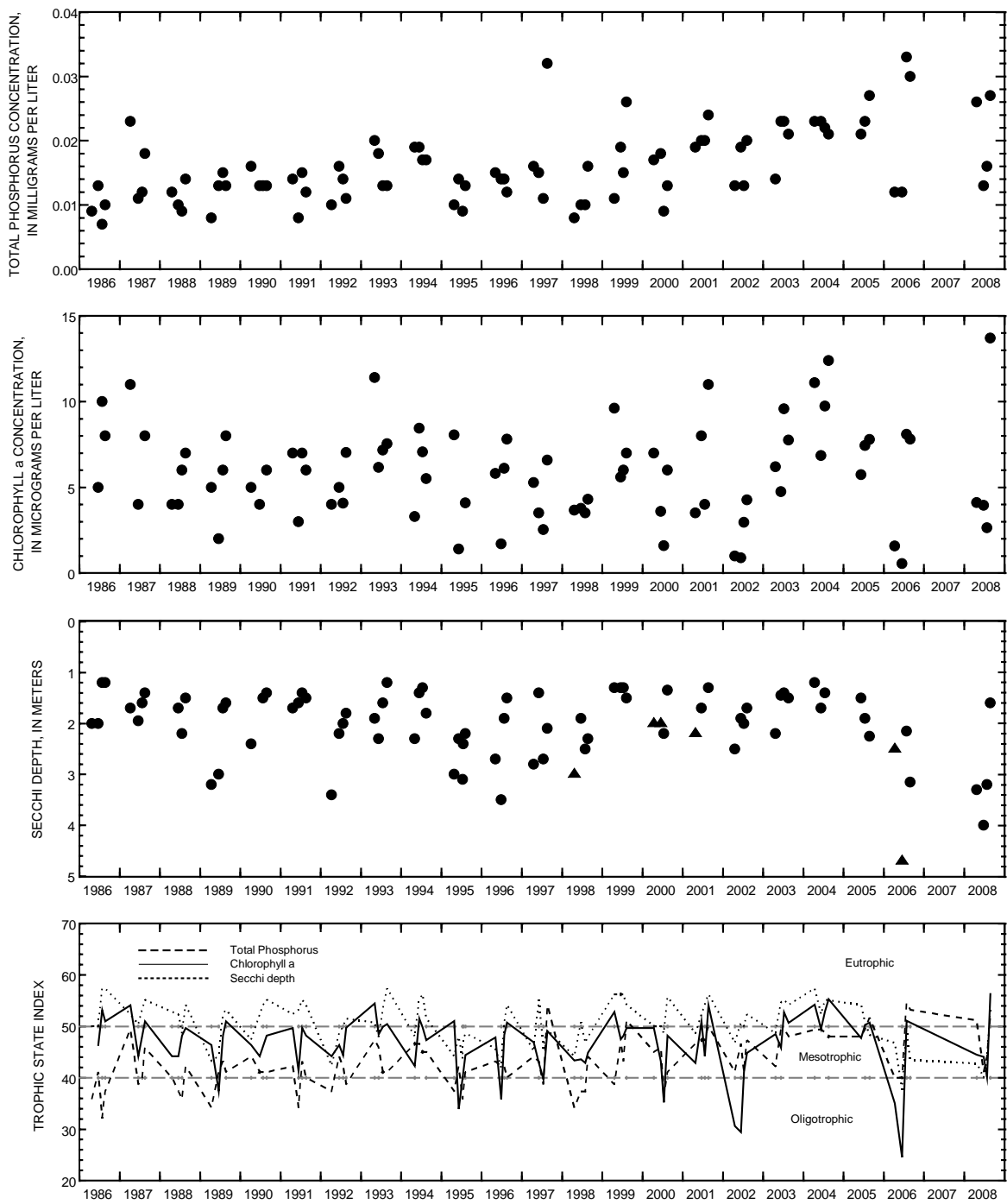
PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above NGVD Of 1929.

REMARKS.--Lake sampled in Ice House Bay, in the southern part of the lake, at an approximate depth of 5 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 23 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Apr. 23		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	3.3		4.0		3.2		1.6	
00098 Sampling depth (m)	0.5	4.0	0.5	5.0	0.5	4.0	0.5	4.5
00010 Water Temperature (°C)	11.4	6.9	23.7	18.6	25.6	23.9	23.8	23.3
00400 pH (standard units)	8.2	8.0	8.5	7.8	8.3	7.7	8.5	8.5
00095 Specific conductance (µS/cm)	597	592	554	583	545	558	548	551
00300 Dissolved oxygen	14	12.9	10.2	6.7	7.7	2.6	7.8	1.7
32210 Chlorophyll a, phytoplankton (µg/L)	4.11	--	3.94	--	2.64	--	13.7	--
00665 Phosphorus, Total (as P)	0.026	0.029	0.013	0.015	0.016	0.018	0.027	0.022



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 3, near Okauchee, Wisconsin.

(Triangles in Secchi plot indicate maximum depth at sampling site. Actual Secchi depth on these days was greater than the plotted triangles.)

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

LOCATION.--Lat 43°07'57", long 88°26'17", in NW ¼ NW ¼ sec.25, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

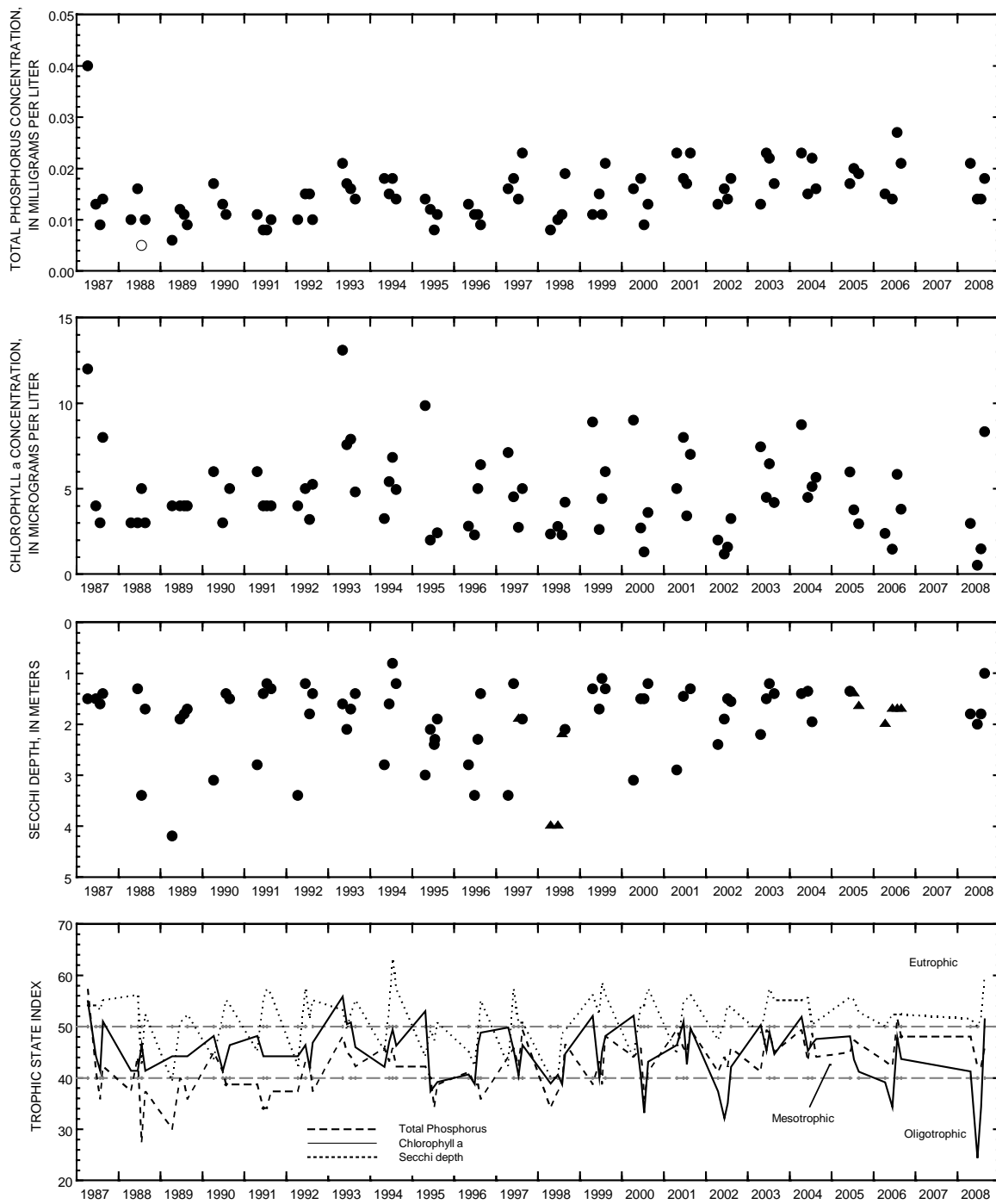
PERIOD OF RECORD.--June 1986 to September 2006, April to August 2008.

LAKE-STAGE GAGE.--Datum of gage is 869.00 ft above NGVD of 1929.

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 23 TO AUGUST 25, 2008
(Milligrams per liter unless otherwise indicated)

Date	Apr. 23		June 24		July 24		Aug. 25	
00078 Secchi-depth (m)	1.8		2.0		1.8		1.0	
00098 Sampling depth (m)	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5
00010 Water Temperature (°C)	14.2	13.9	23.6	22.8	26.1	25.8	23.7	23.7
00400 pH (standard units)	8.0	8.0	8.2	8.5	8.5	8.5	8.7	8.7
00095 Specific conductance (µS/cm)	603	602	547	540	515	517	527	526
00300 Dissolved oxygen	12.6	13.1	10.6	12.7	9.9	10.0	9.1	8.7
32210 Chlorophyll a, phytoplankton (µg/L)	2.97	--	0.53	--	1.47	--	8.33	--
00665 Phosphorus, Total (as P)	0.021	0.025	0.014	0.014	0.014	0.016	0.018	0.022



Surface total phosphorus, chlorophyll a concentrations, Secchi depths,
 and TSI data for Okauchee Lake, No. 4, near Okauchee, Wisconsin.

(Open circles on the first two plots indicate laboratory detection limit for selected analyses.

Actual concentrations for these particular analyses are less than the plotted circles.)

(Triangles in Secchi plot indicate maximum depth at sampling site.

Actual Secchi depth on these days was greater than the plotted triangles.)

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LOCATION.--Lat 42°32'46", long 88°17'58", in NW ¼ SE ¼ sec.13, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at Powers Lake.

SURFACE AREA.—0.72 mi².

DRAINAGE AREA.--3.42 mi².

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

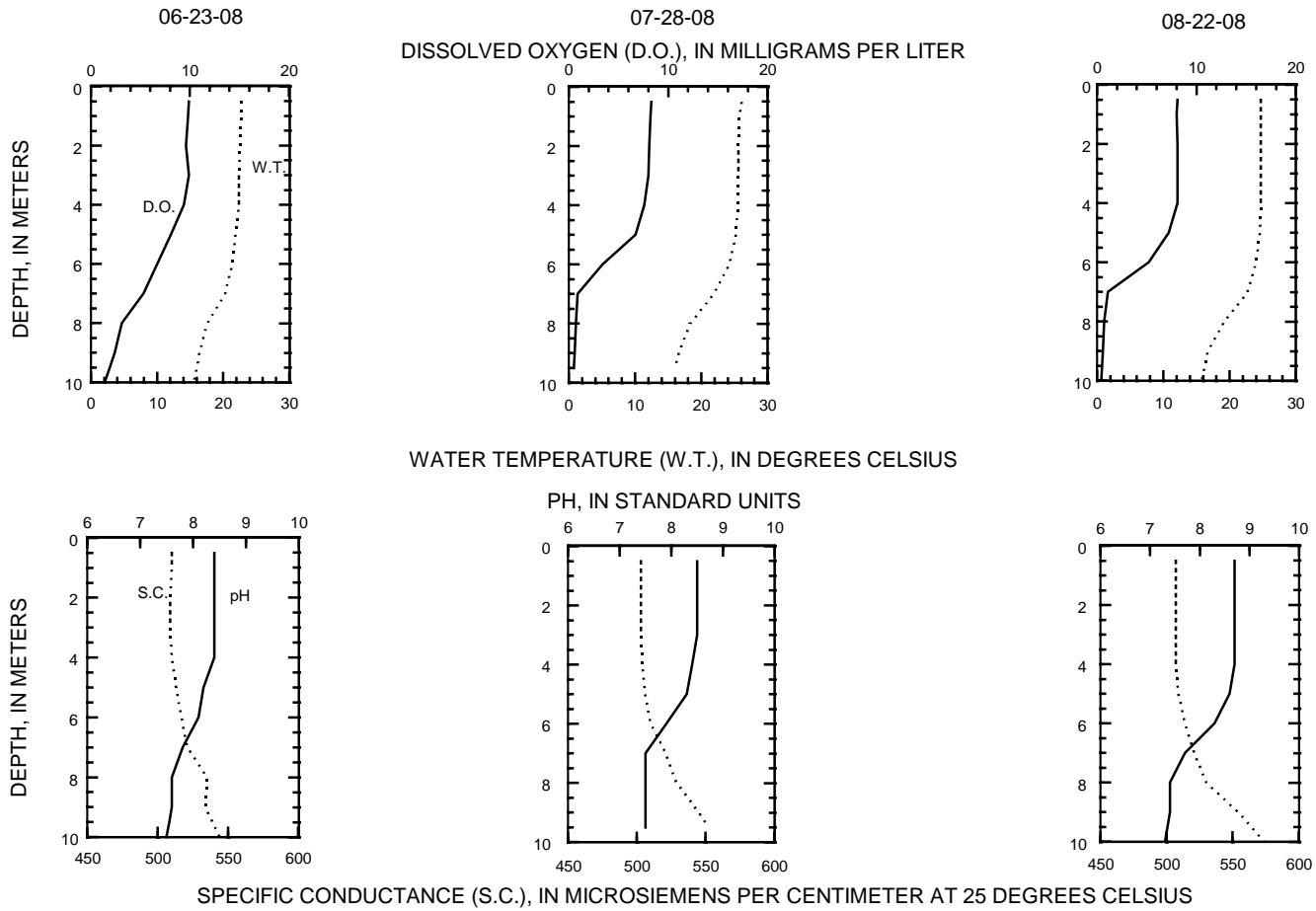
REMARKS.--Lake sampled near center at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

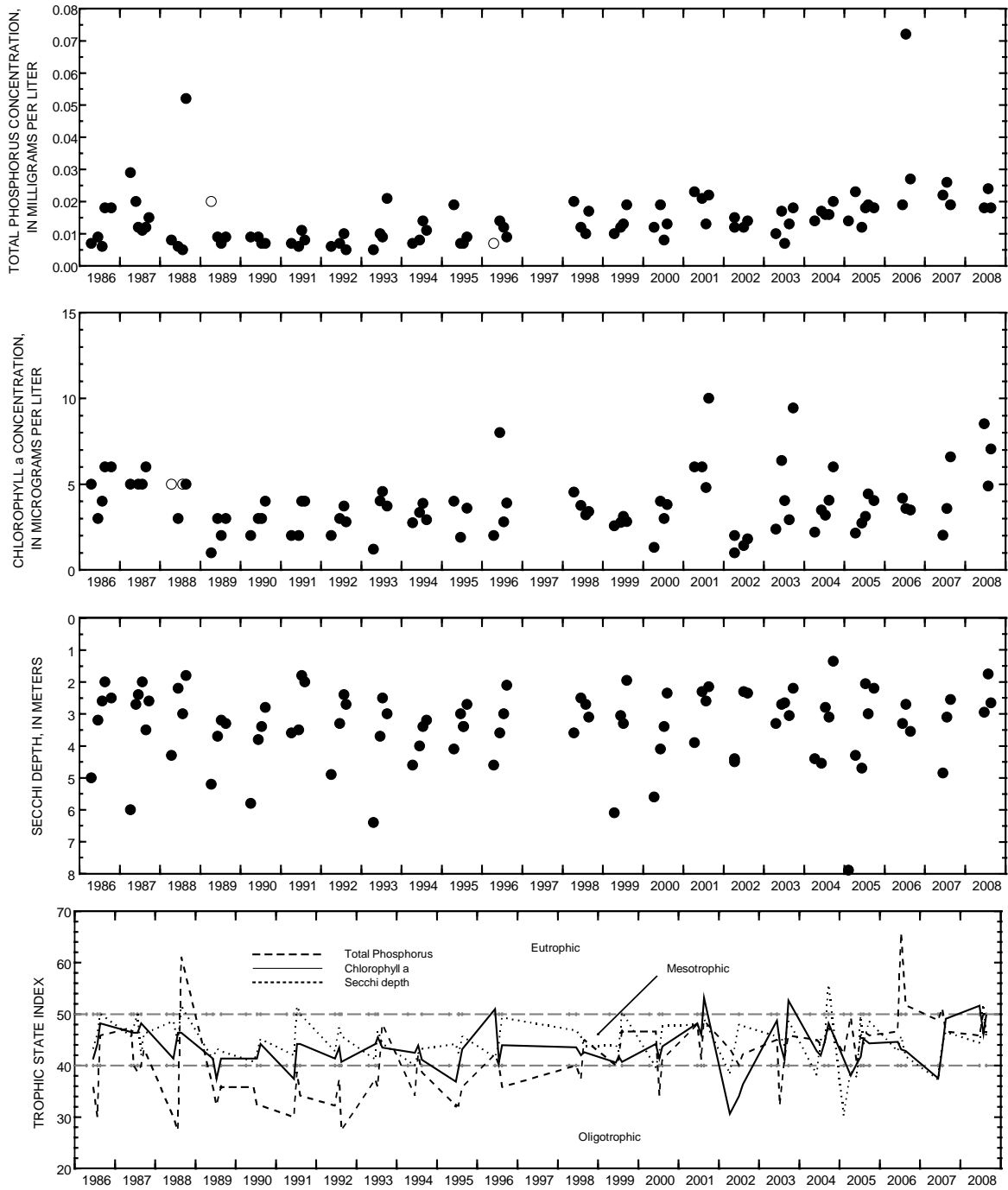
WATER-QUALITY DATA, JUNE 23 TO AUGUST 22, 2008
(Milligrams per liter unless otherwise indicated)

Date	June 23		July 28		Aug. 22	
00078 Secchi-depth (m)	3.0		1.8		2.6	
00098 Sampling depth (m)	0.5	10	0.5	9.5	0.5	10
00010 Water Temperature (°C)	22.8	15.6	26.1	16.0	24.7	15.8
00400 pH (standard units)	8.4	7.5	8.5	7.5	8.7	7.3
00095 Specific conductance (µS/cm)	510	544	503	552	507	574
00300 Dissolved oxygen	9.9	1.4	8.3	0.5	8.1	0.4
32210 Chlorophyll a, phytoplankton (µg/L)	8.51	--	4.88	--	7.04	--
00665 Phosphorus, Total (as P)	0.018	0.017	0.024	0.036	0.018	0.052
00671 Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--
00600 Total nitrogen	--	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	<.019	--	--	--
00608 Ammonia, dissolved (as N)	--	--	<.015	--	--	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	--	--	--	--
00623 Ammonia + organic nitrogen, dissolved (as N)	--	--	0.8	--	--	--

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LAKE-DEPTH PROFILES, JUNE 23 TO AUGUST 22, 2008





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

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

05429485 LAKE WAUBESA AT MCFARLAND, WI

LOCATION.--Lat 43°00'32", long 89°18'19" referenced to North American Datum of 1927, in SW ¼ SW ¼ sec.3, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on left bank just upstream from bridge on U.S. Highway 51, downstream of dam at outlet of Lake Waubesa and 1.0 mi southwest of McFarland.

SURFACE AREA.--3.25 mi².

DRAINAGE AREA.--327 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--October 2003 to current year.

REVISED RECORDS.--WSP 805, WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929 (levels by Wisconsin Department of Natural Resources).

REMARKS.--Lake level regulated by dams at outlets of Lake Mendota and Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.22 ft, June 15-17, 2008; minimum observed, 3.50 ft, Feb. 14, 2006, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 7.22 ft, June 15-17; minimum recorded, 4.30 ft, Mar. 2.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.73	4.86	4.46	4.49	4.41	4.33	4.85	5.69	5.18	6.88	6.60	6.08
2	5.71	4.82	4.53	4.47	4.39	4.31	4.86	5.68	5.14	6.84	6.55	6.07
3	5.69	4.80	4.48	e4.44	4.39	4.42	4.86	5.67	5.10	6.81	6.49	6.05
4	5.64	4.78	4.55	4.41	4.39	4.47	4.89	5.64	5.07	6.75	6.54	6.04
5	5.58	4.77	4.64	4.40	4.40	4.49	4.89	5.60	5.17	6.69	6.55	6.08
6	5.53	4.75	4.64	4.41	4.44	4.49	4.88	5.58	5.26	6.63	6.52	6.04
7	5.49	4.70	4.64	4.52	4.49	4.47	4.88	5.59	5.29	6.61	6.48	5.99
8	5.44	4.67	4.64	4.69	4.47	4.46	4.90	5.57	5.52	6.71	6.44	5.95
9	5.40	4.65	4.63	4.77	4.44	4.44	5.04	5.55	6.13	6.69	6.40	5.92
10	5.34	4.63	4.61	4.77	4.43	4.42	5.10	5.52	6.37	6.65	6.36	5.88
11	5.27	4.61	4.63	4.79	4.40	4.41	5.39	5.53	6.47	6.91	6.33	5.84
12	5.22	4.61	4.65	4.76	4.39	4.40	5.49	5.52	6.60	7.06	6.31	5.82
13	5.18	4.59	4.63	4.75	4.39	4.41	5.50	5.48	7.05	7.06	6.30	5.89
14	5.17	4.59	4.62	4.72	4.37	4.48	5.50	5.46	7.15	7.04	6.29	5.93
15	5.16	4.58	4.60	4.69	4.37	4.54	5.48	5.45	7.20	7.01	6.28	5.92
16	5.19	4.55	4.61	4.66	4.35	4.56	5.45	5.43	7.22	6.99	6.26	5.87
17	5.18	4.53	4.59	4.63	4.39	4.56	5.46	5.42	7.21	6.97	6.25	5.83
18	5.24	4.52	4.58	4.60	4.46	4.58	5.49	5.40	7.19	6.96	6.25	5.79
19	5.26	4.50	4.57	4.58	4.45	4.60	5.53	5.39	7.17	6.96	6.25	5.75
20	5.23	4.50	4.56	4.55	4.44	4.62	5.50	5.37	7.16	6.98	6.23	5.73
21	5.20	4.51	4.54	4.53	4.43	4.64	5.47	5.36	7.14	6.98	6.21	5.71
22	5.19	4.51	4.54	4.53	4.42	4.67	5.46	5.34	7.14	6.96	6.19	5.67
23	5.15	4.50	4.64	4.51	4.40	4.66	5.45	5.32	7.12	6.93	6.19	5.64
24	5.12	4.47	4.64	4.49	4.39	4.66	5.44	5.29	7.11	6.90	6.18	5.62
25	5.07	4.46	4.62	4.47	4.38	4.66	5.72	5.24	7.09	6.87	6.16	5.60
26	5.04	4.45	4.59	4.46	4.37	4.69	5.87	5.27	7.07	6.85	6.14	5.58
27	5.02	4.45	4.58	4.45	4.36	4.71	5.85	5.23	7.05	6.82	6.12	5.54
28	4.98	4.44	4.56	4.43	4.34	4.72	5.81	5.18	7.02	6.78	6.10	5.51
29	4.94	4.45	4.56	4.43	4.33	4.71	5.77	5.13	6.98	6.73	6.10	5.48
30	4.90	4.45	4.53	4.44	---	4.70	5.72	5.18	6.93	6.70	6.10	5.46
31	4.88	---	4.51	4.41	---	4.76	---	5.21	---	6.65	6.09	---
Mean	5.26	4.59	4.59	4.56	4.40	4.55	5.35	5.43	6.51	6.85	6.30	5.81
Max	5.73	4.86	4.65	4.79	4.49	4.76	5.87	5.69	7.22	7.06	6.60	6.08
Min	4.88	4.44	4.46	4.40	4.33	4.31	4.85	5.13	5.07	6.61	6.09	5.46

424848088083100 WIND LAKE AT OUTLET AT WIND LAKE, WI

LOCATION.--Lat 42°48'48", long 88°08'31" referenced to North American Datum of 1927, in NE ¼ NW ¼ sec.16, T.4 N., R.20 E., Racine County, WI, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

DRAINAGE AREA.--39.6 mi².

PERIOD OF RECORD.--March 1985 to current year. Prior to October 2000, published as "Wind Lake Outlet".

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

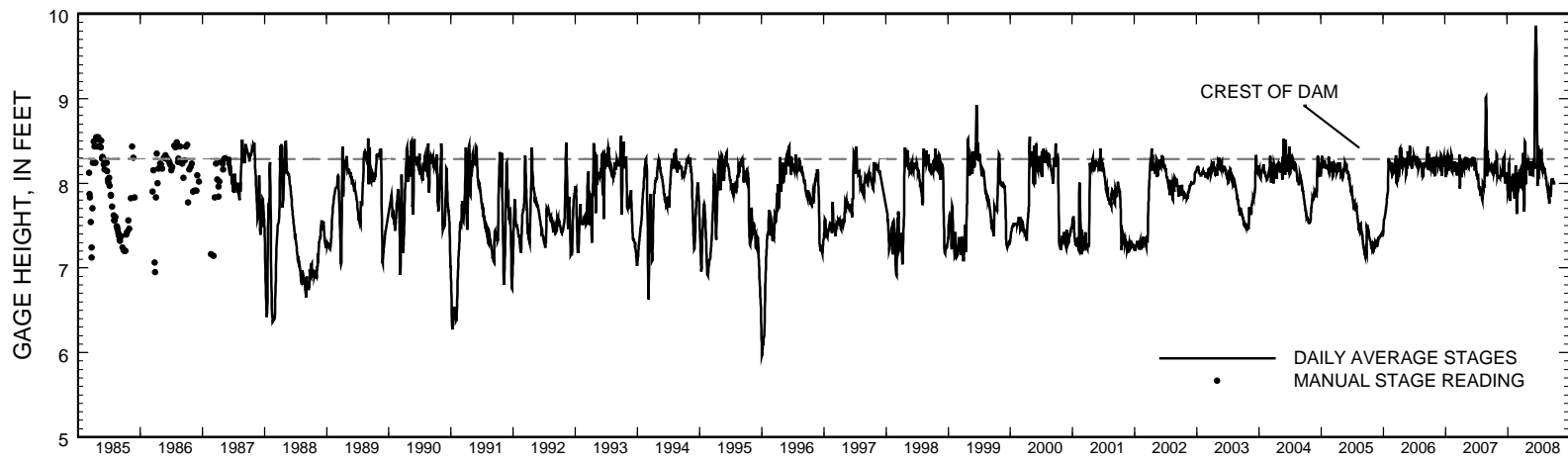
REMARKS.--Lake level regulated by dam with two 10-foot gates at outlet. Lake ice-covered Dec. 3 to Mar. 14. Prior to October 1987, published as Wind Lake at Wind Lake, Wis. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.88 ft, June 14, 15, 2008; minimum recorded, 5.95 ft, Jan. 2, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 9.88 ft, June 14, 15; minimum recorded, 7.59 ft, Feb. 25.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.17	8.08	8.11	7.90	8.11	8.07	8.36	8.19	8.28	8.15	8.15	7.78
2	8.18	8.07	8.20	7.86	8.10	8.12	8.32	8.18	8.28	8.06	8.14	7.77
3	8.20	8.09	8.22	7.86	8.08	8.13	8.18	8.18	8.26	8.06	8.11	7.77
4	8.19	8.10	8.24	7.88	8.06	8.05	8.06	8.18	8.20	8.14	8.15	7.84
5	8.19	8.09	8.28	7.94	7.99	7.96	7.91	8.22	8.28	8.22	8.18	7.91
6	8.19	8.08	8.29	7.99	7.97	7.94	7.77	8.24	8.22	8.29	8.17	7.89
7	8.19	8.07	8.30	8.07	7.94	7.96	7.67	8.22	8.17	8.35	8.15	7.87
8	8.19	8.07	8.26	8.22	7.88	8.04	7.73	8.18	8.52	8.40	8.13	7.87
9	8.18	8.08	8.24	8.24	7.87	8.12	7.99	8.12	9.14	8.33	8.12	7.87
10	8.16	8.07	8.23	8.20	7.85	8.16	8.18	8.09	9.45	8.25	8.10	7.85
11	8.14	8.07	8.28	8.14	7.82	8.10	8.42	8.17	9.59	8.33	8.08	7.84
12	8.13	8.08	8.30	8.04	7.83	8.03	8.49	8.22	9.65	8.30	8.07	7.84
13	8.12	8.08	8.25	7.95	7.90	8.00	8.48	8.23	9.82	8.27	8.06	7.95
14	8.14	8.07	8.10	7.86	7.97	8.05	8.39	8.24	9.86	8.30	8.06	8.02
15	8.16	8.07	8.04	7.79	8.04	8.10	8.21	8.26	9.86	8.33	8.04	8.05
16	8.23	8.06	8.03	7.82	8.10	8.12	8.01	8.25	9.81	8.36	8.02	8.04
17	8.23	8.07	8.00	7.91	8.21	8.13	7.99	8.24	9.70	8.37	8.00	8.04
18	8.21	8.07	8.01	7.98	8.17	8.15	8.13	8.24	9.57	8.30	7.98	8.04
19	8.11	8.07	8.03	8.02	8.10	8.17	8.19	8.23	9.40	8.18	7.97	8.04
20	8.14	8.08	8.05	8.04	8.02	8.16	8.19	8.22	9.19	8.16	7.96	8.04
21	8.22	8.12	8.06	8.05	7.93	8.18	8.17	8.19	8.96	8.19	7.94	8.05
22	8.27	8.13	8.05	8.04	7.84	8.21	8.17	8.17	8.68	8.21	7.93	8.04
23	8.26	8.11	8.09	8.00	7.76	8.14	8.22	8.13	8.39	8.22	7.93	8.04
24	8.22	8.10	8.12	7.96	7.67	8.06	8.24	8.09	8.10	8.22	7.91	8.03
25	8.19	8.10	8.13	7.92	7.64	7.95	8.27	8.08	7.97	8.21	7.89	8.03
26	8.24	8.11	8.13	7.93	7.75	7.94	8.29	8.12	8.16	8.22	7.87	8.02
27	8.30	8.10	8.08	7.93	7.83	8.03	8.25	8.15	8.33	8.20	7.86	8.01
28	8.35	8.09	8.04	7.93	7.91	8.09	8.22	8.13	8.44	8.20	7.84	8.01
29	8.34	8.09	8.01	7.97	8.01	8.09	8.19	8.12	8.43	8.18	7.84	8.00
30	8.23	8.09	7.96	8.02	---	8.06	8.20	8.22	8.30	8.18	7.82	8.00
31	8.14	---	7.93	8.06	---	8.15	---	8.27	---	8.16	7.80	---
Mean	8.20	8.09	8.13	7.98	7.94	8.08	8.16	8.19	8.83	8.24	8.01	7.95
Max	8.35	8.13	8.30	8.24	8.21	8.21	8.49	8.27	9.86	8.40	8.18	8.05
Min	8.11	8.06	7.93	7.79	7.64	7.94	7.67	8.08	7.97	8.06	7.80	7.77



Stage hydrograph for Wind Lake, 1985-2008.

424915088083900 WIND LAKE AT WIND LAKE, WI

LOCATION.--Lat 42°49'15", long 88°08'39", in NW ¼ SW ¼ sec.9, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

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

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

WATER-QUALITY DATA, FEBRUARY 27 TO JULY 28, 2008

(Milligrams per liter unless otherwise indicated)

Date	Feb. 27		Apr. 22		June 23		July 28	
00078 Secchi-depth (m)	--		2.0		1.4		1.5	
00098 Sampling depth (m)	0.5	15	0.5	15	0.5	14.5	0.5	14.5
00010 Water Temperature (°C)	2.4	3.3	14.7	8.1	23.4	14.3	26	14.5
00400 pH (standard units)	7.0	7.0	8.2	7.5	7.8	7.2	8.8	7.2
00095 Specific conductance (µS/cm)	784	964	626	668	531	661	540	678
00300 Dissolved oxygen	8.9	1.5	12.3	8.9	8.8	0.4	9.7	0.4
32210 Chlorophyll a, phytoplankton (µg/L)	--	--	25.2	--	17.4	--	17.2	--
00665 Phosphorus, Total (as P)	0.066	0.136	0.043	0.047	0.081	0.244	0.062	0.428
00671 Orthophosphate, dissolved (as P)	--	--	0.004	--	--	--	<.002	--
00600 Total nitrogen	--	--	1	--	--	--	--	--
00631 Nitrate + nitrite, dissolved (as N)	--	--	0.057	--	--	--	<.019	--
00608 Ammonia, dissolved (as N)	--	--	<.015	--	--	--	<.015	--
00625 Ammonia + organic nitrogen, total (as N)	--	--	0.97	--	--	--	--	--
00623 Ammonia + organic nitrogen, dissolved (as N)	--	--	--	--	--	--	1.1	--
00900 Hardness (as CaCO3)	--	--	210	--	--	--	--	--
00417 Acid neutralizing capacity (as CaCO3)	--	--	148	--	--	--	--	--
00915 Calcium, dissolved (Ca)	--	--	47.5	--	--	--	--	--
00925 Magnesium, dissolved (Mg)	--	--	23.4	--	--	--	--	--
00930 Sodium, dissolved (Na)	--	--	48	--	--	--	--	--
00935 Potassium, dissolved (K)	--	--	3.1	--	--	--	--	--
00940 Chloride, dissolved (Cl)	--	--	88.4	--	--	--	--	--
00945 Sulfate, dissolved (SO4)	--	--	31.8	--	--	--	--	--
00955 Silica, dissolved (SiO2)	--	--	0.805	--	--	--	--	--
01046 Iron (µg/L)	--	--	<100	--	--	--	--	--
01056 Manganese (µg/L)	--	--	<1.6	--	--	--	--	--
00081 Apparent color (PTU)	--	--	50	--	--	--	--	--
63675 Turbidity (NTU)	--	--	<1.0	--	--	--	--	--
70300 Solids, dissolved (at 180 C°)	--	--	352	--	--	--	--	--

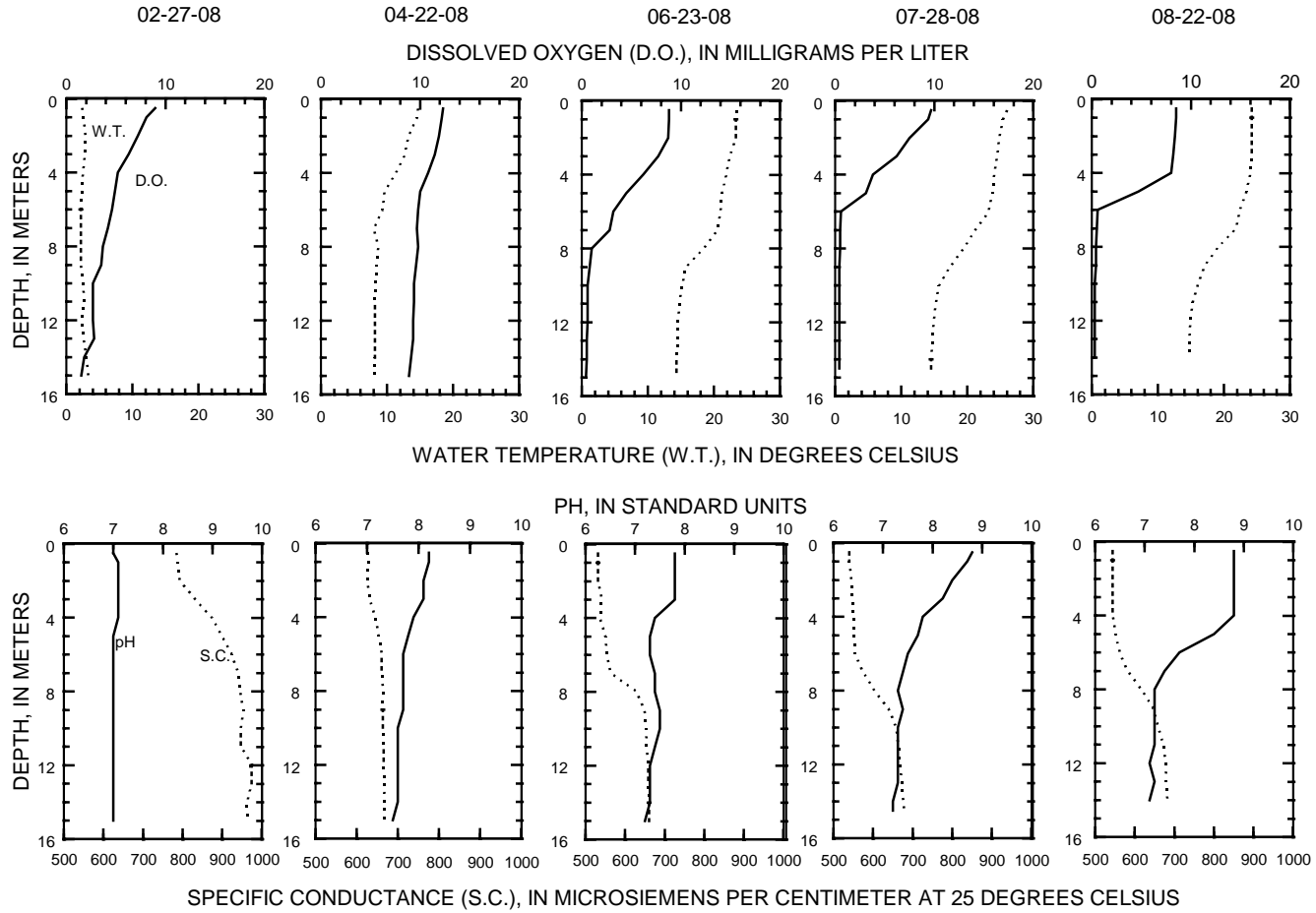
424915088083900 WIND LAKE AT WIND LAKE, WI

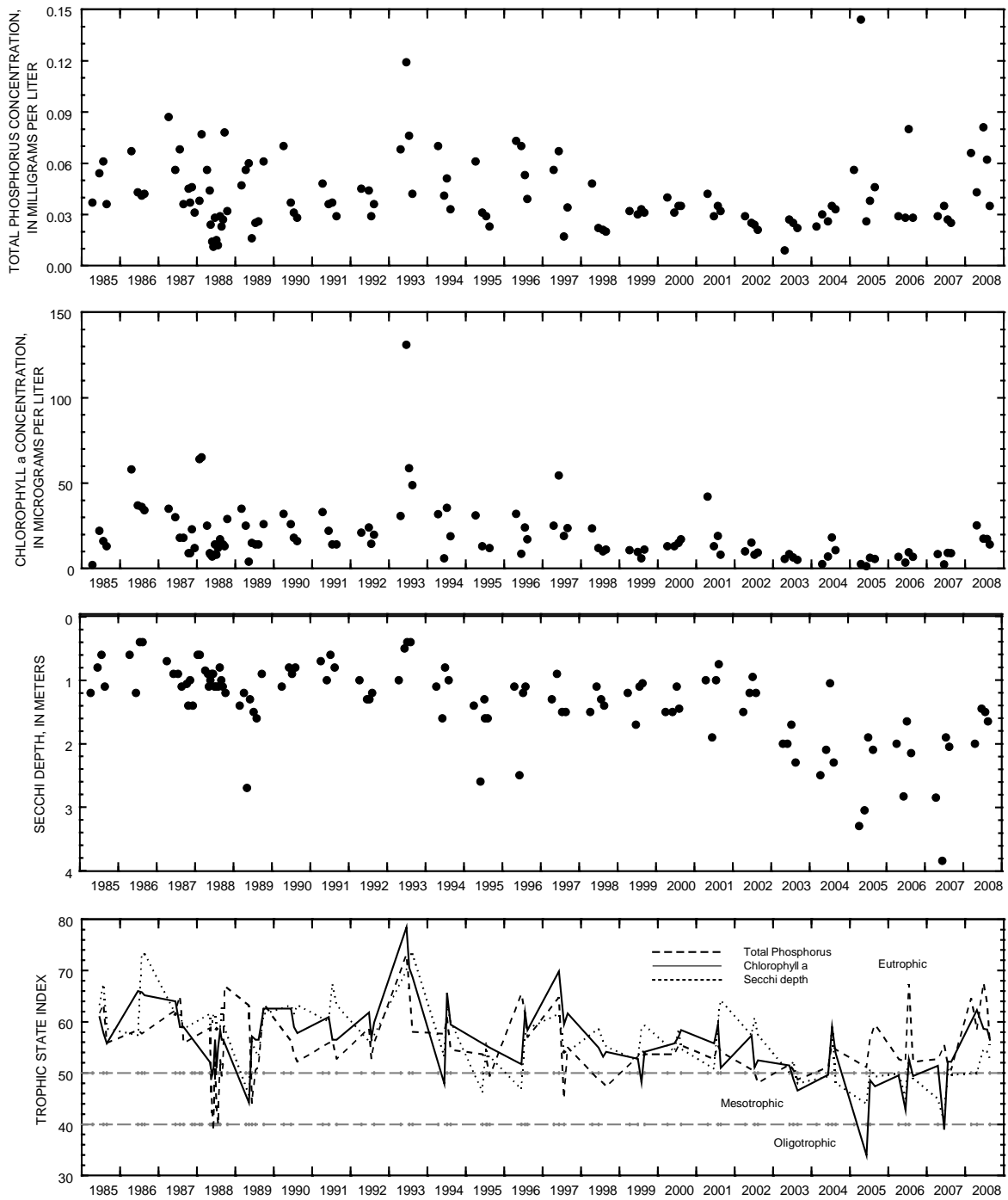
WATER-QUALITY DATA, AUGUST 22, 2008
(Milligrams per liter unless otherwise indicated)

Date	<u>Aug. 22</u>				
00078 Secchi-depth (m)			1.6		
00098 Sampling depth (m)	0.5	4.0	11	13	14
00010 Water Temperature (°C)	24.2	24	15.3	14.8	14.7
00400 pH (standard units)	8.8	8.8	7.2	7.2	7.1
00095 Specific conductance (µS/cm)	544	544	672	680	683
00300 Dissolved oxygen	8.5	8.0	0.3	0.3	0.3
32210 Chlorophyll a, phytoplankton (µg/L)	14	--	--	--	--
00665 Phosphorus, Total (as P)	0.035	0.034	0.417	0.489	0.518

424915088083900 WIND LAKE AT WIND LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 27 TO AUGUST 22, 2008





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

04082500 LAKE WINNEBAGO AT OSHKOSH, WI

LOCATION.--Lat 44°00'35", long 88°31'38" referenced to North American Datum of 1927, in NE ¼ NE ¼ sec.25, T.18 N., R.16 E., Winnebago County, WI, Hydrologic Unit 04030203, 800 ft east of mouth of the upper Fox River.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 mi².

PERIOD OF RECORD.--October 1938 to current year in reports of Geological Survey. Records from July 1882 to September 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 RECORDS.--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.--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 ¼ in. above the crest of Menasha 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 and gage-height telemeter 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, 3.85 ft, June 14; Minimum recorded, 1.64 ft, Mar. 12, 13, 14.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.91	2.57	2.29	2.27	2.14	1.73	2.28	2.88	3.23	3.09	3.18	2.99
2	2.92	2.51	2.31	2.27	2.12	1.71	2.31	2.84	3.22	3.10	3.22	2.96
3	2.90	2.51	2.31	2.26	2.10	1.74	2.31	2.77	3.25	3.15	3.20	2.99
4	2.95	2.50	2.32	2.25	2.07	1.74	2.31	2.81	3.19	3.13	3.25	3.01
5	2.96	2.34	2.32	2.23	2.06	1.74	2.31	2.78	3.20	3.14	3.30	2.98
6	2.96	2.43	2.31	2.23	2.05	1.73	2.32	2.80	3.13	3.12	3.25	2.96
7	2.97	2.41	2.31	2.25	2.03	1.73	2.29	2.79	3.13	3.15	3.23	2.96
8	2.97	2.36	2.30	2.31	2.00	1.71	2.34	2.83	3.26	3.17	3.19	2.95
9	2.91	2.34	2.29	2.36	1.98	1.69	2.41	2.83	3.50	3.16	3.18	2.95
10	2.95	2.34	2.28	2.35	1.95	1.68	2.57	2.88	3.50	3.16	3.13	2.93
11	2.95	2.31	2.27	2.36	1.92	1.67	2.50	2.89	3.50	3.17	3.10	2.91
12	2.88	2.31	2.26	2.37	1.89	1.65	2.64	2.93	3.43	3.11	3.08	2.93
13	2.85	2.29	2.25	2.37	1.86	1.64	2.71	2.93	3.82	3.07	3.10	2.95
14	2.84	2.20	2.25	2.37	1.87	1.65	2.74	2.94	3.85	3.09	3.12	2.97
15	2.84	2.29	2.25	2.36	1.88	1.66	2.77	3.02	3.81	3.04	3.12	2.96
16	2.88	2.30	2.25	2.33	1.87	1.67	2.78	3.03	3.76	3.07	3.09	2.92
17	2.86	2.31	2.25	2.32	1.89	1.69	2.82	3.03	3.70	3.14	3.09	2.92
18	2.88	2.28	2.25	2.34	1.92	1.70	2.89	3.09	3.70	3.14	3.10	2.91
19	2.76	2.24	2.25	2.33	1.91	1.73	2.90	3.12	3.61	3.15	3.11	2.86
20	2.84	2.28	2.25	2.32	1.90	1.77	2.92	3.11	3.56	3.18	3.08	2.88
21	2.81	2.32	2.25	2.31	1.88	1.81	2.93	3.12	3.50	3.20	3.07	2.87
22	2.79	2.29	2.24	2.33	1.86	1.83	2.92	3.14	3.46	3.20	3.04	2.85
23	2.76	2.27	2.29	2.32	1.85	1.87	2.92	3.14	3.43	3.17	3.05	2.84
24	2.74	2.23	2.30	2.31	1.83	1.91	2.93	3.13	3.37	3.15	3.07	2.84
25	2.75	2.24	2.29	2.29	1.81	1.96	2.88	3.12	3.31	3.13	3.07	2.86
26	2.69	2.27	2.27	2.26	1.79	2.02	2.74	3.13	3.27	3.12	3.04	2.85
27	2.65	2.23	2.27	2.24	1.77	2.07	2.94	3.19	3.24	3.13	3.02	2.83
28	2.65	2.28	2.27	2.21	1.75	2.12	3.00	3.14	3.15	3.15	3.00	2.83
29	2.59	2.19	2.29	2.20	1.75	2.16	2.93	3.14	3.14	3.13	3.02	2.79
30	2.59	2.22	2.28	2.19	---	2.18	2.90	3.15	3.13	3.13	3.02	2.74
31	2.52	---	2.28	2.16	---	2.21	---	3.17	---	3.17	3.01	---
Mean	2.82	2.32	2.28	2.29	1.92	1.81	2.67	3.00	3.41	3.14	3.11	2.91
Max	2.97	2.57	2.32	2.37	2.14	2.21	3.00	3.19	3.85	3.20	3.30	3.01
Min	2.52	2.19	2.24	2.16	1.75	1.64	2.28	2.77	3.13	3.04	3.00	2.74

04084255 LAKE WINNEBAGO NEAR STOCKBRIDGE, WI

LOCATION.--Lat 44°04'14", long 88°19'44" referenced to North American Datum of 1983, Calumet County, WI, Hydrologic Unit 04030203, Stockbridge Indian Reservation, on east shore of Lake Winnebago, 300 ft south of County Highway E and 1.6 mi west of Stockbridge.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 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.--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 ¼ in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily mean gage height, 3.85 ft, July 9, 11, 1993, June 14, 2008; minimum observed, 0.30 ft, Mar. 1, 1986.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.85 ft, June 14; minimum recorded, 1.47 ft, Mar. 13.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.81	2.52	2.15	2.15	2.01	1.62	2.20	2.73	3.12	3.04	3.10	2.89
2	2.83	2.47	2.24	2.14	1.98	1.60	2.21	2.73	3.12	3.04	3.12	2.88
3	2.91	2.43	2.23	2.12	1.97	1.65	2.20	2.77	3.05	3.02	3.10	2.89
4	2.86	2.38	2.19	2.11	1.95	1.64	2.21	2.76	3.06	3.05	3.18	2.81
5	2.86	2.46	2.19	2.10	1.94	1.63	2.21	2.72	3.09	3.06	3.22	2.88
6	2.88	2.43	2.17	2.10	1.93	1.63	2.20	2.70	3.13	3.07	3.21	2.92
7	2.88	2.32	2.18	2.13	1.90	1.62	2.22	2.74	3.08	3.10	3.14	2.92
8	2.92	2.23	2.17	2.19	1.87	1.61	2.23	2.72	3.20	3.14	3.11	2.89
9	2.99	2.23	2.16	2.23	1.86	1.58	2.37	2.73	3.47	3.12	3.07	2.86
10	2.92	2.21	2.15	2.23	1.85	1.57	2.25	2.76	3.48	3.09	3.00	2.83
11	2.78	2.18	2.14	2.24	1.80	1.55	2.37	2.74	3.33	3.10	2.99	2.81
12	2.76	2.20	2.13	2.23	1.77	1.54	2.45	2.83	3.34	3.13	2.99	2.83
13	2.74	2.20	2.12	2.25	1.74	1.53	2.57	2.84	3.79	3.15	3.01	2.83
14	2.70	2.27	2.13	2.25	1.76	1.53	2.66	2.89	3.85	3.01	3.00	2.84
15	2.65	2.27	2.12	2.23	1.77	1.55	2.73	2.92	3.78	2.98	3.00	2.84
16	2.74	2.16	2.14	2.20	1.75	1.57	2.74	2.98	3.73	2.98	3.05	2.87
17	2.77	2.06	2.12	2.20	1.78	1.58	2.74	3.04	3.69	3.08	3.04	2.82
18	2.76	2.12	2.12	2.21	1.82	1.60	2.78	3.03	3.61	3.07	3.03	2.77
19	2.90	2.13	2.13	2.20	1.80	1.63	2.81	3.03	3.53	3.03	2.96	2.79
20	2.80	2.14	2.12	2.19	1.78	1.67	2.83	3.05	3.48	3.11	2.96	2.77
21	2.73	2.08	2.12	2.18	1.76	1.70	2.84	3.04	3.45	3.09	2.95	2.73
22	2.69	2.14	2.11	2.20	1.74	1.74	2.84	3.02	3.39	3.07	2.97	2.73
23	2.70	2.23	2.17	2.19	1.73	1.78	2.85	2.97	3.33	3.06	3.01	2.73
24	2.63	2.28	2.17	2.18	1.70	1.82	2.80	3.00	3.29	3.08	2.97	2.75
25	2.57	2.26	2.15	2.14	1.69	1.86	2.84	3.04	3.23	3.08	2.93	2.74
26	2.56	2.18	2.15	2.13	1.68	1.93	3.12	3.06	3.20	3.10	2.90	2.74
27	2.57	2.25	2.15	2.11	1.66	1.98	2.95	2.98	3.16	3.09	2.90	2.71
28	2.55	2.20	2.15	2.08	1.64	2.03	2.82	3.03	3.20	3.03	2.91	2.68
29	2.54	2.25	2.16	2.07	1.64	2.06	2.84	3.06	3.10	3.04	2.93	2.68
30	2.51	2.18	2.15	2.08	---	2.07	2.82	3.07	3.04	3.09	2.92	2.70
31	2.56	---	2.15	2.03	---	2.12	---	3.15	---	3.09	2.91	---
Mean	2.74	2.25	2.15	2.16	1.80	1.71	2.59	2.91	3.34	3.07	3.02	2.80
Max	2.99	2.52	2.24	2.25	2.01	2.12	3.12	3.15	3.85	3.15	3.22	2.92
Min	2.51	2.06	2.11	2.03	1.64	1.53	2.20	2.70	3.04	2.98	2.90	2.68

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2008

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APPENDIX

Wisconsin Lakes Team Quality-Assurance Plan

Most lake studies that are conducted by the USGS Wisconsin Water Science Center include water sampling and analysis to determine water quality and biological productivity. Because all sampling and analyses are subject to possible biases and variability, rigorous sampling efforts should include quality-assurance samples. Studies conducted by the Lake Studies Team of the USGS Wisconsin Water Science Center include a quality-assurance plan each year that involves collecting three types of samples from a subset of the lakes studied each year, which include blanks, replicates, and spikes. These samples are collected and/or prepared solely for the purpose of assessing the magnitude of potential biases and variability so that the accuracy and precision of all data can be evaluated. The plan for this quality-assurance sampling is described below.

Three types of QA/QC samples are collected:

Blanks:

Provide information about accuracy and potential biases due to treatment or reagents

Replicates:

Provide information about precision (variability)

Standard additions (spikes):

Provide information about accuracy and matrix interferences

Blank Sampling

B1. A **preservation blank** consists of deionized water or inorganic blank water, to which is added any reagents or preservatives that are normally added to natural water samples. The blank is not taken to the field, but is shipped to the laboratory for analysis along with the natural water samples.

This blank sample is analyzed for the Nutrient Group¹ and chlorophyll-a.

B2. A **field blank** consists of deionized water or inorganic blank water treated exactly the same as regular samples. Typically, during winter, the field blank is analyzed for total phosphorus (TP) only; during summer, it is analyzed for TP and chlorophyll-a, and in the spring it is analyzed for the Nutrient Group and chlorophyll-a.

¹Nutrient Group = all phosphorus and nitrogen species that are commonly determined in lakes (total phosphorus, nitrate + nitrite, ammonia, total Kjeldahl nitrogen, total nitrogen)

Replicate Sampling

Triplicate samples are taken near water surface in summer for analysis of total phosphorus and chlorophyll-a. For a portion of the sites where surface triplicates are collected, a set of triplicate samples is also sometimes taken from near-bottom water, for analysis of total phosphorus.

Triplicate samples collected in the spring are taken near the water surface for analysis of the Nutrient Group.

Standard Addition Testing

Replicate samples are collected for a **standard addition (spike) test**, which consists of an addition of a prepared phosphorus solution (standard) of known volume and concentration, such that the expected result of analysis is the natural water TP concentration plus the known addition. One sample from each set receives no spike (the mean of these gives the natural water TP concentration).

Data and results of replicate sampling and field blank testing in water year 2008 are shown in Table A1.

Table A1. Analyses of replicate samples from Wisconsin lakes in water years 2004-2008. See text for procedures used. Phosphorus data in milligrams per liter; chlorophyll data in micrograms per liter. Symbol "<" indicates less than given detection limit (DL); mean and standard deviation not calculated for datasets containing values less than DL.

Parameter	Lake	Date	Replicate Data					Mean	Standard Deviation	Percent Standard Deviation
Total Phosphorus	Delavan	7/20/04	0.031	0.020	0.041					
	Big Cedar	8/18/04	0.012	0.011	0.012					
	Big Cedar, South	7/19/05	0.015	0.015	0.009					
	Delavan	8/16/05	0.032	0.029	0.027					
	Middle	8/25/05	0.014	0.012	0.013	0.017	0.013			
	Puckaway, West	7/18/05	0.309	0.310	0.313					
	Upper Nemahbin	8/24/05	0.015	0.017	0.018	0.039	0.023			
	Big Cedar	8/30/06	0.035	0.034	0.032					
	Delavan	6/13/06	0.062	0.045						
	Delavan	8/15/06	0.030	0.028	0.029	0.026				
	Beulah	8/30/07	0.017	0.015						
	Delavan	4/16/07	0.040	0.038						
	Spring	9/6/07	0.008	0.007						
	Beulah	3/4/08	0.010	0.011						
Beulah	8/26/08	0.011	0.012							
Total Phosphorus, near bottom	Wind	7/11/05	0.380	0.378	0.394					
	Wind	7/10/06	0.380	0.378	0.394					
Dissolved Phosphorus	Beulah	8/30/07	<0.002	<0.002						
	Beulah	3/4/08	0.001	0.003						
	Beulah	8/26/08	<0.002	<0.002						
Dissolved Ammonia	Beulah	8/30/07	0.170	0.190						
	Beulah	3/4/08	0.083	0.046						
	Beulah	8/26/08	<0.015	<0.015						
Total Kjeldahl Nitrogen	Beulah	8/30/07	0.510	0.420						
	Beulah	3/4/08	0.570	0.450						
	Beulah	8/26/08	0.530	0.580						
Dissolved Nitrate plus Nitrite	Delavan	4/14/04	<0.022	<0.022	<0.022					
	Beulah	8/30/07	<0.019	<0.019						
	Beulah	3/4/08	0.675	0.670						
	Beulah	8/26/08	<0.019	<0.019						
Chlorophyll-a (micrograms per liter)	Delavan	7/20/04	10.4	11.6	10.5					
	Big Cedar	8/18/04	8.36	8.56	8.61					
	Big Cedar, South	7/19/05	3.13	3.10	2.63					
	Middle	8/25/05	4.45	4.48	4.82	4.70	4.40			
	Puckaway, West	7/18/05	174.00	178.00	168.00					
	Big Cedar, South	8/29/06	8.02	7.56	8.20					
	Beulah	8/30/07	4.05	3.78						
	Spring	9/6/07	2.47	2.79						
	Beulah	8/26/08	6.97	7.45						
	Beulah	8/30/07	<1.0	<1.0						
Turbidity, NTU	Beulah	3/4/08	<1.0	<1.0						
	Beulah	8/26/08	<1.0	<1.0						
	Beulah	8/30/07	42.8	41						
Dissolved Calcium	Beulah	3/4/08	62.8	62.5						
	Beulah	8/26/08	47.9	47.6						
	Beulah	8/30/07	32.7	31.2						
Diss. Magnesium	Beulah	3/4/08	35.6	35.5						
	Beulah	8/26/08	32.8	32.5						
	Beulah	8/30/07	1.5	1.4						
Diss. Potassium	Beulah	3/4/08	1.8	1.9						
	Beulah	8/26/08	1.4	1.4						

Table A1. -- continued

Parameter	Lake	Date	Replicate Data		Mean	Deviation	Standard
Dissolved Sodium	Beulah	8/30/07	8.8	8.5	8.65	0.212	2.5
	Beulah	3/4/08	9.9	10	9.95	0.071	0.7
	Beulah	8/26/08	9	8.9	8.95	0.071	0.8
ANC as CaCO ₃	Beulah	8/30/07	192	193	192.5	0.707	0.4
	Spring	9/6/07	6.6	6.4	6.5	0.141	2.2
	Beulah	3/4/08	245	244	244.5	0.707	0.3
	Beulah	8/26/08	219	218	218.5	0.707	0.3
Diss. Chloride	Beulah	8/30/07	20.3	20.4	20.35	0.071	0.3
	Beulah	3/4/08	23.5	23.7	23.6	0.141	0.6
	Beulah	8/26/08	21	20.9	20.95	0.071	0.3
Dissolved Silica	Beulah	8/30/07	15.2	15.3	15.25	0.071	0.5
	Spring	9/6/07	0.105	0.111	0.108	0.004	3.9
	Beulah	3/4/08	15.3	15.2	15.25	0.071	0.5
	Beulah	8/26/08	10.3	10.3	10.3	0.000	0.0
Dissolved Sulfate	Beulah	8/30/07	26.1	26.2	26.15	0.071	0.3
	Beulah	3/4/08	29.5	29.5	29.5	0.000	0.0
	Beulah	8/26/08	26.3	26.3	26.3	0.000	0.0
Dissolved Iron	Beulah	8/30/07	<100	<100			
	Beulah	3/4/08	<100	<100			
	Beulah	8/26/08	<100	<100			
Diss. Manganese	Beulah	8/30/07	<0.5	<0.5			
	Beulah	8/26/08	<0.5	<0.5			
Dissolved Solids	Beulah	8/26/08	302	298	300	2.83	0.9

*Algal bloom on lake.

Table A2. Data from tests of blanks, 2004-2008. All data in milligrams per liter, unless otherwise indicated.
 < = less than given detection limit; E = estimated value.

Delavan Lake. Analyses at USGS National Water Quality Laboratory, Lakewood, CO.

Parameter	4/7/06	6/13/06	8/14/06	4/16/07
Total P	< 0.004	E 0.002	< 0.004	<0.004
Dissolved orthophosphate	<0.006	<0.006	E0.003	<0.006
Chlorophyll a	< 0.0260		< 0.0260	<0.260
Chlorophyll b				
Total Kjeldahl Nitrogen (as N)				
Ammonia (as N)				
Nitrate + Nitrite (as N)				

Lake Beulah at Deep Hole near East Troy, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07	2/27/08	8/26/08
Total P	<0.005	<0.005	<0.005
Dissolved orthophosphate	0.005	<0.002	<0.002
Total Kjeldahl	<0.14	<0.14	<0.14
Dissolved Ammonia	<0.15	<0.015	<0.015
Dissolved Nitrate plus Nitrite	<0.019	<0.019	<0.019
Chlorophyll a (ug/L)	<0.260	---	<0.260
Dissolved Calcium	<0.10	<0.10	<0.10
Dissolved Magnesium	<0.10	<0.10	<0.10
Dissolved Potassium	<0.10	<0.10	<0.10
Dissolved Sodium	0.200	<0.10	<0.10
ANC as CaCO ₃	<2	3	<2
Dissolved Chloride	<1.0	1.2	<1.0
Dissolved Silica	<0.22	<0.022	<0.022
Dissolved Sulfate	<4.5	<4.5	<4.5
Dissolved Iron	<100	<100	<100
Dissolved Manganese	<0.5	<0.5	<100
Dissolved Solids	---	---	<50
Turbidity, NTU	---	<1.0	<1.0

Rolling Stone Lake near Pickerel, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07
Total P	<0.005
Chlorophyll a (ug/L)	<0.260
ANC as CaCO ₃	2
Dissolved Silica	<0.022

Wind Lake at Wind Lake, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	6/13/06
Total P	< 0.005
Chlorophyll a (ug/L)	<0.260

Table A3. Data (for 2004-2008) from standard addition tests using stock solution containing 5.00 mg/L phosphorus. See text for detail of procedures. All concentration data in milligrams per liter.

<u>Lake, Date</u>	<u>Original Sample Concentration</u>	<u>Stock Solution Volume Added (milliliters)</u>	<u>Final Expected Concentration</u>	<u>Actual Detected Concentration</u>	<u>Percent Recovery</u>
Delavan, August 16, 2005	0.029	0.188	0.036	0.037	103%
	0.029	0.75	0.059	0.063	107%
No Spike data in 2006					
No Spike data in 2007					
No Spike data in 2008					



Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 2009

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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
meter (m)	3.281	foot
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 either 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— or the North American Vertical Datum of 1988 (NAVD 88).

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 (mmho/cm) at 25 degrees Celsius, formerly used by the U.S. Geological Survey.

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 2009

By Wisconsin Water Science Center 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 locations of water-quality and lake-stage stations in Wisconsin for water year 2009 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, 2008 through September 30, 2009 is called "water year 2009."

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 included for all lakes. 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, 2009."

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 Water Science Center's home page is at <http://wi.water.usgs.gov/>. Information on the Wisconsin Water Science Center's Lakes Program is found at <http://wi.water.usgs.gov/lakes/index.html> and <http://wi.water.usgs.gov/projects/index.html>.



Figure 1. Location of USGS 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 2009 included:

Big Cedar Lake Protection and Rehabilitation District

Dane County

Delavan Lake Sanitary District

Geneva Lake Environmental Agency

Green Lake Sanitary District

Lake Beulah Management District

Little Cedar Lake Protection and Rehabilitation District

Middle Genesee Lake District

Mercer School District (Mercer Lake Association)

Powers Lake District

Rock County Public Works Department

U.S. Army Corps of Engineers

Village of Oconomowoc Lake

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 2009 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: B.W. Olson (Merrill), and S.A. March (Middleton). The data were collected and processed by G.L. Goddard, S.B. Manteufel, B.W. Olson, D.L. Olson, P.C. Reneau, J.G. Schuler, Z.T. Scott, and B.J. Siebers. S.B. Manteufel assembled, edited, and formatted the report. Additional assistance in preparation of the report was provided by M.M. Greenwood, and D.L. Olson.

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
Balsam Lake near Birchwood	453907091345800	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
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
Benedict Lake near Powers Lake	423201088180800	May 1998–Aug. 2000
Big Blacksmith Lake near Keshena	445401088334500	Feb. 1990–Aug. 1992
Big Hills (Hills) Lake near Wild Rose	440912089092000	June 1983–Aug. 1984, Feb.–Aug. 1987, Feb.–Aug. 1990, Feb.–Aug. 1993, Feb.–Aug. 1996, Feb.–Aug. 1999
Big Muskego Lake, at North Site, near Muskego	425301088061300	Feb.–Aug. 1988
Research Base, near Muskego	425235088075300	May–June 1994
Big Round Lake near Milltown	453142092180100	Feb.–Sept. 2001
Big St. Germain Lake, near St. Germain	455557089311000	Feb. 1992–Aug. 1996
near Lake Tomahawk	05390750	1991–2001
Big Sand Lake, Deep Hole, near Hertel	454910092134000	Feb.–Sept. 2001
East Site, near Hertel	454921092124300	Feb.–Sept. 2001
Big Sissabagama Lake, near Stone Lake	454724091303600	Apr. 1986–Sept. 1996, Oct. 1997–Sept. 2002
North Site, near Stone Lake	454800091312900	Mar. 1998–Sept. 2001
Booth Lake near East Troy	424800088254800	Feb. 1992–Aug. 1994, Feb. 2001–Aug. 2003
Buffalo Lake, Center Site, at Packwaukee	434558089260600	May 1998–Sept. 2001
East End, at Montello	434720089201600	May 1998–Sept. 2001
West End, near Endeavor	434414089282400	May 1998–Sept. 2001

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Butternut Lake, near Park Falls	455854090310300	Oct. 2002–Oct. 2004
Deep Hole, near Park Falls	455803090310800	Mar. 2003–Sept. 2004
North Site, near Butternut	455904090303400	Mar. 2003–Sept. 2004
Far South Site, near Park Falls	455651090312700	Mar. 2003–Sept. 2004
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
Eagle Spring Lake at Eagleville	425103088261500	Apr. 1991–Sept. 2001
Elizabeth Lake near Twin Lakes	423051088155300	Feb. 1995–Sept. 1997
Fish Lake near Sauk City	05406050	Nov. 1966–Sept. 1981, Apr. 1985–May 1987, May 1988, Apr. 1989– Oct. 1990, Oct. 1990– Nov. 1996, Nov. 1996– Sept. 2004
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
Geneva Lake, Geneva Bay, at Lake Geneva	423455088263800	Apr. 1997–Feb. 1999
Williams Bay, at Williams Bay	423420088320500	Apr. 1997–Feb. 1999
Center, near Lake Geneva	423402088301400	Apr. 1997–Mar. 1999
East End, near Lake Geneva	423421088272300	Apr. 1997–May 2000
Hemlock Lake near Mikana	453421091333700	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
Hooker Lake at Salem	423335088060300	Feb. 1992–Aug. 1993
Kawaguesaga, Deep Hole, near Minocqua	455208089435800	May–Sept. 2003
South Site, near Minocqua	455145089442600	May–Sept. 2003
Kirby Lake near Cumberland	453554092042101	Nov. 1995–Oct. 1996
(Site 1) near Cumberland	453608092035801	Nov. 1995–Nov. 1996
(Site 2) near Cumberland	453601092035301	Nov. 1995–Nov. 1996

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
(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 at Oconomowoc	430733088305900	Feb. 1984–Aug. 1985, Apr. –Aug. 1991, Feb. 2001–Aug. 2003
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 Desair near Rice Lake	453446091465100	Aug. 2004
Lake Keesus,		
East Bay, near Merton	430957088183400	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
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 Mill, at Lauderdale	424554088332700 424555088335700	Oct. 1993–Oct. 1994 Nov. 1993–Nov. 1994, Aug. 2002
Green, Auxiliary, Number 1, near Lauderdale	424640088341900	June 1999–Sept. 2000
Green, near Lauderdale	424652088341500	Nov. 1993–Nov. 1994, Aug. 2002
Legend Lake (site 1) near Shawano	445342088312700	Feb. 1990–Feb. 1992
Little Arbor Vitae near Woodruff	455446089370300	Feb. 1991–Sept. 2002
Little Green Lake, at Center, near Markesan	434412088590700	Feb. 1991–Aug. 2003
Little Muskego Lake at Muskego	425425088083500	Oct. 1986–Aug. 2002
Little Rock Lake near Woodruff	455946089415702	Oct. 1983–Sept. 1996
Little St. Germain Lake, near Eagle River	05390700	(a)
Upper East Bay, at St. Germain	455532089253900	Dec. 1996–Mar. 97, Mar. 1999, Mar. 2000–Aug. 2003

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Northeast Bay, near St. Germain	455545089262500	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
South Bay, near St. Germain	455437089270800	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
West Bay, at St. Germain	455428089282400	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
Little Sand Lake - Site No. 2 - near Mole Lake	452826088544101	May1996–Sept. 2003
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
Minocqua Lake		
Deep Hole, at Minocqua	455214089412800	May–Sept. 2003
North Bay, at Minocqua	455232089424100	May–Sept. 2003
South Bay, at Minocqua	455206089425200	May–Sept. 2003
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
Muskego (Big Muskego)		
Auxiliary Number 1, near Muskego	425329088054000	June 1996–Aug. 2000
Bass Bay, near Muskego	425344008807010	Feb. 1988–Aug. 2002

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
near Wind Lake	425109088075000	Oct. 1987–Sept. 1989, Jan. 1991–Sept. 2002
South Site, near Muskego	425212088072800	Feb. 1988–Aug. 2002
Muskellunge Lake near Eagle River	455700089224900	June 2000–Aug. 2001
Muskellunge Lake, near Lake Outlet near Eagle River	455706089232400	Nov. 2000–Oct. 2001
Nagawicka Lake, at Deep Hole, at Delafield	430417088230300	Feb. 2003–Sept. 2004
Namekagon Lakes		
Garden, near Cable	461224091033200	Mar. 1998–Aug. 1999
Jackson, near Cable	461457091065900	Mar. 1998–Aug. 1999
Namekagon		
Deep Hole, near Cable	461308091065100	Mar. 1998–Aug. 1999
East Basin, near Cable	461228091044300	Mar. 1998–Aug. 1999
Northeast Basin, near Cable	461410091050700	Mar. 1998–Aug. 1999
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
Pike Lake near Hartford	431916088200501	Dec. 1998–Dec. 2000
Pike Lake-QW Site-near Hartford	431835088200600	Feb.–Aug. 2000
Potter Lake near Mukwonago	423246088175800	Feb. 1993–Sept. 2007
Pretty Lake, at Deep Hole, near Dousman	425722088295000	Feb. 1993–Aug. 1997
Puckaway Lake, West Basin, near Marquette	434515089124000	Apr. 2005–Sept. 2007
East Basin, near Marquette	43454208907300	Apr. 2005–Sept. 2007
River site, near Marquette	434824089083200	Apr. 2005–Sept. 2007
Red Cedar Lake, at Mikana	453522091360600	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Oct. 2000–Sept. 2001
Deep Hole, near Mikana	453725091345100	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
South End, at Mikana	453519091352500	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
Rice Lake at Deep Hole near Whitewater	424629088415700	Apr.–Nov. 1991
Round Lake near Shawano	445328088335000	Feb. 1990–Aug. 1992
Sand Lake (Deep Hole) near Keshena	445321088323101	June–Aug. 1992

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Shell Lake at Shell Lake	05334000	Aug. 1936–Sept. 1999
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
Spooner Lake, Deep Hole, near Spooner	455034091493300	June 2002–Aug. 2004
Southeast Site, near Spooner	454945091483900	June 2002–Aug. 2004
Stewart Lake at Mt. Horeb	430117089442701	May 1992–Sept. 1993
Tichigan Lake near Waterford	424854088123300	Mar. 1994–Aug. 1996, Apr. 2003–Aug. 2004
Tombeau Lake near Powers Lake	423153088184800	May 1998–Aug. 2000
Twin Lake, East Twin, near Westfield	435430089350700	June 2002–Aug. 2004
West Twin, near Westfield	435438089352300	June 2002–Aug. 2004

(a) Wisconsin Valley Improvement Co. currently collects stage data for this site.

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-mm (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, 2009". NWIS parameter codes and minimum laboratory reporting levels for chemical constituents are given in table 2. The parameter code for turbidity has changed from 00076 to 63675 or 63676 because the method of testing has changed.

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).

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		LRL	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. (SO4)	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. (SiO2)	mg/L	7631-86-9	00955	0.1	56	0.02	1899	0.008	I560LLD
Nitrogen, NO2+NO3, 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, amm.+org., total ⁴	mg/L	17778-88-0	00625	0.100	1985	--	--	0.2	I470BLT
Nitrogen, amm.+org.,diss.	mg/L	--	00623	--	--	--	--	--	I470DLD
Nitrogen, total ⁵	mg/L	--	00600	--	--	--	--	--	--
Nitrogen, dissolved	mg/L	--	00602	--	--	--	--	--	--
Phosphorus, total	mg/L	7723-14-0	00665	0.05	1984	0.004	2333	0.005	I520PLT
Phosphorus, ortho, diss.	mg/L	14265-44-2	00671	0.01	1262	0.002	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	--	--	--	--	0.26	I250UNF

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)

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).

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 a 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 per cent 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 Carlson's (1977) trophic state index (TSI). In previous USGS data reports, a modification of Carlson's trophic state index for Wisconsin lakes by Lillie and others (1993) had been used; however, this approach did not properly classify oligotrophic and highly eutrophic lakes and, therefore, was discontinued.

Lillie and Mason's (1983) water quality indices for Wisconsin lakes were developed based on summer measurements of total phosphorus and chlorophyll *a* concentrations, and Secchi depth from a random set of lakes in Wisconsin. These data were used to classify the lakes's 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

Carlson's (1977) 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 hypereutrophic.

Carlson's (1977) TSI values are also based on near-surface total phosphorus and chlorophyll *a* concentrations, and Secchi depths. The indices were developed to place these three characteristics on similar scales to allow comparison of different lakes. TSI values based on phosphorus concentrations (TSI_P), Secchi depths (TSI_{SD}), and chlorophyll *a* concentrations (TSI_C) typically are computed only for measurements collected during the open-water period.

TSI values for a lake can be calculated using the following equations (Carlson, 1977):

$$TSI_P = 4.15 + 14.42 \times (\ln [\text{total phosphorus concentration} \times 1,000])$$

$$TSI_{SD} = 60.0 - 14.41 \times (\ln \text{Secchi depth})$$

$$TSI_C = 30.6 + 9.81 \times (\ln \text{chlorophyll } a \text{ concentration})$$

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

The three main 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-----	-----0.024-----	-----2.0-----	-----7.2-----
Mesotrophic	-----40-----	-----0.012-----	-----4.0-----	-----2.6-----
Oligotrophic				

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LAKE DATA

Remarks codes and symbols used in the following tables:

[<, less than; --, not available; E, estimated]

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LOCATION.--Lat 42°48'40", long 88°24'16", in SW ¼ NW ¼ NW ¼ sec.17, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to current year.

REMARKS.--Lake sampled at the deep hole at a depth of 19 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

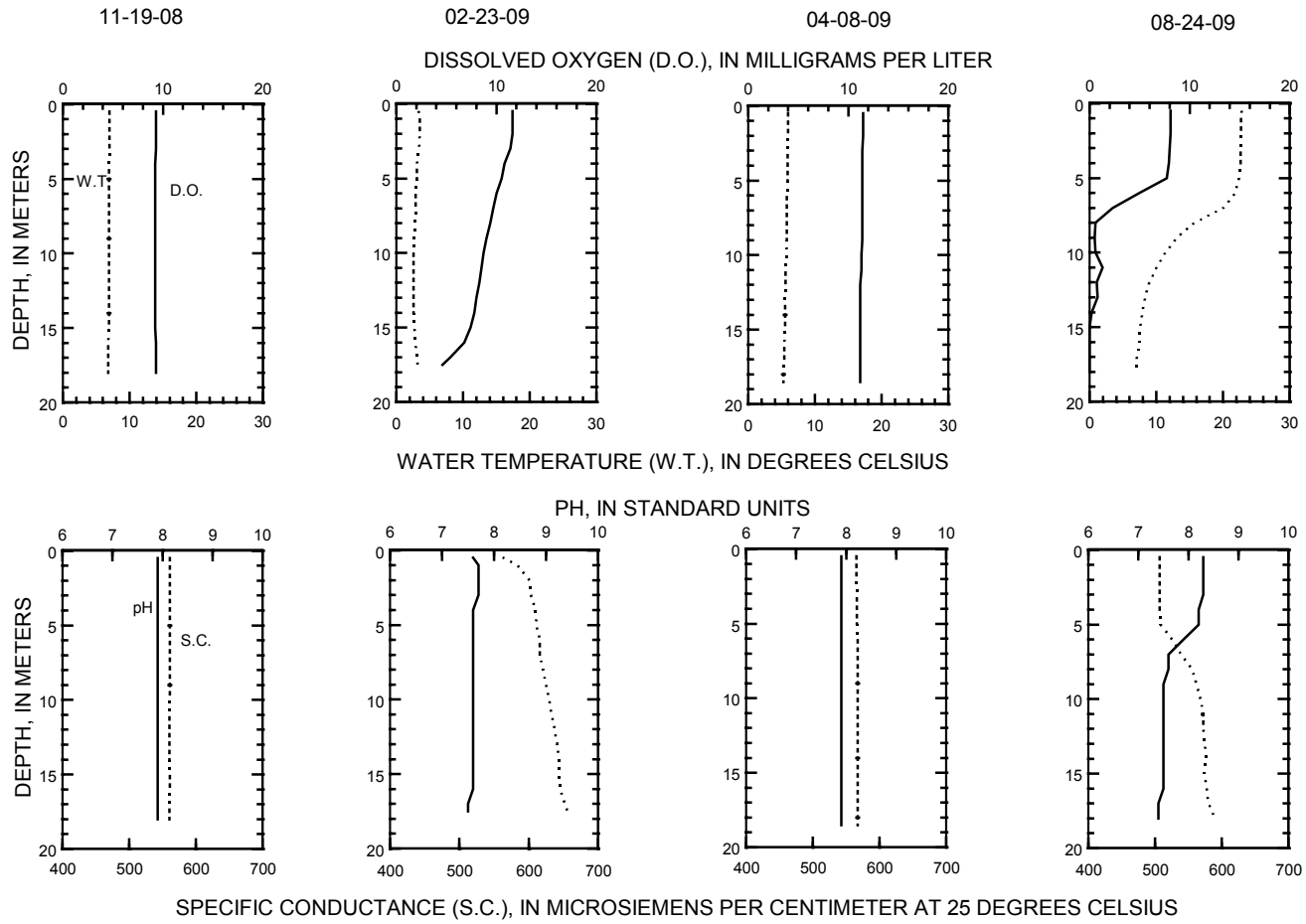
WATER-QUALITY DATA, NOVEMBER 19, 2008 – AUGUST 24, 2009

(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	Nov. 19	Feb. 23	Apr. 8	August 24					
32210	Chlorophyll a, phytoplankton (µg/L)	2.16	0.55	0.78	2.66					
00078	Secchi-depth (m)	3.1	--	5.4	6.0					
00098	Sampling depth (m)	2.0	2.0	17.0	2.0	2.0	9.0	15.0	17.0	18.0
00010	Water Temperature (°C)	7.0	3.5	3.0	6.0	22.7	13.0	7.6	7.1	6.9
00400	pH (standard units)	7.9	7.7	7.5	7.9	8.3	7.5	7.5	7.4	7.4
00095	Specific conductance (µS/cm)	561	601	652	565	507	562	574	580	589
00300	Dissolved oxygen	9.3	11.6	5.4	11.5	8.1	0.5	0.0	0.0	0.0
00665	Phosphorus, total (as P)	0.014	0.013	0.013	0.013	0.017	0.024	0.021	0.022	0.035
00671	Orthophosphate, dissolved (as P)	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	0.003
00631	Nitrate plus nitrite, dissolved (as N)	0.307	0.673	0.311	1.180	0.074	0.500	0.809	0.650	0.158
00608	Ammonia, dissolved (as N)	0.19	0.211	0.263	0.06	0.032	0.089	0.198	0.298	0.773
00625	Ammonia plus organic nitrogen, total (as N)	0.65	0.66	0.64	0.44	0.16	0.31	0.33	0.40	1.10
00600	Total nitrogen	0.96	1.30	0.95	1.60	0.23	0.81	1.10	1.10	1.20
63675	Turbidity, (NTU)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
00900	Hardness (as CaCO ₃)	290	300	290	300	230	250	270	270	270
00915	Calcium, dissolved (Ca)	58.9	63	59.2	63.3	41.7	50	58.4	56.7	58.6
00925	Magnesium, dissolved (Mg)	33.9	34.7	35.5	33.9	31.2	31.1	31.3	30.4	31.1
00930	Sodium, dissolved (Na)	9.3	9.7	12.5	9.8	8.6	8.8	9.0	8.7	8.8
00935	Potassium, dissolved (K)	1.8	1.7	1.9	1.8	1.4	1.5	1.6	1.6	1.6
00417	ANC (as CaCO ₃)	246	258	252	252	209	225	249	250	259
00940	Chloride, dissolved (Cl)	22.4	23	28.8	23.1	21.6	21.3	22	21.9	22.3
00945	Sulfate, dissolved (SO ₄)	29.7	30.5	29.5	31.4	27.7	28.7	29.6	29.5	26.9
00955	Silica, dissolved (SiO ₂)	15.4	14.8	14.7	13.2	11.3	11.1	15.4	15.5	18.4
01046	Iron (µg/L)	<100	<100	<100	<100	<100	<100	<100	<100	<100
01056	Manganese (µg/L)	<1.0	<1.0	20	<1.0	<1.0	<1.0	120	170	520
70300	Solids, dissolved (at 180 °C)	328	350	362	346	312	328	360	356	360

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, NOVEMBER 19, 2008 TO AUGUST 24, 2009



424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LOCATION.--Lat 42°49'29", long 88°23'13", in SE ¼ NE ¼ NE ¼ sec.8, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to current year.

REMARKS.--Lake sampled at a depth of 15 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

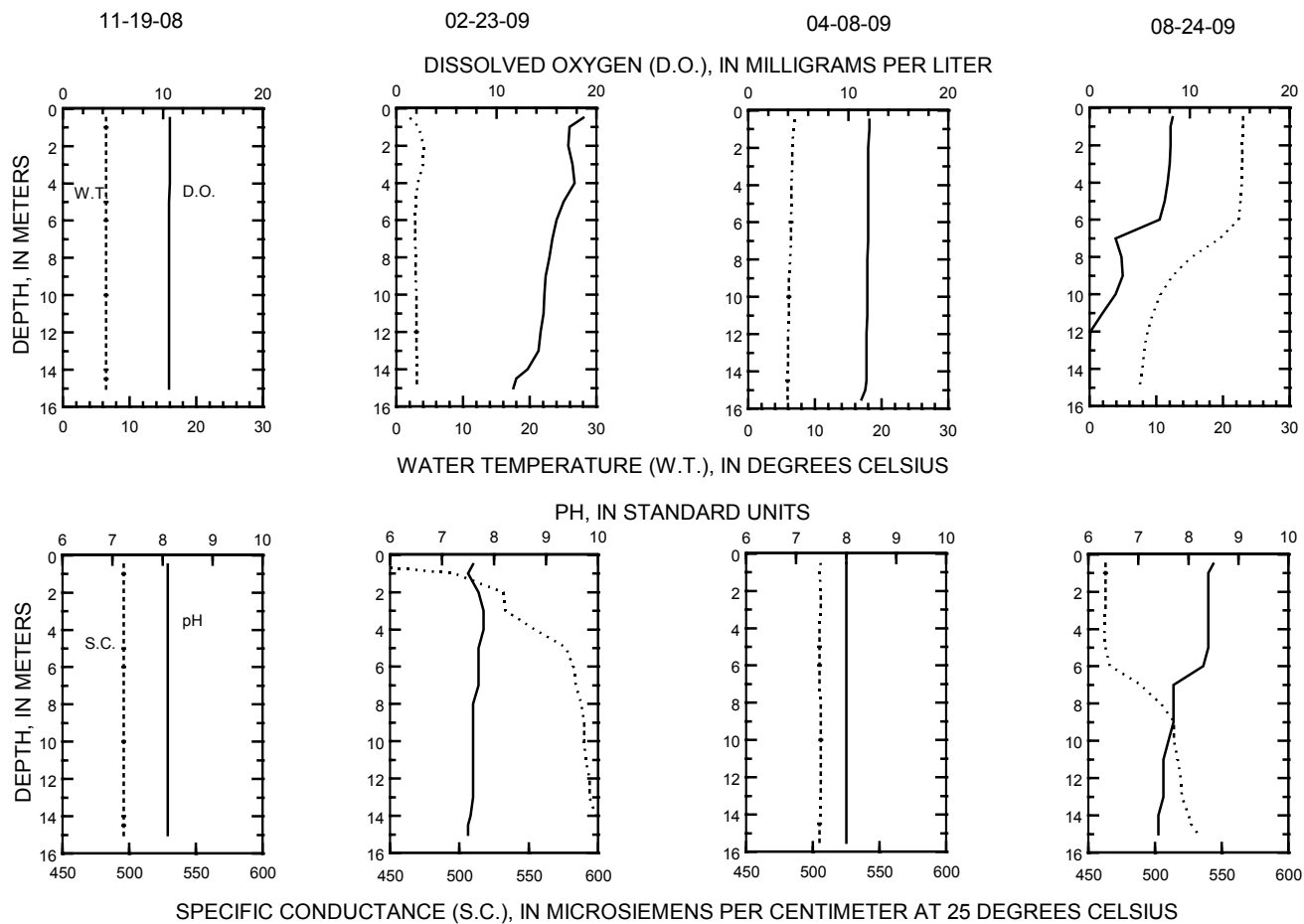
WATER-QUALITY DATA, NOVEMBER 19, 2008 – AUGUST 24, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Nov. 19</u>	<u>Feb. 23</u>	<u>Apr.8</u>	<u>August 24</u>					
32210	Chlorophyll a, phytoplankton (µg/L)	1.95	1.00	1.45	3.47					
00078	Secchi-depth (m)	4.5	--	4.2	4.4					
00098	Sampling depth (m)	2.0	2.0	14.5	2.0	2.0	9.0	13.0	14.0	14.5
00010	Water Temperature (°C)	6.5	4.1	3.1	6.6	22.9	12.4	8.2	7.9	7.7
00400	pH (standard units)	8.1	7.7	7.5	8.0	8.4	7.7	7.5	7.4	7.4
00095	Specific conductance (µS/cm)	496	532	605	506	463	514	520	525	527
00300	Dissolved oxygen	10.7	17.2	11.7	12.0	8.1	3.3	0.0	0.0	0.0
00665	Phosphorus, total (as P)	0.012	0.014	0.029	0.017	0.014	0.014	0.038	0.037	0.038
00671	Orthophosphate, dissolved (as P)	<.002	<.002	0.018	<.002	<.002	<.002	<.002	<.002	<.002
00631	Nitrate plus nitrite, dissolved (as N)	0.033	0.077	1.48	0.31	<.019	0.182	<.019	<.019	<.019
00608	Ammonia, dissolved (as N)	0.173	0.158	0.301	0.067	<.015	0.111	0.428	0.572	0.642
00625	Ammonia plus organic nitrogen, total (as N)	0.8	0.7	0.68	0.6	0.25	0.18	0.97	1	1.1
00600	Total nitrogen	0.83	0.78	2.2	0.91	--	0.36	--	--	--
63675	Turbidity, (NTU)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
00900	Hardness (as CaCO3)	240	250	330	260	200	230	240	240	240
00915	Calcium, dissolved (Ca)	43.8	45.9	71.2	49.8	32	44.2	45.9	46.4	47
00925	Magnesium, dissolved (Mg)	32.5	33.8	36.4	32.3	30.2	29.9	29.7	29.8	30
00930	Sodium, dissolved (Na)	11.1	12.5	9.7	11.3	10.4	10.3	10.1	10.2	10.3
00935	Potassium, dissolved (K)	1.8	1.8	1.8	1.7	1.5	1.6	1.6	1.6	1.6
00417	ANC (as CaCO3)	205	213	278	216	179	206	218	219	218
00940	Chloride, dissolved (Cl)	25.8	28.4	23.9	26	25.3	24.5	24.8	24.8	25.1
00945	Sulfate, dissolved (SO4)	26.4	27.2	33.3	27.6	26.2	26	26.2	26	25.5
00955	Silica, dissolved (SiO2)	15.4	12.3	17.7	10.2	9.13	8.26	13.1	14.7	15.1
01046	Iron (µg/L)	<100	<100	<100	<100	<100	<100	<100	<100	<100
01056	Manganese (µg/L)	<1.0	<1.0	90	<1.0	<1.0	<1.0	90	150	180
70300	Solids, dissolved (at 180 °C)	286	308	382	306	286	310	312	326	322

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, NOVEMBER 19, 2008 TO AUGUST 24, 2009



432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°24'09", long 88°15'16", in NE ¼ SW ¼ sec. 20, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

REMARKS.--Lake sampled on north side at a depth of 12 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

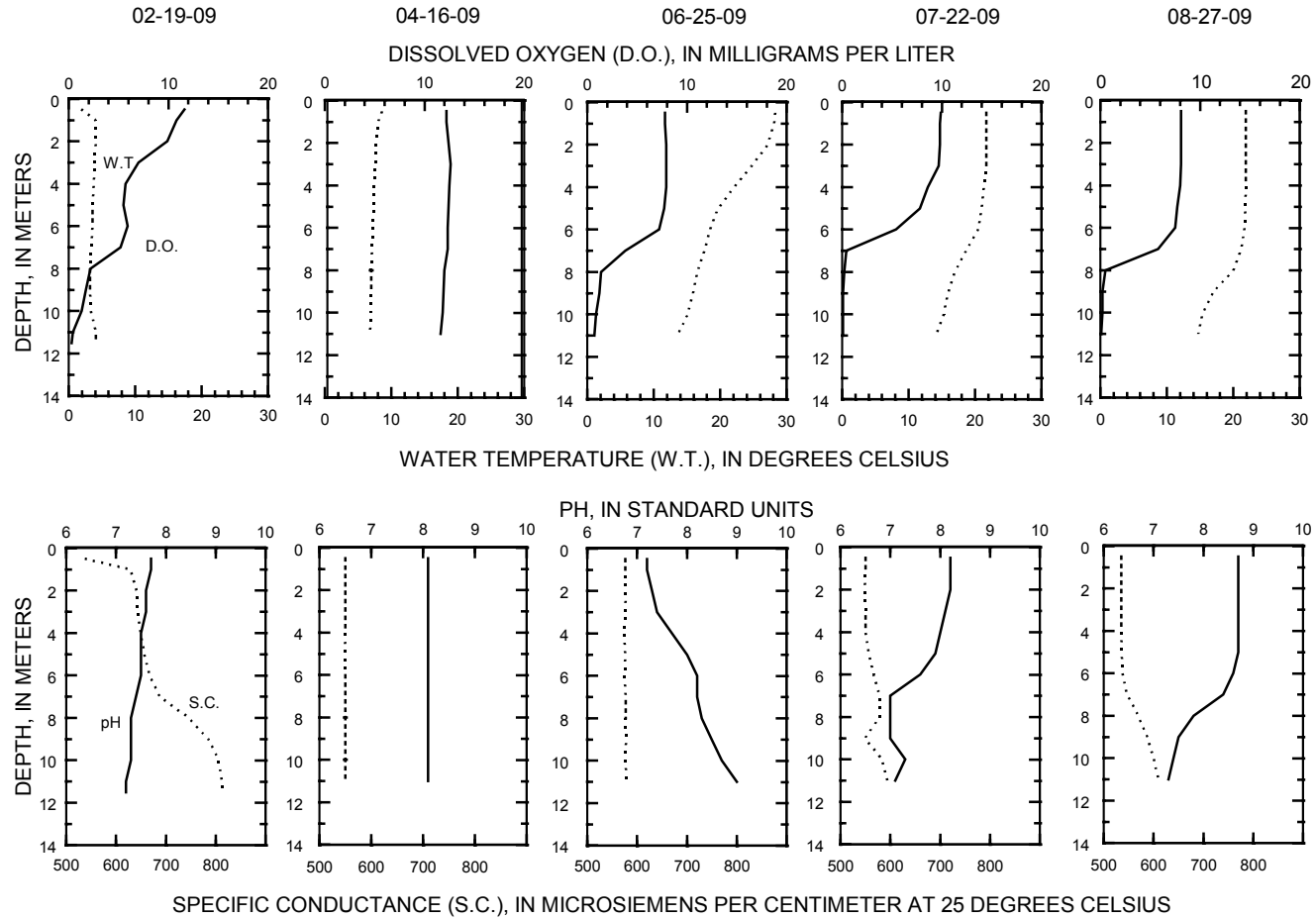
WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 27, 2009

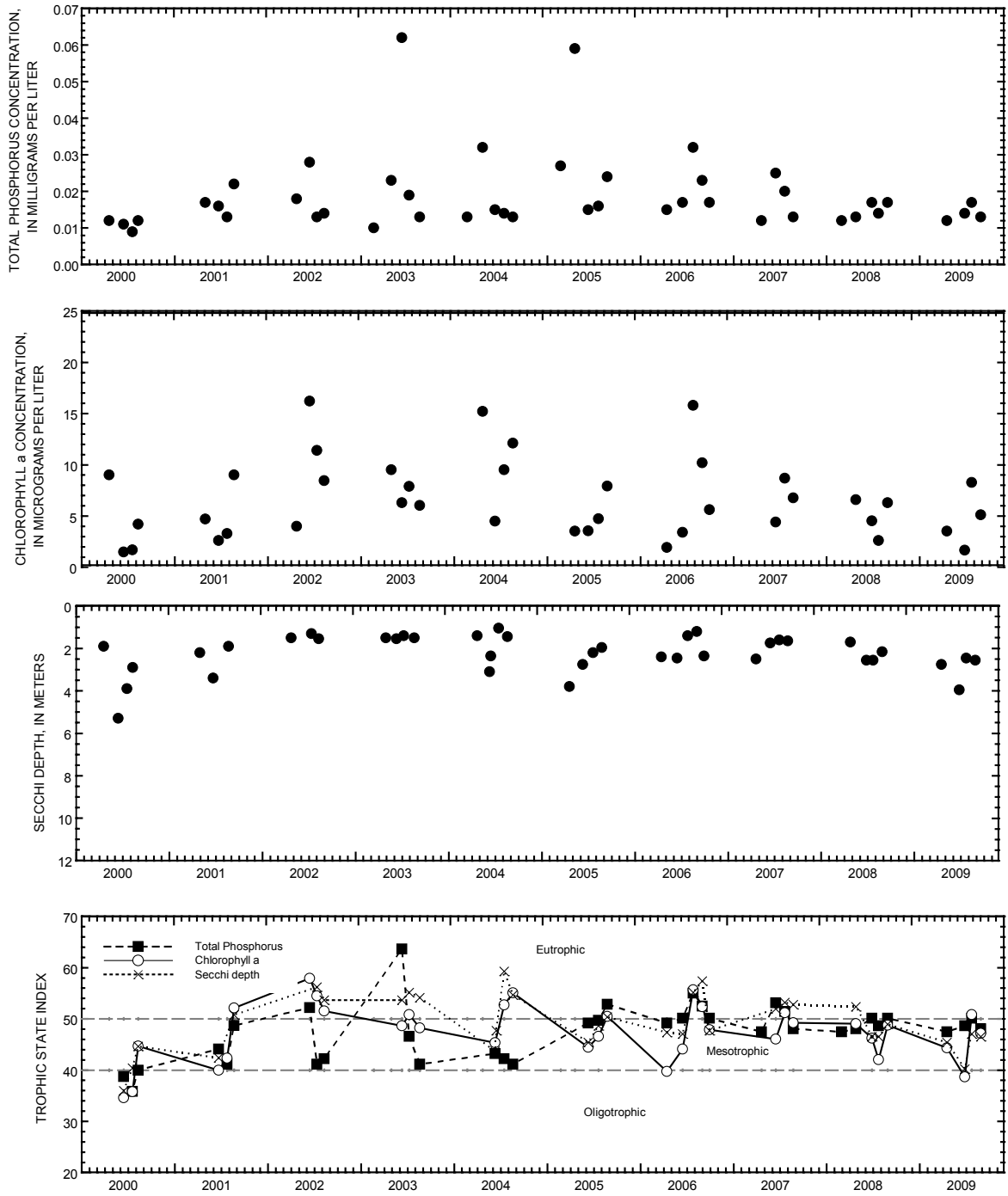
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 19</u>		<u>April 16</u>		<u>June 25</u>		<u>July 22</u>		<u>August 27</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--		3.53		1.67		8.29		5.12	
00078	Secchi-depth (m)	--		2.8		4.0		2.4		2.6	
00098	Sampling depth (m)	0.5	11.5	0.5	11.0	0.5	11.0	0.5	11.0	0.5	11.0
00010	Water Temperature (°C)	1.9	4.1	8.6	6.8	28.3	13.5	21.7	14.1	21.9	14.7
00400	pH (standard units)	7.7	7.2	8.1	8.1	7.2	9.0	8.2	7.1	8.7	7.3
00095	Specific conductance (µS/cm)	537	814	550	550	576	580	550	594	535	610
00300	Dissolved oxygen	11.6	0.3	12.2	11.6	7.8	0.7	9.9	0.1	8.1	0.1
00665	Phosphorus, total (as P)	0.017	0.031	0.012	0.013	0.014	0.038	0.017	0.052	0.013	0.048

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 19 TO AUGUST 27, 2009





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

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'24", long 88°15'49", in NE ¼ SE ¼ sec.31, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

REMARKS.--Lake sampled on south side at deep hole. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

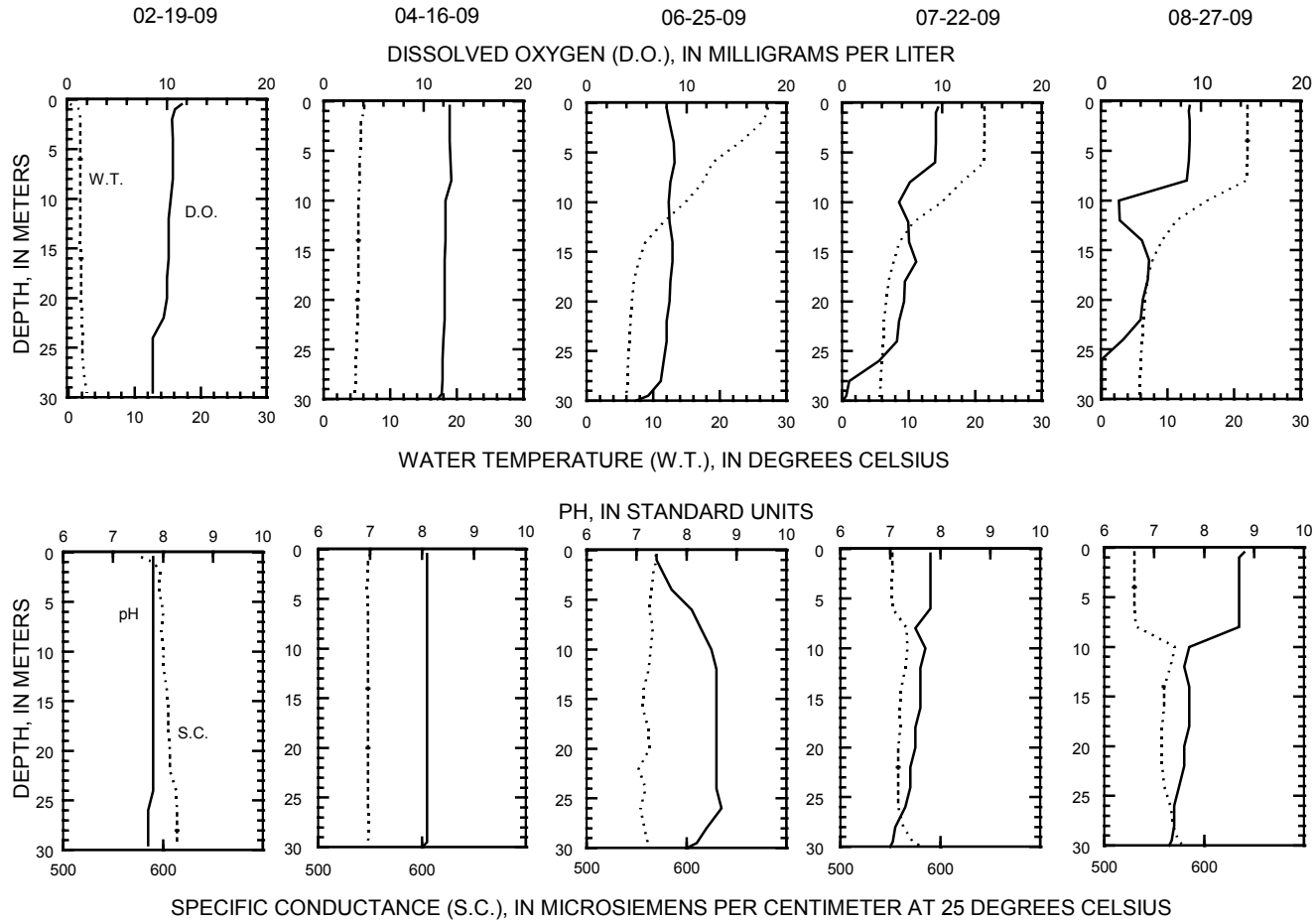
WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 27, 2009

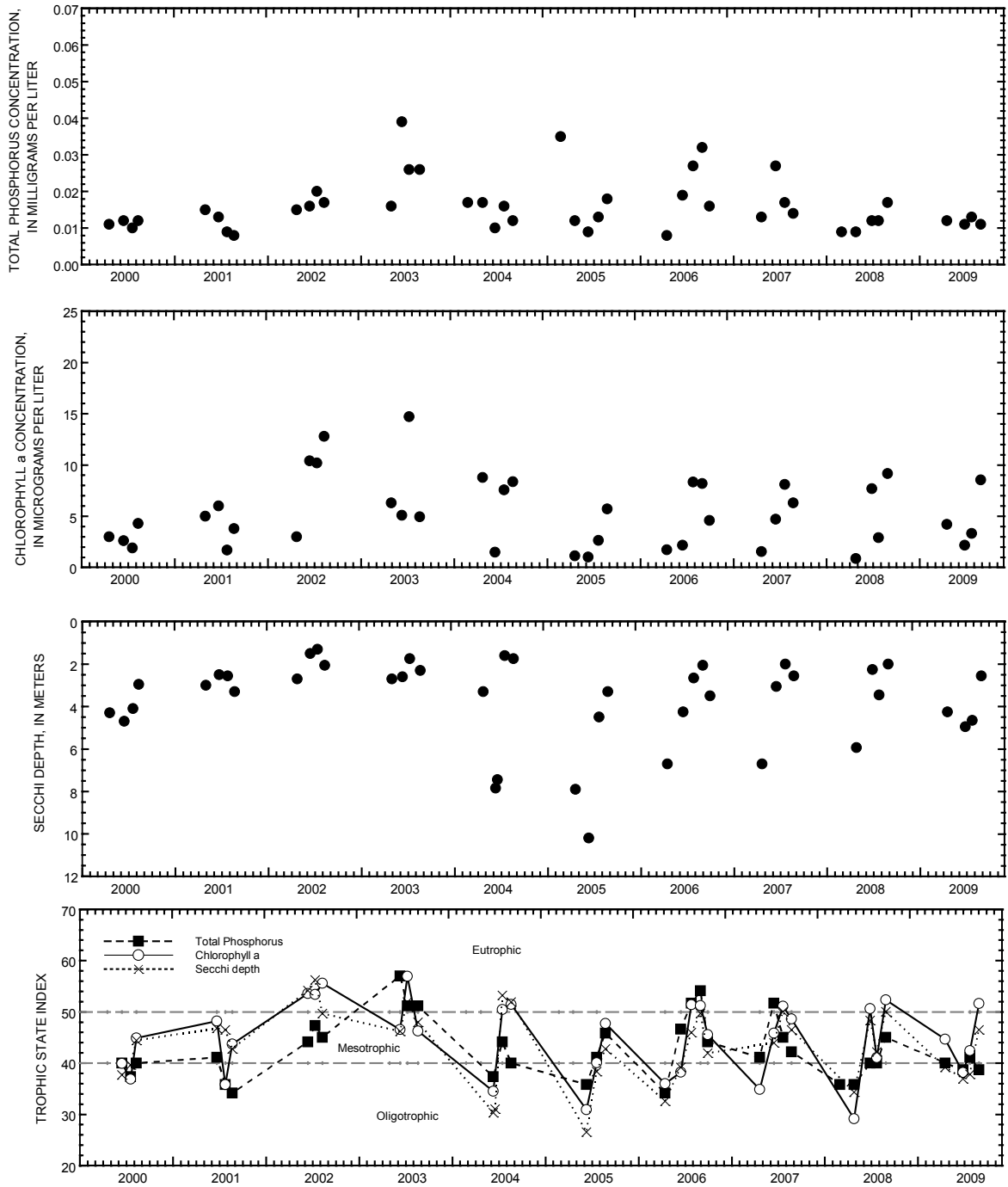
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 19</u>		<u>April 16</u>		<u>June 25</u>		<u>July 22</u>		<u>August 27</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	4.2	4.2	2.17	2.17	3.33	3.33	8.55	8.55
00078	Secchi-depth (m)	--	--	4.2	4.2	5.0	5.0	4.6	4.6	2.6	2.6
00098	Sampling depth (m)	0.5	29.5	0.5	30	0.5	30	0.5	30	0.5	30
00010	Water Temperature (°C)	1.6	2.6	6.1	4.6	27.2	5.9	21.4	5.6	22	5.7
00400	pH (standard units)	7.8	7.7	8.1	8	7.4	8	7.8	7	8.8	7.3
00095	Specific conductance (µS/cm)	578	614	550	549	569	564	552	581	530	579
00300	Dissolved oxygen	11.5	8.6	12.6	11.4	8	4.9	9.6	0.1	8.9	0.1
00665	Phosphorus, total (as P)	0.017	0.057	0.012	0.021	0.011	0.029	0.013	0.014	0.011	0.03
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	0.003	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.542	--	--	--	0.208	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<.015	--	--	--	<.015	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	<.14	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.4	--	--	--
00600	Total nitrogen	--	--	--	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	--	--	240	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	40.2	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	34.7	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	23.3	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.8	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	--	--	199	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	50.9	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	--	--	23.2	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	--	--	3.66	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	312	--	--	--	--	--	--	--

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 19 TO AUGUST 27, 2009





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

423706088363400 DELAVAN LAKE NEAR DELAVAN, WI

LOCATION.--Lat 42°36'27", long 88°36'19" referenced to North American Datum of 1927, in SW ¼ NE ¼ sec.28, T.2 N., R.16 E., Walworth County, WI, 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.

SURFACE AREA.--3.24 mi².

DRAINAGE AREA.--41.4 mi², of which 2.30 mi² probably is noncontributing.

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 Stephen J. Field and Marvin D. Duerk.

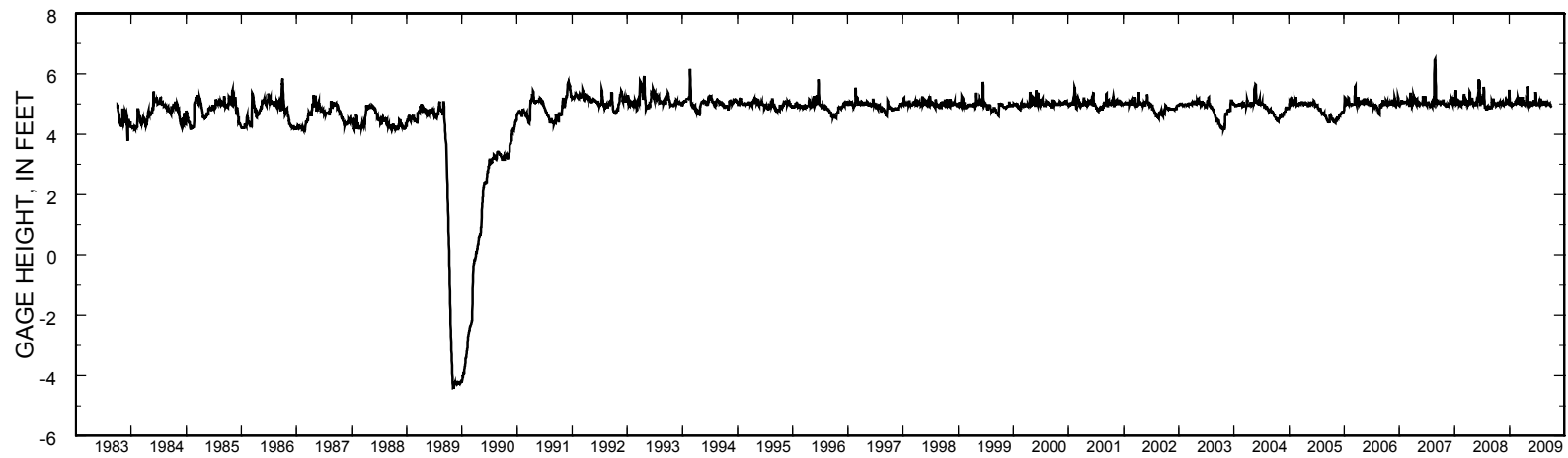
GAGE.--Water-stage recorder. Datum of gage is 922.92 ft above NGVD of 1929 or 922.72 ft above NAVD of 1988. Prior to Sept. 5, 1989, staff gage at bridge on North Shore Drive at same datum.

REMARKS.—Records good. Lake was ice covered from Dec. 16 to Mar. 18. Lake levels controlled by Delavan Lake Sanitary District.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 6.53 ft, Aug. 27, 2007; minimum daily, -4.44 ft, Nov. 6, 1989 (lake drawn down for lake rehabilitation program).

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.63 ft, Apr. 27; minimum, 4.92 ft, Sept. 30.

GAGE HEIGHT, FEET WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009 DAILY MEAN VALUES [e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	4.98	5.02	5.04	5.05	5.00	5.05	5.13	5.17	5.01	4.96	5.00	5.03
2	4.96	5.03	5.02	5.03	5.01	5.02	5.08	5.05	4.99	4.97	5.00	5.03
3	4.95	5.04	5.01	5.04	5.00	5.01	5.03	4.97	4.98	4.97	5.00	5.02
4	4.95	5.05	5.01	5.06	5.00	5.00	5.03	5.00	4.97	4.99	5.00	5.00
5	4.94	5.05	5.00	5.05	5.00	5.01	5.00	5.03	4.97	4.99	5.01	4.99
6	4.95	5.06	5.01	5.03	5.00	5.02	4.98	5.04	4.97	5.00	5.00	4.98
7	4.96	5.06	5.02	5.01	5.01	5.05	4.97	5.05	4.98	5.00	5.02	4.98
8	5.02	5.05	5.03	4.98	5.08	5.15	4.96	5.02	5.10	5.00	5.09	4.99
9	5.02	5.03	5.09	5.01	5.07	5.22	4.97	5.01	5.13	5.01	5.11	4.99
10	5.02	5.01	5.10	5.05	5.08	5.21	4.97	4.98	5.03	e5.01	5.06	4.99
11	5.01	5.00	5.07	5.04	5.12	5.15	4.97	4.99	4.96	5.04	4.99	4.99
12	5.01	5.03	5.05	5.02	5.12	5.04	4.97	5.00	4.96	5.03	4.99	4.99
13	5.02	5.02	5.05	5.01	5.05	5.01	4.97	5.02	5.00	5.01	4.99	4.99
14	5.03	5.05	5.06	4.99	5.00	4.99	5.00	5.09	5.00	4.98	4.99	5.00
15	5.04	5.04	5.12	4.98	5.01	5.01	5.01	5.05	5.00	5.01	4.99	5.00
16	5.05	5.02	5.13	4.96	5.01	5.02	5.01	4.97	4.98	5.00	4.99	4.98
17	5.04	5.00	5.12	4.95	5.02	5.03	5.02	4.93	4.96	4.99	5.01	4.97
18	5.03	4.98	5.08	4.95	5.04	5.03	5.02	4.94	4.95	4.99	5.02	4.97
19	5.01	4.98	5.10	4.96	5.04	5.02	5.04	4.95	5.13	4.98	5.01	4.97
20	5.01	4.96	5.08	4.97	5.04	e4.99	5.13	4.97	5.40	4.98	5.02	4.98
21	5.00	4.97	5.05	4.98	5.05	e4.99	5.15	4.98	5.39	4.98	5.02	5.01
22	4.98	4.97	5.02	4.98	5.06	e5.00	5.13	4.99	5.28	5.04	5.01	5.02
23	4.97	4.98	5.01	4.98	5.05	e5.00	5.08	5.00	5.18	5.19	5.00	5.01
24	5.03	5.00	5.02	4.99	5.05	5.05	5.02	5.00	5.10	5.17	5.01	4.97
25	5.06	5.00	5.01	4.99	5.04	5.24	4.98	4.99	5.04	5.08	5.01	4.96
26	5.05	5.00	5.00	4.99	5.05	5.20	5.17	5.00	5.00	5.01	5.05	4.98
27	5.02	5.01	5.08	4.99	5.18	5.08	5.58	5.09	4.99	5.01	5.10	4.98
28	5.01	5.00	5.45	5.00	5.13	4.98	5.51	5.09	4.98	4.99	5.12	4.96
29	5.00	5.01	5.47	5.00	---	5.03	5.37	5.05	4.96	4.97	5.09	4.93
30	5.01	5.01	5.34	5.00	---	5.06	5.26	5.02	4.96	4.98	5.04	4.92
31	5.01	---	5.19	5.00	---	5.09	---	4.99	---	5.00	5.03	---
Mean	5.00	5.01	5.09	5.00	5.05	5.06	5.08	5.01	5.04	5.01	5.02	4.99
Max	5.06	5.06	5.47	5.06	5.18	5.24	5.58	5.17	5.40	5.19	5.12	5.03
Min	4.94	4.96	5.00	4.95	5.00	4.98	4.96	4.93	4.95	4.96	4.99	4.92



Stage hydrograph for Delavan Lake, 1983 – 2009.

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

LOCATION.--Lat 42°35'56", long 88°36'50", in SE ¼ SW ¼ sec.28, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA.--3.24 mi².

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 0.5 m of the lake and analyzed by the Wisconsin State Laboratory of Hygiene. A "*" indicates data collected by the Delavan Lake Sanitary District.

WATER-QUALITY DATA, OCTOBER 3, 2008 TO NOVEMBER 18, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Oct. 3*</u>	<u>Oct. 10*</u>	<u>Oct. 13*</u>	<u>Oct. 30*</u>	<u>Nov. 5*</u>	<u>Nov. 11*</u>	<u>Nov. 18</u>	
32210	Chlorophyll <i>a</i> , phytoplankton (µg/L)	--	--	--	--	--	--	2.53	
00078	Secchi-depth (m)	1.2	1.5	1.5	1.8	3.0	3.7	4.3	
00098	Sampling depth (m)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	16.0
00010	Water Temperature (°C)	18.0	16.0	17.0	11.0	11.0	9.5	8.0	7.7
00400	pH (standard units)	--	--	--	--	--	--	7.7	7.7
00095	Specific conductance (µS/cm)	--	--	--	--	--	--	536	536
00300	Dissolved oxygen	--	--	--	--	--	--	9.8	9.6
00665	Phosphorus, Total (as P)	0.262	0.100	0.091	0.084	0.074	0.080	0.079	0.079
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	<.008	0.023
00600	Total nitrogen	--	--	--	--	--	--	0.88	--
00631	Nitrate + nitrite, dissolved (as N)	--	--	--	--	--	--	0.158	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	--	E.018	--
00625	Ammonia + organic nitrogen, total (as N)	--	--	--	--	--	--	0.72	--

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, NOVEMBER 26, 2008 TO APRIL 8, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Nov. 26*</u>	<u>Feb. 23</u>		<u>Mar. 20*</u>	<u>Mar. 26*</u>	<u>Apr. 2*</u>	<u>Apr. 8</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	1.31		--	--	--	13.2	
00078	Secchi-depth (m)	5.8	9.9		1.2	1.1	1.1	3.1	
00098	Sampling depth (m)	0.5	0.5	16.0	0.5	0.5	0.5	0.5	16.0
00010	Water Temperature (°C)	5.0	1.7	4.7	5.0	6.0	6.0	6.0	5.7
00400	pH (standard units)	--	7.7	7.3	--	--	--	8.7	8.7
00095	Specific conductance (µS/cm)	--	485	840	--	--	--	544	544
00300	Dissolved oxygen	--	18.0	0.8	--	--	--	14.2	13.9
00665	Phosphorus, Total (as P)	0.078	0.090	0.214	0.081	0.080	0.070	0.029	0.034
00671	Orthophosphate, dissolved (as P)	--	0.056	0.179	--	--	--	E.004	E.005
00600	Total nitrogen	--	1	--	--	--	--	0.94	1
00631	Nitrate + nitrite, dissolved (as N)	--	0.331	--	--	--	--	0.413	0.381
00608	Ammonia, dissolved (as N)	--	0.177	--	--	--	--	E.017	0.047
00625	Ammonia + organic nitrogen, total (as N)	--	0.72	--	--	--	--	0.52	0.63
00900	Hardness (as CaCO ₃)	--	--	--	--	--	--	220	230
00410	Acid neutralizing capacity (as CaCO ₃)	--	--	--	--	--	--	192	192
00915	Calcium, dissolved (Ca)	--	--	--	--	--	--	42.2	43
00925	Magnesium, dissolved (Mg)	--	--	--	--	--	--	28.2	29.4
00930	Sodium, dissolved (Na)	--	--	--	--	--	--	28.2	27.2
00935	Potassium, dissolved (K)	--	--	--	--	--	--	2.75	2.82
00940	Chloride, dissolved (Cl)	--	--	--	--	--	--	54.1	55
00950	Fluoride, dissolved (F)	--	--	--	--	--	--	0.19	0.19
00945	Sulfate, dissolved (SO ₄)	--	--	--	--	--	--	19.9	19.9
00955	Silica, dissolved (SiO ₂)	--	--	--	--	--	--	<.2	<.2
01046	Iron (µg/L)	--	--	--	--	--	--	<4	<4
01056	Manganese (µg/L)	--	--	--	--	--	--	2.2	6.7
00080	Apparent color (PCU)	--	--	--	--	--	--	12	15
63676	Turbidity (NTU)	--	--	--	--	--	--	E3.5	E2.9
70300	Solids, dissolved (at 180 C°)	--	--	--	--	--	--	317	317

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, APRIL 16 TO JUNE 11, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 16*</u>	<u>Apr. 23*</u>	<u>Apr. 29*</u>	<u>May 7*</u>	<u>May 12</u>			
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	9.04			
00078	Secchi-depth (m)	3.0	3.4	2.7	4.0	4.4			
00098	Sampling depth (m)	0.5	0.5	0.5	0.5	0.5	9.0	11.0	16.0
00010	Water Temperature (°C)	8.0	8.0	10.0	12.5	13.9	12.3	11.2	10.4
00400	pH (standard units)	--	--	--	--	8.4	8.2	8.1	7.8
00095	Specific conductance (µS/cm)	--	--	--	--	544	544	546	550
00300	Dissolved oxygen	--	--	--	--	11.1	8.9	7.0	4.0
00665	Phosphorus, Total (as P)	0.025	0.025	0.036	0.044	0.034	0.037	0.051	0.085
00671	Orthophosphate, dissolved (as P)	--	--	--	--	<.008	<.008	E.005	0.035
00600	Total nitrogen	--	--	--	--	0.97	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	--	--	--	--	0.382	--	--	--
00608	Ammonia, dissolved (as N)	--	--	--	--	E.012	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	--	--	--	--	0.59	--	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>May 22*</u>	<u>May 28*</u>	<u>June 3*</u>	<u>June 11*</u>	<u>June 11</u>			
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	4.16			
00078	Secchi-depth (m)	1.5	1.8	2.7	2.7	3.8			
00098	Sampling depth (m)	0.5	0.5	0.5	0.5	0.5	8.0	12.0	16.0
00010	Water Temperature (°C)	16.0	17.0	16.0	18.0	18.4	17.4	15.2	13.2
00400	pH (standard units)	--	--	--	--	8.4	8.3	7.8	7.4
00095	Specific conductance (µS/cm)	--	--	--	--	553	555	564	578
00300	Dissolved oxygen	--	--	--	--	--	--	--	--
00665	Phosphorus, Total (as P)	0.042	0.044	0.040	0.041	0.039	0.038	0.079	0.293
00671	Orthophosphate, dissolved (as P)	--	--	--	--	<.008	<.008	0.041	0.182
00600	Total nitrogen	--	--	--	--	0.72	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	--	--	--	--	0.102	--	--	--
00608	Ammonia, dissolved (as N)	--	--	--	--	<.020	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	--	--	--	--	0.61	--	--	--

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, JUNE 18 TO AUGUST 11, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>June 18*</u>	<u>June 24*</u>	<u>July 1*</u>	<u>July 8*</u>	<u>July 16*</u>	<u>July 16</u>			
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	--	25			
00078	Secchi-depth (m)	2.7	3.0	3.7	2.1	2.1	1.5			
00098	Sampling depth (m)	0.5	0.5	0.5	0.5	0.5	0.5	7.0	12.0	15.5
00010	Water Temperature (°C)	20.0	26.0	22.0	23.0	22.0	23.3	22.3	14.9	14.2
00400	pH (standard units)	--	--	--	--	--	8.5	8.2	7.4	7.4
00095	Specific conductance (µS/cm)	--	--	--	--	--	535	543	571	580
00300	Dissolved oxygen	--	--	--	--	--	10.8	7.5	0.0	0.0
00665	Phosphorus, Total (as P)	0.047	0.030	0.042	0.040	0.036	0.044	0.036	0.270	0.389
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	E.004	E.004	0.152	0.266
00600	Total nitrogen	--	--	--	--	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	--	--	--	--	--	<.016	--	--	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	0.075	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	--	--	--	--	--	0.76	--	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>July 21*</u>	<u>July 27*</u>	<u>Aug. 4*</u>	<u>Aug. 11*</u>
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	--
00078	Secchi-depth (m)	1.5	1.2	1.2	1.4
00098	Sampling depth (m)	0.5	0.5	0.5	0.5
00010	Water Temperature (°C)	22.0	23.0	23.0	22.0
00400	pH (standard units)	--	--	--	--
00095	Specific conductance (µS/cm)	--	--	--	--
00300	Dissolved oxygen	--	--	--	--
00665	Phosphorus, Total (as P)	0.046	0.038	0.033	0.032

423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

WATER-QUALITY DATA, AUGUST 11 TO SEPTEMBER 21, 2009

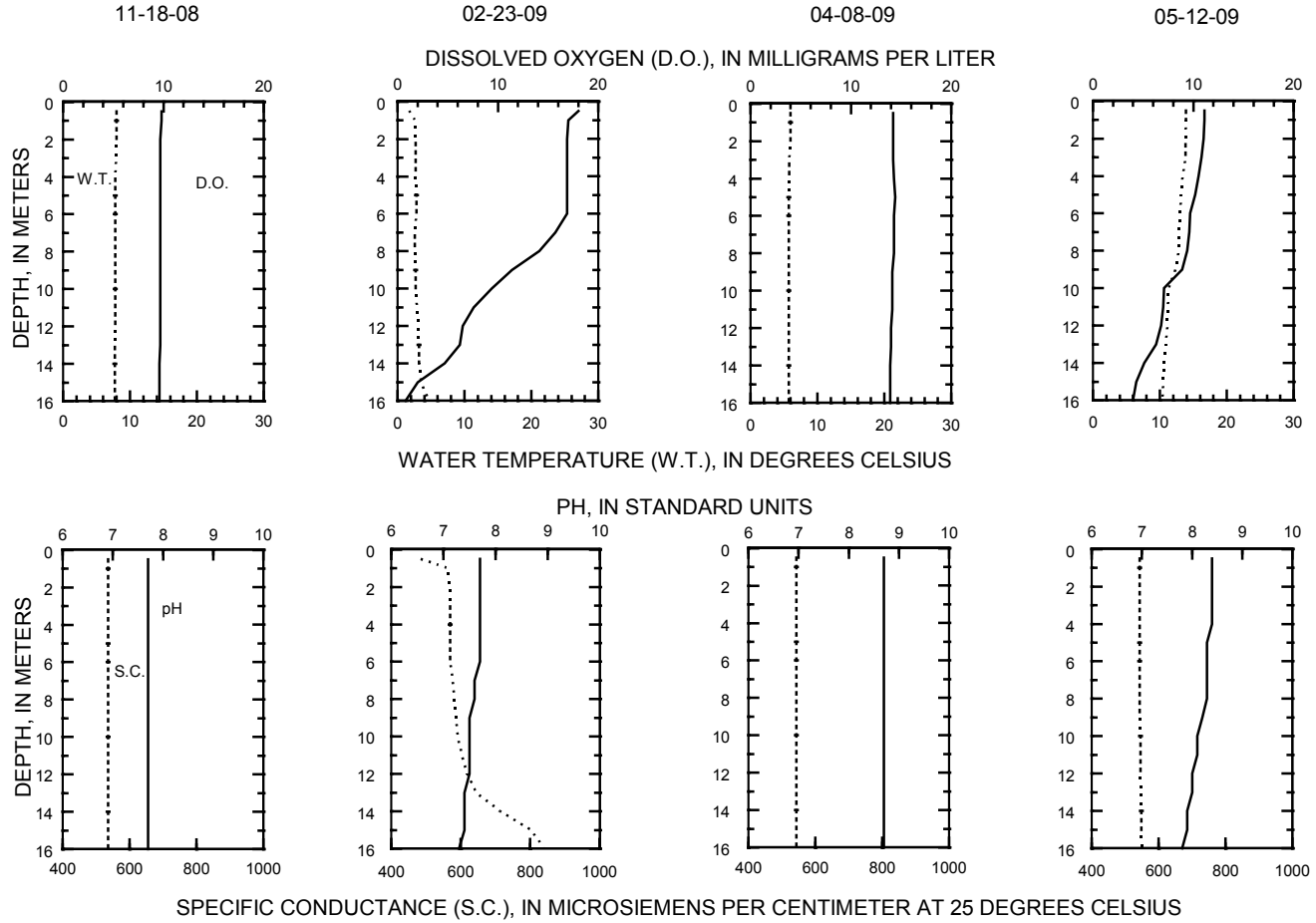
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	Aug. 11								Aug. 19*	Aug. 25*
32210	Chlorophyll a, phytoplankton (µg/L)	16								--	--
00078	Secchi-depth (m)	1.5								1.5	1.4
00098	Sampling depth (m)	0.5	9.0	10.0	12.0	13.0	14.0	15.0	16.0	0.5	0.5
00010	Water Temperature (°C)	24.0	22.0	20.1	16.1	15.1	14.7	14.6	14.4	23.0	22.0
00400	pH (standard units)	8.6	8.0	7.7	7.5	7.4	7.3	7.3	7.3	--	--
00095	Specific conductance (µS/cm)	512	525	535	564	572	578	580	582	--	--
00300	Dissolved oxygen	10.7	4.7	0.5	0.1	0.1	0.1	0.1	0.1	--	--
00665	Phosphorus, Total (as P)	0.042	0.038	0.092	0.256	0.337	0.399	0.421	0.421	0.033	0.042
00671	Orthophosphate, dissolved (as P)	<.008	<.008	--	--	0.196	--	--	0.33	--	--
00600	Total nitrogen	E.69	--	--	--	--	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	E.009	--	--	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	0.08	--	--	--	--	--	--	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	0.68	--	--	--	--	--	--	--	--	--

Parameter Code	Parameter Name	Sept. 1*	Sept. 8*	Sept. 15*	Sept. 15				Sept. 21*	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	10.8				--	
00078	Secchi-depth (m)	1.8	1.8	2.1	1.8				2.4	
00098	Sampling depth (m)	0.5	0.5	0.5	0.5	10.0	13.0	15.0	16.0	0.5
00010	Water Temperature (°C)	21.0	21.0	22.0	23.2	19.9	16.3	14.5	14.2	19.5
00400	pH (standard units)	--	--	--	8.7	7.5	6.8	6.5	6.3	--
00095	Specific conductance (µS/cm)	--	--	--	519	549	602	626	648	--
00300	Dissolved oxygen	--	--	--	9.6	0.1	0.0	0.0	0.0	--
00665	Phosphorus, Total (as P)	0.053	0.042	0.041	0.035	0.065	0.386	0.601	0.801	0.035
00671	Orthophosphate, dissolved (as P)	--	--	--	<.008	<.008	0.301	--	0.727	--
00600	Total nitrogen	--	--	--	--	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	--	--	--	<.016	--	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	--	0.029	--	--	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	--	--	--	0.62	--	--	--	--	--

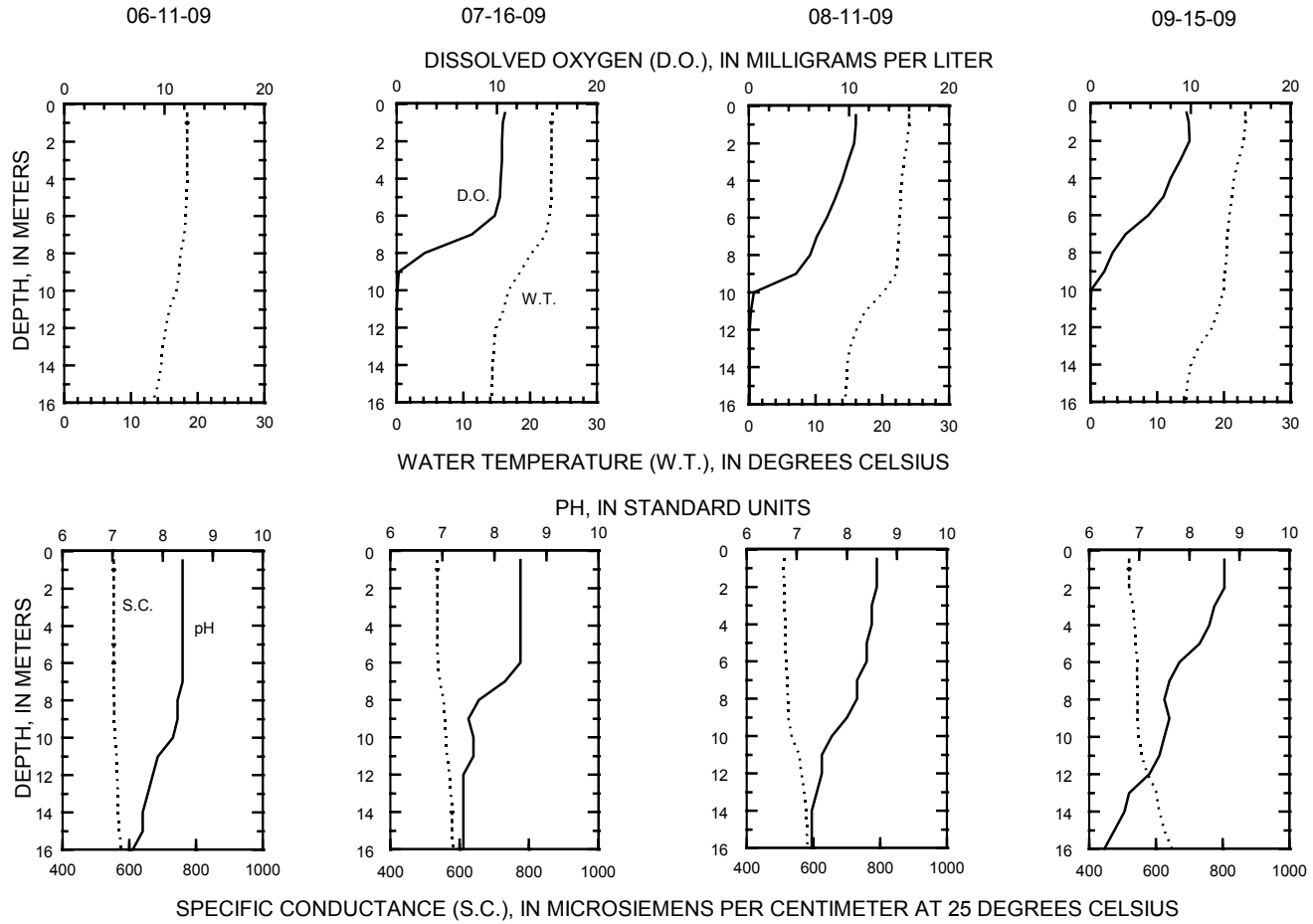
423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

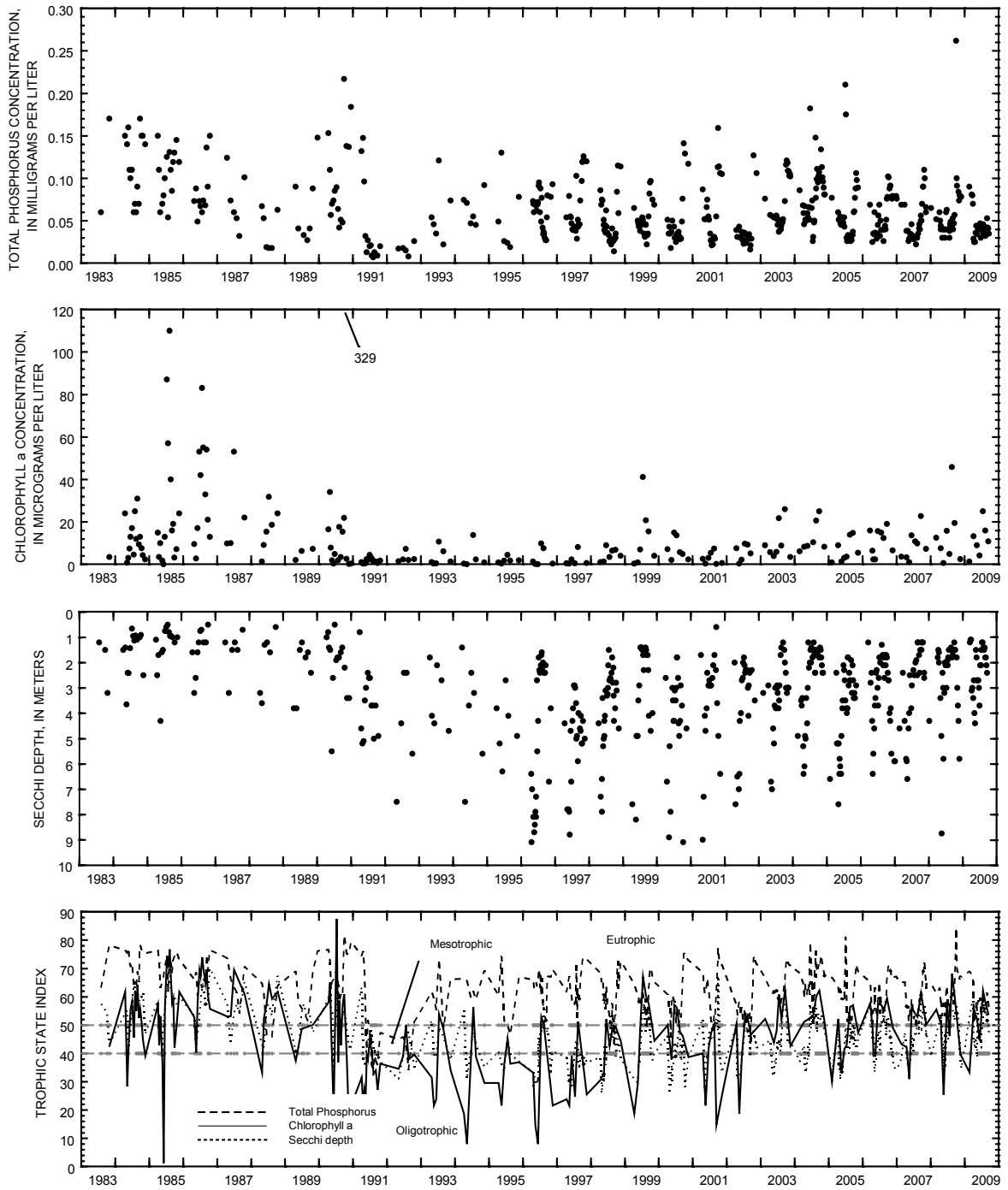
LAKE-DEPTH PROFILES, NOVEMBER 18, 2008 TO MAY 12, 2009



423556088365001 DELAVAN LAKE AT CENTER NEAR DELAVAN LAKE, WI

LAKE-DEPTH PROFILES, JUNE 11 TO SEPTEMBER 15, 2009





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

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

LOCATION.--Lat 42° 36'59", long 88° 35'44", in NW ¼ SW ¼ sec.22, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA--3.24 mi².

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

PERIOD OF RECORD.--October 1983 to August 2009 (discontinued).

Date	<u>Apr. 8</u>	<u>May 12</u>	<u>June 11</u>	<u>July 16</u>	<u>Aug. 11</u>
00078 Secchi-depth (m)	2.6	4.1	3.7	1.3	1.6

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

LOCATION.--Lat 42° 35'26", long 88° 38'01", in SE ¼ NW ¼ sec.32, T.2 N., R.16 E., Walworth County, Hydrologic Unit 07090001, 2.6 mi southeast of Delavan.

SURFACE AREA--3.24 mi².

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

PERIOD OF RECORD.--October 1983 to August 2009 (discontinued).

Date	<u>Apr. 8</u>	<u>May 12</u>	<u>June 11</u>	<u>July 16</u>	<u>Aug. 11</u>
00078 Secchi-depth (m)	2.7	5.0	3.5	1.8	1.8

05404500 DEVILS LAKE NEAR BARABOO, WI

LOCATION.--Lat 43°25'35", long 89°43'40" referenced to North American Datum of 1927, in SW ¼ SE ¼ sec.13, T.11 N., R.6 E., Sauk County, WI, Hydrologic Unit 07070004, in Devils Lake State Park, 3.5 mi south of Baraboo.

SURFACE AREA.--0.56 mi².

DRAINAGE AREA.--4.79 mi².

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.

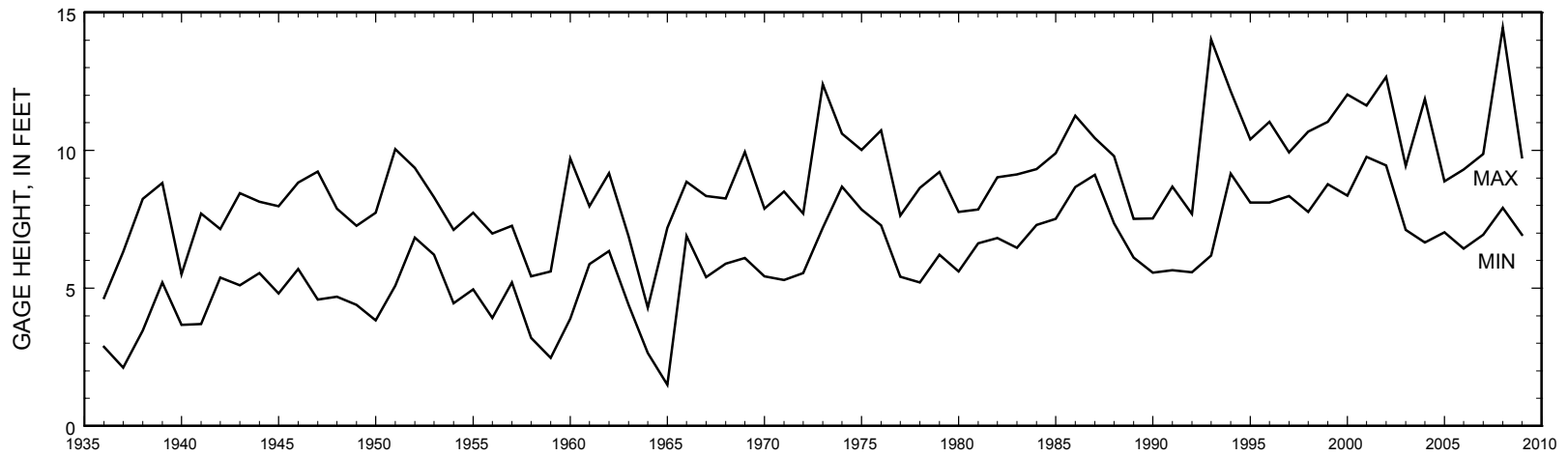
GAGE.--Water-stage recorder installed July 17, 1991. Datum of gage is 954.88 ft, above NAVD of 1988.

REMARKS.--Lake has no surface outlet. Water removed from lake by siphon October 1 to February 17 and September 9-30.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed, 14.83 ft, June 12, 2008; minimum observed, 1.49 ft, Feb. 8, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum observed, 9.77 ft, Oct. 1; minimum observed, 6.93 ft, Feb. 19, 20, 24 and 26.

GAGE HEIGHT, FEET WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009 DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9.75	8.84	8.31	7.90	7.24	7.00	8.21	8.60	8.80	8.61	8.19	7.99
2	9.70	8.81	8.29	7.87	7.21	7.00	8.22	8.60	8.78	8.58	8.17	7.97
3	9.67	8.79	8.26	7.85	7.19	7.00	8.22	8.60	8.76	8.57	8.14	7.96
4	9.63	8.76	8.24	7.83	7.17	6.99	8.23	8.60	8.74	8.55	8.13	7.94
5	9.60	8.74	8.22	7.81	7.15	6.99	8.23	8.60	8.72	8.54	8.10	7.93
6	9.58	8.72	8.20	7.78	7.13	7.00	8.22	8.61	8.70	8.52	8.08	7.91
7	9.56	8.71	8.18	7.76	7.12	7.03	8.21	8.66	8.68	8.50	8.08	7.90
8	9.55	8.68	8.16	7.73	7.10	7.10	8.21	8.65	8.82	8.52	8.20	7.89
9	9.51	8.65	8.20	7.72	7.09	7.16	8.21	8.75	8.83	8.50	8.24	7.87
10	9.48	8.61	8.19	7.70	7.08	7.22	8.20	8.77	8.82	8.49	8.23	7.84
11	9.45	8.59	8.16	7.68	7.07	7.26	8.19	8.78	8.80	8.48	8.22	7.80
12	9.42	8.62	8.14	7.66	7.05	7.28	8.19	8.78	8.79	8.46	8.20	7.77
13	9.40	8.62	8.12	7.65	7.04	7.29	8.18	8.81	8.79	8.44	8.19	7.74
14	9.37	8.64	8.10	7.64	7.03	7.30	8.17	8.89	8.77	8.41	8.17	7.72
15	9.35	8.63	8.09	7.61	7.01	7.31	8.16	8.91	8.75	8.39	8.15	7.69
16	9.32	8.61	8.07	7.59	6.99	7.33	8.16	8.91	8.73	8.37	8.14	7.66
17	9.29	8.59	8.06	7.57	6.97	7.39	8.15	8.91	8.73	8.34	8.16	7.63
18	9.26	8.58	8.03	7.54	6.97	7.46	8.14	8.91	8.73	8.31	8.16	7.61
19	9.23	8.56	8.08	7.52	6.95	7.50	8.14	8.90	8.81	8.29	8.14	7.58
20	9.20	8.54	8.07	7.50	6.94	7.52	8.15	8.90	8.80	8.27	8.13	7.55
21	9.16	8.52	8.06	7.48	6.96	7.54	8.18	8.88	8.79	8.27	8.14	7.53
22	9.13	8.49	8.04	7.46	6.96	7.55	8.18	8.88	8.83	8.30	8.11	7.54
23	9.10	8.46	8.02	7.43	6.96	7.59	8.18	8.87	8.83	8.29	8.09	7.55
24	9.10	8.44	8.01	7.41	6.95	7.73	8.18	8.86	8.81	8.29	8.08	7.53
25	9.09	8.42	7.99	7.39	6.95	8.00	8.22	8.84	8.79	8.27	8.06	7.51
26	9.05	8.40	7.98	7.37	6.97	8.07	8.41	8.82	8.77	8.26	8.04	7.49
27	9.02	8.37	7.97	7.34	7.01	8.10	8.52	8.84	8.75	8.25	8.03	7.47
28	8.98	8.35	7.99	7.32	7.01	8.11	8.55	8.86	8.71	8.23	8.02	7.43
29	8.94	8.33	7.97	7.30	---	8.15	8.57	8.85	8.67	8.21	8.05	7.39
30	8.91	8.31	7.95	7.28	---	8.16	8.59	8.84	8.64	8.22	8.03	7.36
31	8.88	---	7.93	7.26	---	8.19	---	8.82	---	8.21	8.01	---
Mean	9.31	8.58	8.10	7.58	7.05	7.46	8.25	8.79	8.76	8.39	8.13	7.69
Max	9.75	8.84	8.31	7.90	7.24	8.19	8.59	8.91	8.83	8.61	8.24	7.99
Min	8.88	8.31	7.93	7.26	6.94	6.99	8.14	8.60	8.64	8.21	8.01	7.36



Annual minimum and maximum water levels for Devils Lake, 1936-2009.

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI

LOCATION.--Lat 42°35'25", long 88°26'04" referenced to North American Datum of 1927, in SE ¼ NW ¼ sec.36, T.2 N., R.17 E., Walworth County, WI, Hydrologic Unit 07120006, at Geneva Lake dam at Center Street at Lake Geneva.

SURFACE AREA.--8.22 mi².

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--October 1997 to August 2002, December 2002 to current year.

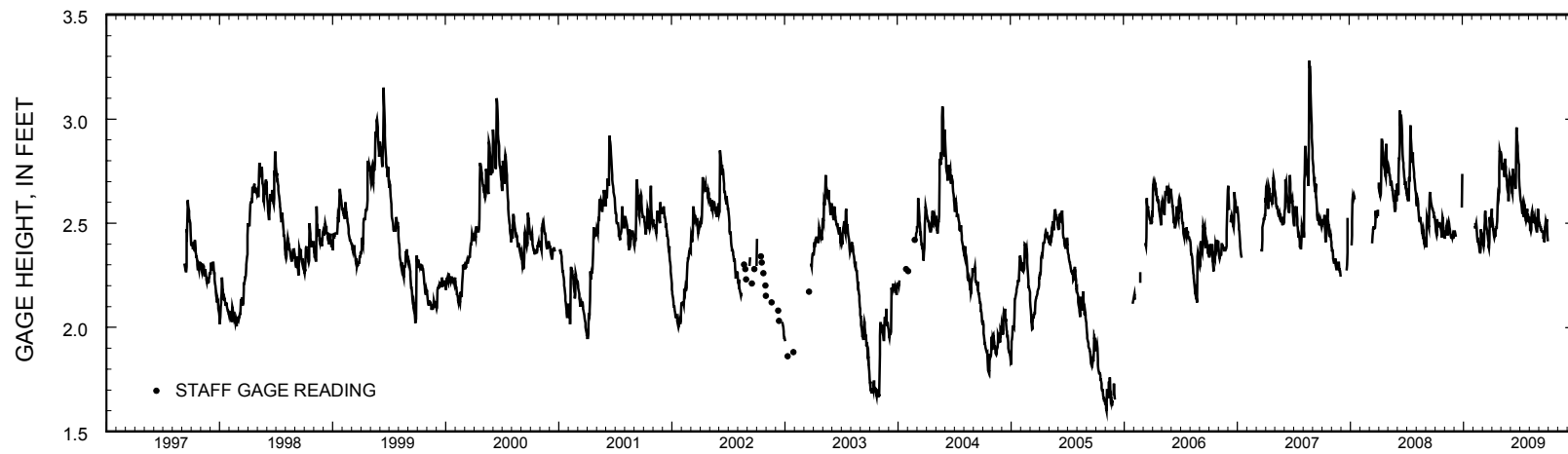
GAGE.--Water-stage recorder. Datum of gage is 861.86 ft above NAVD of 1988 or 862.08 ft above NGVD of 1929. Intermittent staff-gage readings during winter months.

REMARKS.—Records good except for estimated days, which are poor. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.35 ft, Aug. 20, 2007; minimum gage height, 1.44 ft, Nov. 5, 2005 (affected by wind).

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.09 ft (affected by wind), May 13; minimum gage height, 2.18 ft (affected by wind), Feb. 26, but may have been lower during period when the float was frozen in the well.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.51	2.43	2.46	---	---	2.44	2.57	2.84	2.72	2.66	2.52	2.52
2	2.49	2.43	2.46	---	---	e2.42	2.52	2.83	2.71	2.63	2.50	2.50
3	2.46	2.45	2.46	---	---	e2.40	2.52	2.80	2.69	2.61	2.49	2.50
4	2.46	2.45	2.46	---	---	2.40	2.50	2.78	2.68	2.60	2.47	2.49
5	2.45	2.46	2.45	---	---	2.39	2.48	2.76	2.68	2.60	2.47	2.49
6	2.44	2.46	2.44	---	---	2.39	2.47	2.76	2.65	2.59	2.46	2.48
7	2.45	2.48	---	---	---	2.41	2.46	2.79	2.64	2.57	2.47	2.48
8	2.52	2.49	---	---	2.48	2.48	2.44	2.77	2.73	2.55	2.52	2.47
9	2.50	2.47	2.45	---	2.48	2.51	2.43	2.78	2.76	2.55	2.55	2.47
10	2.49	2.45	---	---	2.50	2.54	2.43	2.76	2.74	2.55	2.56	2.46
11	2.48	2.44	---	---	2.49	2.56	2.44	2.74	2.72	2.58	2.54	2.46
12	2.49	2.47	---	---	2.50	2.53	2.44	2.72	2.72	2.57	2.53	2.46
13	2.50	2.50	---	---	2.48	2.51	2.44	2.74	2.72	2.55	2.52	2.46
14	2.50	2.51	2.44	---	2.48	2.49	2.47	2.81	2.71	2.53	2.52	2.46
15	2.50	2.51	---	---	e2.44	2.48	2.47	2.78	2.70	2.59	2.51	2.45
16	2.50	2.50	---	---	e2.42	2.47	2.48	2.77	2.67	2.58	2.50	2.43
17	2.49	2.48	---	---	2.41	2.46	2.48	2.74	2.67	2.56	2.52	2.43
18	2.48	2.47	e2.46	---	2.43	2.45	2.49	2.73	2.67	2.53	2.53	2.42
19	2.48	2.47	---	---	e2.41	2.44	2.51	2.71	2.83	2.52	2.50	2.41
20	2.47	2.45	---	---	e2.40	2.42	2.59	2.70	2.96	2.51	2.53	2.42
21	2.46	2.44	---	---	e2.39	2.41	2.63	2.68	2.93	2.51	2.50	2.48
22	2.44	2.43	---	e2.52	2.39	2.39	2.63	2.66	2.90	2.52	2.48	2.49
23	2.43	2.43	---	---	e2.37	2.38	2.62	2.65	2.89	2.55	2.47	2.51
24	2.49	2.44	---	---	e2.36	2.41	2.64	2.64	2.87	2.57	2.47	2.51
25	2.53	2.44	---	---	2.36	2.53	2.65	2.61	2.85	2.55	2.46	2.50
26	2.52	2.43	---	---	2.38	2.52	2.77	2.61	2.81	2.54	2.46	2.51
27	2.47	2.44	2.58	---	2.47	2.50	2.85	2.71	2.79	2.54	2.51	2.52
28	2.46	2.44	2.73	---	2.46	2.48	2.84	2.73	2.78	2.53	2.57	2.50
29	2.44	2.43	---	---	---	2.53	2.82	2.72	2.72	2.51	2.57	2.44
30	2.44	2.43	---	---	---	2.51	2.84	2.71	2.68	2.51	2.54	2.42
31	2.44	---	---	---	---	2.52	---	2.69	---	2.53	2.52	---
Mean	2.48	2.46	---	---	---	2.46	2.56	2.73	2.75	2.56	2.51	2.47
Max	2.53	2.51	---	---	---	2.56	2.85	2.84	2.96	2.66	2.57	2.52
Min	2.43	2.43	---	---	---	2.38	2.43	2.61	2.64	2.51	2.46	2.41



Stage hydrograph for Geneva Lake, 1997-2009.

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LOCATION.--Lat 42°33'29", long 88°32'33", in NE ¼ SE ¼ sec.12, T.1 N., R.16 E., Walworth County, Hydrologic Unit 07120006, 1.3 mi south of Williams Bay.

SURFACE AREA.--8.22 mi².

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. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll a concentration are collected from the top 0.5 m of the lake.

WATER-QUALITY DATA, NOVEMBER 18, 2008 TO JUNE 11, 2009
(Milligrams per liter unless otherwise indicated)

Parameter Name	November 18				April 9				June 11			
Chlorophyll a, phytoplankton (µg/L)	3.31				1.53				1.81			
Secchi-depth (m)	5.0				7.5				5.0			
Sampling depth (m)	0.5	29.0	36.0	42.0	0.5	42.5	0.5	11.0	15.0	33.0	38.0	42.5
Water Temperature (°C)	9.1	9.0	7.5	7.2	4.1	3.8	16.8	16.3	10.8	7.1	6.9	6.7
pH (standard units)	7.7	7.6	7.1	7.1	8.2	8.3	8.4	8.4	8.2	8.0	7.9	7.9
Specific conductance (µS/cm)	523	525	530	532	512	512	523	524	526	529	530	531
Dissolved oxygen	9.1	7.5	0.6	0.2	13.4	12.9	--	--	--	--	--	--
Phosphorus, Total (as P)	0.012	0.014	0.043	0.052	0.011	0.012	0.011	0.009	0.012	0.011	0.012	0.017
Orthophosphate, dissolved (as P)	0.004	--	--	--	<.002	<.002	--	--	--	--	--	--
Nitrate + nitrite, dissolved (as N)	0.063	--	--	--	0.103	0.099	0.031	--	--	--	--	--
Ammonia, dissolved (as N)	<.015	--	--	--	<.015	<.015	0.022	--	--	--	--	--
Ammonia + organic nitrogen, total (as N)	0.38	--	--	--	0.46	0.47	0.57	--	--	--	--	--
Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--	--	--	--
Total nitrogen	0.44	--	--	--	0.56	0.57	0.6	--	--	--	--	--
Turbidity, (NTU)	--	--	--	--	<1.0	<1.0	--	--	--	--	--	--
Apparent color, (PTU)	--	--	--	--	5	5	--	--	--	--	--	--
Hardness (as CaCO ₃)	--	--	--	--	230	240	--	--	--	--	--	--
Calcium, dissolved (Ca)	--	--	--	--	35.7	36.4	--	--	--	--	--	--
Magnesium, dissolved (Mg)	--	--	--	--	34.3	35	--	--	--	--	--	--
Sodium, dissolved (Na)	--	--	--	--	20.5	20.8	--	--	--	--	--	--
Potassium, dissolved (K)	--	--	--	--	1.9	1.9	--	--	--	--	--	--
ANC (as CaCO ₃)	--	--	--	--	190	190	--	--	--	--	--	--
Chloride, dissolved (Cl)	--	--	--	--	42.9	41.9	--	--	--	--	--	--
Sulfate, dissolved (SO ₄)	--	--	--	--	30.4	30.5	--	--	--	--	--	--
Silica, dissolved (SiO ₂)	--	--	--	--	2.31	2.34	--	--	--	--	--	--
Iron (µg/L)	--	--	--	--	<100	<100	--	--	--	--	--	--
Manganese (µg/L)	--	--	--	--	<1.0	<1.0	--	--	--	--	--	--
Solids, dissolved (at 180 °C)	--	--	--	--	302	294	--	--	--	--	--	--

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

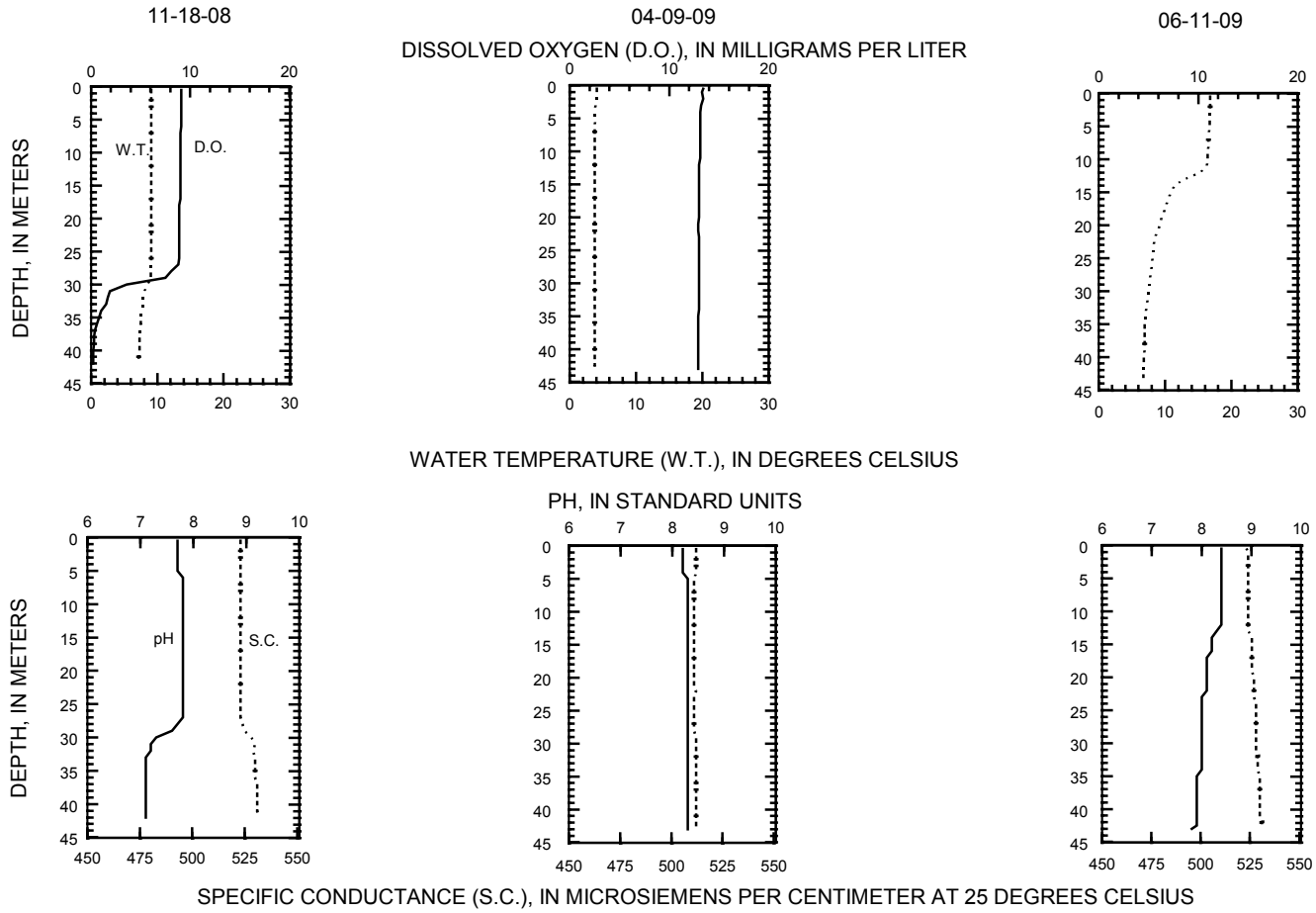
WATER-QUALITY DATA, JULY 16 TO SEPTEMBER 15, 2009
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	July 16						August 11					
32210	Chlorophyll a, phytoplankton (µg/L)	3.65						3.04					
00078	Secchi-depth (m)	3.6						4.6					
00098	Sampling depth (m)	0.5	7.0	17.0	32.0	37.0	41.5	0.5	10.0	18.0	33.0	38.0	42.0
00010	Water Temperature (°C)	22.3	21.7	10.4	7.2	6.9	6.8	22.9	21.2	10.4	7.3	7.0	6.9
00400	pH (standard units)	8.3	8.3	8.3	8.2	8.1	8.0	8.6	8.4	8.0	7.9	7.8	7.8
00095	Specific conductance (µS/cm)	514	517	517	517	517	518	507	510	513	515	518	519
00300	Dissolved oxygen	8.9	8.7	8.3	7.7	6.6	6.1	--	--	--	--	--	--
00665	Phosphorus, Total (as P)	0.011	0.012	0.016	0.009	0.010	0.014	0.012	0.015	0.012	0.010	0.011	0.017
00671	Orthophosphate, dissolved (as P)	<.002	--	--	--	--	--	<.002	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	<.019	--	--	--	--	--	<.019	--	--	--	--	--
00608	Ammonia, dissolved (as N)	<.015	--	--	--	--	--	0.034	--	--	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	0.47	--	--	--	--	--	0.48	--	--	--	--	--

Parameter Code	Parameter Name	September 15					
32210	Chlorophyll a, phytoplankton (µg/L)	--					
00078	Secchi-depth (m)	4.2					
00098	Sampling depth (m)	0.5	12	16	33	38	42
00010	Water Temperature (°C)	23.3	19.5	12.3	7.4	7.1	6.9
00400	pH (standard units)	8.5	7.8	7.3	7.2	7.1	6.8
00095	Specific conductance (µS/cm)	528	533	533	535	537	541
00300	Dissolved oxygen	8.7	6.4	4.9	7.4	4.6	0.5
00665	Phosphorus, Total (as P)	0.008	0.01	0.01	0.008	0.02	0.065
00671	Orthophosphate, dissolved (as P)	0.002	<.002	<.002	0.002	0.05	0.012
00631	Nitrate + nitrite, dissolved (as N)	<.019	<.019	0.159	0.269	0.317	0.176
00608	Ammonia, dissolved (as N)	0.043	<.015	<.015	<.015	<.015	0.17
00625	Ammonia + organic nitrogen, total (as N)	0.45	0.48	0.41	0.37	0.42	0.61
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.57	0.64	0.74	0.79

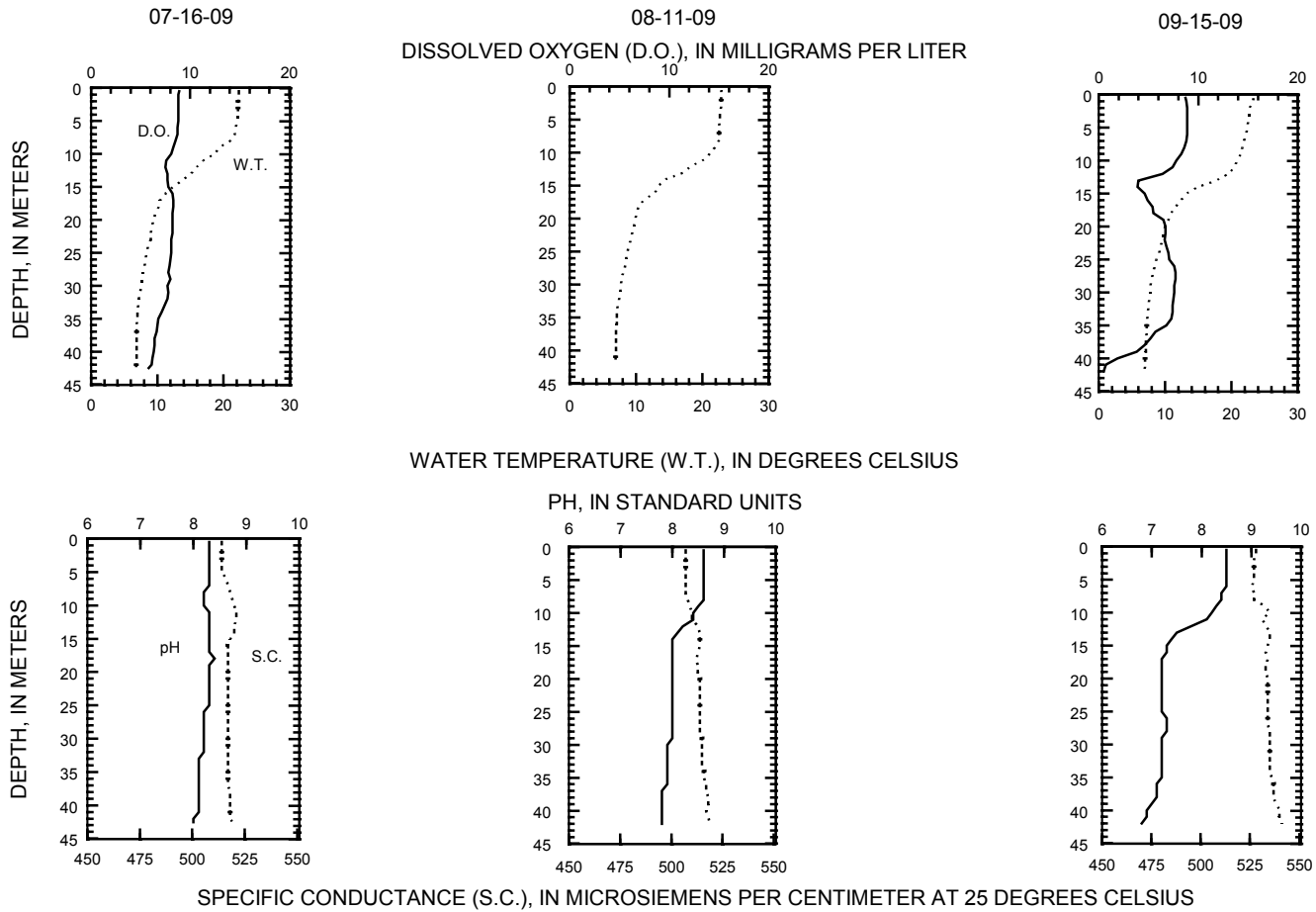
423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

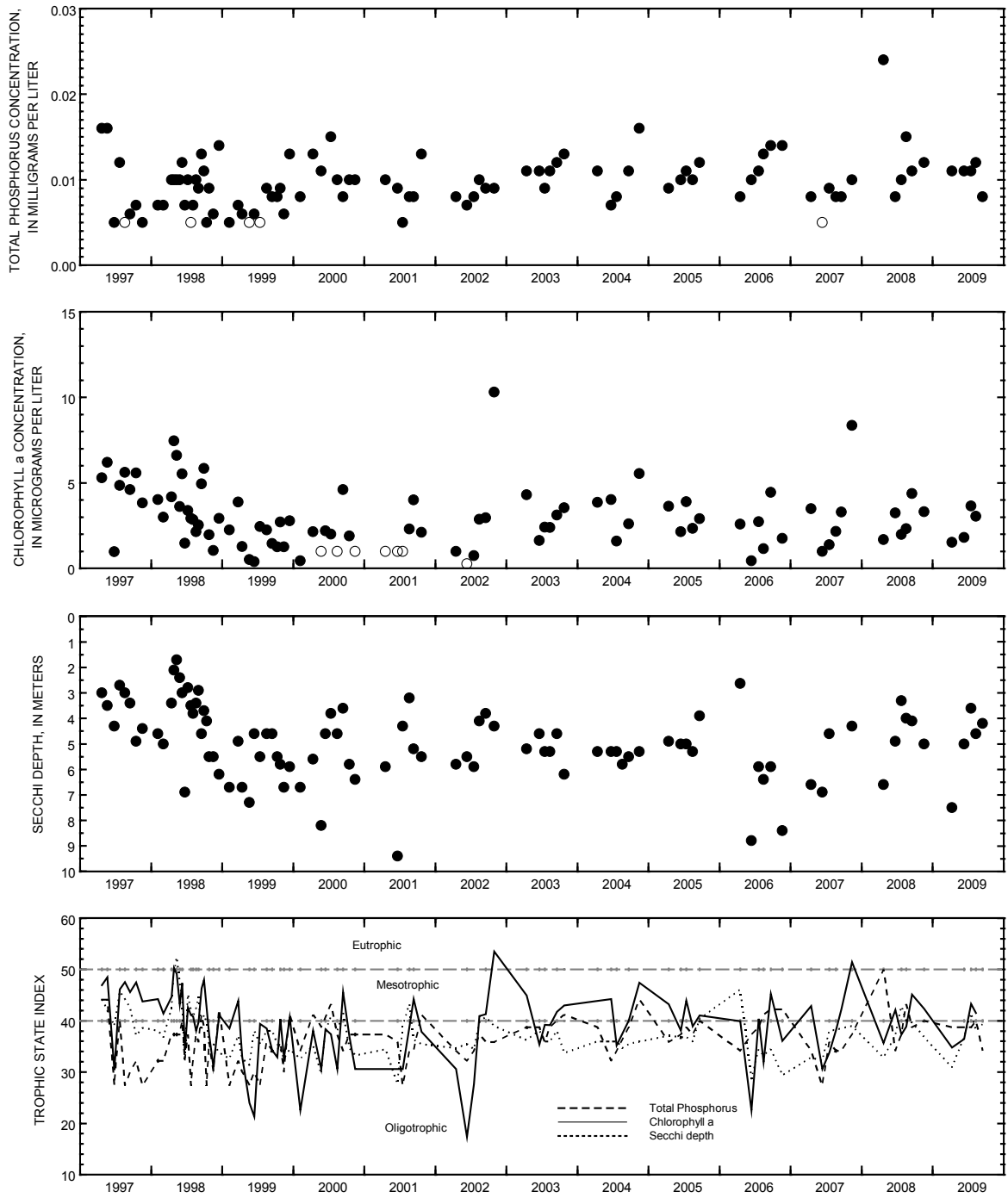
LAKE-DEPTH PROFILES, NOVEMBER 18, 2008 TO JUNE 11, 2009



423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LAKE-DEPTH PROFILES, JULY 16 TO SEPTEMBER 15, 2009





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

(Open circles on the first two 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" referenced to North American Datum of 1927, in NE ¼ SE ¼ SE ¼ sec.27, T.16 N., R.13 E., Green Lake County, WI, Hydrologic Unit 04030201, on left bank at downstream side of County Trunk Highway A, 2.3 mi southeast of Green Lake.

SURFACE AREA.--11.48 mi².

DRAINAGE AREA.--103 mi²; Area of Green Lake, 7,346 acres.

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

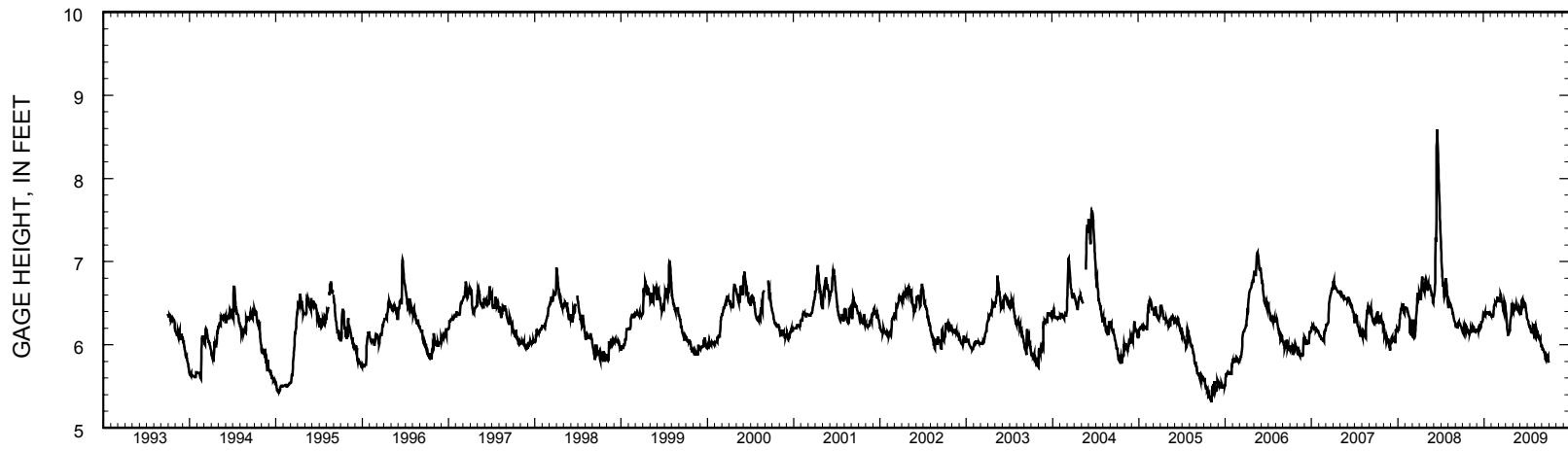
GAGE.--Water-stage recorder. Datum of gage is 790.00 ft above sea level.

REMARKS.--Lake level regulated by dam at outlet at Green Lake. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 8.67 ft, June 15, 2008; minimum recorded, 5.27 ft, Nov. 5, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.65 ft, Mar. 10; minimum recorded gage height, 5.77 ft, Sept. 27.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.17	6.14	6.18	6.37	6.36	6.56	6.44	6.45	6.41	6.31	6.21	5.98
2	6.15	6.14	6.18	6.37	6.35	e6.56	6.40	6.43	6.39	6.30	6.18	5.98
3	6.15	6.16	6.18	6.36	6.34	e6.55	6.37	6.44	6.38	6.30	6.20	5.97
4	6.14	6.17	6.18	6.38	6.34	6.55	6.34	6.42	6.37	6.29	6.17	5.96
5	6.13	6.16	6.19	6.37	6.34	6.55	6.29	6.40	6.37	6.29	6.12	5.95
6	6.16	6.17	6.20	6.36	6.34	6.53	6.27	6.41	6.39	6.28	6.09	5.95
7	6.17	6.18	6.17	6.37	6.34	6.51	6.24	6.42	6.41	6.26	6.08	5.94
8	6.19	6.16	6.17	6.37	6.34	6.54	6.20	6.43	6.49	6.24	6.13	5.94
9	6.17	6.16	6.22	6.39	6.34	6.58	6.17	6.44	6.54	6.23	6.15	5.93
10	6.19	6.16	6.23	6.39	6.37	6.61	6.14	6.45	6.55	6.23	6.17	5.93
11	6.19	6.17	6.23	6.38	6.41	e6.60	6.12	6.44	6.53	6.23	6.18	5.92
12	6.20	6.19	6.22	6.38	6.43	e6.58	6.12	6.44	6.49	6.22	6.16	5.91
13	6.21	6.20	6.22	6.38	6.46	6.56	6.12	6.44	6.46	6.22	6.16	5.90
14	6.19	6.23	6.22	6.38	6.48	6.53	6.13	6.46	6.47	6.20	6.16	5.90
15	6.20	6.22	6.25	e6.38	6.48	6.52	6.14	6.49	6.47	6.19	6.14	5.88
16	6.22	6.21	6.20	e6.38	6.49	6.51	6.15	6.45	6.44	6.18	6.13	5.85
17	6.21	6.21	6.21	6.39	6.49	6.51	6.16	6.45	6.47	6.16	6.12	5.84
18	6.22	6.21	6.21	6.39	6.51	6.50	6.18	6.44	6.48	6.15	6.09	5.84
19	6.21	6.19	6.25	6.39	6.50	6.47	6.18	6.44	6.50	6.15	6.08	5.82
20	6.20	6.17	6.27	6.39	6.51	6.45	6.23	6.44	6.51	6.15	6.08	5.81
21	6.19	e6.16	e6.27	6.38	6.52	6.44	6.29	6.42	6.50	6.15	6.09	5.84
22	6.17	e6.16	6.27	6.38	6.52	6.41	6.32	6.42	6.49	6.17	6.08	5.85
23	6.16	e6.16	6.27	6.37	6.52	6.39	6.33	6.42	6.49	6.20	6.08	5.86
24	6.19	e6.16	6.28	6.36	6.52	6.42	6.34	6.41	6.48	6.19	6.07	5.87
25	6.18	e6.17	6.28	6.36	6.52	6.53	6.35	6.40	6.46	6.17	6.07	5.86
26	6.16	6.17	6.30	6.36	6.54	6.53	6.44	6.41	6.44	6.23	6.08	5.86
27	6.16	6.16	6.32	6.36	6.57	6.51	6.49	6.42	6.41	6.22	e6.04	5.86
28	6.15	6.16	6.37	6.36	6.57	6.50	6.49	6.46	6.39	6.22	e6.02	5.87
29	6.15	6.17	6.37	6.36	---	6.50	6.48	6.45	6.36	6.24	6.00	5.84
30	6.14	6.17	6.36	6.35	---	6.47	6.48	6.43	6.33	6.24	5.99	5.80
31	6.15	---	6.37	6.36	---	6.45	---	6.42	---	6.24	5.99	---
Mean	6.18	6.17	6.25	6.37	6.45	6.51	6.28	6.43	6.45	6.22	6.11	5.89
Max	6.22	6.23	6.37	6.39	6.57	6.61	6.49	6.49	6.55	6.31	6.21	5.98
Min	6.13	6.14	6.17	6.35	6.34	6.39	6.12	6.40	6.33	6.15	5.99	5.80



Stage hydrograph for Green Lake, 1993-2009.

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LOCATION.--Lat 43°47'56", long 89°02'05", in NW ¼ SE ¼ sec.2, T.15 N., R.12 E., Green Lake County, Hydrologic Unit 04030201, about 5 miles southwest of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 to current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "*" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, OCTOBER 3, 2008 TO JUNE 10, 2009
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	Oct. 3*	Oct. 11*	April 15	May 19*	May 29*	May 31*	June 10*
00078	Secchi-depth (m)	4.3	4.3	6.7	2.9	1.2	1.2	1.8
00098	Sampling depth (m)	0.1	0.1	0.5	67.0	0.1	0.1	0.1
00010	Water Temperature (°C)	16.1	15.6	2.9	3.1	10.6	13.3	15.6
00400	pH (standard units)	--	--	8.1	8.2	--	--	--
00095	Specific conductance (µS/cm)	--	--	503	517	--	--	--
00300	Dissolved oxygen	--	--	13.0	12.6	--	--	--
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	1.53	--	--	--	--
00665	Phosphorus, total (as P)	--	--	0.057	0.058	--	--	--
00671	Orthophosphate, dissolved (as P)	--	--	0.045	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.406	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<.015	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.44	--	--	--	--
00600	Total nitrogen	--	--	0.85	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	230	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	33.9	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	34.4	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	18.6	--	--	--	--
00935	Potassium, dissolved (K)	--	--	3.3	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	183	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	38.4	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	30.5	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	1.17	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	282	--	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

WATER-QUALITY DATA, JUNE 14 TO SEPTEMBER 23, 2009
(Milligrams per liter unless otherwise indicated)

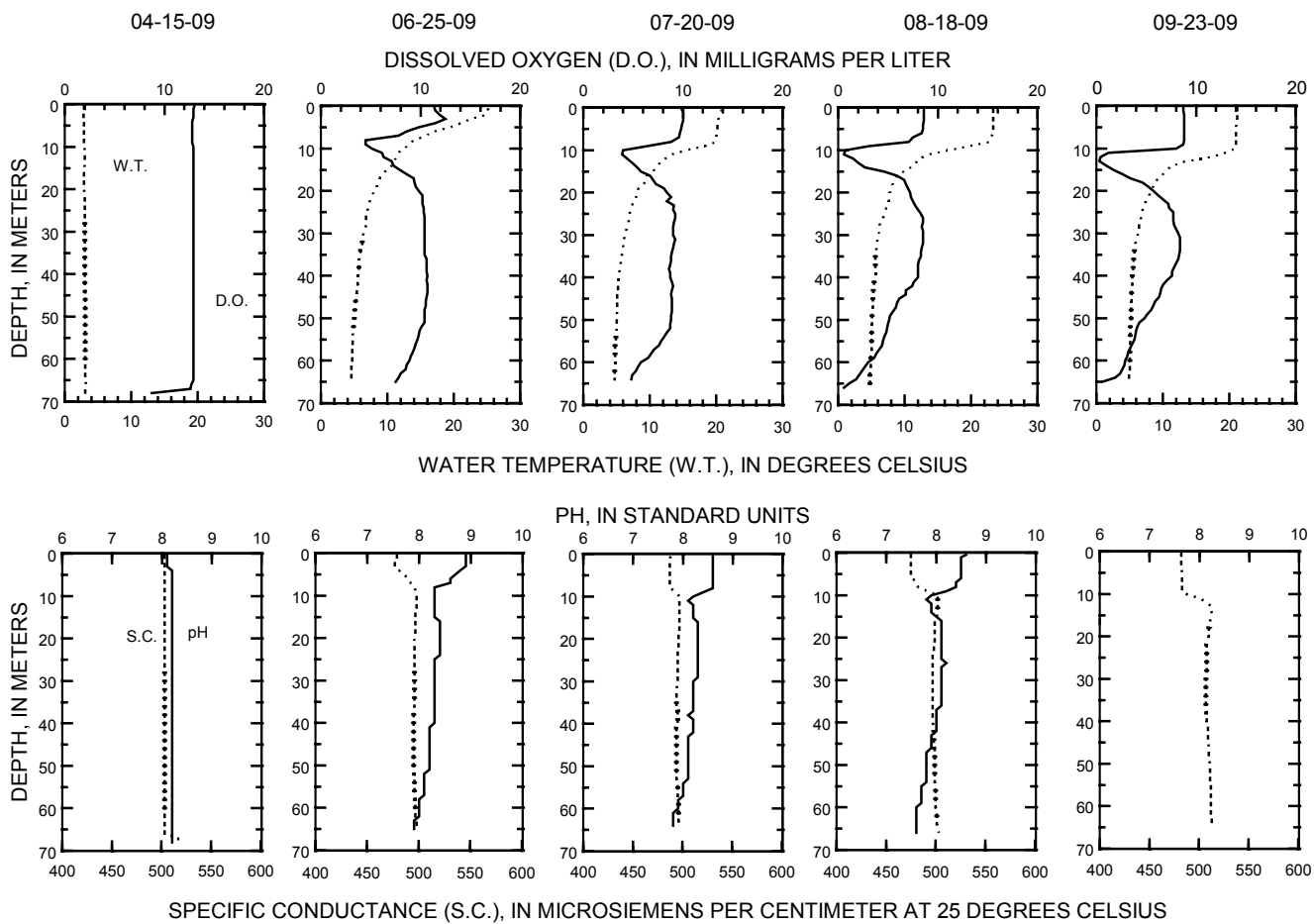
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>June 14*</u>	<u>June 22*</u>	<u>June 25</u>		<u>June 26*</u>	<u>July 3*</u>	<u>July 6*</u>	<u>July 13*</u>
00078	Secchi-depth (m)	2.4	3.5	5.9		8.5	6.1	6.1	5.2
00098	Sampling depth (m)	0.1	0.1	0.5	67	0.1	0.1	0.1	0.1
00010	Water Temperature (°C)	19.4	23.3	25.2	4.5	27.2	21.1	21.7	22.2
00400	pH (standard units)	--	--	8.9	7.8	--	--	--	--
00095	Specific conductance (µS/cm)	--	--	479	499	--	--	--	--
00300	Dissolved oxygen	--	--	11.4	6.8	--	--	--	--
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	1.97	--	--	--	--	--
00665	Phosphorus, total (as P)	--	--	0.018	0.106	--	--	--	--

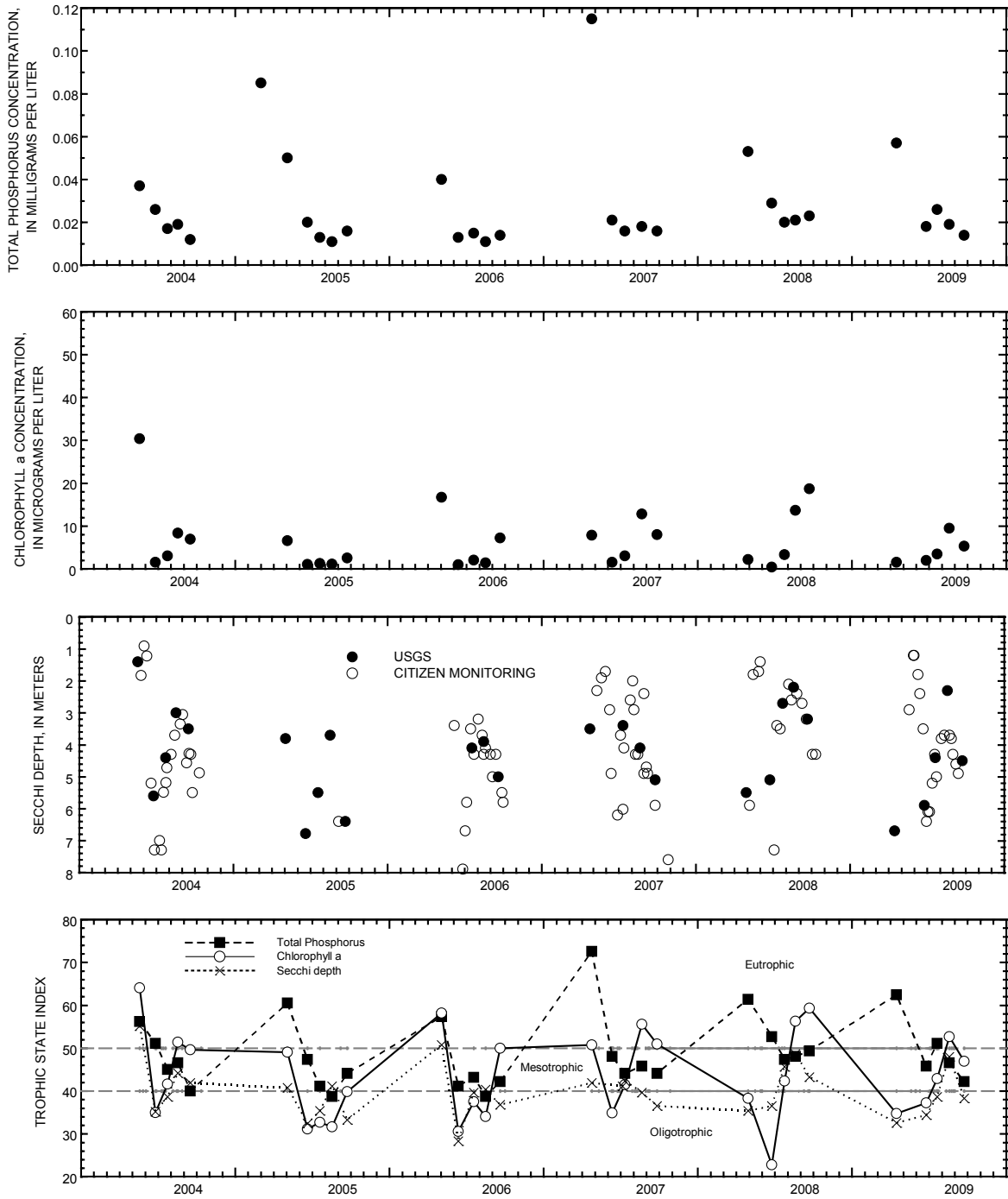
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>July 19*</u>	<u>July 20</u>		<u>July 23*</u>	<u>Aug. 4*</u>	<u>Aug. 11*</u>	<u>August 18</u>		
00078	Secchi-depth (m)	4.3	4.4		5	3.8	3.7	2.3		
00098	Sampling depth (m)	0.1	0.5	67	0.1	0.1	0.1	0.5	16	66
00010	Water Temperature (°C)	20.6	20.8	4.7	22.8	21.1	23.3	23.3	8.8	4.8
00400	pH (standard units)	--	8.6	7.7	--	--	--	8.6	8.1	7.6
00095	Specific conductance (µS/cm)	--	488	498	--	--	--	475	499	503
00300	Dissolved oxygen	--	9.9	3.6	--	--	--	8.6	5.9	0.6
32210	Chlorophyll a, phytoplankton (µg/L)	--	3.5	--	--	--	--	9.47	--	--
00665	Phosphorus, total (as P)	--	0.026	0.15	--	--	--	0.019	0.01	0.181
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	<.019	--	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	--	0.053	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	0.58	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Aug. 23*</u>	<u>Aug. 28*</u>	<u>Sept. 1*</u>	<u>Sept. 8*</u>	<u>Sept. 14*</u>	<u>September 23</u>		
00078	Secchi-depth (m)	3.7	3.8	4.3	4.6	4.9	4.5		
00098	Sampling depth (m)	0.1	0.1	0.1	0.1	0.1	0.5	15.0	66.5
00010	Water Temperature (°C)	21.7	21.7	21.7	22.2	23.3	21.2	10.6	4.7
00400	pH (standard units)	--	--	--	--	--	8.8	7.8	7.7
00095	Specific conductance (µS/cm)	--	--	--	--	--	482	512	530
00300	Dissolved oxygen	--	--	--	--	--	8.7	1.7	0.2
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	--	--	--	5.31	--	--
00665	Phosphorus, total (as P)	--	--	--	--	--	0.014	0.01	0.278

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 15 TO SEPTEMBER 23, 2009





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

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'28", long 88°57'00", in SE ¼ SE ¼ sec.28, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "**" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, OCTOBER 3, 2008 TO JULY 19, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Oct. 3*</u>	<u>Oct. 11*</u>	<u>April 15</u>		<u>May 19*</u>	<u>May 29*</u>	<u>May 31*</u>	<u>June 10*</u>	<u>June 14*</u>
00078	Secchi-depth (m)	3.0	3.0	4.3		2.6	1.8	1.2	1.8	2.7
00098	Sampling depth (m)	0.1	0.1	0.5	34.0	0.1	0.1	0.1	0.1	0.1
00010	Water Temperature (°C)	16.7	16.7	3.5	3.5	11.1	13.3	16.1	16.7	20.0
00400	pH (standard units)	--	--	8.1	8.3	--	--	--	--	--
00095	Specific conductance (µS/cm)	--	--	503	506	--	--	--	--	--
00300	Dissolved oxygen	--	--	14.4	14.9	--	--	--	--	--
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	3.84	--	--	--	--	--	--
00665	Phosphorus, total (as P)	--	--	0.058	0.059	--	--	--	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>June 22*</u>	<u>June 25</u>		<u>June 26*</u>	<u>July 3*</u>	<u>July 6*</u>	<u>July 13*</u>	<u>July 19*</u>
00078	Secchi-depth (m)	3.2	5.6		7.9	6.4	6.4	4.6	4.3
00098	Sampling depth (m)	0.1	0.5	32.0	0.1	0.1	0.1	0.1	0.1
00010	Water Temperature (°C)	22.8	27.4	5.9	27.2	22.2	23.3	22.2	21.1
00400	pH (standard units)	--	8.7	8.1	--	--	--	--	--
00095	Specific conductance (µS/cm)	--	483	498	--	--	--	--	--
00300	Dissolved oxygen	--	10.3	9.3	--	--	--	--	--
32210	Chlorophyll a, phytoplankton (µg/L)	--	1.16	--	--	--	--	--	--
00665	Phosphorus, total (as P)	--	0.018	0.068	--	--	--	--	--

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

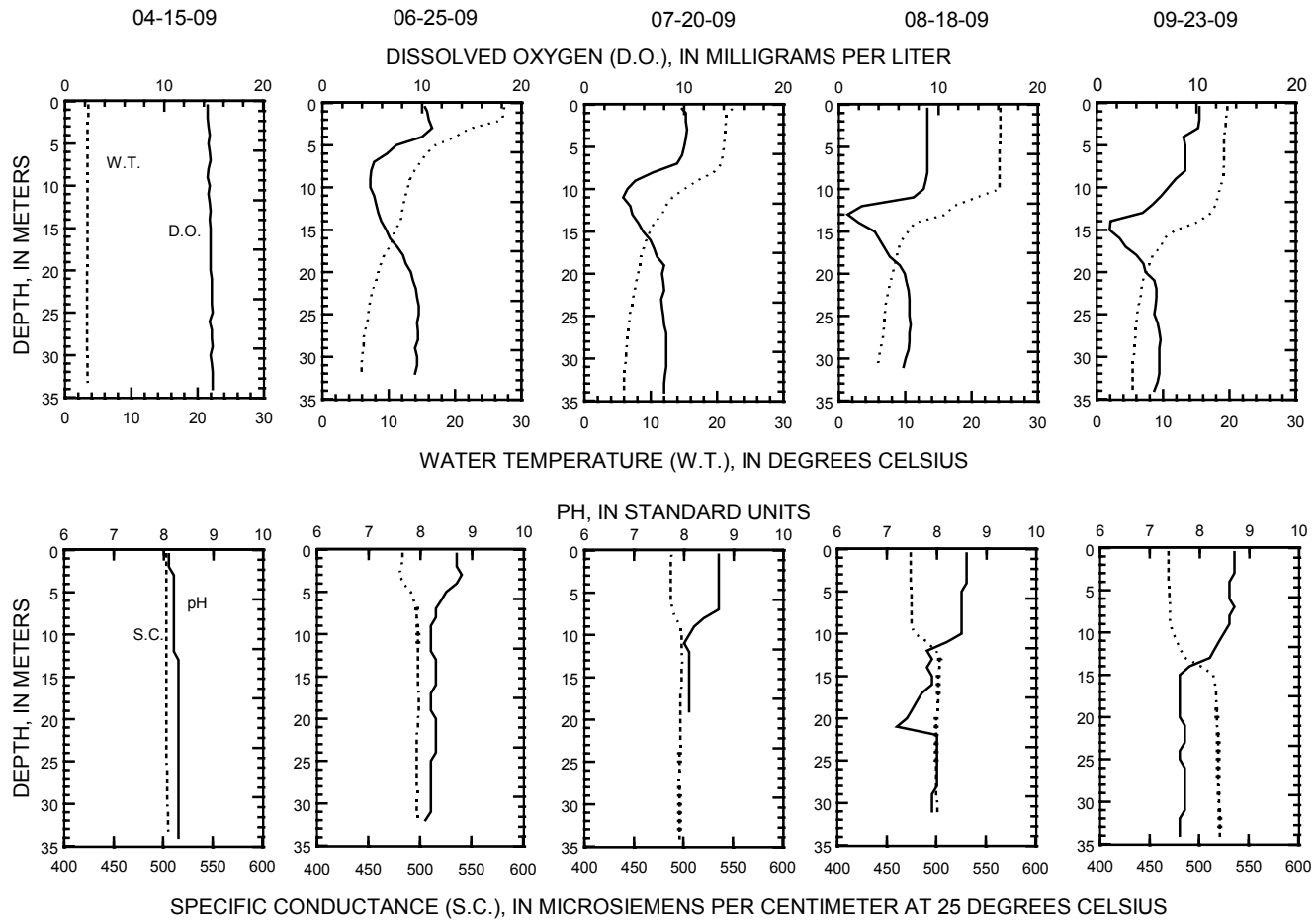
WATER-QUALITY DATA, JULY 20 TO SEPTEMBER 23, 2009
(Milligrams per liter unless otherwise indicated)

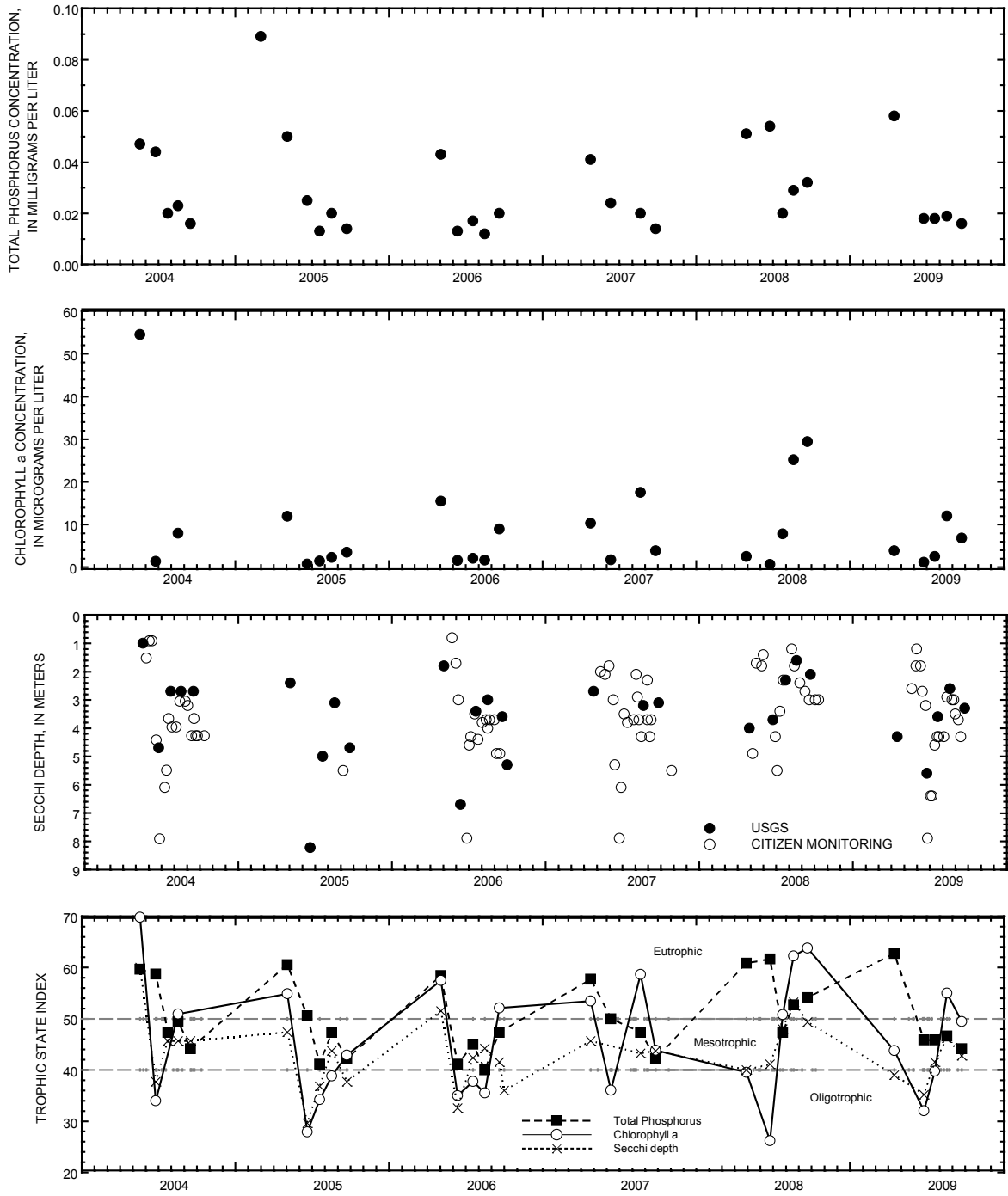
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>July 20</u>		<u>July 23*</u>	<u>Aug. 4*</u>	<u>Aug. 11*</u>	<u>August 18</u>			<u>Aug. 23*</u>	<u>Aug. 28*</u>
00078	Secchi-depth (m)	3.6		4.3	4.3	2.9	2.6			3.0	3.0
00098	Sampling depth (m)	0.5	34.0	0.1	0.1	0.1	0.5	16.0	31.0	0.1	0.1
00010	Water Temperature (°C)	22.3	6.0	22.2	22.2	24.4	24.3	9.4	5.9	21.7	22.2
00400	pH (standard units)	8.7	--	--	--	--	8.6	7.9	7.9	--	--
00095	Specific conductance (µS/cm)	488	496	--	--	--	474	502	501	--	--
00300	Dissolved oxygen	9.8	8.0	--	--	--	8.9	4.1	6.5	--	--
32210	Chlorophyll a, phytoplankton (µg/L)	2.54	--	--	--	--	12	--	--	--	--
00665	Phosphorus, total (as P)	0.018	0.076	--	--	--	0.019	0.01	0.087	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Sept. 1*</u>		<u>Sept. 8*</u>	<u>Sept. 14*</u>			<u>Sept. 23*</u>		
00078	Secchi-depth (m)	3.5		3.7	4.3			3.3		
00098	Sampling depth (m)	0.1		0.1	0.1			0.5	19.0	34.0
00010	Water Temperature (°C)	21.7		21.7	23.3			20.9	8.9	5.7
00400	pH (standard units)	--		--	--			8.7	7.8	7.8
00095	Specific conductance (µS/cm)	--		--	--			485	510	510
00300	Dissolved oxygen	--		--	--			9.8	3.5	5.9
32210	Chlorophyll a, phytoplankton (µg/L)	--		--	--			6.83	--	--
00665	Phosphorus, total (as P)	--		--	--			0.016	0.015	0.093

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 15 TO SEPTEMBER 23, 2009





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

435009088550100 GREEN LAKE INLET, SITE 1, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°50'09", long 88°55'01", in NE ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 15, 2008 TO SEPTEMBER 23, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 15</u>	<u>June 25</u>	<u>July 20</u>	<u>Aug. 18</u>	<u>Sept. 23</u>
00078	00078 Secchi-depth (m)	0.8	0.8	0.7	0.7	0.7
00098	00098 Sampling depth (m)	0.5	0.5	0.5	0.5	0.5
00010	00010 Water Temperature (°C)	11.0	30.0	20.5	24.6	18.1
00400	00400 pH (standard units)	8.6	7.7	7.6	7.8	7.4
00095	00095 Specific conductance (µS/cm)	727	821	914	946	1230
00300	00300 Dissolved oxygen	18.2	5.2	8.6	10.2	3.6
00665	00665 Phosphorus, total (as P)	0.054	0.183	0.111	0.175	0.197

434948088552200 GREEN LAKE INLET, SITE 2, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'48", long 88°55'22", in SW ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA APRIL 15 TO SEPTEMBER 23, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 15</u>	<u>June 25</u>	<u>July 20</u>	<u>Aug. 18</u>	<u>Sept. 23</u>
00078	00078 Secchi-depth (m)	0.8	1.0	0.9	0.7	0.8
00098	00098 Sampling depth (m)	0.5	0.5	0.5	0.5	0.5
00010	00010 Water Temperature (°C)	10.6	28.7	20.2	23.7	18.7
00400	00400 pH (standard units)	8.6	7.6	7.7	7.3	7.5
00095	00095 Specific conductance (µS/cm)	742	805	902	934	1170
00300	00300 Dissolved oxygen	14.8	4.3	7.3	3.1	4.7
00665	00665 Phosphorus, total (as P)	0.054	0.202	0.174	0.162	0.695

425715089164700 LAKE KEGONSA AT BARBER DRIVE NEAR STOUGHTON, WI

LOCATION.--Lat 42°57'15", long 89°16'47" referenced to North American Datum of 1927, in SW ¼ NE ¼ NE ¼ sec.26, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on downstream side of bridge on Barber Drive, 3.5 mi northwest of Stoughton.

SURFACE AREA.--1.05 mi².

DRAINAGE AREA.--386 mi².

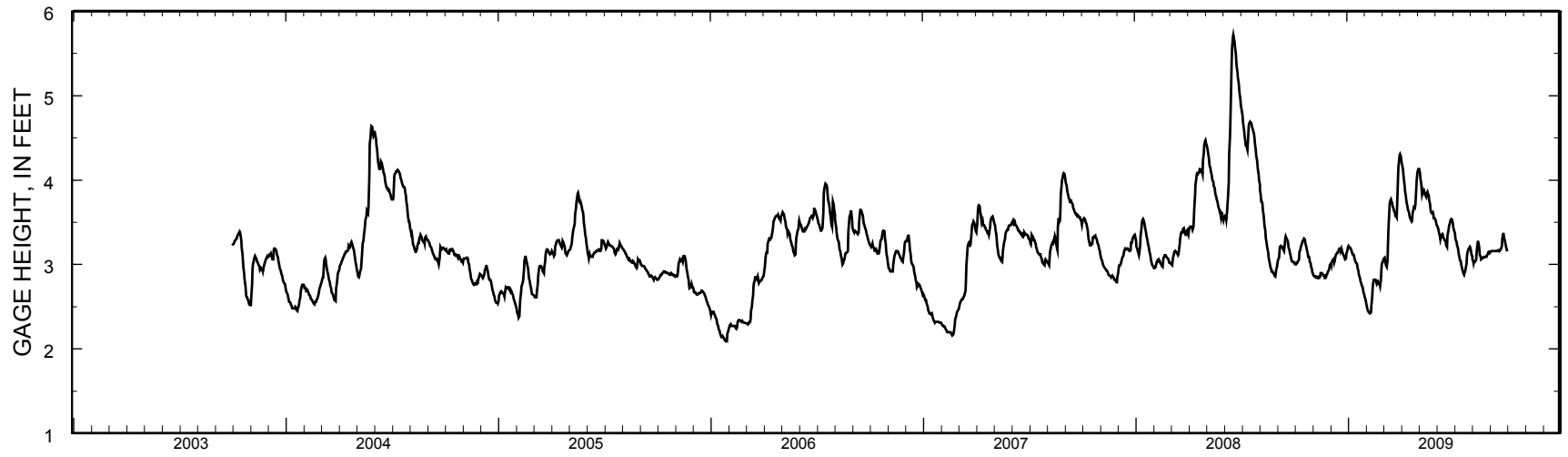
PERIOD OF RECORD.--October 2003 to current year.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level (levels from Wisconsin Department of Transportation benchmark).

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.73 ft, June 16, 2008; minimum observed, 2.07 ft, Jan.27, 2006.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.34 ft, Mar. 28; minimum observed, 2.40 ft, Feb. 6-9.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	3.00	2.88	3.01	3.22	2.53	3.07	4.20	4.13	3.46	3.37	3.06	3.15
2	3.00	2.87	2.99	3.21	2.51	3.08	4.18	4.08	3.45	3.32	3.04	3.15
3	3.02	2.86	3.03	3.20	2.48	3.05	4.13	4.02	3.42	3.29	3.01	3.16
4	3.02	2.86	3.05	3.20	2.45	3.01	4.07	3.96	3.39	3.27	3.03	3.16
5	3.03	2.85	3.06	3.18	2.44	2.98	4.02	3.89	3.35	3.23	3.03	3.16
6	3.04	2.86	3.07	3.17	2.43	2.97	3.94	3.83	3.33	3.20	3.04	3.16
7	3.06	2.86	3.03	3.15	2.42	3.05	3.87	3.87	3.30	3.17	3.05	3.16
8	3.15	2.85	3.05	3.12	2.42	3.25	3.81	3.85	3.34	3.13	3.12	3.16
9	3.17	2.84	3.10	3.12	2.43	3.41	3.76	3.87	3.35	3.08	3.19	3.16
10	3.20	2.84	3.12	3.11	2.51	3.61	3.73	3.85	3.36	3.05	3.27	3.16
11	3.22	2.84	3.13	3.08	2.61	3.72	3.68	3.84	3.35	3.04	3.27	3.16
12	3.25	2.86	3.14	3.06	2.71	3.76	3.65	3.81	3.32	3.00	3.22	3.16
13	3.27	2.86	3.14	3.03	2.77	3.77	3.63	3.80	3.31	2.98	3.17	3.16
14	3.29	2.90	3.16	3.02	2.82	3.75	3.60	3.85	3.29	2.94	3.11	3.16
15	3.30	2.90	3.18	3.01	2.82	3.73	3.57	3.86	3.28	2.92	3.09	3.17
16	3.31	2.90	3.19	2.99	2.82	3.69	3.54	3.84	3.27	2.89	3.06	3.17
17	3.30	2.89	3.19	2.96	2.82	3.67	3.53	3.82	3.23	2.88	3.07	3.16
18	3.26	2.88	3.16	2.92	2.81	3.65	3.51	3.76	3.21	2.90	3.08	3.17
19	3.22	2.87	3.19	2.88	2.77	3.63	3.52	3.72	3.34	2.93	3.08	3.18
20	3.20	2.87	3.17	2.85	2.78	3.61	3.60	3.67	3.39	2.96	3.08	3.19
21	3.17	2.84	3.15	2.83	2.80	3.58	3.65	3.63	3.42	3.01	3.09	3.22
22	3.13	2.84	3.12	2.80	2.79	3.57	3.68	3.61	3.46	3.10	3.09	3.31
23	3.09	2.85	3.11	2.77	2.77	3.56	3.69	3.61	3.49	3.14	3.09	3.36
24	3.09	2.88	3.09	2.75	2.76	3.70	3.68	3.62	3.52	3.17	3.09	3.36
25	3.07	2.89	3.07	2.73	2.74	4.01	3.71	3.60	3.54	3.19	3.09	3.32
26	3.03	2.91	3.06	2.70	2.82	4.15	3.90	3.55	3.54	3.20	3.11	3.29
27	3.01	2.92	3.07	2.67	2.93	4.25	4.00	3.55	3.53	3.21	3.12	3.26
28	2.97	2.94	3.13	2.64	3.00	4.30	4.10	3.54	3.49	3.20	3.14	3.21
29	2.95	2.96	3.16	2.61	---	4.31	4.11	3.52	3.44	3.15	3.15	3.19
30	2.91	2.99	3.19	2.59	---	4.28	4.13	3.49	3.40	3.11	3.15	3.17
31	2.90	---	3.21	2.56	---	4.24	---	3.47	---	3.10	3.14	---
Mean	3.12	2.88	3.11	2.94	2.68	3.63	3.81	3.76	3.39	3.10	3.11	3.20
Max	3.31	2.99	3.21	3.22	3.00	4.31	4.20	4.13	3.54	3.37	3.27	3.36
Min	2.90	2.84	2.99	2.56	2.42	2.97	3.51	3.47	3.21	2.88	3.01	3.15



Stage hydrograph for Lake Kegonsa, 1993-2009.

05427235 LAKE KOSHKONONG NEAR NEWVILLE, WI

LOCATION.--Lat 42°51'27", long 88°56'27" referenced to North American Datum of 1927, in NW ¼ NE ¼ sec.34, T.5 N., R.13 E., Jefferson County, WI, Hydrologic Unit 07090001, 80 ft east of Pottawatomi Trail Bridge at Bingham Point Estates, and 4.5 mi northeast of Newville.

SURFACE AREA.—16.34 mi²

DRAINAGE AREA.--2,560 mi².

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

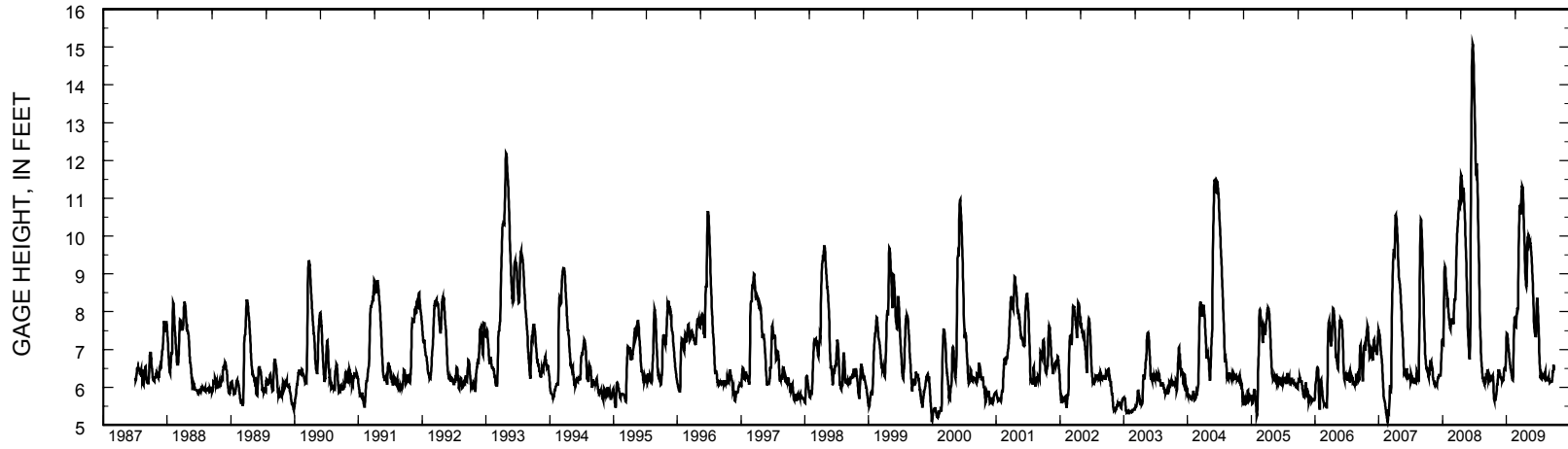
GAGE.--Water-stage recorder. Datum of gage is 769.77 ft above NAVD of 1988 (Wisconsin Department of Transportation bench mark).

REMARKS.--Lake level regulated by dam at Indianford. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 15.13 ft, June 21, 22, 2008; minimum recorded, 5.06 ft, Feb. 22, 2007.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 11.37 ft, Mar. 29; minimum recorded gage height, 5.60 ft, Oct. 23.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.23	5.72	6.25	7.31	6.31	7.98	11.30	9.91	8.63	7.87	6.29	6.20
2	6.20	5.75	6.21	7.40	6.28	8.07	11.31	9.96	8.51	7.73	6.28	6.19
3	6.19	5.78	6.21	7.42	6.26	8.10	11.28	9.99	8.36	7.58	6.26	6.18
4	6.20	5.81	6.20	7.43	6.24	8.09	11.20	9.99	8.21	7.42	6.27	6.17
5	6.20	5.82	6.18	7.42	6.22	8.06	11.11	9.95	8.05	7.26	6.25	6.15
6	6.20	5.85	6.18	7.39	6.19	8.06	11.01	9.91	7.89	7.10	6.23	6.13
7	6.23	5.92	6.17	7.36	6.18	8.14	10.85	9.94	7.74	6.94	6.21	6.12
8	6.32	6.02	6.16	7.32	6.21	8.37	10.69	9.92	7.66	6.78	6.29	6.13
9	6.26	6.08	6.19	7.29	6.28	8.77	10.55	9.94	7.58	6.65	6.37	6.14
10	6.24	6.08	6.19	7.23	6.43	9.23	10.39	9.89	7.51	6.55	6.41	6.15
11	6.26	6.09	6.18	7.17	6.69	9.67	10.22	9.86	7.47	6.50	6.37	6.15
12	6.28	6.14	6.18	7.11	7.00	9.99	10.05	9.80	7.42	6.39	6.31	6.16
13	6.29	6.18	6.17	7.05	7.26	10.24	9.88	9.78	7.42	6.28	6.30	6.16
14	6.31	6.26	6.18	7.00	7.48	10.42	9.72	9.82	7.41	6.24	6.29	6.16
15	6.30	6.33	6.25	6.95	7.63	10.55	9.56	9.80	7.39	6.31	6.27	6.16
16	6.28	6.36	6.30	6.90	7.73	10.66	9.40	9.83	7.35	6.30	6.23	6.15
17	6.23	6.41	6.36	6.85	7.80	10.75	9.23	9.79	7.33	6.26	6.22	6.15
18	6.09	6.40	6.39	6.80	7.84	10.80	9.05	9.74	7.32	6.23	6.23	6.15
19	5.95	6.43	6.48	6.75	7.85	10.81	8.91	9.72	7.50	6.22	6.20	6.17
20	5.88	6.47	6.50	6.70	7.83	10.78	8.86	9.68	7.68	6.23	6.22	6.19
21	5.79	6.41	6.51	6.65	7.82	10.74	8.81	9.64	7.86	6.23	6.23	6.24
22	5.69	6.37	6.51	6.61	7.78	10.67	8.75	9.57	8.06	6.27	6.22	6.31
23	5.65	6.35	6.51	6.57	7.72	10.58	8.70	9.51	8.21	6.30	6.20	6.41
24	5.69	6.35	6.51	6.54	7.66	10.63	8.66	9.43	8.30	6.29	6.18	6.41
25	5.71	6.34	6.49	6.51	7.60	10.85	8.66	9.32	8.34	6.30	6.17	6.41
26	5.76	6.32	6.48	6.48	7.59	11.03	8.79	9.21	8.34	6.27	6.19	6.44
27	5.71	6.29	6.52	6.45	7.71	11.17	9.04	9.14	8.28	6.24	6.19	6.46
28	5.67	6.28	6.67	6.42	7.85	11.26	9.34	9.06	8.22	6.27	6.21	6.59
29	5.67	6.26	6.82	6.39	---	11.34	9.57	8.96	8.12	6.28	6.26	6.52
30	5.67	6.25	6.99	6.37	---	11.32	9.77	8.86	8.00	6.28	6.22	6.48
31	5.70	---	7.16	6.34	---	11.30	---	8.74	---	6.29	6.21	---
Mean	6.03	6.17	6.39	6.91	7.12	9.95	9.82	9.63	7.87	6.58	6.25	6.25
Max	6.32	6.47	7.16	7.43	7.85	11.34	11.31	9.99	8.63	7.87	6.41	6.59
Min	5.65	5.72	6.16	6.34	6.18	7.98	8.66	8.74	7.32	6.22	6.17	6.12



Stage hydrograph for Lake Koshkonong, 1987-2009.

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

LOCATION.--Lat 43°22'55", long 88°13'47", in NW ¼ NE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.6 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

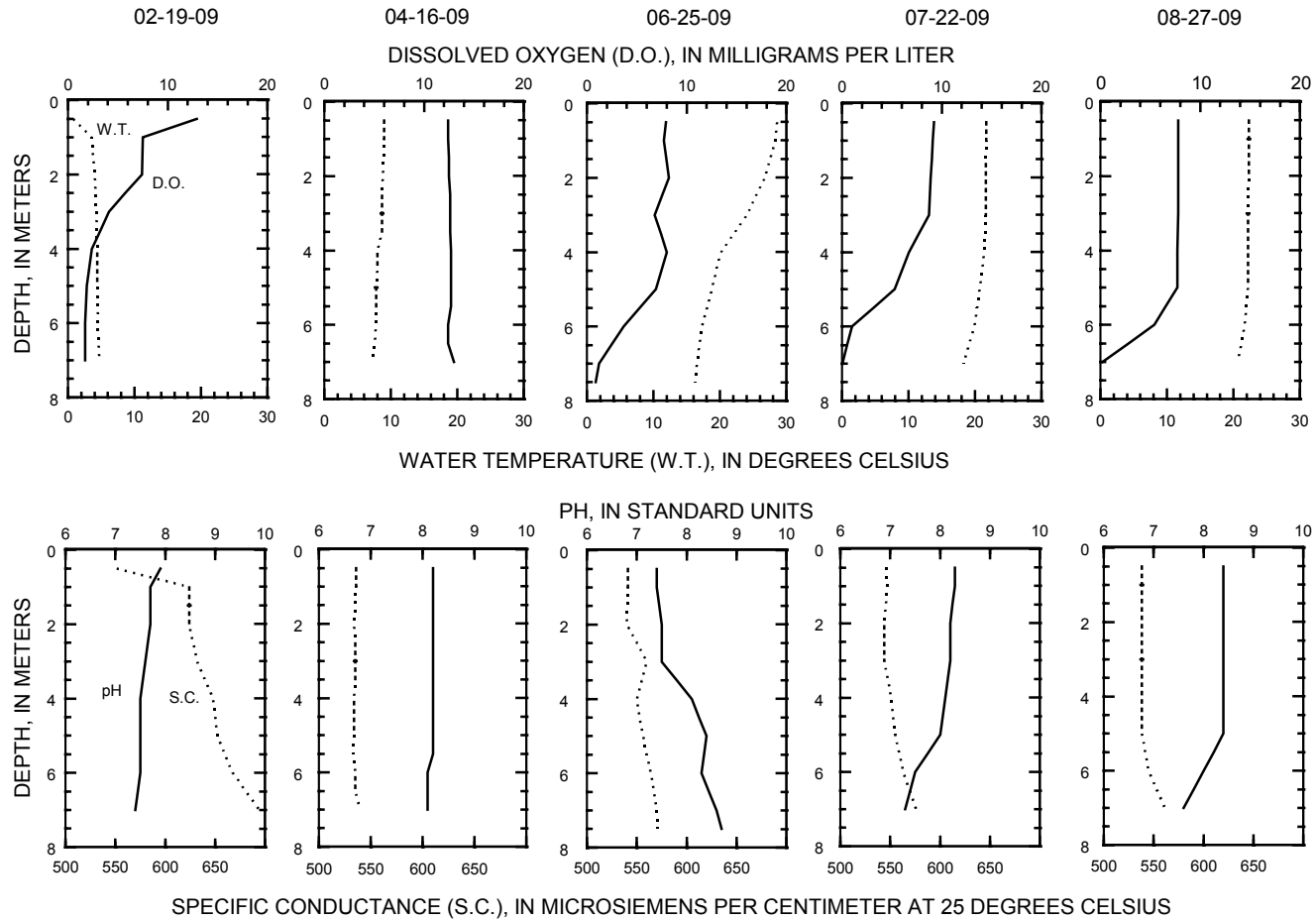
REMARKS.--Lake sampled at center of northern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

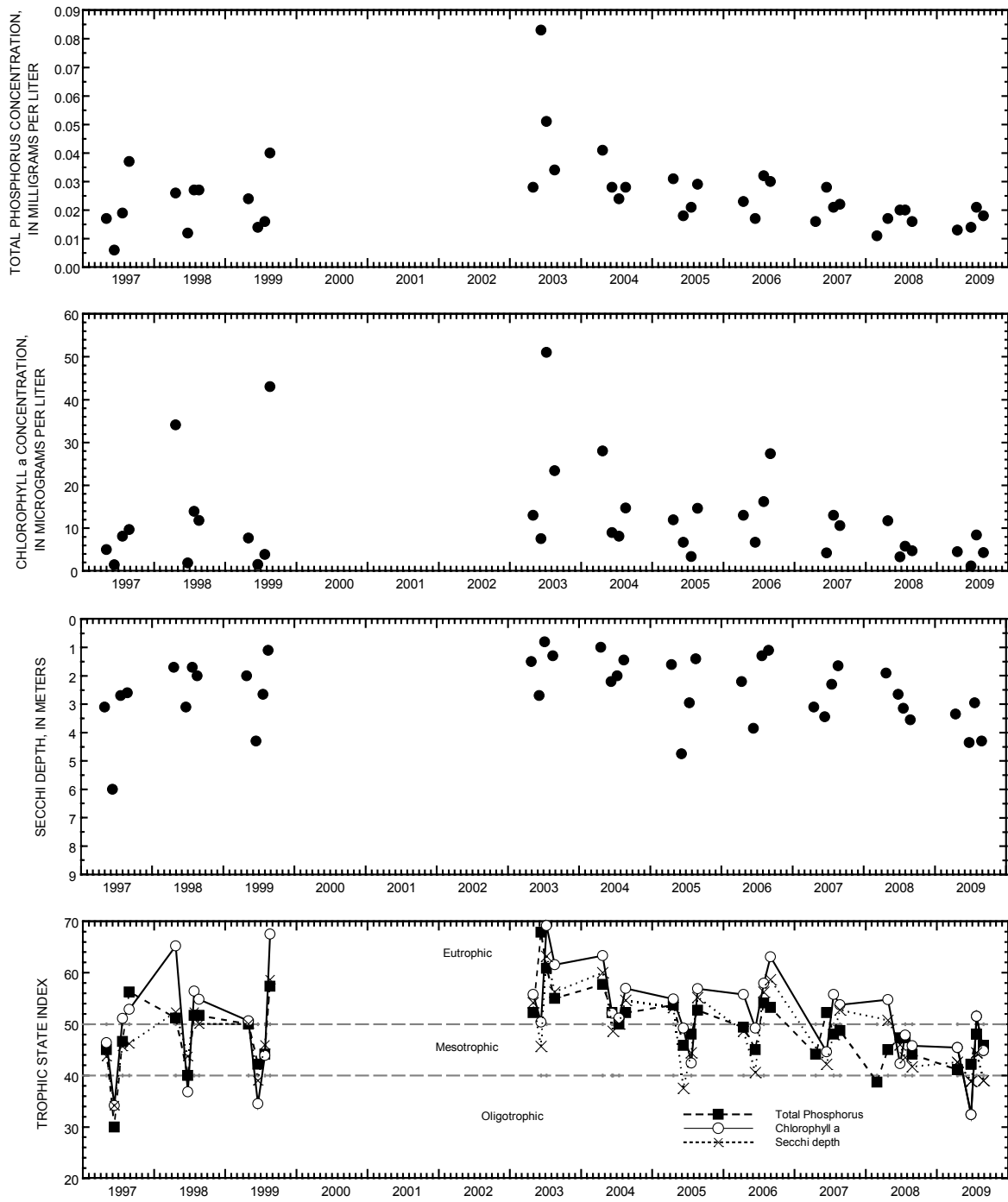
WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 27, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 19</u>		<u>April 16</u>		<u>June 25</u>		<u>July 22</u>		<u>August 27</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	4.53	--	1.2	--	8.42	--	4.47	--
00078	Secchi-depth (m)	--	--	3.4	--	4.4	--	3.0	--	4.3	--
00098	Sampling depth (m)	0.5	7.0	0.5	7.0	0.5	7.5	0.5	7.0	0.5	7.0
00010	Water Temperature (°C)	0.8	4.7	9.1	7.2	28.6	16.2	21.7	18.2	22.3	20.6
00400	pH (standard units)	7.9	7.4	8.2	8.1	7.4	8.7	8.3	7.3	8.4	7.6
00095	Specific conductance (µS/cm)	551	694	536	540	541	571	546	576	538	561
00300	Dissolved oxygen	12.9	1.7	12.4	13.0	7.9	0.9	9.2	0.0	7.8	0.2
00665	Phosphorus, total (as P)	0.020	0.029	0.013	0.015	0.014	0.032	0.021	0.051	0.018	0.021

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

LAKE-DEPTH PROFILES, FEBRUARY 19 TO AUGUST 27, 2009





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 ¼ SE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.8 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

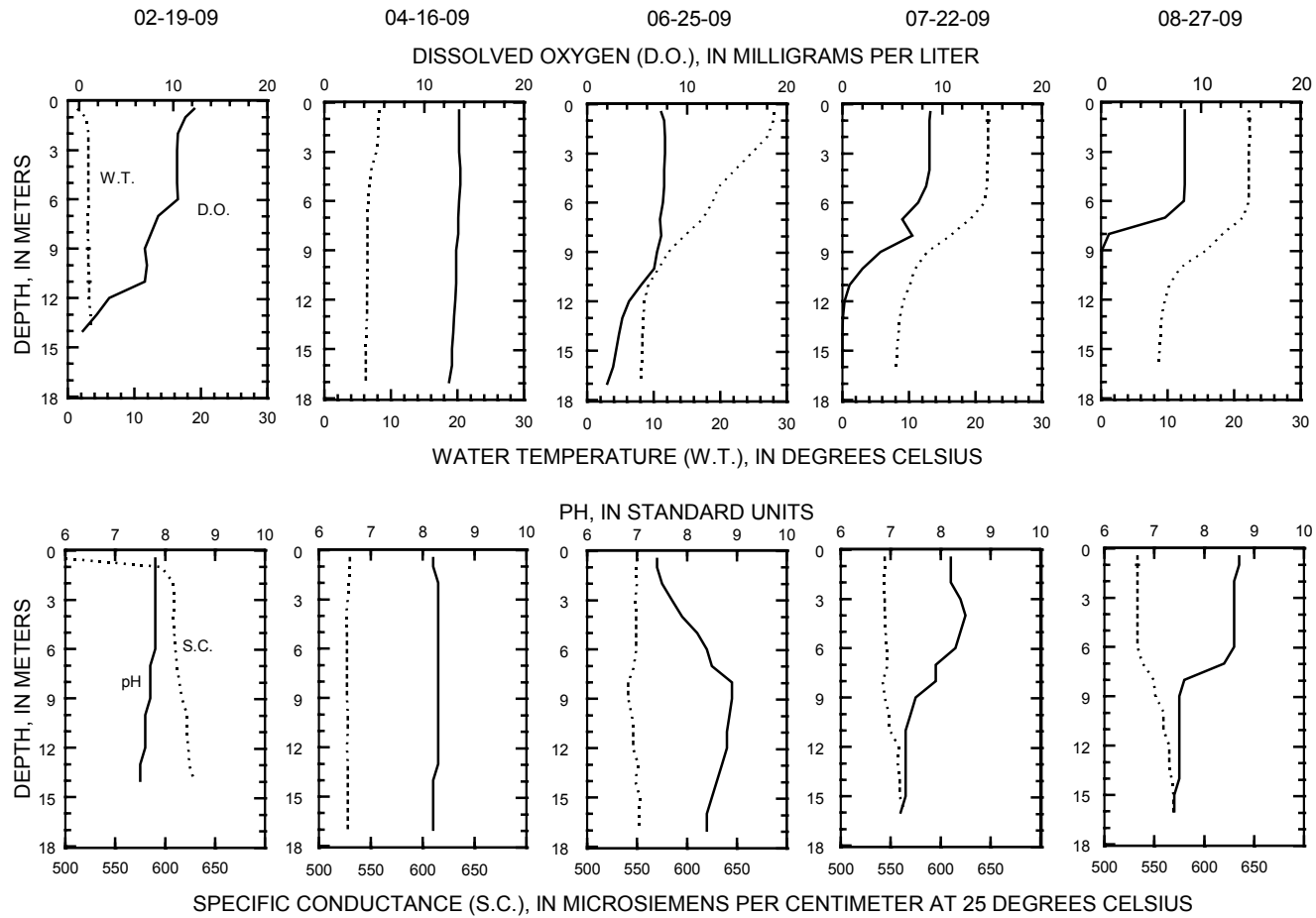
REMARKS.--Lake sampled in southern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

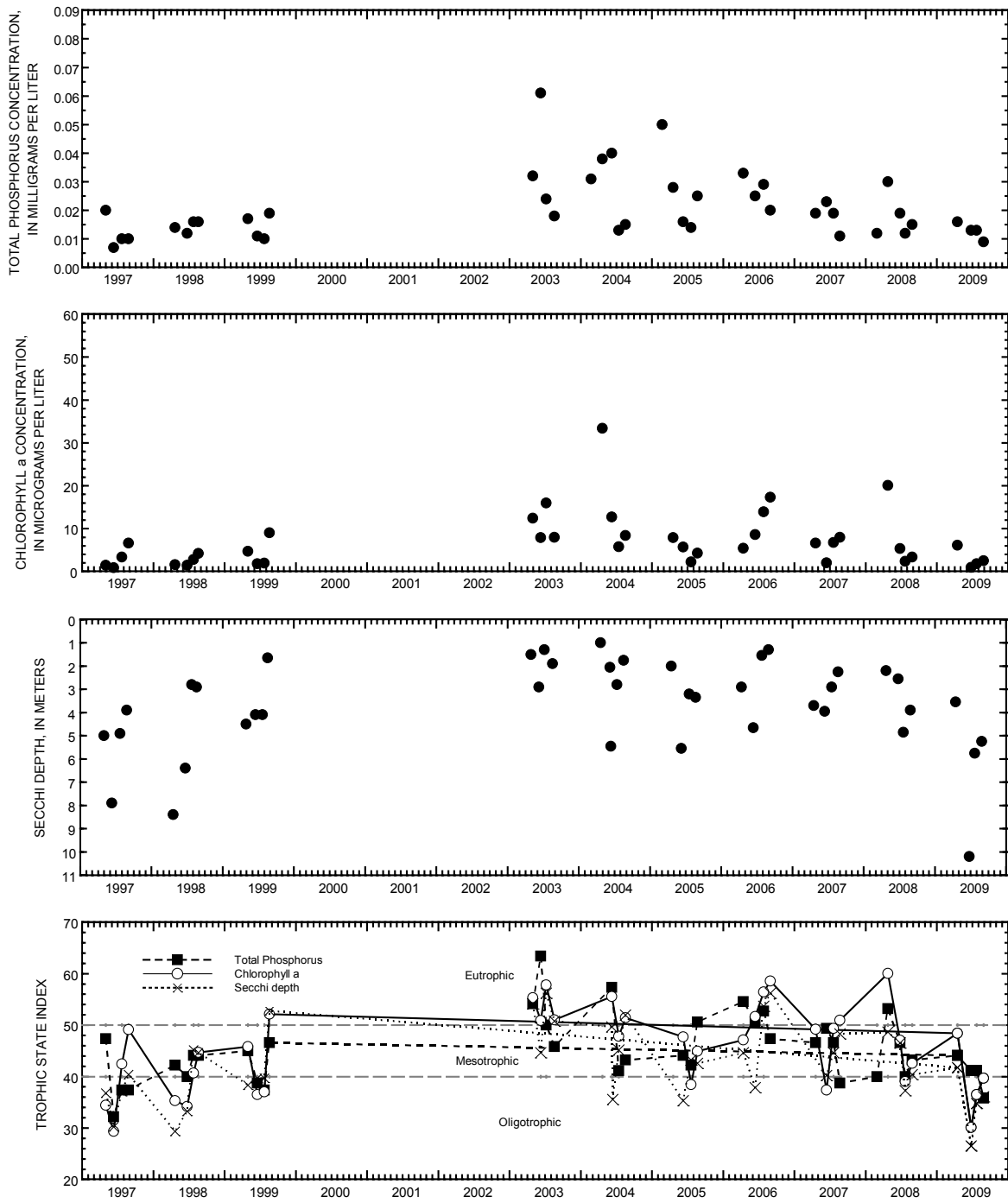
WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 27, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 19</u>		<u>April 16</u>		<u>June 25</u>		<u>July 22</u>		<u>August 27</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	6.14	--	0.95	--	1.82	--	2.53	--
00078	Secchi-depth (m)	--	--	3.6	--	10.2	--	5.8	--	5.2	--
00098	Sampling depth (m)	0.5	14.0	0.5	17.0	0.5	16.5	0.5	16.0	0.5	16.0
00010	Water Temperature (°C)	1.4	3.5	8.3	6.2	28.1	8.2	21.9	8.1	22.2	8.6
00400	pH (standard units)	7.8	7.5	8.2	8.2	7.4	8.4	8.2	7.2	8.7	7.4
00095	Specific conductance (µS/cm)	499	629	530	528	550	552	544	564	533	569
00300	Dissolved oxygen	12.2	0.4	13.5	12.5	7.4	2.6	8.8	0.0	8.4	0.0
00665	Phosphorus, total (as P)	0.015	0.084	0.016	0.015	0.013	0.024	0.013	0.026	0.009	0.173
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	0.004	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.184	--	--	--	<.019	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<.015	--	--	--	<.015	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.45	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.78	--	--	--
00600	Total nitrogen	--	--	0.63	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	240	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	39.7	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	34.4	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	23.9	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.8	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	191	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	50.5	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	20.3	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	2.32	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	296	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 19 TO AUGUST 27, 2009





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

05428000 LAKE MENDOTA AT MADISON, WI

LOCATION.--Lat 43°05'42", long 89°22'12" referenced to North American Datum of 1927, in NW ¼ SE ¼ sec.12, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in county boat house at dam at outlet, in Madison.

SURFACE AREA.—15.2 mi².

DRAINAGE AREA.--233 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--January 1916 to January 1985 (incomplete), February 1985 to current year.

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

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, gage datum was 847.82 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 12.75 ft, June 5, 2000; minimum observed, 8.02 ft, Feb. 24 to Mar. 10, 1920, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 10.99 ft, April 1; minimum recorded, 8.30 ft, Feb. 7, 9.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9.98	9.75	8.99	8.70	8.37	9.46	10.94	10.56	10.06	10.16	9.99	10.01
2	9.96	9.72	8.87	8.69	8.36	9.50	10.94	10.55	10.02	10.14	9.97	10.00
3	9.93	9.70	8.86	8.67	8.35	9.52	10.94	10.53	9.99	10.12	9.95	10.0
4	9.92	9.69	8.83	8.67	8.35	9.53	10.92	10.50	9.95	10.11	9.96	9.99
5	9.91	9.66	e8.82	8.65	8.34	9.55	10.89	10.46	9.92	10.11	9.95	9.98
6	9.90	9.66	e8.81	8.64	8.33	9.59	10.87	10.42	9.89	10.10	9.94	9.97
7	9.92	9.66	e8.77	8.63	8.33	9.70	10.82	10.42	9.86	10.07	9.93	9.96
8	10.01	9.66	e8.76	8.61	8.35	9.93	10.75	10.39	10.02	10.05	10.00	9.95
9	10.01	9.63	e8.75	8.61	8.38	10.21	10.70	10.50	10.06	10.04	10.07	9.94
10	10.0	9.58	e8.74	8.60	8.46	10.48	10.65	10.53	10.06	10.04	10.10	9.93
11	9.99	9.55	e8.73	8.58	8.63	10.68	10.59	10.51	10.05	10.07	10.11	9.92
12	9.99	9.55	e8.72	8.57	8.77	10.77	10.53	10.46	10.04	10.05	10.11	9.91
13	9.99	9.54	e8.70	8.56	8.85	10.81	10.47	10.44	10.04	10.04	10.10	9.90
14	9.99	9.56	e8.68	8.55	8.88	10.79	10.42	10.54	10.03	10.00	10.09	9.89
15	9.99	9.54	e8.67	8.54	8.89	10.77	10.35	10.55	10.00	10.02	10.08	9.88
16	9.98	9.50	e8.67	8.53	8.88	10.74	10.30	10.56	9.97	10.01	10.07	9.86
17	9.97	9.46	e8.67	8.50	8.87	10.71	10.24	10.50	9.98	9.98	10.08	9.85
18	9.95	9.40	e8.67	8.49	8.89	10.69	10.19	10.45	9.98	9.96	10.09	9.84
19	9.93	9.36	e8.66	8.47	8.88	10.66	10.16	10.41	10.16	9.94	10.06	9.83
20	9.93	9.34	e8.66	8.46	8.88	10.62	10.18	10.37	10.26	9.93	10.09	9.82
21	9.91	9.27	e8.66	8.44	8.91	10.58	10.18	10.34	10.29	9.94	10.09	9.83
22	9.88	9.21	e8.65	8.43	8.93	10.54	10.13	10.31	10.30	9.99	10.07	9.98
23	9.86	9.17	e8.65	8.42	8.94	10.51	10.08	10.28	10.32	10.0	10.06	10.19
24	9.89	9.17	e8.65	8.41	8.94	10.59	10.03	10.26	10.32	10.00	10.05	10.24
25	9.90	9.13	e8.65	8.41	8.95	10.78	10.06	10.20	10.32	10.02	10.04	10.25
26	9.91	9.08	e8.65	8.40	9.01	10.84	10.31	10.17	10.31	10.01	10.04	10.26
27	9.87	9.06	e8.66	8.40	9.23	10.86	10.46	10.19	10.27	10.00	10.03	10.27
28	9.84	9.02	e8.67	8.39	9.38	10.88	10.51	10.19	10.27	10.01	10.04	10.33
29	9.82	8.97	e8.68	8.39	---	10.90	10.52	10.16	10.23	9.99	10.06	10.25
30	9.79	8.96	8.70	8.38	---	10.88	10.54	10.13	10.19	10.0	10.03	10.21
31	9.77	---	8.70	8.37	---	10.91	---	10.09	---	10.0	10.01	---
Mean	9.93	9.42	8.72	8.52	8.73	10.42	10.49	10.39	10.11	10.03	10.04	10.01
Max	10.01	9.75	8.99	8.70	9.38	10.91	10.94	10.56	10.32	10.16	10.11	10.33
Min	9.77	8.96	8.65	8.37	8.33	9.46	10.03	10.09	9.86	9.93	9.93	9.82

460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

LOCATION.--Lat 46°09'37", long 90°03'31", in SW ¼ SE ¼ NW ¼ sec.36, T.43 N., R.3 E., Iron County, Hydrologic Unit 07050002, at Minocqua.

SURFACE AREA.—0.29 mi².

PERIOD OF RECORD.—March 2008 to September 2009 (discontinued).

REMARKS.--Lake sampled in the east basin at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 23 TO AUGUST 5, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Mar. 23</u>		<u>Apr. 28</u>	<u>June 16</u>	<u>June 29</u>		<u>Aug. 5</u>		
00078	Secchi-depth (m)	1.9		2.1	2.7	2.3		3.2		
00098	Sampling depth (m)	1.0	5.5	0.5	0.5	0.5	6.0	0.5	5.0	5.5
00010	Water Temperature (°C)	5.1	4.8	7.3	19.9	20.5	14.1	20.1	18.9	18.5
00400	pH (standard units)	7.3	7.2	7.3	8.0	8.1	7.2	7.9	7.2	6.9
00095	Specific conductance (µS/cm)	234	297	204	200	191	239	195	201	207
00300	Dissolved oxygen	5.3	0.1	9.8	10.0	6.9	0.7	8.6	5.8	4.3
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	4.24	2.72	4.23	--	1.7	--	--
00665	Phosphorus, total (as P)	0.026	0.017	0.030	0.040	0.048	0.053	0.023	0.024	0.142
00671	Orthophosphate, dissolved (as P)	--	--	0.005	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	<.019	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.022	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.59	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	2.4	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	10	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	97	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	27.4	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	6.9	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	6.1	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.3	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	84	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	12.6	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	<4.5	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	13.4	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	100	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	134	--	--	--	--	--	--

460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

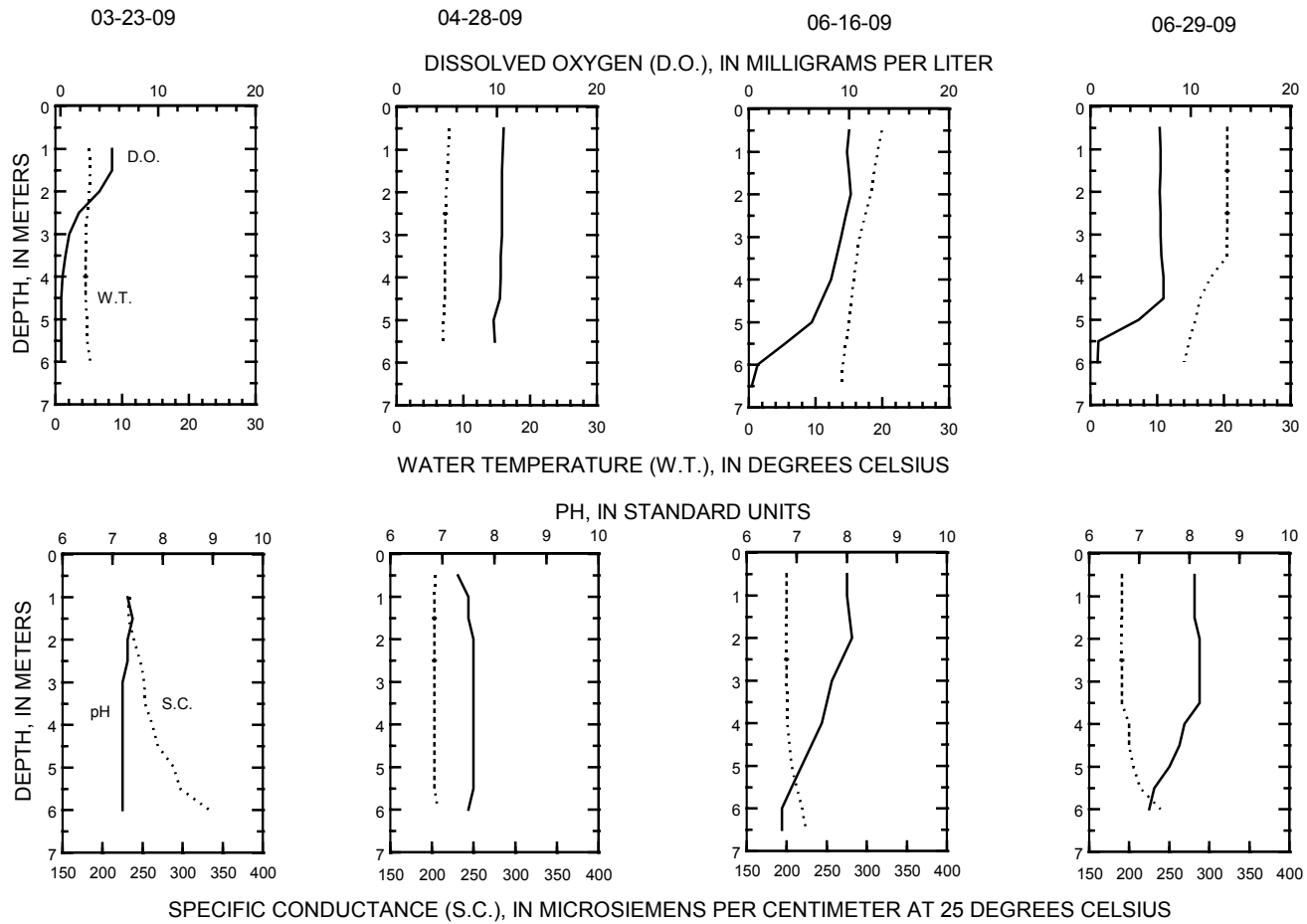
WATER-QUALITY DATA, AUGUST 19 TO SEPTEMBER 16, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Aug. 19</u>		<u>Sept. 2</u>		<u>Sept. 16</u>	
00078	Secchi-depth (m)	3.1				4.2	
00098	Sampling depth (m)	0.5	5.5	0.5	5	0.5	5.5
00010	Water Temperature (°C)	21.9	18.9	19.3	17.9	21.4	18.2
00400	pH (standard units)	7.8	6.8	7.8	7	8.3	7.3
00095	Specific conductance (µS/cm)	182	210	192	193	160	173
00300	Dissolved oxygen	7.8	2.5	9.3	6	9.5	0.6
32210	Chlorophyll a, phytoplankton (µg/L)	2.49	--	2.7	--	--	--
00665	Phosphorus, total (as P)	0.037	0.035	0.024	0.019	0.019	0.037

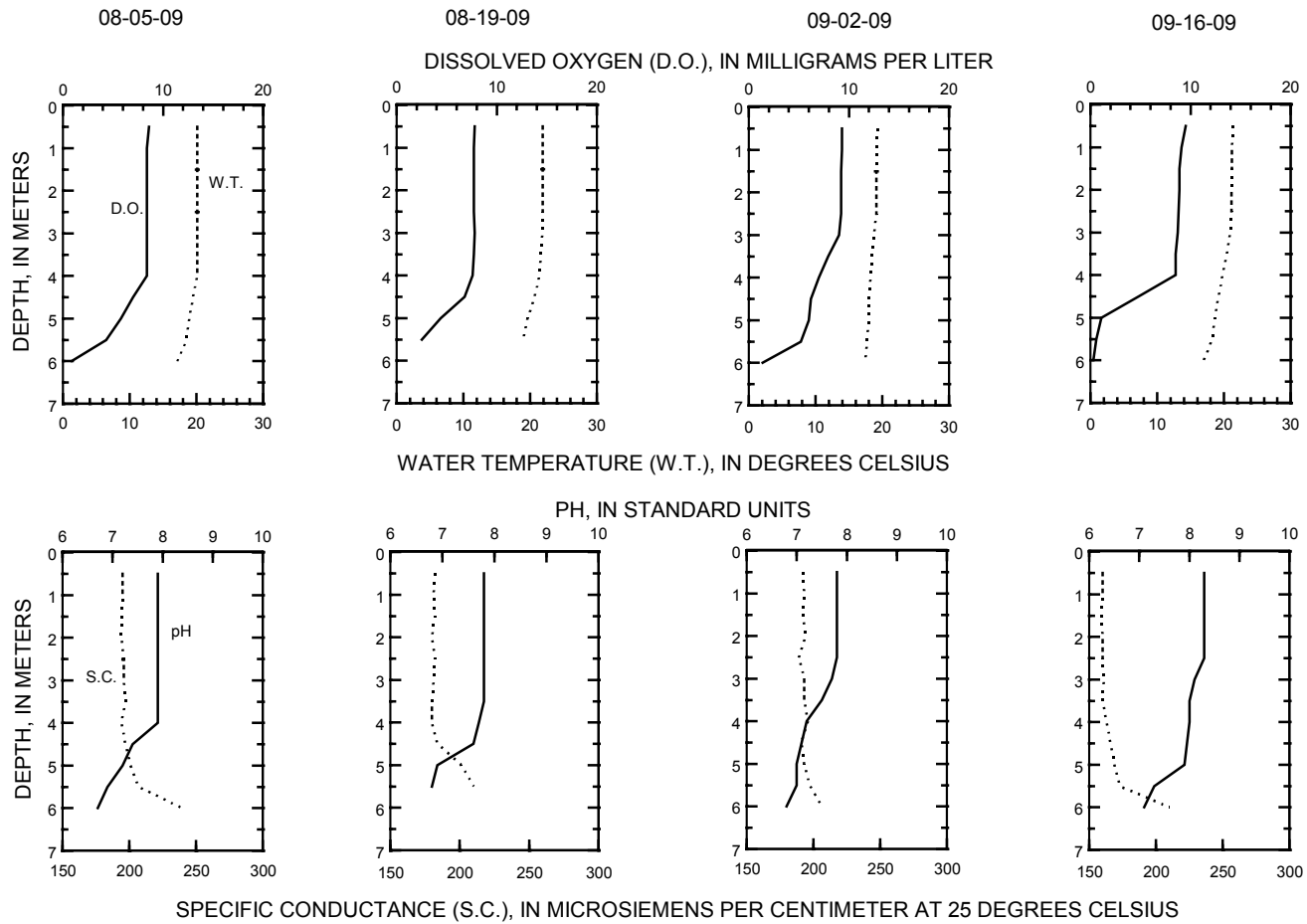
460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

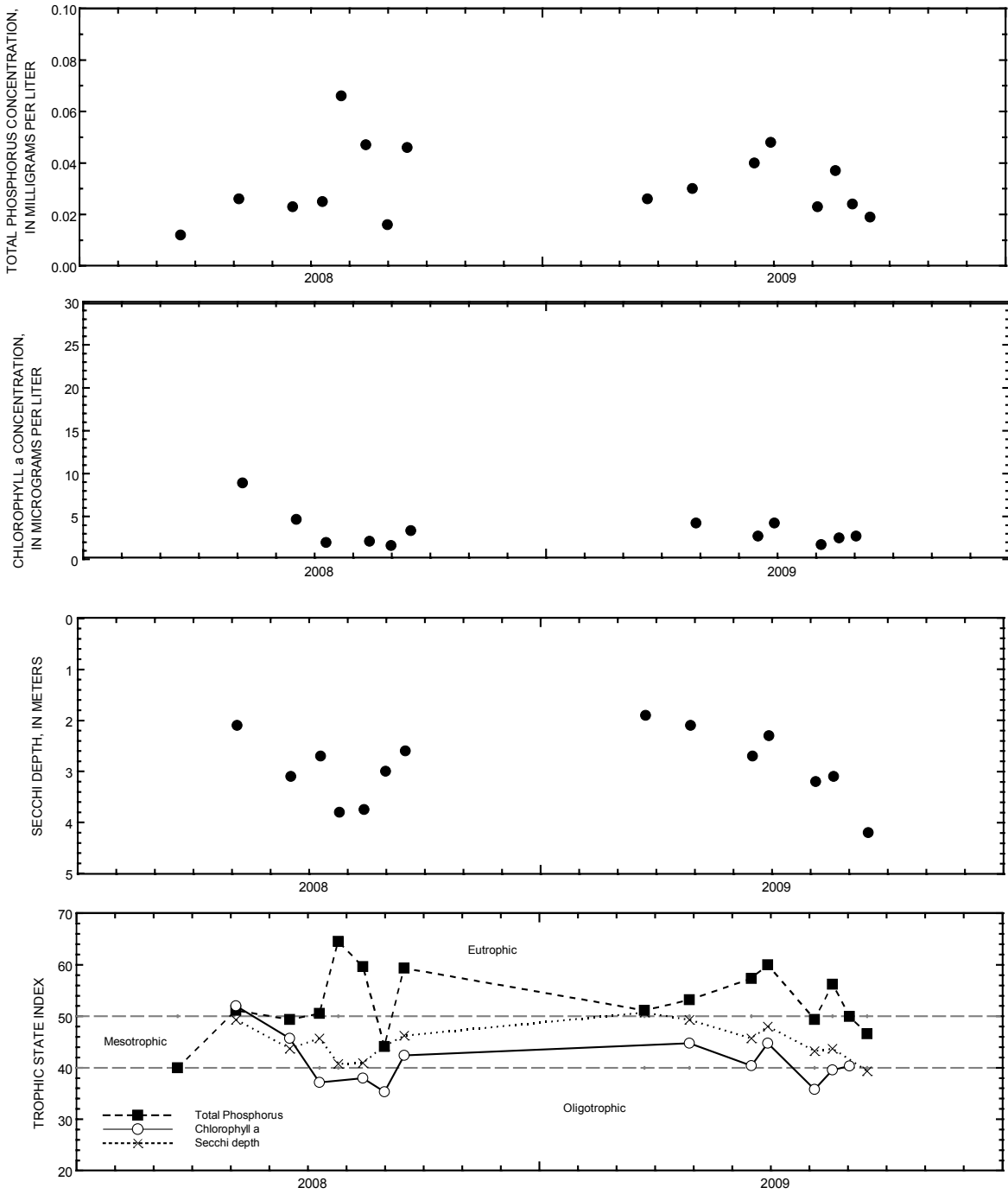
LAKE-DEPTH PROFILES, MARCH 23 TO JUNE 29, 2009



460937090033100 MERCER LAKE, DEEP HOLE, AT MERCER, WI

LAKE-DEPTH PROFILES, AUGUST 5 TO SEPTEMBER 16, 2009





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

460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

LOCATION.--Lat 46°09'45", long 90°04'06", in SW ¼ SE ¼ NW ¼ sec.36, T.43 N., R.3 E., Iron County, Hydrologic Unit 07050002, at Mercer.

SURFACE AREA.—0.29 mi².

PERIOD OF RECORD.—March 2008 to current year.

REMARKS.--Lake sampled in the west basin. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 23 TO SEPTEMBER 16, 2009

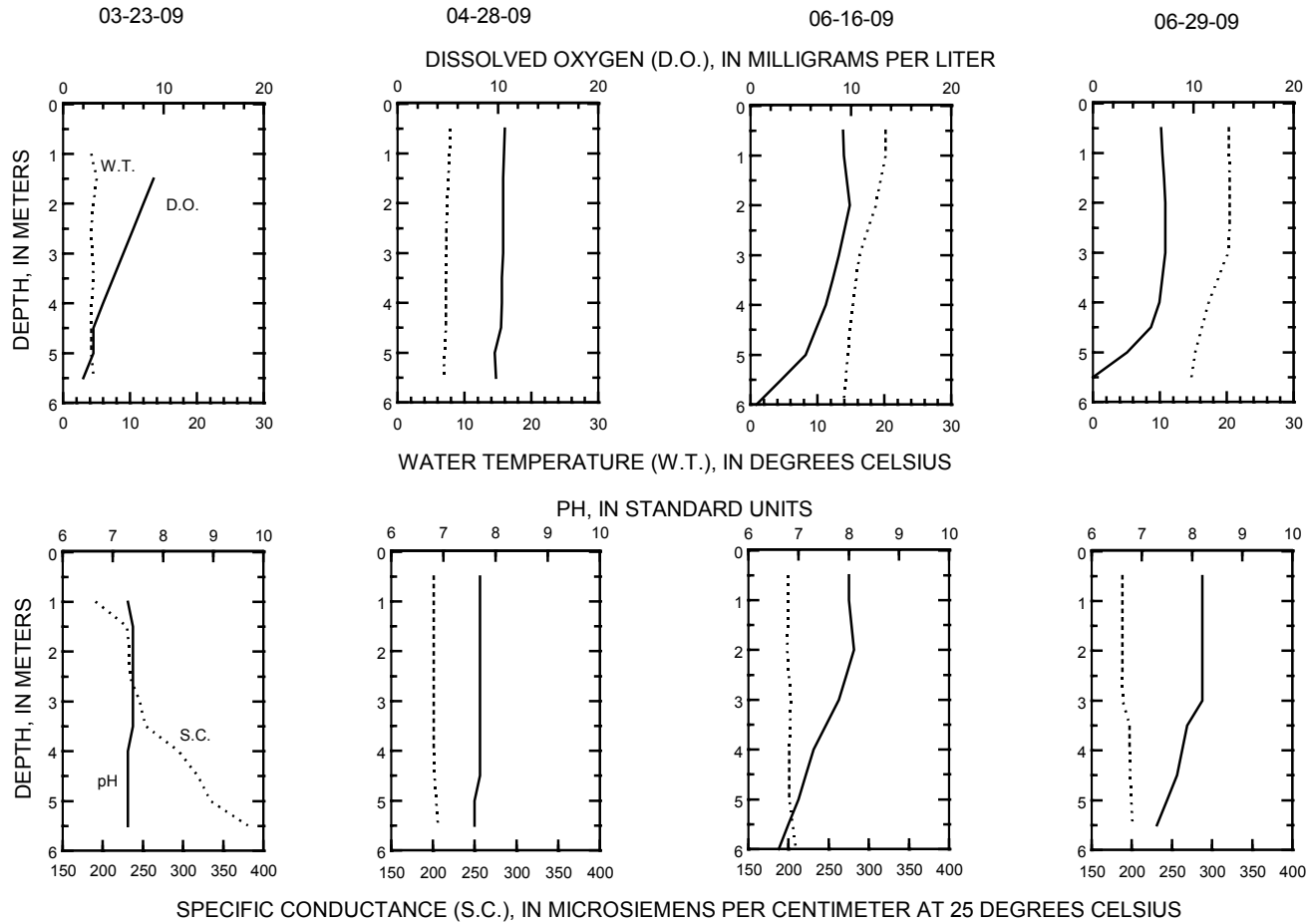
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>March 23</u>		<u>Apr. 28</u>	<u>June 16</u>	<u>June 29</u>		<u>Aug. 5</u>	
00078	Secchi-depth (m)	1.8		2.1	2.7	2.3		3.1	
00098	Sampling depth (m)	1.0	5.5	0.5	0.5	0.5	5.5	0.5	5.5
00010	Water Temperature (°C)	4.2	4.6	7.9	20.2	20.3	14.7	20.0	18.0
00400	pH (standard units)	7.3	7.3	7.7	8.0	8.2	7.3	8.0	6.7
00095	Specific conductance (µS/cm)	191	381	201	199	188	201	191	202
00300	Dissolved oxygen	--	0.4	10.7	9.2	6.8	0.0	8.8	1.8
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	4.84	3.16	5.08	--	1.41	--
00665	Phosphorus, total (as P)	0.026	0.134	0.024	0.039	0.026	0.054	0.020	0.025

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Aug. 19</u>		<u>Sept. 2</u>		<u>Sept. 16</u>	
00078	Secchi-depth (m)	2.7		3.5		4.2	
00098	Sampling depth (m)	0.5	5.5	0.5	5.5	0.5	5.5
00010	Water Temperature (°C)	21.9	18.5	19.3	17.2	21.7	17.6
00400	pH (standard units)	7.8	6.6	7.9	6.9	8.4	7.3
00095	Specific conductance (µS/cm)	176	200	187	192	159	165
00300	Dissolved oxygen	7.7	0.9	9.9	4.9	8.8	0.2
32210	Chlorophyll a, phytoplankton (µg/L)	2.28	--	3.14	--	--	--
00665	Phosphorus, total (as P)	0.022	0.083	0.015	0.030	0.022	0.047

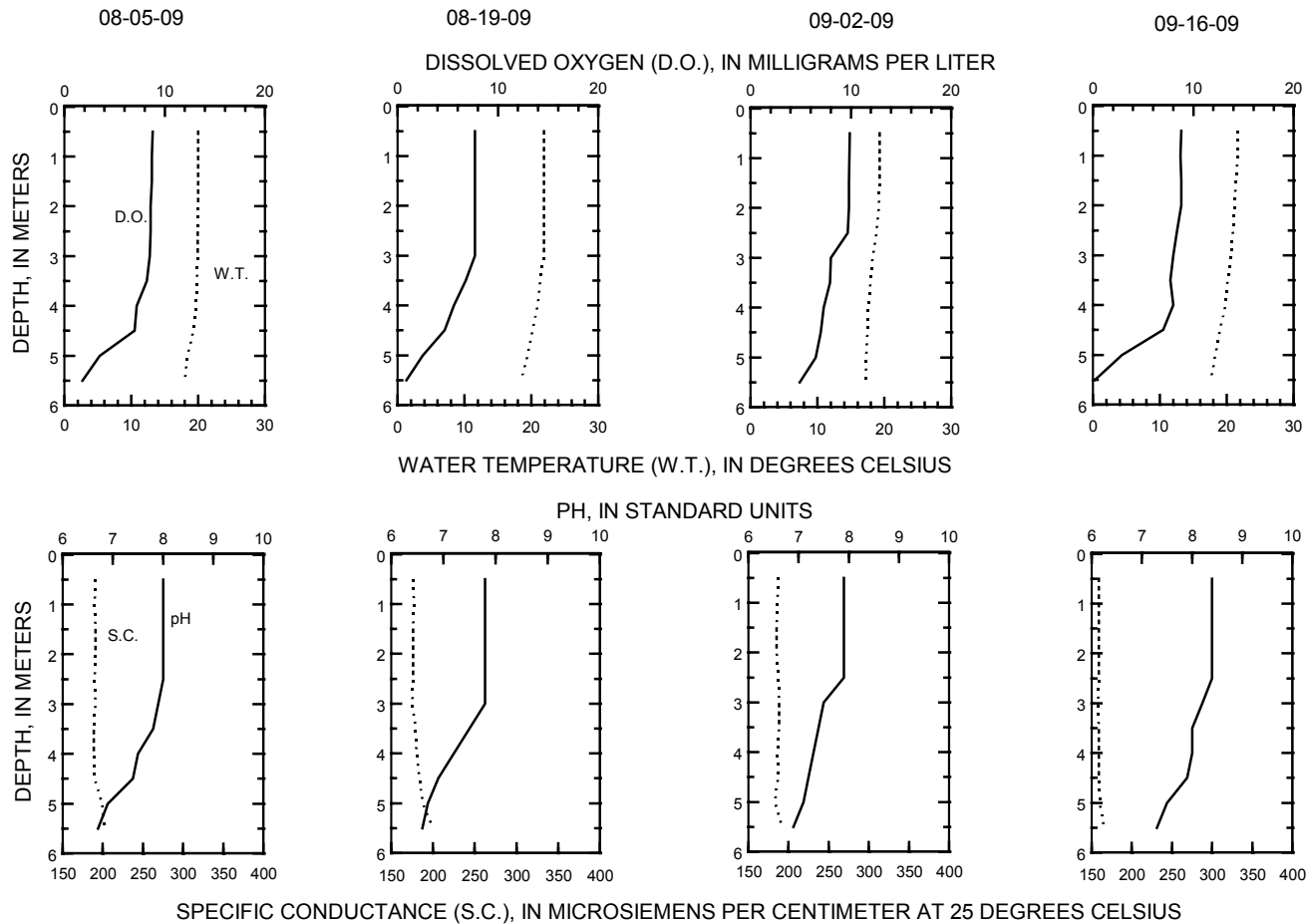
460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

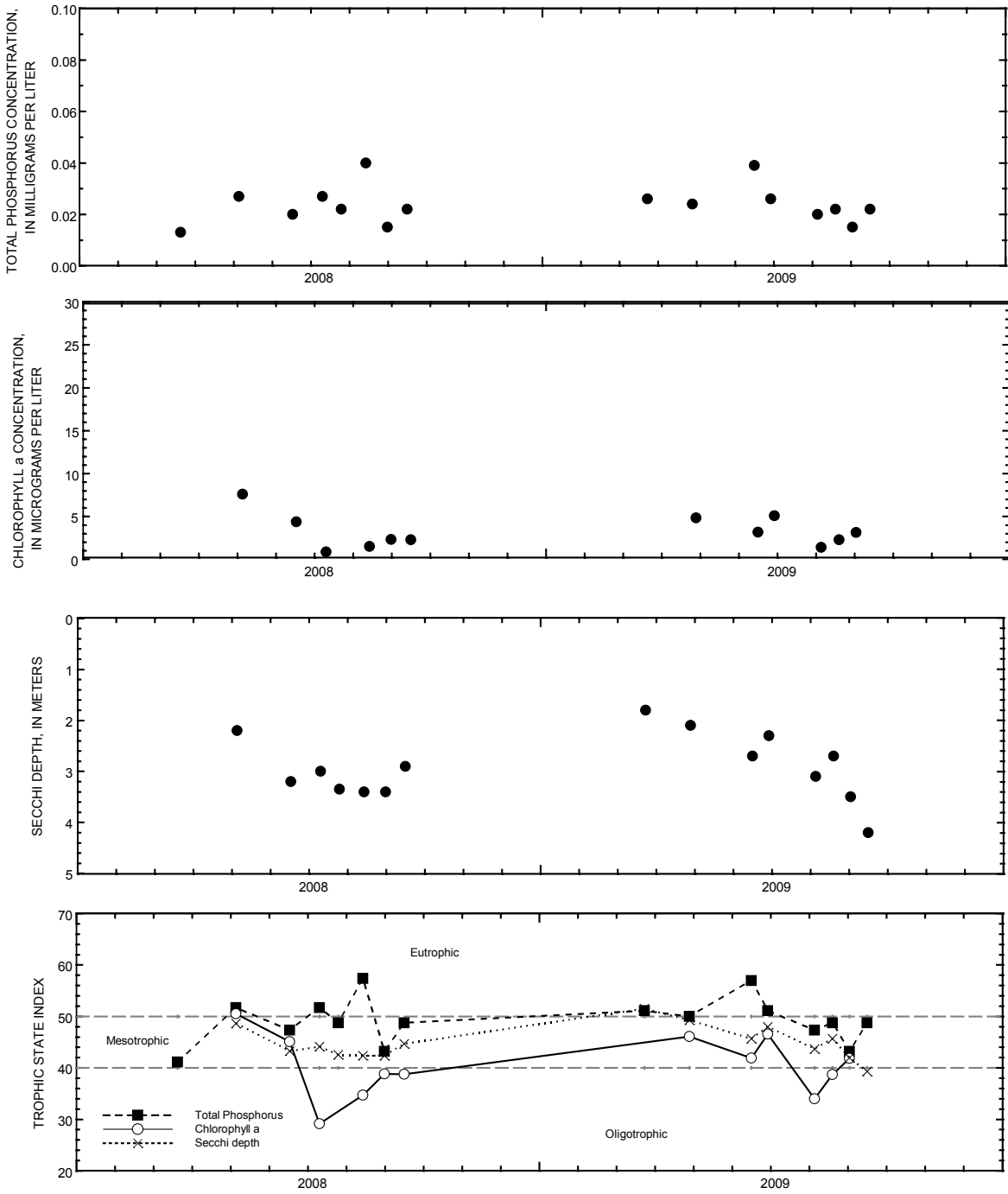
LAKE-DEPTH PROFILES, MARCH 23 TO JUNE 29, 2009



460945090040600 MERCER LAKE, WEST BASIN, AT MERCER, WI

LAKE-DEPTH PROFILES, AUGUST 5 TO SEPTEMBER 16, 2009





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

430251088284700 MIDDLE GENESEE LAKE, AT GENESEE LAKE ROAD, NEAR OCONOMOWOC, WI

LOCATION.--Lat 43° 02'51", long 88°28'47", in SW ¼ SW ¼ SW ¼ sec.22, T. 7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at the southwest side of the lake about 2 miles south of Oconomowoc.

SURFACE AREA.--0.17 mi².

DRAINAGE AREA.--Unknown.

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

GAGE.--Staff gage. Local observer, Tom Schubring provided most readings of gage. Datum of gage is about 0.0 ft above NGVD of 1929.

EXTREMES FOR THE PERIOD OF RECORD.--Maximum observed gage height, 869.65 ft, July 12, 2008; minimum observed, 863.88 ft, Oct. 31, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum observed gage height, 868.05 ft, June 22; minimum observed, 866.40 ft, Oct. 3.

GAGE HEIGHT, FT					
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009					
Date	Gage Height, ft	Date	Gage Height, ft	Date	Gage Height, ft
October 3	866.40	May 26	867.85	July 20	867.52
7	866.49	27	867.88	25	867.50
8	866.55	June 1	867.86	27	867.47
14	866.57	4	867.81	29	867.41
15	866.59	5	867.78	31	867.37
18	866.60	8	867.79	August 1	867.33
25	866.63	9	867.81	2	867.31
28	866.61	11	867.76	3	867.29
31	866.59	15	867.73	4	867.27
November 2	866.57	17	867.70	6	867.21
4	866.59	18	867.67	8	867.29
9	866.61	19	867.91	13	867.21
16	866.63	22	868.05	17	867.12
21	866.59	24	868.03	21	867.07
25	866.58	27	868.00	24	866.97
April 16	867.31	28	867.97	27	866.93
22	867.41	30	867.90	31	866.87
May 3	867.71	July 1	867.89	September 1	866.87
5	867.70	5	867.81	3	866.83
7	867.77	9	867.73	14	866.69
9	867.82	12	867.71	17	866.62
10	867.83	15	867.73	19	866.59
14	867.91	17	867.59	23	866.67
22	867.89	19	867.54	30	866.63

05429000 LAKE MONONA AT MADISON, WI

LOCATION.--Lat 43°03'48", long 89°23'49" referenced to North American Datum of 1927, in SE ¼ SW ¼ sec.23, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in Brittingham Park, in Madison.

SURFACE AREA.--5.3 mi².

DRAINAGE AREA.--279 mi² of which 36.6 mi² probably is noncontributing.

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 NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, datum 843.61 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 7.92 ft, June 15, 2008; minimum observed, 3.22 ft, Jan. 20, 1965, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.21 ft, Mar. 26; minimum recorded, 4.48 ft, Feb. 26.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.68	4.91	5.04	5.12	4.58	4.70	5.89	5.91	5.64	5.83	5.49	5.53
2	5.64	4.91	5.04	5.09	4.55	4.66	5.85	5.83	5.62	5.80	5.47	5.52
3	5.61	4.92	5.05	5.06	4.54	4.62	5.80	5.77	5.62	5.80	5.46	5.51
4	5.58	4.92	5.04	5.04	4.52	4.58	5.76	5.72	5.61	5.80	5.45	5.50
5	5.56	4.92	5.05	5.02	4.51	4.56	5.75	5.71	5.59	5.79	5.43	5.50
6	5.55	4.95	5.07	5.00	4.51	4.54	5.68	5.72	5.58	5.77	5.41	5.49
7	5.57	4.96	5.04	4.97	4.52	4.63	5.66	5.80	5.54	5.77	5.43	5.49
8	5.65	4.94	5.05	4.94	4.52	4.90	5.67	5.80	5.68	5.77	5.54	5.48
9	5.62	4.91	5.11	4.94	4.53	5.15	5.67	5.93	5.68	5.76	5.62	5.47
10	5.60	4.89	5.10	4.92	4.59	5.37	5.67	5.96	5.69	5.77	5.65	5.46
11	5.57	4.90	5.09	4.91	4.67	5.48	5.65	5.94	5.68	5.79	5.65	5.46
12	5.55	4.93	5.03	4.89	4.69	5.52	5.66	5.93	5.69	5.79	5.64	5.44
13	5.52	4.95	5.01	4.89	4.69	5.55	5.67	5.94	5.74	5.76	5.64	5.43
14	5.47	5.00	5.03	4.88	4.72	5.57	5.66	6.01	5.77	5.74	5.63	5.41
15	5.45	5.00	5.02	4.87	4.72	5.58	5.64	5.99	5.79	5.73	5.63	5.40
16	5.41	4.99	4.97	4.86	4.73	5.58	5.63	5.92	5.79	5.69	5.62	5.39
17	5.37	4.98	4.96	4.85	4.74	5.59	5.63	5.88	5.77	5.66	5.62	5.36
18	5.34	5.00	4.95	4.84	4.74	5.59	5.63	5.85	5.77	5.62	5.59	5.34
19	5.30	5.04	5.02	4.84	4.71	5.59	5.66	5.83	6.01	5.60	5.59	5.32
20	5.26	5.04	5.03	4.83	4.68	5.59	5.75	5.79	6.10	5.58	5.61	5.29
21	5.21	5.03	5.04	4.82	4.66	5.59	5.77	5.77	6.11	5.58	5.62	5.28
22	5.17	5.05	5.03	4.81	4.62	5.58	5.79	5.76	6.13	5.62	5.60	5.44
23	5.12	5.06	5.04	4.77	4.57	5.62	5.80	5.78	6.12	5.61	5.59	5.65
24	5.13	5.07	5.05	4.73	4.54	5.79	5.78	5.79	6.10	5.59	5.58	5.65
25	5.10	5.07	5.04	4.70	4.51	6.14	5.79	5.75	6.08	5.59	5.57	5.65
26	5.04	5.07	5.05	4.67	4.55	6.19	6.07	5.70	6.05	5.57	5.58	5.66
27	4.97	5.07	5.10	4.65	4.72	6.17	6.13	5.72	6.01	5.55	5.58	5.68
28	4.93	5.05	5.19	4.63	4.73	6.09	6.09	5.70	5.94	5.54	5.57	5.70
29	4.90	5.05	5.19	4.61	---	6.01	6.02	5.67	5.89	5.51	5.57	5.66
30	4.88	5.06	5.17	4.59	---	5.95	5.98	5.65	5.85	5.51	5.55	5.65
31	4.90	---	5.14	4.59	---	5.92	---	5.63	---	5.52	5.53	---
Mean	5.34	4.99	5.06	4.85	4.62	5.43	5.77	5.81	5.82	5.68	5.56	5.49
Max	5.68	5.07	5.19	5.12	4.74	6.19	6.13	6.01	6.13	5.83	5.65	5.70
Min	4.88	4.89	4.95	4.59	4.51	4.54	5.63	5.63	5.54	5.51	5.41	5.28

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

LOCATION.--Lat 43°05'51", long 88°27'35", in NW ¼ SE ¼ sec.2, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.--1.20 mi².

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

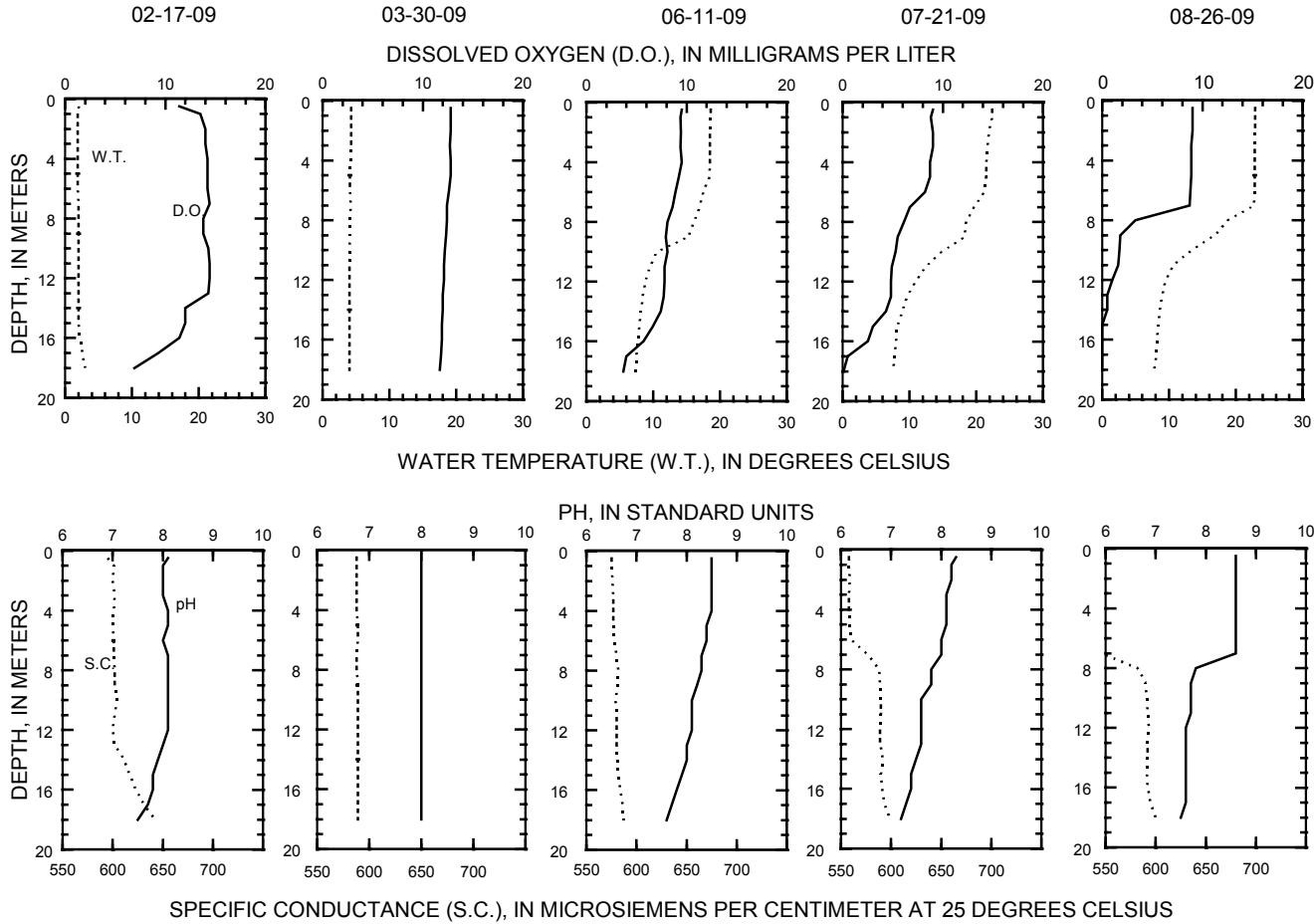
REMARKS.--Lake sampled near center at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

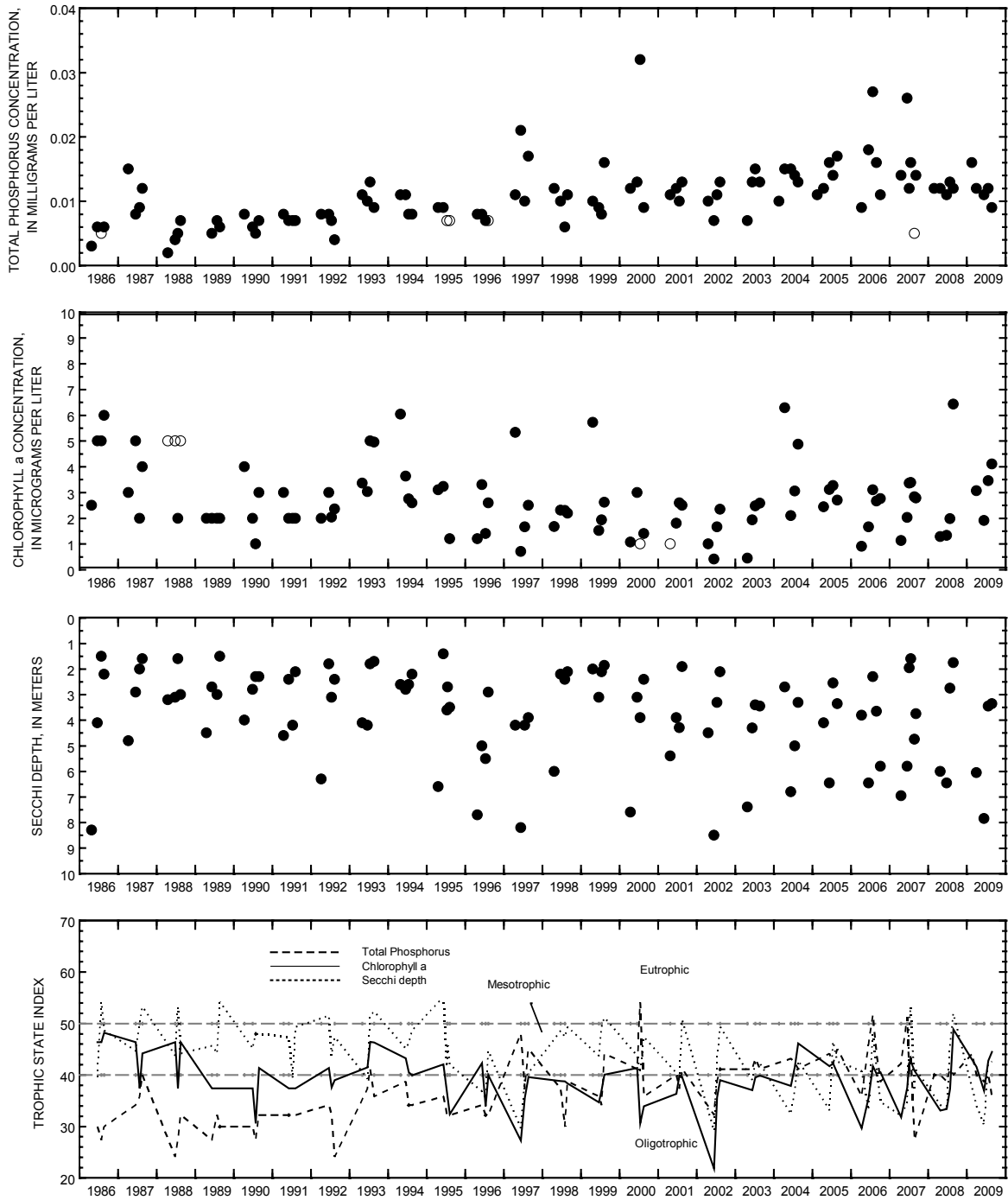
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 26, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 17</u>		<u>March 30</u>		<u>June 11</u>		<u>July 21</u>		<u>August 26</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	3.07	--	1.91	--	3.46	--	4.11	--
00078	Secchi-depth (m)	--	--	6.0	--	7.8	--	3.4	--	3.4	--
00098	Sampling depth (m)	0.5	18	0.5	18	0.5	18	0.5	18	0.5	18
00010	Water Temperature (°C)	2.1	3	4.3	4	18.6	7.4	22.4	7.5	22.9	7.8
00400	pH (standard units)	8.1	7.5	8	8	8.5	7.6	8.3	7.2	8.6	7.5
00095	Specific conductance (µS/cm)	595	642	588	589	575	587	558	599	545	600
00300	Dissolved oxygen	11.4	6.9	12.8	11.7	9.5	3.7	9	0.1	9	0
00665	Phosphorus, total (as P)	0.016	0.019	0.012	0.012	0.011	0.019	0.012	0.018	0.009	0.011
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.501	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<.015	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.56	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	1.1	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	10	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	260	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	52.5	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	32.1	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	20.2	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2.2	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	218	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	47.4	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	27.2	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	8.67	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	356	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2009





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

(Open circles on the first two 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 ¼ NW ¼ sec.1, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.—1.20 mi².

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

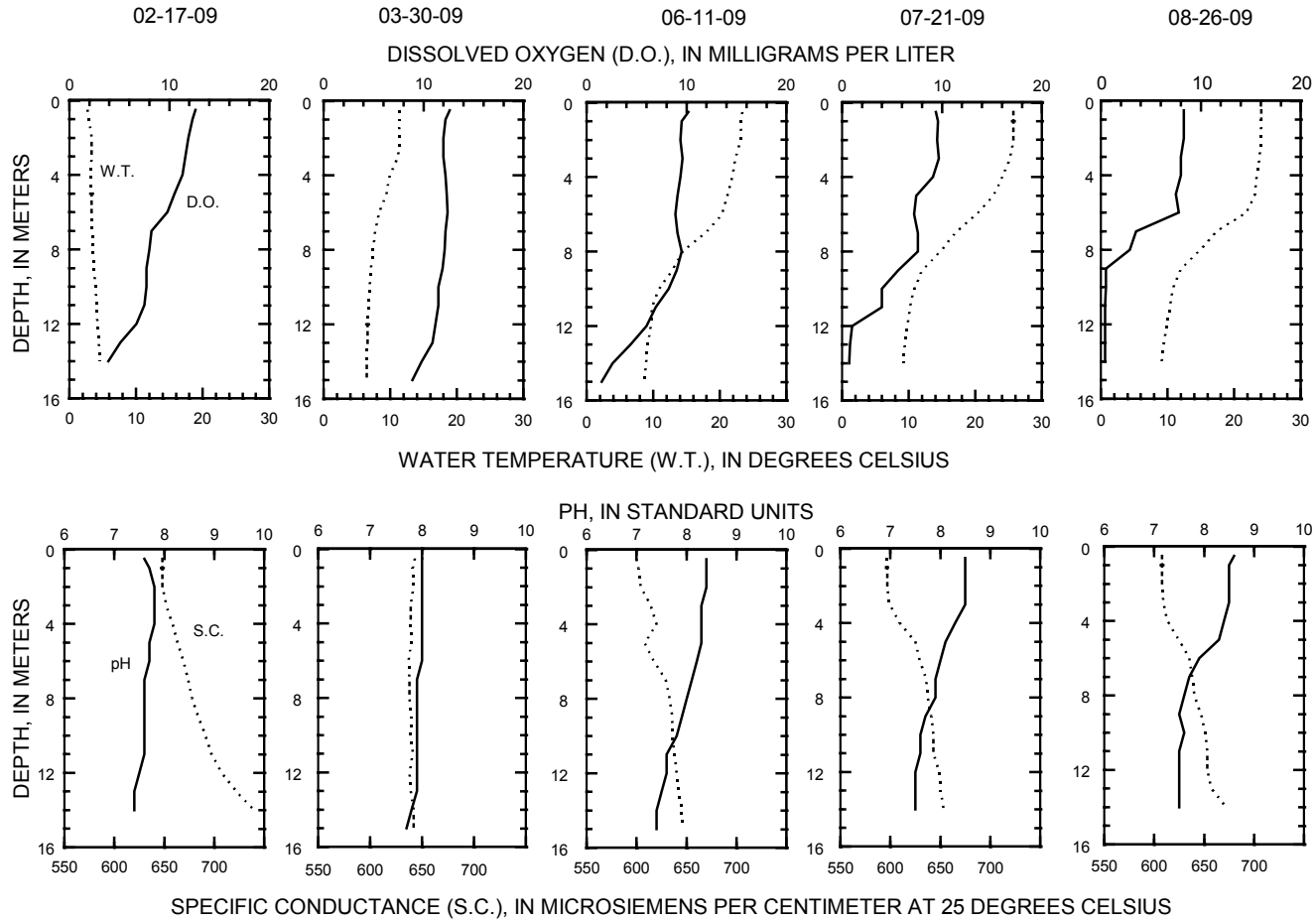
REMARKS.--Lake sampled at the deepest point in northeast bay near Hewitt Point. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

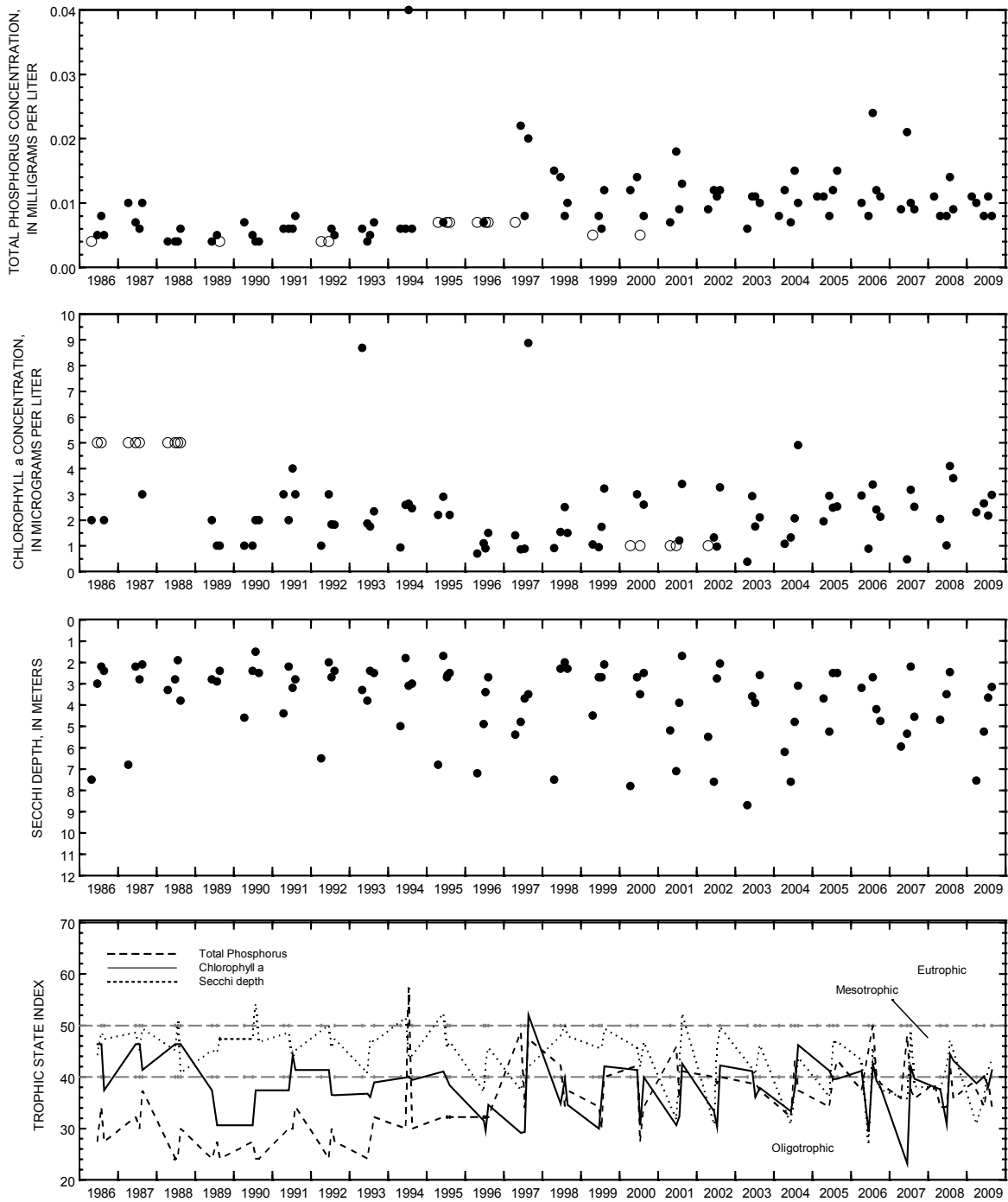
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 26, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 17</u>		<u>March 30</u>		<u>June 11</u>		<u>July 21</u>		<u>August 26</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--		2.3		2.64		2.17		2.97	
00078	Secchi-depth (m)	--		7.6		5.2		3.6		3.2	
00098	Sampling depth (m)	0.5	13.5	0.5	14.0	0.5	14.0	0.5	13.0	0.5	14.5
00010	Water Temperature (°C)	3.5	3.7	5.6	4.9	19.0	8.1	22.3	9.0	22.9	8.9
00400	pH (standard units)	7.8	7.3	7.9	7.9	8.4	7.2	8.1	7.3	8.6	7.5
00095	Specific conductance (µS/cm)	652	713	654	655	618	649	612	660	602	669
00300	Dissolved oxygen	12.1	7.0	13.1	12.9	9.7	4.0	8.9	1.6	9.0	0.0
00665	Phosphorus, total (as P)	0.011	0.014	0.010	0.010	0.008	0.021	0.011	0.015	0.008	0.012

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

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2009





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

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

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LOCATION.--Lat 42°32'46", long 88°17'58", in NW ¼ SE ¼ sec.13, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at Powers Lake.

SURFACE AREA.—0.72 mi².

DRAINAGE AREA.--3.42 mi².

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

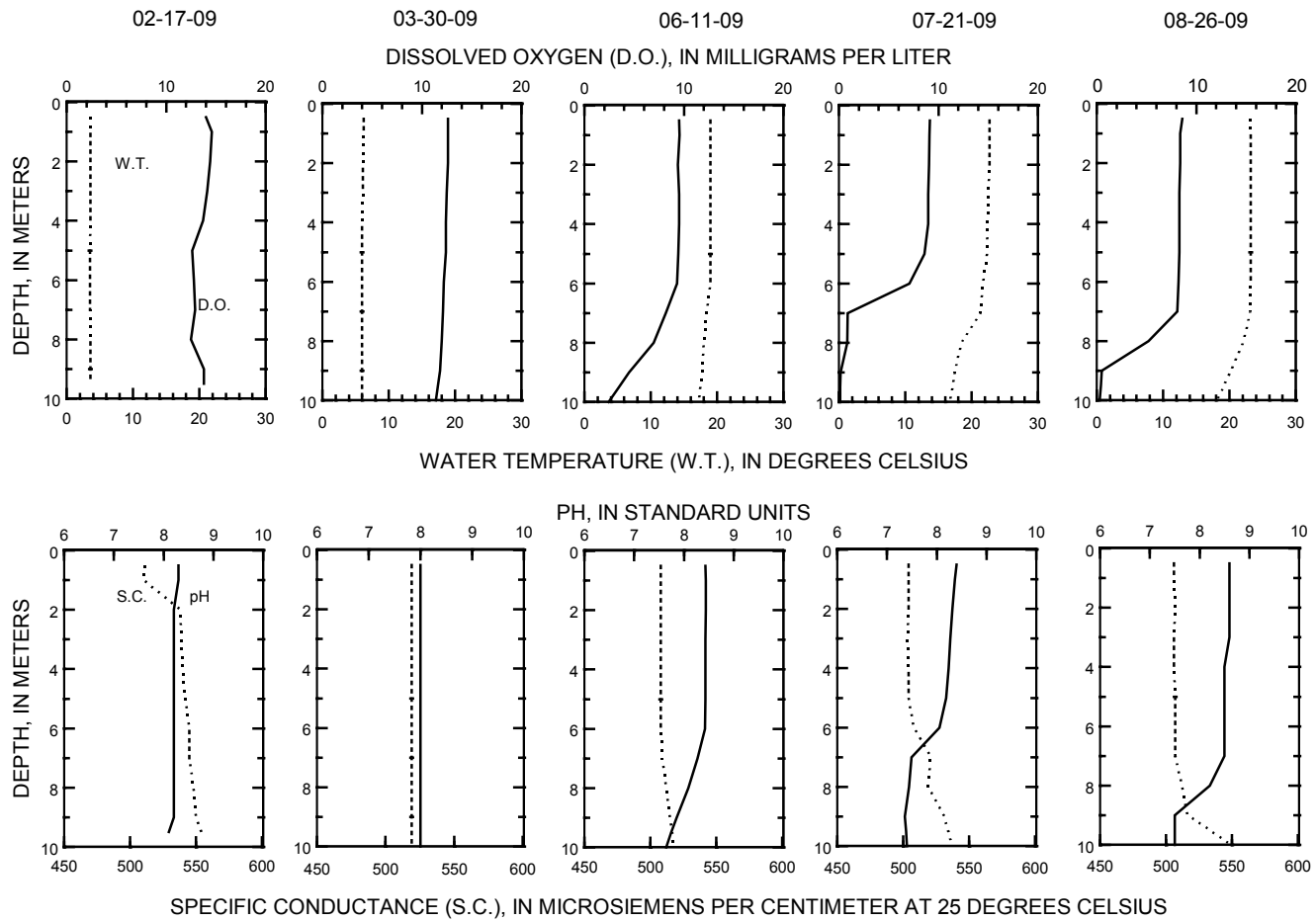
REMARKS.--Lake sampled near center at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

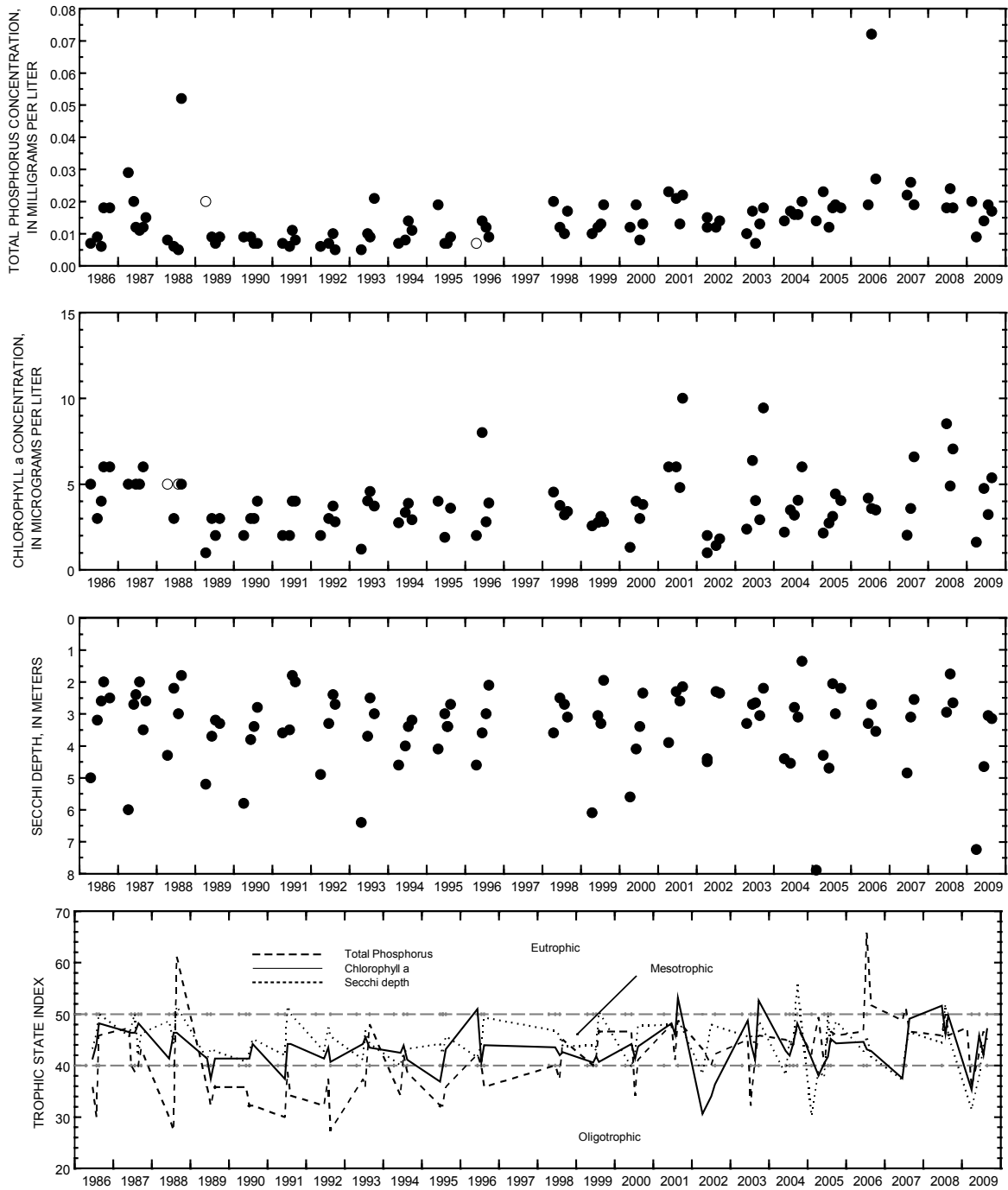
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 26, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 17</u>		<u>March 30</u>		<u>June 11</u>		<u>July 21</u>		<u>August 26</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	1.61	--	4.74	--	3.22	--	5.37	--
00078	Secchi-depth (m)	--	--	7.2	--	4.6	--	3.0	--	3.2	--
00098	Sampling depth (m)	0.5	9.5	0.5	10.0	0.5	10.0	0.5	10.0	0.5	10.0
00010	Water Temperature (°C)	3.5	3.6	6.2	6	19	17.2	22.7	16.7	23.1	18.1
00400	pH (standard units)	8.3	8.1	8.0	8.0	8.4	7.6	8.4	7.4	8.6	7.5
00095	Specific conductance (µS/cm)	511	554	519	519	508	518	504	537	506	549
00300	Dissolved oxygen	14.0	13.8	12.6	11.4	9.5	2.5	9.2	0.1	8.6	0.3
00665	Phosphorus, total (as P)	0.020	0.014	0.009	0.012	0.014	0.017	0.019	0.036	0.017	0.019
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	<.002	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.101	--	--	--	<.019	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.079	--	--	--	<.015	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.71	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.68	--	--	--
00600	Total nitrogen	--	--	0.81	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	10	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	--	--	230	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	39.9	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	30.8	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	19	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2.2	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	--	--	186	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	40.6	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	--	--	29.2	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	--	--	8.95	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	314	--	--	--	--	--	--	--

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2009





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

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

432322088125000 SILVER LAKE NEAR WEST BEND, WI

LOCATION.--Lat 43°23'22", long 88°12'50", in NE ¼ SW ¼ sec.27, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 1.4 mi southwest of West Bend.

PERIOD OF RECORD.—February 1996 to August 1997, and February to August 2009.

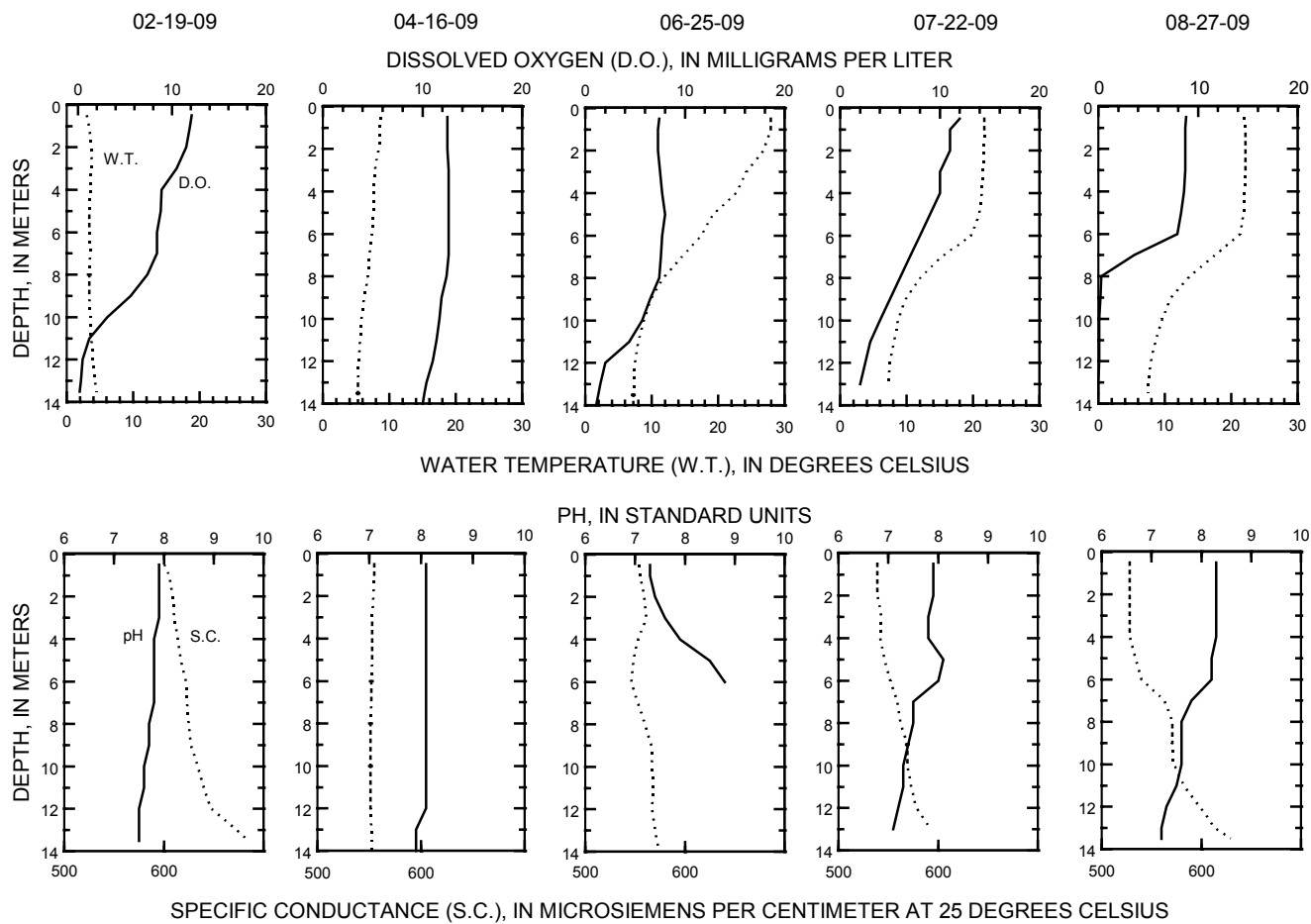
REMARKS.--Lake sampled at northern end of southern basin of lake at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

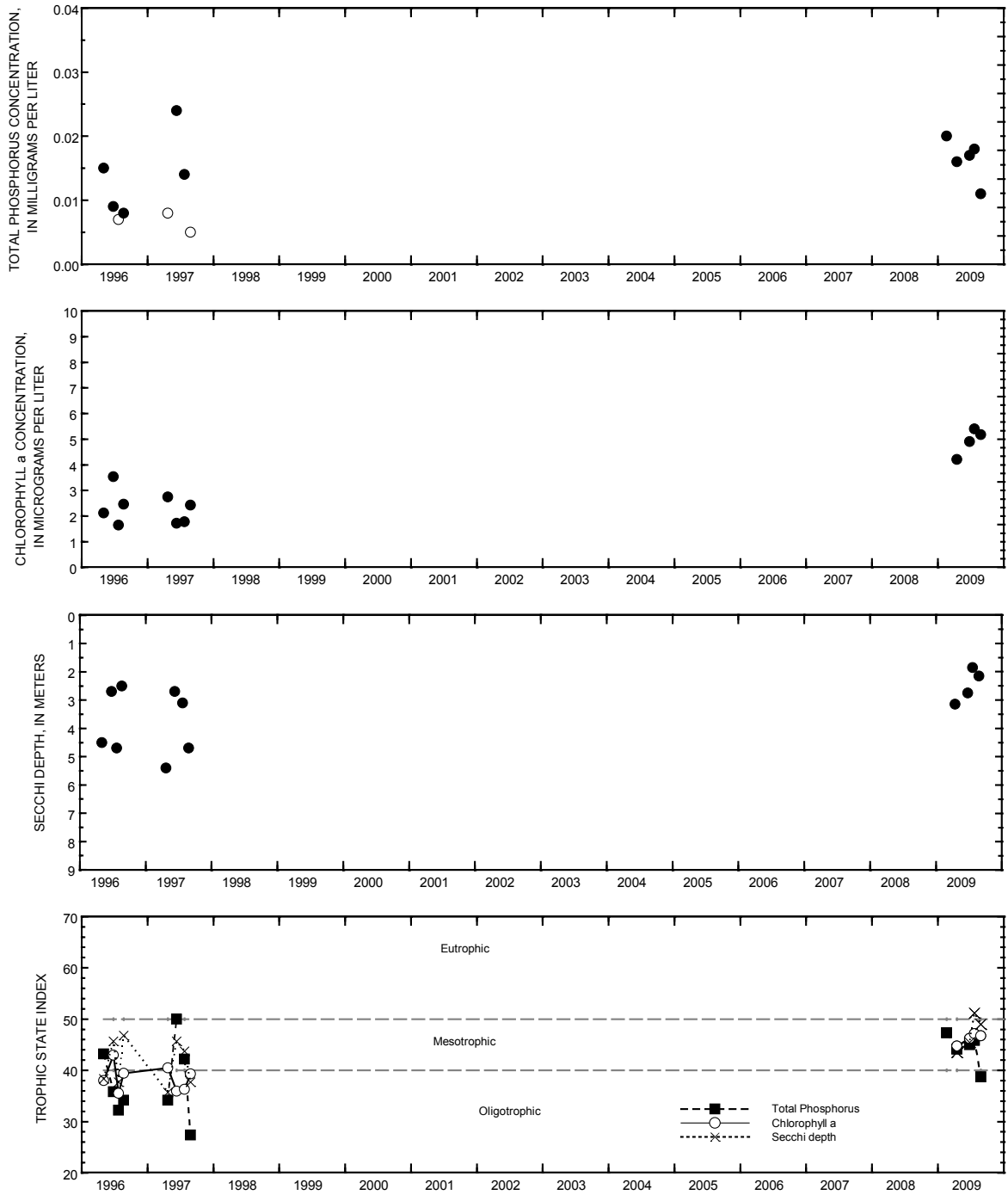
WATER-QUALITY DATA, FEBRUARY 19 TO AUGUST 27, 2009
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	Feb. 19		April 16		June 25		July 22		August 27	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	4.21	--	4.9	--	5.4	--	5.18	--
00078	Secchi-depth (m)	--	--	3.2	--	2.8	--	1.8	--	2.2	--
00098	Sampling depth (m)	0.5	13.5	0.5	14.0	0.5	14.0	0.5	13.0	0.5	13.5
00010	Water Temperature (°C)	3.0	4.5	8.7	5.3	27.9	7.2	21.7	7.2	22.0	7.4
00400	pH (standard units)	7.9	7.5	8.1	7.9	7.3	8.7	7.9	7.1	8.3	7.2
00095	Specific conductance (µS/cm)	600	685	555	553	554	574	539	592	528	629
00300	Dissolved oxygen	12.1	0.2	12.5	10.0	7.4	1.1	9.2	0.0	8.8	0.0
00665	Phosphorus, total (as P)	0.020	0.039	0.016	0.022	0.017	0.045	0.018	0.088	0.011	0.074
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.188	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.158	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.62	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.81	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	280	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	52	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	37.6	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	12.5	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.5	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	248	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	27.2	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	23.3	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	11.3	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	320	--	--	--	--	--	--	--

432322088125000 SILVER LAKE NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 19 TO AUGUST 27, 2009





Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Silver Lake, near West Bend, Wisconsin.

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

460458090102700 TURTLE-FLAMBEAU FLOWAGE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°04'58", long 90°10'27", in SW ¼ SE ¼ SE ¼ sec.25, T.42 W., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

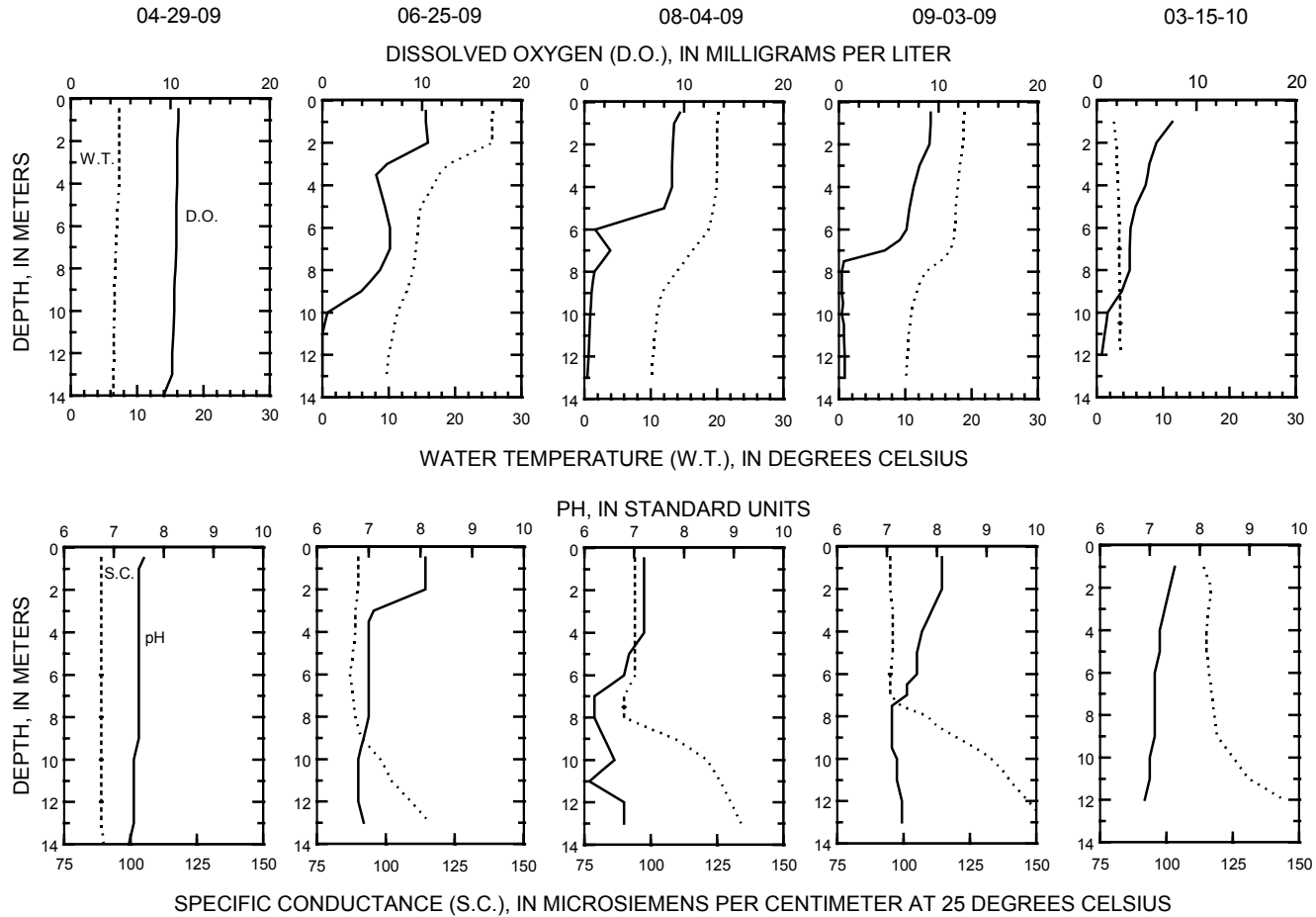
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29, 2009 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.8	2.1		1.5		1.7		--	
00098	Sampling depth (m)	0.5	0.5	13	0.5	13	0.5	13	1.0	12.0
00010	Water Temperature (°C)	7.3	25.7	9.7	20.1	10.1	18.9	10.1	2.6	3.6
00400	pH (standard units)	7.6	8.1	6.9	7.2	6.8	8.1	7.3	7.5	6.9
00095	Specific conductance (µS/cm)	89	90	116	94	134	95	154	114	144
00300	Dissolved oxygen	10.8	10.4	0	9.6	0.3	9.2	0.6	7.6	0.5
32210	Chlorophyll a, phytoplankton (µg/L)	3.79	3.05	--	3.19	--	3.34	--	--	--
00665	Phosphorus, total (as P)	0.025	0.045	0.056	0.034	0.079	0.017	0.065	0.018	0.028
00671	Orthophosphate, dissolved (as P)	0.004	--	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	<.019	--	--	--	--	--	--	0.123	--
00608	Ammonia, dissolved (as N)	0.034	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	0.48	--	--	--	--	--	--	0.33	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.453	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	50	--	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	42	--	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	11.8	--	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	3.1	--	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	2.2	--	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	0.7	--	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	38	--	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	3.1	--	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	<4.5	--	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	8.13	--	--	--	--	--	--	--	--
01046	Iron (µg/L)	600	--	--	--	--	--	--	--	--
01056	Manganese (µg/L)	80	--	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	64	--	--	--	--	--	--	--	--

460458090102700 TURTLE-FLAMBEAU FLOWAGE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460344090124800 TURTLE-FLAMBEAU FLOWAGE, SOUTHWEST BASIN, NEAR MERCER, WI

LOCATION.--Lat 46°03'44", long 90°12'48", in NE ¼ SW ¼ NW ¼ sec.2, T.41 N., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

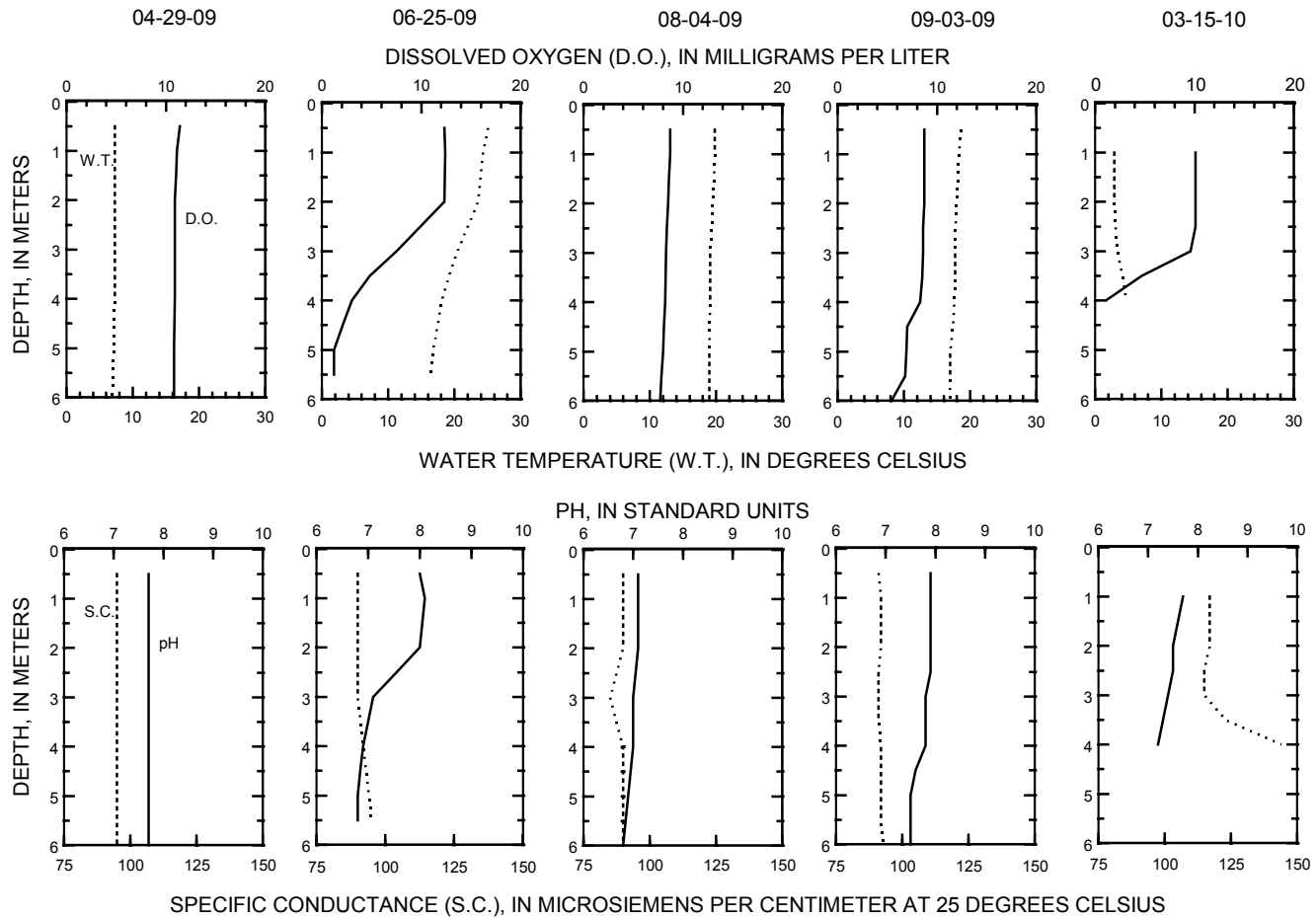
REMARKS.--Lake sampled in the deepest part of the southwest basin of the flowage. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	2.1	1.9		2.4		1.6		--	
00098	Sampling depth (m)	0.5	0.5	5.5	0.5	6.0	0.5	6.0	1.0	4.0
00010	Water Temperature (°C)	8.7	25.1	16.4	19.8	19.0	18.6	16.9	2.9	4.7
00400	pH (standard units)	7.7	8.0	6.8	7.1	6.8	7.9	7.5	7.7	7.2
00095	Specific conductance (µS/cm)	95	90	95	90	90	91	93	117	144
00300	Dissolved oxygen	11.4	12.3	1.2	8.7	7.7	8.7	5.4	10.1	1.1
32210	Chlorophyll a, phytoplankton (µg/L)	1.57	3.63	--	3.79	--	5.95	--	--	--
00665	Phosphorus, total (as P)	0.027	0.044	0.036	0.036	0.029	0.020	0.026	0.013	0.118
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.087	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.39	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.477	--

460344090124800 TURTLE-FLAMBEAU FLOWAGE, SOUTHWEST BASIN, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460511090153800 LAKE BASTINE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°05'11", long 90°15'38", in NE ¼ SE ¼ SE ¼ sec.29, T.41 N., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

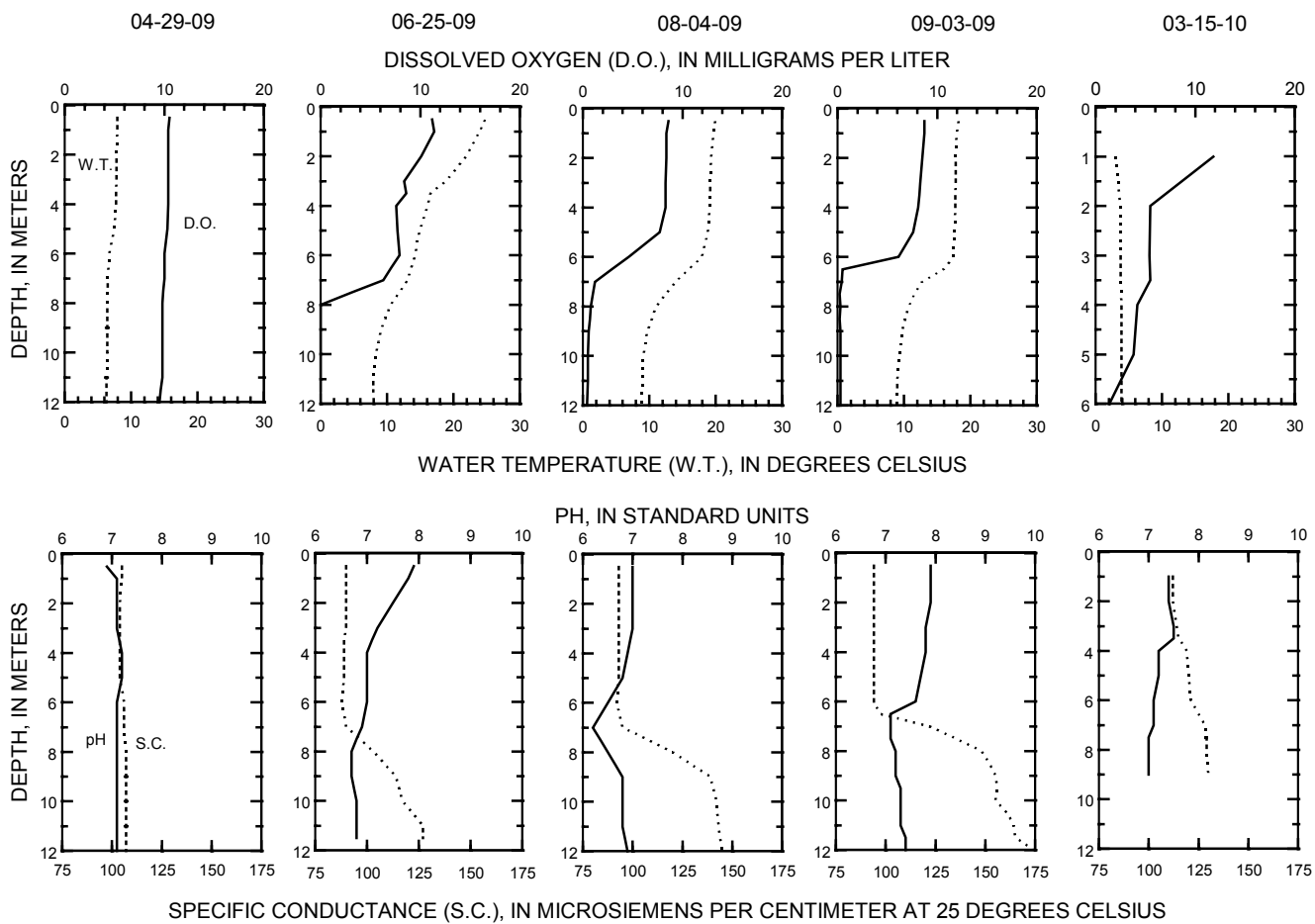
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29, 2009 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.4	2.1		1.7		1.6		--	
00098	Sampling depth (m)	0.5	0.5	11.0	0.5	12.0	0.5	11.0	1.0	9.0
00010	Water Temperature (°C)	7.9	24.7	7.9	19.9	8.8	18.2	9.0	3.0	4.1
00400	pH (standard units)	6.9	7.9	6.8	7.0	6.9	7.9	7.3	7.4	7.0
00095	Specific conductance (µS/cm)	105	90	127	93	145	94	164	112	130
00300	Dissolved oxygen	10.5	11.2	0.0	8.6	0.4	8.7	0.3	11.8	0.5
32210	Chlorophyll a, phytoplankton (µg/L)	3.25	2.38	--	2.86	--	8.36	--	--	--
00665	Phosphorus, total (as P)	0.021	0.042	0.067	0.026	0.064	0.021	0.075	0.012	0.212
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	0.001	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.071	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.45	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.521	--

460511090153800 LAKE BASTINE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460409090084100 TOWNLINE LAKE NEAR MERCER, WI

LOCATION.--Lat 46°04'09", long 90°08'41", in NW ¼ NW ¼ NE ¼ sec.5, T.41 N., R.3 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

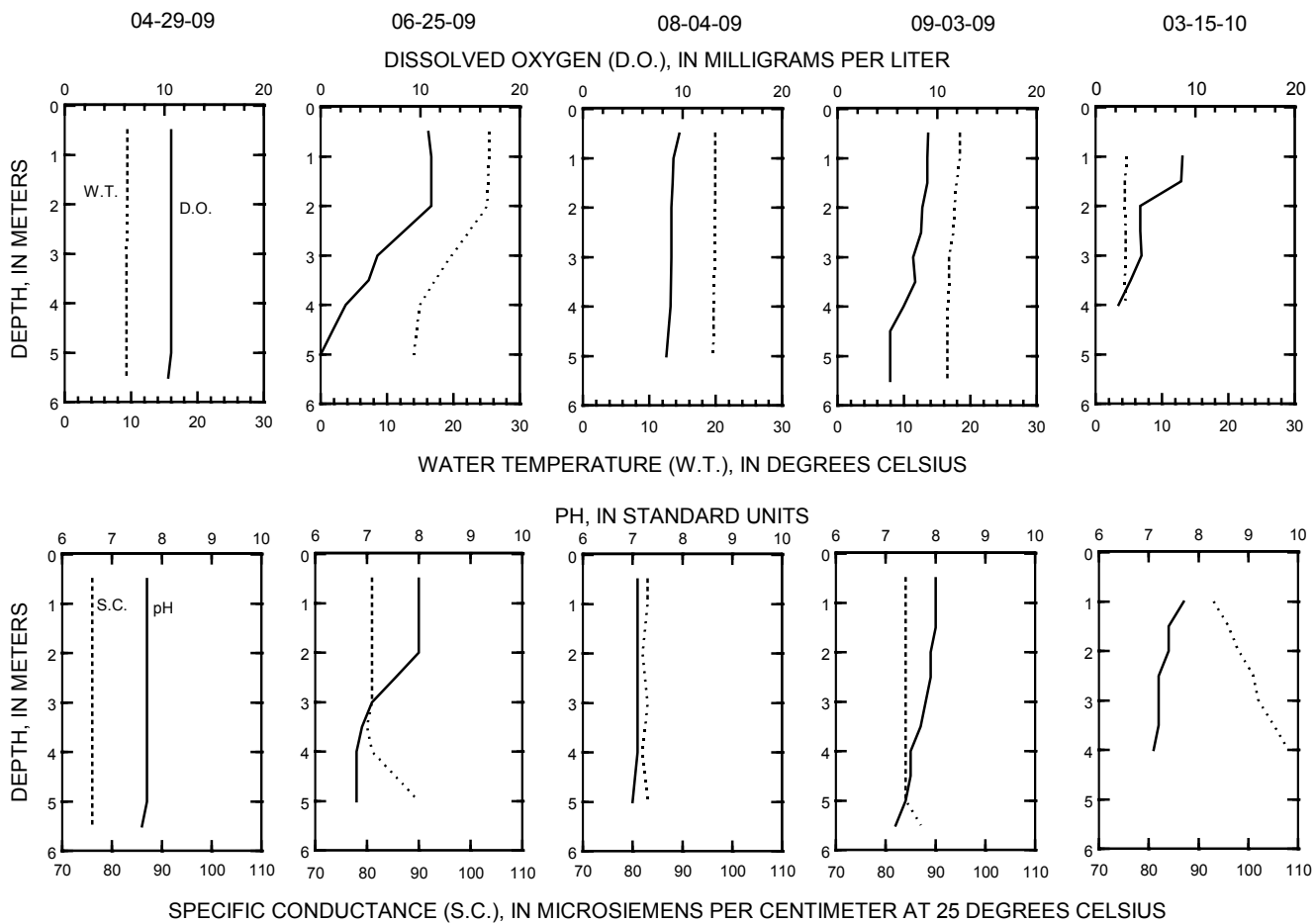
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.2	1.8		1.2		1.6		--	
00098	Sampling depth (m)	0.5	0.5	5.0	0.5	5.0	0.5	5.0	1.0	4.0
00010	Water Temperature (°C)	9.4	25.4	14.0	19.9	19.6	18.4	16.5	4.7	4.0
00400	pH (standard units)	7.7	8.0	6.8	7.1	7.0	8.0	7.4	7.7	7.1
00095	Specific conductance (µS/cm)	76	81	90	83	83	84	84	93	108
00300	Dissolved oxygen	10.7	10.8	0.0	9.7	8.4	9.1	5.3	8.7	2.3
32210	Chlorophyll a, phytoplankton (µg/L)	5.9	3.83	--	6.0	--	6.02	--	--	--
00665	Phosphorus, total (as P)	0.030	0.025	0.040	0.041	0.034	0.033	0.033	0.013	0.036
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	0.006	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.127	--
00608	Ammonia, dissolved (as N)	--	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.37	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.497	--

460409090084100 TOWNLINE LAKE NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460646090091900 TRUDE LAKE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°06'46", long 90°09'19", in SW ¼ SW ¼ SW ¼ sec.17, T.42 N., R.3 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

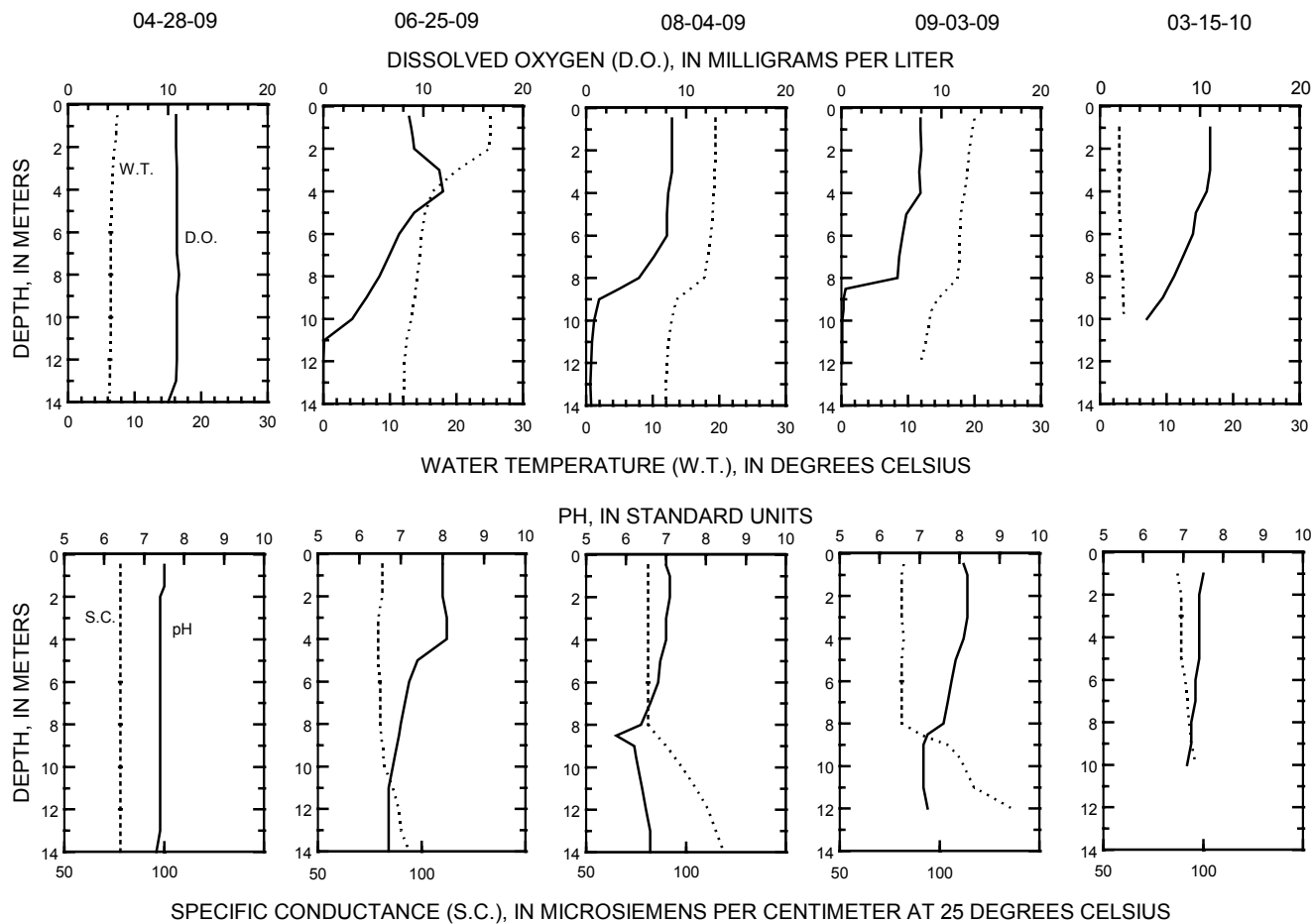
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 28 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 28</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	2.8	3.2		2.3		2.4		--	
00098	Sampling depth (m)	0.5	0.5	13.0	0.5	13.0	0.5	12.0	1.0	10.0
00010	Water Temperature (°C)	7.4	25.0	12.1	19.4	12.0	20.0	11.9	2.9	3.6
00400	pH (standard units)	7.5	8.0	6.7	7.0	6.6	8.1	7.2	7.5	7.1
00095	Specific conductance (µS/cm)	78	81	90	81	115	82	136	87	96
00300	Dissolved oxygen	10.8	8.6	0.0	8.6	0.4	7.9	0.1	11.0	4.7
32210	Chlorophyll a, phytoplankton (µg/L)	1.47	0.88	--	3.08	--	4.52	--	--	--
00665	Phosphorus, total (as P)	0.018	0.039	0.082	0.026	0.032	0.010	0.058	0.016	0.018
00671	Orthophosphate, dissolved (as P)	0.003	--	--	--	--	--	--	0.012	--
00631	Nitrate plus nitrite, dissolved (as N)	0.058	--	--	--	--	--	--	0.066	--
00608	Ammonia, dissolved (as N)	0.029	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	0.57	--	--	--	--	--	--	0.39	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	--	--	--
00600	Total nitrogen	0.63	--	--	--	--	--	--	0.456	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	40	--	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	37	--	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	9.8	--	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	3	--	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	1.6	--	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	0.7	--	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	34	--	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	2.2	--	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	<4.5	--	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	8.24	--	--	--	--	--	--	--	--
01046	Iron (µg/L)	100	--	--	--	--	--	--	--	--
01056	Manganese (µg/L)	90	--	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	58	--	--	--	--	--	--	--	--

460646090091900 TRUDE LAKE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



05429485 LAKE WAUBESA AT MCFARLAND, WI

LOCATION.--Lat 43°00'32", long 89°18'19" referenced to North American Datum of 1927, in SW ¼ SW ¼ sec.3, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on left bank just upstream from bridge on U.S. Highway 51, downstream of dam at outlet of Lake Waubesa and 1.0 mi southwest of McFarland.

SURFACE AREA.--3.25 mi².

DRAINAGE AREA.--327 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--October 2003 to current year.

REVISED RECORDS.--WSP 805, WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929 (levels by Wisconsin Department of Natural Resources).

REMARKS.--Lake level regulated by dams at outlets of Lake Mendota and Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.22 ft, June 15-17, 2008; minimum observed, 3.50 ft, Feb. 14, 2006, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 5.86 ft, June 22; minimum recorded, 4.22 ft, Feb. 6-7.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.41	4.52	4.70	4.76	4.29	4.48	5.52	5.56	5.28	5.57	5.29	5.33
2	5.36	4.51	4.68	4.73	4.28	4.44	5.47	5.49	5.28	5.55	5.27	5.32
3	5.32	4.51	4.67	4.71	4.26	4.40	5.44	5.42	5.28	5.53	5.26	5.30
4	5.29	4.52	4.69	4.69	4.26	4.36	5.38	5.36	5.27	5.52	5.26	5.29
5	5.25	4.52	4.65	4.67	4.24	4.33	5.34	5.31	5.26	5.52	5.25	5.28
6	5.23	4.52	4.63	4.64	4.22	4.33	5.32	5.30	5.25	5.52	5.24	5.27
7	5.21	4.54	4.68	4.63	4.23	4.41	5.29	5.38	5.25	5.51	5.23	5.26
8	5.28	4.57	4.67	4.61	4.24	4.64	5.25	5.39	5.38	5.50	5.34	5.26
9	5.30	4.57	4.69	4.61	4.25	4.86	5.24	5.48	5.43	5.49	5.42	5.25
10	5.26	4.55	4.70	4.60	4.34	5.03	5.22	5.52	5.43	5.49	5.48	5.24
11	5.22	4.52	4.70	4.58	4.41	5.13	5.20	5.51	5.42	5.51	5.49	5.22
12	5.19	4.54	4.69	4.57	4.45	5.14	5.19	5.48	5.42	5.50	5.48	5.21
13	5.15	4.55	4.66	4.57	4.44	5.14	5.18	5.47	5.45	5.49	5.47	5.20
14	5.12	4.59	4.65	4.55	4.44	5.14	5.19	5.55	5.48	5.46	5.45	5.19
15	5.09	4.62	4.69	4.54	4.43	5.14	5.18	5.55	5.51	5.46	5.43	5.18
16	5.05	4.62	4.68	4.53	4.42	5.15	5.18	5.54	5.52	5.45	5.42	5.16
17	5.00	4.62	4.66	4.52	4.42	5.16	5.17	5.50	5.53	5.42	5.42	5.13
18	4.96	4.61	4.63	4.51	4.43	5.18	5.17	5.45	5.54	5.39	5.42	5.11
19	4.90	4.60	4.63	4.50	4.43	5.17	5.19	5.42	5.71	5.37	5.40	5.09
20	4.87	4.63	4.64	4.50	4.41	5.16	5.32	5.39	5.81	5.34	5.41	5.06
21	4.84	4.65	4.64	4.49	4.41	5.15	5.37	5.38	5.84	5.32	5.42	5.07
22	4.78	4.64	4.64	4.48	4.40	5.14	5.36	5.37	5.85	5.37	5.41	5.15
23	4.74	4.63	4.64	4.47	4.36	5.14	5.34	5.38	5.82	5.36	5.40	5.31
24	4.73	4.65	4.64	4.46	4.32	5.30	5.32	5.38	5.77	5.35	5.39	5.34
25	4.74	4.67	4.64	4.43	4.29	5.67	5.37	5.34	5.74	5.36	5.38	5.34
26	4.72	4.66	4.65	4.40	4.33	5.73	5.64	5.30	5.71	5.36	5.37	5.34
27	4.69	4.66	4.69	4.38	4.50	5.73	5.72	5.32	5.67	5.34	5.37	5.35
28	4.63	4.66	4.78	4.36	4.51	5.69	5.69	5.34	5.66	5.33	5.37	5.40
29	4.59	4.66	4.80	4.34	---	5.66	5.63	5.32	5.63	5.31	5.40	5.39
30	4.54	4.66	4.80	4.32	---	5.59	5.60	5.30	5.59	5.31	5.37	5.35
31	4.52	---	4.79	4.30	---	5.54	---	5.28	---	5.31	5.35	---
Mean	5.00	4.59	4.68	4.53	4.36	5.07	5.35	5.41	5.53	5.43	5.38	5.25
Max	5.41	4.67	4.80	4.76	4.51	5.73	5.72	5.56	5.85	5.57	5.49	5.40
Min	4.52	4.51	4.63	4.30	4.22	4.33	5.17	5.28	5.25	5.31	5.23	5.06

424848088083100 WIND LAKE AT OUTLET AT WIND LAKE, WI

LOCATION.--Lat 42°48'48", long 88°08'31" referenced to North American Datum of 1927, in NE ¼ NW ¼ sec.16, T.4 N., R.20 E., Racine County, WI, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

DRAINAGE AREA.--39.6 mi².

PERIOD OF RECORD.--March 1985 to current year. Prior to October 2000, published as "Wind Lake Outlet".

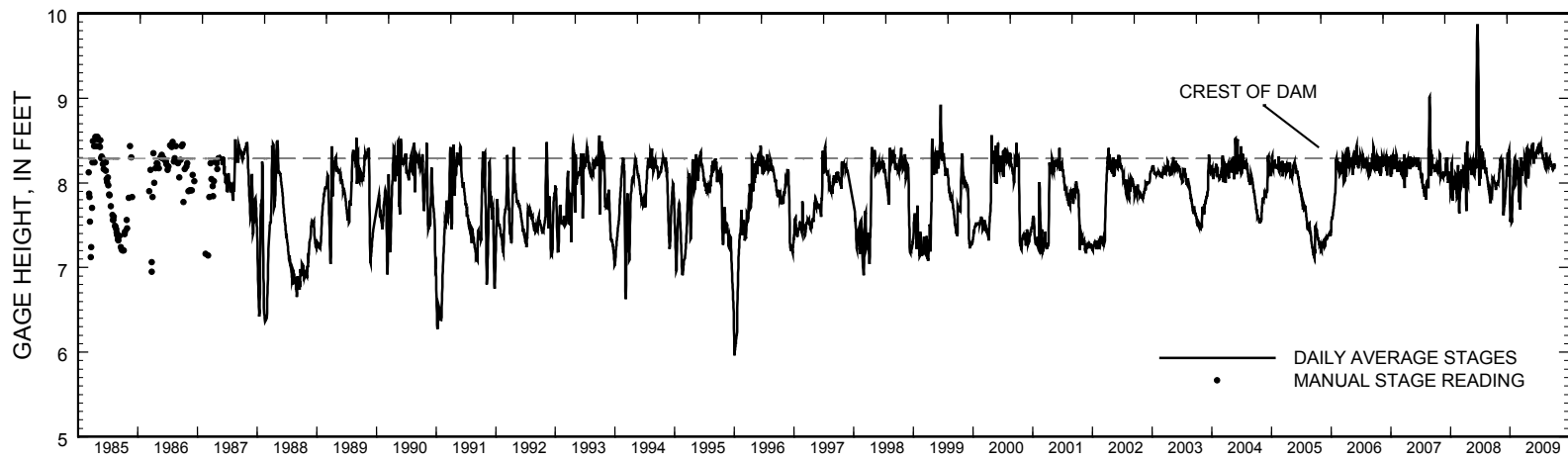
REVISED RECORDS.--WDR WI-91-1: 1988(m).

REMARKS.--Lake level regulated by dam with two 10-foot gates at outlet. Lake ice-covered Dec. 3 to Mar. 14. Prior to October 1987, published as Wind Lake at Wind Lake, Wis. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.88 ft, June 14, 15, 2008; minimum recorded, 5.95 ft, Jan. 2, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 8.57 ft, June 19; minimum recorded, 7.50 ft, Jan. 3.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	7.98	8.24	7.84	7.75	8.16	7.78	8.15	8.31	8.35	8.42	8.20	8.26
2	7.96	8.26	7.85	7.60	8.05	7.68	8.09	8.29	8.31	8.42	8.19	8.26
3	7.95	8.28	7.88	7.54	7.97	7.68	8.06	8.32	8.31	8.42	8.17	8.25
4	7.93	8.29	7.91	7.59	7.98	7.81	8.01	8.36	8.30	8.42	8.17	8.25
5	7.93	8.27	7.92	7.59	8.00	7.94	8.00	8.35	8.30	8.44	8.17	8.24
6	7.93	8.24	7.96	7.60	8.02	8.08	8.05	8.33	8.30	8.43	8.16	8.24
7	7.94	8.20	7.97	7.62	8.05	8.22	8.11	8.35	8.30	8.41	8.17	8.24
8	7.99	8.21	8.00	7.60	8.10	8.30	8.19	8.35	8.37	8.40	8.29	8.23
9	7.99	8.22	8.07	7.58	8.15	8.24	8.27	8.36	8.34	8.40	8.36	8.22
10	7.98	8.21	8.11	7.56	8.17	8.19	8.35	8.33	8.35	8.37	8.34	8.22
11	7.98	8.19	8.14	7.53	8.19	8.18	8.40	8.33	8.37	8.42	8.30	8.21
12	7.98	8.24	8.17	7.54	8.18	8.08	8.41	8.36	8.38	8.41	8.28	8.21
13	7.99	8.25	8.19	7.63	8.19	8.10	8.33	8.34	8.39	8.39	8.26	8.20
14	7.99	8.26	8.24	7.71	8.24	8.19	8.21	8.38	8.39	8.36	8.25	8.20
15	8.00	8.26	8.31	7.78	8.27	8.24	8.11	8.37	8.40	8.35	8.24	8.19
16	8.01	8.22	8.33	7.83	8.26	8.25	8.11	8.39	8.40	8.35	8.22	8.18
17	8.01	8.20	8.36	7.89	8.20	8.20	8.15	8.39	8.39	8.34	8.24	8.17
18	8.01	8.16	8.32	7.94	8.20	8.22	8.20	8.39	8.38	8.33	8.24	8.16
19	8.00	8.03	8.32	7.99	8.20	8.23	8.26	8.44	8.41	8.30	8.22	8.15
20	8.01	7.80	8.29	8.03	8.17	8.22	8.30	8.47	8.36	8.29	8.22	8.15
21	8.02	7.63	8.26	8.06	8.18	8.21	8.11	8.45	8.36	8.29	8.23	8.16
22	8.02	7.63	8.31	8.10	8.15	8.24	8.05	8.39	8.42	8.30	8.22	8.17
23	8.02	7.64	8.37	8.14	8.06	8.24	8.11	8.27	8.43	8.29	8.21	8.19
24	8.06	7.68	8.39	8.16	7.95	8.18	8.18	8.24	8.36	8.27	8.20	8.19
25	8.11	7.70	8.30	8.19	7.82	8.15	8.28	8.24	8.35	8.27	8.20	8.19
26	8.13	7.71	8.15	8.21	7.77	8.14	8.39	8.26	8.41	8.26	8.28	8.20
27	8.14	7.72	8.07	8.24	7.86	8.17	8.27	8.32	8.41	8.25	8.28	8.20
28	8.16	7.74	8.16	8.26	7.84	8.21	8.31	8.35	8.40	8.25	8.29	8.23
29	8.18	7.75	8.18	8.29	---	8.32	8.32	8.35	8.36	8.23	8.30	8.20
30	8.19	7.78	8.09	8.30	---	8.30	8.28	8.34	8.36	8.22	8.29	8.18
31	8.21	---	7.95	8.24	---	8.21	---	8.34	---	8.21	8.27	---
Mean	8.03	8.03	8.14	7.87	8.09	8.14	8.20	8.35	8.37	8.34	8.24	8.20
Max	8.21	8.29	8.39	8.30	8.27	8.32	8.41	8.47	8.43	8.44	8.36	8.26
Min	7.93	7.63	7.84	7.53	7.77	7.68	8.00	8.24	8.30	8.21	8.16	8.15



Stage hydrograph for Wind Lake, 1985-2009.

424915088083900 WIND LAKE AT WIND LAKE, WI

LOCATION.--Lat 42°49'15", long 88°08'39", in NW ¼ SW ¼ sec.9, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

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

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

WATER-QUALITY DATA, FEBRUARY 17 TO JULY 21, 2009

(Milligrams per liter unless otherwise indicated)

<u>Parameter</u>									
<u>Code</u>	<u>Parameter Name</u>	<u>Feb. 17</u>		<u>March 30</u>		<u>June 11</u>		<u>July 21</u>	
32210	Chlorophyll a, phytoplankton (µg/L)	--	--	12.2	--	0.84	--	8.59	--
00078	Secchi-depth (m)	--	--	2.0	--	4.6	--	2.0	--
00098	Sampling depth (m)	0.5	15.5	0.5	15.0	0.5	15.0	0.5	14.0
00010	Water Temperature (°C)	4.2	2.9	5.5	4.8	18.0	13.0	22.6	14.7
00400	pH (standard units)	7.7	7.0	8.0	8.0	8.6	7.0	8.4	6.7
00095	Specific conductance (µS/cm)	655	900	676	674	634	672	628	689
00300	Dissolved oxygen	9.7	1.0	15.3	14.0	8.6	0.0	9.6	0.1
00665	Phosphorus, total (as P)	0.030	0.086	0.035	0.038	0.029	0.126	0.030	0.136
00671	Orthophosphate, dissolved (as P)	--	--	0.002	--	--	--	<.002	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.089	--	--	--	<.019	--
00608	Ammonia, dissolved (as N)	--	--	0.064	--	--	--	<.015	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	1	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	1	--
00600	Total nitrogen	--	--	1.1	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	30	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	200	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	44.5	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	22.7	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	54.3	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2.9	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	157	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	104	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	30.5	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	0.374	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	400	--	--	--	--	--

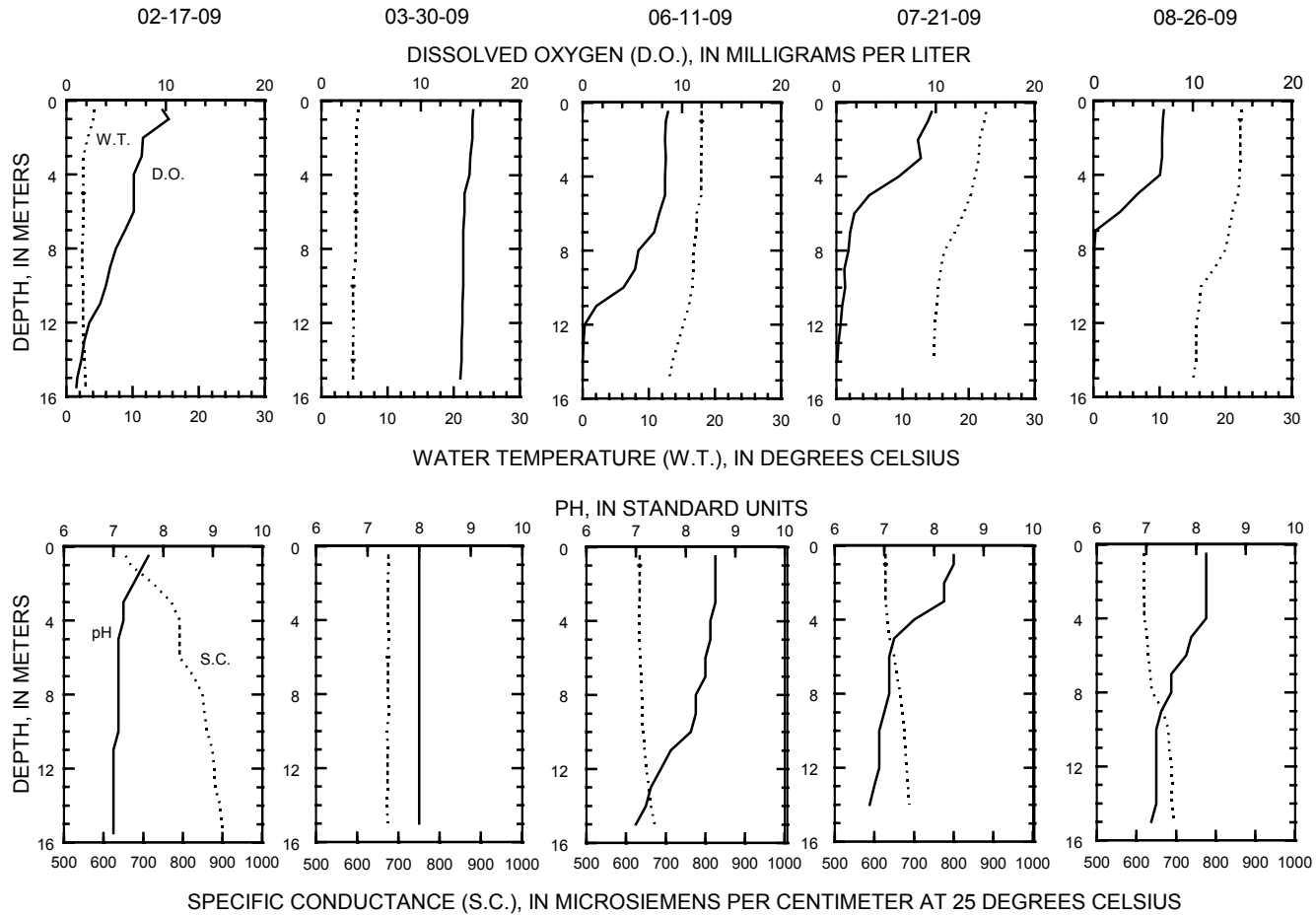
424915088083900 WIND LAKE AT WIND LAKE, WI

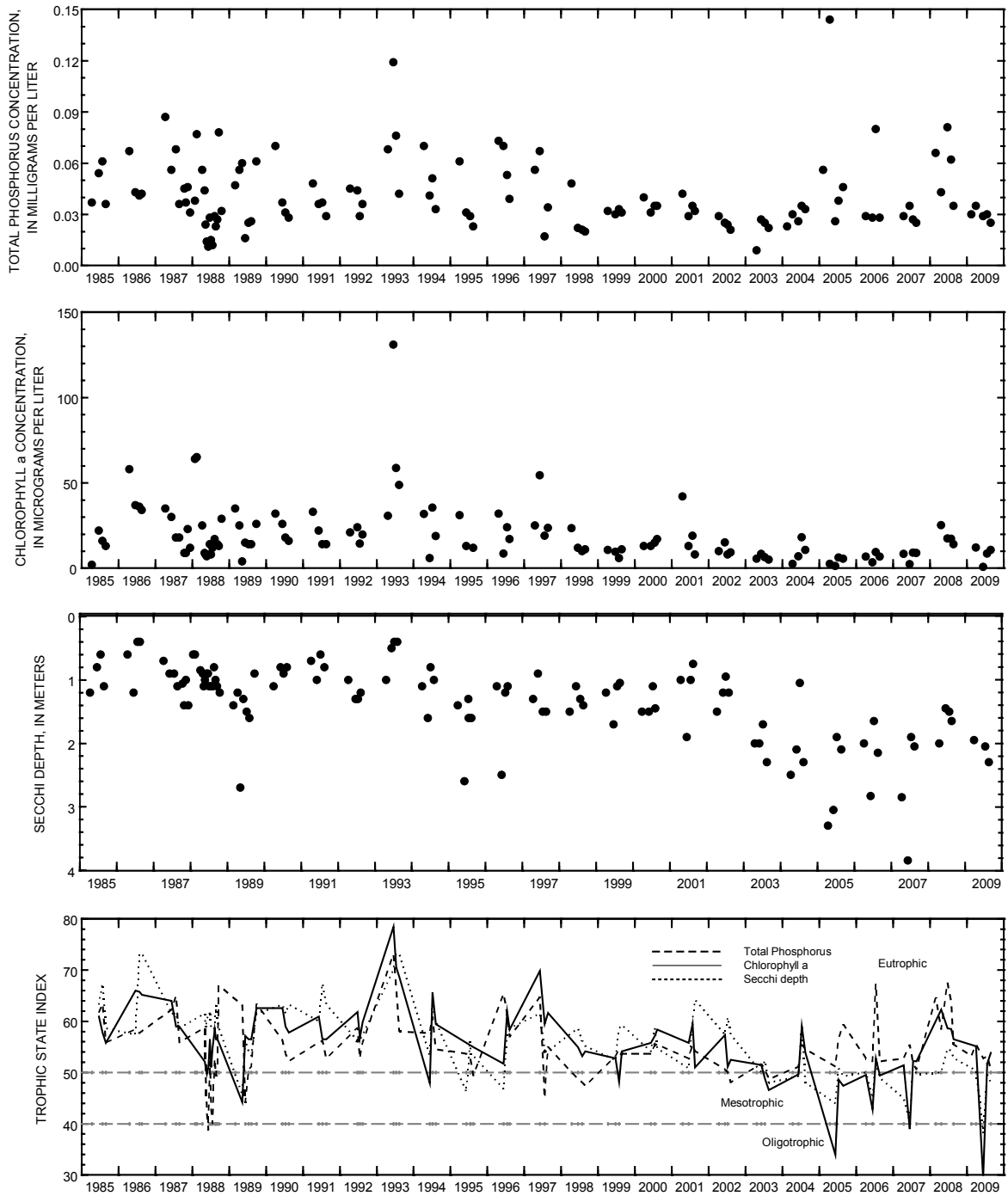
WATER-QUALITY DATA, AUGUST 26, 2009
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>August 26</u>				
32210	Chlorophyll a, phytoplankton (µg/L)			10.7		
00078	Secchi-depth (m)			2.3		
00098	Sampling depth (m)	0.5	7.0	11.0	14.0	15.0
00010	Water Temperature (°C)	22.3	20.5	16.0	15.5	15.1
00400	pH (standard units)	8.2	7.5	7.2	7.2	7.1
00095	Specific conductance (µS/cm)	619	634	683	688	695
00300	Dissolved oxygen	7.1	0.2	0.1	0.1	0.0
00665	Phosphorus, total (as P)	0.025	0.053	0.338	0.461	0.514

424915088083900 WIND LAKE AT WIND LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2009





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

04082500 LAKE WINNEBAGO AT OSHKOSH, WI

LOCATION.--Lat 44°00'35", long 88°31'38" referenced to North American Datum of 1927, in NE ¼ NE ¼ sec.25, T.18 N., R.16 E., Winnebago County, WI, Hydrologic Unit 04030203, 800 ft east of mouth of the upper Fox River.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 mi².

PERIOD OF RECORD.--October 1938 to current year in reports of Geological Survey. Records from July 1882 to September 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 RECORDS.--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).

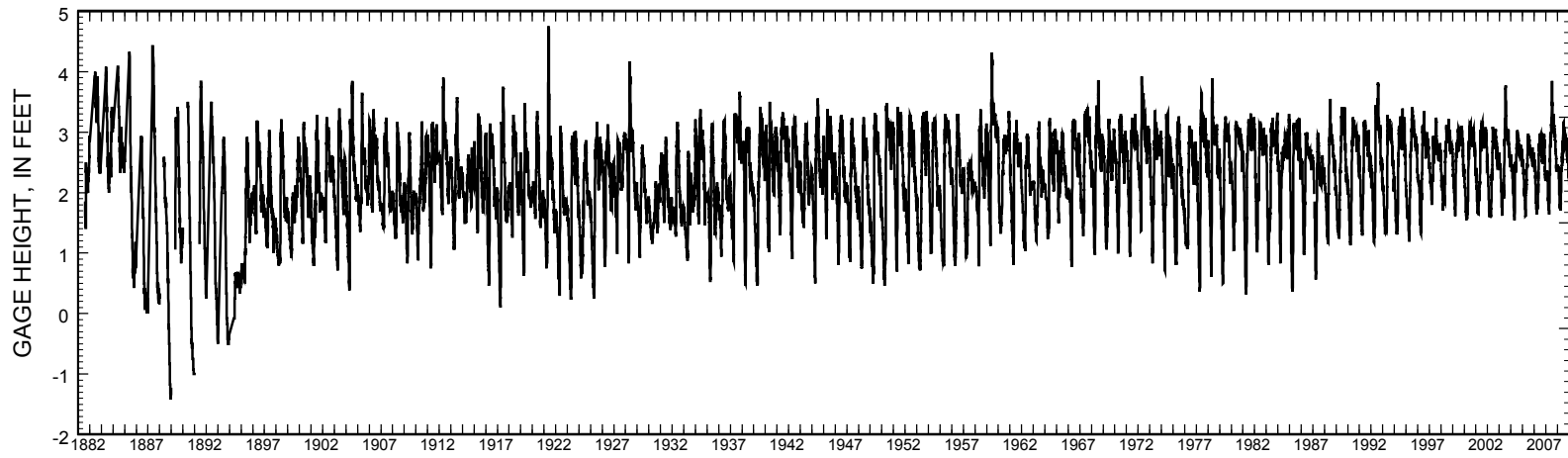
REMARKS.--Lake elevations controlled by dams at Menasha and Neenah, which are operated in the interest of navigation. Crests of both dams are at elevation 746.73 ft. Present limits of regulation are from 21 ¼ in. above the crest of Menasha to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 4.32 ft, Mar. 9, 1982; Minimum observed, 0.33 ft, May 17, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.17 ft, June 8, 10; Minimum recorded, 1.70 ft, Mar. 5, 6.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.74	2.42	2.35	2.41	1.92	1.75	2.37	2.56	3.03	3.01	2.74	2.86
2	2.71	2.41	2.38	2.41	1.90	1.74	2.38	2.58	3.03	2.99	2.76	2.85
3	2.72	2.40	2.40	2.40	1.88	1.73	2.38	2.59	3.08	3.00	2.76	2.85
4	2.69	2.41	2.41	2.40	1.86	1.72	2.40	2.58	3.08	3.00	2.80	2.85
5	2.68	2.41	2.41	2.40	1.85	1.70	2.40	2.56	3.08	2.98	2.78	2.85
6	2.70	2.40	2.40	2.39	1.82	1.70	2.36	2.57	3.13	2.98	2.77	2.84
7	2.68	2.39	2.40	2.38	1.81	1.71	2.34	2.62	3.12	2.99	2.78	2.84
8	2.67	2.40	2.40	2.38	1.79	1.72	2.35	2.66	3.17	2.95	2.85	2.84
9	2.68	2.42	2.45	2.37	1.77	1.77	2.34	2.74	3.16	2.94	2.89	2.84
10	2.70	2.43	2.46	2.35	1.79	1.81	2.35	2.76	3.17	2.90	2.90	2.83
11	2.68	2.43	2.45	2.34	1.80	1.84	2.35	2.78	3.15	2.91	2.90	2.82
12	2.68	2.41	2.44	2.32	1.81	1.82	2.37	2.79	3.14	2.91	2.88	2.81
13	2.67	2.42	2.42	2.31	1.80	1.81	2.40	2.74	3.13	2.90	2.88	2.81
14	2.64	2.46	2.41	2.29	1.79	1.80	2.39	2.78	3.14	2.88	2.86	2.81
15	2.64	2.45	2.41	2.27	1.78	1.80	2.40	2.86	3.14	2.82	2.88	2.81
16	2.65	2.45	2.40	2.25	1.77	1.81	2.42	2.68	3.11	2.84	2.85	2.81
17	2.62	2.43	2.40	2.23	1.76	1.82	2.42	2.80	3.12	2.83	2.88	2.76
18	2.60	2.44	2.38	2.22	1.77	1.85	2.44	2.73	3.12	2.81	2.86	2.76
19	2.55	2.37	2.40	2.20	1.77	1.88	2.46	2.74	3.06	2.80	2.88	2.75
20	2.56	2.39	2.40	2.18	1.76	1.91	2.44	2.74	3.06	2.78	2.81	2.74
21	2.57	2.38	2.42	2.16	1.75	1.95	2.52	2.76	3.08	2.76	2.87	2.75
22	2.55	2.38	2.41	2.14	1.76	1.98	2.60	2.82	3.04	2.80	2.89	2.78
23	2.50	2.36	2.40	2.11	1.75	2.01	2.55	2.82	3.04	2.79	2.88	2.80
24	2.47	2.35	2.40	2.09	1.74	2.09	2.50	2.88	3.05	2.77	2.86	2.79
25	2.46	2.34	2.39	2.07	1.73	2.22	2.50	2.89	3.07	2.76	2.85	2.79
26	2.40	2.36	2.39	2.05	1.75	2.27	2.58	2.89	3.09	2.78	2.90	2.74
27	2.46	2.35	2.40	2.03	1.78	2.31	2.58	2.99	3.06	2.79	2.89	2.69
28	2.43	2.34	2.44	2.01	1.77	2.33	2.66	2.98	2.99	2.78	2.87	2.60
29	2.42	2.37	2.43	1.99	---	2.34	2.62	3.02	3.01	2.79	2.87	2.73
30	2.39	2.40	2.42	1.97	---	2.38	2.58	3.01	3.03	2.79	2.90	2.67
31	2.40	---	2.42	1.95	---	2.38	---	3.06	---	2.79	2.88	---
Mean	2.59	2.40	2.41	2.23	1.79	1.93	2.45	2.77	3.09	2.87	2.85	2.79
Max	2.74	2.46	2.46	2.41	1.92	2.38	2.66	3.06	3.17	3.01	2.90	2.86
Min	2.39	2.34	2.35	1.95	1.73	1.70	2.34	2.56	2.99	2.76	2.74	2.60



Stage hydrograph for Lake Winnebago, 1882-2010.

04084255 LAKE WINNEBAGO NEAR STOCKBRIDGE, WI

LOCATION.--Lat 44°04'14", long 88°19'44" referenced to North American Datum of 1983, Calumet County, WI, Hydrologic Unit 04030203, Stockbridge Indian Reservation, on east shore of Lake Winnebago, 300 ft south of County Highway E and 1.6 mi west of Stockbridge.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 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.--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 ¼ in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily mean gage height, 3.85 ft, July 9, 11, 1993, June 14, 2008; minimum observed, 0.30 ft, Mar. 1, 1986.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.09 ft, June 9; minimum recorded, 1.58 ft, Mar. 5, 6.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.64	2.27	2.31	2.30	1.82	1.64	2.28	2.54	2.89	2.90	2.74	2.74
2	2.67	2.28	2.34	2.31	1.79	1.63	2.33	2.54	2.91	2.90	2.70	2.73
3	2.59	2.29	2.31	2.29	1.78	1.62	2.34	2.49	2.94	2.88	2.70	2.73
4	2.58	2.31	2.32	2.31	1.76	1.60	2.35	2.46	2.99	2.87	2.69	2.73
5	2.56	2.30	2.30	2.29	1.73	1.58	2.28	2.45	3.03	2.89	2.68	2.72
6	2.53	2.27	2.31	2.28	1.71	1.58	2.27	2.47	2.94	2.89	2.67	2.72
7	2.52	2.33	2.30	2.28	1.69	1.59	2.34	2.55	2.92	2.85	2.65	2.71
8	2.62	2.37	2.30	2.28	1.68	1.63	2.30	2.57	3.02	2.80	2.72	2.70
9	2.68	2.44	2.36	2.26	1.66	1.66	2.27	2.57	3.09	2.81	2.78	2.70
10	2.57	2.39	2.36	2.25	1.66	1.69	2.24	2.67	3.04	2.82	2.80	2.69
11	2.56	2.30	2.35	2.22	1.69	1.74	2.27	2.68	3.00	2.86	2.78	2.69
12	2.57	2.29	2.33	2.20	1.70	1.71	2.28	2.68	3.01	2.84	2.78	2.69
13	2.58	2.35	2.30	2.20	1.68	1.69	2.24	2.64	3.03	2.79	2.78	2.69
14	2.61	2.37	2.30	2.19	1.68	1.68	2.27	2.82	3.03	2.77	2.79	2.70
15	2.59	2.37	2.33	2.17	1.67	1.68	2.33	2.72	3.01	2.78	2.78	2.67
16	2.55	2.40	2.30	2.14	1.66	1.69	2.36	2.80	2.96	2.81	2.79	2.62
17	2.51	2.38	2.30	2.12	1.64	1.70	2.37	2.73	3.00	2.76	2.78	2.64
18	2.51	2.35	2.28	2.11	1.67	1.75	2.37	2.70	2.99	2.72	2.83	2.63
19	2.52	2.33	2.30	2.09	1.67	1.78	2.28	2.64	2.96	2.68	2.74	2.60
20	2.45	2.31	2.30	2.07	1.65	1.82	2.37	2.69	3.00	2.67	2.80	2.60
21	2.42	2.34	2.33	2.04	1.65	1.85	2.50	2.69	2.95	2.65	2.81	2.63
22	2.35	2.27	2.31	2.03	1.66	1.88	2.44	2.69	2.92	2.66	2.76	2.63
23	2.30	2.28	2.29	2.02	1.64	1.90	2.38	2.72	2.94	2.68	2.74	2.68
24	2.37	2.27	2.30	1.99	1.62	1.96	2.38	2.72	2.96	2.69	2.77	2.65
25	2.45	2.28	2.29	1.96	1.62	2.13	2.35	2.68	2.97	2.70	2.79	2.62
26	2.51	2.26	2.29	1.94	1.64	2.19	2.43	2.73	2.96	2.70	2.74	2.63
27	2.45	2.29	2.30	1.92	1.67	2.22	2.52	2.76	2.94	2.69	2.73	2.70
28	2.40	2.30	2.35	1.90	1.66	2.23	2.47	2.89	3.04	2.72	2.75	2.79
29	2.33	2.27	2.33	1.88	---	2.26	2.47	2.95	3.03	2.71	2.80	2.62
30	2.33	2.21	2.32	1.86	---	2.28	2.48	2.98	2.95	2.69	2.76	2.52
31	2.30	---	2.33	1.83	---	2.26	---	2.93	---	2.69	2.76	---
Mean	2.50	2.32	2.31	2.12	1.68	1.83	2.35	2.68	2.98	2.77	2.75	2.67
Max	2.68	2.44	2.36	2.31	1.82	2.28	2.52	2.98	3.09	2.90	2.83	2.79
Min	2.30	2.21	2.28	1.83	1.62	1.58	2.24	2.45	2.89	2.65	2.65	2.52

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APPENDIX

Wisconsin Lakes Team Quality-Assurance Plan

Most lake studies that are conducted by the USGS Wisconsin Water Science Center include water sampling and analysis to determine water quality and biological productivity. Because all sampling and analyses are subject to possible biases and variability, rigorous sampling efforts should include quality-assurance samples. Studies conducted by the Lake Studies Team of the USGS Wisconsin Water Science Center include a quality-assurance plan each year that involves collecting three types of samples from a subset of the lakes studied each year, which include blanks, replicates, and spikes. These samples are collected and/or prepared solely for the purpose of assessing the magnitude of potential biases and variability so that the accuracy and precision of all data can be evaluated. The plan for this quality-assurance sampling is described below.

Three types of QA/QC samples are collected:

Blanks:

Provide information about accuracy and potential biases due to treatment or reagents

Replicates:

Provide information about precision (variability)

Standard additions (spikes):

Provide information about accuracy and matrix interferences

Blank Sampling

B1. A **preservation blank** consists of deionized water or inorganic blank water, to which is added any reagents or preservatives that are normally added to natural water samples. The blank is not taken to the field, but is shipped to the laboratory for analysis along with the natural water samples.

This blank sample is analyzed for the Nutrient Group¹ and chlorophyll-a.

B2. A **field blank** consists of deionized water or inorganic blank water treated exactly the same as regular samples. Typically, during winter, the field blank is analyzed for total phosphorus (TP) only; during summer, it is analyzed for TP and chlorophyll-a, and in the spring it is analyzed for the Nutrient Group and chlorophyll-a.

¹Nutrient Group = all phosphorus and nitrogen species that are commonly determined in lakes (total phosphorus, nitrate + nitrite, ammonia, total Kjeldahl nitrogen, total nitrogen)

Replicate Sampling

Triplicate samples are taken near water surface in summer for analysis of total phosphorus and chlorophyll-a. For a portion of the sites where surface triplicates are collected, a set of triplicate samples is also sometimes taken from near-bottom water, for analysis of total phosphorus.

Triplicate samples collected in the spring are taken near the water surface for analysis of the Nutrient Group.

Standard Addition Testing

Replicate samples are collected for a **standard addition (spike) test**, which consists of an addition of a prepared phosphorus solution (standard) of known volume and concentration, such that the expected result of analysis is the natural water TP concentration plus the known addition. One sample from each set receives no spike (the mean of these gives the natural water TP concentration).

Data and results of replicate sampling and field blank testing in water year 2009 are shown in Table A1.

Table A1. Analyses of replicate samples from Wisconsin lakes in water years 2005-2009. See text for procedures used. Phosphorus data in milligrams per liter; chlorophyll data in micrograms per liter. Symbol "<" indicates less than given detection limit (DL); mean and standard deviation not calculated for datasets containing values less than DL.

Parameter	Lake	Date	Replicate Data					Mean	Standard Deviation	Percent Standard Deviation
Total Phosphorus	Big Cedar, South	7/19/05	0.015	0.015	0.009			0.013	0.003	26.6
	Delavan	8/16/05	0.032	0.029	0.027			0.029	0.003	8.6
	Middle	8/25/05	0.014	0.012	0.013	0.017	0.013	0.014	0.002	13.9
	Puckaway, West	7/18/05	0.309	0.310	0.313			0.311	0.002	0.7
	Upper Nemahbin	8/24/05	0.015	0.017	0.018	0.039	0.023	0.022	0.010	43.5
	Big Cedar	8/30/06	0.035	0.034	0.032			0.034	0.002	4.5
	Delavan	6/13/06	0.062	0.045				0.054	0.012	22.5
	Delavan	8/15/06	0.030	0.028	0.029	0.026		0.028	0.002	6.0
	Beulah	8/30/07	0.017	0.015				0.016	0.001	8.8
	Delavan	4/16/07	0.040	0.038				0.039	0.001	3.6
	Spring	9/6/07	0.008	0.007				0.008	0.001	9.4
	Beulah	3/4/08	0.010	0.011				0.011	0.001	6.7
	Beulah	8/26/08	0.011	0.012				0.012	0.001	6.1
	Beulah	2/23/09	0.013	0.013				0.013	0.000	0.0
Beulah	8/24/09	0.017	0.017				0.017	0.000	0.0	
Delavan	9/15/09	0.035	0.031	0.031			0.032	0.002	7.1	
Total Phosphorus, near bottom	Wind	7/11/05	0.380	0.378	0.394			0.384	0.009	2.3
	Wind	7/10/06	0.380	0.378	0.394			0.384	0.009	2.3
Dissolved Phosphorus	Beulah	8/30/07	<0.002	<0.002						
	Beulah	3/4/08	0.001	0.003				0.002	0.001	70.7
	Beulah	8/26/08	<0.002	<0.002						
	Beulah	2/23/09	<0.002	<0.002						
	Beulah	8/24/09	<0.002	<0.002						
Dissolved Ammonia	Beulah	8/30/07	0.170	0.190				0.180	0.014	7.9
	Beulah	3/4/08	0.083	0.046				0.065	0.026	40.6
	Beulah	8/26/08	<0.015	<0.015						
	Beulah	2/23/09	0.211	0.204				0.208	0.005	2.4
Beulah	8/24/09	0.032	0.035				0.034	0.002	6.3	
Total Kjeldahl Nitrogen	Beulah	8/30/07	0.510	0.420				0.465	0.064	13.7
	Beulah	3/4/08	0.570	0.450				0.510	0.085	16.6
	Beulah	8/26/08	0.530	0.580				0.555	0.035	6.4
	Beulah	2/23/09	0.660	0.690				0.675	0.021	3.1
	Beulah	8/24/09	0.160	0.530				0.345	0.262	75.8
Dissolved Nitrate plus Nitrite	Beulah	8/30/07	<0.019	<0.019						
	Beulah	3/4/08	0.675	0.670				0.673	0.004	0.5
	Beulah	8/26/08	<0.019	<0.019						
	Beulah	2/23/09	0.673	0.721				0.697	0.034	4.9
Beulah	8/24/09	0.074	0.073				0.074	0.001	1.0	
Chlorophyll-a (micrograms per liter)	Big Cedar, South	7/19/05	3.13	3.10	2.63			2.95	0.28	9.49
	Middle	8/25/05	4.45	4.48	4.82	4.70	4.40	4.58	0.21	4.48
	Puckaway, West	7/18/05	174.00	178.00	168.00			173.33	5.03	2.90
	Big Cedar, South	8/29/06	8.02	7.56	8.20			7.93	0.33	4.16
	Beulah	8/30/07	4.05	3.78				3.92	0.19	4.88
	Spring	9/6/07	2.47	2.79				2.63	0.23	8.60
	Beulah	8/26/08	6.97	7.45				7.21	0.34	4.71
	Beulah	2/23/09	0.55	0.55				0.55	0.00	0.0
	Beulah	8/24/09	2.66	2.90				2.78	0.17	6.1
	Delavan	9/15/09	10.80	10.10	9.8			10.23	0.51	5.0
Turbidity, NTU	Beulah	8/30/07	<1.0	<1.0						
	Beulah	3/4/08	<1.0	<1.0						
	Beulah	8/26/08	<1.0	<1.0						
	Beulah	2/23/09	<1.0	<1.0						
Beulah	8/24/09	<1.0	<1.0							

Table A1. -- continued									
Parameter	Lake	Date	Replicate Data				Mean	Standard Deviation	Percent Standard Deviation
Dissolved Calcium	Beulah	8/30/07	42.8	41			41.9	1.273	3.0
	Beulah	3/4/08	62.8	62.5			62.65	0.212	0.3
	Beulah	8/26/08	47.9	47.6			47.75	0.212	0.4
	Beulah	2/23/09	63	63.8			63.4	0.566	0.9
	Beulah	8/24/09	41.7	41.9			41.8	0.141	0.3
Diss. Magnesium	Beulah	8/30/07	32.7	31.2			31.95	1.061	3.3
	Beulah	3/4/08	35.6	35.5			35.55	0.071	0.2
	Beulah	8/26/08	32.8	32.5			32.65	0.212	0.6
	Beulah	2/23/09	34.7	35.1			34.9	0.283	0.8
	Beulah	8/24/09	31.2	31.3			31.25	0.071	0.2
Diss. Potassium	Beulah	8/30/07	1.5	1.4			1.45	0.071	4.9
	Beulah	3/4/08	1.8	1.9			1.85	0.071	3.8
	Beulah	8/26/08	1.4	1.4			1.4	0.000	0.0
	Beulah	2/23/09	1.7	1.7			1.7	0.000	0.0
	Beulah	8/24/09	1.4	1.4			1.4	0.000	0.0
Dissolved Sodium	Beulah	8/30/07	8.8	8.5			8.65	0.212	2.5
	Beulah	3/4/08	9.9	10			9.95	0.071	0.7
	Beulah	8/26/08	9	8.9			8.95	0.071	0.8
	Beulah	2/23/09	9.7	9.8			9.75	0.071	0.7
	Beulah	8/24/09	8.6	8.7			8.65	0.071	0.8
ANC as CaCO3	Beulah	8/30/07	192	193			192.5	0.707	0.4
	Spring	9/6/07	6.6	6.4			6.5	0.141	2.2
	Beulah	3/4/08	245	244			244.5	0.707	0.3
	Beulah	8/26/08	219	218			218.5	0.707	0.3
	Beulah	2/23/09	258	256			257	1.414	0.6
	Beulah	8/24/09	209	209			209	0.000	0.0
Diss. Chloride	Beulah	8/30/07	20.3	20.4			20.35	0.071	0.3
	Beulah	3/4/08	23.5	23.7			23.6	0.141	0.6
	Beulah	8/26/08	21	20.9			20.95	0.071	0.3
	Beulah	2/23/09	23	22.9			22.95	0.071	0.3
	Beulah	8/24/09	21.6	21.4			21.5	0.141	0.7
Dissolved Silica	Beulah	8/30/07	15.2	15.3			15.25	0.071	0.5
	Spring	9/6/07	0.105	0.111			0.108	0.004	3.9
	Beulah	3/4/08	15.3	15.2			15.25	0.071	0.5
	Beulah	8/26/08	10.3	10.3			10.3	0.000	0.0
	Beulah	2/23/09	14.8	15			14.9	0.141	0.9
	Beulah	8/24/09	11.3	11.3			11.3	0.000	0.0
Dissolved Sulfate	Beulah	8/30/07	26.1	26.2			26.15	0.071	0.3
	Beulah	3/4/08	29.5	29.5			29.5	0.000	0.0
	Beulah	8/26/08	26.3	26.3			26.3	0.000	0.0
	Beulah	2/23/09	30.5	30.8			30.65	0.212	0.7
	Beulah	8/24/09	27.7	27.8			27.75	0.071	0.3
Dissolved Iron	Beulah	8/30/07	<100	<100					
	Beulah	3/4/08	<100	<100					
	Beulah	8/26/08	<100	<100					
	Beulah	2/23/09	<100	<100					
	Beulah	8/24/09	<100	<100					
Diss. Manganese	Beulah	8/30/07	<0.5	<0.5					
	Beulah	8/26/08	<0.5	<0.5					
	Beulah	2/23/09	<1.0	<1.0					
	Beulah	8/24/09	<1.0	<1.0					
Dissolved Solids	Beulah	8/26/08	302	298			300	2.83	0.9
	Beulah	2/23/09	350	346			348	2.83	0.8
	Beulah	8/24/09	312	312			312	0.00	0.0

Table A2. Data from tests of blanks, 2005-2009. All data in milligrams per liter, unless otherwise indicated. < = less than given detection limit; E = estimated value.					
Delavan Lake. Analyses at USGS National Water Quality Laboratory, Lakewood, CO.					
Parameter	4/7/06	6/13/06	8/14/06	4/16/07	9/14/09
Total P	< 0.004	E 0.002	< 0.004	<0.004	<0.008
Dissolved orthophosphate	<0.006	<0.006	E0.003	<0.006	<0.008
Chlorophyll a	< 0.0260		< 0.0260	<0.260	
Chlorophyll b					
Total Kjeldahl Nitrogen (as N)					
Ammonia (as N)					
Nitrate + Nitrite (as N)					
Lake Beulah at Deep Hole near East Troy, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI					
Parameter	8/29/07	2/27/08	8/26/08	2/22/09	8/20/09
Total P	<0.005	<0.005	<0.005	<0.005	<0.005
Dissolved orthophosphate	0.005	<0.002	<0.002	<0.002	<0.002
Total Kjeldahl	<0.14	<0.14	<0.14	<0.14	<0.14
Dissolved Ammonia	<0.15	<0.015	<0.015	<0.015	<0.015
Dissolved Nitrate plus Nitrite	<0.019	<0.019	<0.019	<0.019	<0.019
Chlorophyll a (ug/L)	<0.260	---	<0.260	<0.260	<0.260
Dissolved Calcium	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Magnesium	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Potassium	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Sodium	0.200	<0.10	<0.10	<0.10	<0.10
ANC as CaCO3	<2	3	<2	<2	<2
Dissolved Chloride	<1.0	1.2	<1.0	<1.0	<1.0
Dissolved Silica	<0.22	<0.022	<0.022	<0.022	<0.022
Dissolved Sulfate	<4.5	<4.5	<4.5	<4.5	<4.5
Dissolved Iron	<100	<100	<100	<100	<100
Dissolved Manganese	<0.5	<0.5	<100	<1.0	<1.0
Dissolved Solids	---	---	<50	<50	<50
Turbidity, NTU	---	<1.0	<1.0		<1.0
Rolling Stone Lake near Pickerel, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI					
Parameter	8/29/07				
Total P	<0.005				
Chlorophyll a (ug/L)	<0.260				
ANC as CaCO3	2				
Dissolved Silica	<0.022				
Wind Lake at Wind Lake, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI					
Parameter	6/13/06				
Total P	< 0.005				
Chlorophyll a (ug/L)	<0.260				
Silver Lake near West Bend, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI					
Parameter	8/31/09				
Total P	< 0.005				
Chlorophyll a (ug/L)	<0.260				

Table A3. Data (for 2005-2009) from standard addition tests using stock solution containing 5.00 mg/L phosphorus. See text for detail of procedures. All concentration data in milligrams per liter.

<u>Lake, Date</u>	<u>Original Sample Concentration</u>	<u>Stock Solution Volume Added (milliliters)</u>	<u>Final Expected Concentration</u>	<u>Actual Detected Concentration</u>	<u>Percent Recovery</u>
Delavan, August 16, 2005	0.029	0.188	0.036	0.037	103%
	0.029	0.75	0.059	0.063	107%
No Spike data in 2006					
No Spike data in 2007					
No Spike data in 2008					
No Spike data in 2009					



Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 2010

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TABLES

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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
meter (m)	3.281	foot
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 either 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— or the North American Vertical Datum of 1988 (NAVD 88).

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 (mmho/cm) at 25 degrees Celsius, formerly used by the U.S. Geological Survey.

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 2010

By Wisconsin Water Science Center 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 locations of water-quality and lake-stage stations in Wisconsin for water year 2010 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, 2009 through September 30, 2010 is called "water year 2010."

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 included for all lakes. 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, 2010."

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 Water Science Center's home page is at <http://wi.water.usgs.gov/>. Information on the Wisconsin Water Science Center's Lakes Program is found at <http://wi.water.usgs.gov/lakes/index.html> and <http://wi.water.usgs.gov/projects/index.html>.



Figure 1. Location of USGS 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 2010 included:

Big Cedar Lake Protection and Rehabilitation District

Dane County

Delavan Lake Sanitary District

Geneva Lake Environmental Agency

Green Lake Sanitary District

Iron County Land & Water Conservation Department

Lake Beulah Management District

Little Cedar Lake Protection and Rehabilitation District

Middle Genesee Lake District

Okauchee Lake Management District

Powers Lake District

Rock County Public Works Department

U.S. Army Corps of Engineers

Village of Oconomowoc Lake

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 2010 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: B.W. Olson (Merrill), and S.A. March (Middleton). The data were collected and processed by G.L. Goddard, S.B. Manteufel, B.W. Olson, D.L. Olson, P.C. Reneau, J.G. Schuler, Z.T. Scott, B.J. Siebers and E.F. Younger. S.B. Manteufel assembled, edited, and formatted the report. Additional assistance in preparation of the report was provided by M.M. Greenwood, and D.L. Olson.

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
Balsam Lake near Birchwood	453907091345800	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
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
Benedict Lake near Powers Lake	423201088180800	May 1998–Aug. 2000
Big Blacksmith Lake near Keshena	445401088334500	Feb. 1990–Aug. 1992
Big Hills (Hills) Lake near Wild Rose	440912089092000	June 1983–Aug. 1984, Feb.–Aug. 1987, Feb.–Aug. 1990, Feb.–Aug. 1993, Feb.–Aug. 1996, Feb.–Aug. 1999
Big Muskego Lake, at North Site, near Muskego	425301088061300	Feb.–Aug. 1988
Research Base, near Muskego	425235088075300	May–June 1994
Big Round Lake near Milltown	453142092180100	Feb.–Sept. 2001
Big St. Germain Lake, near St. Germain	455557089311000	Feb. 1992–Aug. 1996
near Lake Tomahawk	05390750	1991–2001
Big Sand Lake, Deep Hole, near Hertel	454910092134000	Feb.–Sept. 2001
East Site, near Hertel	454921092124300	Feb.–Sept. 2001
Big Sissabagama Lake, near Stone Lake	454724091303600	Apr. 1986–Sept. 1996, Oct. 1997–Sept. 2002
North Site, near Stone Lake	454800091312900	Mar. 1998–Sept. 2001
Booth Lake near East Troy	424800088254800	Feb. 1992–Aug. 1994, Feb. 2001–Aug. 2003
Buffalo Lake, Center Site, at Packwaukee	434558089260600	May 1998–Sept. 2001
East End, at Montello	434720089201600	May 1998–Sept. 2001
West End, near Endeavor	434414089282400	May 1998–Sept. 2001

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Butternut Lake, near Park Falls	455854090310300	Oct. 2002–Oct. 2004
Deep Hole, near Park Falls	455803090310800	Mar. 2003–Sept. 2004
North Site, near Butternut	455904090303400	Mar. 2003–Sept. 2004
Far South Site, near Park Falls	455651090312700	Mar. 2003–Sept. 2004
Delavan Lake, Center, at Delavan	423556088365001	Oct. 1983–Oct. 2009
North end, near Lake Lawn	423659088354401	Oct. 1983–Oct. 2009
SW end, near Delavan	423526088380101	Oct. 1983–Oct. 2009
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
Eagle Spring Lake at Eagleville	425103088261500	Apr. 1991–Sept. 2001
Elizabeth Lake near Twin Lakes	423051088155300	Feb. 1995–Sept. 1997
Fish Lake near Sauk City	05406050	Nov. 1966–Sept. 1981, Apr. 1985–May 1987, May 1988, Apr. 1989– Oct. 1990, Oct. 1990– Nov. 1996, Nov. 1996– Sept. 2004
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
Geneva Lake, Geneva Bay, at Lake Geneva	423455088263800	Apr. 1997–Feb. 1999
Williams Bay, at Williams Bay	423420088320500	Apr. 1997–Feb. 1999
Center, near Lake Geneva	423402088301400	Apr. 1997–Mar. 1999
East End, near Lake Geneva	423421088272300	Apr. 1997–May 2000
Hemlock Lake near Mikana	453421091333700	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
Hooker Lake at Salem	423335088060300	Feb. 1992–Aug. 1993
Kawaguesaga, Deep Hole, near Minocqua	455208089435800	May–Sept. 2003
South Site, near Minocqua	455145089442600	May–Sept. 2003
Kirby Lake near Cumberland	453554092042101	Nov. 1995–Oct. 1996
(Site 1) near Cumberland	453608092035801	Nov. 1995–Nov. 1996
(Site 2) near Cumberland	453601092035301	Nov. 1995–Nov. 1996

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
(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 at Oconomowoc	430733088305900	Feb. 1984–Aug. 1985, Apr. –Aug. 1991, Feb. 2001–Aug. 2003
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 Desair near Rice Lake	453446091465100	Aug. 2004
Lake Keesus,		
East Bay, near Merton	430957088183400	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
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 Mill, at Lauderdale	424554088332700 424555088335700	Oct. 1993–Oct. 1994 Nov. 1993–Nov. 1994, Aug. 2002
Green, Auxiliary, Number 1, near Lauderdale	424640088341900	June 1999–Sept. 2000
Green, near Lauderdale	424652088341500	Nov. 1993–Nov. 1994, Aug. 2002
Legend Lake (site 1) near Shawano	445342088312700	Feb. 1990–Feb. 1992
Little Arbor Vitae near Woodruff	455446089370300	Feb. 1991–Sept. 2002
Little Green Lake, at Center, near Markesan	434412088590700	Feb. 1991–Aug. 2003
Little Muskego Lake at Muskego	425425088083500	Oct. 1986–Aug. 2002
Little Rock Lake near Woodruff	455946089415702	Oct. 1983–Sept. 1996
Little St. Germain Lake, near Eagle River	05390700	(a)
Upper East Bay, at St. Germain	455532089253900	Dec. 1996–Mar. 97, Mar. 1999, Mar. 2000–Aug. 2003

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Northeast Bay, near St. Germain	455545089262500	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
South Bay, near St. Germain	455437089270800	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
West Bay, at St. Germain	455428089282400	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
Little Sand Lake - Site No. 2 - near Mole Lake	452826088544101	May 1996–Sept. 2003
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
Mercer Lake, Deep Hole, at Mercer	460937090033100	Mar. 2008–Sept. 2009
West basin, at Mercer	460945090040600	Mar. 2008–Sept. 2009
Minocqua Lake		
Deep Hole, at Minocqua	455214089412800	May–Sept. 2003
North Bay, at Minocqua	455232089424100	May–Sept. 2003
South Bay, at Minocqua	455206089425200	May–Sept. 2003
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
Muskego (Big Muskego)		
Auxiliary Number 1, near Muskego	425329088054000	June 1996–Aug. 2000
Bass Bay, near Muskego	425344008807010	Feb. 1988–Aug. 2002

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
near Wind Lake	425109088075000	Oct. 1987–Sept. 1989, Jan. 1991–Sept. 2002
South Site, near Muskego	425212088072800	Feb. 1988–Aug. 2002
Muskellunge Lake near Eagle River	455700089224900	June 2000–Aug. 2001
Muskellunge Lake, near Lake Outlet near Eagle River	455706089232400	Nov. 2000–Oct. 2001
Nagawicka Lake, at Deep Hole, at Delafield	430417088230300	Feb. 2003–Sept. 2004
Namekagon Lakes		
Garden, near Cable	461224091033200	Mar. 1998–Aug. 1999
Jackson, near Cable	461457091065900	Mar. 1998–Aug. 1999
Namekagon		
Deep Hole, near Cable	461308091065100	Mar. 1998–Aug. 1999
East Basin, near Cable	461228091044300	Mar. 1998–Aug. 1999
Northeast Basin, near Cable	461410091050700	Mar. 1998–Aug. 1999
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
Pike Lake near Hartford	431916088200501	Dec. 1998–Dec. 2000
Pike Lake-QW Site-near Hartford	431835088200600	Feb.–Aug. 2000
Potter Lake near Mukwonago	423246088175800	Feb. 1993–Sept. 2007
Pretty Lake, at Deep Hole, near Dousman	425722088295000	Feb. 1993–Aug. 1997
Puckaway Lake, West Basin, near Marquette	434515089124000	Apr. 2005–Sept. 2007
East Basin, near Marquette	43454208907300	Apr. 2005–Sept. 2007
River site, near Marquette	434824089083200	Apr. 2005–Sept. 2007
Red Cedar Lake, at Mikana	453522091360600	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Oct. 2000–Sept. 2001
Deep Hole, near Mikana	453725091345100	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
South End, at Mikana	453519091352500	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
Rice Lake at Deep Hole near Whitewater	424629088415700	Apr.–Nov. 1991
Round Lake near Shawano	445328088335000	Feb. 1990–Aug. 1992
Sand Lake (Deep Hole) near Keshena	445321088323101	June–Aug. 1992

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Shell Lake at Shell Lake	05334000	Aug. 1936–Sept. 1999
Silver Lake near Oconomowoc	430436088293300	Apr. 1992–Aug. 1996
Silver Lake near West Bend	432322088125000	Feb. 1996–Aug. 1997 Feb. 2009–Aug. 2009
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
Spooner Lake, Deep Hole, near Spooner	455034091493300	June 2002–Aug. 2004
Southeast Site, near Spooner	454945091483900	June 2002–Aug. 2004
Stewart Lake at Mt. Horeb	430117089442701	May 1992–Sept. 1993
Tichigan Lake near Waterford	424854088123300	Mar. 1994–Aug. 1996, Apr. 2003–Aug. 2004
Tombeau Lake near Powers Lake	423153088184800	May 1998–Aug. 2000
Turtle-Flambeau Flowage, Deep Hole, near Mercer	460458090102700	Apr. 2009–Mar. 2010
SW Basin, near Mercer	460344090124800	Apr. 2009–Mar. 2010
Lake Bastine, Deep Hole, near Mercer	460511090153800	Apr. 2009–Mar. 2010
Townline Lake, near Mercer	460409090084100	Apr. 2009–Mar. 2010
Trude Lake, Deep Hole, near Mercer	460646090091900	Apr. 2009–Mar. 2010
Twin Lake, East Twin, near Westfield	435430089350700	June 2002–Aug. 2004
West Twin, near Westfield	435438089352300	June 2002–Aug. 2004

(a) Wisconsin Valley Improvement Co. currently collects stage data for this site.

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-mm (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, 2010". NWIS parameter codes and minimum laboratory reporting levels for chemical constituents are given in table 2. The parameter code for turbidity has changed from 00076 to 63675 or 63676 because the method of testing has changed.

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).

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		LRL	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. (SO4)	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. (SiO2)	mg/L	7631-86-9	00955	0.1	56	0.02	1899	0.008	I560LLD
Nitrogen, NO2+NO3, 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, amm.+org., total ⁴	mg/L	17778-88-0	00625	0.100	1985	--	--	0.2	I470BLT
Nitrogen, amm.+org.,diss.	mg/L	--	00623	--	--	--	--	--	I470DLD
Nitrogen, total ⁵	mg/L	--	00600	--	--	--	--	--	--
Nitrogen, dissolved	mg/L	--	00602	--	--	--	--	--	--
Phosphorus, total	mg/L	7723-14-0	00665	0.05	1984	0.004	2333	0.005	I520PLT
Phosphorus, ortho, diss.	mg/L	14265-44-2	00671	0.01	1262	0.002	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	--	--	--	--	0.26	I250UNF

- 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)

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).

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 a 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 per cent 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 Carlson's (1977) trophic state index (TSI). In previous USGS data reports, a modification of Carlson's trophic state index for Wisconsin lakes by Lillie and others (1993) had been used; however, this approach did not properly classify oligotrophic and highly eutrophic lakes and, therefore, was discontinued.

Lillie and Mason's (1983) water quality indices for Wisconsin lakes were developed based on summer measurements of total phosphorus and chlorophyll *a* concentrations, and Secchi depth from a random set of lakes in Wisconsin. These data were used to classify the lakes's 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

Carlson's (1977) 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 hypereutrophic.

Carlson's (1977) TSI values are also based on near-surface total phosphorus and chlorophyll *a* concentrations, and Secchi depths. The indices were developed to place these three characteristics on similar scales to allow comparison of different lakes. TSI values based on phosphorus concentrations (TSI_P), Secchi depths (TSI_{SD}), and chlorophyll *a* concentrations (TSI_C) typically are computed only for measurements collected during the open-water period.

TSI values for a lake can be calculated using the following equations (Carlson, 1977):

$$TSI_P = 4.15 + 14.42 \times (\ln [\text{total phosphorus concentration} \times 1,000])$$

$$TSI_{SD} = 60.0 - 14.41 \times (\ln \text{Secchi depth})$$

$$TSI_C = 30.6 + 9.81 \times (\ln \text{chlorophyll } a \text{ concentration})$$

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

The three main 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-----	-----0.024-----	-----2.0-----	-----7.2-----
Mesotrophic	-----40-----	-----0.012-----	-----4.0-----	-----2.6-----
Oligotrophic				

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LAKE DATA

Remarks codes and symbols used in the following tables:

[<, less than; --, not available; E, estimated]

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LOCATION.--Lat 42°48'40", long 88°24'16", in SW ¼ NW ¼ NW ¼ sec.17, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to August 2010.

REMARKS.--Lake sampled at the deep hole at a depth of 19 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, AUGUST 19, 2010
(Milligrams per liter unless otherwise indicated)

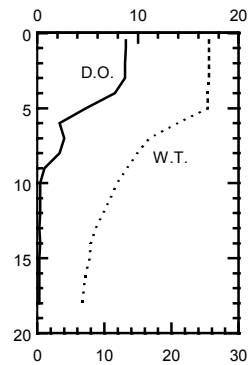
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>August 19</u>				
32210	Chlorophyll a (µg/L)			5.56		
00078	Secchi-depth (m)			2.8		
00098	Sampling depth (m)	2.0	8.0	14.0	17.0	18.0
00010	Water Temperature (°C)	25.6	14.9	8.0	6.9	6.8
00400	pH (standard units)	8.4	7.7	7.4	7.4	7.4
00095	Specific conductance (µS/cm)	493	549	580	588	589
00300	Dissolved oxygen	8.7	2.2	0.3	0.2	0.2
00665	Phosphorus, total (as P)	0.016	0.012	0.014	0.021	0.032
00671	Orthophosphate, dissolved (as P)	0.002	<0.002	0.002	<0.002	0.009
00631	Nitrate plus nitrite, dissolved (as N)	0.022	0.673	0.724	0.204	0.188
00608	Ammonia, dissolved (as N)	0.030	0.172	<0.015	0.408	0.657
00625	Ammonia plus organic nitrogen, total (as N)	0.68	0.64	0.62	0.84	1.10
00600	Total nitrogen	0.7	1.3	1.3	1.0	1.3
63675	Turbidity, (NTU)	<1.0	<1.0	<1.0	<1.0	<1.0
00900	Hardness (as CaCO ₃)	257	295	313	305	316
00915	Calcium, dissolved (Ca)	47.3	58.6	64.8	63.7	66.2
00925	Magnesium, dissolved (Mg)	33.8	36.0	36.7	35.4	36.5
00930	Sodium, dissolved (Na)	11.4	11.9	11.5	11.1	11.4
00935	Potassium, dissolved (K)	1.5	1.7	1.8	1.7	1.8
00417	ANC (as CaCO ₃)	207	230	247	253	254
00940	Chloride, dissolved (Cl)	21.5	22.6	23.2	23.3	23.2
00945	Sulfate, dissolved (SO ₄)	25.8	28.9	29.1	29.6	27.4
00955	Silica, dissolved (SiO ₂)	18.1	9.13	16.1	19.1	20.1
01046	Iron (µg/L)	<100	<100	<100	<100	<100
01056	Manganese (µg/L)	<1.0	<1.0	150	270	350
70300	Solids, dissolved (at 180 °C)	286	304	326	332	332

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, AUGUST 19, 2010

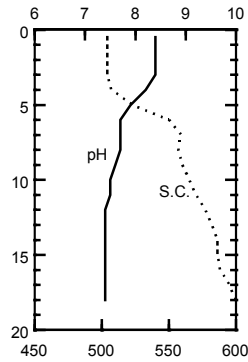
08-19-10

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

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LOCATION.--Lat 42°49'29", long 88°23'13", in SE ¼ NE ¼ NE ¼ sec.8, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to August 2010.

REMARKS.--Lake sampled at a depth of 15 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, AUGUST 19, 2010

(Milligrams per liter unless otherwise indicated)

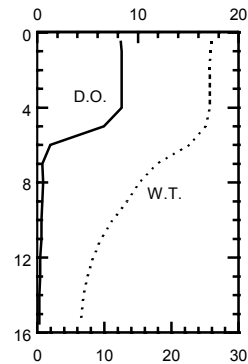
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>August 19</u>				
32210	Chlorophyll a (µg/L)			5.78		
00078	Secchi-depth (m)			2.4		
00098	Sampling depth (m)	2.0	8.0	12.0	14.0	15.0
00010	Water Temperature (°C)	25.7	15.2	8.3	6.9	6.6
00400	pH (standard units)	8.5	7.6	7.4	7.3	7.4
00095	Specific conductance (µS/cm)	463	496	560	578	587
00300	Dissolved oxygen	8.4	0.6	0.3	0.2	0.2
00665	Phosphorus, total (as P)	0.015	0.016	0.015	0.032	0.031
00671	Orthophosphate, dissolved (as P)	<.002	--	--	--	<.002
00631	Nitrate plus nitrite, dissolved (as N)	<.019	--	--	--	<.019
00608	Ammonia, dissolved (as N)	<.015	--	--	--	0.597
00625	Ammonia plus organic nitrogen, total (as N)	0.50	--	--	--	1.2
00600	Total nitrogen	<0.52	--	--	--	<1.2
63675	Turbidity, (NTU)	<1.0	--	--	--	<1.0
00900	Hardness (as CaCO ₃)	220	--	--	--	291
00915	Calcium, dissolved (Ca)	36.0	--	--	--	57.2
00925	Magnesium, dissolved (Mg)	31.6	--	--	--	36.0
00930	Sodium, dissolved (Na)	12.6	--	--	--	14.9
00935	Potassium, dissolved (K)	1.6	--	--	--	1.9
00417	ANC (as CaCO ₃)	179	--	--	--	241
00940	Chloride, dissolved (Cl)	25.8	--	--	--	28.5
00945	Sulfate, dissolved (SO ₄)	28.4	--	--	--	25.0
00955	Silica, dissolved (SiO ₂)	14.9	--	--	--	19.8
01046	Iron (µg/L)	<100	--	--	--	<100
01056	Manganese (µg/L)	<1.0	--	--	--	310
70300	Solids, dissolved (at 180 °C)	260	--	--	--	328

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, AUGUST 19, 2010

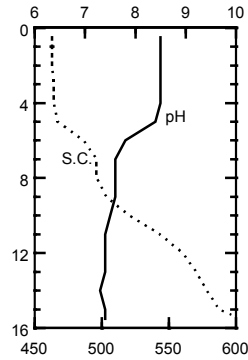
08-19-10

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

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°24'09", long 88°15'16", in NE ¼ SW ¼ sec. 20, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

REMARKS.--Lake sampled on north side at a depth of 12 m. Lake ice-covered during February sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

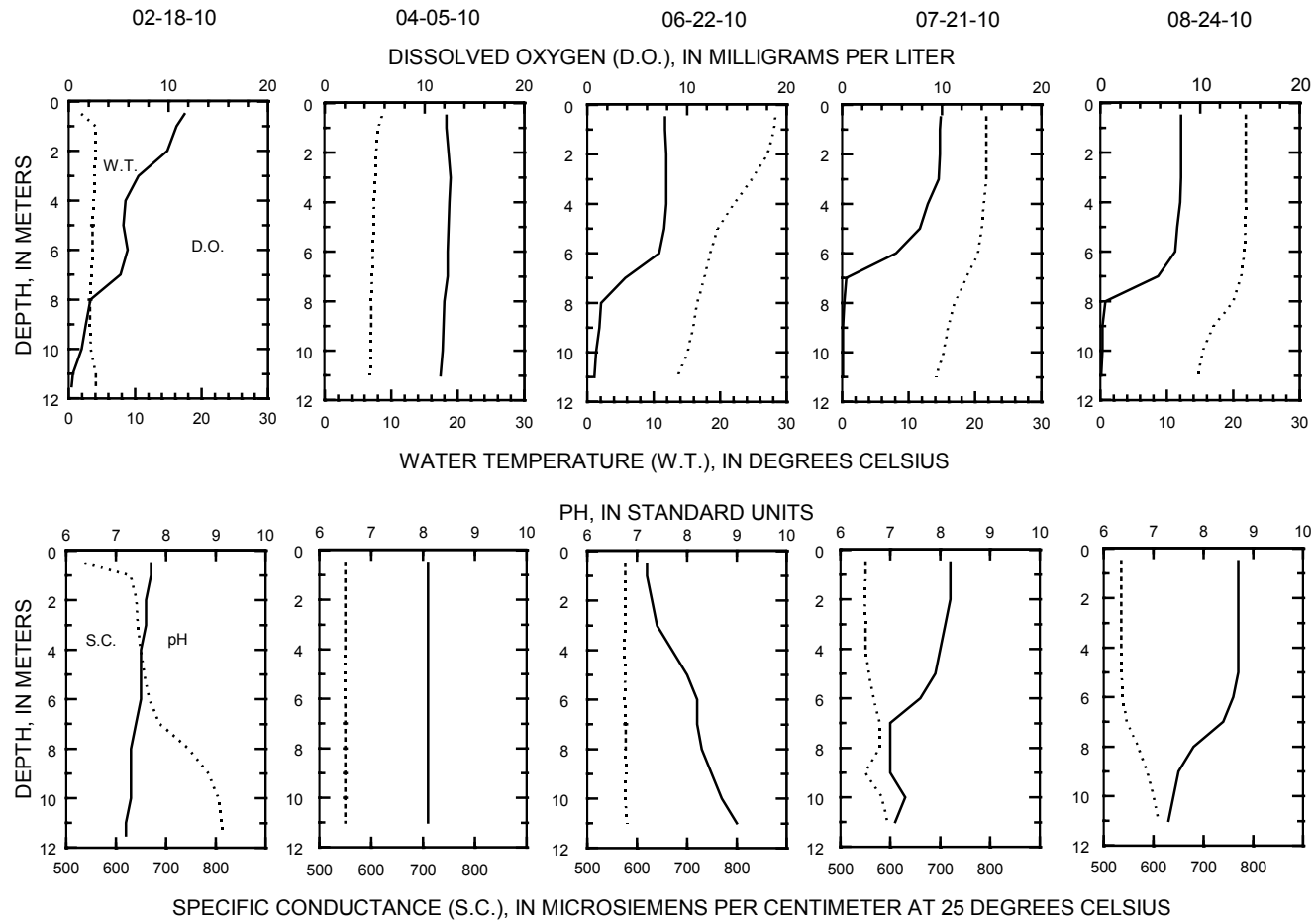
WATER-QUALITY DATA, FEBRUARY 18 TO AUGUST 24, 2010

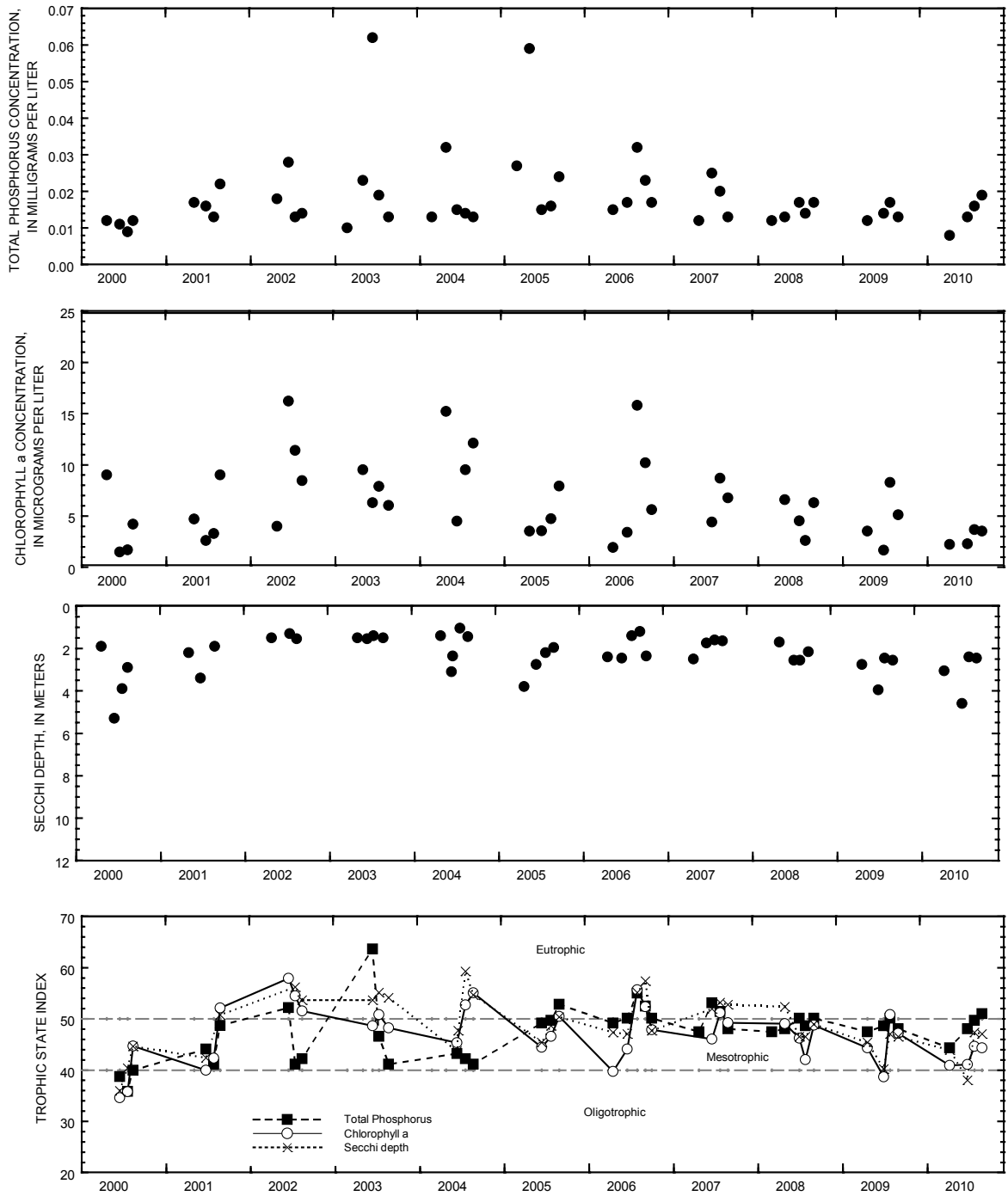
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Feb. 18</u>		<u>April 5</u>		<u>June 22</u>		<u>July 21</u>		<u>August 24</u>	
32210	Chlorophyll a (µg/L)	--		2.24		2.30		3.67		3.53	
00078	Secchi-depth (m)	--		3.0		4.6		2.4		2.4	
00098	Sampling depth (m)	0.5	11.0	0.5	12.0	0.5	9.5	0.5	11.0	0.5	11.0
00010	Water Temperature (°C)	2.3	3.5	11.0	5.0	24.3	13.0	27.2	13.1	25.7	13.5
00400	pH (standard units)	8.1	7.2	8.1	7.1	8.3	7.3	8.6	6.9	8.6	7.3
00095	Specific conductance (µS/cm)	599	760	565	730	561	549	509	590	508	605
00300	Dissolved oxygen	13.9	2.8	10.6	4.2	10.2	5.3	9.0	0.3	9.1	0.2
00665	Phosphorus, total (as P)	0.026	0.030	0.008	--	0.013	0.024	0.016	0.036	0.019	0.058

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 18 TO AUGUST 24, 2010





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

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'24", long 88°15'49", in NE ¼ SE ¼ sec.31, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

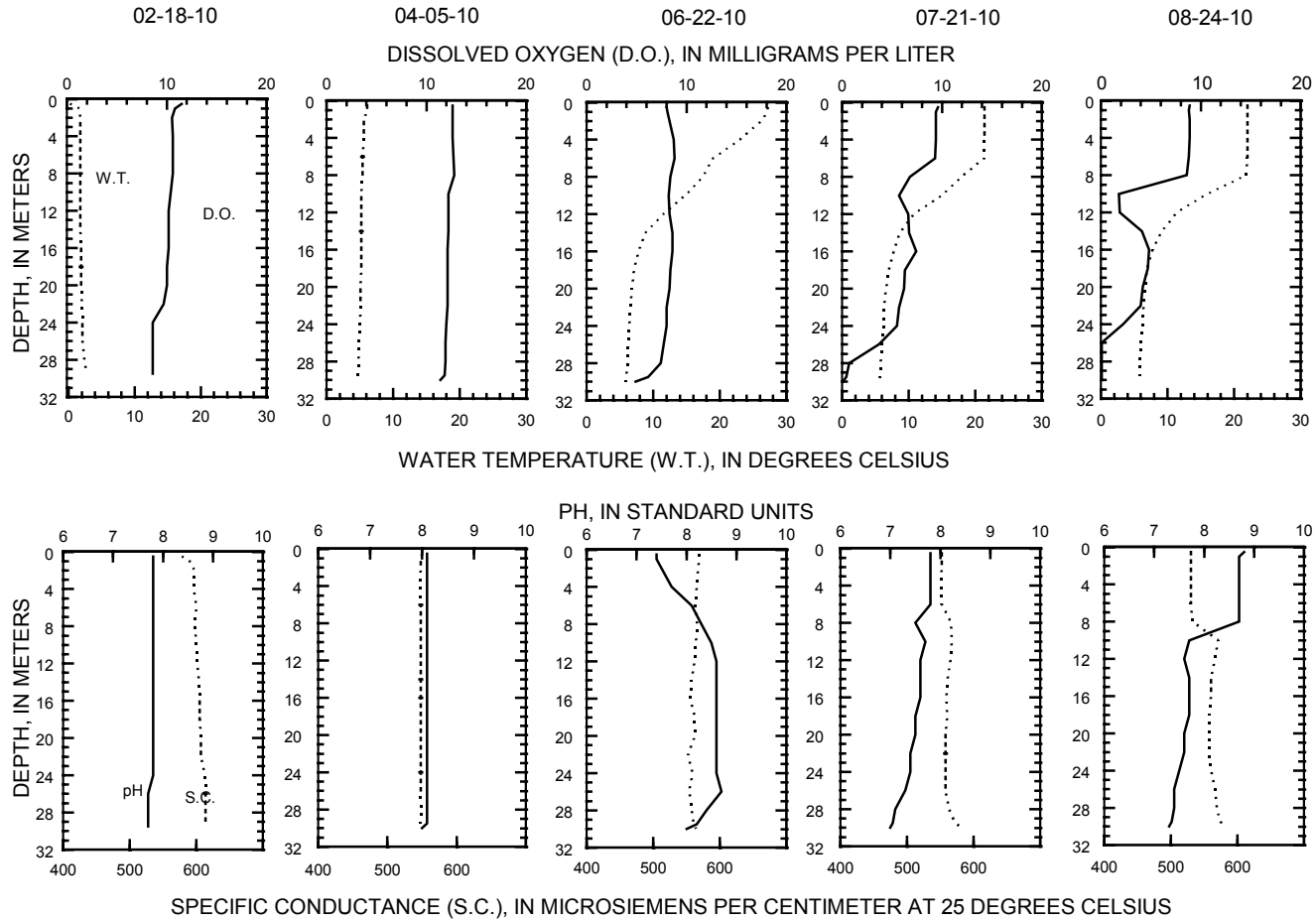
REMARKS.--Lake sampled on south side at deep hole. Lake ice-covered during February sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

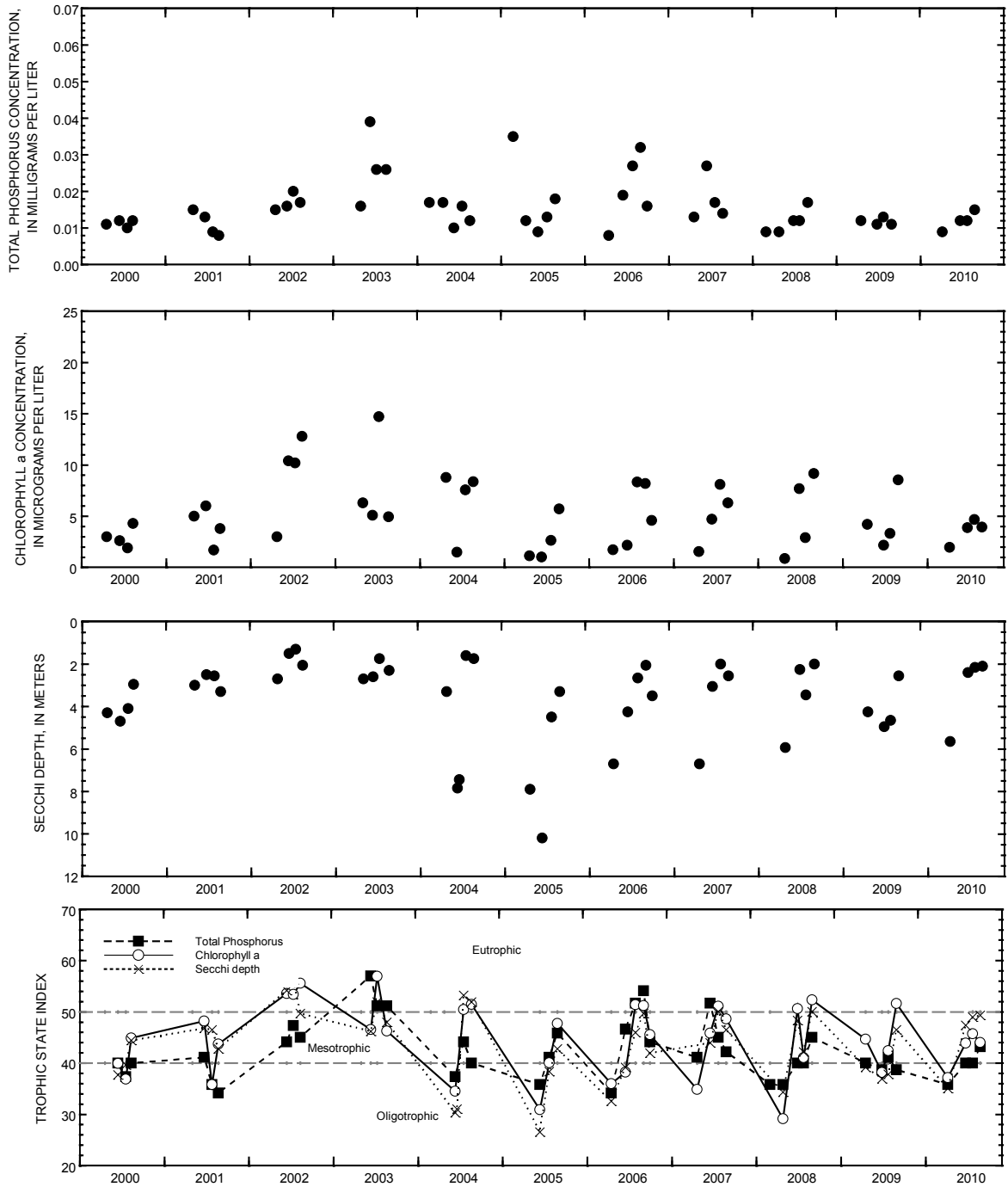
WATER-QUALITY DATA, FEBRUARY 18 TO AUGUST 24, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	Feb. 18		April 5		June 22		July 21		August 24	
32210	Chlorophyll a (µg/L)	--	--	1.96	--	3.87	--	4.67	--	3.93	--
00078	Secchi-depth (m)	--	--	5.6	--	2.4	--	2.2	--	2.1	--
00098	Sampling depth (m)	0.5	30.0	0.5	30.0	0.5	29.5	0.5	32.0	0.5	30.0
00010	Water Temperature (°C)	0.3	3.3	7.4	5.0	23.7	6.0	26.9	5.9	25.4	6.1
00400	pH (standard units)	8.0	7.3	8.0	7.8	8.5	7.4	8.5	6.8	8.6	7.4
00095	Specific conductance (µS/cm)	554	601	552	556	554	576	514	595	496	573
00300	Dissolved oxygen	12.4	4.3	11.0	10.4	10.6	1.7	10.2	0.4	9.5	0.1
00665	Phosphorus, total (as P)	0.009	0.16	0.009	--	0.012	0.008	0.012	0.019	0.015	0.081
00671	Orthophosphate, dissolved (as P)	--	--	0.002	--	--	--	0.003	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.426	--	--	--	0.040	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<0.015	--	--	--	0.019	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.38	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.44	--	--	--
00600	Total nitrogen	--	--	0.81	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	236	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	37.6	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	34.5	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	23.1	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.6	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	192	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	52.3	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	22.4	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	3.14	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	310	--	--	--	--	--	--	--

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 18 TO AUGUST 24, 2010





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

423706088363400 DELAVAN LAKE NEAR DELAVAN, WI

LOCATION.--Lat 42°36'27", long 88°36'19" referenced to North American Datum of 1927, in SW ¼ NE ¼ sec.28, T.2 N., R.16 E., Walworth County, WI, 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.

SURFACE AREA.--3.24 mi².

DRAINAGE AREA.--41.4 mi², of which 2.30 mi² probably is noncontributing.

PERIOD OF RECORD.--October 1983 to February 2010 (discontinued). October 1983 to September 1985 data published in Water Resources Investigation series report "Water Quality and Hydrology of Delavan Lake in Southeastern Wisconsin" by Stephen J. Field and Marvin D. Duerk.

GAGE.--Water-stage recorder. Datum of gage is 922.92 ft above NGVD of 1929 or 922.72 ft above NAVD of 1988. Prior to Sept. 5, 1989, staff gage at bridge on North Shore Drive at same datum.

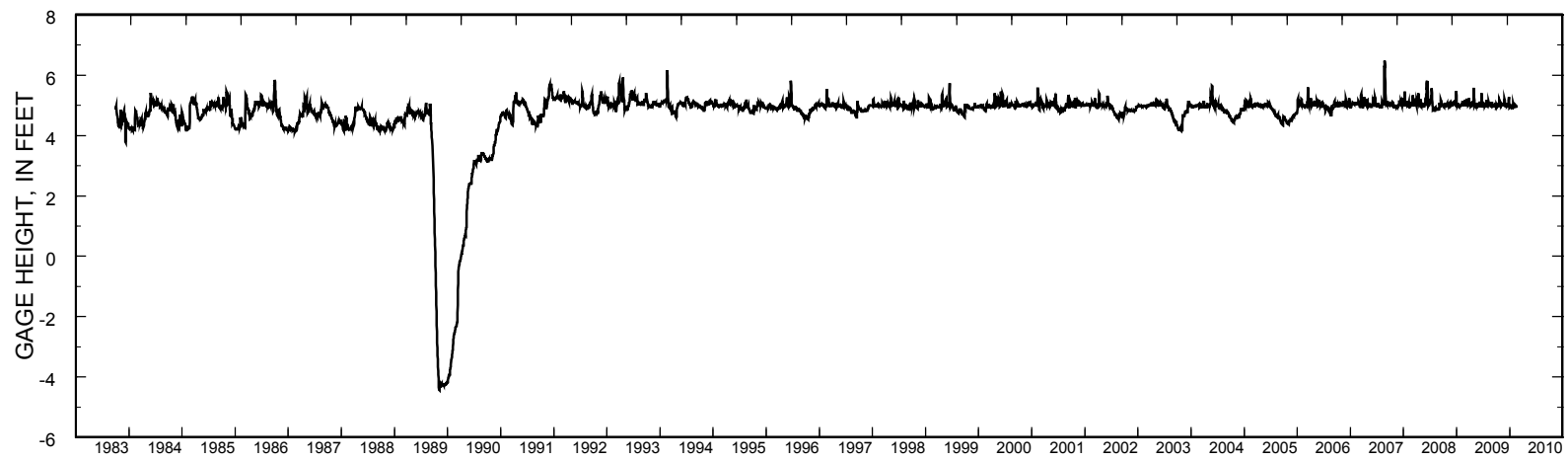
REMARKS.—Records good. Lake was ice-covered from Dec. 16-25 and Dec. 29 to Mar. 25. Lake levels controlled by Delavan Lake Sanitary District.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 6.53 ft, Aug. 27, 2007; minimum daily, -4.44 ft, Nov. 6, 1989 (lake drawn down for lake rehabilitation program).

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.31 ft, Dec. 26; minimum, 4.90 ft, Oct. 1 and Dec. 30.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	4.94	5.11	5.00	4.95	4.96	---	---	---	---	---	---	---
2	5.03	5.07	4.99	4.96	4.97	---	---	---	---	---	---	---
3	5.03	5.03	4.99	4.96	4.96	---	---	---	---	---	---	---
4	5.00	5.01	4.98	4.95	4.95	---	---	---	---	---	---	---
5	4.98	5.03	4.97	4.96	4.95	---	---	---	---	---	---	---
6	4.99	5.04	4.97	4.97	4.96	---	---	---	---	---	---	---
7	4.98	5.04	4.97	5.00	4.97	---	---	---	---	---	---	---
8	4.98	5.04	4.98	5.00	4.99	---	---	---	---	---	---	---
9	5.00	5.05	5.07	5.01	5.01	---	---	---	---	---	---	---
10	5.00	5.04	5.02	5.00	5.02	---	---	---	---	---	---	---
11	4.99	5.03	4.97	4.99	5.01	---	---	---	---	---	---	---
12	4.98	5.02	4.96	4.98	4.99	---	---	---	---	---	---	---
13	4.97	5.01	4.96	4.98	4.97	---	---	---	---	---	---	---
14	4.97	5.00	4.97	4.97	4.96	---	---	---	---	---	---	---
15	4.98	5.01	4.98	4.96	4.96	---	---	---	---	---	---	---
16	5.00	5.00	4.98	4.96	4.96	---	---	---	---	---	---	---
17	5.01	5.00	4.98	4.96	4.96	---	---	---	---	---	---	---
18	5.00	5.02	4.98	4.95	4.96	---	---	---	---	---	---	---
19	5.00	5.04	4.99	4.96	---	---	---	---	---	---	---	---
20	5.01	5.04	4.99	4.96	---	---	---	---	---	---	---	---
21	5.01	5.04	4.99	4.96	---	---	---	---	---	---	---	---
22	5.04	5.04	5.00	4.96	---	---	---	---	---	---	---	---
23	5.17	5.05	5.01	4.95	---	---	---	---	---	---	---	---
24	5.13	5.06	5.07	4.96	---	---	---	---	---	---	---	---
25	5.05	5.13	5.17	5.03	---	---	---	---	---	---	---	---
26	5.08	5.19	5.28	5.06	---	---	---	---	---	---	---	---
27	5.05	5.21	5.25	5.01	---	---	---	---	---	---	---	---
28	5.00	5.15	5.12	4.99	---	---	---	---	---	---	---	---
29	4.99	5.09	4.99	4.99	---	---	---	---	---	---	---	---
30	5.08	5.04	4.92	4.98	---	---	---	---	---	---	---	---
31	5.13	---	4.93	4.97	---	---	---	---	---	---	---	---
Mean	5.02	5.05	5.01	4.98	---	---	---	---	---	---	---	---
Max	5.17	5.21	5.28	5.06	---	---	---	---	---	---	---	---
Min	4.94	5.00	4.92	4.95	---	---	---	---	---	---	---	---



Stage hydrograph for Delavan Lake, 1983 – 2010.

05404500 DEVILS LAKE NEAR BARABOO, WI

LOCATION.--Lat 43°25'35", long 89°43'40" referenced to North American Datum of 1927, in SW ¼ SE ¼ sec.13, T.11 N., R.6 E., Sauk County, WI, Hydrologic Unit 07070004, in Devils Lake State Park, 3.5 mi south of Baraboo.

SURFACE AREA.--0.56 mi².

DRAINAGE AREA.--4.79 mi².

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.

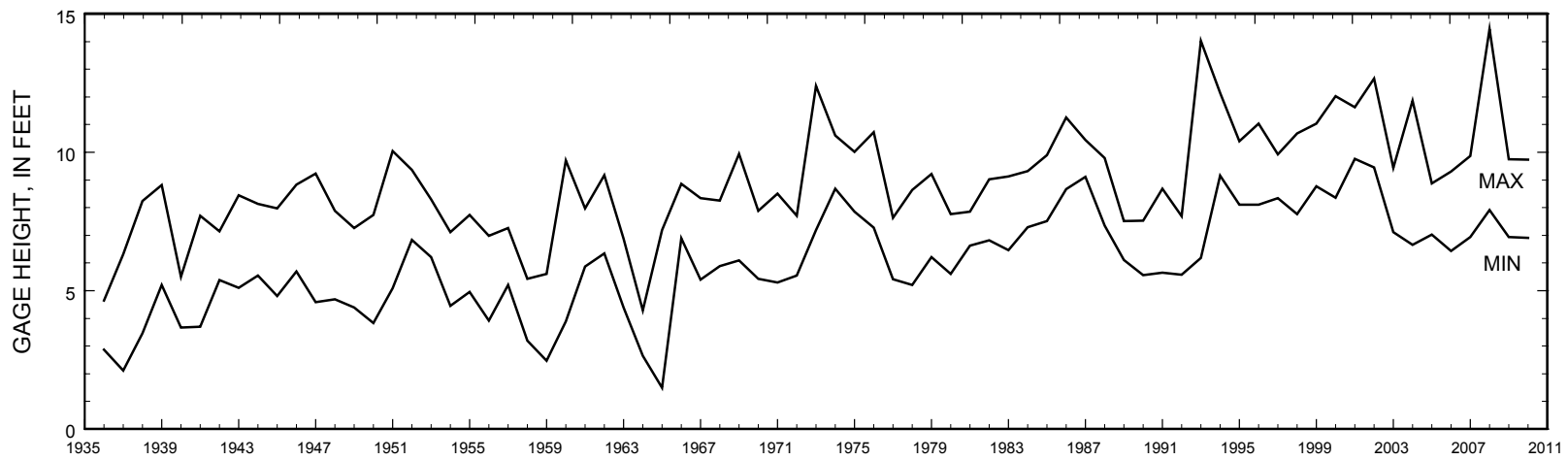
GAGE.--Water-stage recorder installed July 17, 1991. Datum of gage is 954.88 ft, above NAVD of 1988.

REMARKS.--Lake has no surface outlet. Water removed from lake by bottom withdrawal pipe, October 1 to November 2, May 13-28 and June 16 to September 30.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed, 14.83 ft, June 12, 2008; minimum observed, 1.49 ft, Feb. 8, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum observed, 9.78 ft, June 27; minimum observed, 6.87 ft, Nov. 17, 20 and Dec. 6.

GAGE HEIGHT, FEET WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010 DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	7.34	7.09	6.94	7.21	7.29	7.27	7.93	9.03	8.93	9.58	9.37	9.58
2	7.38	7.06	6.93	7.21	7.30	7.26	7.93	9.06	8.91	9.53	9.33	9.62
3	7.36	7.05	6.91	7.20	7.30	7.26	7.94	9.07	8.90	9.47	9.28	9.61
4	7.34	7.04	6.91	7.20	7.30	7.25	7.94	9.07	8.90	9.42	9.24	9.57
5	7.32	7.03	6.90	7.20	7.30	7.24	7.92	9.08	8.90	9.39	9.19	9.54
6	7.32	7.03	6.89	7.19	7.30	7.24	8.03	9.07	8.92	9.37	9.14	9.51
7	7.31	7.02	6.89	7.22	7.29	7.23	8.36	9.08	8.90	9.34	9.09	9.46
8	7.28	7.02	6.89	7.24	7.30	7.23	8.52	9.10	8.94	9.34	9.17	9.40
9	7.25	7.01	6.98	7.24	7.33	7.23	8.58	9.10	8.95	9.30	9.34	9.36
10	7.22	7.00	6.99	7.24	7.34	7.30	8.62	9.10	8.93	9.25	9.36	9.33
11	7.19	7.00	6.98	7.23	7.34	7.42	8.64	9.13	8.97	9.20	9.33	9.29
12	7.17	6.99	6.97	7.23	7.33	7.57	8.65	9.16	8.97	9.15	9.30	9.25
13	7.14	6.98	6.97	7.22	7.33	7.71	8.66	9.36	8.95	9.11	9.40	9.20
14	7.12	6.95	6.97	7.22	7.32	7.81	8.67	9.41	8.95	9.07	9.57	9.16
15	7.11	6.94	6.97	7.22	7.32	7.87	8.68	9.41	9.23	9.34	9.56	9.12
16	7.09	6.93	6.97	7.21	7.32	7.91	8.68	9.40	9.67	9.32	9.52	9.07
17	7.07	6.92	---	7.21	7.31	7.93	8.68	9.38	9.69	9.28	9.48	9.03
18	7.05	6.92	---	7.21	7.31	7.95	8.67	9.36	9.72	9.25	9.44	8.99
19	7.02	6.92	---	7.20	7.30	7.97	8.66	9.33	9.69	9.21	9.40	8.95
20	7.00	6.93	---	7.20	7.30	7.98	8.66	9.30	9.66	9.18	9.41	8.91
21	6.99	6.92	---	7.19	7.30	7.99	8.65	9.28	9.63	9.13	9.56	8.88
22	7.01	6.92	---	7.19	7.30	7.99	8.64	9.26	9.62	9.23	9.54	8.84
23	7.07	6.91	---	7.19	7.30	7.99	8.63	9.23	9.70	9.43	9.52	8.83
24	7.08	6.91	---	7.25	7.30	7.98	8.66	9.20	9.71	9.53	9.48	8.86
25	7.07	6.94	---	7.29	7.30	7.98	8.72	9.17	9.68	9.56	9.43	8.81
26	7.05	6.97	---	7.29	7.29	7.97	8.74	9.12	9.71	9.53	9.38	8.76
27	7.04	6.97	---	7.30	7.28	7.96	8.74	9.08	9.74	9.50	9.33	8.72
28	7.02	6.96	---	7.30	7.28	7.95	8.73	9.03	9.72	9.52	9.28	8.68
29	7.02	6.95	7.21	7.30	---	7.95	8.73	9.01	9.68	9.50	9.23	8.65
30	7.12	6.95	7.20	7.30	---	7.95	8.79	8.99	9.63	9.46	9.19	8.61
31	7.10	---	7.21	7.29	---	7.93	---	8.95	---	9.41	9.20	---
Mean	7.15	6.97	---	7.23	7.31	7.69	8.52	9.17	9.32	9.35	9.36	9.12
Max	7.38	7.09	---	7.30	7.34	7.99	8.79	9.41	9.74	9.58	9.57	9.62
Min	6.99	6.91	---	7.19	7.28	7.23	7.92	8.95	8.90	9.07	9.09	8.61



Annual minimum and maximum water levels for Devils Lake, 1936-2010.

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI

LOCATION.--Lat 42°35'25", long 88°26'04" referenced to North American Datum of 1927, in SE ¼ NW ¼ sec.36, T.2 N., R.17 E., Walworth County, WI, Hydrologic Unit 07120006, at Geneva Lake dam at Center Street at Lake Geneva.

SURFACE AREA.--8.22 mi².

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--October 1997 to August 2002, December 2002 to current year.

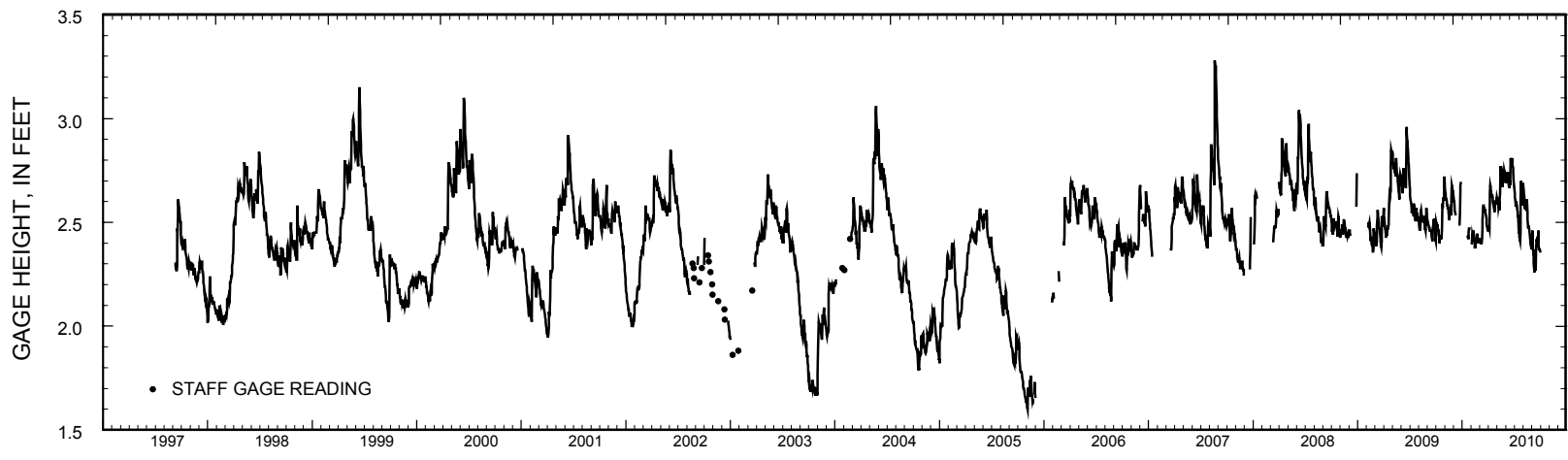
GAGE.--Water-stage recorder. Datum of gage is 861.86 ft above NAVD of 1988 or 862.08 ft above NGVD of 1929. Intermittent staff-gage readings during winter months.

REMARKS.—Records good except for estimated days, which are poor. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.35 ft, Aug. 20, 2007; minimum gage height, 1.44 ft, Nov. 5, 2005 (affected by wind).

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.07 ft (affected by wind), June 18; minimum gage height, 2.19 ft (affected by wind), Apr. 6.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.41	2.68	2.63	2.62	2.40	2.42	2.46	2.62	2.69	2.64	2.69	2.39
2	2.50	2.67	2.61	2.62	2.40	2.41	2.47	2.61	2.72	2.62	2.67	2.40
3	2.49	2.65	2.60	2.62	2.41	2.41	2.48	2.62	2.71	2.60	2.65	2.46
4	2.49	2.64	2.60	2.62	2.40	2.40	2.48	2.61	2.70	2.59	2.64	2.40
5	2.47	2.63	2.57	2.62	2.40	e2.41	2.47	2.60	2.68	2.57	2.63	2.37
6	2.49	2.61	2.56	2.62	2.44	e2.40	2.60	2.57	2.73	2.56	2.59	2.36
7	2.47	2.61	2.55	2.62	e2.43	2.39	2.64	2.58	2.70	2.55	2.57	2.37
8	2.46	2.60	2.54	2.62	e2.43	2.39	2.68	2.60	2.70	2.57	2.57	2.30
9	2.46	2.59	2.64	2.62	2.44	2.39	2.67	2.58	2.73	2.55	2.59	2.28
10	2.46	2.58	2.64	2.62	2.46	2.41	2.66	2.56	2.69	2.54	2.58	2.26
11	2.44	2.58	e2.60	2.62	2.43	2.46	2.65	2.61	2.68	2.53	2.57	2.29
12	2.43	2.57	2.64	2.62	2.42	2.50	2.63	2.64	2.67	2.52	2.56	2.30
13	2.42	2.57	2.62	e2.46	2.41	2.54	2.62	2.75	2.66	2.50	2.56	2.29
14	2.40	2.56	2.58	2.61	2.40	2.57	2.63	2.77	2.66	2.50	2.61	2.28
15	2.42	2.55	2.58	2.56	2.38	2.57	2.63	2.75	2.67	2.48	2.59	2.27
16	2.43	2.53	2.58	2.56	2.38	2.56	2.62	2.72	2.69	2.48	2.55	2.38
17	2.43	2.51	2.58	2.55	2.38	2.56	2.60	2.71	2.67	2.45	2.51	2.41
18	2.43	2.54	2.58	2.51	2.40	2.55	2.59	2.70	2.72	2.45	2.49	2.42
19	2.43	2.55	2.58	2.46	2.41	2.55	2.58	2.68	2.80	2.43	2.47	2.41
20	2.42	2.56	2.58	2.45	2.43	2.55	2.58	2.67	2.76	2.42	2.48	2.40
21	2.43	2.55	2.58	2.43	2.43	2.55	2.57	2.68	2.75	2.41	2.48	2.43
22	2.46	2.54	2.52	2.43	2.44	2.53	2.56	2.72	2.76	2.45	2.47	2.42
23	2.57	2.54	2.49	2.42	2.44	2.52	2.55	2.71	2.79	2.61	2.45	2.44
24	2.59	2.54	2.54	2.45	2.44	2.51	2.56	2.70	2.77	2.70	2.45	2.46
25	2.57	2.61	2.65	2.47	e2.43	2.50	2.60	2.71	2.75	2.68	2.43	2.39
26	2.61	2.68	2.68	2.47	e2.41	2.49	2.60	2.75	2.75	2.67	2.41	2.37
27	2.62	2.67	2.69	2.49	e2.40	2.48	2.59	2.74	2.74	2.65	2.40	2.37
28	2.61	2.65	2.68	2.48	2.42	2.47	2.59	2.73	2.72	2.63	2.39	2.37
29	2.61	2.65	2.66	2.48	---	2.47	2.59	2.72	2.68	2.60	2.38	2.37
30	2.72	2.65	2.66	2.45	---	2.46	2.60	2.71	2.66	2.58	2.38	2.36
31	2.72	---	2.63	2.41	---	2.46	---	2.70	---	2.69	2.37	---
Mean	2.50	2.60	2.60	2.53	2.42	2.48	2.58	2.67	2.71	2.56	2.52	2.37
Max	2.72	2.68	2.69	2.62	2.46	2.57	2.68	2.77	2.80	2.70	2.69	2.46
Min	2.40	2.51	2.49	2.41	2.38	2.39	2.46	2.56	2.66	2.41	2.37	2.26



Stage hydrograph for Geneva Lake, 1997-2010.

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LOCATION.--Lat 42°33'29", long 88°32'33", in NE ¼ SE ¼ sec.12, T.1 N., R.16 E., Walworth County, Hydrologic Unit 07120006, 1.3 mi south of Williams Bay.

SURFACE AREA.--8.22 mi².

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 0.5 m of the lake.

WATER-QUALITY DATA, NOVEMBER 3, 2009 TO JUNE 10, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	November 3				April 20		June 10					
32210	Chlorophyll a (µg/L)	3.14				0.75		1.36					
00078	Secchi-depth (m)	6.8				8.9		3.7					
00098	Sampling depth (m)	0.5	28.0	35.0	42.5	0.5	42.0	0.5	7.0	13.0	33.0	38.0	42.0
00010	Water Temperature (°C)	11.0	10.6	8.1	7.6	9.2	5.5	19.9	17.6	11.7	8.0	7.6	7.6
00400	pH (standard units)	7.9	7.7	7.2	7.0	8.4	8.3	8.0	8.1	8.0	7.9	7.9	7.9
00095	Specific conductance (µS/cm)	526	529	531	532	528	533	526	525	528	535	536	536
00300	Dissolved oxygen	9.9	7.5	1.8	0.3	13.0	13.0	10.8	11.0	11.6	9.6	9.2	9.2
00665	Phosphorus, Total (as P)	0.012	0.012	0.028	0.045	0.007	--	0.010	0.013	0.010	0.008	0.009	0.009
00671	Orthophosphate, dissolved (as P)	<.002	--	--	--	<.002	--	--	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	0.086	--	--	--	0.121	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	0.020	--	--	--	0.016	--	--	--	--	--	--	--
00625	Ammonia + organic nitrogen, total (as N)	0.41	--	--	--	0.42	--	--	--	--	--	--	--
00600	Total nitrogen	0.50	--	--	--	0.54	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	--	--	--	--	232	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	--	--	36.4	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	--	--	34.3	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	--	--	20.8	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	--	--	1.7	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	--	--	--	--	187	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	--	--	42.5	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	--	--	--	--	30.3	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	--	--	--	--	2.44	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	--	--	286	--	--	--	--	--	--	--

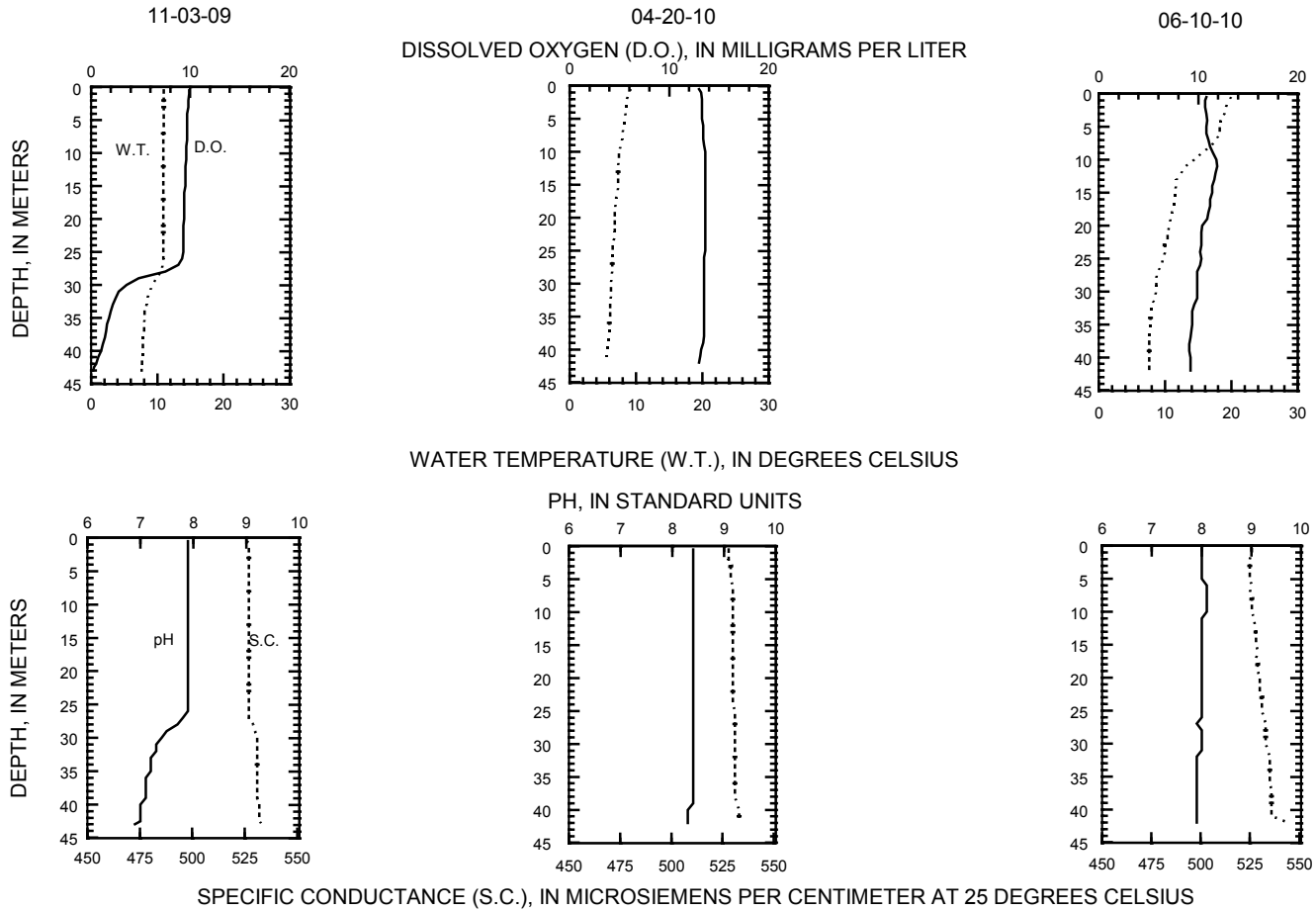
423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

WATER-QUALITY DATA, JULY 29 TO SEPTEMBER 17, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	July 29		August 19						September 17					
32210	Chlorophyll a (µg/L)	1.78		2.61						5.51					
00078	Secchi-depth (m)	5.5		3.6						4.65					
00098	Sampling depth (m)	0.5	42.5	0.5	9.0	15.0	32.0	37.0	41.0	0.5	12.0	17.0	32.0	37.0	41.0
00010	Water Temperature (°C)	26.5	7.9	26.2	24.7	12.5	8.8	8.3	8.2	20.2	20.1	12.4	8.9	8.5	8.4
00400	pH (standard units)	8.5	7.3	8.5	8.4	8.0	7.7	7.6	7.6	8.5	8.5	7.9	7.7	7.6	7.6
00095	Specific conductance (µS/cm)	527	542	535	537	533	538	539	540	520	521	533	537	538	539
00300	Dissolved oxygen	9.3	3.0	8.5	7.4	7.3	3.1	2.5	1.6	9.0	8.8	5.6	3.2	1.9	1.7
00665	Phosphorus, Total (as P)	0.007	--	0.010	0.010	0.012	0.009	0.009	0.019	0.016	0.014	0.016	0.017	0.025	0.032
00671	Orthophosphate, dissolved (as P)	<.002	--	--	--	--	--	--	--	--	--	--	--	--	--
00631	Nitrate + nitrite, dissolved (as N)	<.019	--	--	--	--	--	--	--	<.019	<.019	0.133	0.273	0.279	0.258
00608	Ammonia, dissolved (as N)	<.015	--	--	--	--	--	--	--	<.015	<.015	0.031	<.015	0.022	0.051
00625	Ammonia + organic nitrogen, total (as N)	0.34	--	--	--	--	--	--	--	0.49	0.44	0.41	0.36	0.38	0.43
00600	Total nitrogen	<.36	--	--	--	--	--	--	--	<.51	<.46	0.54	0.63	0.66	0.69

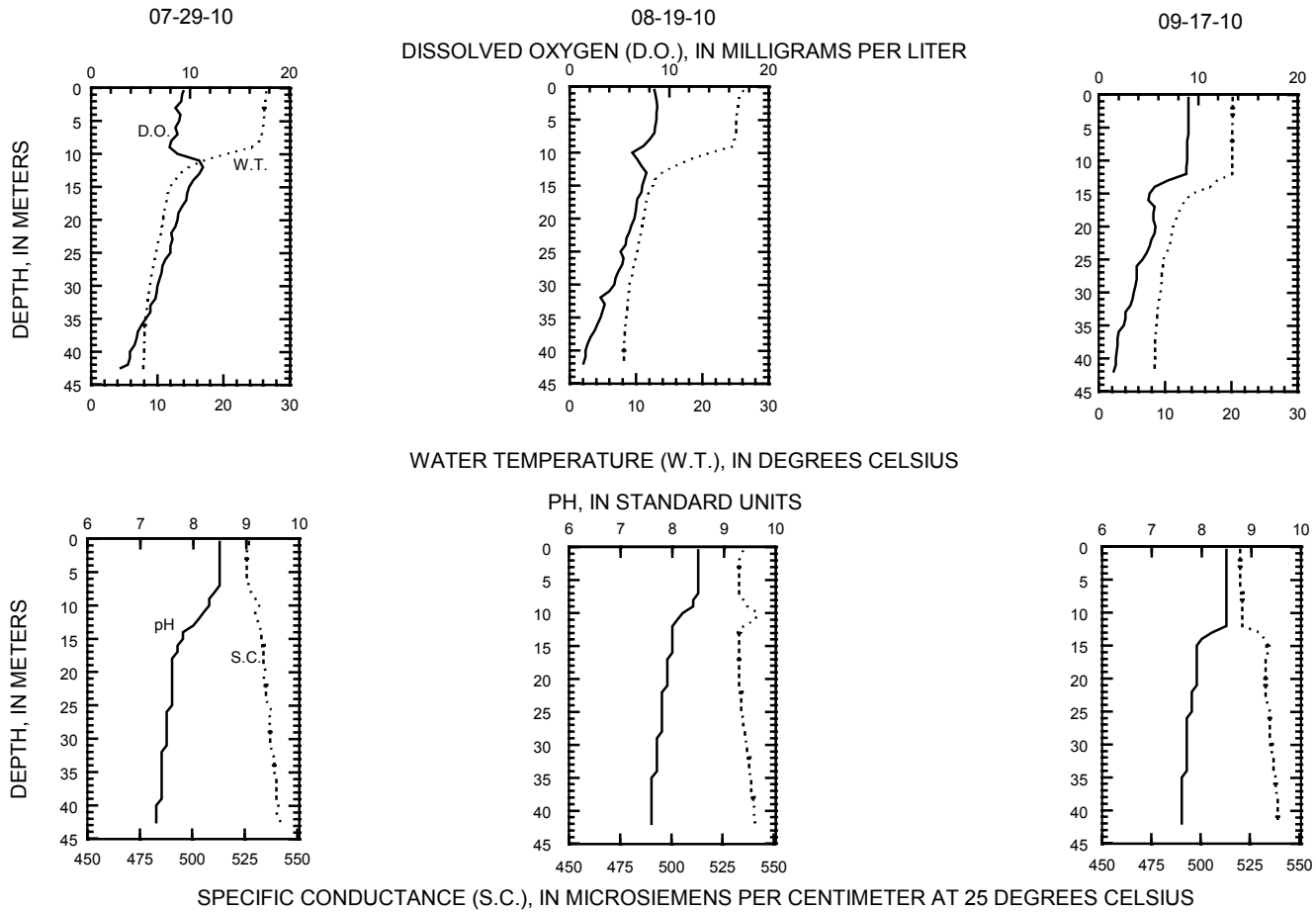
423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

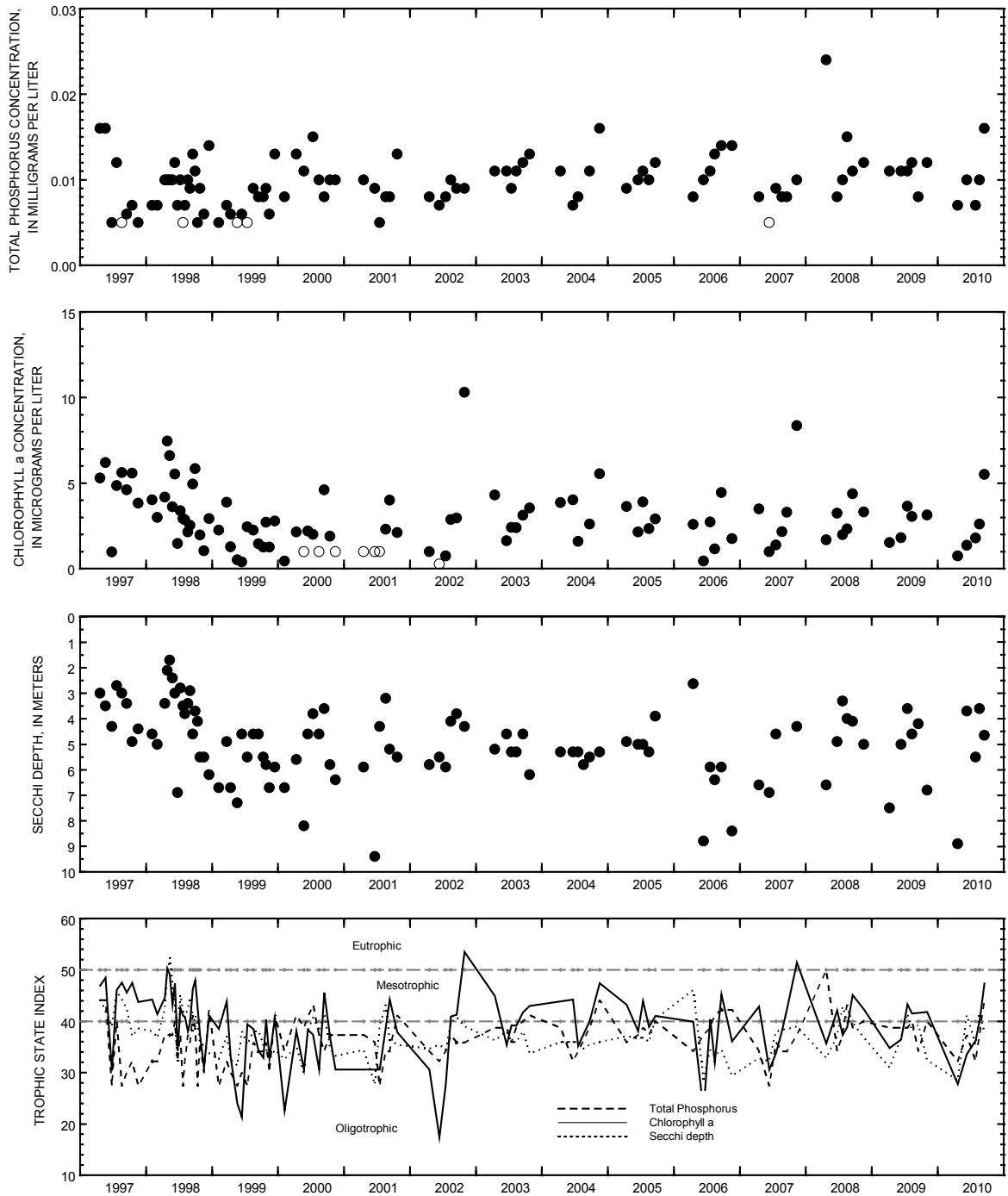
LAKE-DEPTH PROFILES, NOVEMBER 3, 2009 TO JUNE 10, 2010



423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LAKE-DEPTH PROFILES, JULY 29 TO SEPTEMBER 17, 2010





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

(Open circles on the first two 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" referenced to North American Datum of 1927, in NE ¼ SE ¼ SE ¼ sec.27, T.16 N., R.13 E., Green Lake County, WI, Hydrologic Unit 04030201, on left bank at downstream side of County Trunk Highway A, 2.3 mi southeast of Green Lake.

SURFACE AREA.--11.48 mi².

DRAINAGE AREA.--103 mi²; Area of Green Lake, 7,346 acres.

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

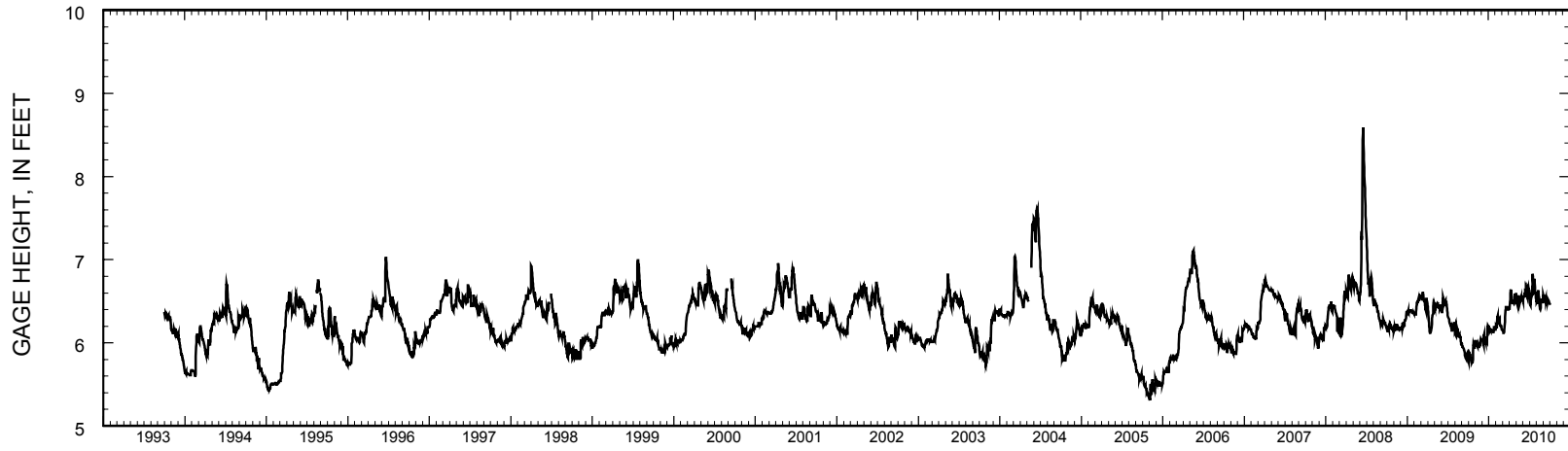
GAGE.--Water-stage recorder. Datum of gage is 790.00 ft above sea level.

REMARKS.--Lake level regulated by dam at outlet at Green Lake. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 8.67 ft, June 15, 2008; minimum recorded, 5.27 ft, Nov. 5, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.96 ft, July 15; minimum recorded gage height, 5.63 ft, Oct. 1.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.78	6.02	6.04	6.18	6.16	6.15	6.41	6.60	6.52	6.52	6.51	6.57
2	5.83	6.02	6.04	6.16	6.19	6.15	6.41	6.59	6.50	6.48	6.51	6.58
3	5.84	5.99	6.03	6.16	6.20	6.14	6.42	6.55	6.52	e6.47	6.49	6.56
4	5.83	5.98	6.02	6.15	e6.19	6.14	6.48	6.53	6.57	e6.46	6.50	6.53
5	5.83	5.98	6.02	6.15	e6.19	6.13	6.49	6.49	6.56	e6.45	6.49	6.52
6	5.85	5.98	5.99	6.14	6.19	6.12	6.52	6.48	6.57	e6.54	6.48	6.53
7	5.87	5.99	5.99	6.15	6.22	6.12	6.60	6.46	6.56	6.52	6.48	6.51
8	5.86	5.97	5.97	6.16	6.29	6.12	6.64	6.49	6.56	6.55	6.57	6.51
9	5.84	5.98	6.08	6.15	6.30	6.13	6.63	6.51	6.58	6.55	6.63	6.51
10	5.83	5.96	6.10	6.16	6.32	6.15	6.62	6.49	6.55	6.56	6.60	6.50
11	5.82	5.95	6.07	6.16	6.30	6.21	6.56	6.50	6.58	6.62	6.58	6.51
12	5.79	5.97	6.03	6.15	6.30	6.25	6.53	6.51	6.60	6.64	6.56	6.53
13	5.79	5.97	6.04	6.15	6.31	e6.31	6.51	6.56	6.59	6.63	6.55	6.52
14	5.77	5.97	6.05	6.15	6.31	6.38	6.50	6.56	6.57	6.57	6.53	6.51
15	5.77	5.97	6.07	6.15	6.30	6.39	6.49	6.56	6.60	6.83	6.50	6.50
16	5.77	5.95	6.03	6.14	6.29	6.41	6.48	6.54	6.63	6.80	6.45	6.52
17	5.76	5.95	6.01	6.14	6.28	6.43	6.48	6.52	6.61	6.75	6.42	6.52
18	e5.77	5.95	6.02	6.14	6.27	6.43	6.50	6.51	6.63	6.70	6.41	6.52
19	e5.77	5.98	6.02	6.14	6.28	e6.42	6.50	6.51	6.61	6.65	6.40	6.51
20	e5.77	5.99	6.03	6.13	6.25	e6.42	6.50	6.51	6.58	6.61	6.42	6.50
21	e5.80	5.98	6.04	6.13	6.21	e6.41	6.48	6.50	6.56	6.59	6.48	6.50
22	e5.90	5.98	6.02	6.13	6.21	6.41	6.48	6.52	6.65	6.64	6.52	6.49
23	e5.98	5.97	6.01	6.13	6.21	6.40	6.47	6.54	6.67	6.77	6.52	6.51
24	e5.98	5.97	6.05	6.17	6.21	6.40	6.48	6.53	6.66	6.73	6.52	6.52
25	e5.96	6.02	6.13	6.19	6.20	e6.40	6.55	6.54	6.63	6.67	6.51	6.51
26	5.94	6.05	6.17	6.19	6.20	e6.40	6.59	6.54	6.66	6.63	6.51	6.51
27	5.94	6.05	6.21	6.18	6.19	6.40	6.57	6.54	6.66	6.59	6.50	6.50
28	5.94	6.04	6.20	6.18	6.16	6.41	6.56	6.53	e6.62	6.61	6.49	6.49
29	5.94	6.04	6.18	6.17	---	6.42	6.54	6.52	6.59	6.56	6.49	6.48
30	6.01	6.04	6.19	6.16	---	6.42	6.54	6.53	6.54	6.54	6.49	6.47
31	6.02	---	6.20	6.16	---	6.41	---	6.52	---	6.52	6.49	---
Mean	5.86	5.99	6.07	6.15	6.24	6.31	6.52	6.53	6.59	6.60	6.50	6.51
Max	6.02	6.05	6.21	6.19	6.32	6.43	6.64	6.60	6.67	6.83	6.63	6.58
Min	5.76	5.95	5.97	6.13	6.16	6.12	6.41	6.46	6.50	6.45	6.40	6.47



Stage hydrograph for Green Lake, 1993-2010.

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LOCATION.--Lat 43°47'56", long 89°02'05", in NW ¼ SE ¼ sec.2, T.15 N., R.12 E., Green Lake County, Hydrologic Unit 04030201, about 5 miles southwest of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 to current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "*" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, April 19 TO JUNE 16, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 19		May 20*	May 26*	June 3*	June 10*	June 16*
32210	Chlorophyll a (µg/L)	4.92		--	--	--	--	--
00078	Secchi-depth (m)	2.7		0.9	1.2	1.4	1.8	3.7
00098	Sampling depth (m)	0.5	66.0	0.1	0.1	0.1	0.1	0.1
00010	Water Temperature (°C)	7.1	4.0	16.7	22.2	22.8	20	21.7
00400	pH (standard units)	8.1	8.1	--	--	--	--	--
00095	Specific conductance (µS/cm)	511	515	--	--	--	--	--
00300	Dissolved oxygen	14.0	11.9	--	--	--	--	--
00665	Phosphorus, total (as P)	0.041	0.049	--	--	--	--	--
00671	Orthophosphate, dissolved (as P)	0.02	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	0.224	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	<.015	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, unfltrd, total (as N)	0.49	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, fltrd, total (as N)	--	--	--	--	--	--	--
00600	Total nitrogen	0.71	--	--	--	--	--	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--
00081	Apparent color, (PTU)	5	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	225	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	33.6	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	34.3	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	18.8	--	--	--	--	--	--
00935	Potassium, dissolved (K)	3.1	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	180	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	37.8	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	30.9	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	0.362	--	--	--	--	--	--
01046	Iron (µg/L)	<100	--	--	--	--	--	--
01056	Manganese (µg/L)	<1.0	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	276	--	--	--	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

WATER-QUALITY DATA, JUNE 24 TO SEPTEMBER 29, 2010
(Milligrams per liter unless otherwise indicated)

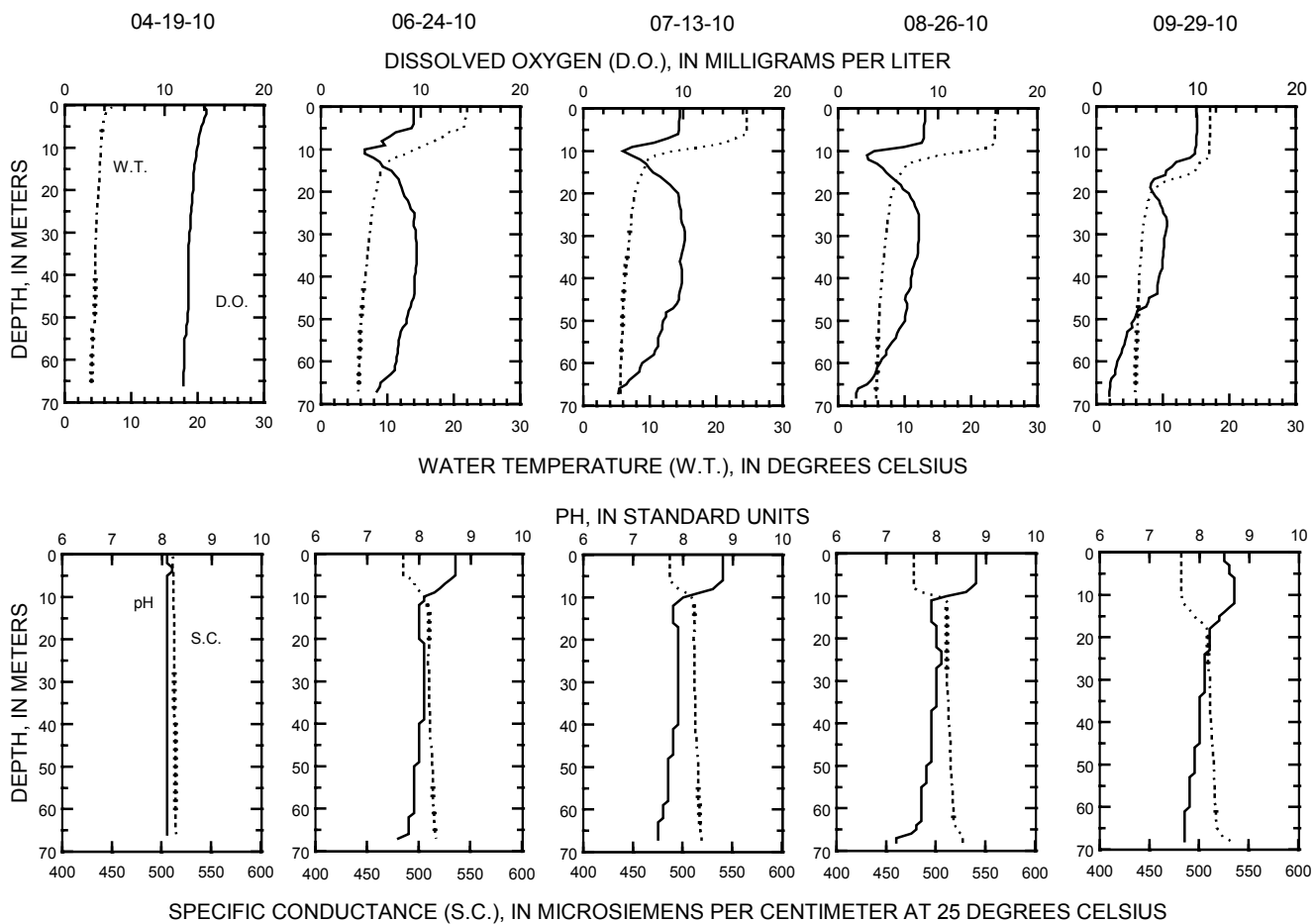
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>June 24</u>		<u>June 26*</u>	<u>June 30*</u>	<u>July 9*</u>	<u>July 13</u>		<u>July 19*</u>
32210	Chlorophyll a (µg/L)	3.1		--	--	--	3.2		--
00078	Secchi-depth (m)	5.0		6.4	5.9	5.3	4.6		4.4
00098	Sampling depth (m)	0.5	68.5	0.1	0.1	0.1	0.5	66.5	0.1
00010	Water Temperature (°C)	22.0	5.6	24.4	23.9	24.4	24.6	5.6	25
00400	pH (standard units)	8.7	7.6	--	--	--	8.8	7.5	--
00095	Specific conductance (µS/cm)	485	517	--	--	--	487	519	--
00300	Dissolved oxygen	9.3	5.6	--	--	--	9.7	3.5	--
00665	Phosphorus, total (as P)	0.022	0.094	--	--	--	0.045	0.116	--

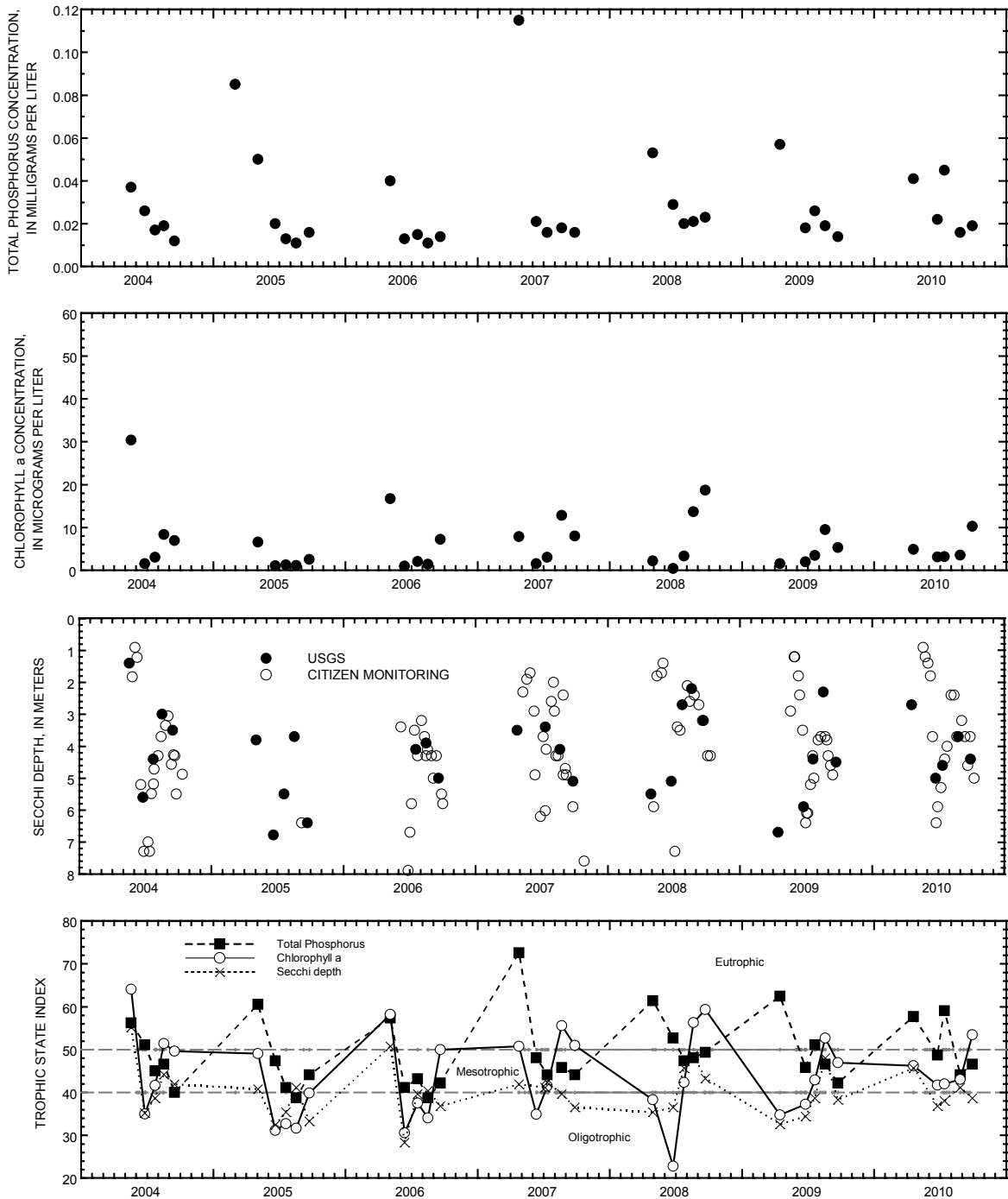
<u>Parameter Code</u>	<u>Parameter Name</u>	<u>July 26*</u>	<u>August 6*</u>	<u>August 14*</u>	<u>August 22*</u>	<u>August 26</u>		
32210	Chlorophyll a (µg/L)	--	--	--	--	3.57		
00078	Secchi-depth (m)	4	2.4	2.4	3.7	3.7		
00098	Sampling depth (m)	0.1	0.1	0.1	0.1	0.5	14.0	68.0
00010	Water Temperature (°C)	26.1	25.6	25.6	25	23.7	9.9	5.7
00400	pH (standard units)	--	--	--	--	8.8	7.9	7.2
00095	Specific conductance (µS/cm)	--	--	--	--	478	511	527
00300	Dissolved oxygen	--	--	--	--	8.7	4.5	1.8
00665	Phosphorus, total (as P)	--	--	--	--	0.016	0.013	0.185
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	0.022	--	--
00608	Ammonia, dissolved (as N)	--	--	--	--	0.032	--	--
00625	Ammonia plus organic nitrogen, unfltrd, total (as N)	--	--	--	--	--	--	--
00623	Ammonia plus organic nitrogen, fltrd, total (as N)	--	--	--	--	0.69	--	--

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Sept. 5*</u>	<u>Sept. 14*</u>	<u>Sept. 22*</u>	<u>Sept. 28*</u>	<u>September 29</u>		
32210	Chlorophyll a (µg/L)	--	--	--	--	10.3		
00078	Secchi-depth (m)	3.2	3.7	4.6	3.7	4.4		
00098	Sampling depth (m)	0.1	0.1	0.1	0.1	0.5	19.0	69.0
00010	Water Temperature (°C)	21.1	19.4	19.4	17.2	17.1	9.0	5.7
00400	pH (standard units)	--	--	--	--	8.5	8.2	7.6
00095	Specific conductance (µS/cm)	--	--	--	--	482	509	534
00300	Dissolved oxygen	--	--	--	--	10.0	5.4	1.2
00665	Phosphorus, total (as P)	--	--	--	--	0.019	0.012	0.202

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 19 TO SEPTEMBER 29, 2010





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

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'28", long 88°57'00", in SE ¼ SE ¼ sec.28, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "*" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, APRIL 19 TO JULY 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 19		May 20*	May 26*	June 3*	June 10*	June 16*
32210	Chlorophyll a (µg/L)	2.6		--	--	--	--	--
00078	Secchi-depth (m)	2.1		1.1	0.9	1.7	1.2	3.8
00098	Sampling depth (m)	0.5	32.0	0.1	0.1	0.1	0.1	0.1
00010	Water Temperature (°C)	7.9	4.8	15.6	22.2	22.8	20.6	22.8
00400	pH (standard units)	8.3	8.2	--	--	--	--	--
00095	Specific conductance (µS/cm)	513	514	--	--	--	--	--
00300	Dissolved oxygen	14	12.7	--	--	--	--	--
00665	Phosphorus, total (as P)	0.036	0.046	--	--	--	--	--

Parameter Code	Parameter Name	June 24		June 26*	June 30*	July 9*	July 13		July 19*	July 26*
32210	Chlorophyll a (µg/L)	3.12		--	--	--	3.86		--	--
00078	Secchi-depth (m)	5.0		6.2	4.9	4.6	3.4		3.7	3.7
00098	Sampling depth (m)	0.5	37.0	0.1	0.1	0.1	0.5	32.0	0.1	0.1
00010	Water Temperature (°C)	24.0	6.6	25	24.4	26.1	25.5	6.9	26.7	26.7
00400	pH (standard units)	8.8	7.8	--	--	--	8.9	7.8	--	--
00095	Specific conductance (µS/cm)	489	515	--	--	--	490	514	--	--
00300	Dissolved oxygen	9.3	8.0	--	--	--	9.3	8.2	--	--
00665	Phosphorus, total (as P)	0.022	0.065	--	--	--	0.02	0.067	--	--

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

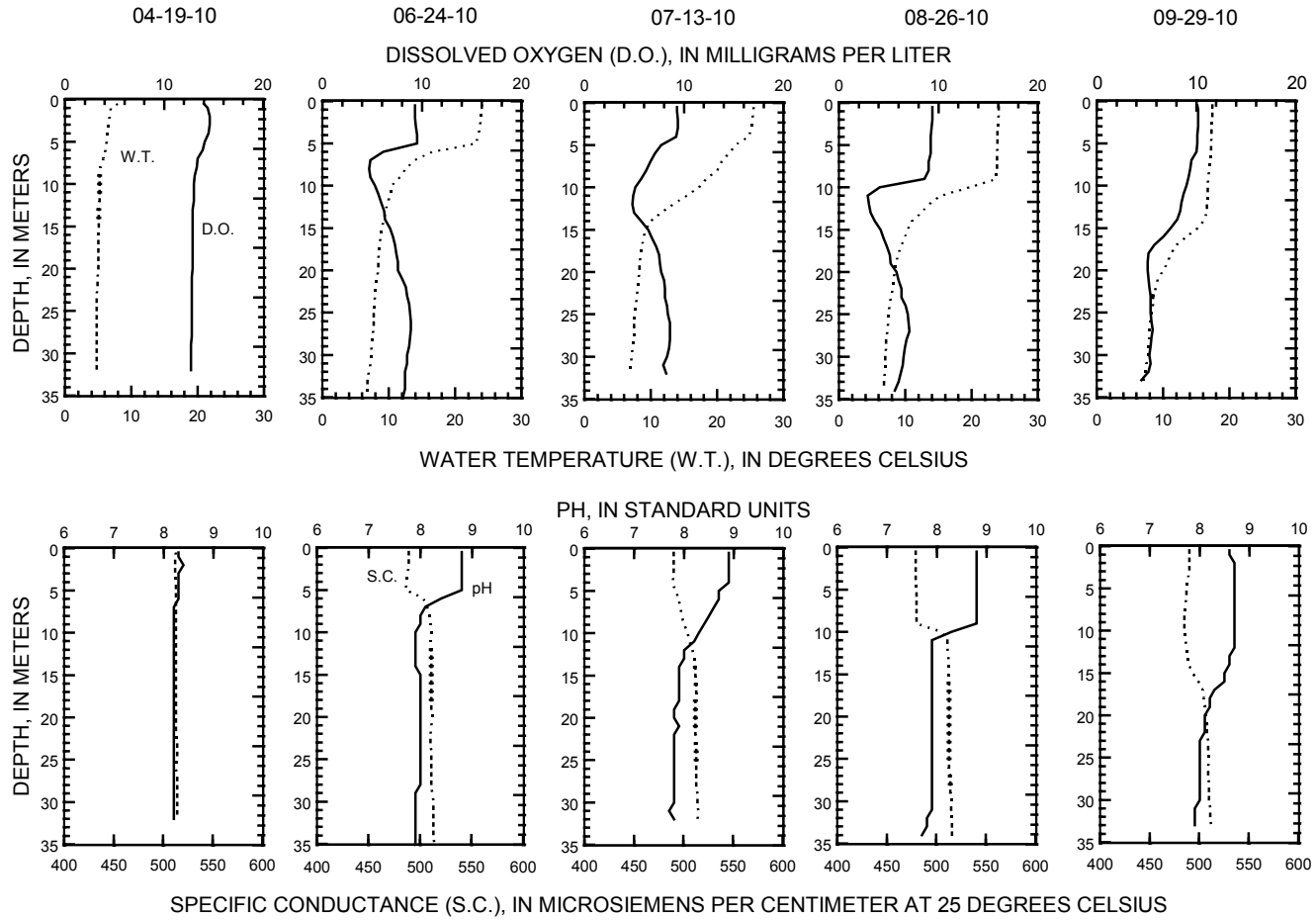
WATER-QUALITY DATA, AUGUST 6 TO SEPTEMBER 29, 2010
(Milligrams per liter unless otherwise indicated)

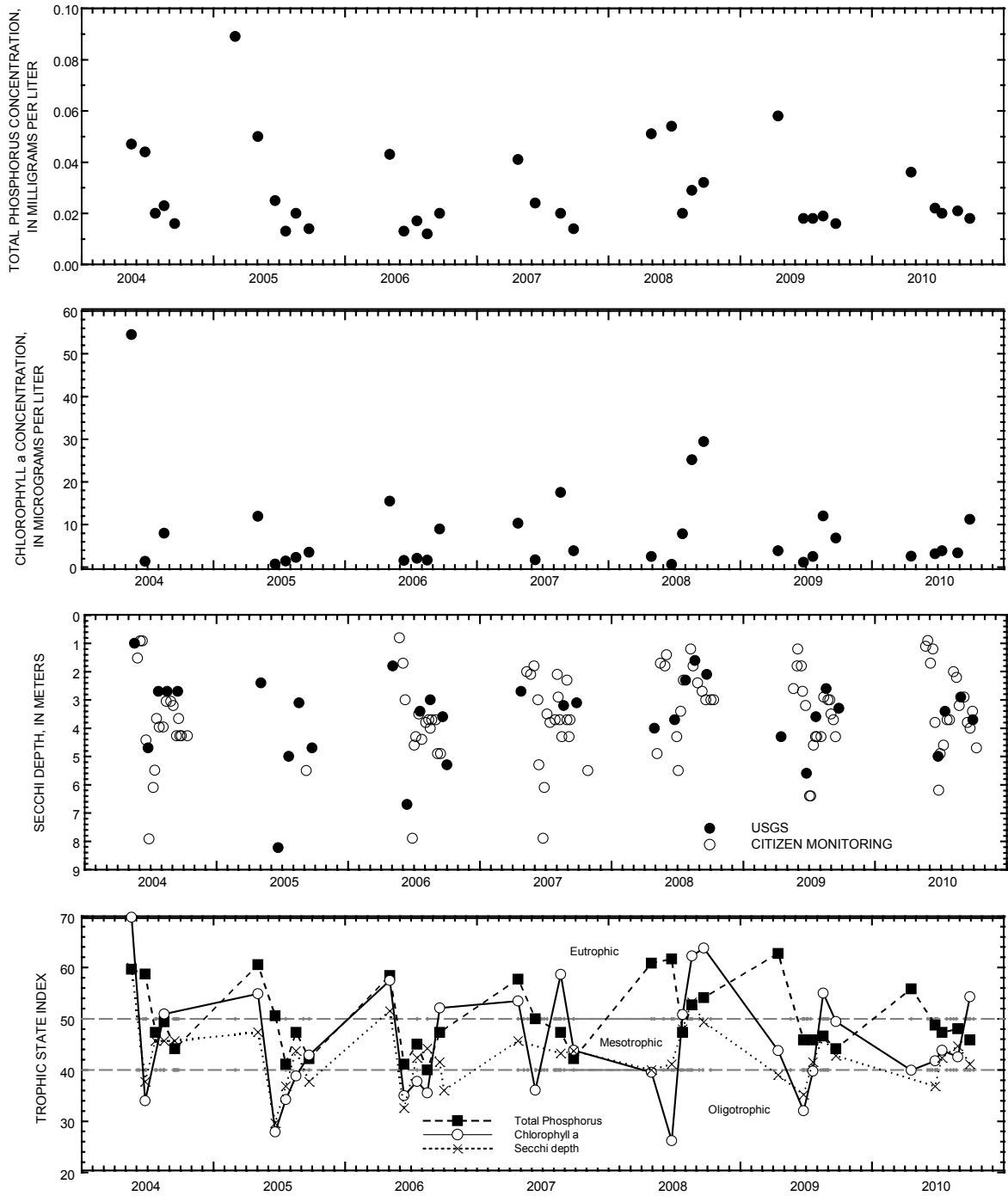
Parameter Code	Parameter Name	August 6*	August 14*	August 22*	August 26			Sept. 5*	Sept. 14*	Sept. 22*
32210	Chlorophyll a (µg/L)	--	--	--	8.38			--	--	--
00078	Secchi-depth (m)	2.0	2.2	3.2	2.9			2.9	3.8	4.0
00098	Sampling depth (m)	0.1	0.1	0.1	0.5	15.0	34.0	0.1	0.1	0.1
00010	Water Temperature (°C)	27.2	27.2	25.6	24.1	10.3	6.8	21.7	20.0	20.0
00400	pH (standard units)	--	--	--	8.8	7.9	7.7	--	--	--
00095	Specific conductance (µS/cm)	--	--	--	479	512	516	--	--	--
00300	Dissolved oxygen	--	--	--	9.4	4.2	5.6	--	--	--
00665	Phosphorus, total (as P)	--	--	--	0.021	0.017	0.077	--	--	--

Parameter Code	Parameter Name	Sept. 28*	September 29		
32210	Chlorophyll a (µg/L)	--	11.2		
00078	Secchi-depth (m)	3.4	3.7		
00098	Sampling depth (m)	0.1	0.5	20.0	33.0
00010	Water Temperature (°C)	17.8	17.4	10.0	7.1
00400	pH (standard units)	--	8.6	8.1	7.9
00095	Specific conductance (µS/cm)	--	490	507	512
00300	Dissolved oxygen	--	10.1	5.1	4.5
00665	Phosphorus, total (as P)	--	0.018	0.016	0.061

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 19 TO SEPTEMBER 29, 2010





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

435009088550100 GREEN LAKE INLET, SITE 1, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°50'09", long 88°55'01", in NE ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 19 TO SEPTEMBER 29, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>April 19</u>	<u>June 29</u>	<u>July 13</u>	<u>Aug. 26</u>	<u>Sept. 29</u>
00078	00078 Secchi-depth (m)	0.7	1.0	0.9	1.0	1.5
00098	00098 Sampling depth (m)	0.5	0.1	0.1	0.5	0.5
00010	00010 Water Temperature (°C)	16.5	23.0	24.9	22.2	17.0
00400	00400 pH (standard units)	8.4	7.6	7.7	7.9	8.1
00095	00095 Specific conductance (µS/cm)	814	600	664	830	905
00300	00300 Dissolved oxygen	13.7	4.0	5.5	4.6	9.8
00665	00665 Phosphorus, total (as P)	0.092	0.130	0.150	0.175	0.070

434948088552200 GREEN LAKE INLET, SITE 2, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'48", long 88°55'22", in SW ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA APRIL 19 TO SEPTEMBER 29, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>April 19</u>	<u>June 29</u>	<u>July 13</u>	<u>Aug. 26</u>	<u>Sept. 29</u>
00078	00078 Secchi-depth (m)	0.8	1.0	0.8	1.0	1.0
00098	00098 Sampling depth (m)	0.5	0.1	0.1	0.5	0.5
00010	00010 Water Temperature (°C)	15.8	22.3	24.5	22.5	17.5
00400	00400 pH (standard units)	8.5	7.8	7.7	7.9	8.4
00095	00095 Specific conductance (µS/cm)	747	703	671	796	872
00300	00300 Dissolved oxygen	16.1	5.4	5.0	5.6	10.5
00665	00665 Phosphorus, total (as P)	0.063	0.177	0.144	0.160	0.070

425715089164700 LAKE KEGONSA AT BARBER DRIVE NEAR STOUGHTON, WI

LOCATION.--Lat 42°57'15", long 89°16'47" referenced to North American Datum of 1927, in SW ¼ NE ¼ NE ¼ sec.26, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on downstream side of bridge on Barber Drive, 3.5 mi northwest of Stoughton.

SURFACE AREA.--1.05 mi².

DRAINAGE AREA.--386 mi².

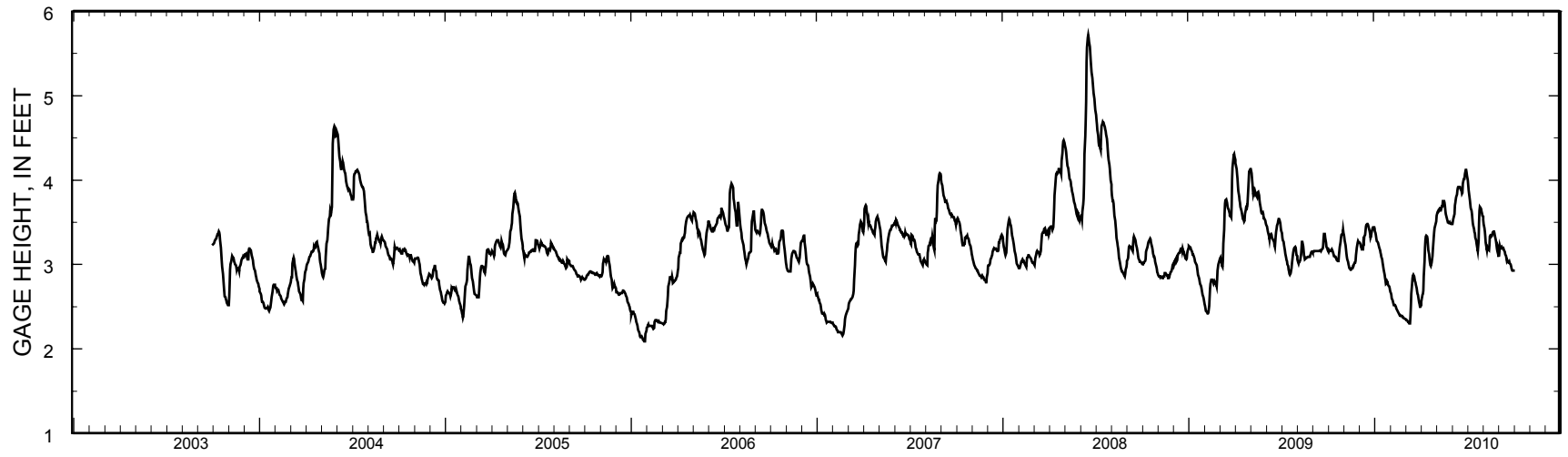
PERIOD OF RECORD.--October 2003 to current year.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level (levels from Wisconsin Department of Transportation benchmark).

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.73 ft, June 16, 2008; minimum observed, 2.07 ft, Jan.27, 2006.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.16 ft, June 27; minimum observed, 2.30 ft, Mar. 6-10.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
[e, estimated]												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	3.15	3.35	3.26	3.40	2.67	2.35	2.56	3.58	3.48	4.00	3.53	e3.19
2	3.17	3.32	3.26	3.37	2.66	2.34	2.59	3.62	3.51	3.94	3.48	e3.16
3	3.16	3.28	3.24	3.34	2.64	2.34	2.64	3.63	3.54	3.88	3.43	e3.22
4	3.16	3.23	3.21	3.31	2.60	2.33	2.65	3.64	3.56	3.80	3.39	e3.20
5	3.16	3.18	3.20	3.28	2.58	2.32	2.69	3.63	3.60	3.76	3.33	e3.20
6	3.17	3.13	3.18	3.27	2.56	2.32	2.86	3.64	3.70	3.71	3.26	e3.21
7	3.17	3.09	3.18	3.26	2.54	2.31	3.04	3.67	3.73	3.67	3.20	e3.19
8	3.18	3.06	3.18	3.24	2.52	2.30	3.20	3.67	3.77	3.64	3.17	e3.19
9	3.17	3.03	3.28	3.22	2.52	2.30	3.29	3.67	3.80	3.60	3.21	e3.20
10	3.14	3.00	3.27	3.20	2.52	2.38	3.33	3.66	3.83	3.54	3.20	e3.20
11	3.12	2.98	3.33	3.17	2.51	2.50	3.34	3.69	3.88	3.49	3.18	e3.17
12	3.10	2.96	3.35	3.14	2.50	2.65	3.33	3.69	3.91	3.46	3.17	e3.16
13	3.10	2.95	3.40	3.12	2.48	2.77	3.31	3.75	3.92	3.42	3.23	e3.15
14	3.09	2.94	3.45	3.09	2.46	2.84	3.24	3.75	3.92	3.38	3.33	e3.12
15	3.09	2.94	3.47	3.06	2.45	2.87	3.17	3.75	3.92	3.37	3.34	e3.10
16	3.08	2.95	3.48	3.02	2.44	2.88	3.12	3.73	3.92	3.32	3.33	e3.07
17	3.06	2.96	3.48	2.99	2.43	2.86	3.06	3.69	3.90	3.29	3.34	e3.04
18	3.05	2.96	3.47	2.96	2.42	2.83	3.02	3.64	3.89	3.25	3.34	e3.05
19	3.04	2.98	3.45	2.93	2.40	2.80	2.99	3.60	3.87	3.22	3.36	e3.04
20	3.04	2.98	3.43	2.88	2.40	2.79	2.98	3.56	3.84	3.19	3.38	e3.02
21	3.04	3.00	3.39	2.84	2.39	2.76	3.02	3.54	3.85	3.16	e3.39	e3.02
22	3.11	3.02	3.36	2.81	2.39	2.72	3.06	3.52	3.96	3.28	3.39	e3.03
23	3.21	3.02	3.32	2.77	2.39	2.68	3.10	3.50	4.01	3.50	3.37	e3.01
24	3.24	3.04	3.33	2.78	2.39	2.65	3.18	3.50	4.02	3.64	3.34	e3.00
25	3.27	3.11	3.39	2.80	2.38	2.64	3.32	3.49	4.02	3.68	3.30	e2.98
26	3.32	3.20	3.41	2.79	2.37	2.58	3.38	3.49	4.07	3.67	3.27	2.96
27	3.35	3.23	3.43	2.76	2.37	2.55	3.43	3.50	4.12	3.66	3.23	e2.94
28	3.36	3.26	3.44	2.75	2.36	2.53	3.45	3.49	4.12	3.63	3.19	2.93
29	3.36	3.28	3.44	2.74	---	2.50	3.47	3.48	4.09	3.61	3.16	2.93
30	3.41	3.27	3.44	2.72	---	2.50	3.51	3.48	4.05	3.58	e3.12	2.93
31	3.37	---	3.42	2.69	---	2.52	---	3.48	---	3.57	e3.09	---
Mean	3.18	3.09	3.35	3.02	2.48	2.57	3.11	3.60	3.86	3.55	3.29	3.09
Max	3.41	3.35	3.48	3.40	2.67	2.88	3.51	3.75	4.12	4.00	3.53	3.22
Min	3.04	2.94	3.18	2.69	2.36	2.30	2.56	3.48	3.48	3.16	3.09	2.93



Stage hydrograph for Lake Kegonsa, 1993-2010.

05427235 LAKE KOSHKONONG NEAR NEWVILLE, WI

LOCATION.--Lat 42°51'27", long 88°56'27" referenced to North American Datum of 1927, in NW ¼ NE ¼ sec.34, T.5 N., R.13 E., Jefferson County, WI, Hydrologic Unit 07090001, 80 ft east of Pottawatomi Trail Bridge at Bingham Point Estates, and 4.5 mi northeast of Newville.

SURFACE AREA.—16.34 mi²

DRAINAGE AREA.--2,560 mi².

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

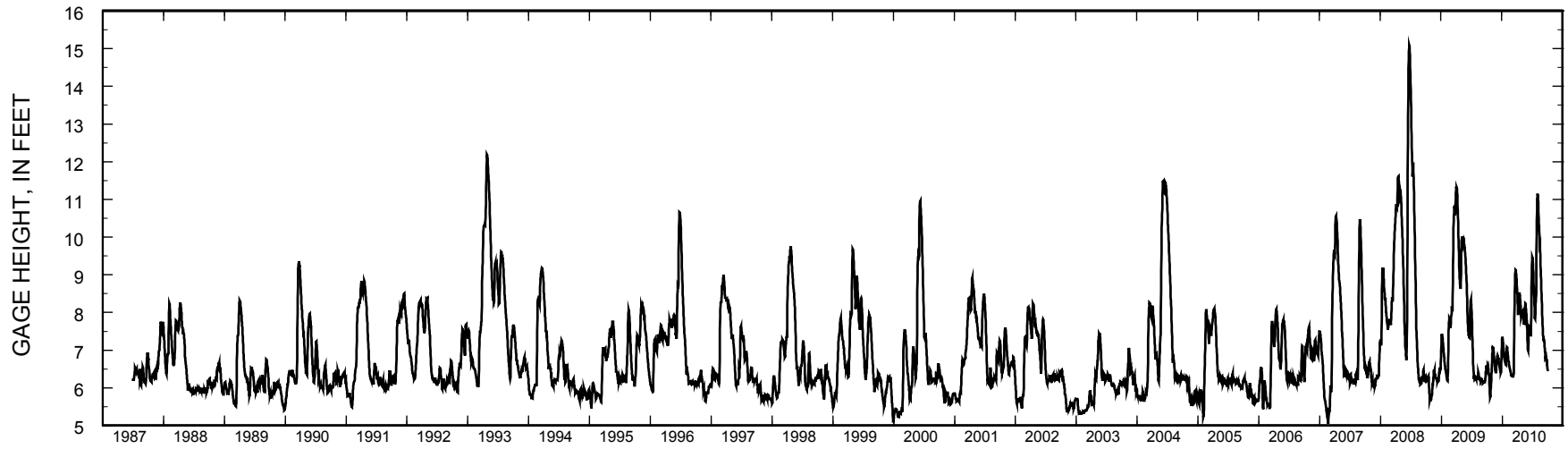
GAGE.--Water-stage recorder. Datum of gage is 769.77 ft above NAVD of 1988 (Wisconsin Department of Transportation bench mark).

REMARKS.--Lake level regulated by dam at Indianford. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 15.13 ft, June 21, 22, 2008; minimum recorded, 5.06 ft, Feb. 22, 2007.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 11.16 ft, July 31; minimum recorded gage height, 5.74 ft, Oct. 20.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.47	6.79	6.82	7.34	7.03	6.30	8.37	8.04	7.16	9.44	11.14	7.51
2	6.53	6.90	6.87	7.35	6.99	6.30	8.26	8.05	7.06	9.37	11.08	7.41
3	6.57	6.96	6.87	7.33	6.94	6.30	8.19	8.04	7.02	9.28	11.01	7.37
4	6.59	7.00	6.87	7.29	6.89	6.30	8.06	8.00	6.99	9.16	10.92	7.32
5	6.58	7.04	6.83	7.24	6.83	6.30	7.96	7.98	7.01	9.06	10.80	7.27
6	6.62	7.03	6.81	7.19	6.78	6.31	7.96	7.91	7.19	8.94	10.66	7.26
7	6.60	7.07	6.78	7.15	6.75	6.32	8.03	7.86	7.28	8.80	10.50	7.30
8	6.54	7.06	6.76	7.10	6.71	6.34	8.14	7.85	7.39	8.65	10.35	7.27
9	6.51	7.05	6.80	7.04	6.70	6.38	8.23	7.76	7.53	8.51	10.29	7.23
10	6.47	7.00	6.73	6.98	6.68	6.52	8.36	7.68	7.57	8.37	10.16	7.18
11	6.42	6.94	6.68	6.92	6.65	6.85	8.46	7.69	7.61	8.23	10.01	7.14
12	6.38	6.87	6.63	6.87	6.61	7.35	8.50	7.69	7.64	8.12	9.86	7.09
13	6.34	6.80	6.61	6.82	6.58	7.83	8.50	7.80	7.62	7.99	9.77	7.04
14	6.29	6.77	6.59	6.78	6.56	8.22	8.47	7.93	7.58	7.85	9.81	6.97
15	6.24	6.72	6.57	6.75	6.53	8.52	8.46	8.04	7.53	7.83	9.68	6.90
16	6.12	6.65	6.54	6.72	6.51	8.76	8.45	8.14	7.50	7.87	9.52	6.86
17	5.98	6.58	6.51	6.70	6.49	8.93	8.39	8.21	7.44	7.99	9.39	6.80
18	5.85	6.52	6.48	6.69	6.47	9.03	8.30	8.24	7.43	8.13	9.25	6.82
19	5.77	6.49	6.46	6.68	6.45	9.09	8.23	8.23	7.44	8.22	9.12	6.79
20	5.75	6.47	6.44	6.66	6.44	9.13	8.16	8.18	7.40	8.30	8.98	6.75
21	5.78	6.44	6.42	6.64	6.42	9.12	8.08	8.14	7.40	8.36	8.86	6.75
22	5.83	6.43	6.41	6.62	6.39	9.10	7.98	8.08	7.69	8.50	8.74	6.74
23	5.92	6.40	6.40	6.61	6.36	9.06	7.88	8.01	7.93	9.05	8.61	6.70
24	6.02	6.39	6.43	6.64	6.35	9.01	7.86	7.95	8.34	9.57	8.48	6.76
25	6.08	6.46	6.51	6.72	6.34	8.96	7.91	7.89	8.68	10.04	8.35	6.71
26	6.19	6.59	6.65	6.84	6.33	8.87	7.94	7.85	8.99	10.43	8.21	6.65
27	6.27	6.59	6.81	6.96	6.31	8.79	7.97	7.77	9.23	10.72	8.07	6.60
28	6.36	6.65	6.96	7.04	6.31	8.73	7.99	7.65	9.40	10.93	7.95	6.56
29	6.44	6.74	7.10	7.08	---	8.63	7.97	7.52	9.46	11.03	7.83	6.51
30	6.57	6.78	7.22	7.08	---	8.53	7.99	7.37	9.47	11.07	7.69	6.48
31	6.73	---	7.30	7.07	---	8.46	---	7.29	---	11.15	7.57	---
Mean	6.28	6.74	6.71	6.93	6.59	7.88	8.17	7.90	7.80	9.06	9.44	6.96
Max	6.73	7.07	7.30	7.35	7.03	9.13	8.50	8.24	9.47	11.15	11.14	7.51
Min	5.75	6.39	6.40	6.61	6.31	6.30	7.86	7.29	6.99	7.83	7.57	6.48



Stage hydrograph for Lake Koshkonong, 1987-2010.

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

LOCATION.--Lat 43°22'55", long 88°13'47", in NW ¼ NE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.6 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

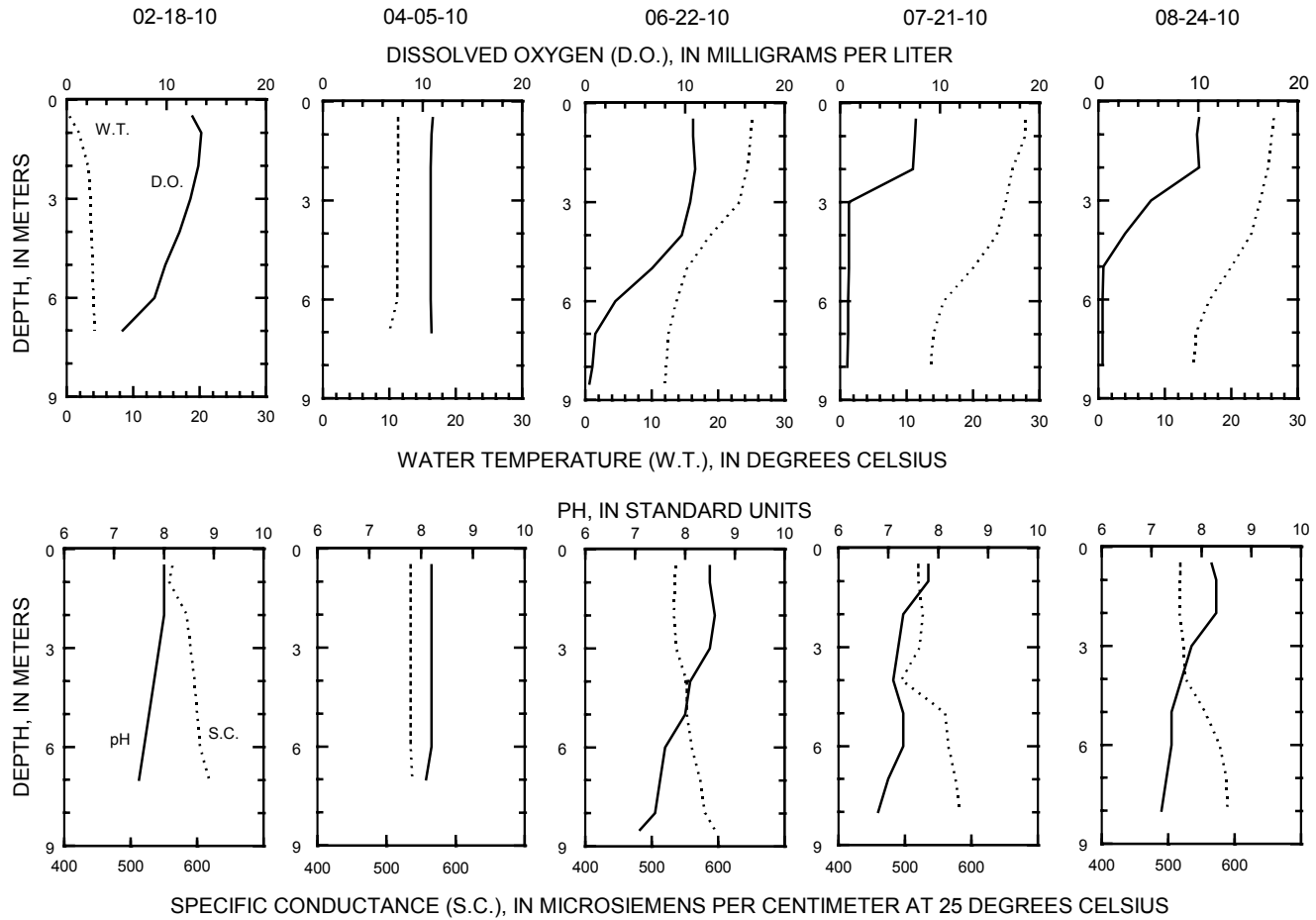
REMARKS.--Lake sampled at center of northern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

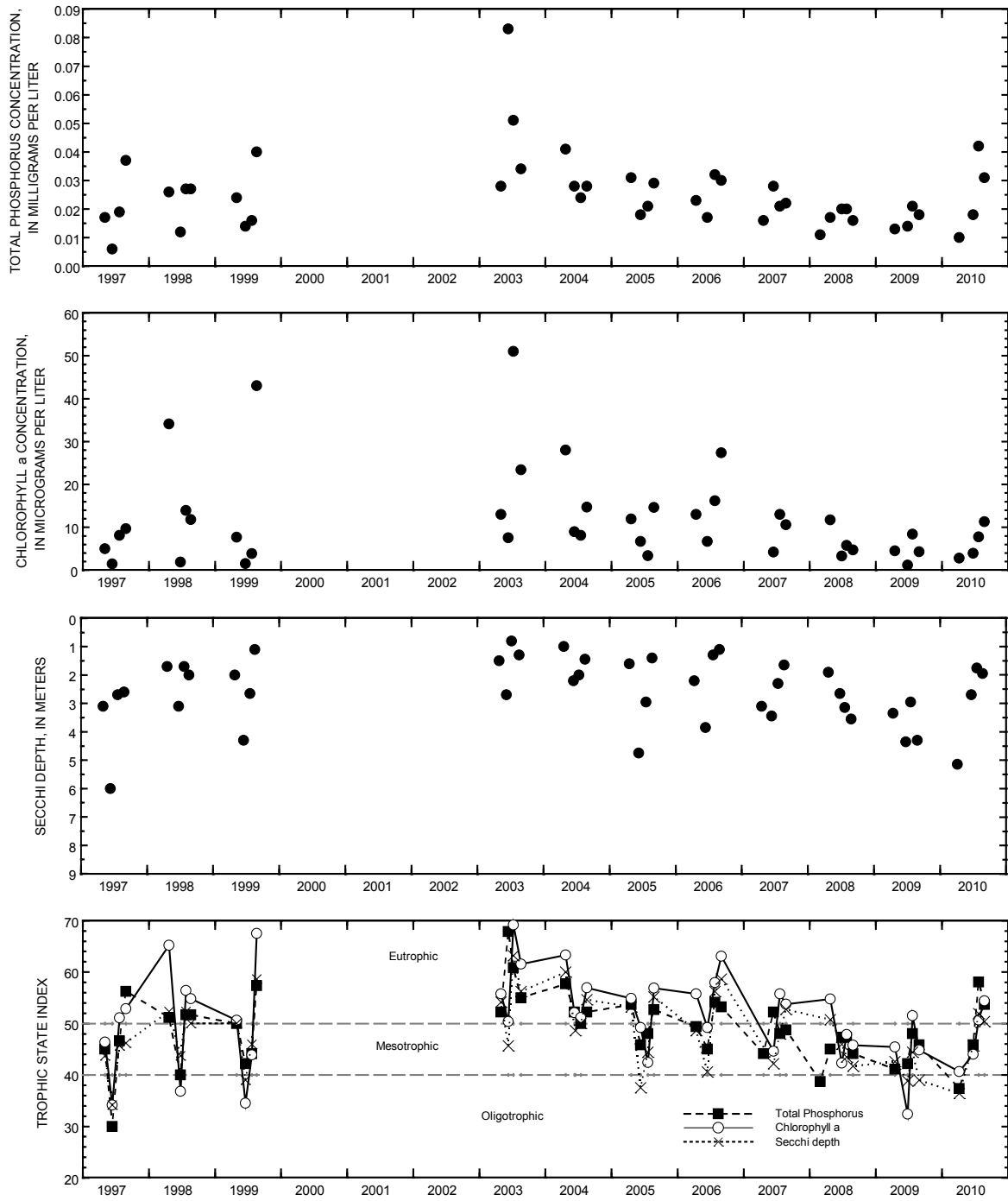
WATER-QUALITY DATA, FEBRUARY 18 TO AUGUST 24, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	February 18		April 5		June 22		July 21		August 24	
32210	Chlorophyll a (µg/L)	--		2.79		3.92		7.76		11.3	
00078	Secchi-depth (m)	--		5.2		2.7		1.8		2.0	
00098	Sampling depth (m)	0.5	7.0	0.5	7.0	0.5	8.5	0.5	8.0	0.5	7.5
00010	Water Temperature (°C)	0.4	4.2	11.3	10.0	25.0	12.0	27.9	13.6	26.4	14.3
00400	pH (standard units)	8.0	7.5	8.2	8.1	8.5	7.1	7.8	6.8	8.2	7.2
00095	Specific conductance (µS/cm)	563	618	535	537	536	594	520	583	518	589
00300	Dissolved oxygen	12.6	5.6	11.0	10.9	10.8	0.4	7.6	0.7	10.1	0.4
00665	Phosphorus, total (as P)	0.010	0.014	0.010	--	0.018	0.065	0.042	0.059	0.031	0.228

43225088134700 LITTLE CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, FEBRUARY 18 TO AUGUST 24, 2010





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 ¼ SE ¼ sec.33, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, 2.8 mi southwest of West Bend.

SURFACE AREA.--0.38 mi².

PERIOD OF RECORD.--February 1997 to August 1999, February 2003 to current year.

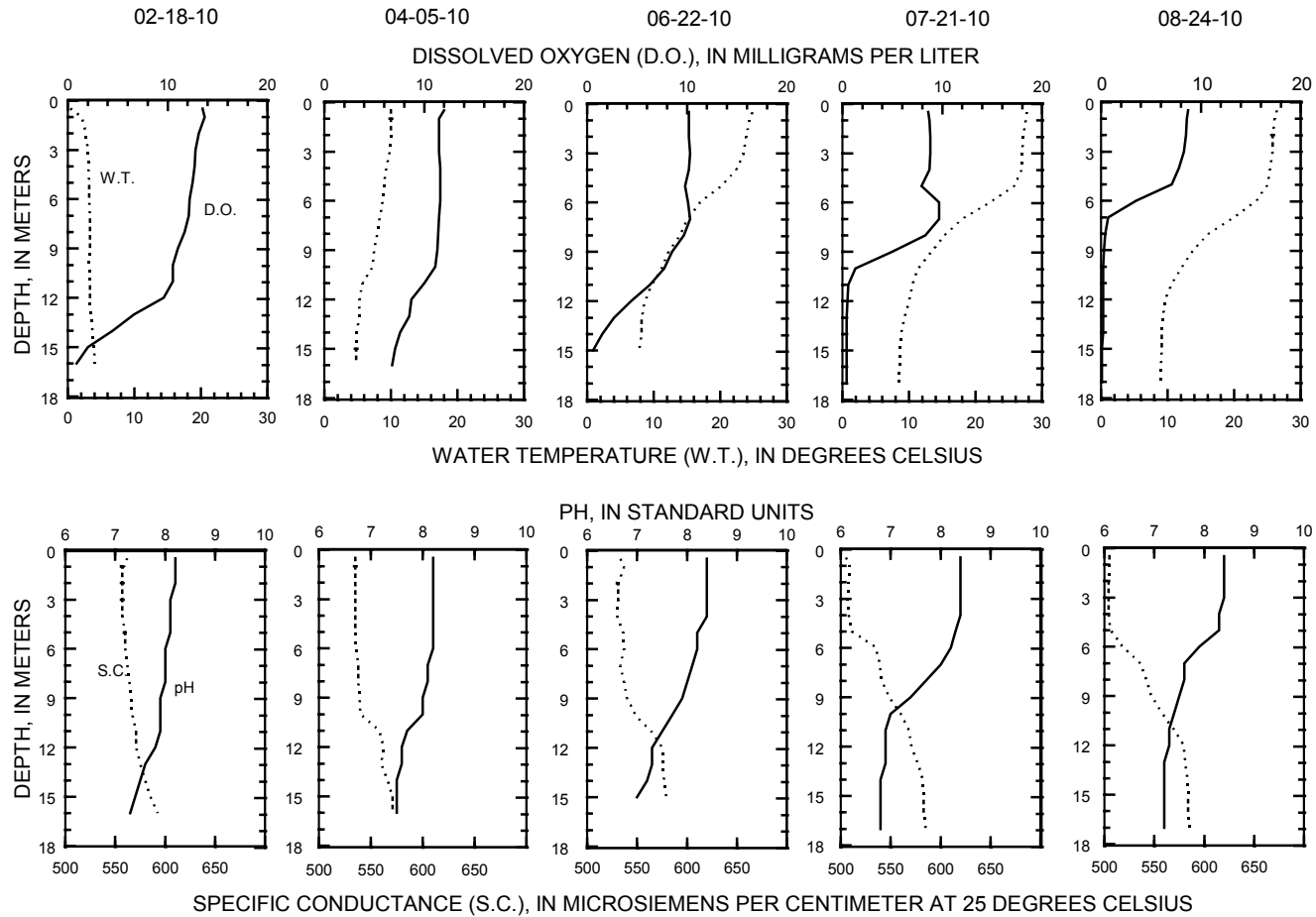
REMARKS.--Lake sampled in southern basin at deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

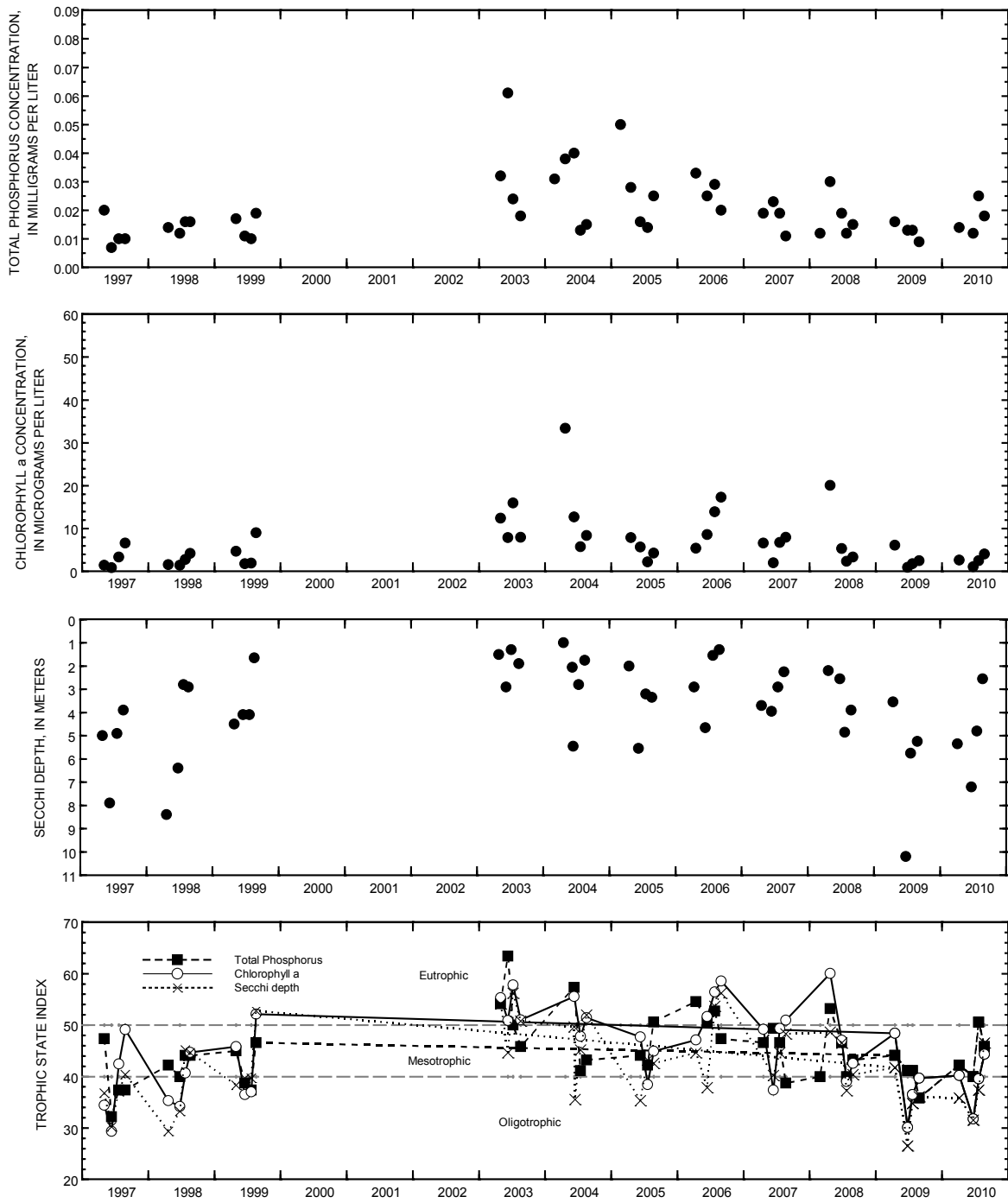
WATER-QUALITY DATA, FEBRUARY 18 TO AUGUST 24, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	February 18		April 5		June 22		July 21		August 24	
32210	Chlorophyll a (µg/L)	--	--	2.66	--	1.13	--	2.49	--	4.05	--
00078	Secchi-depth (m)	--	--	5.4	--	7.2	--	4.8	--	2.6	--
00098	Sampling depth (m)	0.5	16.0	0.5	16.0	0.5	15.5	0.5	17.0	0.5	0.5
00010	Water Temperature (°C)	0.4	4.1	10.0	4.8	24.8	7.8	22.7	8.5	26.4	8.9
00400	pH (standard units)	8.2	7.3	8.2	7.5	8.4	7.0	8.4	6.8	8.4	7.2
00095	Specific conductance (µS/cm)	562	592	535	571	533	579	505	585	505	585
00300	Dissolved oxygen	13.5	0.9	12.0	6.8	10.2	0.6	8.6	0.4	8.7	0.1
00665	Phosphorus, total (as P)	0.017	0.128	0.014	--	0.012	0.053	0.025	0.114	0.018	0.192
00671	Orthophosphate, dissolved (as P)	--	--	0.002	--	--	--	0.003	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.146	--	--	--	<0.019	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.017	--	--	--	<0.015	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.40	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.36	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.51	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	5	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	226	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	35.5	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	33.4	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	23.1	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	1.6	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	183	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	52.7	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	20.4	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	2.46	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	2.1	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	302	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 18 TO AUGUST 24, 2010





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

05428000 LAKE MENDOTA AT MADISON, WI

LOCATION.--Lat 43°05'42", long 89°22'12" referenced to North American Datum of 1927, in NW ¼ SE ¼ sec.12, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in county boat house at dam at outlet, in Madison.

SURFACE AREA.--15.2 mi².

DRAINAGE AREA.--233 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--January 1916 to January 1985 (incomplete), February 1985 to current year.

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

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, gage datum was 847.82 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 12.75 ft, June 5, 2000; minimum observed, 8.02 ft, Feb. 24 to Mar. 10, 1920, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 11.46 ft, Aug. 15; minimum recorded, 8.23 ft, Jan. 16.

GAGE HEIGHT, FEET												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	10.19	10.33	9.27	8.60	8.42	8.39	9.29	9.85	9.97	10.83	11.29	11.18
2	10.22	10.34	9.25	8.57	8.43	8.39	9.30	9.87	9.94	10.80	11.26	11.24
3	10.22	10.32	9.20	8.54	8.43	8.40	9.34	9.88	9.93	10.77	11.25	11.32
4	10.20	10.31	9.16	8.50	8.42	8.41	9.35	9.87	9.92	10.74	11.23	11.28
5	10.17	10.29	9.09	8.47	8.42	8.42	9.37	9.90	9.96	10.72	11.21	11.24
6	10.19	10.24	9.05	8.44	8.42	8.43	9.49	9.87	10.10	10.70	11.16	11.22
7	10.16	10.23	9.03	8.43	8.41	8.44	9.63	9.90	10.09	10.71	11.12	11.21
8	10.15	10.21	8.99	8.43	8.41	8.45	9.76	9.94	10.11	10.72	11.16	11.17
9	10.14	10.19	9.11	8.40	8.44	8.48	9.81	9.92	10.17	10.68	11.25	11.14
10	10.11	10.13	9.04	8.37	8.44	8.55	9.85	9.92	10.15	10.64	11.27	11.11
11	10.07	10.08	8.97	8.34	8.43	8.65	9.88	9.98	10.14	10.58	11.27	11.11
12	10.05	10.02	8.93	8.32	8.43	8.76	9.90	10.01	10.14	10.54	11.26	11.09
13	10.02	9.96	8.89	8.32	8.43	8.87	9.90	10.16	10.13	10.49	11.29	11.08
14	10.0	9.92	8.87	8.32	8.42	8.95	9.90	10.24	10.12	10.43	11.41	11.05
15	9.99	9.86	8.85	8.32	8.42	9.00	9.89	10.26	10.14	10.52	11.42	11.02
16	9.98	9.80	8.76	8.31	8.42	9.04	9.90	10.27	10.20	10.56	11.38	11.01
17	9.96	9.75	8.75	8.32	8.42	9.07	9.87	10.26	10.19	10.55	11.35	10.97
18	9.92	9.70	8.72	8.32	8.41	9.09	9.83	10.25	10.20	10.54	11.32	11.03
19	9.91	9.66	8.69	8.31	8.41	9.12	9.80	10.22	10.19	10.49	11.30	11.03
20	9.90	9.60	8.65	8.31	8.41	9.16	9.77	10.19	10.16	10.45	11.30	11.01
21	9.89	9.56	8.61	8.31	8.41	9.18	9.74	10.18	10.16	10.41	11.31	11.01
22	9.93	9.51	8.59	8.31	8.42	9.20	9.72	10.16	10.27	10.47	11.30	11.00
23	10.07	9.46	8.56	8.30	8.42	9.21	9.70	10.13	10.46	10.79	11.28	10.98
24	10.13	9.42	8.58	8.36	8.41	9.22	9.70	10.11	10.60	11.10	11.26	10.99
25	10.14	9.44	8.65	8.40	8.41	9.23	9.78	10.11	10.67	11.29	11.23	10.94
26	10.16	9.47	8.69	8.42	8.40	9.23	9.80	10.13	10.77	11.34	11.19	10.89
27	10.16	9.42	8.71	8.43	8.40	9.24	9.80	10.17	10.86	11.35	11.15	10.85
28	10.16	9.39	8.70	8.43	8.40	9.25	9.79	10.14	10.90	11.37	11.12	10.82
29	10.16	9.37	8.67	8.43	---	9.25	9.79	10.09	10.88	11.35	11.09	10.78
30	10.28	9.32	8.65	8.43	---	9.25	9.81	10.05	10.86	11.32	11.07	10.74
31	10.33	---	8.63	8.42	---	9.27	---	10.02	---	11.31	11.07	---
Mean	10.10	9.84	8.85	8.39	8.42	8.89	9.72	10.07	10.28	10.79	11.24	11.05
Max	10.33	10.34	9.27	8.60	8.44	9.27	9.90	10.27	10.90	11.37	11.42	11.32
Min	9.89	9.32	8.56	8.30	8.40	8.39	9.29	9.85	9.92	10.41	11.07	10.74

430251088284700 MIDDLE GENESEE LAKE, AT GENESEE LAKE ROAD, NEAR OCONOMOWOC, WI

LOCATION.--Lat 43° 02'51", long 88°28'47", in SW ¼ SW ¼ SW ¼ sec.22, T. 7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at the southwest side of the lake about 2 miles south of Oconomowoc.

SURFACE AREA.--0.17 mi².

DRAINAGE AREA.--Unknown.

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

GAGE.--Staff gage. Local observer, Tom Schubring provided most readings of gage. Datum of gage is about 0.0 ft above NGVD of 1929.

EXTREMES FOR THE PERIOD OF RECORD.--Maximum observed gage height, 869.65 ft, July 12, 2008; minimum observed, 863.88 ft, Oct. 31, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum observed gage height, 868.50 ft, Aug. 9; minimum observed, 866.51 ft, Oct. 21.

**GAGE HEIGHT, FT
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010**

Date	Gage Height, ft	Date	Gage Height, ft	Date	Gage Height, ft
October 2	866.69	June 11	866.74	August 9	868.50
10	866.61	16	866.84	12	868.48
12	866.59	20	866.82	13	868.44
17	866.53	22	866.90	14	868.48
21	866.51	23	867.18	16	868.42
24	866.63	25	867.40	18	868.40
28	866.65	26	867.18	19	868.36
30	866.71	27	867.28	21	868.38
November 1	866.69	30	867.32	25	868.28
14	866.67	July 1	867.34	26	868.26
12	866.53	7	867.42	28	868.22
27	866.61	11	867.42	31	868.14
30	866.57	12	867.44	September 1	868.14
December 6	866.53	14	867.42	4	868.08
May 19	866.70	15	867.70	8	868.00
20	866.70	17	867.72	13	867.92
25	866.68	23	868.02	17	867.80
31	866.60	27	868.38	23	867.78
June 1	866.58	31	868.42	26	867.68
3	866.68	August 1	868.46	30	867.58
6	866.78	6	868.44		

05429000 LAKE MONONA AT MADISON, WI

LOCATION.--Lat 43°03'48", long 89°23'49" referenced to North American Datum of 1927, in SE ¼ SW ¼ sec.23, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in Brittingham Park, in Madison.

SURFACE AREA.--5.3 mi².

DRAINAGE AREA.--279 mi² of which 36.6 mi² probably is noncontributing.

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 NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, datum 843.61 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--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, 7.92 ft, June 15, 2008; minimum observed, 3.22 ft, Jan. 20, 1965, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 7.08 ft, Aug. 14; minimum recorded, 4.03 ft, Apr. 2.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.66	5.29	5.32	5.15	4.49	4.29	4.15	5.16	5.64	6.41	6.77	6.65
2	5.70	5.23	5.30	5.13	4.51	4.28	4.14	5.16	5.66	6.36	6.75	6.70
3	5.67	5.18	5.26	5.10	4.50	4.25	4.14	5.13	5.69	6.32	6.73	6.83
4	5.64	5.15	5.23	5.07	4.48	4.22	4.12	5.13	5.74	6.28	6.70	6.78
5	5.62	5.13	5.21	5.05	4.47	4.20	4.11	5.08	5.82	6.27	6.65	6.75
6	5.61	5.11	5.19	5.03	4.45	4.19	4.25	5.06	5.98	6.27	6.62	6.73
7	5.59	5.11	5.17	5.02	4.44	4.17	4.39	5.06	6.01	6.32	6.59	6.65
8	5.58	5.10	5.18	5.01	4.44	4.17	4.54	5.02	6.09	6.37	6.67	6.62
9	5.55	5.10	5.26	4.99	4.46	4.17	4.59	5.00	6.10	6.33	6.79	6.58
10	5.50	5.14	5.23	4.97	4.45	4.22	4.59	4.99	6.11	6.30	6.81	6.54
11	5.46	5.17	5.23	4.94	4.43	4.30	4.58	5.06	6.13	6.28	6.79	6.51
12	5.43	5.20	5.22	4.90	4.42	4.38	4.56	5.05	6.15	6.28	6.78	6.47
13	5.39	5.23	5.21	4.84	4.42	4.42	4.58	5.19	6.13	6.27	6.86	6.43
14	5.37	5.25	5.18	4.78	4.40	4.44	4.59	5.20	6.13	6.26	7.05	6.39
15	5.35	5.25	5.15	4.72	4.40	4.44	4.61	5.21	6.14	6.34	7.03	6.36
16	5.31	5.26	5.09	4.66	4.39	4.44	4.63	5.21	6.15	6.33	6.99	6.32
17	5.27	5.27	5.08	4.62	4.40	4.43	4.63	5.19	6.14	6.33	6.96	6.29
18	5.23	5.29	5.07	4.58	4.37	4.41	4.67	5.19	6.14	6.31	6.93	6.37
19	5.20	5.30	5.04	4.55	4.37	4.39	4.72	5.22	6.11	6.30	6.89	6.36
20	5.19	5.30	5.03	4.52	4.44	4.39	4.76	5.25	6.09	6.30	6.88	6.32
21	5.15	5.30	5.02	4.49	4.40	4.37	4.81	5.31	6.13	6.28	6.88	6.29
22	5.18	5.31	5.02	4.45	4.38	4.35	4.83	5.33	6.36	6.41	6.83	6.26
23	5.30	5.32	5.02	4.44	4.38	4.33	4.86	5.35	6.48	6.70	6.79	6.23
24	5.32	5.33	5.07	4.49	4.39	4.31	4.91	5.38	6.51	6.85	6.74	6.21
25	5.31	5.39	5.20	4.52	4.39	4.29	5.02	5.45	6.48	6.91	6.68	6.19
26	5.30	5.43	5.26	4.50	4.41	4.26	5.06	5.51	6.55	6.91	6.63	6.18
27	5.27	5.42	5.27	4.48	4.39	4.24	5.08	5.56	6.59	6.89	6.59	6.18
28	5.24	5.41	5.25	4.47	4.32	4.22	5.09	5.55	6.57	6.87	6.56	6.17
29	5.22	5.39	5.22	4.45	---	4.19	5.10	5.58	6.52	6.83	6.53	6.16
30	5.33	5.34	5.21	4.44	---	4.18	5.13	5.61	6.47	6.80	6.50	6.17
31	5.32	---	5.19	4.47	---	4.18	---	5.63	---	6.80	6.49	---
Mean	5.40	5.26	5.17	4.74	4.42	4.29	4.64	5.25	6.16	6.47	6.76	6.42
Max	5.70	5.43	5.32	5.15	4.51	4.44	5.13	5.63	6.59	6.91	7.05	6.83
Min	5.15	5.10	5.02	4.44	4.32	4.17	4.11	4.99	5.64	6.26	6.49	6.16

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

LOCATION.--Lat 43°05'51", long 88°27'35", in NW ¼ SE ¼ sec.2, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.--1.20 mi².

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

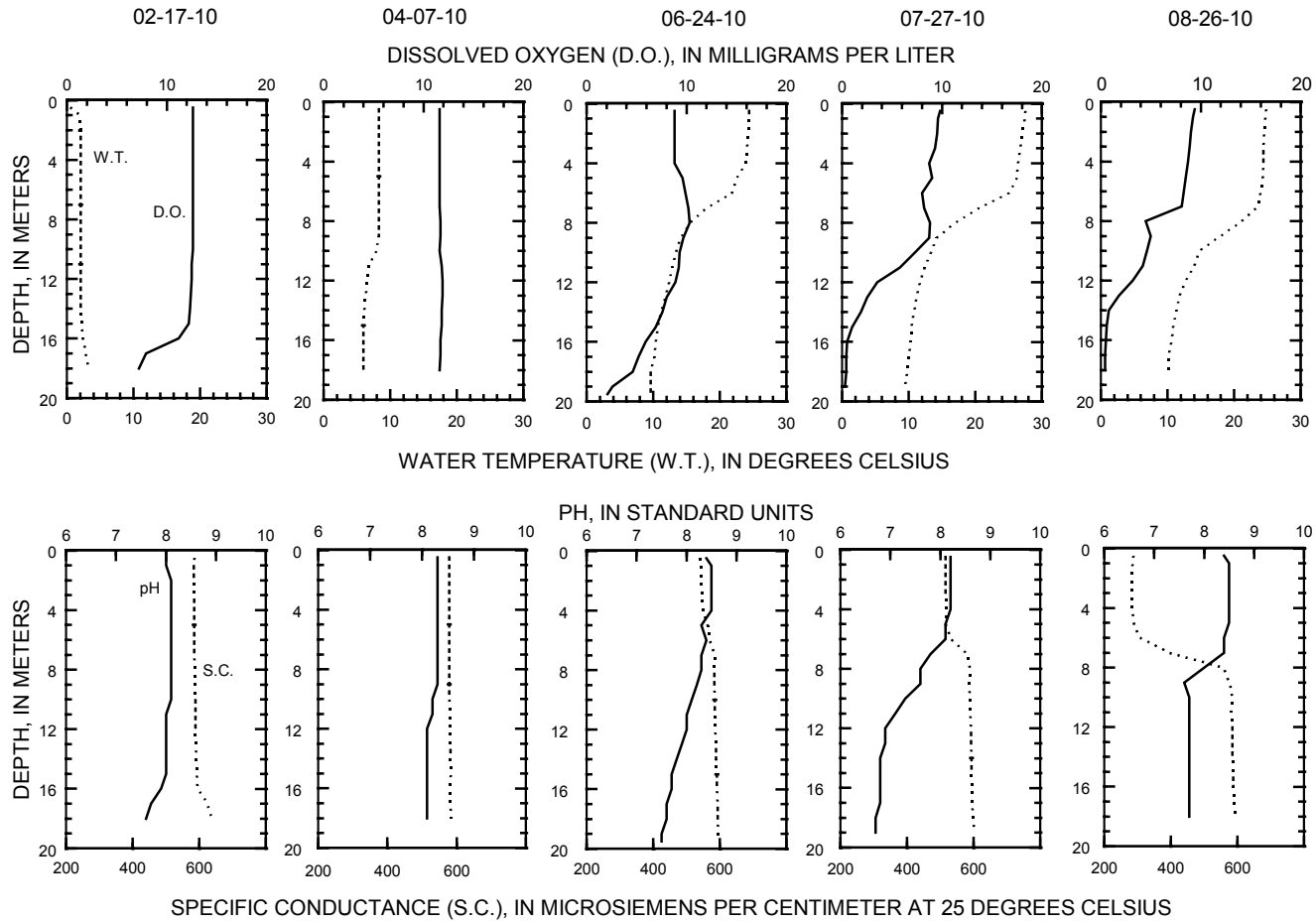
REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

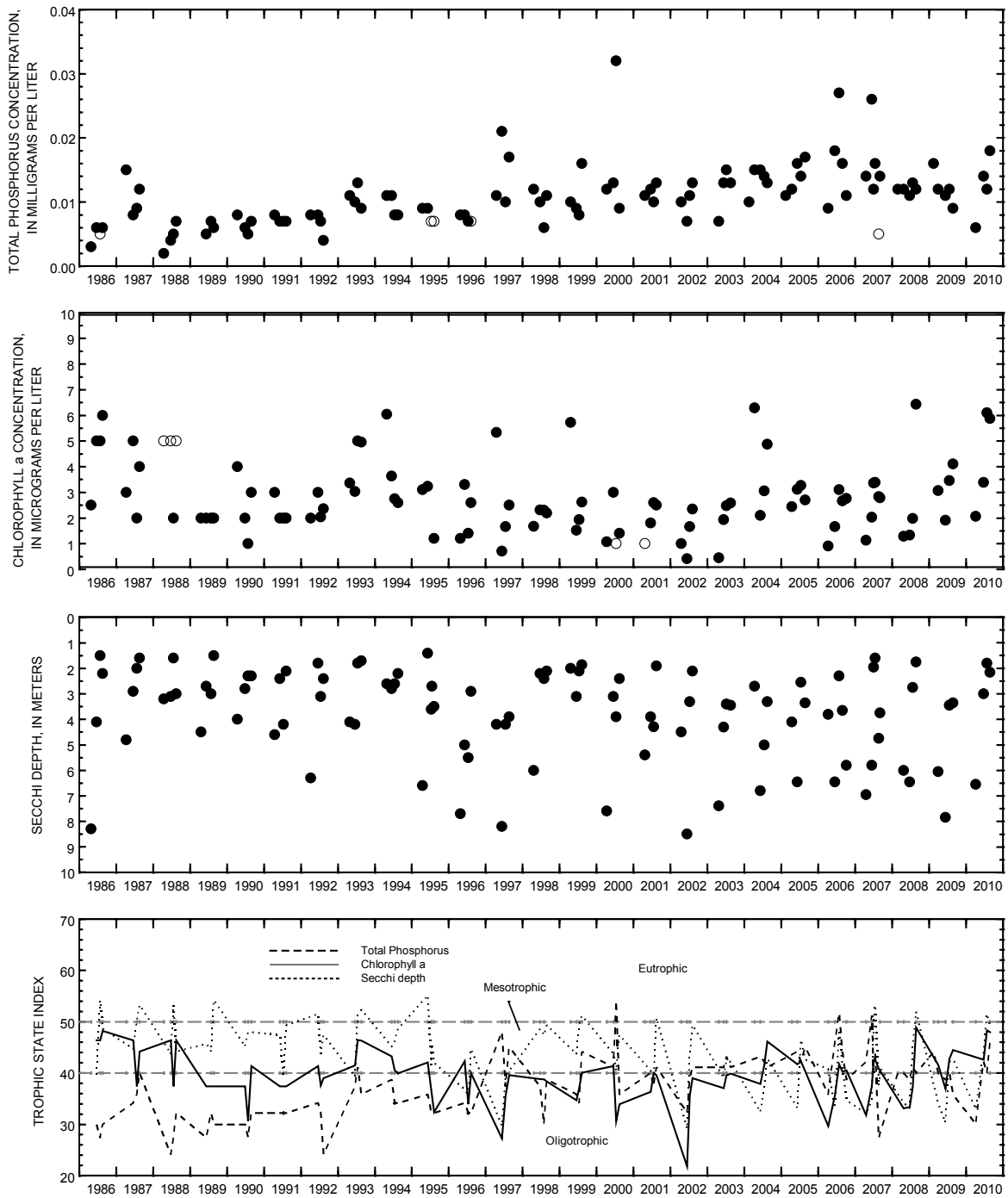
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	February 17		April 7		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	--		2.07		3.39		6.1		5.88	
00078	Secchi-depth (m)	--		6.6		3.0		1.8		2.2	
00098	Sampling depth (m)	0.5	18.0	0.5	18.0	0.5	19.5	0.5	19.0	0.5	18.0
00010	Water Temperature (°C)	0.5	3.2	8.3	6.0	24.4	9.6	27.5	9.4	24.8	10.1
00400	pH (standard units)	8.0	7.6	8.3	8.1	8.4	7.5	8.2	6.7	8.4	7.7
00095	Specific conductance (µS/cm)	586	637	578	583	542	596	515	602	288	592
00300	Dissolved oxygen	12.6	7.2	11.6	11.6	8.8	2.1	9.8	0.3	9.4	0.4
00665	Phosphorus, total (as P)	0.010	0.027	0.006	--	0.014	0.043	0.012	0.019	0.018	0.023
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.273	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.024	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.52	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.79	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	10	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	249	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	46.8	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	32.1	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	21.6	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	207	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	50.7	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	24.8	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	7.47	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	330	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2010





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

(Open circles on the first two 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 ¼ NW ¼ sec.1, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.—1.20 mi².

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

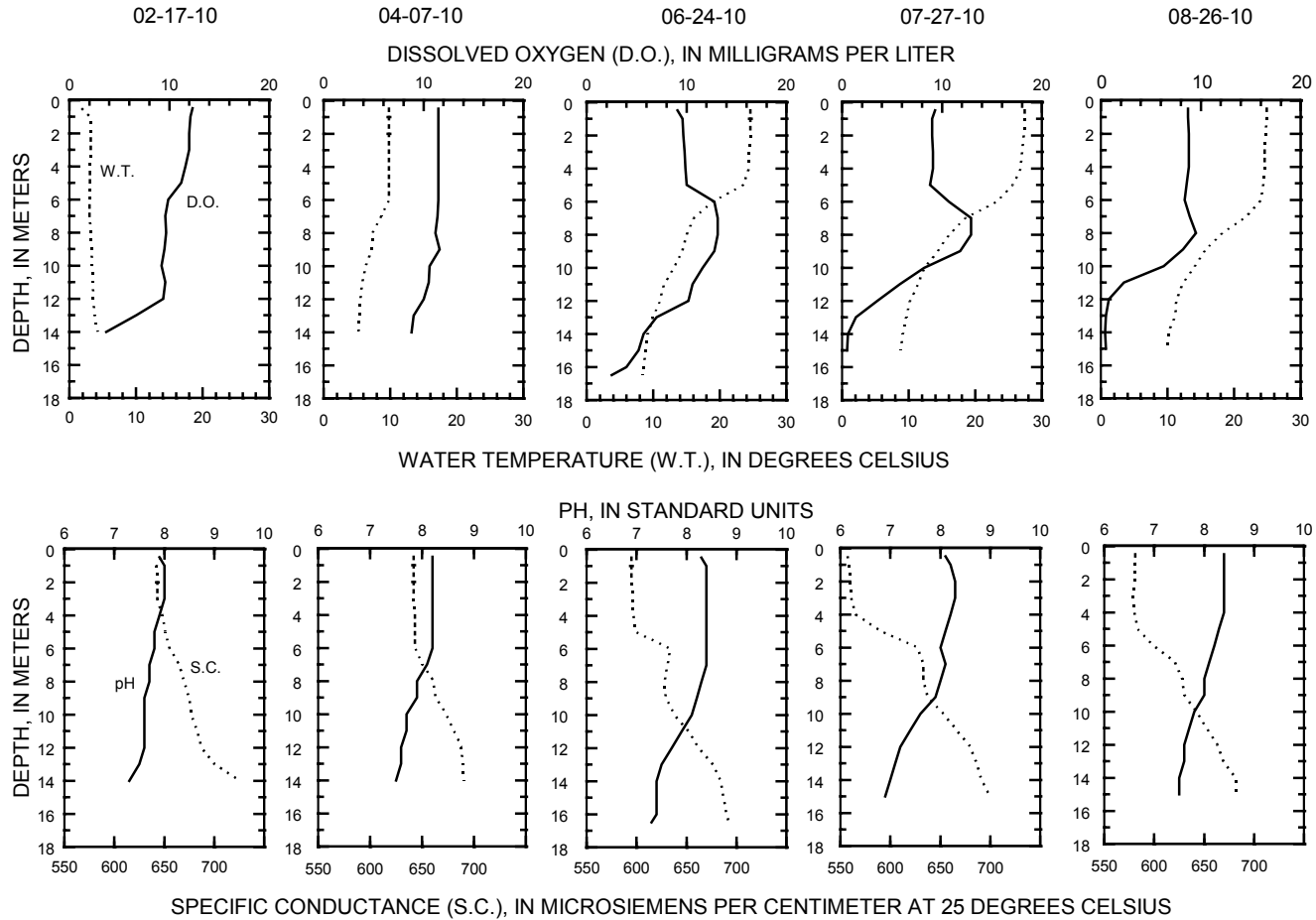
REMARKS.--Lake sampled at the deepest point in northeast bay near Hewitt Point. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

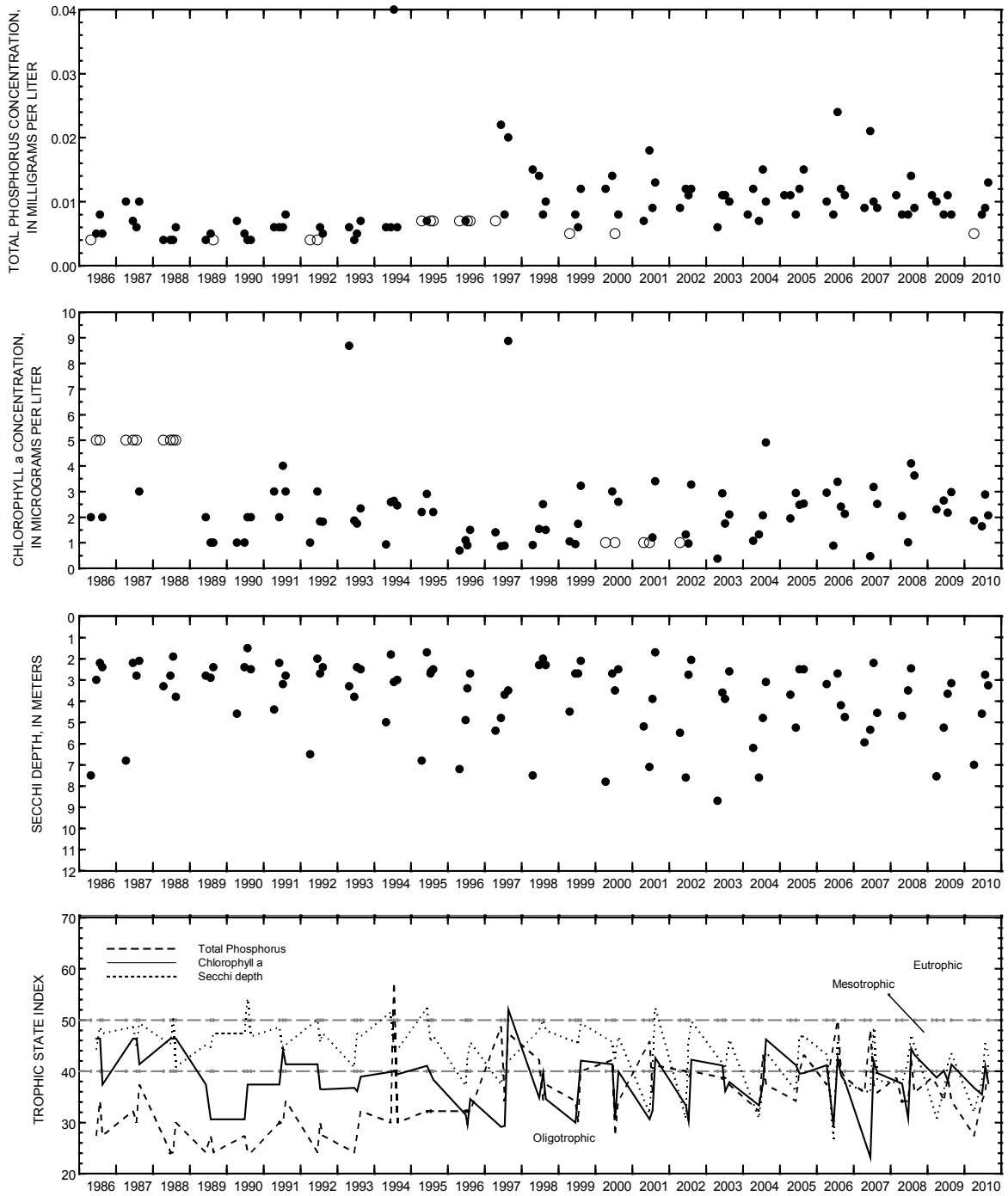
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>February 17</u>		<u>April 7</u>		<u>June 24</u>		<u>July 27</u>		<u>August 26</u>	
32210	Chlorophyll a (µg/L)	--		1.87		1.64		2.88		2.06	
00078	Secchi-depth (m)	--		7.0		4.6		2.8		3.2	
00098	Sampling depth (m)	0.5	12.0	0.5	14.0	0.5	16.5	0.5	15.0	0.5	14.5
00010	Water Temperature (°C)	1.8	3.6	9.8	5.2	24.6	8.4	27.4	8.8	24.9	10.0
00400	pH (standard units)	7.9	7.6	8.2	7.5	8.3	7.3	8.1	6.9	8.4	7.5
00095	Specific conductance (µS/cm)	646	687	642	390	595	692	557	699	581	683
00300	Dissolved oxygen	12.3	9.4	11.5	8.8	9.1	2.5	9.3	0.5	8.7	0.5
00665	Phosphorus, total (as P)	0.011	0.011	<.005	--	0.008	0.009	0.009	0.045	0.013	0.049

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

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 26, 2010





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

(Open circles on the first two 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 ¼ SE ¼ 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 September 2006, April to August 2008, April to August 2010.

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.

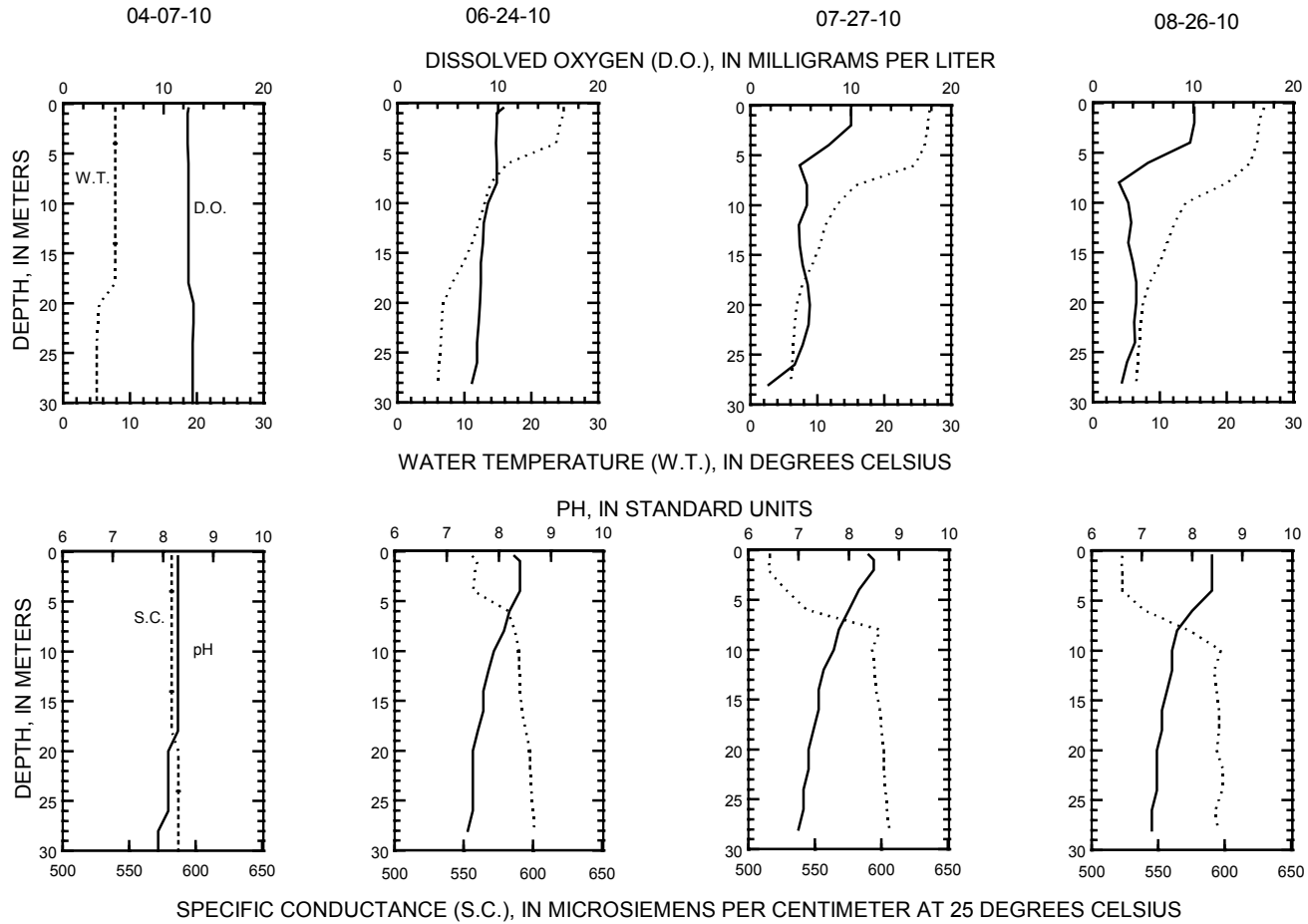
WATER-QUALITY DATA, APRIL 8 TO AUGUST 26, 2010

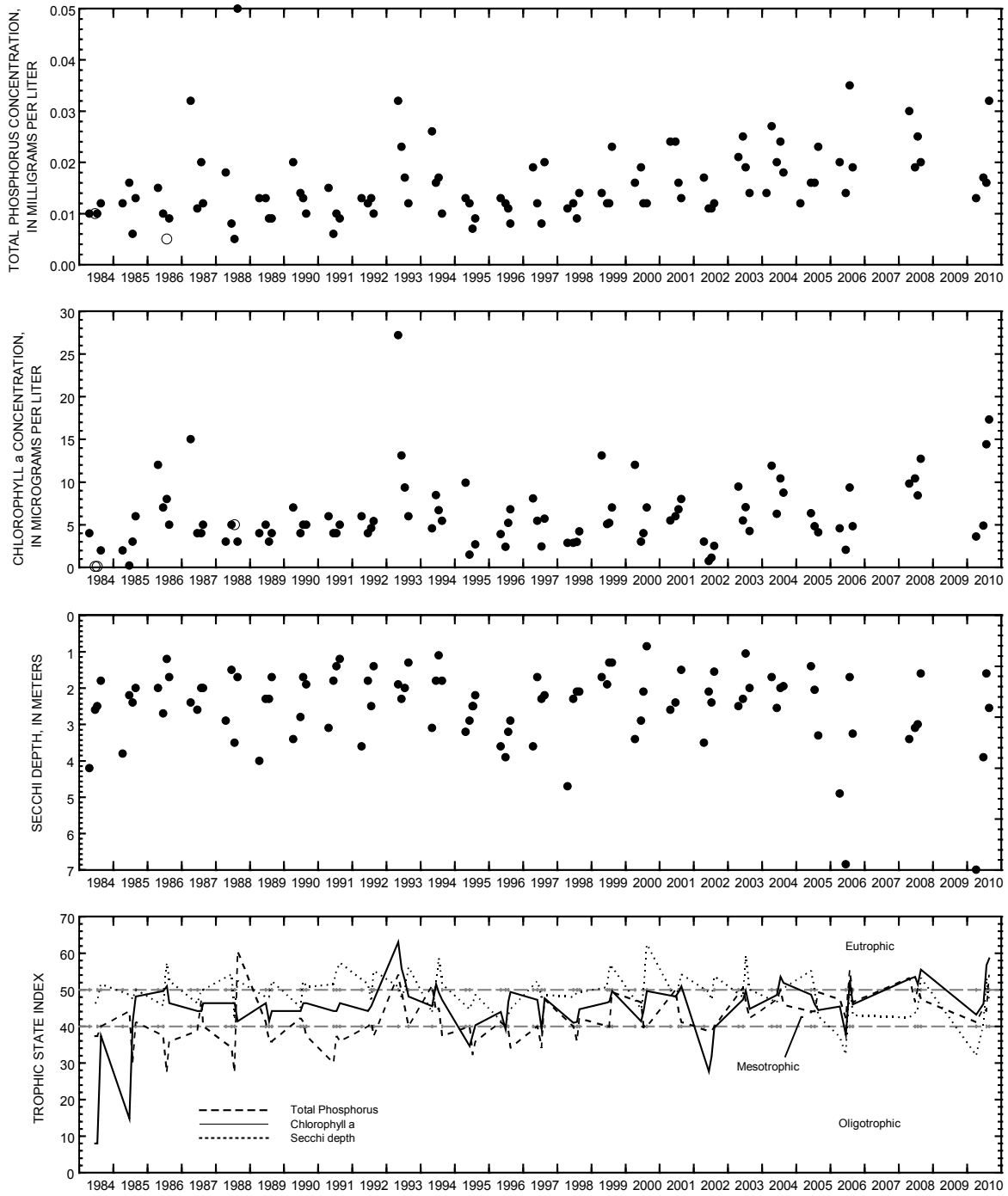
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 8		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	3.61		4.9		14.4		17.3	
00078	Secchi-depth (m)	7.0		3.9		1.6		2.6	
00098	Sampling depth (m)	0.5	30.0	0.5	27.5	0.5	27.5	0.5	27.5
00010	Water Temperature (°C)	7.8	5.0	24.8	6.0	26.8	6.0	25.6	6.5
00400	pH (standard units)	8.3	7.9	8.3	7.4	8.4	7.0	8.4	7.2
00095	Specific conductance (µS/cm)	582	587	556	601	516	606	523	595
00300	Dissolved oxygen	12.5	12.9	10.5	7.4	10.0	1.8	10.1	2.9
00665	Phosphorus, total (as P)	0.013	--	0.017	0.106	0.016	0.014	0.032	0.028
00671	Orthophosphate, dissolved (as P)	0.002	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	0.391	--	--	--	--	--	--	--
00608	Ammonia, dissolved (as N)	<.015	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, unfltrd, total (as N)	0.51	--	--	--	--	--	--	--
00600	Total nitrogen	0.9	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	15	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	267	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	52.6	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	33	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	18.5	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	2	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	223	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	44.8	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	24.6	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	6.74	--	--	--	--	--	--	--
01046	Iron (µg/L)	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	336	--	--	--	--	--	--	--

430723088252100 OKAUCHEE LAKE AT OKAUCHEE, WI

LAKE-DEPTH PROFILES, APRIL 8 10 TO AUGUST 26, 2010





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

(Open circles on the first two 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

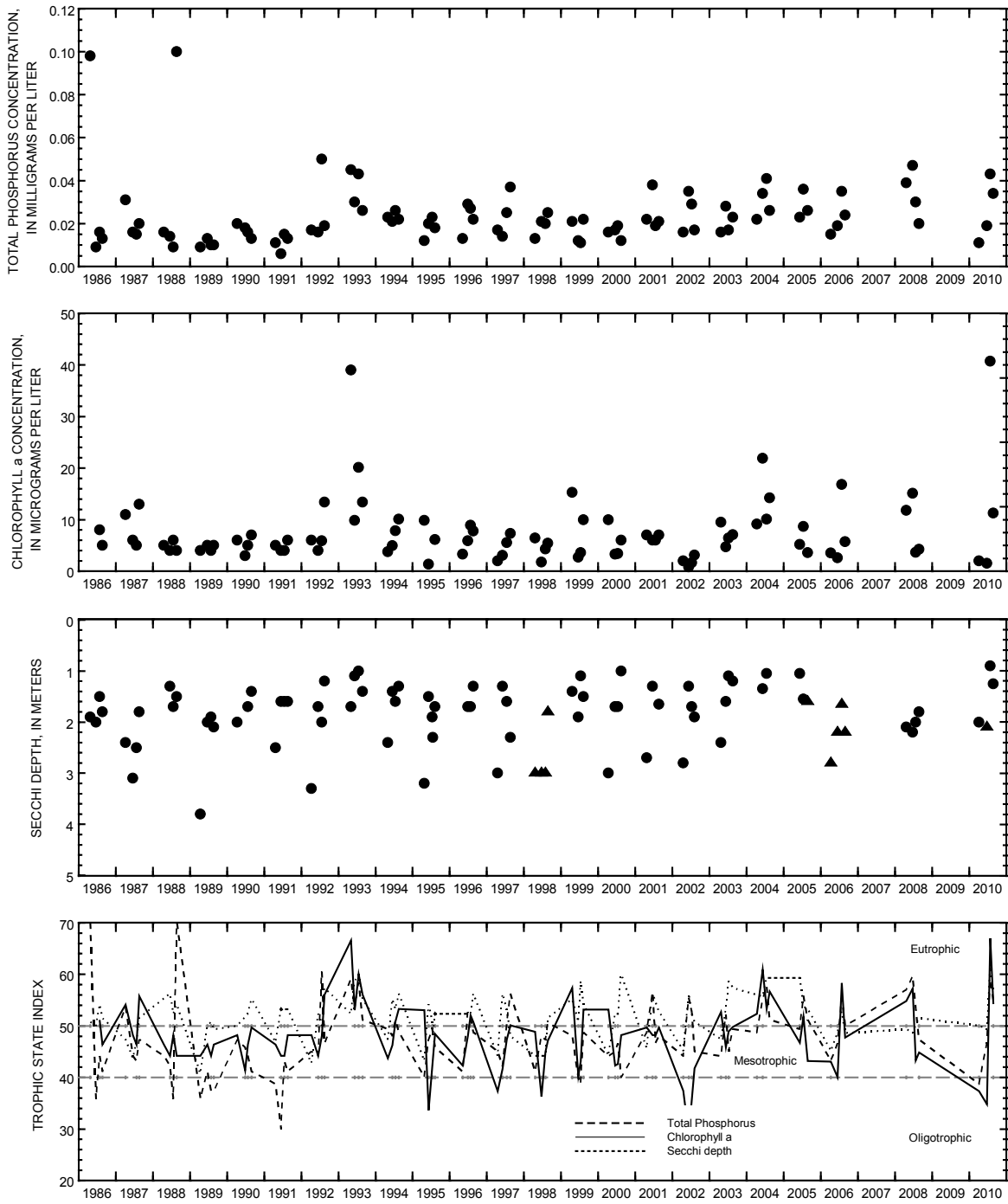
LOCATION.--Lat 43°07'59", long 88°24'42", in NE ¼ NW ¼ sec.30, T.8 N., R.18 E., Waukesha County, Hydrologic Unit 07090001, near Okauchee.

PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008, April to August 2010.

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 8 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 8		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	1.99		1.54		40.7		11.3	
00078	Secchi-depth (m)	2.0		>2.1		0.9		1.2	
00098	Sampling depth (m)	0.5	1.5	0.5	2.5	0.5	1.5	0.5	2.0
00010	Water Temperature (°C)	6.9	6.9	26.0	24.2	27.3	25.6	25.7	23.4
00400	pH (standard units)	8.1	8.2	8.3	8.3	8.4	8.0	8.2	8.2
00095	Specific conductance (µS/cm)	590	590	563	582	515	521	533	557
00300	Dissolved oxygen	--	--	8.9	12.0	9.7	6.3	9.9	10.6
00665	Phosphorus, total (as P)	0.011	--	0.019	--	0.043	--	0.034	--



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 1, near Okauchee, Wisconsin.

(Triangles in Secchi plot indicate maximum depth at sampling site. Actual Secchi depth on these days was greater than the plotted triangles.)

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

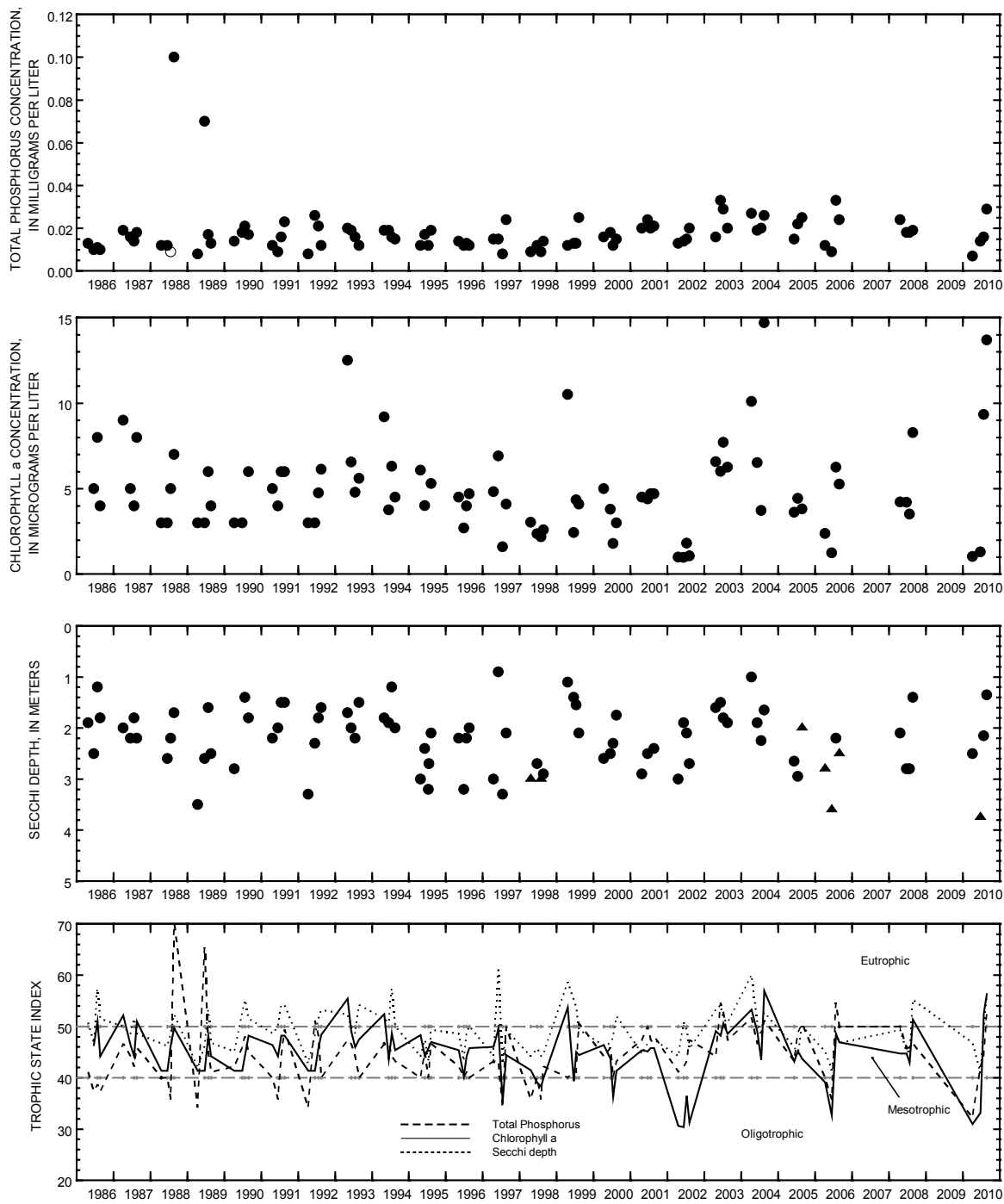
LOCATION.--Lat 43°06'45", long 88°26'45", in SE ¼ NE ¼ sec.35, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008, April to August 2010.

REMARKS.--Lake sampled in Lower Okauchee Lake, at an approximate depth of 3 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 8 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 8		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	1.04		1.3		9.34		13.7	
00078	Secchi-depth (m)	2.5		>3.8		2.2		1.4	
00098	Sampling depth (m)	0.5	2.0	0.5	3.5	0.5	3.0	0.5	2.5
00010	Water Temperature (°C)	8.0	10.3	26.2	25.0	27.2	26.3	25.8	24.9
00400	pH (standard units)	8.3	8.3	8.4	8.4	8.3	8.3	8.4	8.3
00095	Specific conductance (µS/cm)	561	553	526	527	516	515	514	513
00300	Dissolved oxygen	--	--	11.2	13.8	8.8	9.0	10.4	9.8
00665	Phosphorus, total (as P)	0.007	--	0.014	--	0.016	--	0.029	--



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 2, near Okauchee, Wisconsin.

(Open circles on the first two plots indicate laboratory detection limit for selected analyses.

Actual concentrations for these particular analyses are less than the plotted circles.)

(Triangles in Secchi plot indicate maximum depth at sampling site.

Actual Secchi depth on these days was greater than the plotted triangles.)

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

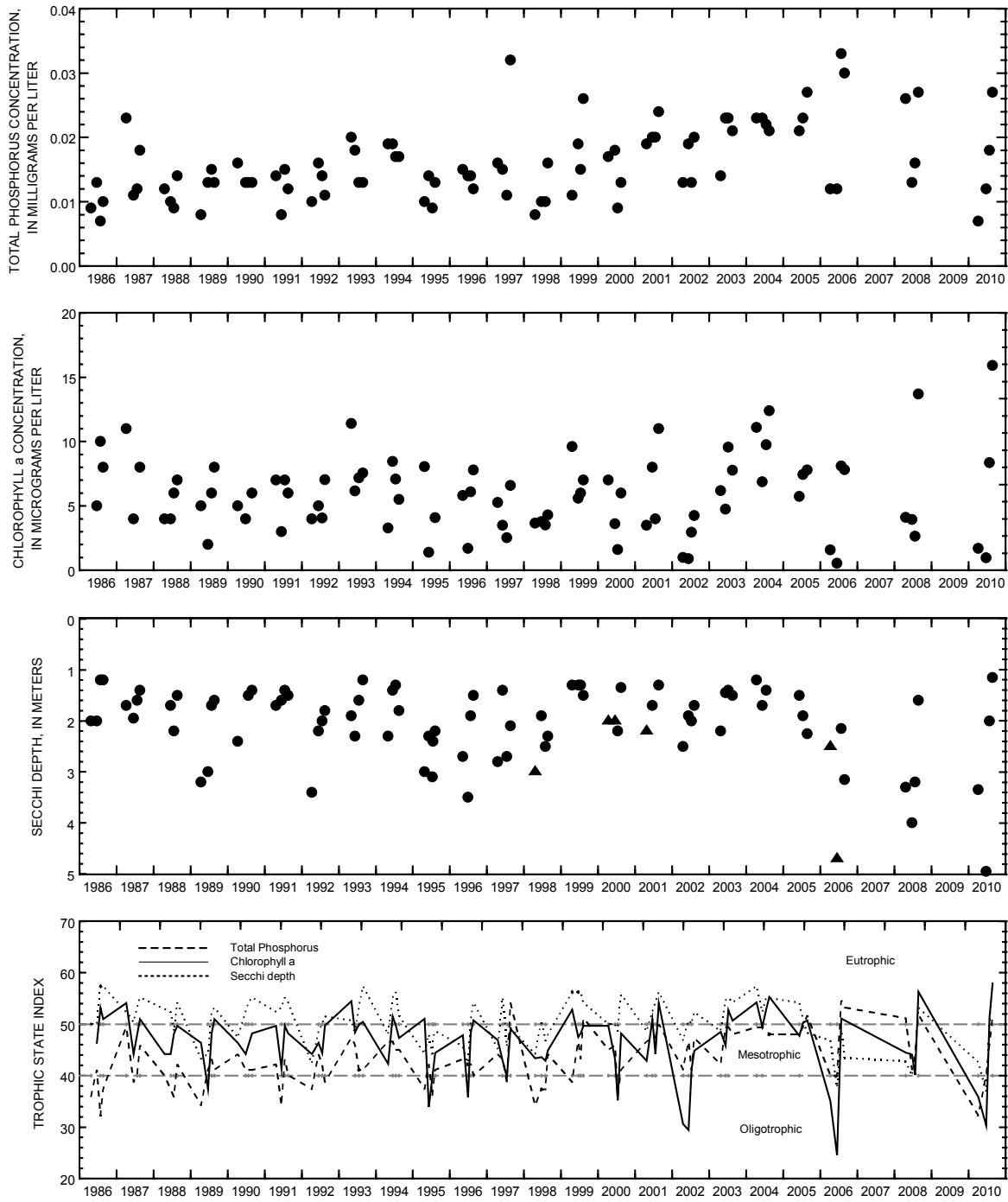
LOCATION.--Lat 43°06'42", long 88°25'24", in NE ¼ SE ¼ sec.36, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--April 1986 to September 2006, April to August 2008, April to August 2010.

REMARKS.--Lake sampled in Ice House Bay, in the southern part of the lake, at an approximate depth of 5 m. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 8 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 8		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	1.71		0.97		8.35		15.9	
00078	Secchi-depth (m)	3.4		5.0		2.0		1.2	
00098	Sampling depth (m)	0.5	4.0	0.5	5.3	0.5	4.0	0.5	4.5
00010	Water Temperature (°C)	8.4	8.2	26.0	20.8	27.1	26.4	25.3	24.4
00400	pH (standard units)	8.3	8.3	8.5	8.2	8.4	7.9	8.3	8.2
00095	Specific conductance (µS/cm)	565	565	513	544	494	510	521	520
00300	Dissolved oxygen	--	--	11.2	18.3	9.1	2.6	8.9	8.1
00665	Phosphorus, total (as P)	0.007	--	0.012	--	0.018	--	0.027	--



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 3, near Okauchee, Wisconsin.

(Triangles in Secchi plot indicate maximum depth at sampling site.
Actual Secchi depth on these days was greater than the plotted triangles.)

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

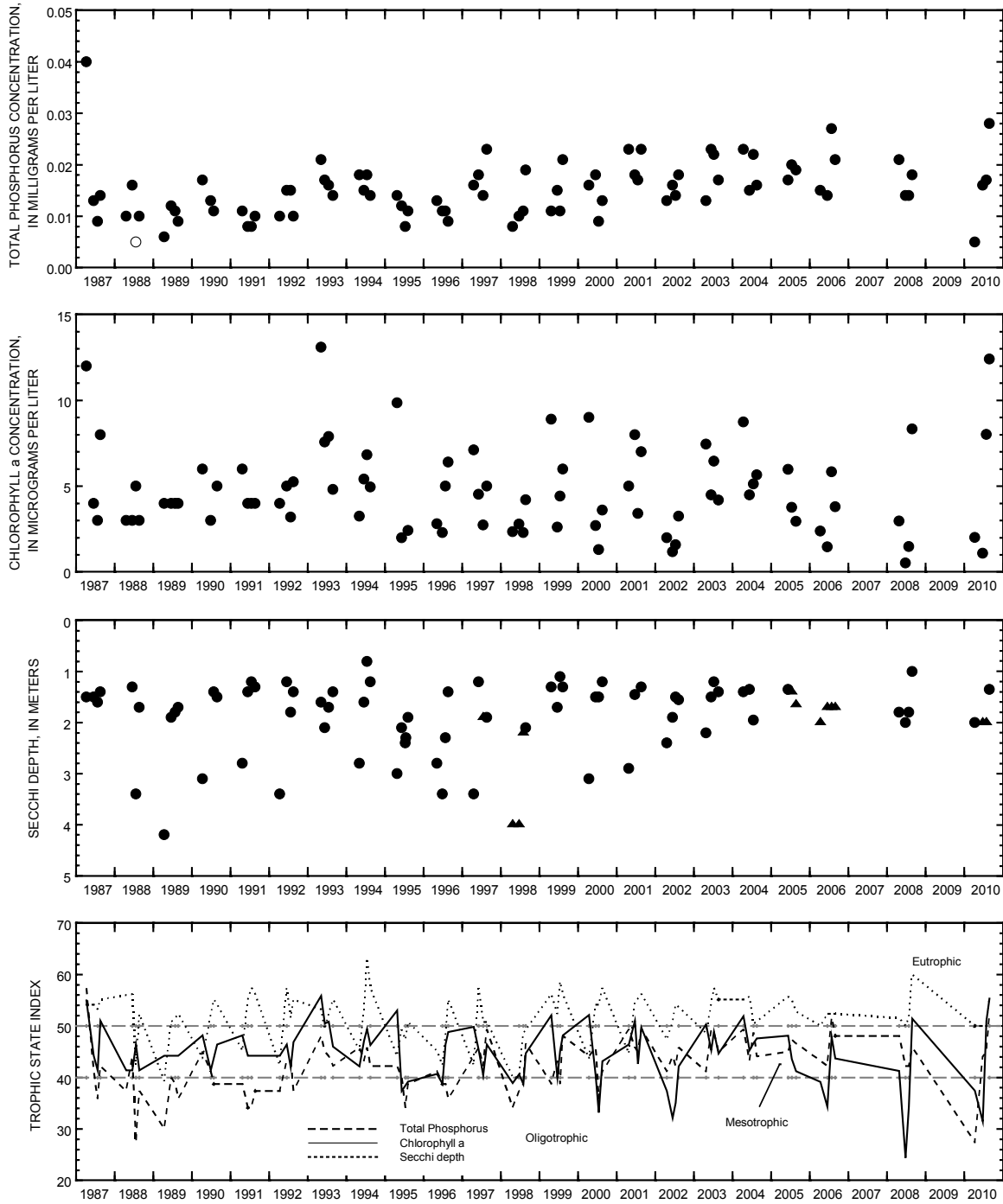
LOCATION.--Lat 43°07'57", long 88°26'17", in NW ¼ NW ¼ sec.25, T.8 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Okauchee.

PERIOD OF RECORD.--June 1986 to September 2006, April to August 2008, April to August 2010.

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 8 TO AUGUST 26, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	April 8		June 24		July 27		August 26	
32210	Chlorophyll a (µg/L)	2.01		1.09		8.01		12.4	
00078	Secchi-depth (m)	2.0		>2.0		>2.0		1.4	
00098	Sampling depth (m)	0.5	1.5	0.5	1.75	0.5	1.5	0.5	1.5
00010	Water Temperature (°C)	10.2	8.0	25.9	25.7	27.3	27.1	25.3	24.5
00400	pH (standard units)	8.3	8.3	8.6	8.7	8.3	8.4	8.2	8.3
00095	Specific conductance (µS/cm)	553	561	494	495	504	504	528	523
00300	Dissolved oxygen	--	--	11.4	12.6	9.8	10.3	9.6	10.8
00665	Phosphorus, total (as P)	0.005	--	0.016	--	0.017	--	0.028	--



Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Okauchee Lake, No. 4, near Okauchee, Wisconsin.

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

(Triangles in Secchi plot indicate maximum depth at sampling site. Actual Secchi depth on these days was greater than the plotted triangles.)

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LOCATION.--Lat 42°32'46", long 88°17'58", in NW ¼ SE ¼ sec.13, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at Powers Lake.

SURFACE AREA.—0.72 mi².

DRAINAGE AREA.--3.42 mi².

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

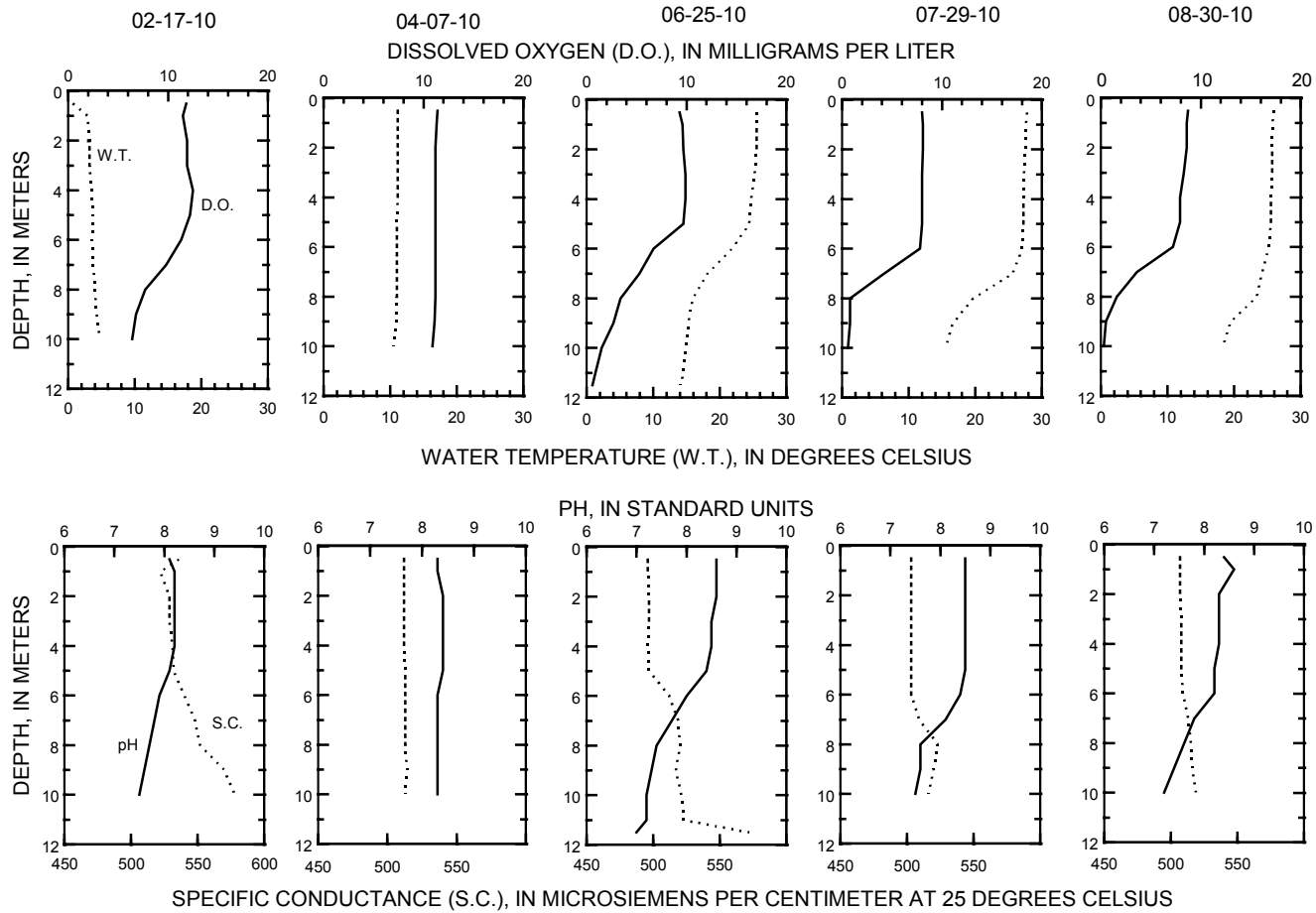
REMARKS.--Lake sampled near center at the deep hole. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

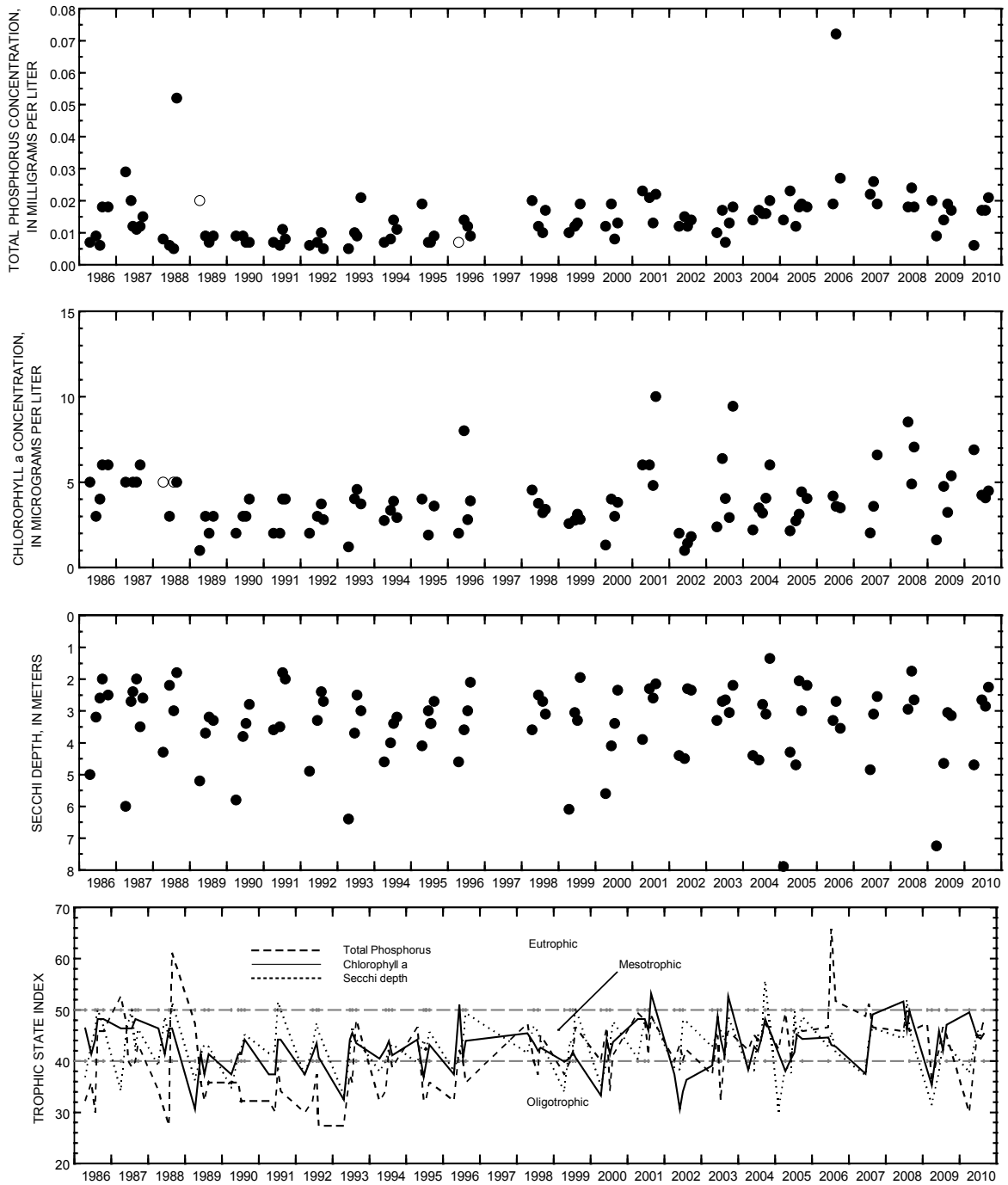
WATER-QUALITY DATA, FEBRUARY 17 TO AUGUST 30, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	February 17		April 7		June 25		July 29		August 30	
32210	Chlorophyll a (µg/L)	--	--	6.89	--	4.24	--	4.08	--	4.48	--
00078	Secchi-depth (m)	--	--	4.7	--	2.65	--	2.85	--	2.25	--
00098	Sampling depth (m)	0.5	10.0	0.5	10.0	0.5	11.5	0.5	10.0	0.5	9.5
00010	Water Temperature (°C)	0.7	4.8	11.1	10.5	25.6	14.1	27.8	15.5	25.9	18.3
00400	pH (standard units)	8.1	7.5	8.3	8.3	8.6	7.0	8.5	7.5	8.4	7.2
00095	Specific conductance (µS/cm)	536	578	512	513	496	572	503	516	507	519
00300	Dissolved oxygen	11.8	6.4	11.4	10.9	9.3	0.6	8.0	0.6	8.7	0.3
00665	Phosphorus, total (as P)	0.014	0.015	0.006	--	0.017	0.022	0.017	0.051	0.021	0.036
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	<.002	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.083	--	--	--	0.025	--	--	--
00608	Ammonia, dissolved (as N)	--	--	<.015	--	--	--	0.019	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.65	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.6	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.68	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	10	--	--	--	--	--	--	--
00900	Hardness (as CaCO ₃)	--	--	223	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	38.2	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	31	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	19.5	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2	--	--	--	--	--	--	--
00417	ANC (as CaCO ₃)	--	--	182	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	42.1	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO ₄)	--	--	26.6	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO ₂)	--	--	8.01	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	<1.0	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	292	--	--	--	--	--	--	--

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 17 TO AUGUST 30, 2010





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

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

460458090102700 TURTLE-FLAMBEAU FLOWAGE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°04'58", long 90°10'27", in SW ¼ SE ¼ SE ¼ sec.25, T.42 W., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

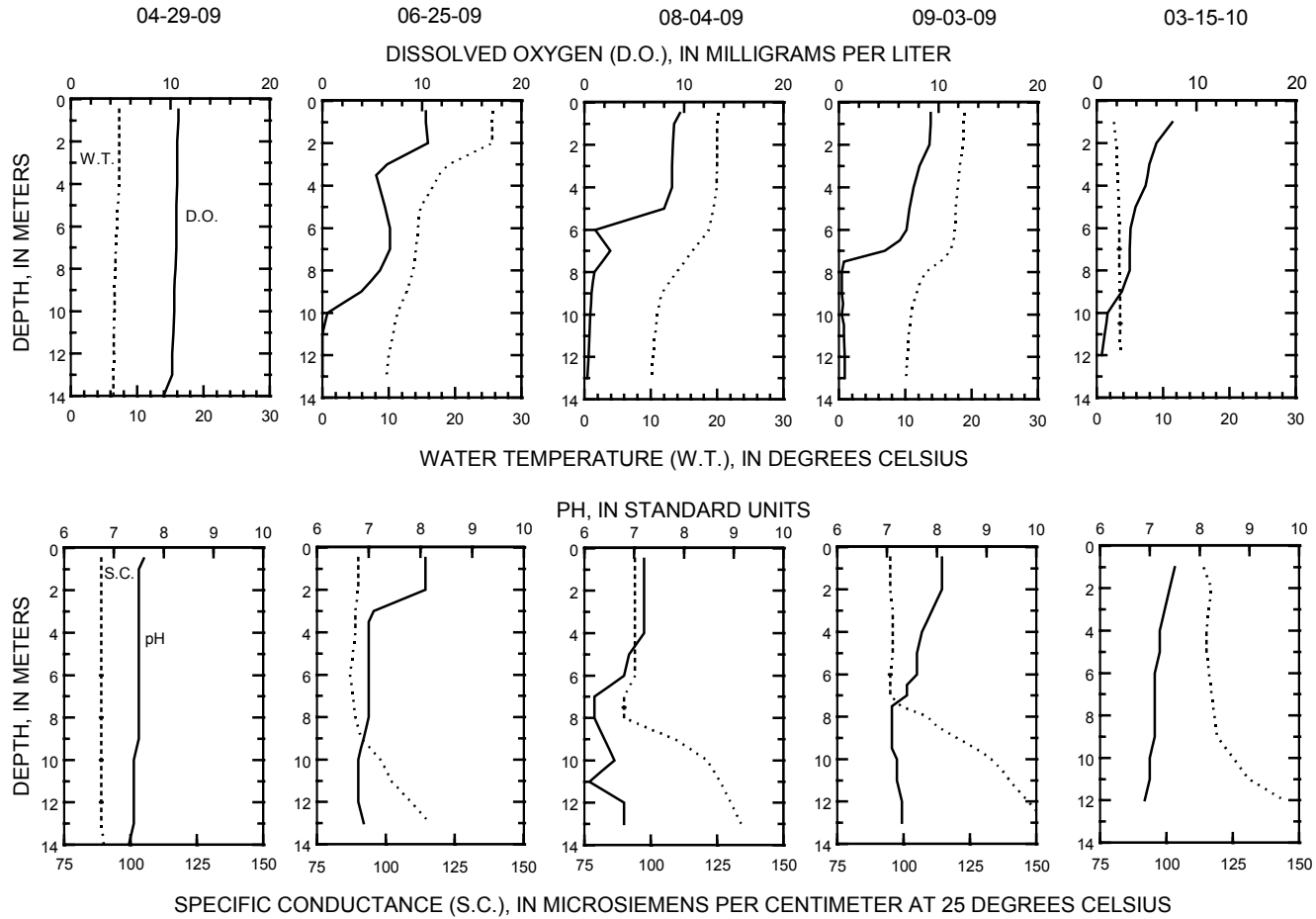
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29, 2009 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.8	2.1		1.5		1.7		--	
00098	Sampling depth (m)	0.5	0.5	13	0.5	13	0.5	13	1.0	12.0
00010	Water Temperature (°C)	7.3	25.7	9.7	20.1	10.1	18.9	10.1	2.6	3.6
00400	pH (standard units)	7.6	8.1	6.9	7.2	6.8	8.1	7.3	7.5	6.9
00095	Specific conductance (µS/cm)	89	90	116	94	134	95	154	114	144
00300	Dissolved oxygen	10.8	10.4	0	9.6	0.3	9.2	0.6	7.6	0.5
32210	Chlorophyll a (µg/L)	3.79	3.05	--	3.19	--	3.34	--	--	--
00665	Phosphorus, total (as P)	0.025	0.045	0.056	0.034	0.079	0.017	0.065	0.018	0.028
00671	Orthophosphate, dissolved (as P)	0.004	--	--	--	--	--	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	<.019	--	--	--	--	--	--	0.123	--
00608	Ammonia, dissolved (as N)	0.034	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	0.48	--	--	--	--	--	--	0.33	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.453	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	50	--	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	42	--	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	11.8	--	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	3.1	--	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	2.2	--	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	0.7	--	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	38	--	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	3.1	--	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	<4.5	--	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	8.13	--	--	--	--	--	--	--	--
01046	Iron (µg/L)	600	--	--	--	--	--	--	--	--
01056	Manganese (µg/L)	80	--	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	64	--	--	--	--	--	--	--	--

460458090102700 TURTLE-FLAMBEAU FLOWAGE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460344090124800 TURTLE-FLAMBEAU FLOWAGE, SOUTHWEST BASIN, NEAR MERCER, WI

LOCATION.--Lat 46°03'44", long 90°12'48", in NE ¼ SW ¼ NW ¼ sec.2, T.41 N., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

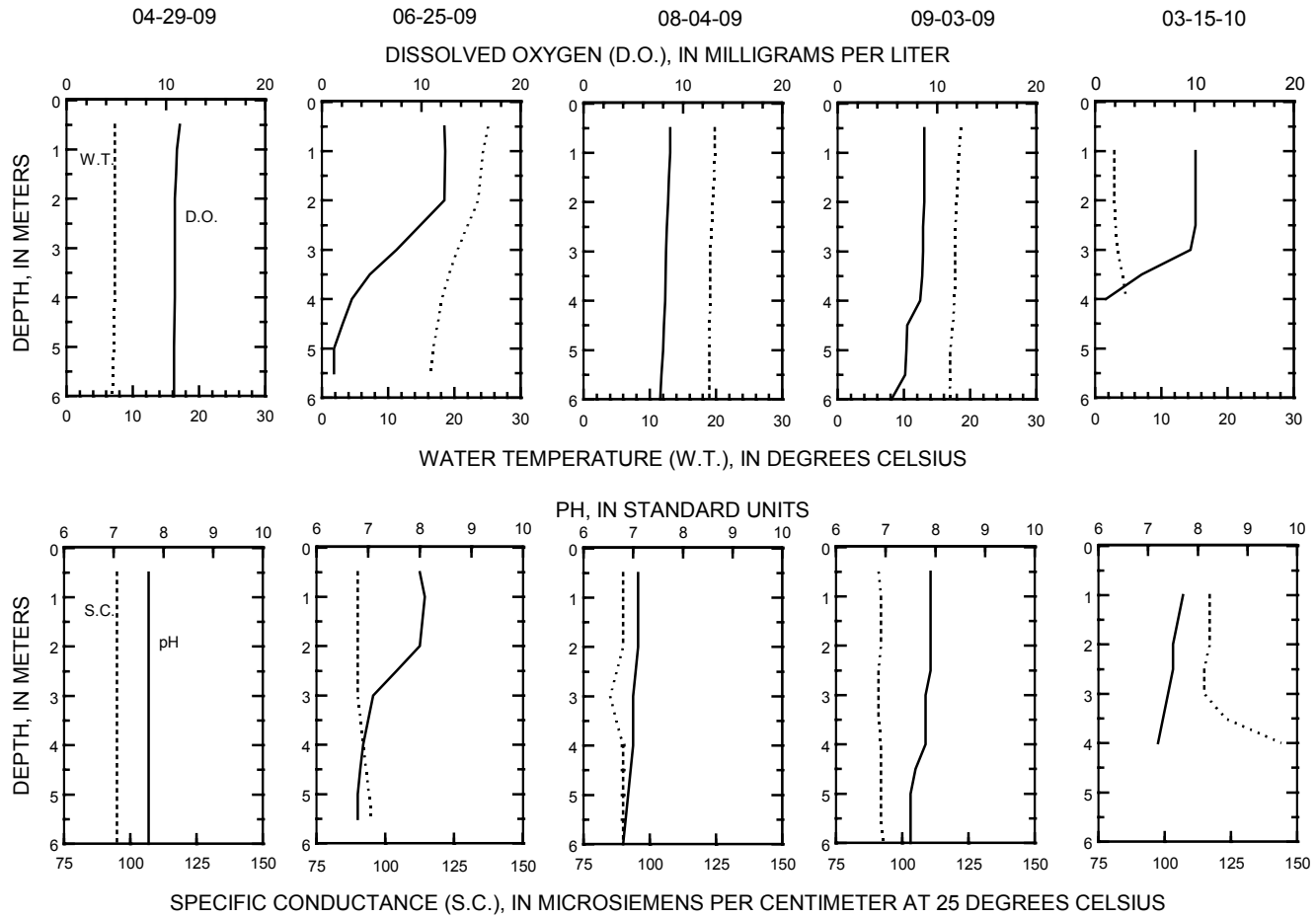
REMARKS.--Lake sampled in the deepest part of the southwest basin of the flowage. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	2.1	1.9		2.4		1.6		--	
00098	Sampling depth (m)	0.5	0.5	5.5	0.5	6.0	0.5	6.0	1.0	4.0
00010	Water Temperature (°C)	8.7	25.1	16.4	19.8	19.0	18.6	16.9	2.9	4.7
00400	pH (standard units)	7.7	8.0	6.8	7.1	6.8	7.9	7.5	7.7	7.2
00095	Specific conductance (µS/cm)	95	90	95	90	90	91	93	117	144
00300	Dissolved oxygen	11.4	12.3	1.2	8.7	7.7	8.7	5.4	10.1	1.1
32210	Chlorophyll a (µg/L)	1.57	3.63	--	3.79	--	5.95	--	--	--
00665	Phosphorus, total (as P)	0.027	0.044	0.036	0.036	0.029	0.020	0.026	0.013	0.118
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.087	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.39	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.477	--

460344090124800 TURTLE-FLAMBEAU FLOWAGE, SOUTHWEST BASIN, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460511090153800 LAKE BASTINE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°05'11", long 90°15'38", in NE ¼ SE ¼ SE ¼ sec.29, T.41 N., R.2 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

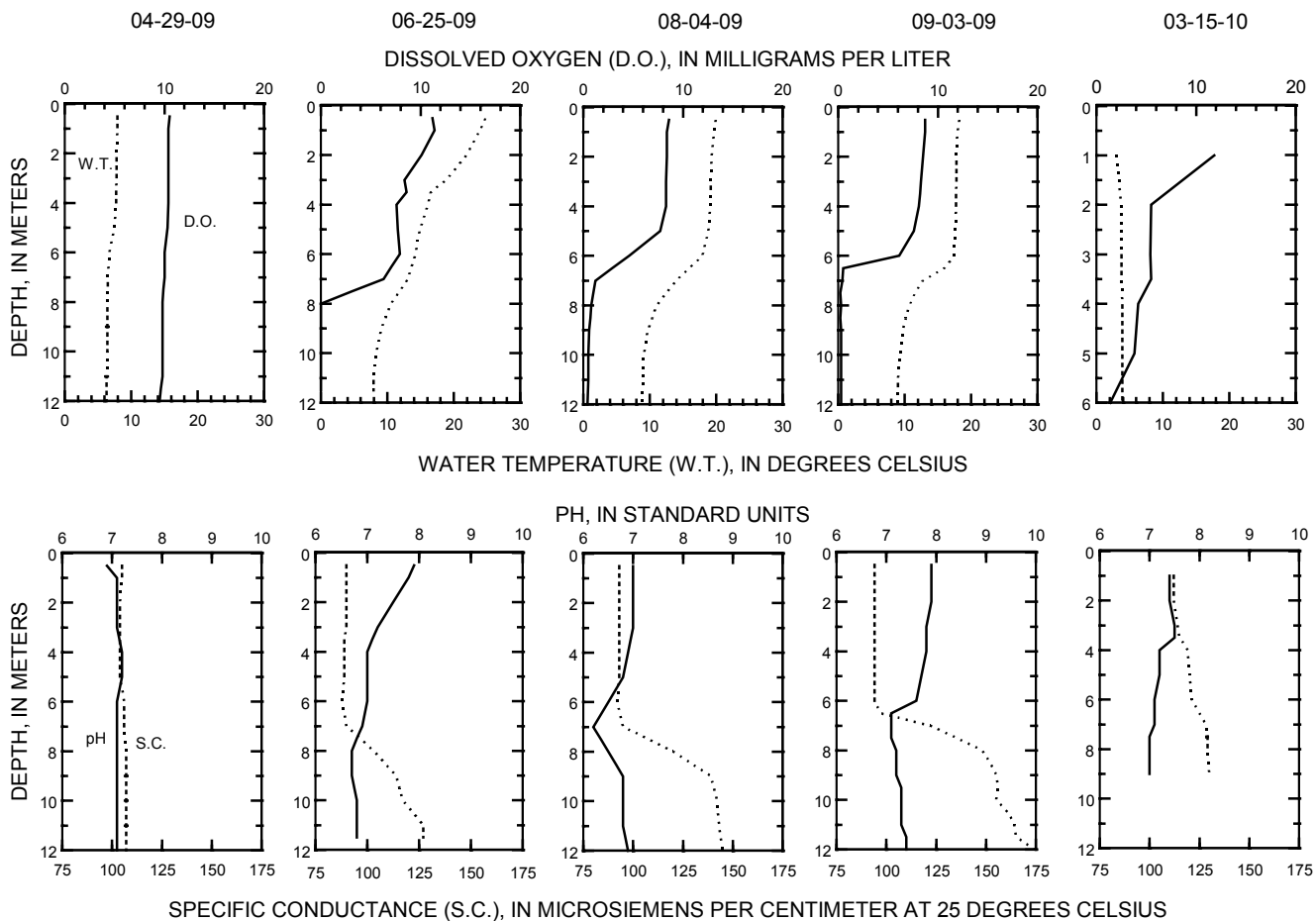
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29, 2009 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.4	2.1		1.7		1.6		--	
00098	Sampling depth (m)	0.5	0.5	11.0	0.5	12.0	0.5	11.0	1.0	9.0
00010	Water Temperature (°C)	7.9	24.7	7.9	19.9	8.8	18.2	9.0	3.0	4.1
00400	pH (standard units)	6.9	7.9	6.8	7.0	6.9	7.9	7.3	7.4	7.0
00095	Specific conductance (µS/cm)	105	90	127	93	145	94	164	112	130
00300	Dissolved oxygen	10.5	11.2	0.0	8.6	0.4	8.7	0.3	11.8	0.5
32210	Chlorophyll a (µg/L)	3.25	2.38	--	2.86	--	8.36	--	--	--
00665	Phosphorus, total (as P)	0.021	0.042	0.067	0.026	0.064	0.021	0.075	0.012	0.212
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	0.001	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.071	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.45	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.521	--

460511090153800 LAKE BASTINE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460409090084100 TOWNLINE LAKE NEAR MERCER, WI

LOCATION.--Lat 46°04'09", long 90°08'41", in NW ¼ NW ¼ NE ¼ sec.5, T.41 N., R.3 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

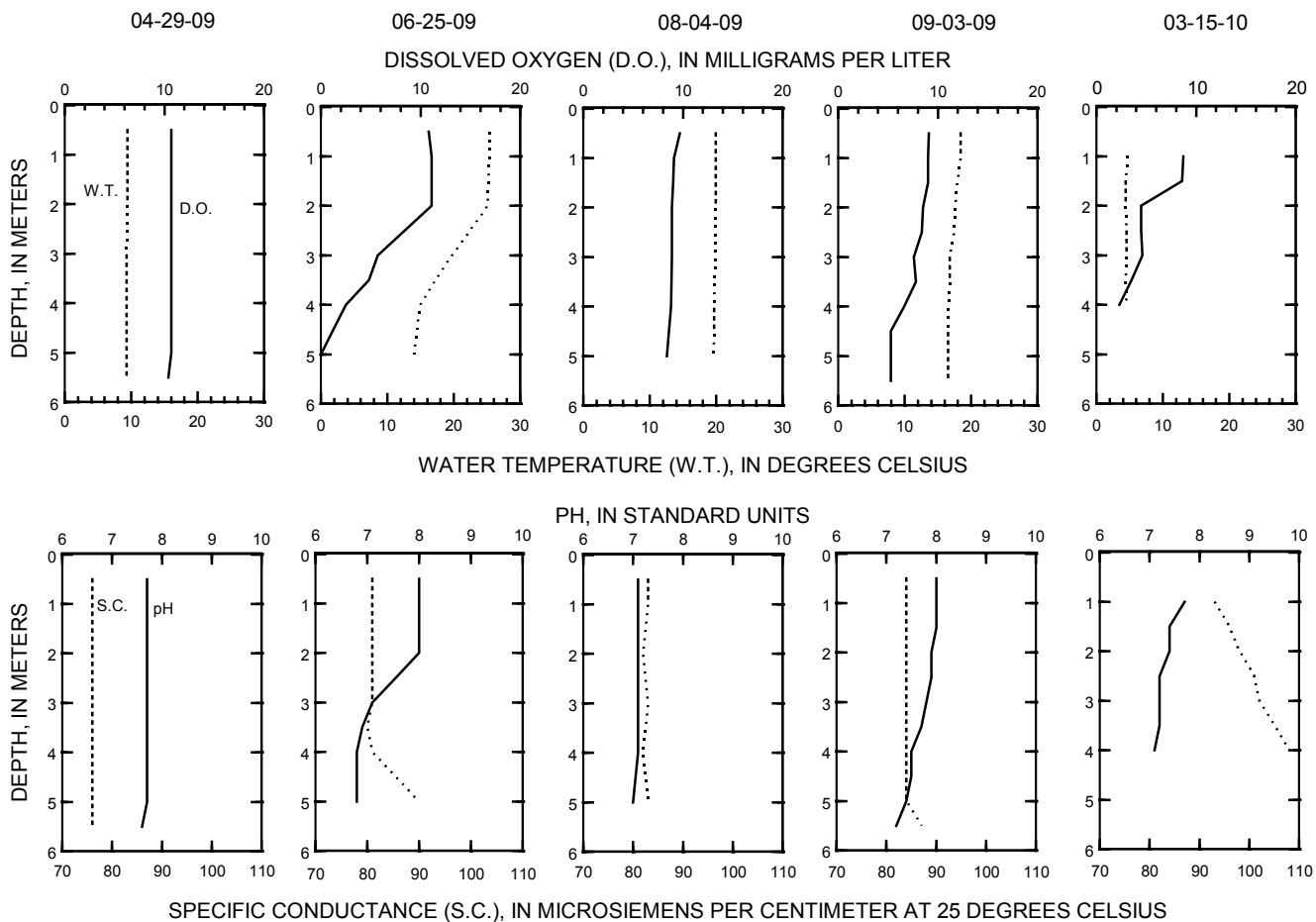
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 29 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 29</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	1.2	1.8		1.2		1.6		--	
00098	Sampling depth (m)	0.5	0.5	5.0	0.5	5.0	0.5	5.0	1.0	4.0
00010	Water Temperature (°C)	9.4	25.4	14.0	19.9	19.6	18.4	16.5	4.7	4.0
00400	pH (standard units)	7.7	8.0	6.8	7.1	7.0	8.0	7.4	7.7	7.1
00095	Specific conductance (µS/cm)	76	81	90	83	83	84	84	93	108
00300	Dissolved oxygen	10.7	10.8	0.0	9.7	8.4	9.1	5.3	8.7	2.3
32210	Chlorophyll a (µg/L)	5.9	3.83	--	6.0	--	6.02	--	--	--
00665	Phosphorus, total (as P)	0.030	0.025	0.040	0.041	0.034	0.033	0.033	0.013	0.036
00671	Orthophosphate, dissolved (as P)	--	--	--	--	--	--	--	0.006	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	--	--	--	--	--	0.127	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	--	--	--	--	--	0.37	--
00600	Total nitrogen	--	--	--	--	--	--	--	0.497	--

460409090084100 TOWNLINE LAKE NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



460646090091900 TRUDE LAKE, DEEP HOLE, NEAR MERCER, WI

LOCATION.--Lat 46°06'46", long 90°09'19", in SW ¼ SW ¼ SW ¼ sec.17, T.42 N., R.3 E., Vilas County, Hydrologic Unit 07050002.

PERIOD OF RECORD.—April 2009 to March 2010 (discontinued).

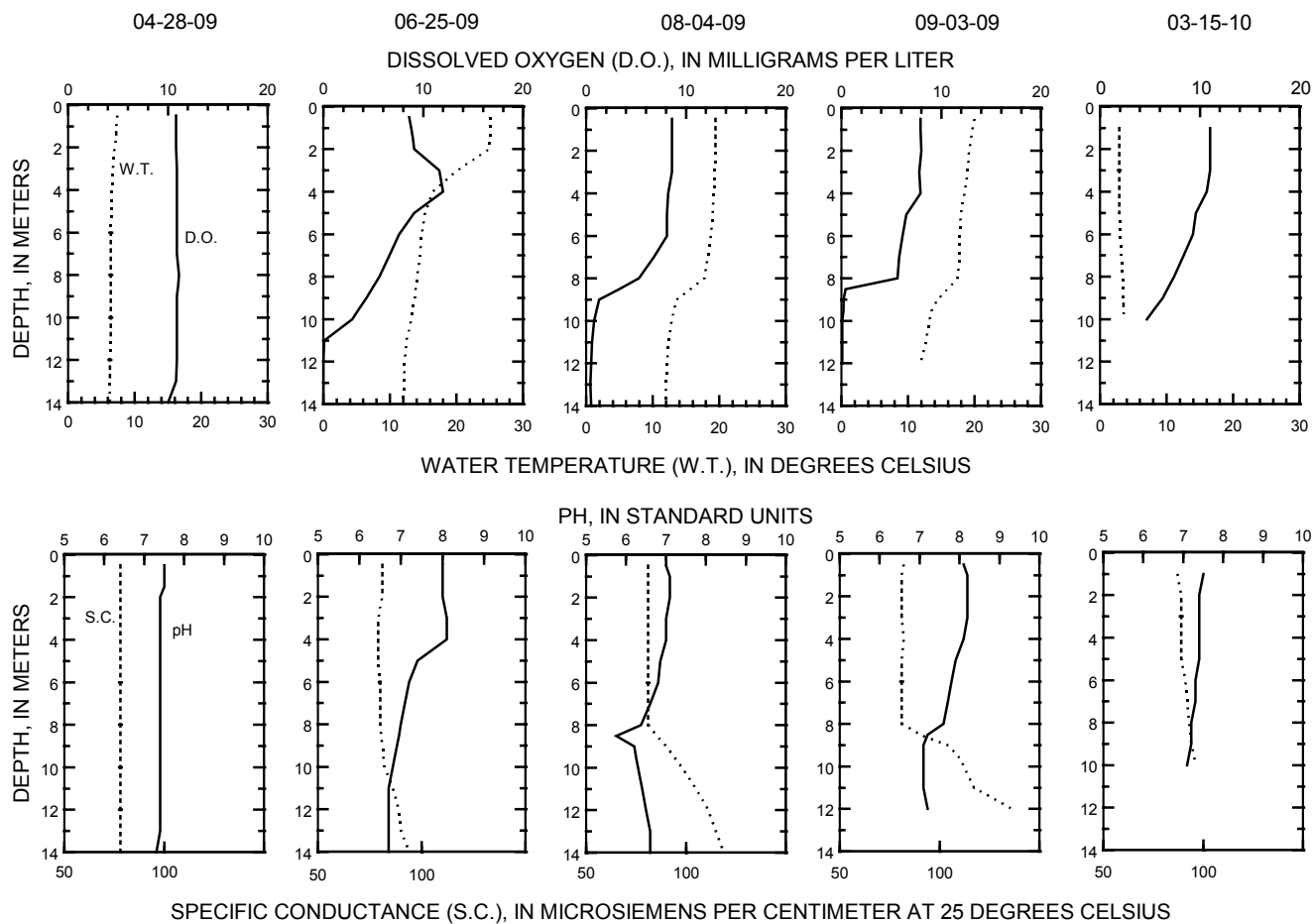
REMARKS.--Lake sampled at the deep hole. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 28 TO MARCH 15, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>Apr. 28</u>	<u>June 25</u>		<u>Aug. 4</u>		<u>Sept. 3</u>		<u>March 15</u>	
00078	Secchi-depth (m)	2.8	3.2		2.3		2.4		--	
00098	Sampling depth (m)	0.5	0.5	13.0	0.5	13.0	0.5	12.0	1.0	10.0
00010	Water Temperature (°C)	7.4	25.0	12.1	19.4	12.0	20.0	11.9	2.9	3.6
00400	pH (standard units)	7.5	8.0	6.7	7.0	6.6	8.1	7.2	7.5	7.1
00095	Specific conductance (µS/cm)	78	81	90	81	115	82	136	87	96
00300	Dissolved oxygen	10.8	8.6	0.0	8.6	0.4	7.9	0.1	11.0	4.7
32210	Chlorophyll a (µg/L)	1.47	0.88	--	3.08	--	4.52	--	--	--
00665	Phosphorus, total (as P)	0.018	0.039	0.082	0.026	0.032	0.010	0.058	0.016	0.018
00671	Orthophosphate, dissolved (as P)	0.003	--	--	--	--	--	--	0.012	--
00631	Nitrate plus nitrite, dissolved (as N)	0.058	--	--	--	--	--	--	0.066	--
00608	Ammonia, dissolved (as N)	0.029	--	--	--	--	--	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	0.57	--	--	--	--	--	--	0.39	--
00600	Total nitrogen	0.63	--	--	--	--	--	--	0.456	--
63675	Turbidity, (NTU)	<1.0	--	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	40	--	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	37	--	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	9.8	--	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	3	--	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	1.6	--	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	0.7	--	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	34	--	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	2.2	--	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	<4.5	--	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	8.24	--	--	--	--	--	--	--	--
01046	Iron (µg/L)	100	--	--	--	--	--	--	--	--
01056	Manganese (µg/L)	90	--	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	58	--	--	--	--	--	--	--	--

460646090091900 TRUDE LAKE, DEEP HOLE, NEAR MERCER, WI

LAKE-DEPTH PROFILES, APRIL 29, 2009 TO MARCH 15, 2010



05429485 LAKE WAUBESA AT MCFARLAND, WI

LOCATION.--Lat 43°00'32", long 89°18'19" referenced to North American Datum of 1927, in SW ¼ SW ¼ sec.3, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on left bank just upstream from bridge on U.S. Highway 51, downstream of dam at outlet of Lake Waubesa and 1.0 mi southwest of McFarland.

SURFACE AREA.--3.25 mi².

DRAINAGE AREA.--327 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--October 2003 to current year.

REVISED RECORDS.--WSP 805, WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929 (levels by Wisconsin Department of Natural Resources).

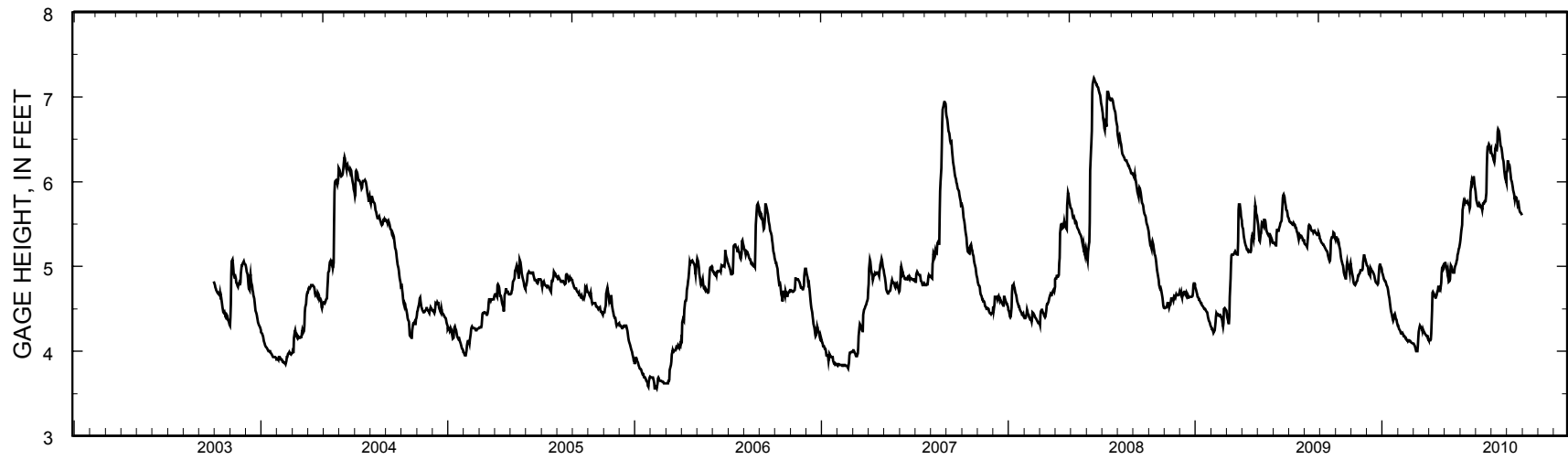
REMARKS.--Lake level regulated by dams at outlets of Lake Mendota and Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.22 ft, June 15-17, 2008; minimum observed, 3.50 ft, Feb.14, 2006, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.63 ft, Aug. 15; minimum recorded, 3.99 ft, Mar. 9.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.32	5.00	5.03	4.94	4.30	4.09	4.14	5.03	5.28	5.89	6.37	6.10
2	5.34	4.97	5.01	4.91	4.30	4.09	4.13	5.04	5.32	5.83	6.34	6.13
3	5.34	4.94	5.00	4.89	4.28	4.08	4.13	5.04	5.37	5.78	6.32	6.24
4	5.34	4.89	4.98	4.87	4.26	4.06	4.13	5.01	5.42	5.74	6.30	6.24
5	5.31	4.86	4.94	4.85	4.25	4.04	4.14	5.00	5.49	5.72	6.29	6.21
6	5.29	4.82	4.91	4.83	4.24	4.02	4.21	4.95	5.67	5.71	6.26	6.20
7	5.30	4.80	4.90	4.83	4.22	4.00	4.48	4.92	5.69	5.71	6.23	6.17
8	5.28	4.79	4.89	4.82	4.21	4.00	4.69	4.95	5.74	5.74	6.27	6.12
9	5.24	4.78	4.98	4.80	4.21	4.00	4.70	4.90	5.77	5.73	6.38	6.08
10	5.20	4.79	4.97	4.78	4.22	4.06	4.69	4.82	5.75	5.72	6.40	6.03
11	5.15	4.80	4.96	4.76	4.21	4.15	4.68	4.83	5.78	5.70	6.39	6.00
12	5.11	4.82	4.95	4.74	4.20	4.23	4.66	4.85	5.77	5.70	6.38	5.97
13	5.08	4.83	4.94	4.71	4.18	4.28	4.64	4.96	5.76	5.69	6.41	5.94
14	5.04	4.86	4.93	4.67	4.18	4.30	4.63	5.01	5.75	5.67	6.59	5.90
15	5.02	4.89	4.92	4.62	4.17	4.29	4.63	4.99	5.75	5.71	6.62	5.86
16	5.01	4.89	4.89	4.58	4.16	4.28	4.66	4.96	5.76	5.74	6.60	5.83
17	4.97	4.91	4.86	4.54	4.16	4.27	4.69	4.94	5.74	5.74	6.57	5.79
18	4.93	4.92	4.84	4.50	4.14	4.26	4.71	4.93	5.73	5.76	6.52	5.82
19	4.89	4.94	4.82	4.47	4.13	4.24	4.72	4.93	5.72	5.76	6.47	5.82
20	4.88	4.96	4.81	4.43	4.13	4.26	4.76	4.93	5.68	5.77	6.42	5.81
21	4.86	4.96	4.80	4.40	4.12	4.25	4.76	4.97	5.70	5.77	6.40	5.78
22	4.86	4.96	4.80	4.38	4.13	4.23	4.73	5.00	5.88	5.87	6.37	5.76
23	5.01	4.96	4.79	4.36	4.13	4.22	4.74	5.01	5.97	6.17	6.33	5.72
24	5.05	4.97	4.80	4.39	4.12	4.21	4.73	5.04	6.01	6.34	6.28	5.74
25	5.02	5.05	4.94	4.43	4.12	4.20	4.81	5.07	5.99	6.41	6.24	5.70
26	5.01	5.13	5.00	4.44	4.12	4.19	4.93	5.08	6.02	6.42	6.18	5.67
27	4.99	5.13	5.02	4.42	4.11	4.18	4.98	5.14	6.05	6.44	6.12	5.65
28	4.96	5.10	5.02	4.39	4.10	4.18	4.99	5.15	6.05	6.43	6.08	5.64
29	4.93	5.09	5.00	4.37	---	4.18	4.96	5.21	6.00	6.40	6.04	5.63
30	5.02	5.07	4.98	4.34	---	4.15	4.97	5.22	5.95	6.37	6.01	5.62
31	5.04	---	4.96	4.32	---	4.13	---	5.25	---	6.39	5.99	---
Mean	5.09	4.93	4.92	4.61	4.18	4.17	4.63	5.00	5.75	5.93	6.33	5.91
Max	5.34	5.13	5.03	4.94	4.30	4.30	4.99	5.25	6.05	6.44	6.62	6.24
Min	4.86	4.78	4.79	4.32	4.10	4.00	4.13	4.82	5.28	5.67	5.99	5.62



Stage hydrograph for Lake Waubesa, 2003-2010

42484808803100 WIND LAKE, HEADWATER, AT OUTLET AT WIND LAKE, WI

LOCATION.--Lat 42°48'48", long 88°08'31" referenced to North American Datum of 1927, in NE ¼ NW ¼ sec.16, T.4 N., R.20 E., Racine County, WI, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

DRAINAGE AREA.--39.6 mi².

PERIOD OF RECORD.--March 1985 to current year. Prior to October 2000, published as "Wind Lake Outlet".

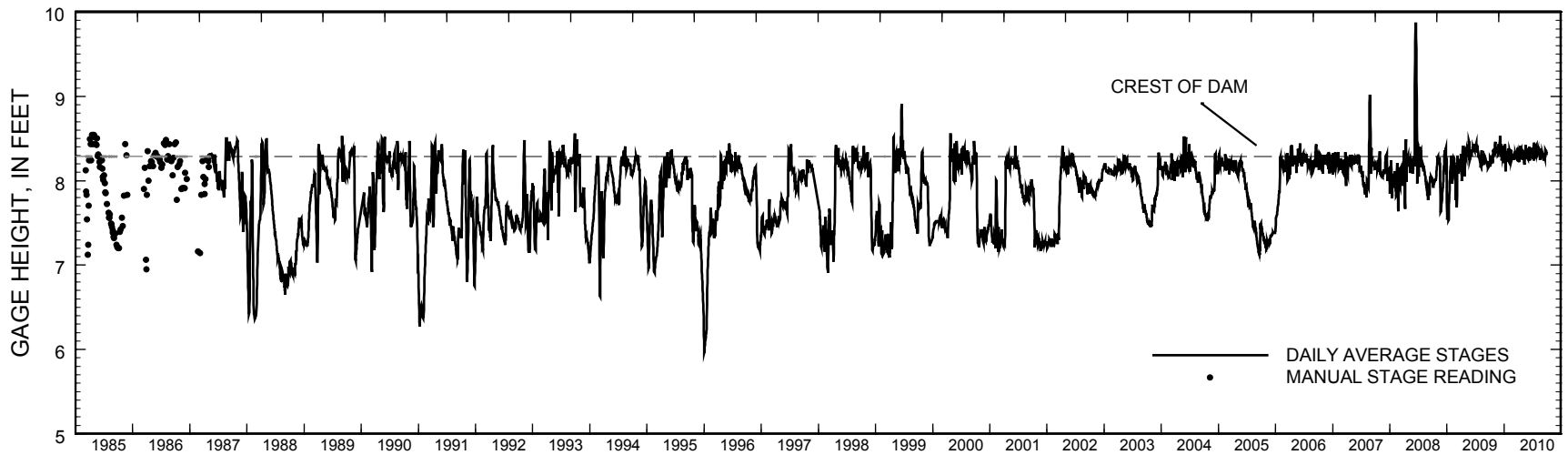
REVISED RECORDS.--WDR WI-91-1: 1988(m).

REMARKS.--Lake level regulated by dam with two 10-foot gates at outlet. Lake ice-covered Dec. 3 to Mar. 14. Prior to October 1987, published as Wind Lake at Wind Lake, Wis. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.88 ft, June 14, 15, 2008; minimum recorded, 5.95 ft, Jan. 2, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 8.56 ft, July 15; minimum recorded, 8.08 ft, Jan. 11.

GAGE HEIGHT, FEET (HEADWATER)												
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010												
DAILY MEAN VALUES												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.18	8.30	8.35	8.27	8.38	8.27	8.36	8.25	8.29	8.32	8.34	8.31
2	8.28	8.34	8.40	8.24	8.31	8.26	8.36	8.26	8.30	8.26	8.33	8.32
3	8.28	8.39	8.44	8.21	8.24	8.26	8.35	8.30	8.33	8.36	8.35	8.33
4	8.27	8.43	8.48	8.24	8.24	8.26	8.26	8.31	8.32	8.39	8.34	8.31
5	8.26	8.46	8.50	8.33	8.32	8.27	8.22	8.33	8.36	8.33	8.35	8.29
6	8.26	8.44	8.53	8.40	8.36	8.28	8.32	8.32	8.39	8.30	8.33	8.28
7	8.26	8.38	8.50	8.43	8.34	8.29	8.25	8.30	8.26	8.42	8.34	8.27
8	8.25	8.34	8.37	8.36	8.31	8.30	8.34	8.22	8.31	8.28	8.36	8.26
9	8.26	8.33	8.36	8.26	8.29	8.29	8.31	8.19	8.38	8.24	8.40	8.25
10	8.26	8.36	8.29	8.16	8.29	8.27	8.34	8.22	8.40	8.33	8.37	8.24
11	8.24	8.37	8.33	8.11	8.26	8.30	8.41	8.30	8.35	8.45	8.31	8.29
12	8.24	8.37	8.38	8.17	8.32	8.32	8.41	8.30	8.27	8.38	8.33	8.30
13	8.23	8.37	8.43	8.24	8.37	8.32	8.37	8.36	8.24	8.26	8.35	8.30
14	8.22	8.38	8.42	8.31	8.35	8.30	8.29	8.30	8.27	8.34	8.37	8.29
15	8.23	8.38	8.27	8.35	8.30	8.27	8.29	8.28	8.32	8.43	8.35	8.29
16	8.25	8.38	8.24	8.31	8.26	8.28	8.35	8.37	8.36	8.30	8.31	8.29
17	8.24	8.38	8.28	8.28	8.23	8.29	8.37	8.42	8.32	8.40	8.26	8.27
18	8.23	8.39	8.32	8.24	8.25	8.32	8.38	8.40	8.35	8.43	8.26	8.29
19	8.22	8.39	8.36	8.24	8.28	8.26	8.36	8.35	8.37	8.34	8.26	8.30
20	8.22	8.37	8.39	8.26	8.27	8.27	8.33	8.31	8.38	8.28	8.27	8.31
21	8.22	8.35	8.41	8.31	8.25	8.30	8.30	8.32	8.38	8.33	8.37	8.32
22	8.26	8.33	8.37	8.35	8.28	8.32	8.27	8.33	8.36	8.37	8.37	8.37
23	8.37	8.32	8.30	8.31	8.29	8.25	8.27	8.36	8.29	8.35	8.37	8.36
24	8.35	8.33	8.27	8.25	8.30	8.30	8.29	8.35	8.35	8.41	8.37	8.35
25	8.34	8.39	8.29	8.27	8.31	8.39	8.35	8.28	8.34	8.42	8.36	8.35
26	8.38	8.43	8.27	8.32	8.31	8.38	8.31	8.28	8.33	8.38	8.34	8.34
27	8.36	8.37	8.31	8.38	8.31	8.32	8.25	8.28	8.31	8.32	8.32	8.33
28	8.33	8.33	8.35	8.32	8.28	8.25	8.27	8.28	8.27	8.28	8.30	8.33
29	8.32	8.34	8.36	8.24	---	8.23	8.32	8.27	8.31	8.29	8.29	8.32
30	8.36	8.33	8.35	8.23	---	8.33	8.31	8.26	8.38	8.34	8.28	8.32
31	8.32	---	8.32	8.33	---	8.36	---	8.27	---	8.39	8.28	---
Mean	8.27	8.37	8.36	8.28	8.30	8.29	8.32	8.30	8.33	8.35	8.33	8.31
Max	8.38	8.46	8.53	8.43	8.38	8.39	8.41	8.42	8.40	8.45	8.40	8.37
Min	8.18	8.30	8.24	8.11	8.23	8.23	8.22	8.19	8.24	8.24	8.26	8.24



Stage hydrograph for Wind Lake, 1985-2010.

424915088083900 WIND LAKE AT WIND LAKE, WI

LOCATION.--Lat 42°49'15", long 88°08'39", in NW ¼ SW ¼ sec.9, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

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 17 TO AUGUST 30, 2010
(Milligrams per liter unless otherwise indicated)

Parameter Code	Parameter Name	February 17		April 7		June 25		July 29		August 30	
32210	Chlorophyll a (µg/L)	--	--	8.5	--	9.88	--	17.9	--	12	--
00078	Secchi-depth (m)	--	--	2.65	--	2.4	--	1.25	--	1.35	--
00098	Sampling depth (m)	0.5	14	0.5	15	0.5	16	0.5	14	0.5	15
00010	Water Temperature (°C)	1.2	3	11	9.3	25.1	12.8	26.9	13.2	25	13.1
00400	pH (standard units)	8.7	7	8.2	7.9	8.4	7.2	8.2	7.4	8.2	7
00095	Specific conductance (µS/cm)	697	923	709	729	616	689	519	695	491	710
00300	Dissolved oxygen	11	3.7	10.6	10.2	7.8	0.3	7.5	0.2	8.5	0.2
00665	Phosphorus, total (as P)	0.048	0.131	0.021	--	0.031	0.199	0.070	0.331	0.033	--
00671	Orthophosphate, dissolved (as P)	--	--	<.002	--	--	--	0.021	--	--	--
00631	Nitrate plus nitrite, dissolved (as N)	--	--	0.037	--	--	--	0.033	--	--	--
00608	Ammonia, dissolved (as N)	--	--	0.029	--	--	--	0.021	--	--	--
00623	Ammonia plus organic nitrogen, dissolved (as N)	--	--	--	--	--	--	0.85	--	--	--
00625	Ammonia plus organic nitrogen, total (as N)	--	--	0.83	--	--	--	--	--	--	--
00600	Total nitrogen	--	--	0.87	--	--	--	--	--	--	--
63675	Turbidity, (NTU)	--	--	<1.0	--	--	--	--	--	--	--
00081	Apparent color, (PTU)	--	--	30	--	--	--	--	--	--	--
00900	Hardness (as CaCO3)	--	--	221	--	--	--	--	--	--	--
00915	Calcium, dissolved (Ca)	--	--	46.4	--	--	--	--	--	--	--
00925	Magnesium, dissolved (Mg)	--	--	25.6	--	--	--	--	--	--	--
00930	Sodium, dissolved (Na)	--	--	55.2	--	--	--	--	--	--	--
00935	Potassium, dissolved (K)	--	--	2.5	--	--	--	--	--	--	--
00417	ANC (as CaCO3)	--	--	167	--	--	--	--	--	--	--
00940	Chloride, dissolved (Cl)	--	--	107	--	--	--	--	--	--	--
00945	Sulfate, dissolved (SO4)	--	--	32.3	--	--	--	--	--	--	--
00955	Silica, dissolved (SiO2)	--	--	0.335	--	--	--	--	--	--	--
01046	Iron (µg/L)	--	--	<100	--	--	--	--	--	--	--
01056	Manganese (µg/L)	--	--	3.1	--	--	--	--	--	--	--
70300	Solids, dissolved (at 180 °C)	--	--	406	--	--	--	--	--	--	--

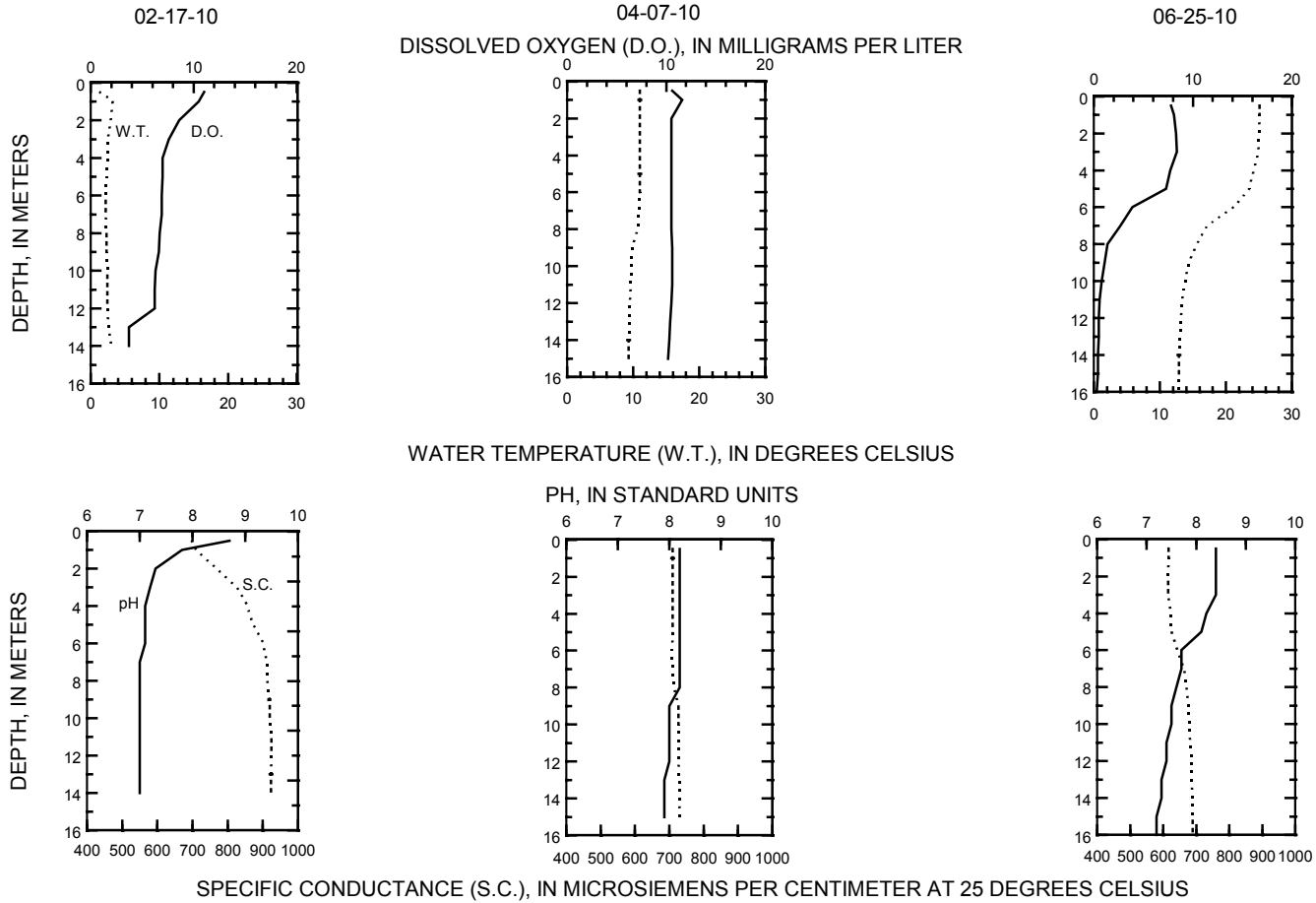
424915088083900 WIND LAKE AT WIND LAKE, WI

WATER-QUALITY DATA, SEPTEMBER 2, 2010
(Milligrams per liter unless otherwise indicated)

<u>Parameter Code</u>	<u>Parameter Name</u>	<u>September 2</u>				
32210	Chlorophyll a (µg/L)			16.9		
00078	Secchi-depth (m)			1.6		
00098	Sampling depth (m)	0.5	7	12	13.5	15
00010	Water Temperature (°C)	25.2	23.1	13.6	13.3	13.1
00400	pH (standard units)	8.2	7.5	7.1	7.1	7
00095	Specific conductance (µS/cm)	497	530	702	705	710
00300	Dissolved oxygen	7.6	0.6	0.2	0.2	0.2
00665	Phosphorus, total (as P)	0.035	0.093	0.439	0.426	0.445

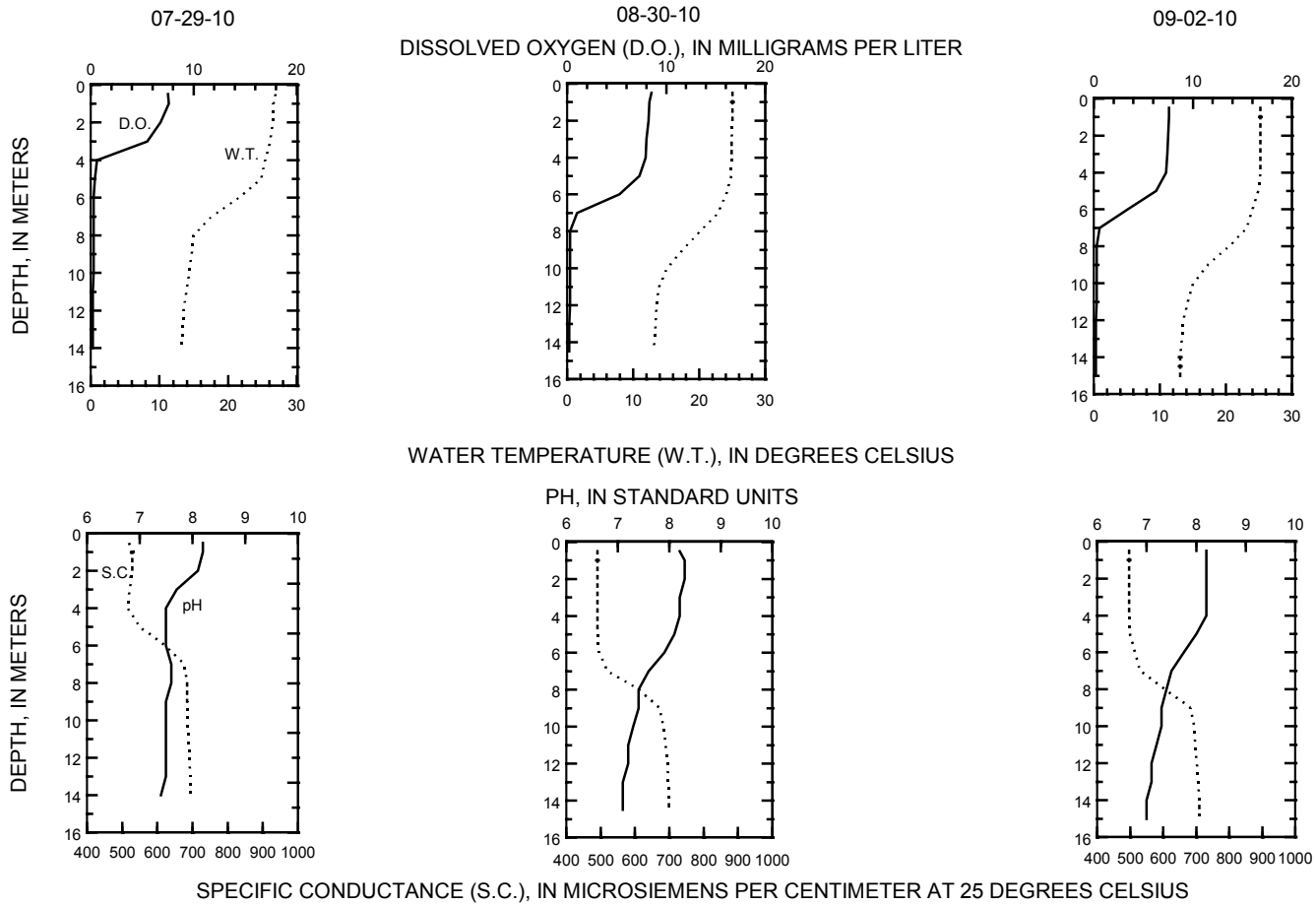
424915088083900 WIND LAKE AT WIND LAKE, WI

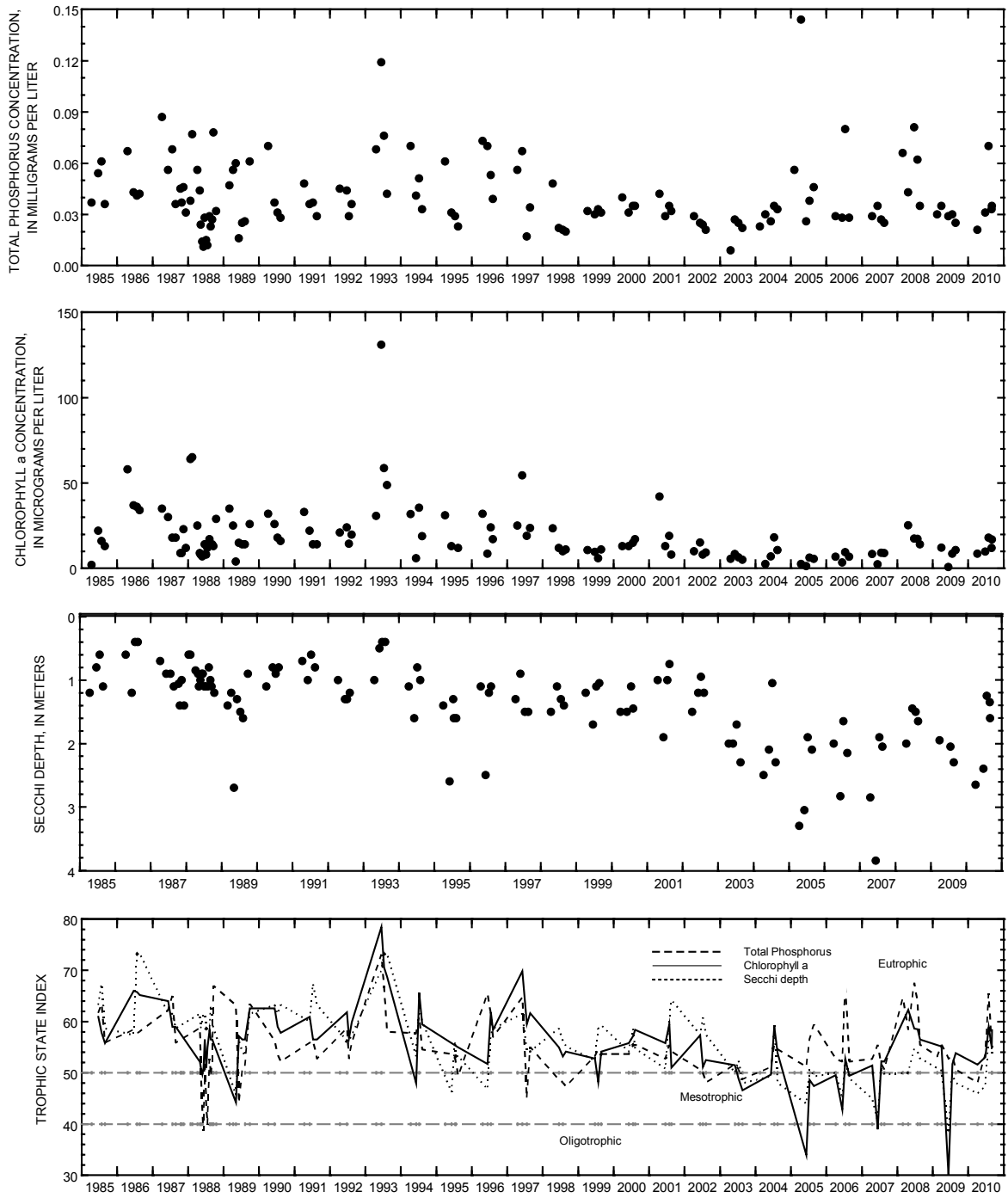
LAKE-DEPTH PROFILES, FEBRUARY 17 TO JUNE 25, 2010



424915088083900 WIND LAKE AT WIND LAKE, WI

LAKE-DEPTH PROFILES, JULY 29 TO SEPTEMBER 2, 2009





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

04082500 LAKE WINNEBAGO AT OSHKOSH, WI

LOCATION.--Lat 44°00'35", long 88°31'38" referenced to North American Datum of 1927, in NE ¼ NE ¼ sec.25, T.18 N., R.16 E., Winnebago County, WI, Hydrologic Unit 04030203, 800 ft east of mouth of the upper Fox River.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 mi².

PERIOD OF RECORD.--October 1938 to current year in reports of Geological Survey. Records from July 1882 to September 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 RECORDS.--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).

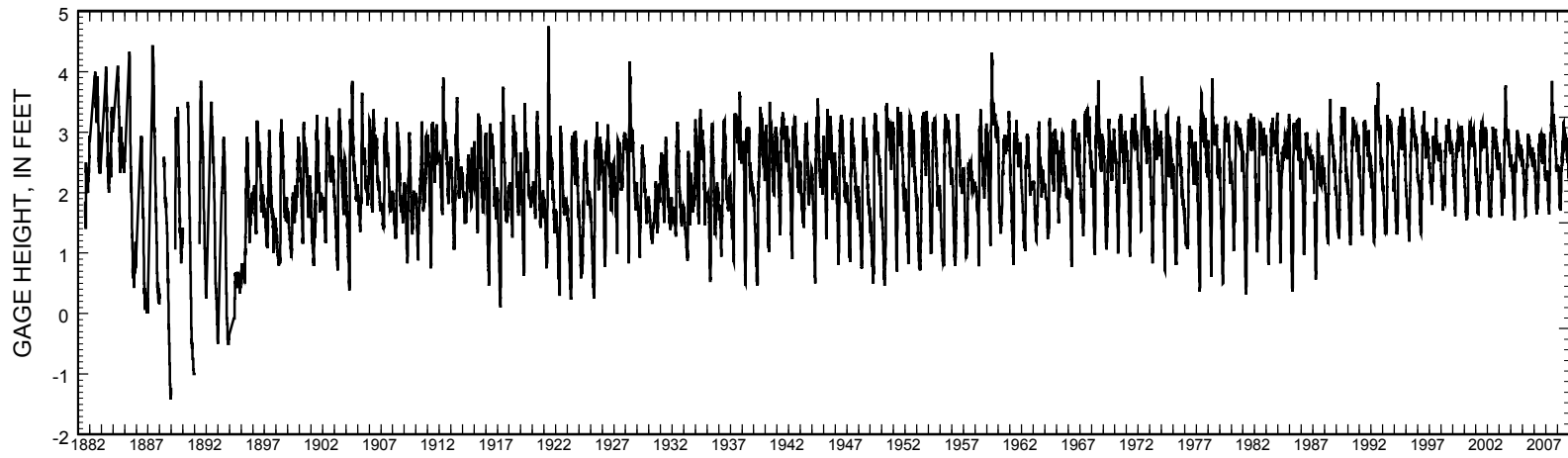
REMARKS.--Lake elevations controlled by dams at Menasha and Neenah, which are operated in the interest of navigation. Crests of both dams are at elevation 746.73 ft. Present limits of regulation are from 21 ¼ in. above the crest of Menasha to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 4.32 ft, Mar. 9, 1982; Minimum observed, 0.33 ft, May 17, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.58 ft, July 25; Minimum recorded, 1.68 ft, Mar. 5-9.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.66	2.57	2.26	2.23	1.88	1.71	2.23	2.82	3.11	3.14	3.35	3.18
2	2.60	2.51	2.24	2.22	1.88	1.70	2.26	2.87	3.13	3.12	3.28	3.17
3	2.59	2.52	2.24	2.20	1.88	1.70	2.27	2.87	3.12	3.13	3.27	3.08
4	2.59	2.49	2.20	2.18	1.87	1.69	2.33	2.89	3.12	3.12	3.26	3.09
5	2.60	2.47	2.20	2.16	1.86	1.69	2.36	2.78	3.15	3.16	3.21	3.06
6	2.56	2.45	2.20	2.14	1.85	1.68	2.45	2.88	3.18	3.20	3.23	3.01
7	2.60	2.40	2.19	2.12	1.84	1.68	2.60	2.86	3.18	3.21	3.26	2.86
8	2.61	2.41	2.23	2.12	1.83	1.68	2.58	2.79	3.18	3.20	3.31	2.98
9	2.61	2.38	2.22	2.09	1.83	1.68	2.63	2.82	3.08	3.18	3.36	2.98
10	2.56	2.38	2.15	2.07	1.83	1.70	2.62	2.79	3.16	3.15	3.35	2.98
11	2.57	2.37	2.21	2.04	1.82	1.74	2.65	2.81	3.15	3.12	3.33	2.96
12	2.56	2.36	2.21	2.03	1.81	1.82	2.65	2.72	3.14	3.13	3.31	2.99
13	2.55	2.33	2.21	2.02	1.80	1.85	2.65	2.74	3.13	3.10	3.23	3.01
14	2.57	2.31	2.21	2.01	1.78	1.88	2.61	2.73	3.11	3.11	3.18	3.03
15	2.56	2.32	2.23	2.00	1.76	1.92	2.62	2.83	3.12	3.31	3.09	3.03
16	2.54	2.33	2.24	1.99	1.75	1.94	2.65	2.84	3.17	3.37	3.03	2.99
17	2.53	2.34	2.24	1.97	1.74	1.97	2.71	2.85	3.17	3.39	3.01	2.98
18	2.52	2.30	2.24	1.96	1.74	2.00	2.70	2.86	3.10	3.41	3.00	2.96
19	2.50	2.29	2.24	1.95	1.73	2.02	2.69	2.88	3.05	3.42	3.03	2.96
20	2.52	2.31	2.25	1.94	1.73	2.05	2.69	2.90	3.05	3.42	3.04	2.95
21	2.53	2.32	2.25	1.92	1.72	2.06	2.72	2.93	2.99	3.37	3.11	2.90
22	2.58	2.31	2.25	1.90	1.72	2.07	2.69	2.95	2.97	3.42	3.14	2.95
23	2.57	2.31	2.24	1.89	1.72	2.09	2.69	2.97	3.01	3.45	3.16	2.94
24	2.52	2.30	2.24	1.91	1.72	2.10	2.72	3.00	3.04	3.55	3.15	2.83
25	2.55	2.31	2.28	1.92	1.72	2.11	2.92	3.01	3.03	3.58	3.16	2.95
26	2.54	2.31	2.30	1.92	1.72	2.11	2.86	3.04	3.06	3.55	3.18	2.90
27	2.55	2.34	2.30	1.92	1.72	2.12	2.89	3.09	3.13	3.51	3.16	2.85
28	2.54	2.30	2.30	1.91	1.71	2.14	2.85	3.10	3.18	3.48	3.16	2.83
29	2.54	2.28	2.28	1.91	---	2.16	2.82	3.10	3.17	3.48	3.16	2.80
30	2.52	2.25	2.26	1.90	---	2.18	2.77	3.10	3.17	3.44	3.16	2.79
31	2.49	---	2.25	1.89	---	2.18	---	3.12	---	3.39	3.16	---
Mean	2.56	2.36	2.24	2.01	1.78	1.92	2.63	2.90	3.11	3.31	3.19	2.97
Max	2.66	2.57	2.30	2.23	1.88	2.18	2.92	3.12	3.18	3.58	3.36	3.18
Min	2.49	2.25	2.15	1.89	1.71	1.68	2.23	2.72	2.97	3.10	3.00	2.79



Stage hydrograph for Lake Winnebago at Oshkosh, WI, 1882-2010.

04084255 LAKE WINNEBAGO NEAR STOCKBRIDGE, WI

LOCATION.--Lat 44°04'14", long 88°19'44" referenced to North American Datum of 1983, Calumet County, WI, Hydrologic Unit 04030203, Stockbridge Indian Reservation, on east shore of Lake Winnebago, 300 ft south of County Highway E and 1.6 mi west of Stockbridge.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 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.--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 ¼ in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily mean gage height, 3.85 ft, July 9, 11, 1993, June 14, 2008; minimum observed, 0.30 ft, Mar. 1, 1986.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.48 ft, July 24, 25, 26; minimum recorded, 1.53 ft, Mar. 6, 7, 8, 9.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.45	2.45	2.14	2.12	1.76	1.58	2.11	2.77	3.03	3.05	3.24	3.11
2	2.43	2.44	2.10	2.11	1.76	1.58	2.16	2.77	2.97	3.07	3.23	3.09
3	2.51	2.44	2.12	2.08	1.76	1.57	2.22	2.82	3.00	3.07	3.18	3.18
4	2.56	2.38	2.21	2.06	1.74	1.57	2.25	2.77	3.02	3.10	3.17	3.09
5	2.50	2.39	2.14	2.05	1.74	1.56	2.26	2.88	3.05	3.10	3.18	2.96
6	2.52	2.31	2.06	2.02	1.73	1.55	2.25	2.76	3.10	3.14	3.17	2.90
7	2.59	2.30	2.04	2.01	1.71	1.55	2.33	2.62	3.05	3.12	3.20	3.03
8	2.52	2.28	2.01	2.00	1.70	1.55	2.45	2.72	3.02	3.13	3.27	2.90
9	2.48	2.26	2.05	1.98	1.71	1.55	2.54	2.71	3.09	3.10	3.27	2.84
10	2.55	2.25	2.19	1.94	1.72	1.58	2.54	2.62	3.04	3.06	3.23	2.80
11	2.49	2.24	2.10	1.93	1.70	1.63	2.53	2.44	3.00	3.07	3.21	2.86
12	2.43	2.23	2.08	1.91	1.68	1.69	2.51	2.52	3.00	3.01	3.20	2.92
13	2.43	2.20	2.09	1.90	1.67	1.74	2.45	2.60	2.99	2.94	3.14	2.93
14	2.38	2.20	2.11	1.89	1.66	1.78	2.48	2.73	2.95	2.95	3.08	2.90
15	2.36	2.22	2.13	1.88	1.65	1.81	2.56	2.70	2.97	3.28	3.09	2.86
16	2.39	2.17	2.12	1.86	1.65	1.83	2.59	2.70	3.09	3.38	3.03	2.83
17	2.41	2.11	2.12	1.85	1.63	1.86	2.59	2.69	3.05	3.33	2.93	2.89
18	2.42	2.13	2.13	1.84	1.62	1.89	2.56	2.72	3.02	3.32	2.92	2.86
19	2.41	2.20	2.13	1.82	1.61	1.91	2.55	2.77	3.01	3.32	2.91	2.84
20	2.36	2.21	2.13	1.81	1.60	1.94	2.57	2.79	2.92	3.30	2.93	2.80
21	2.37	2.19	2.13	1.80	1.60	1.95	2.53	2.79	2.85	3.29	3.01	2.83
22	2.33	2.17	2.13	1.78	1.60	1.97	2.53	2.84	2.87	3.27	3.03	2.80
23	2.33	2.16	2.12	1.76	1.60	1.98	2.54	2.86	2.93	3.40	3.05	2.84
24	2.49	2.16	2.13	1.78	1.61	1.99	2.53	2.88	2.97	3.48	3.08	3.04
25	2.42	2.19	2.17	1.79	1.60	1.99	2.50	2.89	2.95	3.48	3.09	2.85
26	2.42	2.25	2.18	1.81	1.60	1.99	2.67	2.92	2.94	3.48	3.08	2.75
27	2.43	2.23	2.18	1.80	1.59	2.00	2.67	2.96	3.05	3.45	3.10	2.73
28	2.40	2.18	2.19	1.80	1.58	2.01	2.69	2.96	3.11	3.43	3.09	2.70
29	2.39	2.16	2.16	1.79	---	2.03	2.64	2.97	3.06	3.39	3.07	2.70
30	2.51	2.23	2.14	1.78	---	2.05	2.66	2.99	3.04	3.35	3.08	2.69
31	2.60	---	2.14	1.78	---	2.07	---	3.01	---	3.27	3.09	---
Mean	2.45	2.24	2.12	1.89	1.66	1.80	2.48	2.78	3.00	3.23	3.11	2.88
Max	2.60	2.45	2.21	2.12	1.76	2.07	2.69	3.01	3.11	3.48	3.27	3.18
Min	2.33	2.11	2.01	1.76	1.58	1.55	2.11	2.44	2.85	2.94	2.91	2.69

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APPENDIX

Wisconsin Lakes Team Quality-Assurance Plan

Most lake studies and monitoring programs that are conducted by the USGS Wisconsin Water Science Center entail water sampling and analysis to determine water quality and biological productivity. Because all sampling and analysis is subject to error and random variability, a certain proportion of the sampling effort should include quality-assurance samples. Sampling by the USGS was done by the Lake Studies Team of the USGS Wisconsin Water Science Center. This team implements a quality-assurance plan each year that involves collecting three types of samples from a subset of the lakes studied each year, which include blanks, replicates, and spikes (U.S. Geological Survey, Wisconsin Water Science Center Lake Studies Team). These samples are collected and/or prepared solely for the purpose of assessing the magnitude of error and random variability so that the accuracy and precision of all data can be evaluated. The plan for this quality-assurance sampling is described below.

Three types of QA/QC samples are collected:

blanks

Provide information about accuracy and errors due to treatment or reagents

replicates

provide information about precision (variability)

standard additions (spikes)

provide information about accuracy and matrix interferences

Blank Sampling

B1. A **preservation blank** consists of deionized water or inorganic blank water, to which is added any reagents or preservatives that are normally added to natural water samples. The blank is not taken to the field, but is shipped to the laboratory for analysis along with the natural water samples.

This blank sample is analyzed for the Nutrient Group¹ and chlorophyll-a.

B2. A **field blank** consists of deionized water or inorganic blank water treated exactly the same as regular samples. During winter, the field blank is analyzed for total phosphorus (TP) only; during summer, it is analyzed for TP and chlorophyll-a, and in the spring it is analyzed for the Nutrient Group and chlorophyll-a.

¹Nutrient Group = all phosphorus and nitrogen species that are commonly determined in lakes (total phosphorus, nitrate + nitrite, ammonia, total Kjeldahl nitrogen, total nitrogen)

Replicate Sampling

Triplicate samples are taken near water surface in summer for analysis of total phosphorus and chlorophyll-a. For a portion of the sites where surface triplicates are collected, a set of triplicate samples is also taken from near-bottom water, for analysis of total phosphorus.

Triplicate samples collected in the spring are taken near the water surface for analysis of the Nutrient Group.

Standard Addition Testing

Replicate samples are collected for a **standard addition (spike) test**, which consists of an addition of a prepared phosphorus solution (standard) of known volume and concentration, such that the expected result of analysis is the natural water TP concentration plus the known addition. One sample from each set will receive no spike (the mean of these gives the natural water TP concentration).

Data and results of replicate sampling and field blank testing in water year 2008 are shown in Table A1.

Table A1. Analyses of replicate samples from Wisconsin lakes in water years 2006-2010. See text for procedures used. Phosphorus data in milligrams per liter; chlorophyll data in micrograms per liter. Symbol "<" indicates less than given detection limit (DL); mean and standard deviation not calculated for datasets containing values less than DL.

Parameter	Lake	Date	Replicate Data				Mean	Standard Deviation	Percent Standard Deviation
Total Phosphorus	Big Cedar	8/30/06	0.035	0.034	0.032		0.034	0.002	4.5
	Delavan	6/13/06	0.062	0.045			0.054	0.012	22.5
	Delavan	8/15/06	0.030	0.028	0.029	0.026	0.028	0.002	6.0
	Beulah	8/30/07	0.017	0.015			0.016	0.001	8.8
	Delavan	4/16/07	0.040	0.038			0.039	0.001	3.6
	Spring	9/6/07	0.008	0.007			0.008	0.001	9.4
	Beulah	3/4/08	0.010	0.011			0.011	0.001	6.7
	Beulah	8/26/08	0.011	0.012			0.012	0.001	6.1
	Beulah	2/23/09	0.013	0.013			0.013	0.000	0.0
	Beulah	8/24/09	0.017	0.017			0.017	0.000	0.0
	Delavan	9/15/09	0.035	0.031	0.031		0.032	0.002	7.1
	Beulah	8/19/10	0.015	0.016			0.016	0.001	4.6
Total Phosphorus, near bottom	Big Cedar, South	8/24/10	0.015	0.014			0.015	0.001	4.9
	Powers	8/30/10	0.021	0.022			0.022	0.001	3.3
	Wind	7/10/06	0.380	0.378	0.394		0.384	0.009	2.3
Dissolved Phosphorus	Beulah	8/30/07	<0.002	<0.002					
	Beulah	3/4/08	0.001	0.003			0.002	0.001	70.7
	Beulah	8/26/08	<0.002	<0.002					
	Beulah	2/23/09	<0.002	<0.002					
	Beulah	8/24/09	<0.002	<0.002					
	Beulah	8/19/10	<0.002	<0.002					
Dissolved Ammonia	Beulah	8/30/07	0.170	0.190			0.180	0.014	7.9
	Beulah	3/4/08	0.083	0.046			0.065	0.026	40.6
	Beulah	8/26/08	<0.015	<0.015					
	Beulah	2/23/09	0.211	0.204			0.208	0.005	2.4
	Beulah	8/24/09	0.032	0.035			0.034	0.002	6.3
Total Kjeldahl Nitrogen	Beulah	8/30/07	0.510	0.420			0.465	0.064	13.7
	Beulah	3/4/08	0.570	0.450			0.510	0.085	16.6
	Beulah	8/26/08	0.530	0.580			0.555	0.035	6.4
	Beulah	2/23/09	0.660	0.690			0.675	0.021	3.1
	Beulah	8/24/09	0.160	0.530			0.345	0.262	75.8
	Beulah	8/19/10	0.580	0.680			0.63	0.071	11.2
Dissolved Nitrate plus Nitrite	Beulah	8/30/07	<0.019	<0.019					
	Beulah	3/4/08	0.675	0.670			0.673	0.004	0.5
	Beulah	8/26/08	<0.019	<0.019					
	Beulah	2/23/09	0.673	0.721			0.697	0.034	4.9
	Beulah	8/24/09	0.074	0.073			0.074	0.001	1.0
Chlorophyll-a (micrograms per liter)	Beulah	8/19/10	0.022	0.022			0.022	0.000	0.0
	Big Cedar, South	8/29/06	8.02	7.56	8.20		7.93	0.33	4.16
	Beulah	8/30/07	4.05	3.78			3.92	0.19	4.88
	Spring	9/6/07	2.47	2.79			2.63	0.23	8.60
	Beulah	8/26/08	6.97	7.45			7.21	0.34	4.71
	Beulah	2/23/09	0.55	0.55			0.55	0.00	0.0
	Beulah	8/24/09	2.66	2.90			2.78	0.17	6.1
	Delavan	9/15/09	10.80	10.10	9.8		10.23	0.51	5.0
Beulah	8/19/10	5.35	5.56			5.46	0.15	2.72	
Big Cedar, South	8/24/10	3.93	3.9			3.92	0.02	0.54	

Table A1. -- continued									
Parameter	Lake	Date	Replicate Data				Mean	Standard Deviation	Percent Standard Deviation
Turbidity, NTU	Beulah	8/30/07	<1.0	<1.0					
	Beulah	3/4/08	<1.0	<1.0					
	Beulah	8/26/08	<1.0	<1.0					
	Beulah	2/23/09	<1.0	<1.0					
	Beulah	8/24/09	<1.0	<1.0					
Beulah	8/19/10	<1.0	<1.0						
Dissolved Calcium	Beulah	8/30/07	42.8	41			41.9	1.273	3.0
	Beulah	3/4/08	62.8	62.5			62.65	0.212	0.3
	Beulah	8/26/08	47.9	47.6			47.75	0.212	0.4
	Beulah	2/23/09	63	63.8			63.4	0.566	0.9
	Beulah	8/24/09	41.7	41.9			41.8	0.141	0.3
Beulah	8/19/10	47	47.3			47.15	0.212	0.4	
Diss. Magnesium	Beulah	8/30/07	32.7	31.2			31.95	1.061	3.3
	Beulah	3/4/08	35.6	35.5			35.55	0.071	0.2
	Beulah	8/26/08	32.8	32.5			32.65	0.212	0.6
	Beulah	2/23/09	34.7	35.1			34.9	0.283	0.8
	Beulah	8/24/09	31.2	31.3			31.25	0.071	0.2
Beulah	8/19/10	34.1	33.8			33.95	0.212	0.6	
Diss. Potassium	Beulah	8/30/07	1.5	1.4			1.45	0.071	4.9
	Beulah	3/4/08	1.8	1.9			1.85	0.071	3.8
	Beulah	8/26/08	1.4	1.4			1.4	0.000	0.0
	Beulah	2/23/09	1.7	1.7			1.7	0.000	0.0
	Beulah	8/24/09	1.4	1.4			1.4	0.000	0.0
Beulah	8/19/10	1.4	1.5			1.45	0.071	4.9	
Dissolved Sodium	Beulah	8/30/07	8.8	8.5			8.65	0.212	2.5
	Beulah	3/4/08	9.9	10			9.95	0.071	0.7
	Beulah	8/26/08	9	8.9			8.95	0.071	0.8
	Beulah	2/23/09	9.7	9.8			9.75	0.071	0.7
	Beulah	8/24/09	8.6	8.7			8.65	0.071	0.8
Beulah	8/19/10	10.4	11.4			10.9	0.707	6.5	
ANCas CaCO3	Beulah	8/30/07	192	193			192.5	0.707	0.4
	Spring	9/6/07	6.6	6.4			6.5	0.141	2.2
	Beulah	3/4/08	245	244			244.5	0.707	0.3
	Beulah	8/26/08	219	218			218.5	0.707	0.3
	Beulah	2/23/09	258	256			257	1.414	0.6
Beulah	8/24/09	209	209			209	0.000	0.0	
Beulah	8/19/10	208	207			207.5	0.707	0.3	
Diss. Chloride	Beulah	8/30/07	20.3	20.4			20.35	0.071	0.3
	Beulah	3/4/08	23.5	23.7			23.6	0.141	0.6
	Beulah	8/26/08	21	20.9			20.95	0.071	0.3
	Beulah	2/23/09	23	22.9			22.95	0.071	0.3
	Beulah	8/24/09	21.6	21.4			21.5	0.141	0.7
Beulah	8/19/10	21.6	21.5			21.55	0.071	0.3	
Dissolved Silica	Beulah	8/30/07	15.2	15.3			15.25	0.071	0.5
	Spring	9/6/07	0.105	0.111			0.108	0.004	3.9
	Beulah	3/4/08	15.3	15.2			15.25	0.071	0.5
	Beulah	8/26/08	10.3	10.3			10.3	0.000	0.0
	Beulah	2/23/09	14.8	15			14.9	0.141	0.9
	Beulah	8/24/09	11.3	11.3			11.3	0.000	0.0
Beulah	8/19/10	18.1	18.1			18.1	0.000	0.0	
Dissolved Sulfate	Beulah	8/30/07	26.1	26.2			26.15	0.071	0.3
	Beulah	3/4/08	29.5	29.5			29.5	0.000	0.0
	Beulah	8/26/08	26.3	26.3			26.3	0.000	0.0
	Beulah	2/23/09	30.5	30.8			30.65	0.212	0.7
	Beulah	8/24/09	27.7	27.8			27.75	0.071	0.3
Beulah	8/19/10	25.9	25.8			25.85	0.071	0.3	

Table A1. – continued									
Parameter	Lake	Date	Replicate Data				Mean	Standard Deviation	Percent Standard Deviation
Dissolved Iron	Beulah	8/30/07	<100	<100					
	Beulah	3/4/08	<100	<100					
	Beulah	8/26/08	<100	<100					
	Beulah	2/23/09	<100	<100					
	Beulah	8/24/09	<100	<100					
	Beulah	8/19/10	<100	<100					
Diss. Manganese	Beulah	8/30/07	<0.5	<0.5					
	Beulah	8/26/08	<0.5	<0.5					
	Beulah	2/23/09	<1.0	<1.0					
	Beulah	8/24/09	<1.0	<1.0					
Dissolved Solids	Beulah	8/26/08	302	298			300	2.83	0.9
	Beulah	2/23/09	350	346			348	2.83	0.8
	Beulah	8/24/09	312	312			312	0.00	0.0
	Beulah	8/19/10	284	286			285	1.41	0.5

Table A2. Data from tests of blanks, 2006-2010. All data in milligrams per liter, unless otherwise indicated.
 < = less than given detection limit; E = estimated value.

Delavan Lake. Analyses at USGS National Water Quality Laboratory, Lakewood, CO.

Parameter	4/7/06	6/13/06	8/14/06	4/16/07	9/14/09
Total P	< 0.004	E 0.002	< 0.004	<0.004	<0.008
Dissolved orthophosphate	<0.006	<0.006	E0.003	<0.006	<0.008
Chlorophyll a	< 0.0260		< 0.0260	<0.260	
Chlorophyll b					
Total Kjeldahl Nitrogen (as N)					
Ammonia (as N)					
Nitrate + Nitrite (as N)					

Lake Beulah at Deep Hole near East Troy, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07	2/27/08	8/26/08	2/22/09	8/20/09	8/19/10
Total P	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dissolved orthophosphate	0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Total Kjeldahl	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Dissolved Ammonia	<0.15	<0.015	<0.015	<0.015	<0.015	0.015
Dissolved Nitrate plus Nitrite	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
Chlorophyll a (ug/L)	<0.260	---	<0.260	<0.260	<0.260	<0.260
Dissolved Calcium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Magnesium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Potassium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Sodium	0.200	<0.10	<0.10	<0.10	<0.10	<0.10
ANC as CaCO3	<2	3	<2	<2	<2	<2
Dissolved Chloride	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
Dissolved Silica	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022
Dissolved Sulfate	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
Dissolved Iron	<100	<100	<100	<100	<100	<100
Dissolved Manganese	<0.5	<0.5	<100	<1.0	<1.0	<1.0
Dissolved Solids	---	---	<50	<50	<50	<50
Turbidity, NTU	---	<1.0	<1.0		<1.0	<1.0

Mercer Lake at Main Deep Hole at Mercer, WI, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/27/10
Total P	< 0.005

Rolling Stone Lake near Pickerel, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07
Total P	<0.005
Chlorophyll a (ug/L)	<0.260
ANC as CaCO3	2
Dissolved Silica	<0.022

Wind Lake at Wind Lake, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	6/13/06	8/30/10
Total P	< 0.005	< 0.005
Chlorophyll a (ug/L)	<0.260	

Silver Lake near West Bend, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/31/09
Total P	< 0.005
Chlorophyll a (ug/L)	<0.260



Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 2011

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FIGURE

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

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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) 12

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
meter (m)	3.281	foot
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 either 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— or the North American Vertical Datum of 1988 (NAVD 88).

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 (mmho/cm) at 25 degrees Celsius, formerly used by the U.S. Geological Survey.

WATER-QUALITY AND LAKE-STAGE DATA FOR WISCONSIN LAKES, WATER YEAR 2011

By Wisconsin Water Science Center 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 locations of water-quality and lake-stage stations in Wisconsin for water year 2011 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, 2010 through September 30, 2011 is called "water year 2011."

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 included for all lakes. 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, 2011."

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 Water Science Center's home page is at <http://wi.water.usgs.gov/>. Information on the Wisconsin Water Science Center's Lakes Program is found at <http://wi.water.usgs.gov/lakes/index.html> and <http://wi.water.usgs.gov/projects/index.html>.



Figure 1. Location of USGS 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 2011 included:

Big Cedar Lake Protection and Rehabilitation District

Dane County

Geneva Lake Environmental Agency

Green Lake Sanitary District

Lake Beulah Management District

Middle Genesee Lake District

Powers Lake District

Rock County Public Works Department

U.S. Army Corps of Engineers

U.S. Environmental Protection Agency

Village of Oconomowoc Lake

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 2011 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: B.W. Olson (Rhineland), and S.A. March (Middleton). The data were collected and processed by D.E. Housner, S.B. Manteufel, D.L. Olson, P.C. Reneau, Z.T. Scott, B.J. Siebers and E.F. Younger. S.B. Manteufel assembled, edited, and formatted the report. Additional assistance in preparation of the report was provided by M.M. Greenwood, and D.L. Olson.

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
Balsam Lake near Birchwood	453907091345800	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
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
Benedict Lake near Powers Lake	423201088180800	May 1998–Aug. 2000
Big Blacksmith Lake near Keshena	445401088334500	Feb. 1990–Aug. 1992
Big Hills (Hills) Lake near Wild Rose	440912089092000	June 1983–Aug. 1984, Feb.–Aug. 1987, Feb.–Aug. 1990, Feb.–Aug. 1993, Feb.–Aug. 1996, Feb.–Aug. 1999
Big Muskego Lake, at North Site, near Muskego	425301088061300	Feb.–Aug. 1988
Research Base, near Muskego	425235088075300	May–June 1994
Big Round Lake near Milltown	453142092180100	Feb.–Sept. 2001
Big St. Germain Lake, near St. Germain	455557089311000	Feb. 1992–Aug. 1996
near Lake Tomahawk	05390750	1991–2001
Big Sand Lake, Deep Hole, near Hertel	454910092134000	Feb.–Sept. 2001
East Site, near Hertel	454921092124300	Feb.–Sept. 2001
Big Sissabagama Lake, near Stone Lake	454724091303600	Apr. 1986–Sept. 1996, Oct. 1997–Sept. 2002
North Site, near Stone Lake	454800091312900	Mar. 1998–Sept. 2001
Booth Lake near East Troy	424800088254800	Feb. 1992–Aug. 1994, Feb. 2001–Aug. 2003
Buffalo Lake, Center Site, at Packwaukee	434558089260600	May 1998–Sept. 2001
East End, at Montello	434720089201600	May 1998–Sept. 2001
West End, near Endeavor	434414089282400	May 1998–Sept. 2001

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Butternut Lake, near Park Falls	455854090310300	Oct. 2002–Oct. 2004
Deep Hole, near Park Falls	455803090310800	Mar. 2003–Sept. 2004
North Site, near Butternut	455904090303400	Mar. 2003–Sept. 2004
Far South Site, near Park Falls	455651090312700	Mar. 2003–Sept. 2004
Delavan Lake, Center, at Delavan	423556088365001	Oct. 1983–Oct. 2009
North end, near Lake Lawn	423659088354401	Oct. 1983–Oct. 2009
SW end, near Delavan	423526088380101	Oct. 1983–Oct. 2009
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
Eagle Spring Lake at Eagleville	425103088261500	Apr. 1991–Sept. 2001
Elizabeth Lake near Twin Lakes	423051088155300	Feb. 1995–Sept. 1997
Fish Lake near Sauk City	05406050	Nov. 1966–Sept. 1981, Apr. 1985–May 1987, May 1988, Apr. 1989– Oct. 1990, Oct. 1990– Nov. 1996, Nov. 1996– Sept. 2004
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
Geneva Lake, Geneva Bay, at Lake Geneva	423455088263800	Apr. 1997–Feb. 1999
Williams Bay, at Williams Bay	423420088320500	Apr. 1997–Feb. 1999
Center, near Lake Geneva	423402088301400	Apr. 1997–Mar. 1999
East End, near Lake Geneva	423421088272300	Apr. 1997–May 2000
Hemlock Lake near Mikana	453421091333700	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar.–Sept. 2001
Hooker Lake at Salem	423335088060300	Feb. 1992–Aug. 1993
Kawaguesaga, Deep Hole, near Minocqua	455208089435800	May–Sept. 2003
South Site, near Minocqua	455145089442600	May–Sept. 2003
Kirby Lake near Cumberland	453554092042101	Nov. 1995–Oct. 1996
(Site 1) near Cumberland	453608092035801	Nov. 1995–Nov. 1996
(Site 2) near Cumberland	453601092035301	Nov. 1995–Nov. 1996

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
(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 at Oconomowoc	430733088305900	Feb. 1984–Aug. 1985, Apr. –Aug. 1991, Feb. 2001–Aug. 2003
NW, at Oconomowoc	430809088313900	Feb. 1984–Aug. 1985
SE, at Oconomowoc	430707088301400	Feb. 1984–Aug. 1985
Lake Bastine, Deep Hole, near Mercer	460511090153800	Apr. 2009–Mar. 2010
Lake Blass at Lake Delton	433545089482400	Mar. 1989–Aug. 1990
Lake Desair near Rice Lake	453446091465100	Aug. 2004
Lake Keesus, East Bay, near Merton	430957088183400	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
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 Mill, at Lauderdale	424554088332700 424555088335700	Oct. 1993–Oct. 1994 Nov. 1993–Nov. 1994, Aug. 2002
Green, Auxiliary, Number 1, near Lauderdale	424640088341900	June 1999–Sept. 2000
Green, near Lauderdale	424652088341500	Nov. 1993–Nov. 1994, Aug. 2002
Legend Lake (site 1) near Shawano	445342088312700	Feb. 1990–Feb. 1992
Little Arbor Vitae near Woodruff	455446089370300	Feb. 1991–Sept. 2002
Little Green Lake, at Center, near Markesan	434412088590700	Feb. 1991–Aug. 2003
Little Muskego Lake at Muskego	425425088083500	Oct. 1986–Aug. 2002
Little Rock Lake near Woodruff	455946089415702	Oct. 1983–Sept. 1996
Little St. Germain Lake, near Eagle River	05390700	(a)
Upper East Bay, at St. Germain	455532089253900	Dec. 1996–Mar. 97, Mar. 1999, Mar. 2000–Aug. 2003

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Northeast Bay, near St. Germain	455545089262500	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
South Bay, near St. Germain	455437089270800	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
West Bay, at St. Germain	455428089282400	Apr. 1991–Aug. 1994, Aug. 1996–Aug. 1997, Mar. 1999–Aug. 2003
Little Sand Lake - Site No. 2 - near Mole Lake	452826088544101	May1996–Sept. 2003
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
Mercer Lake, Deep Hole, at Mercer	460937090033100	Mar. 2008–Sept. 2009
West basin, at Mercer	460945090040600	Mar. 2008–Sept. 2009
Minocqua Lake		
Deep Hole, at Minocqua	455214089412800	May–Sept. 2003
North Bay, at Minocqua	455232089424100	May–Sept. 2003
South Bay, at Minocqua	455206089425200	May–Sept. 2003
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
Muskego (Big Muskego)		
Auxiliary Number 1, near Muskego	425329088054000	June 1996–Aug. 2000
Bass Bay, near Muskego	425344008807010	Feb. 1988–Aug. 2002

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
near Wind Lake	425109088075000	Oct. 1987–Sept. 1989, Jan. 1991–Sept. 2002
South Site, near Muskego	425212088072800	Feb. 1988–Aug. 2002
Muskellunge Lake near Eagle River	455700089224900	June 2000–Aug. 2001
Muskellunge Lake, near Lake Outlet near Eagle River	455706089232400	Nov. 2000–Oct. 2001
Nagawicka Lake, at Deep Hole, at Delafield	430417088230300	Feb. 2003–Sept. 2004
Namekagon Lakes		
Garden, near Cable	461224091033200	Mar. 1998–Aug. 1999
Jackson, near Cable	461457091065900	Mar. 1998–Aug. 1999
Namekagon		
Deep Hole, near Cable	461308091065100	Mar. 1998–Aug. 1999
East Basin, near Cable	461228091044300	Mar. 1998–Aug. 1999
Northeast Basin, near Cable	461410091050700	Mar. 1998–Aug. 1999
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
Pike Lake near Hartford	431916088200501	Dec. 1998–Dec. 2000
Pike Lake-QW Site-near Hartford	431835088200600	Feb.–Aug. 2000
Potter Lake near Mukwonago	423246088175800	Feb. 1993–Sept. 2007
Pretty Lake, at Deep Hole, near Dousman	425722088295000	Feb. 1993–Aug. 1997
Puckaway Lake, West Basin, near Marquette	434515089124000	Apr. 2005–Sept. 2007
East Basin, near Marquette	43454208907300	Apr. 2005–Sept. 2007
River site, near Marquette	434824089083200	Apr. 2005–Sept. 2007
Red Cedar Lake, at Mikana	453522091360600	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Oct. 2000–Sept. 2001
Deep Hole, near Mikana	453725091345100	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
South End, at Mikana	453519091352500	Mar. 1993–Aug. 1994, Mar. 1996–Aug. 1997, Mar. –Sept. 2001
Rice Lake at Deep Hole near Whitewater	424629088415700	Apr.–Nov. 1991
Round Lake near Shawano	445328088335000	Feb. 1990–Aug. 1992
Sand Lake (Deep Hole) near Keshena	445321088323101	June–Aug. 1992

Table 1. Discontinued lake stations--continued

Station name	Site identification number	Period of record
Shell Lake at Shell Lake	05334000	Aug. 1936–Sept. 1999
Silver Lake near Oconomowoc	430436088293300	Apr. 1992–Aug. 1996
Silver Lake near West Bend	432322088125000	Feb. 1996–Aug. 1997 Feb. 2009–Aug. 2009
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
Spooner Lake, Deep Hole, near Spooner	455034091493300	June 2002–Aug. 2004
Southeast Site, near Spooner	454945091483900	June 2002–Aug. 2004
Stewart Lake at Mt. Horeb	430117089442701	May 1992–Sept. 1993
Tichigan Lake near Waterford	424854088123300	Mar. 1994–Aug. 1996, Apr. 2003–Aug. 2004
Tombeau Lake near Powers Lake	423153088184800	May 1998–Aug. 2000
Townline Lake near Mercer	460409090084100	Apr. 2009–Mar. 2010
Trude Lake, Deep Hole, near Mercer	460646090091900	Apr. 2009–Mar. 2010
Turtle-Flambeau Flowage, Deep Hole, near Mercer	460458090102700	Apr. 2009–Mar. 2010
SW Basin, near Mercer	460344090124800	Apr. 2009–Mar. 2010
Lake Bastine, Deep Hole, near Mercer	460511090153800	Apr. 2009–Mar. 2010
Townline Lake, near Mercer	460409090084100	Apr. 2009–Mar. 2010
Trude Lake, Deep Hole, near Mercer	460646090091900	Apr. 2009–Mar. 2010
Twin Lake, East Twin, near Westfield	435430089350700	June 2002–Aug. 2004
West Twin, near Westfield	435438089352300	June 2002–Aug. 2004

(a) Wisconsin Valley Improvement Co. currently collects stage data for this site.

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- μm (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, 2011". NWIS parameter codes and minimum laboratory reporting levels for chemical constituents are given in table 2. The parameter code for turbidity has changed from 00076 to 63675 or 63676 because the method of testing has changed.

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).

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		LRL	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. (SO4)	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. (SiO2)	mg/L	7631-86-9	00955	0.1	56	0.02	1899	0.008	I560LLD
Nitrogen, NO2+NO3, 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, amm.+org., total ⁴	mg/L	17778-88-0	00625	0.100	1985	--	--	0.2	I470BLT
Nitrogen, amm.+org.,diss.	mg/L	--	00623	--	--	--	--	--	I470DLD
Nitrogen, total ⁵	mg/L	--	00600	--	--	--	--	--	--
Nitrogen, dissolved	mg/L	--	00602	--	--	--	--	--	--
Phosphorus, total	mg/L	7723-14-0	00665	0.05	1984	0.004	2333	0.005	I520PLT
Phosphorus, ortho, diss.	mg/L	14265-44-2	00671	0.01	1262	0.002	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	--	--	--	--	0.26	I250UNF

- 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)

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).

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 a 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 Carlson's (1977) trophic state index (TSI). In previous USGS data reports, a modification of Carlson's trophic state index for Wisconsin lakes by Lillie and others (1993) had been used; however, this approach did not properly classify oligotrophic and highly eutrophic lakes and, therefore, was discontinued.

Lillie and Mason's (1983) water quality indices for Wisconsin lakes were developed based on summer measurements of total phosphorus and chlorophyll *a* concentrations, and Secchi depth from a random set of lakes in Wisconsin. These data were used to classify the lakes's 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

Carlson's (1977) 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 hypereutrophic.

Carlson's (1977) TSI values are also based on near-surface total phosphorus and chlorophyll *a* concentrations, and Secchi depths. The indices were developed to place these three characteristics on similar scales to allow comparison of different lakes. TSI values based on phosphorus concentrations (TSI_P), Secchi depths (TSI_{SD}), and chlorophyll *a* concentrations (TSI_C) typically are computed only for measurements collected during the open-water period.

TSI values for a lake can be calculated using the following equations (Carlson, 1977):

$$TSI_P = 4.15 + 14.42 \times (\ln [\text{total phosphorus concentration} \times 1,000])$$

$$TSI_{SD} = 60.0 - 14.41 \times (\ln \text{Secchi depth})$$

$$TSI_C = 30.6 + 9.81 \times (\ln \text{chlorophyll } a \text{ concentration})$$

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

The three main 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-----	-----0.024-----	-----2.0-----	-----7.2-----
Mesotrophic	-----40-----	-----0.012-----	-----4.0-----	-----2.6-----
Oligotrophic				

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LAKE DATA

Remarks codes and symbols used in the following tables:

[<, less than; >, greater than; --, not available; E, estimated]

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LOCATION.--Lat 42°48'40", long 88°24'16", in SW ¼ NW ¼ NW ¼ sec.17, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to August 2011.

REMARKS.--Lake sampled at the deep hole at a depth of 19 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, JUNE 11 TO AUGUST 10, 2011

(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Nitrate + nitrite water, fltrd, mg/L as N (00631)
JUN 2011													
21...	--	.50	23.7	507	8.4	9.8	3.50	<.005	<.002	1.1	.022	.52	.541
21...	2.90	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
10...	2.65	--	--	--	--	--	--	--	--	--	--	--	--
10...	--	2.0	26.7	497	8.4	8.0	4.45	.014	<.002	.63	.032	.56	.067
10...	--	8.0	15.3	574	7.8	1.4	--	.022	<.002	1.3	.180	.58	.686
10...	--	14.0	8.9	589	7.6	.1	--	.018	<.002	1.4	.046	.33	1.08
10...	--	17.0	8.0	599	7.6	.0	--	.023	<.002	.98	.551	.91	.069
10...	--	18.0	7.8	600	7.5	.0	--	.034	.004	1.8	1.17	1.7	.023

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

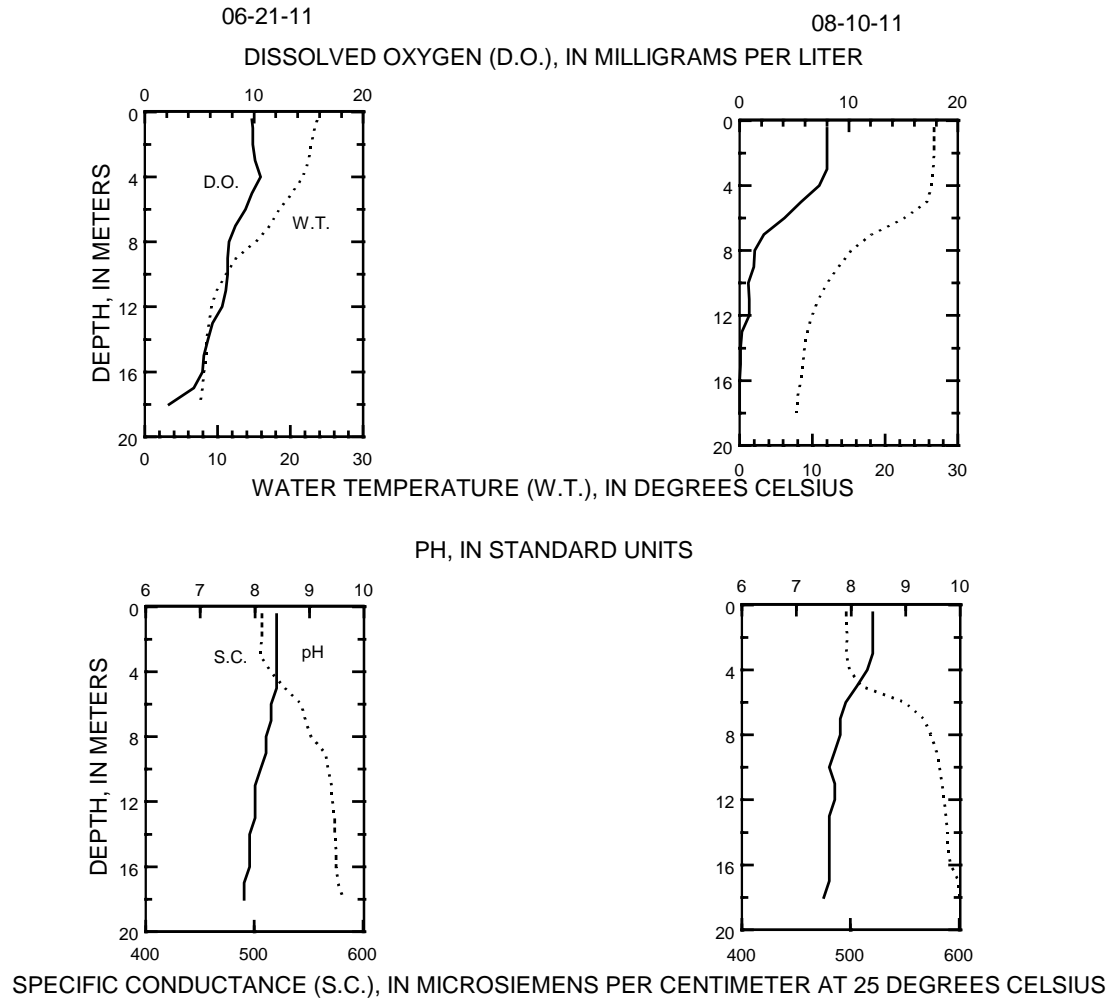
WATER-QUALITY DATA, JUNE 11 TO AUGUST 10, 2011

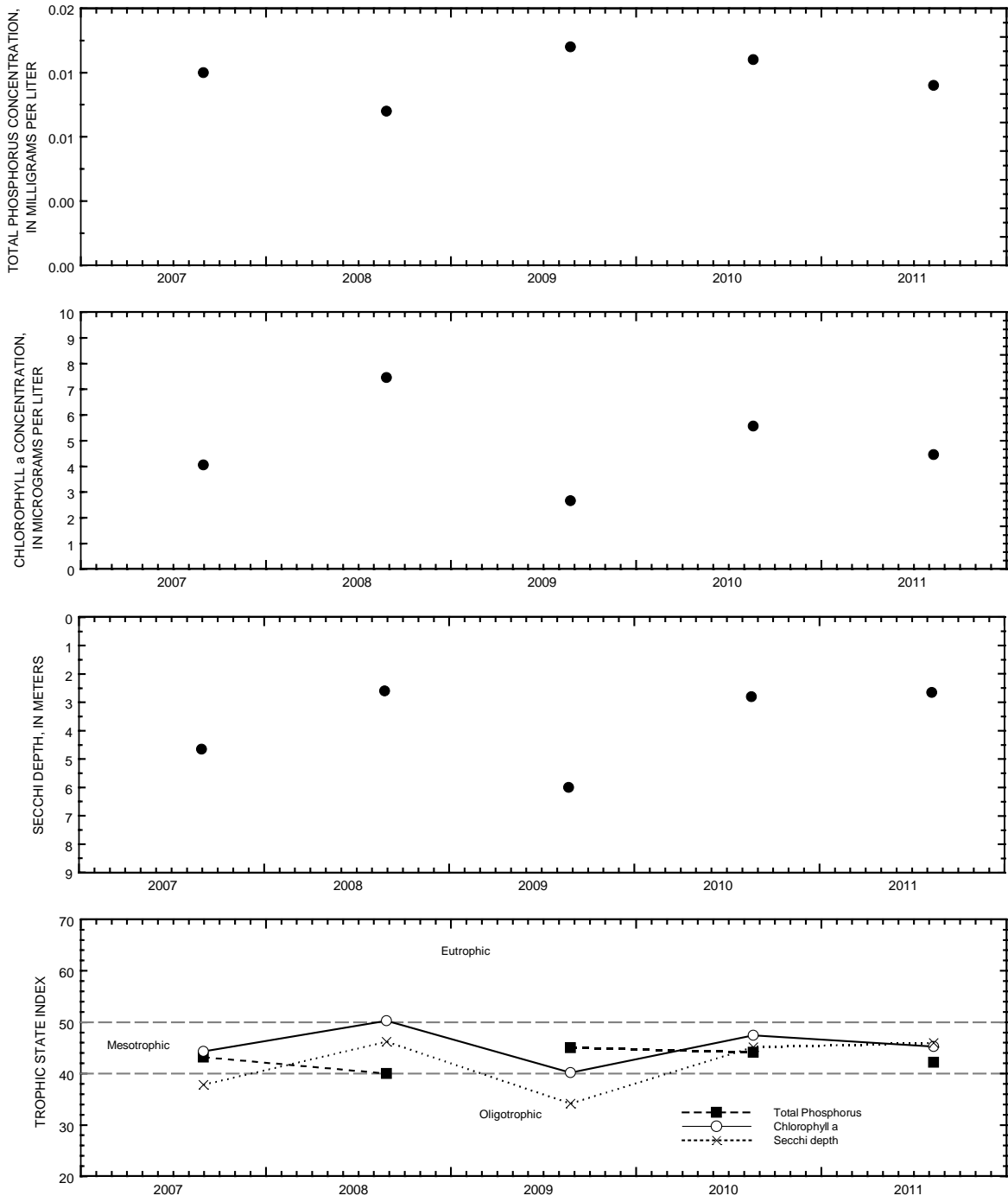
(Milligrams per liter unless otherwise indicated)

Date	Turbidity white light, det ang 90+/-30 degrees NTU (63675)	Hard- ness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnes- ium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potas- sium, water, fltrd, mg/L (00935)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (00417)	Chlor- ide, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)	Mangan- ese, water, fltrd, ug/L (01056)	Dis- solved solids dried @ 180degC wat flt mg/L (70300)
JUN 2011													
21...	<1.0	258	45.6	34.9	10.1	1.30	209	24.1	31.0	6.89	<100	<1.0	298
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
10...	--	--	--	--	--	--	--	--	--	--	--	--	--
10...	<1.0	245	37.4	36.7	10.4	1.50	194	24.7	29.3	12.7	<100	3	270
10...	<1.0	303	59.9	37.2	10.5	1.70	235	23.6	30.0	11.8	<100	3	320
10...	<1.0	311	64.3	36.5	10.5	1.80	248	23.8	30.0	16.8	<100	50	344
10...	<1.0	310	64.0	36.5	10.2	1.70	255	23.7	29.8	19.8	<100	330	342
10...	<1.0	308	64.4	35.8	10.2	1.80	262	24.5	23.2	23.3	<100	680	346

424840088241600 LAKE BEULAH AT DEEP HOLE NEAR EAST TROY, WI

LAKE-DEPTH PROFILES, JUNE 11 TO AUGUST 10, 2011





August surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Lake Beulah, Deep Hole, near East Troy, Wisconsin.

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

LOCATION.--Lat 42°49'29", long 88°23'13", in SE ¼ NE ¼ NE ¼ sec.8, T.4 N., R.18 E., Walworth County, Hydrologic Unit 07120006, near East Troy.

SURFACE AREA.--1.30 mi².

PERIOD OF RECORD.--August 2007 to August 2011.

REMARKS.--Lake sampled at a depth of 15 m. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, JUNE 11 TO AUGUST 10, 2011

(Milligrams per liter unless otherwise indicated)

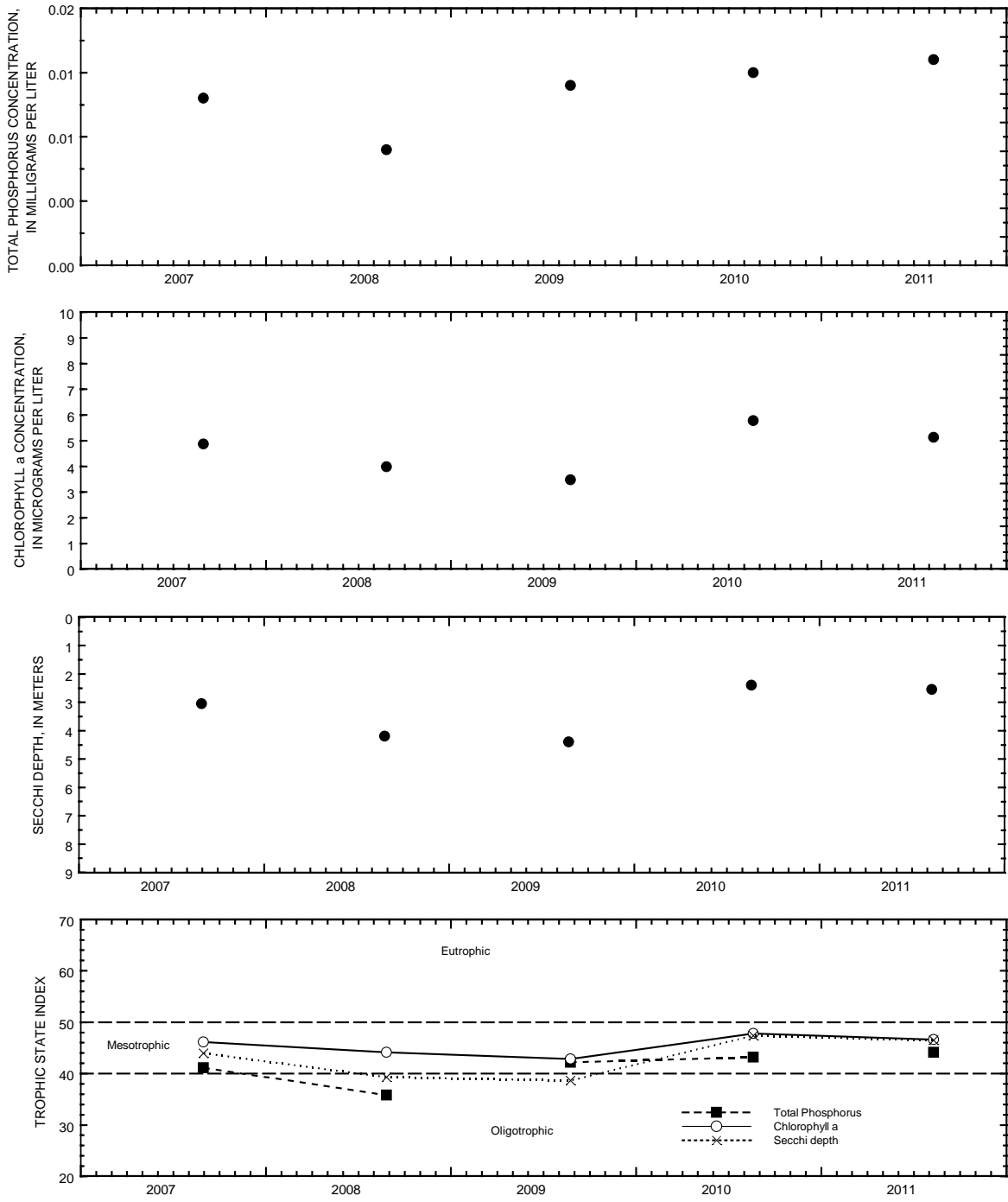
Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Nitrate + nitrite water, fltrd, mg/L as N (00631)
JUN 2011													
21...	3.40	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	.50	24.1	454	8.7	10.1	5.81	.017	<.002	.65	.020	.61	.035
AUG													
10...	2.55	--	--	--	--	--	--	--	--	--	--	--	--
10...	--	2.0	27.1	442	8.7	8.4	5.13	.016	<.002	<.69	<.015	.67	<.019
10...	--	8.0	14.2	515	7.8	1.5	--	.015	--	--	--	--	--
10...	--	12.0	8.3	536	7.7	.1	--	.024	--	--	--	--	--
10...	--	14.0	7.6	546	7.6	.0	--	.038	--	--	--	--	--
10...	--	15.0	7.0	557	7.5	.0	--	--	<.002	<2.4	1.14	2.4	<.019

424929088231300 LAKE BEULAH STATION 2 NEAR EAST TROY, WI

WATER-QUALITY DATA, JUNE 11 TO AUGUST 10, 2011

(Milligrams per liter unless otherwise indicated)

Date	Turbidity white light, det ang 90+/-30 degrees NTU (63675)	Hard- ness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnes- ium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potas- sium, water, fltrd, mg/L (00935)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (00417)	Chlor- ide, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)	Mangan- ese, water, fltrd, ug/L (01056)	Dis- solved solids dried @ 180degC wat flt mg/L (70300)
JUN 2011													
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	<1.0	214	33.1	32.0	10.9	1.30	181	26.2	28.1	8.57	<100	<1.0	260
AUG													
10...	--	--	--	--	--	--	--	--	--	--	--	--	--
10...	<1.0	217	27.7	36.0	11.7	1.50	164	26.4	26.9	14.1	<100	3	242
10...	--	--	--	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--	--	--	--
10...	<1.0	261	49.4	33.5	11.1	1.70	233	28.9	21.1	19.1	<100	290	318



August surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Lake Beulah, Station 2, near East Troy, Wisconsin.

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°24'09", long 88°15'16", in NE ¼ SW ¼ sec. 20, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

REMARKS.--Lake sampled on north side at a depth of 12 m. Lake ice-covered during February sampling. Water-quality analyses by Wisconsin State Laboratory of Hygiene.

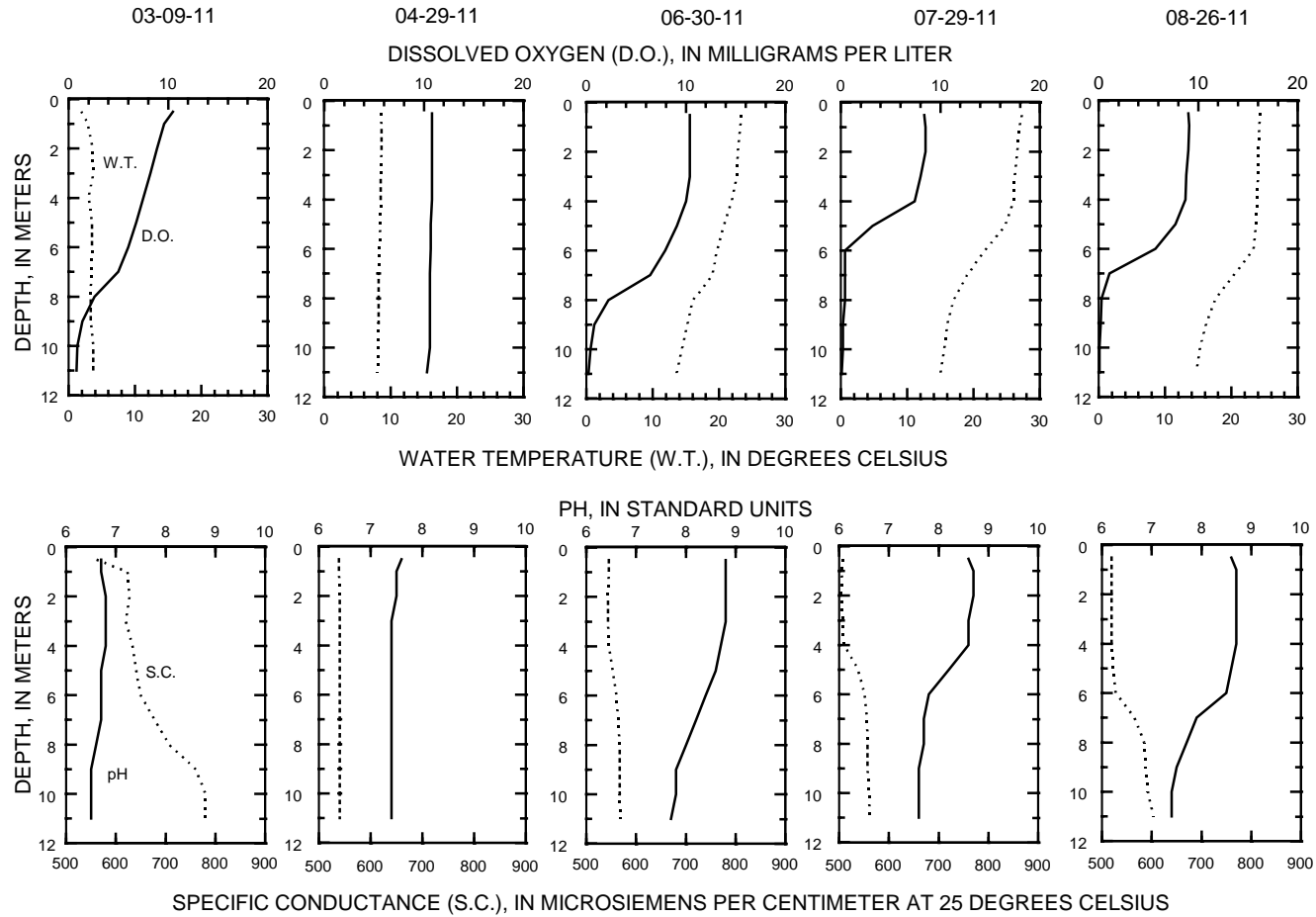
WATER-QUALITY DATA, MARCH 9 TO AUGUST 26, 2011

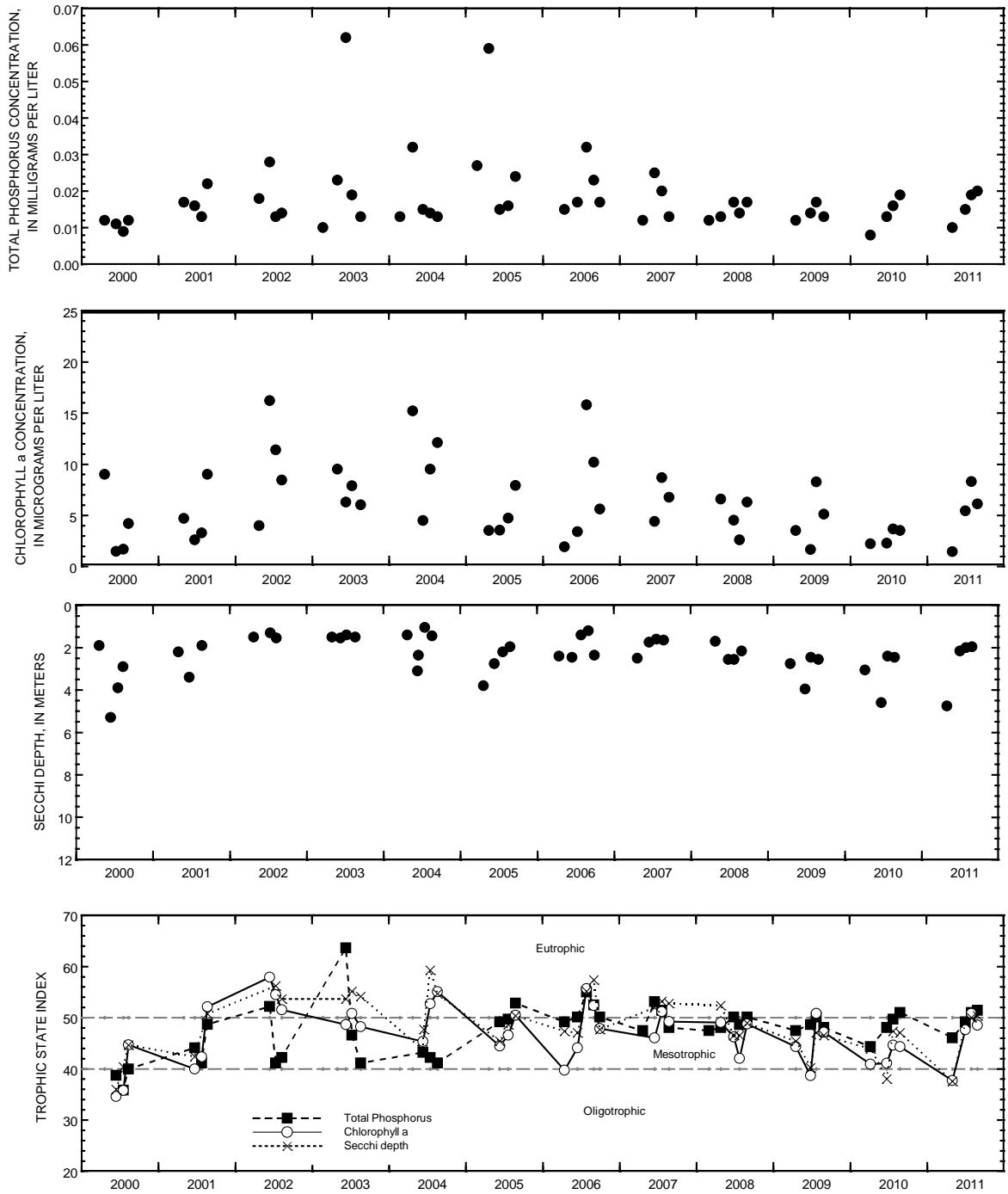
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)
MAR 2011								
09...	--	.50	1.9	561	6.7	10.5	--	.014
09...	--	10.5	3.7	779	6.5	.8	--	.031
APR								
29...	4.75	--	--	--	--	--	--	--
29...	--	.50	8.5	539	7.6	10.8	1.47	.010
JUN								
30...	2.15	--	--	--	--	--	--	--
30...	--	.50	23.3	545	8.8	10.4	5.44	.015
30...	--	11.0	13.6	568	7.7	.2	--	.031
JUL								
29...	--	.50	27.3	507	8.6	8.4	8.31	.019
29...	--	11.0	15.0	561	7.6	.1	--	.034
29...	2.00	--	--	--	--	--	--	--
AUG								
26...	--	.50	24.3	519	8.6	9.0	6.12	.020
26...	--	11.0	14.7	603	7.4	.1	--	.047
26...	1.95	--	--	--	--	--	--	--

432409088151600 BIG CEDAR LAKE, NORTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, MARCH 9 TO AUGUST 26, 2011





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

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LOCATION.--Lat 43°22'24", long 88°15'49", in NE ¼ SE ¼ sec.31, T.11 N., R.19 E., Washington County, Hydrologic Unit 04040003, near West Bend.

SURFACE AREA.--1.46 mi².

PERIOD OF RECORD.--February 2000 to current year.

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

WATER-QUALITY DATA, MARCH 9 TO AUGUST 26, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
MAR 2011													
09...	--	.50	.9	544	6.8	11.2	--	.011	--	--	--	--	--
09...	--	30.0	3.8	644	6.5	.7	--	.127	--	--	--	--	--
APR													
29...	9.85	--	--	--	--	--	--	--	--	--	--	--	--
29...	--	.50	6.5	546	6.9	11.4	.680	.011	.002	.70	.024	--	.29
JUN													
30...	4.05	--	--	--	--	--	--	--	--	--	--	--	--
30...	--	.50	22.5	542	8.8	10.1	2.72	.013	--	--	--	--	--
30...	--	30.0	6.0	566	7.8	2.1	--	.042	--	--	--	--	--
JUL													
29...	--	.50	27.1	498	8.7	9.6	5.11	.011	<.002	.59	--	.54	.56
29...	--	30.0	6.1	565	7.5	.1	--	.018	--	--	--	--	--
29...	2.50	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
26...	--	.50	24.2	512	8.5	9.3	4.85	.013	--	--	--	--	--
26...	--	30.0	6.1	593	7.3	.2	--	.021	--	--	--	--	--
26...	2.95	--	--	--	--	--	--	--	--	--	--	--	--

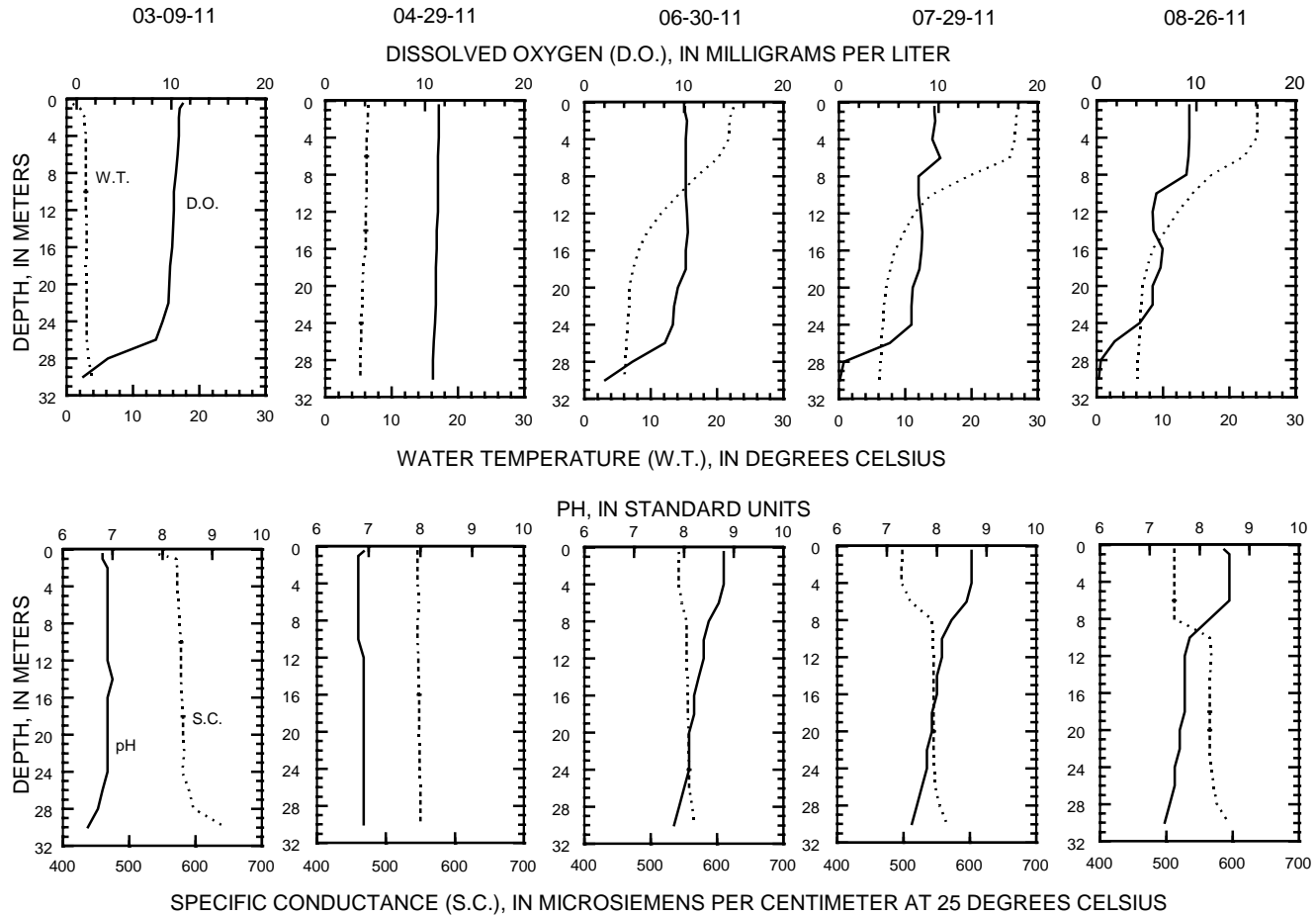
432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

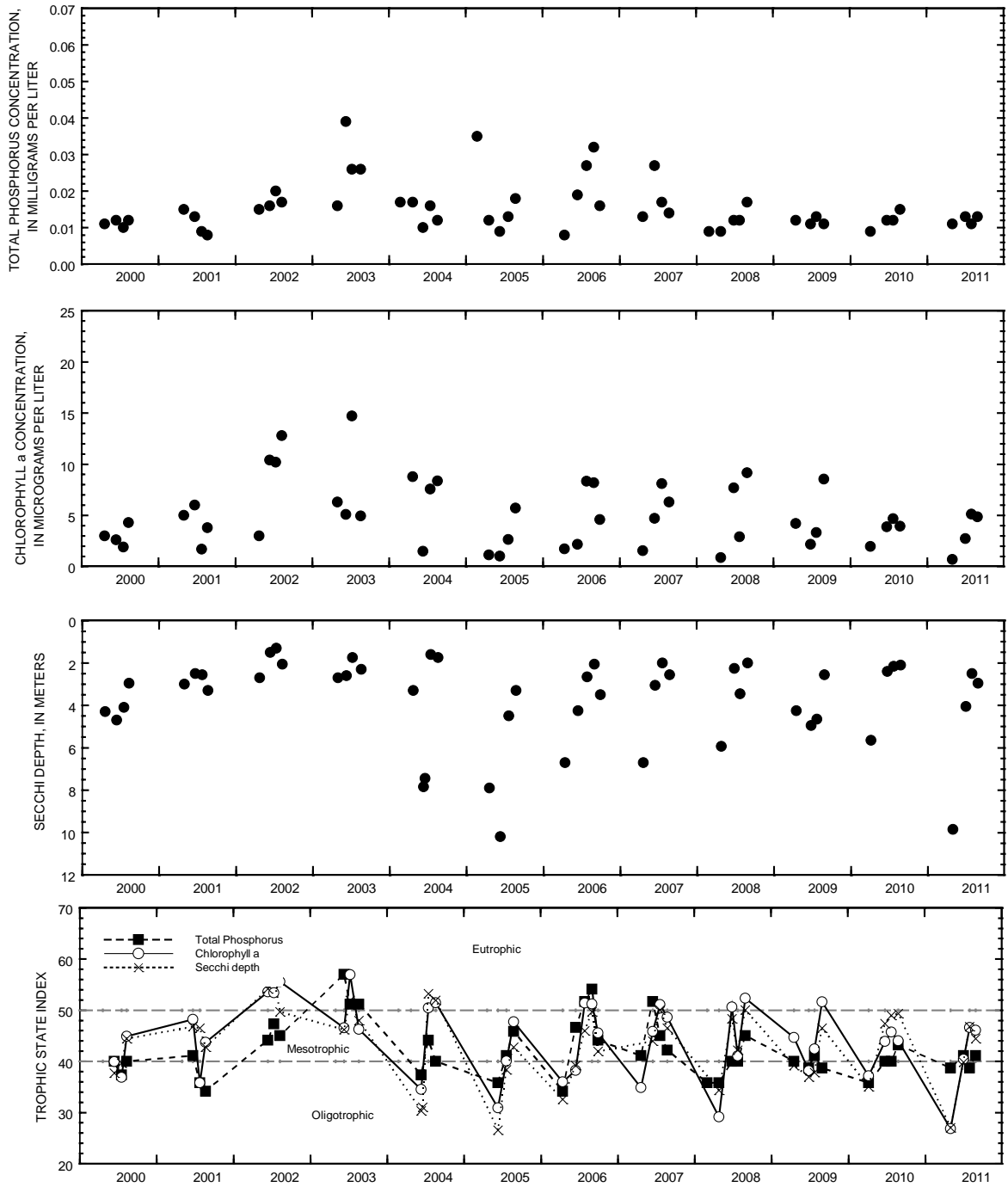
WATER-QUALITY DATA, MARCH 9 TO AUGUST 26, 2011
(Milligrams per liter unless otherwise indicated)

Date	Nitrate + nitrite water, fltrd, mg/L as N (00631)	Turbidity white light, det ang 90+/-30 degrees NTU (63675)	Apparent color, water, unfltrd Pt-Co units (00081)	Hardness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potassium, water, fltrd, mg/L (00935)	ANC, water unfixed end pt, lab, mg/L as CaCO3 (00417)	Chloride, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)
MAR 2011													
09...	--	--	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--	--	--
APR													
29...	--	--	--	--	--	--	--	--	--	--	--	--	--
29...	.414	<1.0	10	240	38.0	35.2	23.5	1.40	191	51.0	22.9	5.19	<100
JUN													
30...	--	--	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL													
29...	.025	--	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
Date	Manganese, water, fltrd, ug/L (01056)	Dissolved solids dried @ 180degC wat flt mg/L (70300)											
MAR 2011													
09...	--	--											
09...	--	--											
APR													
29...	--	--											
29...	<1.0	304											
JUN													
30...	--	--											
JUL													
29...	--	--											
AUG													
26...	--	--											

432224088154900 BIG CEDAR LAKE, SOUTH SITE, NEAR WEST BEND, WI

LAKE-DEPTH PROFILES, MARCH 9 TO AUGUST 26, 2011





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

05404500 DEVILS LAKE NEAR BARABOO, WI

LOCATION.--Lat 43°25'35", long 89°43'40" referenced to North American Datum of 1927, in SW ¼ SE ¼ sec.13, T.11 N., R.6 E., Sauk County, WI, Hydrologic Unit 07070004, in Devils Lake State Park, 3.5 mi south of Baraboo.

SURFACE AREA.--0.56 mi².

DRAINAGE AREA.--4.79 mi².

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 954.88 ft, above NAVD of 1988.

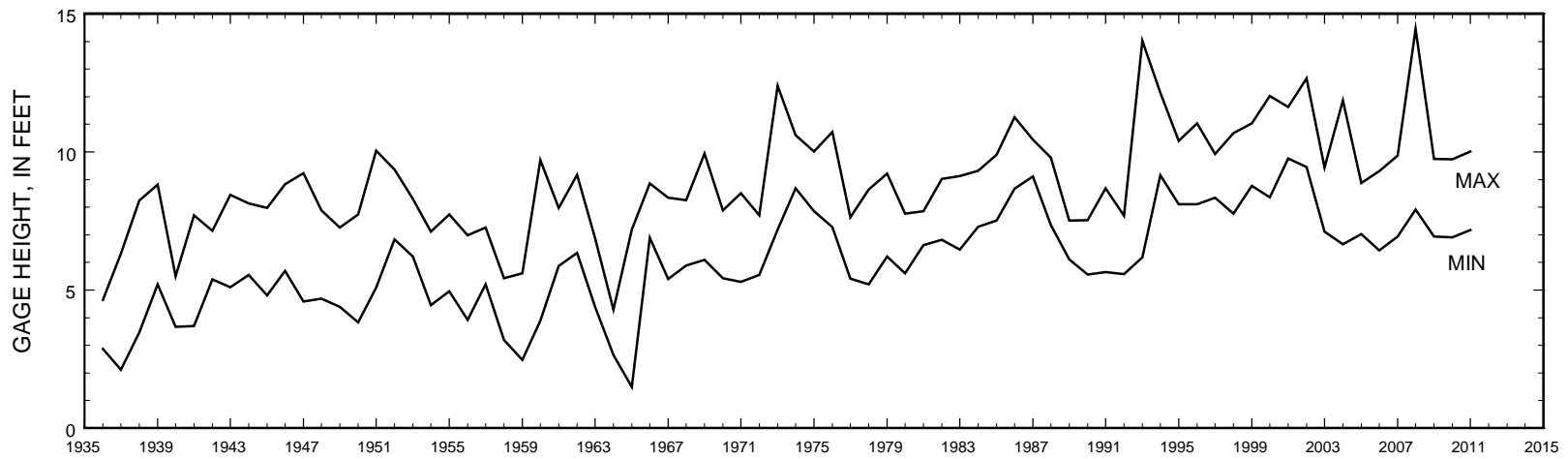
REMARKS.--Lake has no surface outlet. Water removed from lake by bottom withdrawal pipe, October 1 to November 15, April 4 to June 28 and September 6-30.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed, 14.83 ft, June 12, 2008; minimum observed, 1.49 ft, Feb. 8, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum observed, 10.02 ft, May 1; minimum observed, 7.17 ft, Dec. 7-11.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.57	7.60	7.21	7.30	7.46	7.75	9.15	9.90	9.68	8.87	8.43	7.95
2	8.52	7.57	7.20	7.31	7.50	7.76	9.16	9.88	9.64	8.85	8.42	7.94
3	8.47	7.54	7.19	7.31	7.51	7.76	9.19	9.87	9.60	8.82	8.39	8.01
4	8.43	7.51	7.21	7.31	7.50	7.78	9.33	9.85	9.56	8.80	8.37	8.01
5	8.39	7.47	7.21	7.32	7.50	7.80	9.36	9.84	9.52	8.79	8.35	7.98
6	8.35	7.45	7.20	7.32	7.50	7.80	9.38	9.81	9.52	8.82	8.33	7.95
7	8.31	7.42	7.19	7.32	7.51	7.81	9.40	9.79	9.51	8.79	8.30	7.90
8	8.27	7.39	7.18	7.33	7.51	7.81	9.40	9.77	9.46	8.76	8.28	7.87
9	8.23	7.37	7.18	7.33	7.51	7.85	9.41	9.79	9.42	8.74	8.25	7.84
10	8.20	7.35	7.18	7.33	7.51	7.86	9.42	9.82	9.38	8.71	8.21	7.81
11	8.17	7.33	7.21	7.34	7.50	7.87	9.43	9.81	9.40	8.77	8.18	7.79
12	8.13	7.31	7.30	7.35	7.50	7.87	9.43	9.81	9.36	8.76	8.17	7.77
13	8.09	7.33	7.30	7.35	7.50	7.87	9.42	9.80	9.32	8.72	8.23	7.73
14	8.05	7.32	7.29	7.35	7.50	7.88	9.41	9.79	9.28	8.70	8.25	7.69
15	8.00	7.30	7.28	7.37	7.51	7.88	9.41	9.76	9.28	8.67	8.23	7.64
16	7.96	7.29	7.28	7.37	7.50	7.89	9.43	9.72	9.28	8.67	8.21	7.60
17	7.92	7.28	7.27	7.39	7.52	7.94	9.43	9.69	9.25	8.66	8.19	7.57
18	7.88	7.27	7.27	7.41	7.55	8.03	9.42	9.66	9.21	8.66	8.18	7.55
19	7.84	7.27	7.26	7.41	7.57	8.10	9.45	9.64	9.22	8.65	8.16	7.57
20	7.80	7.25	7.26	7.41	7.62	8.31	9.51	9.62	9.20	8.63	8.14	7.55
21	7.75	7.24	7.28	7.41	7.68	8.56	9.52	9.60	9.17	8.60	8.12	7.52
22	7.71	7.24	7.28	7.41	7.70	8.73	9.56	9.59	9.15	8.58	8.10	7.49
23	7.68	7.23	7.28	7.41	7.71	8.98	9.61	9.60	9.13	8.56	8.10	7.46
24	7.75	7.23	7.28	7.41	7.72	9.06	9.63	9.57	9.09	8.54	8.08	7.45
25	7.73	7.25	7.28	7.41	7.73	9.10	9.64	9.65	9.05	8.52	8.06	7.46
26	7.79	7.23	7.28	7.41	7.74	9.12	9.76	9.79	9.01	8.49	8.04	7.55
27	7.77	7.22	7.28	7.42	7.75	9.13	9.86	9.79	8.97	8.51	8.01	7.57
28	7.72	7.22	7.28	7.42	7.75	9.13	9.88	9.77	8.92	8.51	7.99	7.56
29	7.69	7.21	7.27	7.42	---	9.14	9.90	9.76	8.90	8.49	7.97	7.55
30	7.66	7.22	7.28	7.42	---	9.14	9.90	9.75	8.88	8.47	7.95	7.53
31	7.62	---	7.29	7.43	---	9.14	---	9.73	---	8.45	7.96	---
Mean	8.01	7.33	7.25	7.37	7.57	8.29	9.49	9.75	9.28	8.66	8.18	7.70
Max	8.57	7.60	7.30	7.43	7.75	9.14	9.90	9.90	9.68	8.87	8.43	8.01
Min	7.62	7.21	7.18	7.30	7.46	7.75	9.15	9.57	8.88	8.45	7.95	7.45



Annual minimum and maximum water levels for Devils Lake, 1936-2011.

423525088260400 GENEVA LAKE AT LAKE GENEVA, WI

LOCATION.--Lat 42°35'25", long 88°26'04" referenced to North American Datum of 1927, in SE ¼ NW ¼ sec.36, T.2 N., R.17 E., Walworth County, WI, Hydrologic Unit 07120006, at Geneva Lake dam at Center Street at Lake Geneva.

SURFACE AREA.--8.22 mi².

DRAINAGE AREA.--28.7 mi².

PERIOD OF RECORD.--October 1997 to August 2002, December 2002 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.86 ft above NAVD of 1988 or 862.08 ft above NGVD of 1929. Intermittent staff-gage readings during winter months.

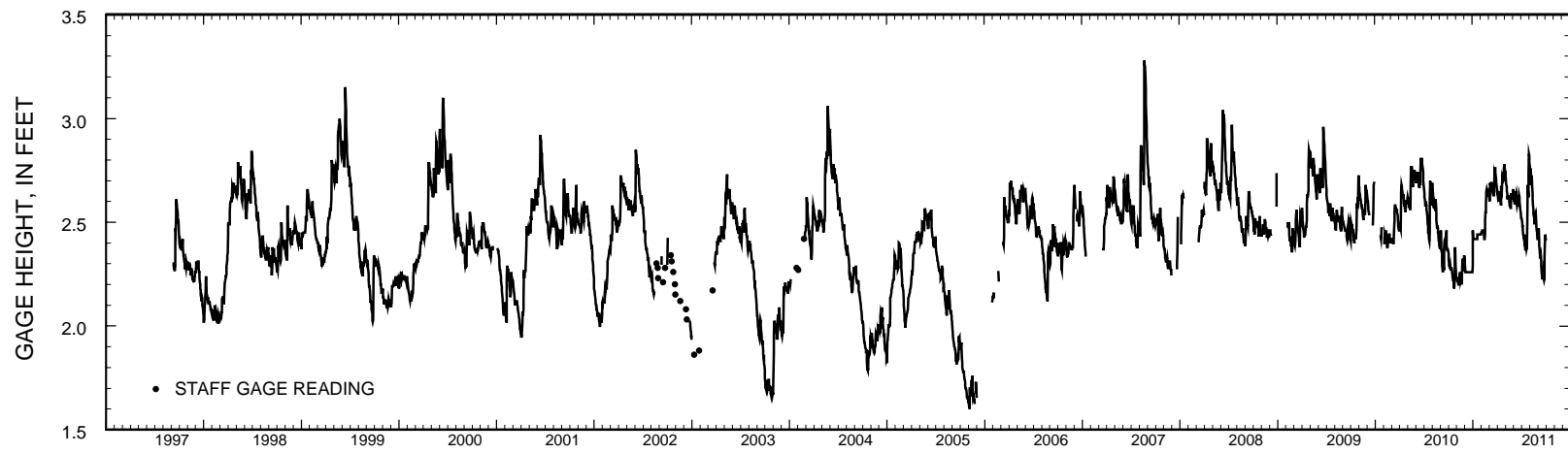
REMARKS.—Records good except for estimated days, which are poor. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.35 ft, Aug. 20, 2007; minimum gage height, 1.44 ft, Nov. 5, 2005 (affected by wind).

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 2.94 ft (affected by wind), Mar. 23; minimum gage height, 2.07 ft (affected by wind), Oct. 24.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES**
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.35	2.23	2.32	2.46	2.44	2.62	2.65	2.74	2.65	2.52	2.74	2.42
2	2.32	2.23	2.29	2.42	2.45	2.62	2.65	2.72	2.61	2.51	2.74	2.43
3	2.30	2.23	2.26	2.42	2.45	2.60	2.63	2.70	2.60	2.49	2.76	2.44
4	2.29	2.22	2.26	2.42	2.45	2.63	2.64	2.69	2.61	2.48	2.73	2.47
5	2.29	2.22	2.26	e2.42	2.45	2.69	2.63	2.68	2.59	2.48	2.70	2.42
6	2.29	2.21	2.26	e2.42	2.46	2.68	2.61	2.67	2.59	2.46	2.68	2.39
7	2.28	2.21	2.26	2.42	2.46	2.67	2.60	2.65	2.60	2.44	2.72	2.37
8	2.29	2.20	2.26	2.42	2.46	2.66	2.63	2.64	2.61	2.43	2.71	2.34
9	2.27	2.20	2.26	2.42	2.46	2.69	2.63	2.61	2.65	2.43	2.72	2.33
10	2.28	2.21	2.26	2.42	2.46	2.69	2.64	2.62	2.63	2.42	2.67	2.33
11	2.28	2.22	2.26	2.42	2.46	2.68	2.65	2.62	2.64	2.44	2.64	2.33
12	2.28	2.21	2.26	2.42	2.45	2.68	2.63	2.63	2.62	2.43	2.61	2.34
13	2.28	2.24	2.26	2.42	2.42	2.67	2.63	2.62	2.60	2.40	2.58	2.31
14	2.27	2.26	2.26	2.42	2.42	2.65	2.60	2.62	2.58	2.38	2.56	2.29
15	2.25	2.22	2.26	2.42	2.42	2.64	2.58	2.61	2.59	2.37	2.54	2.26
16	2.25	2.22	2.26	2.42	2.44	2.64	2.67	2.60	2.61	2.37	2.53	2.24
17	2.23	2.23	2.26	2.42	2.51	2.63	2.67	2.58	2.59	2.37	2.52	2.23
18	2.22	2.22	2.26	2.44	2.55	2.63	2.66	2.58	2.58	2.39	2.50	2.23
19	2.22	2.23	2.26	2.44	2.55	2.63	2.66	2.58	2.58	2.37	2.49	2.28
20	2.22	2.20	2.26	2.44	2.58	2.66	2.71	2.57	2.58	2.38	2.52	2.27
21	2.19	2.21	2.26	2.44	2.65	2.73	2.70	2.57	2.59	2.37	2.53	2.28
22	2.18	2.28	2.26	2.44	2.66	2.72	2.69	2.59	2.63	2.49	2.51	2.24
23	2.19	2.32	2.26	2.44	2.66	2.76	2.74	2.64	2.62	2.68	2.52	2.23
24	2.25	2.28	2.26	2.44	2.65	2.76	2.72	2.61	2.60	2.67	2.53	2.22
25	2.27	2.32	2.26	2.44	2.64	2.74	2.70	2.62	2.58	2.65	2.49	2.23
26	2.38	2.32	2.26	2.44	2.63	2.72	2.76	2.62	2.56	2.62	2.48	2.33
27	2.37	2.28	2.26	2.44	2.63	2.71	2.78	2.61	2.56	2.73	2.46	2.40
28	2.29	2.27	2.26	2.44	2.64	2.69	2.78	2.62	2.55	2.83	2.45	2.43
29	2.26	2.27	2.26	2.44	---	2.68	2.76	2.62	2.52	2.82	2.44	2.44
30	2.25	2.34	2.26	2.44	---	2.66	2.74	2.65	2.52	2.79	2.42	2.42
31	2.23	---	2.29	2.44	---	2.65	---	2.66	---	2.77	2.42	---
Mean	2.27	2.24	2.26	2.43	2.52	2.67	2.67	2.63	2.59	2.52	2.58	2.33
Max	2.38	2.34	2.32	2.46	2.66	2.76	2.78	2.74	2.65	2.83	2.76	2.47
Min	2.18	2.20	2.26	2.42	2.42	2.60	2.58	2.57	2.52	2.37	2.42	2.22



Stage hydrograph for Geneva Lake, 1997-2011.

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LOCATION.--Lat 42°33'29", long 88°32'33", in NE ¼ SE ¼ sec.12, T.1 N., R.16 E., Walworth County, Hydrologic Unit 07120006, 1.3 mi south of Williams Bay.

SURFACE AREA.--8.22 mi².

DRAINAGE AREA.--28.7 mi².

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

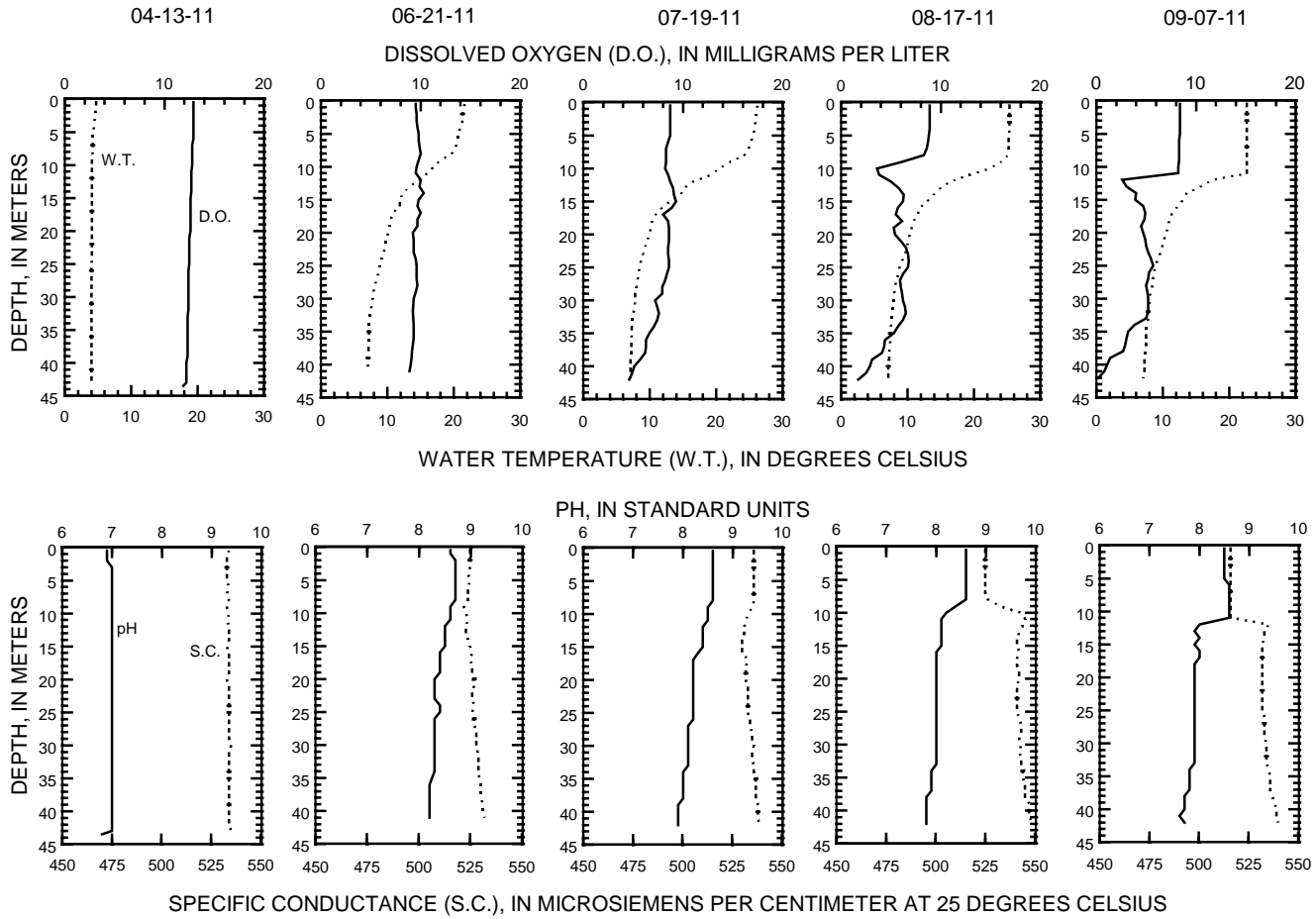
REMARKS.--Lake sampled at deep hole at a depth of about 43 m. Lake ice-covered during February sampling. Water-quality analyses done by Wisconsin State Laboratory of Hygiene. Samples for determination of chlorophyll a concentration are collected from the top 0.5 m of the lake.

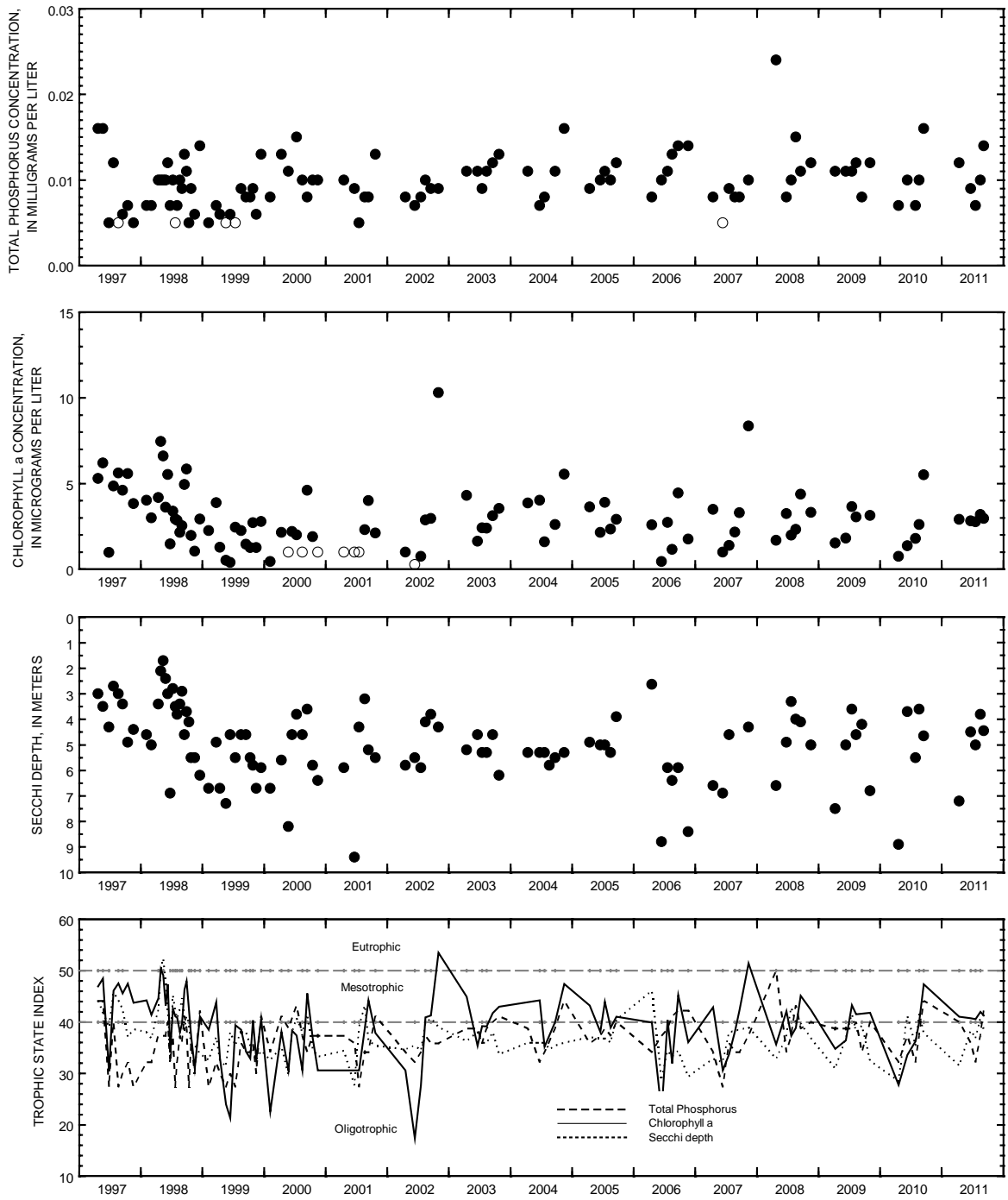
WATER-QUALITY DATA, APRIL 13 TO SEPTEMBER 7, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
APR 2011													
13...	7.20	--	--	--	--	--	--	--	--	--	--	--	--
13...	--	.50	4.7	534	6.9	12.9	2.90	.012	<.002	.45	.019	--	.31
JUN													
21...	4.50	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	.50	21.6	525	8.6	9.5	2.82	.009	--	--	--	--	--
21...	--	41.0	7.0	532	8.2	8.9	--	.011	--	--	--	--	--
JUL													
19...	5.00	--	--	--	--	--	--	--	--	--	--	--	--
19...	--	.50	26.2	536	8.6	8.7	2.77	.007	.002	--	.032	.36	--
19...	--	8.0	24.2	536	8.6	8.3	--	.014	--	--	--	--	--
19...	--	17.0	10.9	533	8.2	8.0	--	.009	--	--	--	--	--
19...	--	32.0	7.5	535	8.1	7.6	--	.008	--	--	--	--	--
19...	--	37.0	7.2	537	8.0	6.3	--	.010	--	--	--	--	--
19...	--	42.0	7.0	539	7.9	4.6	--	.015	--	--	--	--	--
AUG													
17...	3.80	--	--	--	--	--	--	--	--	--	--	--	--
17...	--	.50	25.3	525	8.6	8.9	3.19	.010	--	--	--	--	--
17...	--	42.0	7.1	549	7.8	1.7	--	.037	--	.60	.067	--	.34
SEP													
07...	4.45	--	--	--	--	--	--	--	--	--	--	--	--
07...	--	.50	22.6	516	8.5	8.4	2.96	.014	<.002	--	<.015	.42	--
07...	--	11.0	22.6	516	8.6	8.2	--	.014	<.002	--	<.015	.44	--
07...	--	15.0	13.0	532	7.9	3.9	--	.011	<.002	--	<.015	.45	--
07...	--	33.0	7.8	534	7.9	5.0	--	.010	.002	--	<.015	.43	--
07...	--	38.0	7.3	537	7.7	2.7	--	.033	.020	--	.027	.44	--
07...	--	42.0	7.1	540	7.7	.2	--	.053	.036	--	.069	.55	--

423329088323300 GENEVA LAKE AT WEST END NEAR WILLIAMS BAY, WI

LAKE-DEPTH PROFILES, APRIL 13 TO SEPTEMBER 7, 2011





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

(Open circles on the first two 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" referenced to North American Datum of 1927, in NE ¼ SE ¼ SE ¼ sec.27, T.16 N., R.13 E., Green Lake County, WI, Hydrologic Unit 04030201, on left bank at downstream side of County Trunk Highway A, 2.3 mi southeast of Green Lake.

SURFACE AREA.--11.48 mi².

DRAINAGE AREA.--103 mi²; Area of Green Lake, 7,346 acres.

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

GAGE.--Water-stage recorder. Datum of gage is 789.91 ft above NAVD of 1988.

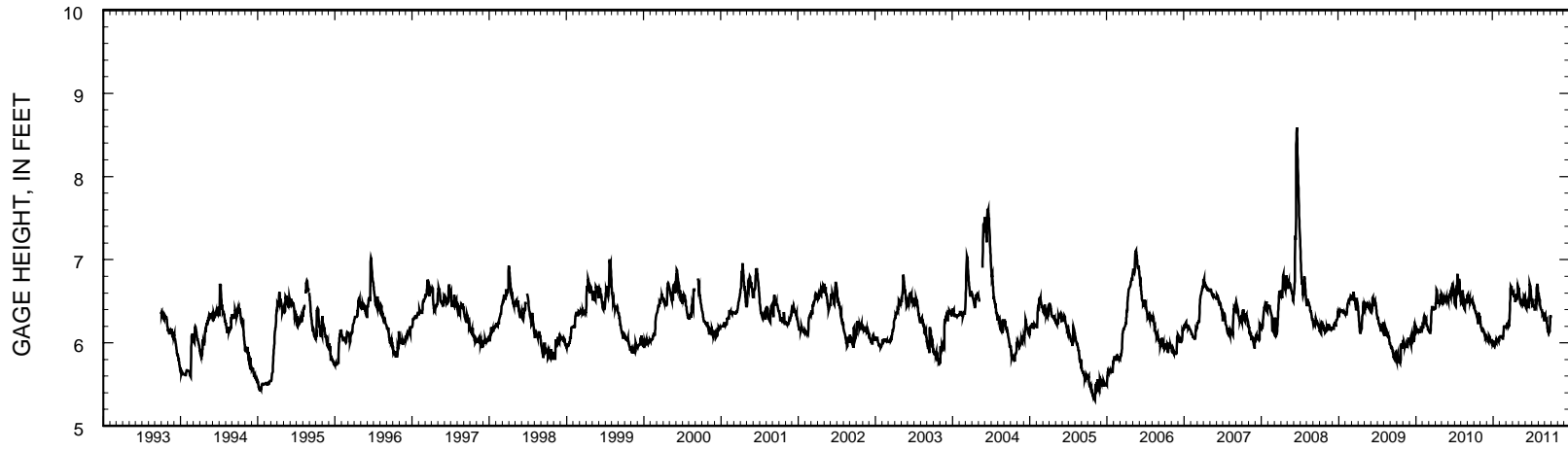
REMARKS.--Lake level regulated by dam at outlet at Green Lake. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 8.67 ft, June 15, 2008; minimum recorded, 5.27 ft, Nov. 5, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.76 ft, June 23; minimum recorded gage height, 5.90 ft, occurred many days.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.46	6.27	6.05	6.03	6.05	6.20	6.60	6.61	6.57	5.02	6.55	6.61
2	6.44	6.26	6.05	5.99	6.08	6.19	6.59	6.62	6.59	4.86	---	6.62
3	6.44	6.24	6.06	5.98	6.07	6.19	6.60	6.61	6.58	4.84	6.49	6.67
4	6.42	6.22	6.06	5.99	6.07	6.21	6.60	6.58	6.59	4.83	6.46	---
5	6.42	6.20	6.04	5.98	6.07	6.21	6.60	6.56	6.58	4.80	6.56	---
6	6.40	6.18	6.03	5.98	6.08	6.20	6.59	6.53	6.60	4.78	6.94	---
7	6.39	6.17	6.02	5.98	6.08	6.19	6.59	6.53	6.62	5.55	6.74	---
8	6.39	6.16	6.02	5.97	6.07	6.19	6.59	6.53	6.64	6.44	6.72	---
9	6.37	6.15	6.02	5.96	6.07	6.23	6.58	6.53	6.64	6.45	6.77	6.29
10	6.37	6.15	6.01	5.96	6.07	6.24	6.54	6.52	6.65	6.46	6.76	6.33
11	6.37	6.15	6.01	5.98	6.07	6.23	6.54	6.50	---	---	6.76	6.34
12	6.36	6.14	6.08	5.99	6.07	6.22	6.57	6.50	---	---	---	6.35
13	6.35	6.14	6.09	5.99	6.07	6.21	6.55	6.52	---	---	---	6.33
14	6.34	6.14	6.08	5.99	6.06	6.21	6.53	6.51	6.41	---	---	6.33
15	6.33	6.16	6.06	6.02	6.05	6.20	6.50	6.51	6.40	---	---	6.23
16	6.32	6.16	6.06	6.01	6.05	6.21	6.54	6.50	---	---	---	6.19
17	6.30	6.15	6.06	6.03	6.05	6.23	6.51	6.50	---	---	---	6.21
18	6.29	6.14	6.04	6.03	6.07	6.27	6.53	6.49	5.11	---	---	---
19	6.28	6.12	6.03	6.04	6.08	6.31	6.53	6.49	5.13	---	6.75	---
20	6.25	6.12	6.02	6.03	6.11	6.39	---	6.49	5.14	---	6.75	---
21	6.24	6.12	6.03	6.03	6.17	6.47	---	6.49	5.12	6.50	6.74	---
22	6.24	6.11	6.03	6.03	6.19	6.52	6.59	6.50	5.33	6.47	6.73	4.91
23	6.25	6.09	6.03	6.03	6.19	6.65	6.59	6.52	---	6.50	6.74	4.88
24	6.32	6.10	6.03	6.03	6.20	6.67	6.59	6.52	---	6.54	6.75	4.86
25	6.33	6.10	6.03	6.03	6.20	6.67	6.58	6.53	5.45	6.50	6.71	4.86
26	6.36	6.07	6.03	6.02	6.20	6.67	---	6.60	5.44	6.45	6.64	---
27	6.32	6.08	6.02	6.03	6.20	6.66	6.69	6.59	5.42	6.54	6.63	---
28	6.31	6.09	6.02	6.03	6.20	6.65	6.67	6.58	5.35	6.64	6.62	---
29	6.32	6.09	5.99	6.03	---	6.64	6.69	6.57	5.34	---	6.61	6.33
30	6.31	6.07	5.98	6.03	---	6.62	6.68	6.58	5.27	---	6.60	6.33
31	6.29	---	5.99	6.03	---	6.61	---	6.60	---	6.75	6.61	---
Mean	6.34	6.14	6.03	6.01	6.11	6.37	---	6.54	---	---	---	---
Max	6.46	6.27	6.09	6.04	6.20	6.67	---	6.62	---	---	---	---
Min	6.24	6.07	5.98	5.96	6.05	6.19	---	6.49	---	---	---	---



Stage hydrograph for Green Lake, 1993-2011.

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LOCATION.--Lat 43°47'56", long 89°02'05", in NW ¼ SE ¼ sec.2, T.15 N., R.12 E., Green Lake County, Hydrologic Unit 04030201, about 5 miles southwest of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 to current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "***" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
APR 2011													
12...	6.30	--	--	--	--	--	--	--	--	--	--	--	--
12...	--	.50	2.8	516	6.8	11.7	4.19	.043	.032	.74	<.015	--	.43
12...	--	30.0	2.7	517	6.7	11.4	--	.047	--	--	--	--	--
JUN													
*03...	1.20	.10	14.4	--	--	--	--	--	--	--	--	--	--
*17...	1.40	.10	18.9	--	--	--	--	--	--	--	--	--	--
*25...	3.80	.10	20.0	--	--	--	--	--	--	--	--	--	--
29...	6.15	--	--	--	--	--	--	--	--	--	--	--	--
29...	--	.50	19.9	483	8.9	9.1	4.98	.030	--	--	--	--	--
29...	--	67.0	5.0	519	8.0	.8	--	.067	--	--	--	--	--
JUL													
*03...	7.60	.10	23.3	--	--	--	--	--	--	--	--	--	--
*14...	5.50	.10	25.0	--	--	--	--	--	--	--	--	--	--
*24...	5.00	.10	26.7	--	--	--	--	--	--	--	--	--	--
25...	5.70	--	--	--	--	--	--	--	--	--	--	--	--
25...	--	.50	27.1	493	8.9	8.9	2.28	.015	--	--	--	--	--
25...	--	67.5	4.5	557	7.5	.4	--	.175	--	--	--	--	--
AUG													
*01...	4.60	.10	27.2	--	--	--	--	--	--	--	--	--	--
*15...	4.90	.10	25.0	--	--	--	--	--	--	--	--	--	--
18...	4.85	--	--	--	--	--	--	--	--	--	--	--	--
18...	--	.50	24.4	487	8.8	8.7	2.30	.012	<.002	--	<.015	.54	--
18...	--	13.0	10.2	519	8.0	4.5	--	.011	--	--	--	--	--
18...	--	67.0	4.9	540	7.5	.1	--	.263	--	--	--	--	--
*20...	5.50	.10	25.6	--	--	--	--	--	--	--	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011

(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
SEP													
*01...	6.20	.10	23.9	--	--	--	--	--	--	--	--	--	--
*10...	5.90	.10	22.2	--	--	--	--	--	--	--	--	--	--
*24...	4.90	.10	17.8	--	--	--	--	--	--	--	--	--	--
28...	5.75	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	.50	16.8	488	8.6	9.1	4.96	.015	--	--	--	--	--
28...	--	14.0	9.9	516	8.0	4.1	--	.013	--	--	--	--	--
28...	--	67.0	5.1	532	7.6	.2	--	.272	--	--	--	--	--
Date	Nitrate + nitrite water, fltrd, mg/L as N (00631)	Turbdty light, det ang 90+/-30 degrees NTU (63675)	Appar- ent color, water, unfltrd Pt-Co units (00081)	Hard- ness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnes- ium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potas- sium, water, fltrd, mg/L (00935)	ANC, wat unfltrd fixed end pt, lab, mg/L as CaCO3 (00417)	Chlor- ide, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)
APR 2011													
12...	--	--	--	--	--	--	--	--	--	--	--	--	--
12...	.307	<1.0	10	220	32.3	33.8	18.5	2.70	182	38.8	29.7	.968	<100
12...	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
*01...	--	--	--	--	--	--	--	--	--	--	--	--	--
*15...	--	--	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--	--	--
18...	<.019	--	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--	--	--
*20...	--	--	--	--	--	--	--	--	--	--	--	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

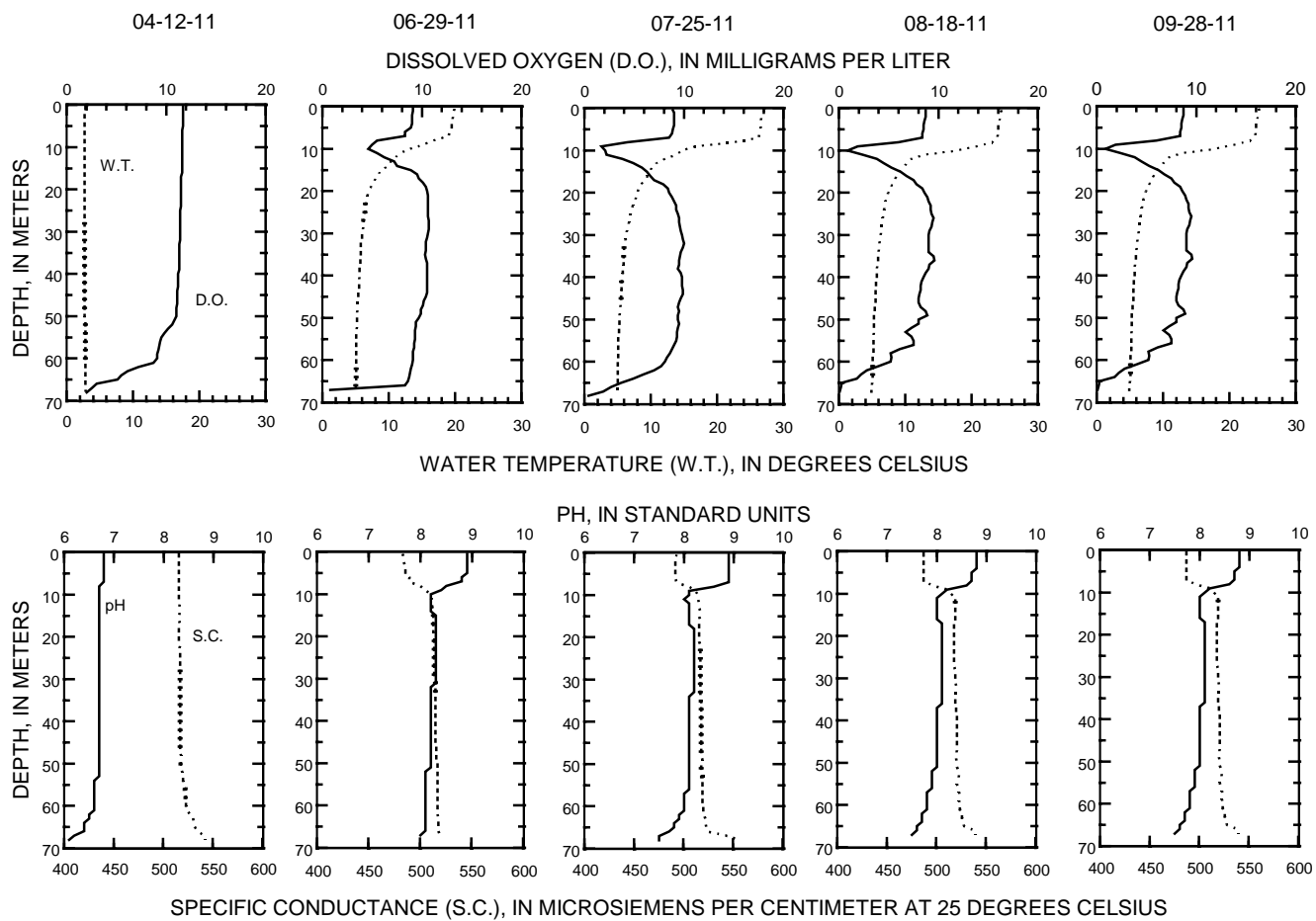
WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011

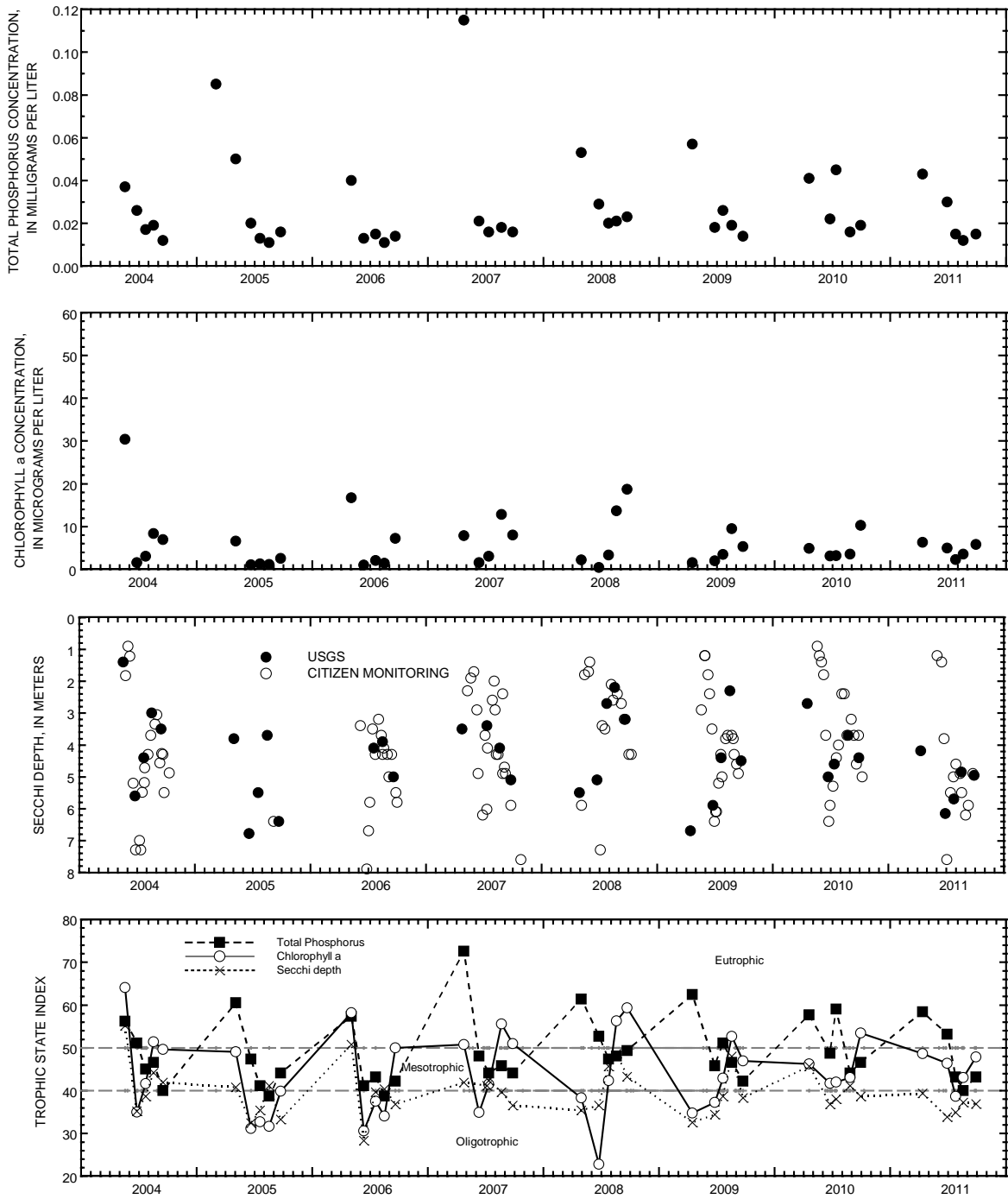
(Milligrams per liter unless otherwise indicated)

Date	Mangan- ese, water, fltrd, ug/L (01056)	Dis- solved solids dried @ 180degC wat flt mg/L (70300)
APR 2011		
12...	--	--
12...	<1.0	276
12...	--	--

434756089020500 GREEN LAKE AT DEEP HOLE NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 12 TO SEPTEMBER 28, 2011





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

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'28", long 88°57'00", in SE ¼ SE ¼ sec.28, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

SURFACE AREA.--11.48 mi².

PERIOD OF RECORD.--May 2004 current year. Lake sampled by Wisconsin Department of Natural Resources prior to 2004.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene. A "*" indicates data that were collected by Mary Jane Bumby, Citizen Lake Monitoring Volunteer.

WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)
APR 2011								
12...	3.00	--	--	--	--	--	--	--
12...	--	.50	3.6	509	7.2	13.1	11.8	.044
12...	--	30.0	3.4	511	6.9	12.8	--	.045
JUN								
*03...	1.20	.10	13.3	--	--	--	--	--
*17...	1.20	.10	18.9	--	--	--	--	--
*25...	2.40	.10	20.0	--	--	--	--	--
29...	5.90	--	--	--	--	--	--	--
29...	--	.50	21.5	489	9.0	9.4	2.54	.024
29...	--	34.0	7.0	512	7.9	.3	--	.060
JUL								
*03...	6.10	.10	24.4	--	--	--	--	--
*14...	3.70	.10	24.4	--	--	--	--	--
*24...	5.80	.10	27.8	--	--	--	--	--
25...	5.40	--	--	--	--	--	--	--
25...	--	.50	27.6	493	8.9	8.6	3.52	.015
25...	--	31.5	6.2	520	8.0	8.0	--	.058
AUG								
*01...	4.60	.10	28.9	--	--	--	--	--
*15...	4.90	.10	25.0	--	--	--	--	--
18...	4.85	--	--	--	--	--	--	--
18...	--	.50	25.2	488	8.8	9.0	3.14	.012
18...	--	15.0	12.0	518	7.9	2.3	--	.013
18...	--	31.0	6.1	523	7.9	7.0	--	.082
*20...	4.30	.10	26.7	--	--	--	--	--

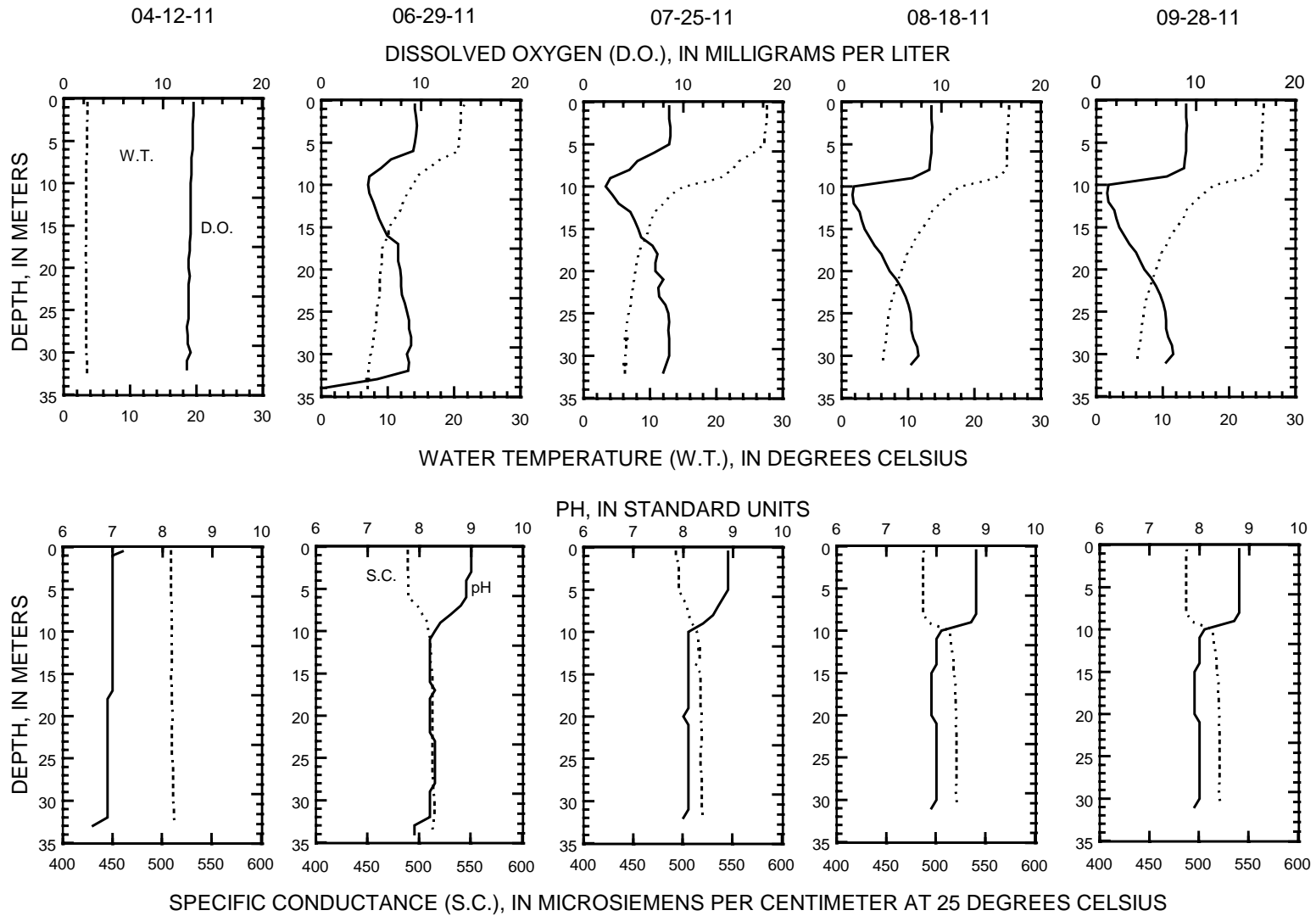
434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

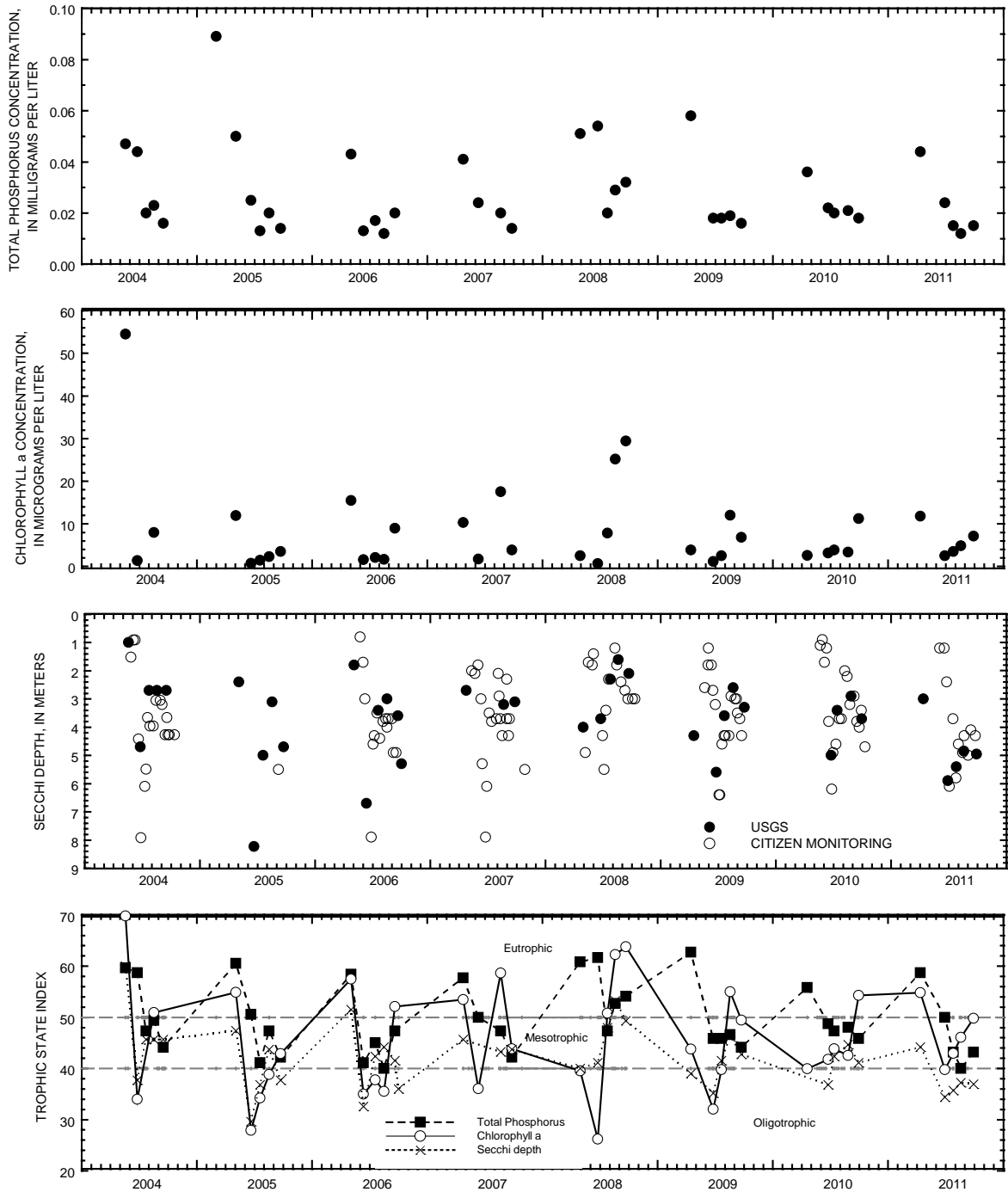
WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011
 (Milligrams per liter unless otherwise indicated)

SEP								
*01...	5.00	.10	24.4	--	--	--	--	--
*10...	4.10	.10	22.8	--	--	--	--	--
*24...	4.30	.10	17.8	--	--	--	--	--
28...	4.95	--	--	--	--	--	--	--
28...	--	.50	16.6	492	8.6	9.0	7.14	.015
28...	--	23.0	8.5	516	7.9	4.5	--	.022
28...	--	31.5	6.1	518	7.9	3.4	--	.073

434928088570000 GREEN LAKE AT EAST END NEAR GREEN LAKE, WI

LAKE-DEPTH PROFILES, APRIL 12 TO SEPTEMBER 28, 2011





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

435009088550100 GREEN LAKE INLET, SITE 1, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°50'09", long 88°55'01", in NE ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, APRIL 12 TO SEPTEMBER 28, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Phos- phorus, water, unfltrd mg/L as P (00665)
APR 2011							
12...	>1.00	--	--	--	--	--	--
12...	--	.50	12.1	656	8.0	12.1	.082
JUN							
29...	.50	--	--	--	--	--	--
29...	--	.10	25.5	698	8.4	10.6	.113
JUL							
25...	.80	--	--	--	--	--	--
25...	--	.10	29.1	702	8.5	12.8	.196
AUG							
18...	>.80	--	--	--	--	--	--
18...	--	.10	24.4	813	7.9	4.3	.112
SEP							
28...	>.80	--	--	--	--	--	--
28...	--	.10	15.6	646	8.1	10.9	.093

43494808852200 GREEN LAKE INLET, SITE 2, NEAR GREEN LAKE, WI

LOCATION.--Lat 43°49'48", long 88°55'22", in SW ¼ NW ¼ sec.26, T.16 N., R.13 E., Green Lake County, Hydrologic Unit 04030201, about one mile southeast of the City of Green Lake.

PERIOD OF RECORD.--May 2006 to current year.

REMARKS.--Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA APRIL 12 TO SEPTEMBER 28, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Phos- phorus, water, unfltrd mg/L as P (00665)
APR 2011							
12...	.80	--	--	--	--	--	--
12...	--	.50	14.1	629	7.6	10.1	.077
JUN							
29...	.50	--	--	--	--	--	--
29...	--	.10	25.8	698	8.4	9.6	.121
JUL							
25...	1.10	--	--	--	--	--	--
25...	--	.10	28.6	636	8.5	11.9	.225
AUG							
18...	>.90	--	--	--	--	--	--
18...	--	.10	24.1	805	7.9	4.2	.115
SEP							
28...	>.80	--	--	--	--	--	--
28...	--	.10	15.6	652	8.1	10.5	.088

425715089164700 LAKE KEGONSA AT BARBER DRIVE NEAR STOUGHTON, WI

LOCATION.--Lat 42°57'15", long 89°16'47" referenced to North American Datum of 1927, in SW ¼ NE ¼ NE ¼ sec.26, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on downstream side of bridge on Barber Drive, 3.5 mi northwest of Stoughton.

SURFACE AREA.--1.05 mi².

DRAINAGE AREA.--386 mi².

PERIOD OF RECORD.--October 2003 to current year.

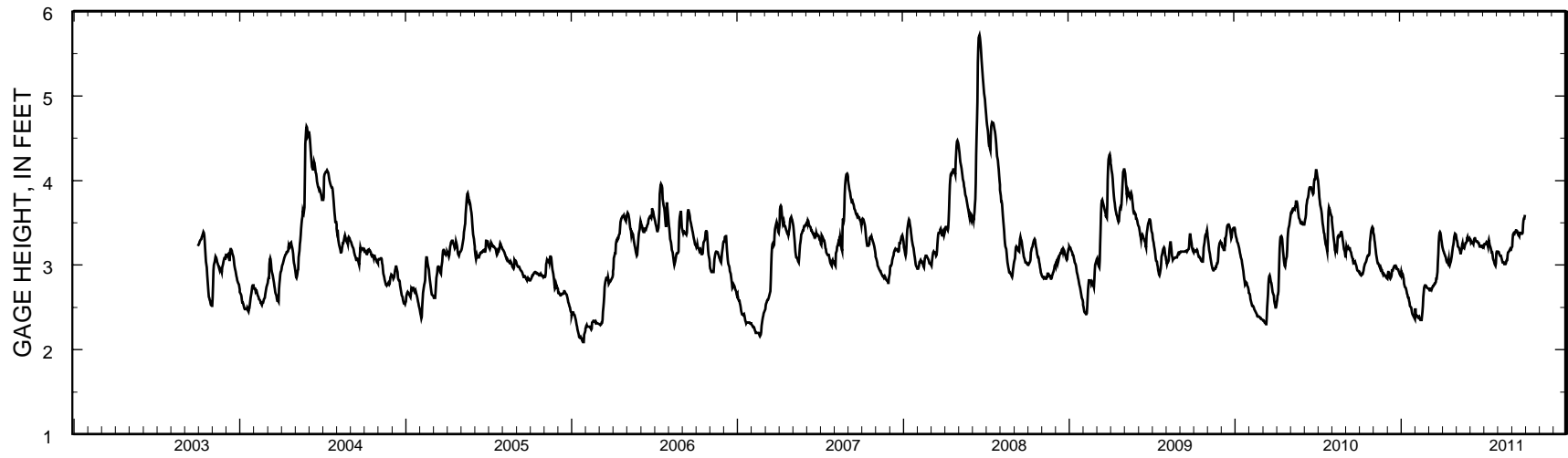
GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above sea level (levels from Wisconsin Department of Transportation benchmark).

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.73 ft, June 16, 2008; minimum observed, 2.07 ft, Jan.27, 2006.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.63 ft, Sept. 30; minimum observed, 2.30 ft, Feb. 13.

GAGE HEIGHT, FEET WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011 DAILY MEAN VALUES [e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.91	3.39	2.84	2.92	2.36	2.72	3.21	3.33	3.30	3.22	3.15	3.21
2	2.91	3.35	2.89	2.89	2.49	2.71	3.19	3.30	3.30	3.24	3.15	3.22
3	2.89	3.30	2.92	2.91	2.42	2.70	3.17	3.29	3.27	3.25	3.15	3.31
4	2.88	3.27	2.92	2.90	2.41	2.70	3.16	3.26	3.28	3.25	3.13	3.36
5	2.89	3.22	2.91	2.89	2.40	2.72	3.14	3.22	3.27	3.26	3.12	3.37
6	2.89	3.18	2.88	2.86	2.40	2.72	3.13	3.21	3.26	3.27	3.11	3.36
7	2.90	3.13	2.85	2.84	2.39	2.72	3.10	3.20	3.26	3.26	3.11	3.36
8	2.90	3.10	2.84	2.78	2.39	2.71	3.09	3.18	3.25	3.25	3.11	e3.38
9	2.92	3.07	2.85	2.76	2.38	2.74	3.06	3.17	3.29	3.24	3.09	3.39
10	2.94	3.04	2.86	2.74	2.39	2.75	3.04	3.14	3.31	3.22	3.07	3.39
11	2.97	3.02	2.88	2.73	2.37	2.75	3.03	3.14	3.32	3.28	3.05	3.41
12	2.99	3.02	2.94	2.71	2.36	2.76	3.03	3.17	3.32	3.30	3.03	3.41
13	3.01	3.01	2.94	2.69	2.35	2.77	3.02	3.19	3.30	3.27	3.03	3.40
14	3.02	2.98	2.96	2.66	2.35	2.78	3.04	3.24	3.29	3.24	3.03	3.38
15	3.04	2.97	2.97	2.65	2.35	2.78	3.07	3.26	3.28	3.21	3.01	3.36
16	3.06	2.96	2.98	2.62	2.35	2.79	3.00	3.22	3.28	3.19	3.01	3.35
17	3.08	2.97	2.99	2.61	2.40	2.80	2.99	3.21	3.28	3.17	3.01	3.35
18	3.10	2.96	2.99	2.61	2.45	2.84	3.01	3.20	3.27	3.15	3.01	3.34
19	3.11	2.94	2.98	2.58	2.52	2.84	3.04	3.22	3.26	3.15	3.02	3.38
20	3.11	2.94	2.97	2.56	2.62	2.92	3.07	3.24	3.26	3.12	3.05	3.38
21	3.12	2.91	2.98	2.52	2.73	3.04	3.10	3.26	3.24	3.08	3.06	3.37
22	3.12	2.91	2.97	2.51	2.75	3.13	3.14	3.26	3.22	3.06	3.06	3.37
23	3.14	2.89	2.96	2.50	2.76	3.27	3.18	3.27	3.22	3.05	3.12	3.37
24	3.27	2.90	2.95	2.47	2.76	3.34	3.22	3.28	3.22	3.03	3.15	3.37
25	3.31	2.89	2.95	2.44	2.75	3.38	3.24	3.32	3.23	3.01	3.16	3.38
26	3.40	2.88	2.93	2.42	2.75	3.39	3.28	3.33	3.23	2.99	3.17	3.48
27	3.42	2.87	2.92	2.41	2.74	3.38	3.33	3.31	3.22	3.02	3.18	3.53
28	3.44	2.87	2.90	2.40	2.73	3.35	3.35	3.30	3.21	3.14	3.19	3.55
29	3.45	2.86	2.89	2.39	---	3.31	3.37	3.31	3.22	3.16	3.18	3.55
30	3.44	2.85	2.88	2.38	---	3.28	3.36	3.32	3.23	3.16	3.18	3.58
31	3.43	---	2.89	2.37	---	3.24	---	3.31	---	3.16	3.20	---
Mean	3.10	3.02	2.92	2.64	2.50	2.95	3.14	3.25	3.26	3.17	3.10	3.39
Max	3.45	3.39	2.99	2.92	2.76	3.39	3.37	3.33	3.32	3.30	3.20	3.58
Min	2.88	2.85	2.84	2.37	2.35	2.70	2.99	3.14	3.21	2.99	3.01	3.21



Stage hydrograph for Lake Kegonsa, 1993-2011.

05427235 LAKE KOSHKONONG NEAR NEWVILLE, WI

LOCATION.--Lat 42°51'27", long 88°56'27" referenced to North American Datum of 1927, in NW ¼ NE ¼ sec.34, T.5 N., R.13 E., Jefferson County, WI, Hydrologic Unit 07090001, 80 ft east of Pottawatomi Trail Bridge at Bingham Point Estates, and 4.5 mi northeast of Newville.

SURFACE AREA.—16.34 mi²

DRAINAGE AREA.--2,560 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 769.77 ft above NAVD of 1988 (Wisconsin Department of Transportation bench mark).

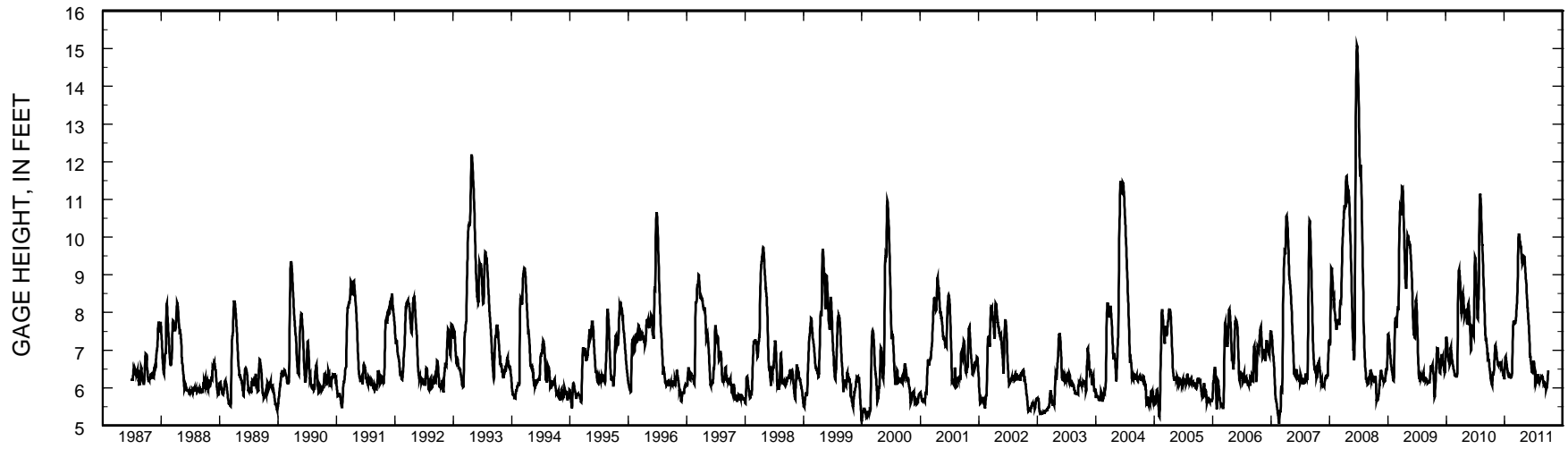
REMARKS.--Lake level regulated by dam at Indianford. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum recorded gage height, 15.13 ft, June 21, 22, 2008; minimum recorded, 5.06 ft, Feb. 22, 2007.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 10.09 ft, Mar. 30; minimum recorded gage height, 5.93 ft, Sept. 18.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES**
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.43	7.04	6.69	6.39	6.30	7.77	10.04	9.49	7.62	6.70	6.26	6.13
2	6.40	7.08	6.69	6.53	6.34	7.75	10.01	9.48	7.49	6.70	6.23	6.12
3	6.32	7.11	6.68	6.63	6.35	7.73	9.95	9.45	7.38	6.65	6.21	6.14
4	6.28	7.14	6.68	6.71	6.32	7.70	9.94	9.41	7.27	6.58	6.16	6.17
5	6.25	7.12	6.67	6.77	6.30	7.71	9.88	9.34	7.16	6.53	6.17	6.13
6	6.23	7.09	6.65	6.81	6.28	7.71	9.84	9.32	7.03	6.46	6.19	6.10
7	6.21	7.06	6.62	6.83	6.27	7.72	9.81	9.25	6.89	6.39	6.20	6.10
8	6.19	7.04	6.60	6.82	6.27	7.72	9.79	9.18	e6.80	6.33	6.21	6.08
9	6.16	7.01	6.58	6.80	6.27	7.76	9.76	9.08	e6.85	6.27	6.28	6.06
10	6.15	6.97	6.57	6.77	6.27	7.79	9.74	9.01	e6.82	6.22	6.27	6.06
11	6.12	6.94	6.57	6.73	6.27	7.84	9.75	8.93	e6.78	6.26	6.25	6.07
12	6.10	6.89	6.61	6.70	6.28	7.91	9.71	8.89	e6.73	6.25	6.24	6.06
13	6.10	6.81	6.58	6.66	6.29	7.98	9.67	8.85	e6.68	6.19	6.28	6.07
14	6.06	6.79	6.54	6.62	6.31	8.04	9.61	8.82	e6.64	6.13	6.30	6.05
15	6.13	6.75	6.51	6.59	6.32	8.11	9.51	8.74	e6.59	6.12	6.29	6.01
16	6.20	6.73	6.49	6.54	6.34	8.19	9.47	8.63	e6.55	6.16	6.29	5.98
17	6.28	6.71	6.47	6.52	6.39	8.25	9.43	8.54	6.52	6.18	6.29	5.96
18	6.33	6.68	6.45	6.49	6.53	8.32	9.37	8.45	6.48	6.21	6.30	5.96
19	6.36	6.64	6.43	6.45	6.72	8.41	9.33	8.38	6.44	6.21	6.29	6.00
20	6.37	6.62	6.41	6.42	6.95	8.55	9.32	8.30	6.42	6.21	6.30	5.99
21	6.36	6.59	6.40	6.40	7.22	8.75	9.29	8.22	6.41	6.20	6.29	6.04
22	6.33	6.62	6.37	6.38	7.41	8.96	9.28	8.13	6.43	6.21	6.26	6.07
23	6.33	6.64	6.35	6.36	7.55	9.24	9.32	8.12	6.50	6.21	6.27	6.09
24	6.42	6.58	6.34	6.34	7.65	9.49	9.33	8.03	6.53	6.21	6.32	6.11
25	6.43	6.65	6.33	6.32	7.71	9.70	9.34	7.97	6.57	6.20	6.29	6.14
26	6.49	6.63	6.31	6.31	7.75	9.88	9.36	7.92	6.62	6.18	6.26	6.23
27	6.61	6.62	6.29	6.30	7.77	9.98	9.41	7.83	6.67	6.24	6.24	6.29
28	6.70	6.60	6.27	6.30	7.77	10.04	9.44	7.78	6.72	6.37	6.21	6.31
29	6.77	6.59	6.24	6.29	---	10.07	9.46	7.75	6.72	6.36	6.18	6.40
30	6.90	6.64	6.23	6.29	---	10.07	9.45	7.70	6.71	6.31	6.15	6.43
31	6.99	---	6.27	6.29	---	10.06	---	7.65	---	6.28	6.15	---
Mean	6.35	6.81	6.48	6.53	6.72	8.55	9.59	8.60	6.77	6.31	6.25	6.11
Max	6.99	7.14	6.69	6.83	7.77	10.07	10.04	9.49	7.62	6.70	6.32	6.43
Min	6.06	6.58	6.23	6.29	6.27	7.70	9.28	7.65	6.41	6.12	6.15	5.96



Stage hydrograph for Lake Koshkonong, 1987-2011.

05428000 LAKE MENDOTA AT MADISON, WI

LOCATION.--Lat 43°05'42", long 89°22'12" referenced to North American Datum of 1927, in NW ¼ SE ¼ sec.12, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in county boat house at dam at outlet, in Madison.

SURFACE AREA.—15.2 mi².

DRAINAGE AREA.--233 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--January 1916 to January 1985 (incomplete), February 1985 to current year.

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

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, gage datum was 847.82 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

REMARKS.--Lake level regulated by concrete dam with two 12-foot gates and 20-foot lock at outlet. Gage-height telemeter at station.

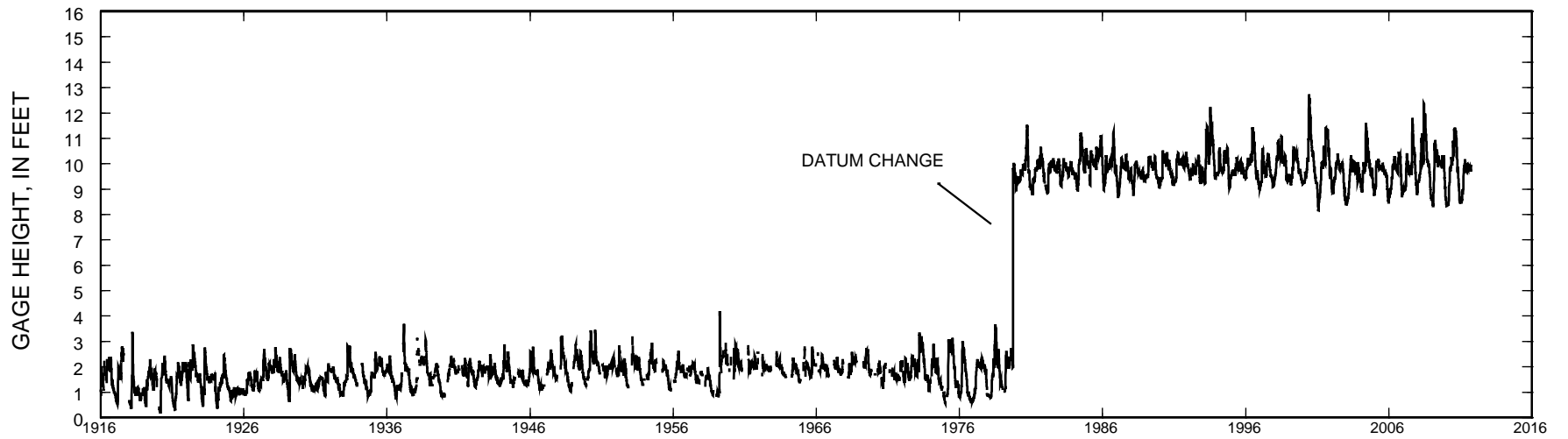
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 12.75 ft, June 5, 2000; minimum observed, 8.02 ft, Feb. 24 to Mar. 10, 1920, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 10.71 ft, Oct. 1; minimum recorded, 8.39 ft, Dec. 30.

GAGE HEIGHT, FEET WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011 DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	10.68	9.72	8.94	8.49	8.57	8.90	9.77	10.13	9.79	9.91	9.88	9.85
2	10.63	9.70	8.88	8.51	8.62	8.90	9.78	e10.10	9.74	9.93	9.87	9.86
3	10.56	9.68	8.83	8.52	8.60	8.89	e9.79	e10.07	9.72	9.92	9.87	e9.92
4	10.51	9.66	8.82	8.53	8.60	8.89	e9.91	e10.04	9.73	9.91	9.85	e9.92
5	10.46	9.62	8.80	8.53	8.60	8.92	e9.94	e10.00	9.72	9.90	9.84	e9.88
6	10.42	9.57	8.75	8.53	8.61	8.92	e9.91	9.99	9.71	9.89	9.83	e9.87
7	10.38	9.53	8.69	8.53	8.61	8.92	e9.93	9.96	9.72	9.87	9.87	e9.86
8	10.33	9.50	8.63	8.53	8.60	8.93	e9.91	9.95	9.72	9.86	9.88	e9.84
9	10.29	9.48	8.61	8.52	8.60	8.96	e9.91	e9.92	9.78	9.84	9.88	e9.84
10	10.25	9.45	8.59	8.52	8.60	8.97	e9.93	e9.94	9.79	9.83	9.85	e9.84
11	10.20	9.43	8.58	8.53	8.59	8.97	e9.94	e9.94	9.79	9.83	9.83	e9.85
12	10.16	9.41	e8.58	8.53	8.59	8.98	e9.89	e9.99	9.78	9.83	9.81	e9.87
13	10.12	9.39	e8.59	8.52	8.59	8.99	e9.88	e9.97	9.76	9.80	9.86	e9.80
14	10.06	9.38	e8.60	8.52	8.58	9.00	e9.83	e9.94	9.74	9.77	9.89	e9.75
15	10.0	9.35	e8.60	8.53	8.58	9.00	e9.85	9.91	9.74	9.76	9.89	e9.72
16	9.94	9.32	8.61	8.53	8.58	9.02	9.89	9.87	9.75	9.76	9.88	e9.72
17	9.90	9.31	8.59	8.54	8.59	9.04	9.87	9.84	9.75	9.77	9.88	e9.71
18	9.84	9.28	8.57	8.56	8.66	9.08	9.84	9.82	9.74	9.80	9.87	e9.71
19	9.79	9.23	8.55	8.56	8.75	9.11	9.87	9.81	9.80	9.80	9.86	e9.73
20	9.74	9.21	8.53	8.55	8.83	9.21	9.94	9.79	9.86	9.79	9.88	e9.77
21	9.69	9.17	8.53	8.55	8.92	9.38	9.94	9.77	9.88	9.79	9.88	9.77
22	9.65	9.17	8.52	8.55	8.94	9.50	9.96	9.76	9.92	9.78	9.86	9.75
23	9.64	9.15	8.50	8.54	8.94	9.66	10.01	9.76	9.96	9.79	9.88	9.74
24	9.72	9.09	8.50	8.53	8.94	9.73	10.02	9.74	9.97	9.78	9.91	9.74
25	9.74	9.13	8.49	8.53	8.93	9.76	10.01	9.80	9.96	9.77	9.89	9.74
26	9.83	9.08	8.48	8.53	8.93	9.77	10.08	9.85	9.95	9.76	9.88	9.83
27	9.87	9.04	8.46	8.53	8.93	9.77	10.15	9.84	9.95	9.81	9.88	9.90
28	9.83	8.99	8.45	8.54	8.92	9.77	10.17	9.82	9.94	9.87	9.87	9.91
29	9.78	8.97	8.43	8.53	---	9.77	10.16	9.81	9.93	9.88	9.85	9.95
30	9.76	8.97	8.43	8.54	---	9.77	10.12	9.81	9.91	9.88	9.84	9.94
31	9.74	---	8.45	8.54	---	9.77	---	9.80	---	9.88	9.85	---
Mean	10.05	9.33	8.60	8.53	8.71	9.23	9.94	9.89	9.82	9.83	9.87	9.82
Max	10.68	9.72	8.94	8.56	8.94	9.77	10.17	10.13	9.97	9.93	9.91	9.95
Min	9.64	8.97	8.43	8.49	8.57	8.89	9.77	9.74	9.71	9.76	9.81	9.71



Stage hydrograph for Lake Mendota, 1916-2011.

430251088284700 MIDDLE GENESEE LAKE, AT GENESEE LAKE ROAD, NEAR OCONOMOWOC, WI

LOCATION.--Lat 43°02'51", long 88°28'47", in SW ¼ SW ¼ SW ¼ sec.22, T. 7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at the southwest side of the lake about 2 miles south of Oconomowoc.

SURFACE AREA.--0.17 mi².

DRAINAGE AREA.--Unknown.

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

GAGE.--Staff gage. Local observer, Tom Schubring provided most readings of gage. Datum of gage is about 0.0 ft above NGVD of 1929.

EXTREMES FOR THE PERIOD OF RECORD.--Maximum observed gage height, 869.65 ft, July 12, 2008; minimum observed, 863.88 ft, Oct. 31, 2005.

EXTREMES FOR CURRENT YEAR.--Maximum observed gage height, 867.48 ft, Oct. 3; minimum observed, 865.75 ft, Sept. 23.

**GAGE HEIGHT, FT
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**

Date	Gage Height, ft	Date	Gage Height, ft	Date	Gage Height, ft
October 3	867.48	May 18	867.07	July 24	866.57
10	867.40	23	867.11	31	866.59
15	867.28	28	867.09	August 1	866.59
18	867.20	31	867.05	4	866.55
21	867.14	June 4	866.99	12	866.41
24	867.22	7	866.97	18	866.35
29	867.18	16	866.93	29	866.17
31	867.12	19	866.89	31	866.15
November 2	867.10	21	866.87	September 1	866.13
7	867.02	25	866.93	10	865.97
8	867.07	28	866.85	14	865.87
April 29	867.08	July 5	866.75	21	865.79
30	867.05	7	866.71	23	865.75
May 1	867.05	9	866.65	29	865.85
5	867.03	11	866.71		
10	867.11	15	866.63		

05429000 LAKE MONONA AT MADISON, WI

LOCATION.--Lat 43°03'48", long 89°23'49" referenced to North American Datum of 1927, in SE ¼ SW ¼ sec.23, T.7 N., R.9 E., Dane County, WI, Hydrologic Unit 07090001, in Brittingham Park, in Madison.

SURFACE AREA.--5.3 mi².

DRAINAGE AREA.--279 mi² of which 36.6 mi² probably is noncontributing.

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 NGVD of 1929, or 5.60 ft below City of Madison datum. Prior to Oct. 1, 1979, datum 843.61 ft; prior to Nov. 15, 1971, nonrecording gage at same site.

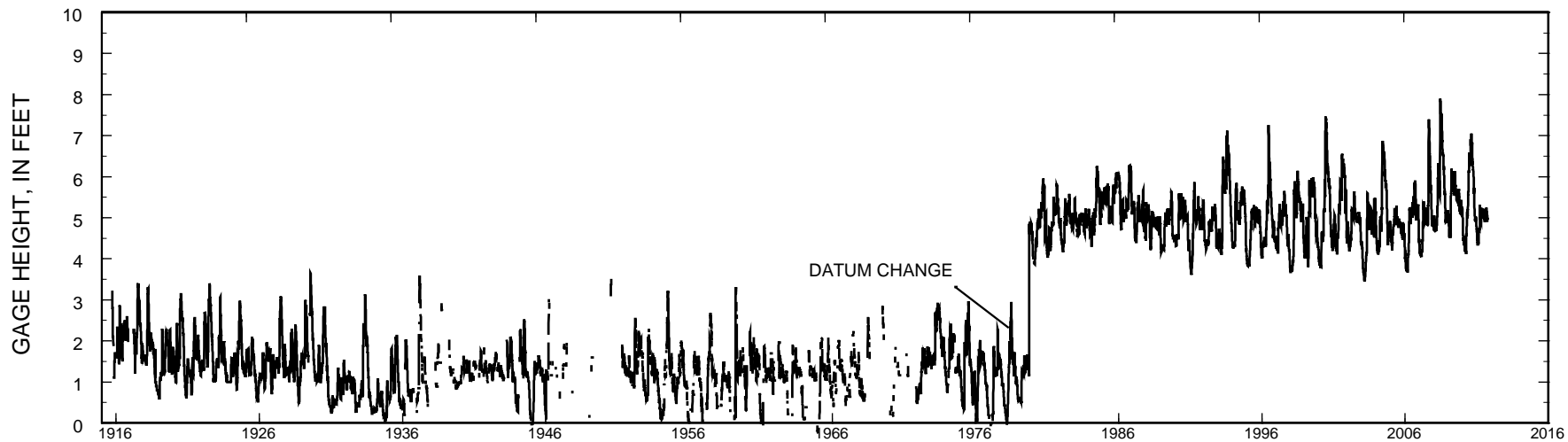
REMARKS.--Lake level regulated by concrete dam with four 12-foot stop-log sections and 12-foot lock at outlet of Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.92 ft, June 15, 2008; minimum observed, 3.22 ft, Jan. 20, 1965, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 6.19 ft, Oct. 1, 2; minimum recorded, 4.31 ft, Feb. 1.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

	[e, estimated]											
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.16	5.37	4.91	4.73	e4.35	4.68	5.05	5.19	5.12	5.19	5.01	5.12
2	6.15	5.32	4.92	4.72	4.39	4.66	5.03	5.16	5.14	5.17	5.01	5.12
3	6.13	5.26	4.92	4.69	4.39	4.67	5.02	5.14	5.11	5.15	5.00	5.22
4	6.12	5.20	4.94	4.66	4.38	4.67	5.01	5.12	5.08	5.14	5.00	5.25
5	6.12	5.15	4.94	4.63	4.38	4.69	4.98	5.11	5.05	5.12	5.00	5.23
6	6.11	5.12	4.96	4.60	4.38	4.68	4.98	5.12	5.03	5.13	5.00	5.21
7	6.10	5.11	4.98	4.57	4.37	4.68	4.97	5.11	5.01	5.11	5.03	5.18
8	6.09	5.10	4.99	4.54	4.36	4.68	4.97	5.10	5.00	5.08	5.06	5.16
9	6.09	5.08	5.00	4.52	4.36	4.71	4.97	5.10	5.12	5.07	5.04	5.15
10	6.08	5.07	5.00	4.50	4.36	4.71	4.96	5.09	5.12	5.06	5.02	5.13
11	6.07	5.05	4.99	4.50	4.36	4.71	4.95	5.13	5.10	5.07	5.01	5.12
12	6.05	5.05	5.03	4.48	4.35	4.72	4.94	5.24	5.08	5.06	5.01	5.10
13	6.02	5.05	4.98	4.46	4.35	4.70	4.92	5.24	5.07	5.04	5.04	5.08
14	5.98	5.03	4.96	4.45	4.34	4.71	4.92	5.23	5.06	5.02	5.06	5.04
15	5.95	5.03	4.95	4.44	4.36	4.72	4.93	5.21	5.08	4.99	5.05	5.00
16	5.92	5.01	4.94	e4.40	4.38	4.72	4.91	5.16	5.07	4.98	5.04	4.98
17	5.88	5.00	4.91	e4.41	4.43	4.74	4.88	5.13	5.09	4.97	5.04	4.97
18	5.85	4.98	4.89	e4.40	4.51	4.76	4.89	5.11	5.09	4.96	5.04	4.97
19	5.81	4.97	4.87	e4.39	4.56	4.76	4.95	5.08	5.11	4.96	5.04	5.00
20	5.77	4.96	4.85	e4.38	4.63	4.89	5.01	5.06	5.12	4.94	5.07	4.98
21	5.72	4.95	4.85	e4.37	4.72	5.07	5.05	5.05	5.13	4.92	5.07	4.95
22	5.63	4.95	4.82	e4.36	4.74	5.17	5.08	5.03	5.21	4.92	5.07	4.93
23	5.58	4.92	4.80	e4.35	4.74	5.32	5.11	5.00	5.22	4.92	5.11	4.91
24	5.67	4.94	4.79	e4.35	4.73	5.32	5.11	4.99	5.20	4.91	5.14	4.90
25	5.67	4.94	4.78	e4.35	4.71	5.31	5.11	5.17	5.20	4.89	5.13	4.90
26	5.73	4.91	4.76	e4.35	4.70	5.28	5.18	5.20	5.21	4.89	5.13	5.03
27	5.68	4.90	4.74	e4.35	4.70	5.23	5.24	5.17	5.20	4.95	5.13	5.07
28	5.63	4.90	4.73	e4.35	4.68	5.18	5.23	5.17	5.16	5.00	5.12	5.05
29	5.56	4.91	4.72	e4.35	---	5.14	5.22	5.17	5.16	5.01	5.11	5.02
30	5.50	4.93	4.72	e4.35	---	5.11	5.23	5.16	5.17	5.01	5.11	4.98
31	5.43	---	4.72	e4.35	---	5.07	---	5.16	---	5.00	5.12	---
Mean	5.88	5.04	4.88	4.46	4.49	4.89	5.03	5.13	5.12	5.02	5.06	5.06
Max	6.16	5.37	5.03	4.73	4.74	5.32	5.24	5.24	5.22	5.19	5.14	5.25
Min	5.43	4.90	4.72	4.35	4.34	4.66	4.88	4.99	5.00	4.89	5.00	4.90



Stage hydrograph for Lake Monona, 1915-2011.

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

LOCATION.--Lat 43°05'51", long 88°27'35", in NW ¼ SE ¼ sec.2, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.--1.20 mi².

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 16 TO AUGUST 26, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Nitrate + nitrite water, fltrd, mg/L as N (00631)
FEB 2011													
16...	--	.50	1.9	613	7.5	11.9	--	.012	--	--	--	--	--
16...	--	18.0	4.0	607	7.1	5.6	--	.038	--	--	--	--	--
APR													
29...	5.75	--	--	--	--	--	--	--	--	--	--	--	--
29...	--	.50	8.6	577	7.5	11.4	1.56	.012	<.002	.69	.021	.34	.353
JUN													
28...	4.30	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	.50	21.9	564	8.4	11.1	2.03	.013	--	--	--	--	--
28...	--	17.5	8.6	587	7.6	2.7	--	.030	--	--	--	--	--
JUL													
26...	3.35	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	.50	28.7	531	8.6	9.2	2.42	.012	--	--	--	--	--
26...	--	18.0	8.6	595	7.6	.1	--	.030	--	--	--	--	--
AUG													
26...	2.85	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	.50	25.1	530	8.5	9.3	--	.012	--	--	--	--	--
26...	--	18.0	8.6	620	7.4	.1	2.24	.025	--	--	--	--	--

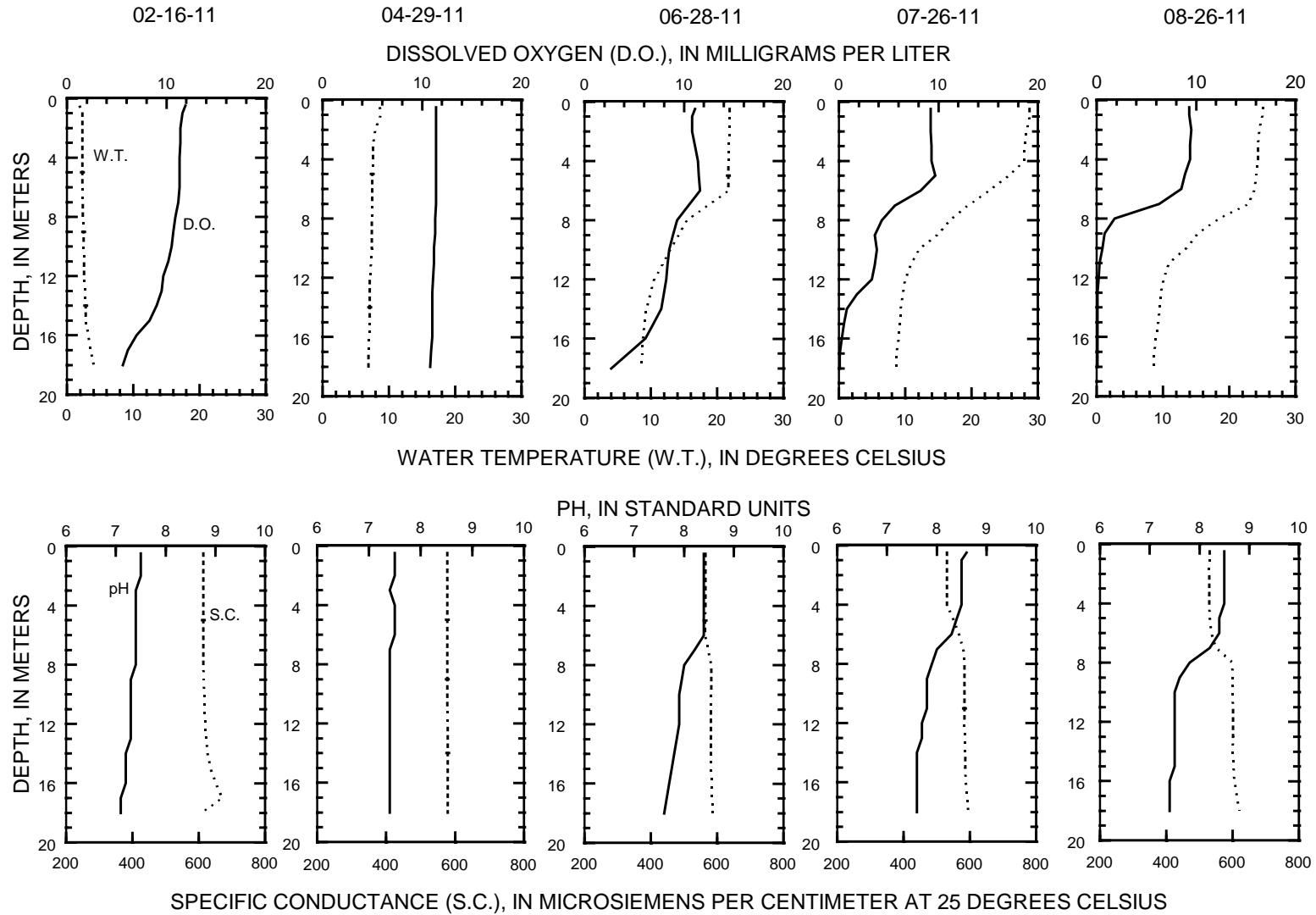
430551088273500 OCONOMOWOC LAKE NO. 1 (CENTER) AT OCONOMOWOC, WI

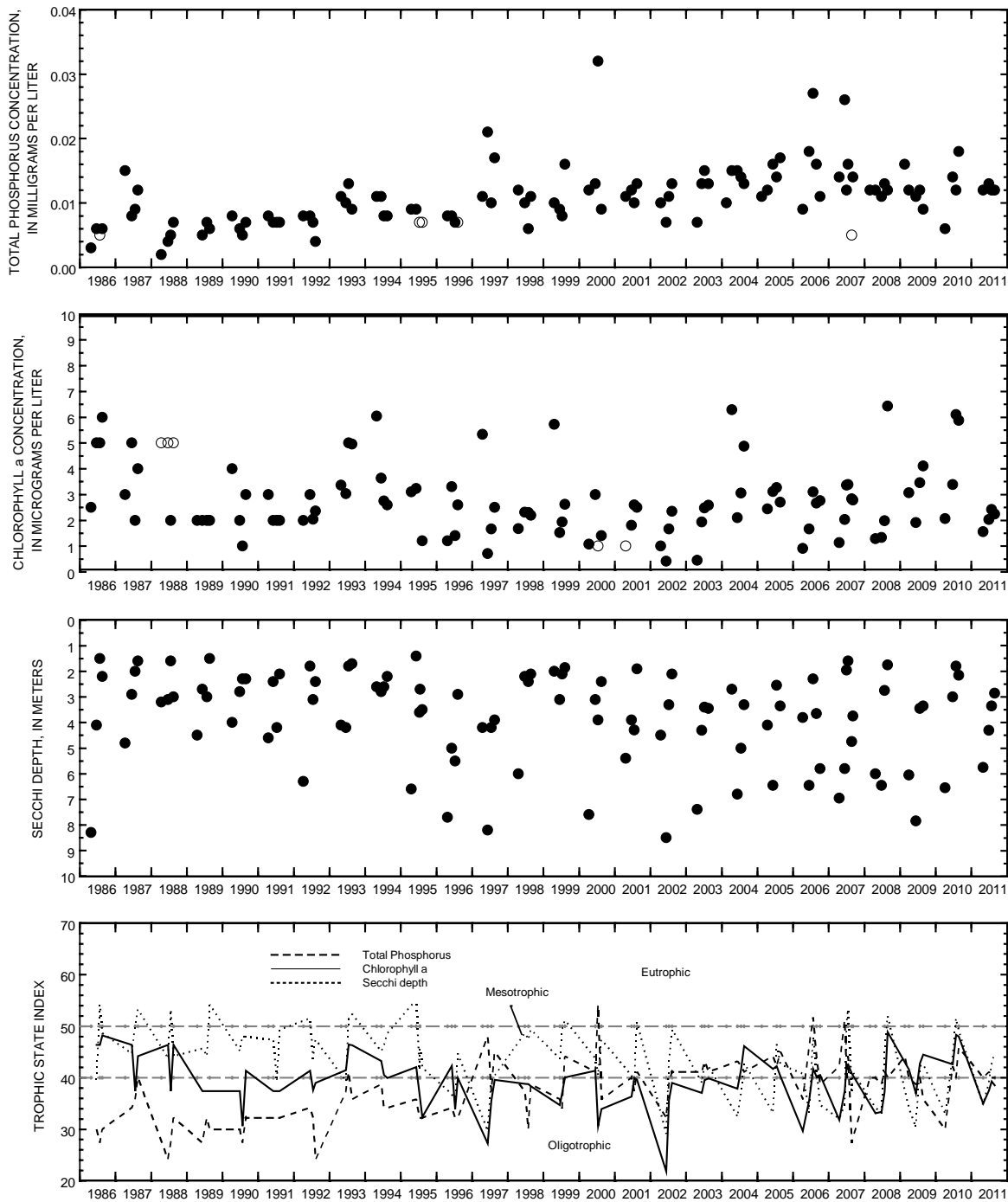
WATER-QUALITY DATA, FEBRUARY 16 TO AUGUST 26, 2011
(Milligrams per liter unless otherwise indicated)

Date	Turbidity white light, det ang 90+/-30 degrees NTU (63675)	Appar- ent color, water, unfltrd Pt-Co units (00081)	Hard- ness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnes- ium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potas- sium, water, fltrd, mg/L (00935)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (00417)	Chlor- ide, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)	Mangan- ese, water, fltrd, ug/L (01056)
FEB 2011													
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
APR													
29...	--	--	--	--	--	--	--	--	--	--	--	--	--
29...	<1.0	15	265	51.8	33.0	21.3	1.90	216	47.7	23.8	9.21	<100	<1.0
JUN													
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
Date	Dis- solved solids dried @ 180degC wat flt mg/L (70300)												
FEB 2011													
16...	--												
16...	--												
APR													
29...	--												
29...	332												

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

LAKE-DEPTH PROFILES, FEBRUARY 16 TO AUGUST 26, 2011





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

(Open circles on the first two 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 ¼ NW ¼ sec.1, T.7 N., R.17 E., Waukesha County, Hydrologic Unit 07090001, at Oconomowoc.

SURFACE AREA.—1.20 mi².

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.

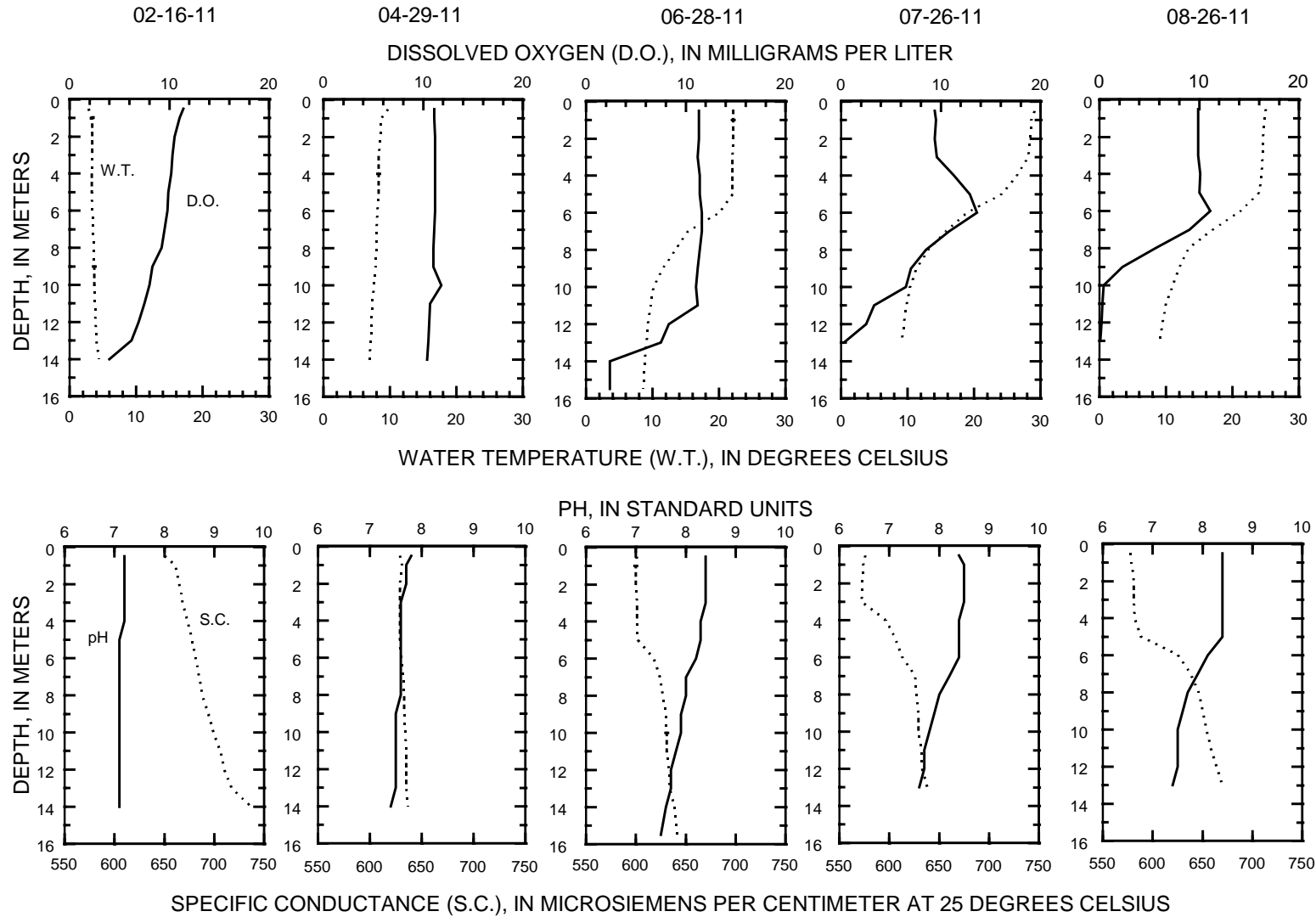
WATER-QUALITY DATA, FEBRUARY 16 TO AUGUST 26, 2011

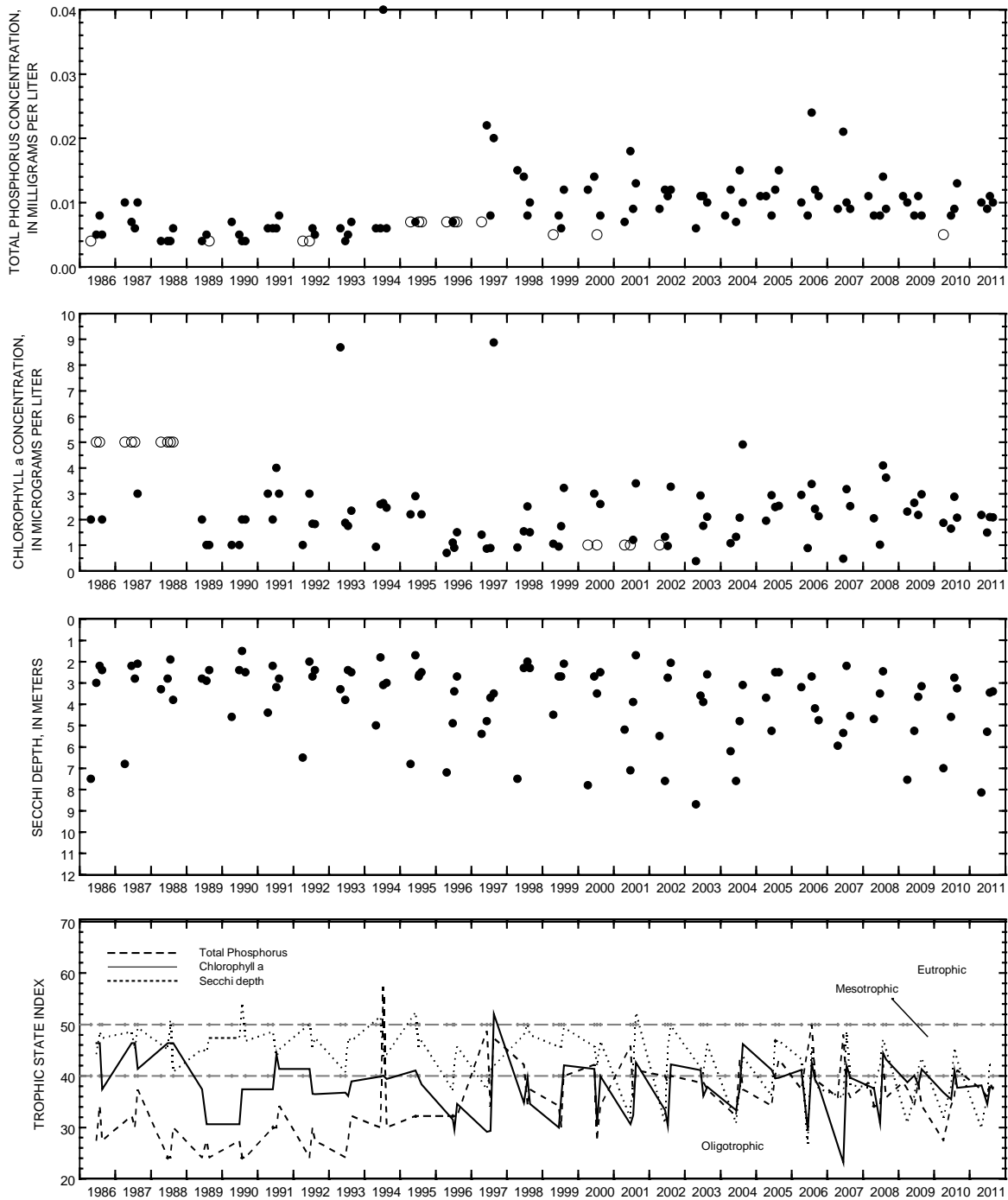
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)
FEB 2011								
16...	--	.50	2.8	650	7.2	11.4	--	.011
16...	--	14.0	4.4	737	7.1	4.0	--	.014
APR								
29...	--	.50	9.7	629	7.8	11.1	2.17	.010
29...	8.15	--	--	--	--	--	--	--
JUN								
28...	5.30	--	--	--	--	--	--	--
28...	--	.50	22.1	601	8.4	11.3	1.49	.009
28...	--	15.5	8.6	641	7.5	2.4	--	.025
JUL								
26...	--	.50	29.1	576	8.4	9.4	2.09	.011
26...	--	13.0	9.1	638	7.6	.3	--	.019
26...	3.45	--	--	--	--	--	--	--
AUG								
26...	--	.50	25.0	578	8.4	9.9	2.08	.010
26...	--	13.0	9.1	670	7.4	.1	--	.038
26...	3.40	--	--	--	--	--	--	--

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

LAKE-DEPTH PROFILES, FEBRUARY 16 TO AUGUST 26, 2011





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

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

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LOCATION.--Lat 42°32'46", long 88°17'58", in NW ¼ SE ¼ sec.13, T.1 N., R.18 E., Walworth County, Hydrologic Unit 07120006, at Powers Lake.

SURFACE AREA.—0.72 mi².

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 16 TO AUGUST 17, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, unfltrd uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
FEB 2011													
16...	--	.50	1.6	566	7.2	12.7	--	.018	--	--	--	--	--
16...	--	6.5	3.9	574	7.3	9.5	--	.014	--	--	--	--	--
APR													
13...	6.60	--	--	--	--	--	--	--	--	--	--	--	--
13...	--	.50	10.4	524	7.5	11.4	1.71	.015	<.002	.57	.045	--	.46
JUN													
28...	3.25	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	.50	22.4	504	8.4	10.6	3.73	.021	--	--	--	--	--
28...	--	9.5	16.9	522	7.4	.5	--	.025	--	--	--	--	--
JUL													
26...	1.90	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	.50	28.3	477	8.6	8.5	4.50	.020	<.002	<.59	--	.66	.57
26...	--	10.0	16.6	529	7.6	.1	--	.028	--	--	--	--	--
AUG													
17...	2.95	--	--	--	--	--	--	--	--	--	--	--	--
17...	--	.50	25.9	484	8.8	9.0	4.43	.013	--	--	--	--	--
17...	--	10.0	16.6	569	7.5	.2	--	.035	--	--	--	--	--

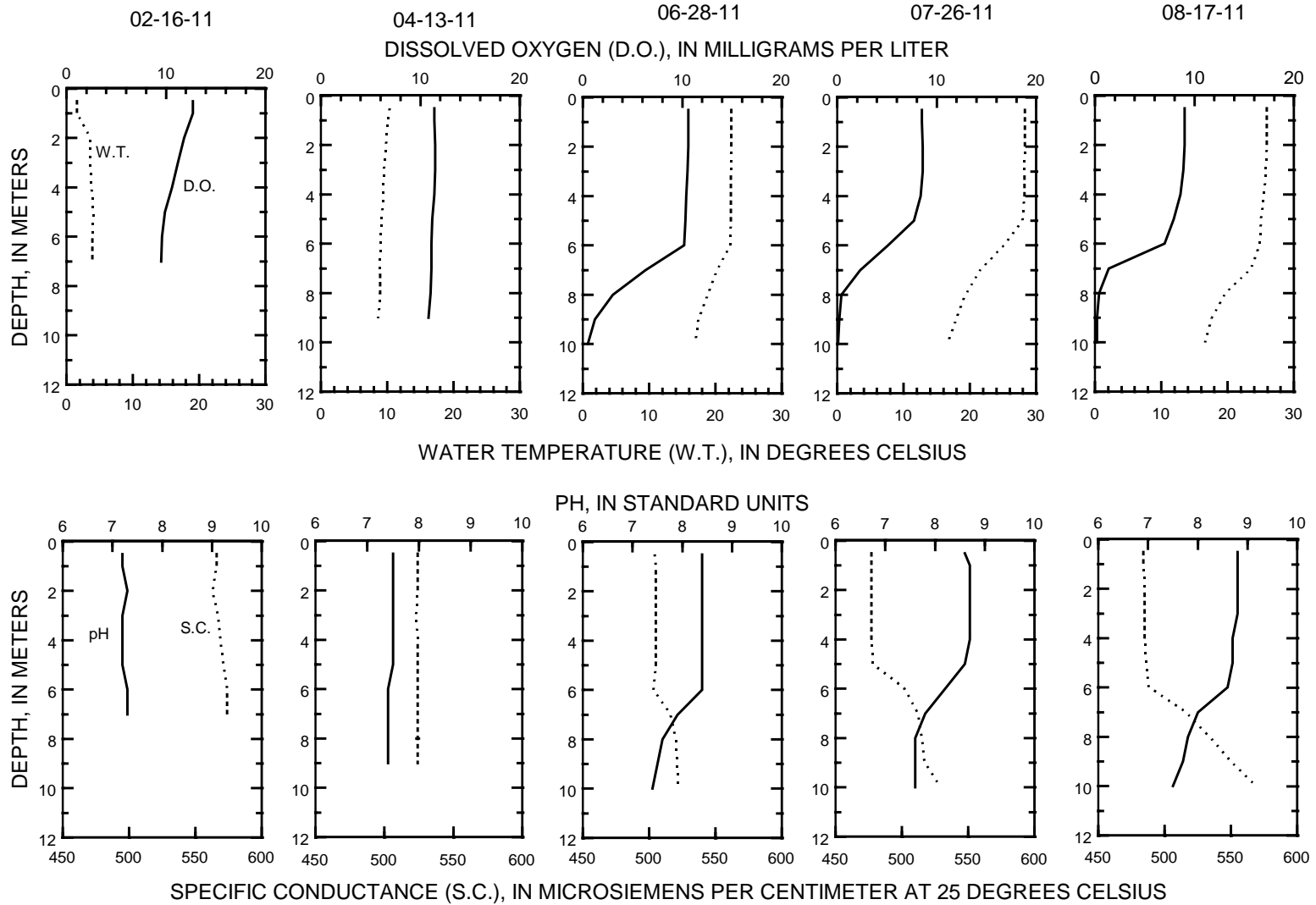
423246088175800 POWERS LAKE AT POWERS LAKE, WI

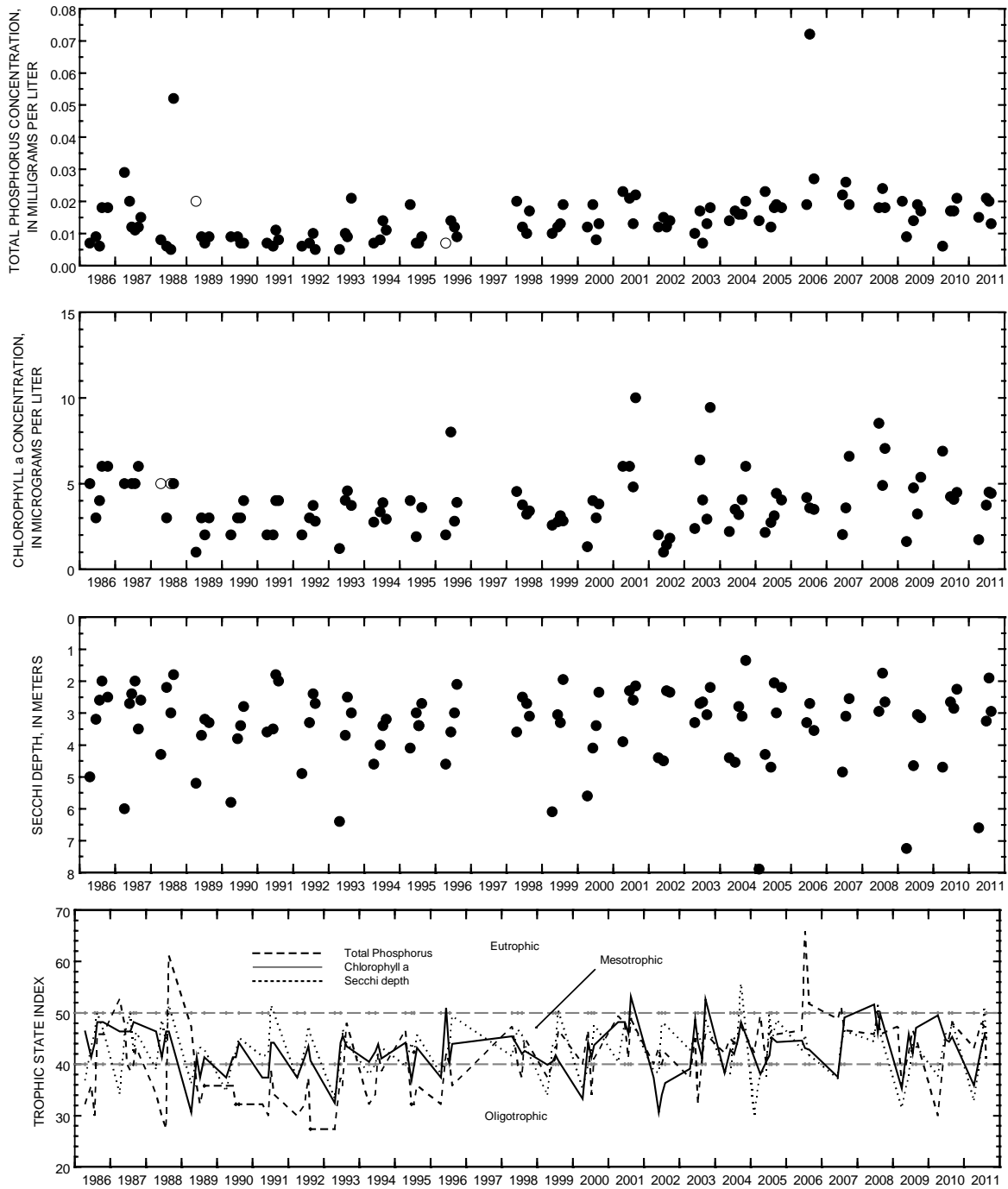
WATER-QUALITY DATA, FEBRUARY 16 TO AUGUST 17, 2011
(Milligrams per liter unless otherwise indicated)

Date	Nitrate + nitrite water, fltrd, mg/L as N (00631)	Turbdty white light, det ang 90+/-30 degrees NTU (63675)	Appar-ent color, water, unfltrd Pt-Co units (00081)	Hard-ness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnes-ium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potas-sium, water, fltrd, mg/L (00935)	ANC, wat unfixed end pt, lab, mg/L as CaCO3 (00417)	Chlor-ide, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)
FEB 2011													
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
APR													
13...	--	--	--	--	--	--	--	--	--	--	--	--	--
13...	.106	<1.0	10	223	37.1	31.6	20.4	1.90	183	43.4	29.3	11.6	<100
JUN													
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	<.019	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
17...	--	--	--	--	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--	--	--	--	--
Date	Mangan-ese, water, fltrd, ug/L (01056)	Dis-solved solids dried @ 180degC wat flt mg/L (70300)											
FEB 2011													
16...	--	--											
16...	--	--											
APR													
13...	--	--											
13...	<1.0	296											

423246088175800 POWERS LAKE AT POWERS LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 16 TO AUGUST 17, 2011





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

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

05429485 LAKE WAUBESA AT MCFARLAND, WI

LOCATION.--Lat 43°00'32", long 89°18'19" referenced to North American Datum of 1927, in SW ¼ SW ¼ sec.3, T.6 N., R.10 E., Dane County, WI, Hydrologic Unit 07090001, on left bank just upstream from bridge on U.S. Highway 51, downstream of dam at outlet of Lake Waubesa and 1.0 mi southwest of McFarland.

SURFACE AREA.--3.25 mi².

DRAINAGE AREA.--327 mi² of which 36.6 mi² probably is noncontributing.

PERIOD OF RECORD.--October 2003 to current year.

REVISED RECORDS.--WSP 805, WDR WI-73-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 840.00 ft above NGVD of 1929 (levels by Wisconsin Department of Natural Resources).

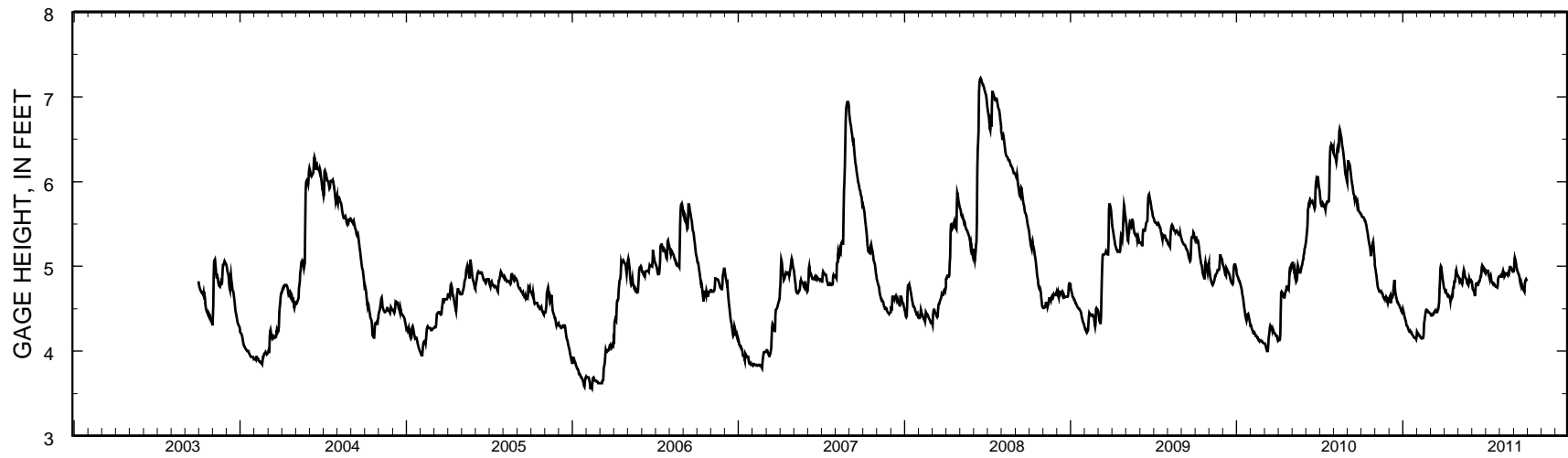
REMARKS.--Lake level regulated by dams at outlets of Lake Mendota and Lake Waubesa. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.22 ft, June 15-17, 2008; minimum observed, 3.50 ft, Feb.14, 2006, current datum.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 5.62 ft, Oct. 1-2; minimum recorded, 4.14 ft, Feb. 12-13.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.62	5.01	4.62	4.50	4.17	4.44	4.74	4.89	4.82	4.92	4.88	4.94
2	5.61	4.96	4.63	4.48	4.23	4.43	4.73	4.88	4.79	4.94	4.88	4.95
3	5.59	4.92	4.61	4.46	4.22	4.42	4.71	4.87	4.74	4.95	4.89	5.05
4	5.58	4.89	4.63	4.44	4.20	4.42	4.72	4.85	4.72	4.94	4.88	5.10
5	5.58	4.84	4.58	4.41	4.20	4.44	4.72	4.82	4.71	4.95	4.88	5.08
6	5.58	4.80	4.58	4.39	4.20	4.44	4.69	4.84	4.69	4.95	4.88	5.06
7	5.57	4.76	4.64	4.37	4.19	4.43	4.67	4.83	4.66	4.91	4.91	5.03
8	5.56	4.74	4.63	4.36	4.18	4.43	4.65	4.82	4.66	4.89	4.93	4.99
9	5.54	4.73	4.63	4.33	4.18	4.46	4.64	4.80	4.74	4.87	4.95	4.97
10	5.54	4.71	4.65	4.30	4.16	4.47	4.64	4.79	4.79	4.85	4.93	4.95
11	5.52	4.70	4.67	4.29	4.16	4.47	4.65	4.82	4.80	4.89	4.91	4.94
12	5.50	4.70	4.75	4.28	4.15	4.48	4.64	4.89	4.80	4.90	4.88	4.92
13	5.48	4.71	4.84	4.26	4.15	4.47	4.63	4.93	4.79	4.87	4.89	4.90
14	5.44	4.71	4.76	4.25	4.16	4.46	4.62	4.96	4.78	4.83	4.92	4.88
15	5.39	4.69	4.70	4.24	4.16	4.46	4.59	4.94	4.78	4.81	4.92	4.84
16	5.35	4.68	4.67	4.23	4.16	4.46	4.63	4.91	4.82	4.80	4.92	4.81
17	5.32	4.68	4.64	4.23	4.21	4.47	4.64	4.88	4.82	4.79	4.91	4.79
18	5.29	4.67	4.62	4.24	4.33	4.50	4.62	4.86	4.83	4.80	4.91	4.77
19	5.26	4.64	4.60	4.23	4.36	4.50	4.64	4.85	4.85	4.80	4.90	4.80
20	5.24	4.63	4.58	4.22	4.40	4.58	4.73	4.83	4.88	4.79	4.92	4.78
21	5.21	4.62	4.58	4.22	4.47	4.74	4.75	4.80	4.88	4.78	4.93	4.76
22	5.16	4.63	4.57	4.20	4.49	4.83	4.75	4.79	4.93	4.77	4.92	4.74
23	5.12	4.63	4.55	4.19	4.49	4.97	4.82	4.79	4.99	4.76	4.96	4.73
24	5.21	4.61	4.54	4.18	4.48	5.00	4.82	4.78	5.01	4.76	4.99	4.71
25	5.22	4.64	4.52	4.17	4.48	4.99	4.82	4.82	5.00	4.76	4.99	4.70
26	5.27	4.63	4.51	4.16	4.47	4.95	4.87	4.86	4.98	4.75	4.98	4.79
27	5.29	4.62	4.50	4.16	4.46	4.91	4.94	4.84	4.96	4.77	4.97	4.83
28	5.24	4.59	4.48	4.16	4.46	4.87	4.96	4.82	4.97	4.85	4.96	4.84
29	5.17	4.57	4.47	4.16	---	4.83	4.93	4.82	4.96	4.87	4.96	4.85
30	5.11	4.60	4.46	4.15	---	4.80	4.89	4.83	4.93	4.88	4.94	4.84
31	5.06	---	4.48	4.14	---	4.76	---	4.82	---	4.88	4.94	---
Mean	5.37	4.71	4.60	4.27	4.28	4.61	4.73	4.85	4.84	4.85	4.92	4.88
Max	5.62	5.01	4.84	4.50	4.49	5.00	4.96	4.96	5.01	4.95	4.99	5.10
Min	5.06	4.57	4.46	4.14	4.15	4.42	4.59	4.78	4.66	4.75	4.88	4.70



Stage hydrograph for Lake Waubesa, 2003-2011.

42484808803100 WIND LAKE, HEADWATER, AT OUTLET AT WIND LAKE, WI

LOCATION.--Lat 42°48'48", long 88°08'31" referenced to North American Datum of 1927, in NE ¼ NW ¼ sec.16, T.4 N., R.20 E., Racine County, WI, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

DRAINAGE AREA.--39.6 mi².

PERIOD OF RECORD.--March 1985 to current year. Prior to October 2000, published as "Wind Lake Outlet".

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

REMARKS.--Lake level regulated by dam with two 10-foot gates at outlet. Lake ice-covered Dec. 3 to Mar. 14. Prior to October 1987, published as Wind Lake at Wind Lake, Wis. Gage-height telemeter at station.

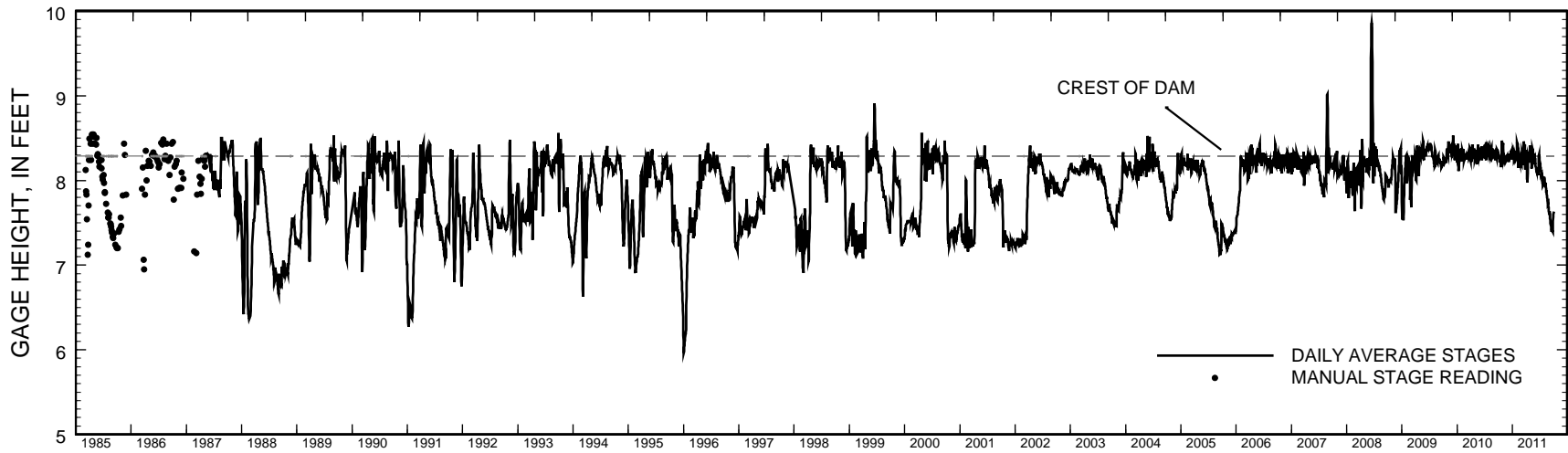
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.88 ft, June 14, 15, 2008; minimum recorded, 5.95 ft, Jan. 2, 1996.

EXTREMES FOR CURRENT YEAR.—Headwater: Maximum recorded gage height, 8.50 ft, Oct. 25; minimum recorded, 7.37 ft, Sept. 18. Tailwater (Feb. 15, 2011 to Sept. 30, 2011): Maximum recorded gage height, 7.71 ft, Mar. 23; minimum recorded, 4.09 ft, May 10.

**GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES**

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.31	8.44	8.28	e8.27	8.36	8.18	8.30	8.22	8.19	8.19	7.99	7.61
2	8.31	8.38	8.27	e8.27	8.45	8.20	8.23	8.23	8.18	8.19	7.98	7.60
3	8.29	8.27	e8.26	8.28	8.43	8.22	8.19	8.25	8.16	8.18	7.97	7.61
4	8.27	8.24	e8.26	8.29	8.42	8.25	8.18	8.26	8.16	8.16	7.95	7.64
5	8.26	e8.24	e8.26	8.32	8.42	8.34	8.12	8.24	8.15	8.15	7.93	7.61
6	8.25	e8.26	e8.25	8.33	8.42	8.32	8.06	8.22	8.13	8.14	7.92	7.57
7	8.24	e8.28	8.24	8.34	8.39	8.25	8.02	8.14	8.13	8.11	7.96	7.55
8	8.23	e8.30	8.23	8.32	8.20	8.21	8.00	8.20	8.11	8.09	7.96	7.53
9	8.23	8.29	8.23	8.30	8.20	8.26	7.98	8.27	8.15	8.07	7.95	7.50
10	8.23	8.29	8.23	8.27	8.15	8.28	7.99	8.35	8.12	8.06	7.93	7.49
11	8.22	8.28	8.25	8.26	e8.19	8.23	8.08	8.32	8.12	8.07	7.90	7.48
12	8.22	8.28	8.32	8.25	e8.23	8.19	8.18	8.31	8.11	8.06	7.87	7.47
13	8.22	8.27	8.31	8.23	8.24	8.18	8.24	8.38	8.09	8.04	7.87	7.46
14	8.20	8.25	8.29	8.24	e8.24	8.22	8.23	8.36	8.08	8.02	7.86	7.44
15	8.19	8.24	8.28	8.27	e8.24	8.36	8.21	8.30	8.08	8.00	7.84	7.42
16	8.17	8.24	8.29	8.28	8.22	8.46	8.29	8.28	8.09	7.99	7.82	7.40
17	8.17	8.25	e8.30	8.30	8.21	8.43	8.27	8.30	8.08	7.98	7.81	7.39
18	8.17	8.23	e8.31	8.31	8.22	8.36	8.25	8.30	8.07	7.97	7.80	7.39
19	8.22	e8.22	e8.31	8.29	8.20	8.26	8.28	8.29	8.07	7.96	7.78	7.44
20	8.26	e8.23	e8.32	8.28	8.20	8.23	8.34	8.30	8.06	7.95	7.77	7.43
21	8.31	e8.24	8.34	8.27	8.29	8.38	8.27	8.31	8.07	7.94	7.76	7.41
22	8.34	e8.26	8.35	8.26	8.27	8.42	8.26	8.30	8.16	7.95	7.73	7.40
23	8.37	8.29	8.35	8.24	8.24	8.42	8.32	8.32	8.19	8.01	7.72	7.40
24	8.47	8.28	8.35	8.24	8.24	8.24	8.30	8.27	8.29	8.01	7.73	7.39
25	8.42	8.29	8.36	8.25	8.22	8.13	8.25	8.28	8.31	7.99	7.71	e7.45
26	8.21	8.28	8.36	8.27	8.22	8.20	8.32	8.24	8.30	7.97	7.69	7.52
27	8.21	8.27	8.33	8.30	8.21	8.33	e8.41	8.20	8.28	8.00	7.68	7.57
28	8.30	8.27	8.31	8.32	8.19	8.25	8.38	8.19	8.27	8.04	7.66	7.59
29	8.37	8.27	8.27	8.34	---	8.22	8.30	8.20	8.24	8.04	7.64	7.60
30	8.41	8.28	e8.26	8.34	---	8.26	8.26	8.21	8.22	8.02	7.62	7.62
31	8.44	---	e8.26	8.34	---	8.36	---	8.20	---	8.01	7.62	---
Mean	8.27	8.27	8.29	8.29	8.27	8.28	8.22	8.27	8.16	8.04	7.82	7.50
Max	8.47	8.44	8.36	8.34	8.45	8.46	8.41	8.38	8.31	8.19	7.99	7.64
Min	8.17	8.22	8.23	8.23	8.15	8.13	7.98	8.14	8.06	7.94	7.62	7.39



Stage hydrograph for Wind Lake, headwater, 1985-2011.

424915088083900 WIND LAKE AT WIND LAKE, WI

LOCATION.--Lat 42°49'15", long 88°08'39", in NW ¼ SW ¼ sec.9, T.4 N., R.20 E., Racine County, Hydrologic Unit 07120006, at Wind Lake.

SURFACE AREA.--1.46 mi².

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 16 TO AUGUST 17, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Total nitro- gen, water, unfltrd mg/L (00600)	Ammonia water, fltrd, mg/L as N (00608)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)
FEB 2011													
16...	--	.50	2.4	604	7.2	10.6	--	.056	--	--	--	--	--
16...	--	9.5	3.6	784	7.1	4.4	--	.090	--	--	--	--	--
APR													
13...	2.15	--	--	--	--	--	--	--	--	--	--	--	--
13...	--	.50	12.5	615	7.7	12.1	12.2	.045	<.002	1.2	.023	--	1.1
JUN													
28...	3.10	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	.50	22.1	615	8.4	9.9	2.32	.018	--	--	--	--	--
28...	--	10.5	14.4	645	7.2	.0	--	.022	--	--	--	--	--
JUL													
26...	--	.50	28.2	600	8.7	8.3	6.88	.021	<.002	<.92	--	.92	.90
26...	--	14.0	14.0	645	7.3	.0	--	.037	--	--	--	--	--
26...	1.90	--	--	--	--	--	--	--	--	--	--	--	--
AUG													
17...	2.25	--	--	--	--	--	--	--	--	--	--	--	--
17...	--	.50	25.1	597	8.8	8.8	6.97	.018	--	--	--	--	--
17...	--	5.0	24.3	594	8.9	8.1	--	.023	--	--	--	--	--
17...	--	10.0	14.7	663	7.5	.1	--	.029	--	--	--	--	--
17...	--	11.5	14.4	666	7.5	.1	--	.029	--	--	--	--	--
17...	--	13.0	14.1	668	7.4	.0	--	.032	--	--	--	--	--

424915088083900 WIND LAKE AT WIND LAKE, WI

WATER-QUALITY DATA, FEBRUARY 16 TO AUGUST 17, 2011

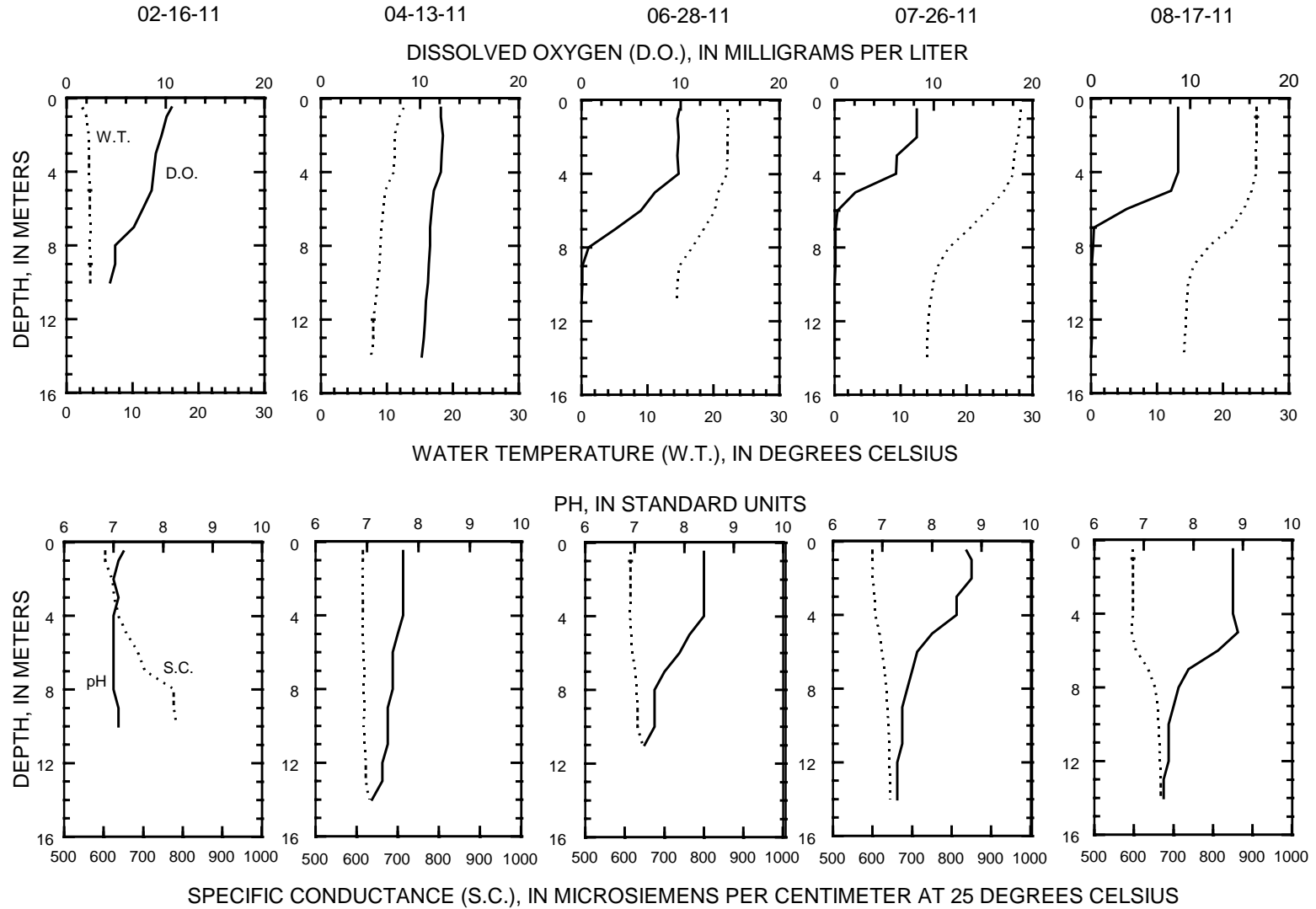
(Milligrams per liter unless otherwise indicated)

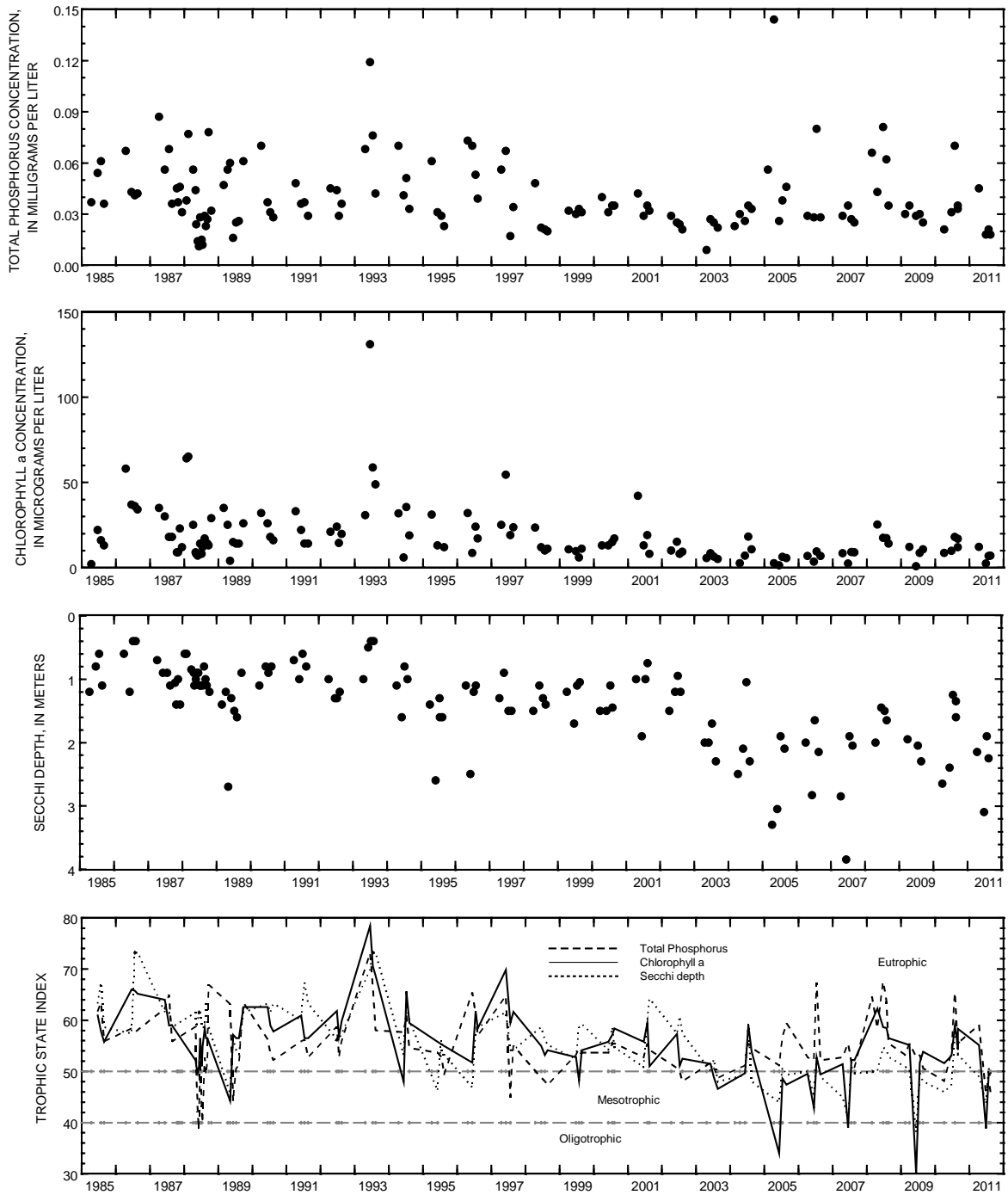
Date	Nitrate + nitrite water, fltrd, mg/L as N (00631)	Turbidity white light, det ang 90+/-30 degrees (63675)	Apparent color, water, unfltrd Pt-Co units (00081)	Hardness, water, mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)	Sodium, water, fltrd, mg/L (00930)	Potassium, water, fltrd, mg/L (00935)	ANC, wat unfixed end pt, lab, mg/L as CaCO3 (00417)	Chloride, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Silica, water, fltrd, mg/L as SiO2 (00955)	Iron, water, fltrd, ug/L (01046)
FEB 2011													
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--	--	--
APR													
13...	--	--	--	--	--	--	--	--	--	--	--	--	--
13...	.171	<1.0	50	203	42.9	23.2	45.3	2.70	157	85.3	28.6	.178	<100
JUN													
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL													
26...	<.019	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--	--	--

Date	Manganese, water, fltrd, ug/L (01056)	Dissolved solids dried @ 180degC, wat flt mg/L (70300)
FEB 2011		
16...	--	--
16...	--	--
APR		
13...	--	--
13...	1	348

424915088083900 WIND LAKE AT WIND LAKE, WI

LAKE-DEPTH PROFILES, FEBRUARY 16 TO AUGUST 17, 2011





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

04082500 LAKE WINNEBAGO AT OSHKOSH, WI

LOCATION.--Lat 44°00'35", long 88°31'38" referenced to North American Datum of 1927, in NE ¼ NE ¼ sec.25, T.18 N., R.16 E., Winnebago County, WI, Hydrologic Unit 04030203, 800 ft east of mouth of the upper Fox River.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 mi².

PERIOD OF RECORD.--October 1938 to current year in reports of Geological Survey. Records from July 1882 to September 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 RECORDS.--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).

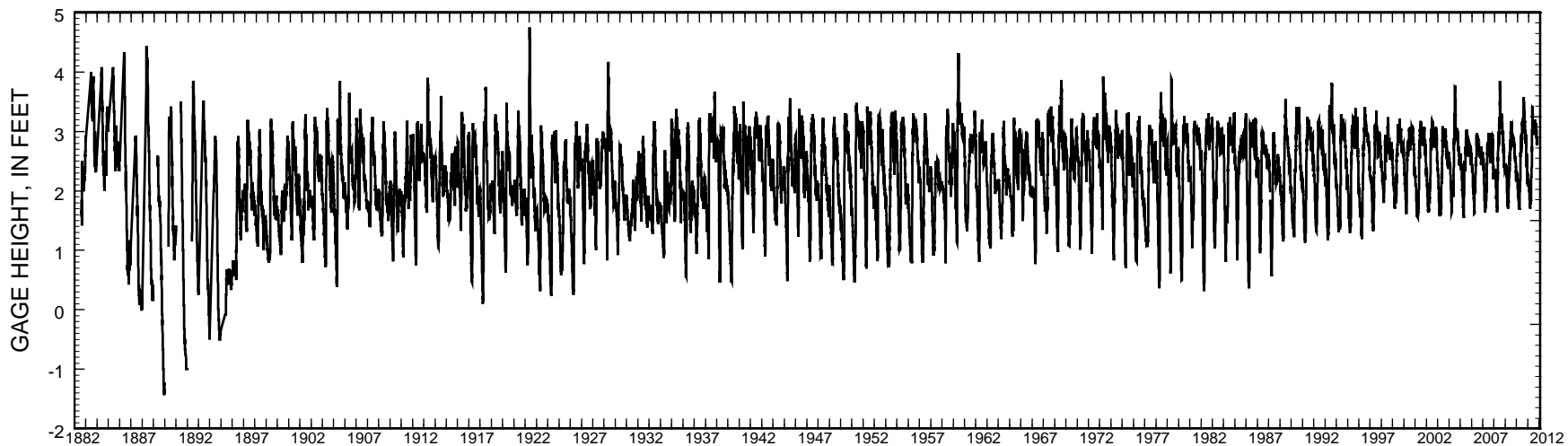
REMARKS.--Lake elevations controlled by dams at Menasha and Neenah, which are operated in the interest of navigation. Crests of both dams are at elevation 746.73 ft. Present limits of regulation are from 21 ¼ in. above the crest of Menasha to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 4.32 ft, Mar. 9, 1982; Minimum observed, 0.33 ft, May 17, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.43 ft, Apr. 30; Minimum recorded, 1.70 ft, Feb. 15, 16, 17.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.81	2.51	2.09	2.10	1.86	1.78	2.25	3.23	2.94	3.04	3.02	2.92
2	2.83	2.50	2.14	2.09	1.86	1.78	2.25	3.31	3.04	3.05	3.04	2.92
3	2.81	2.47	2.15	2.08	1.86	1.77	2.30	3.35	2.99	3.08	3.04	2.99
4	2.80	2.49	2.14	2.08	1.84	1.78	2.30	3.33	2.99	3.08	3.07	3.03
5	2.80	2.50	2.12	2.08	1.83	1.79	2.36	3.31	3.04	3.07	3.06	3.03
6	2.80	2.46	2.10	2.08	1.81	1.79	2.38	3.25	3.04	3.11	3.06	3.03
7	2.80	2.43	2.09	2.07	1.81	1.78	2.39	3.26	3.06	3.09	3.12	3.01
8	2.80	2.43	2.09	2.06	1.80	1.78	2.40	3.21	3.06	3.08	3.14	3.00
9	2.81	2.42	2.10	2.05	1.79	1.80	2.41	3.20	3.14	3.09	3.10	2.99
10	2.79	2.41	2.11	2.03	1.77	1.82	2.44	3.14	3.12	3.08	3.10	2.98
11	2.79	2.38	2.12	2.03	1.75	1.82	2.48	3.11	3.13	3.13	3.09	2.97
12	2.76	2.41	2.21	2.03	1.73	1.83	2.56	3.06	3.14	3.14	3.09	2.94
13	2.72	2.38	2.16	2.02	1.73	1.84	2.58	3.08	3.14	3.16	3.14	2.92
14	2.70	2.26	2.14	2.01	1.72	1.83	2.67	3.11	3.14	3.14	3.13	2.89
15	2.69	2.33	2.12	2.02	1.71	1.84	2.74	3.13	3.12	3.10	3.11	2.87
16	2.63	2.32	2.10	2.01	1.70	1.85	2.67	3.03	3.09	3.12	3.11	2.84
17	2.62	2.30	2.09	2.00	1.70	1.89	2.73	3.00	3.14	3.14	3.07	2.83
18	2.59	2.29	2.09	2.00	1.71	1.94	2.93	2.98	3.15	3.16	3.07	2.80
19	2.56	2.23	2.08	2.00	1.72	1.97	3.02	2.98	3.16	3.18	3.04	2.81
20	2.54	2.28	2.08	1.98	1.73	2.00	3.02	2.98	3.18	3.19	3.03	2.83
21	2.55	2.25	2.09	1.97	1.79	2.04	3.06	2.99	3.19	3.17	2.99	2.76
22	2.55	2.21	2.09	1.95	1.81	2.11	3.14	3.00	3.19	3.16	2.97	2.81
23	2.56	2.18	2.10	1.94	1.81	2.22	3.12	2.98	3.17	3.19	2.93	2.80
24	2.62	2.30	2.09	1.92	1.80	2.24	3.17	3.04	3.18	3.20	2.91	2.80
25	2.63	2.12	2.09	1.91	1.80	2.24	3.19	3.08	3.19	3.18	2.94	2.82
26	2.50	2.12	2.10	1.89	1.80	2.24	3.30	3.09	3.18	3.16	2.91	2.91
27	2.40	2.19	2.10	1.89	1.80	2.25	3.31	3.05	3.13	3.12	2.94	2.87
28	2.57	2.19	2.10	1.88	1.79	2.25	3.34	3.01	3.07	3.10	2.93	2.86
29	2.59	2.19	2.10	1.87	---	2.25	3.38	3.02	3.14	3.09	2.91	2.79
30	2.55	2.13	2.10	1.86	---	2.25	3.43	3.02	3.10	3.07	2.91	2.87
31	2.53	---	2.10	1.86	---	2.25	---	2.96	---	3.02	2.92	---
Mean	2.67	2.32	2.11	1.99	1.78	1.97	2.78	3.11	3.11	3.12	3.03	2.90
Max	2.83	2.51	2.21	2.10	1.86	2.25	3.43	3.35	3.19	3.20	3.14	3.03
Min	2.40	2.12	2.08	1.86	1.70	1.77	2.25	2.96	2.94	3.02	2.91	2.76



Stage hydrograph for Lake Winnebago at Oshkosh, WI, 1882-2011.

440128088271201 LAKE WINNEBAGO BUOY SITE NEAR OSHKOSH, WI

LOCATION.--Lat 44°01'28", long 88°27'12", in NE ¼ NW ¼, sec. 22, T 18 N., R 17 E., Winnebago County, WI, Hydrologic Unit 04030203.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 mi².

PERIOD OF RECORD.--May 2011 to September 2011.

REMARKS.--Lake sampled near buoy near the center of the lake.

WATER-QUALITY DATA, MAY 19 TO JULY 29, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unfltrd uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro- matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)
MAY 2011								
19...	1.10	--	--	--	--	--	--	--
19...	--	.50	12.5	353	8.0	11.2	36.1	.052
19...	--	5.5	12.1	352	7.6	10.6	--	.046
27...	--	.50	14.6	350	7.6	11.9	35.5	.054
27...	--	5.5	13.1	352	7.6	10.0	--	.050
JUN								
17...	--	.50	--	--	--	--	--	.051
24...	--	.50	--	--	--	--	--	.047
29...	--	.50	--	--	--	--	--	.056
JUL								
08...	1.50	--	--	--	--	--	--	--
08...	--	.50	25.2	368	8.7	9.8	44.1	.063
08...	--	5.0	23.6	370	8.5	8.0	--	.038
08...	--	5.8	22.6	383	7.8	.8	--	.053
15...	--	.50	--	--	--	--	--	.069
15...	.55	--	--	--	--	--	--	--
21...	--	.50	--	--	--	--	--	.072
29...	--	.50	--	--	--	--	--	.072

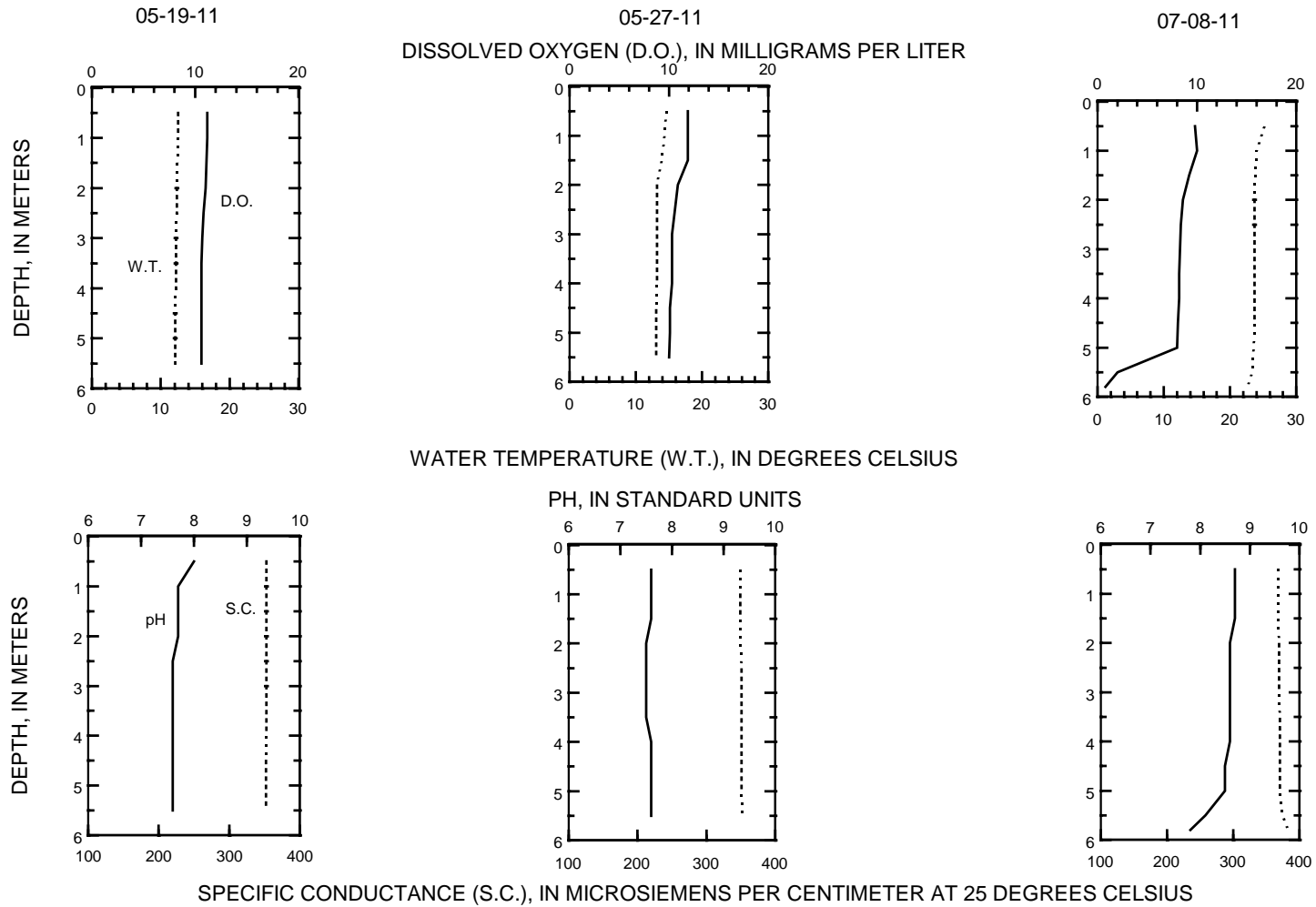
440128088271201 LAKE WINNEBAGO BUOY SITE NEAR OSHKOSH, WI

WATER-QUALITY DATA, AUGUST 4 TO SEPTEMBER 22, 2011
(Milligrams per liter unless otherwise indicated)

Date	Trans- parency Secchi disc, meters (00078)	Sam- pling depth, meters (00098)	Temper- ature, water, deg C (00010)	Specif- ic conduc- tance, wat unf uS/cm @ 25 degC (00095)	pH, water, unfltrd field, std units (00400)	Dis- solved oxygen, mg/L (00300)	Chloro- phyll a trichro -matic method, uncorr, ug/L (32210)	Phos- phorus, water, unfltrd mg/L as P (00665)
AUG 2011								
04...	--	.50	--	--	--	--	--	.094
18...	--	.50	--	--	--	--	--	.137
26...	--	.50	--	--	--	--	--	.127
30...	.85	--	--	--	--	--	--	--
30...	--	.50	22.8	359	8.9	9.6	--	--
30...	--	5.5	22.7	360	8.9	8.7	--	--
SEP								
09...	--	.50	--	--	--	--	--	.150
22...	.85	--	--	--	--	--	--	--
22...	--	.50	16.6	360	8.8	9.2	74.0	.151
22...	--	5.0	16.6	360	8.8	9.1	74.2	.155

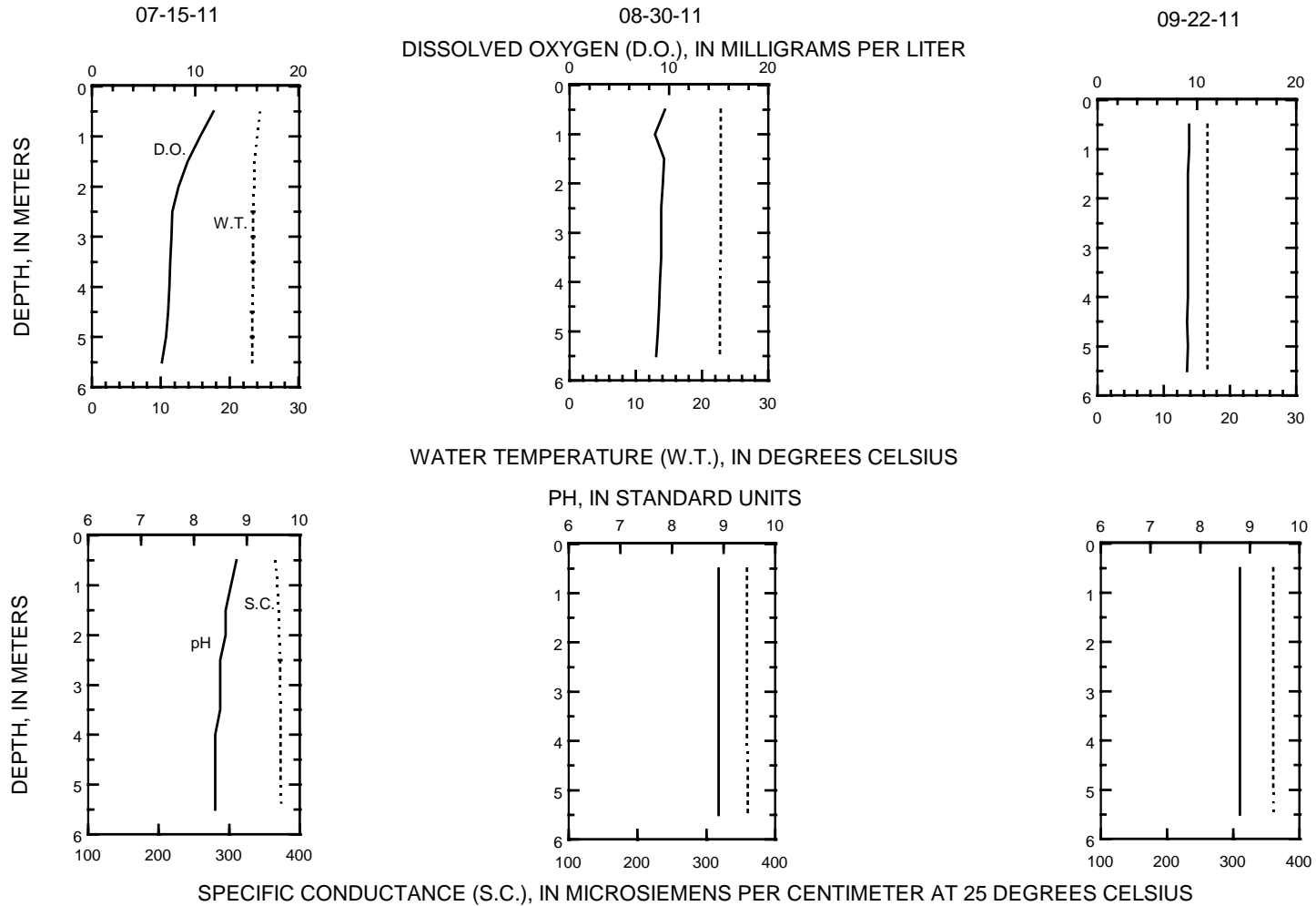
440128088271201 LAKE WINNEBAGO BUOY SITE NEAR OSHKOSH, WI

LAKE-DEPTH PROFILES, MAY 19 TO JULY 8, 2011



440128088271201 LAKE WINNEBAGO BUOY SITE NEAR OSHKOSH, WI

LAKE-DEPTH PROFILES, JULY 15 TO SEPTEMBER 22, 2011



04084255 LAKE WINNEBAGO NEAR STOCKBRIDGE, WI

LOCATION.--Lat 44°04'14", long 88°19'44" referenced to North American Datum of 1983, Calumet County, WI, Hydrologic Unit 04030203, Stockbridge Indian Reservation, on east shore of Lake Winnebago, 300 ft south of County Highway E and 1.6 mi west of Stockbridge.

SURFACE AREA.--215 mi².

DRAINAGE AREA.--5,880 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.--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 ¼ in. above the crest of Menasha dam to crest during navigation season, plus additional 18 in. below crest during winter. Data-collection platform and gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily mean gage height, 3.85 ft, July 9, 11, 1993, June 14, 2008; minimum observed, 0.30 ft, Mar. 1, 1986.

EXTREMES FOR CURRENT YEAR.--Maximum daily mean gage height, 3.33 ft, Apr. 29; minimum recorded, 1.49 ft, Feb. 17.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.67	2.39	2.16	1.99	1.76	1.68	2.17	3.32	3.05	2.99	2.94	2.82
2	2.60	2.39	2.09	1.99	1.77	1.68	2.18	3.30	2.88	3.00	2.94	2.87
3	2.66	2.41	2.04	1.98	1.74	1.67	2.19	3.26	2.87	3.01	2.95	2.93
4	2.69	2.35	2.03	1.99	1.72	1.69	2.25	3.25	2.92	3.01	2.97	2.96
5	2.69	2.33	2.03	1.98	1.71	1.69	2.28	3.23	2.94	3.03	2.97	2.90
6	2.70	2.38	2.02	1.98	1.70	1.69	2.30	3.20	2.95	3.02	2.99	2.90
7	2.70	2.34	2.01	1.98	1.70	1.68	2.30	3.16	3.00	3.00	3.03	2.88
8	2.70	2.31	2.00	1.96	1.69	1.68	2.31	3.12	3.05	2.99	3.04	2.87
9	2.67	2.29	1.99	1.94	1.68	1.71	2.32	3.05	2.95	2.99	3.11	2.87
10	2.67	2.28	2.01	1.93	1.66	1.72	2.35	3.02	2.94	3.02	3.06	2.88
11	2.65	2.27	2.00	1.93	1.65	1.72	2.46	2.97	3.03	3.08	3.04	2.88
12	2.64	2.24	2.13	1.93	1.63	1.73	2.48	2.97	3.04	3.08	3.01	2.90
13	2.62	2.20	2.06	1.92	1.62	1.73	2.50	2.95	3.05	3.03	3.01	2.86
14	2.61	2.32	2.03	1.90	1.62	1.73	2.46	2.87	3.00	3.00	3.00	2.83
15	2.55	2.25	2.01	1.92	1.60	1.73	2.42	2.78	2.95	3.00	3.02	2.77
16	2.57	2.20	2.00	1.90	1.59	1.75	2.65	2.83	3.02	3.04	3.02	2.74
17	2.53	2.20	2.00	1.89	1.58	1.79	2.84	2.84	3.04	3.06	3.01	2.68
18	2.50	2.21	1.99	1.90	1.62	1.86	2.81	2.84	3.04	3.11	2.98	2.65
19	2.50	2.21	1.98	1.89	1.62	1.87	2.78	2.88	3.05	3.10	2.96	2.74
20	2.49	2.13	1.98	1.87	1.64	1.90	2.94	2.89	3.06	3.16	2.93	2.73
21	2.50	2.11	1.98	1.86	1.69	1.97	2.99	2.88	3.03	3.14	2.91	2.79
22	2.44	2.16	2.00	1.85	1.70	2.02	3.00	2.90	3.11	3.09	2.87	2.74
23	2.44	2.26	2.00	1.84	1.70	2.13	3.08	2.96	3.12	3.10	2.89	2.69
24	2.50	2.08	2.00	1.82	1.70	2.15	3.12	2.90	3.14	3.11	2.89	2.66
25	2.50	2.16	2.00	1.81	1.70	2.15	3.11	2.81	3.10	3.11	2.86	2.65
26	2.70	2.25	2.00	1.80	1.70	2.16	3.11	2.84	3.08	3.06	2.84	2.67
27	2.84	2.12	2.00	1.78	1.70	2.17	3.26	2.92	3.02	3.01	2.81	2.73
28	2.63	2.08	2.00	1.78	1.69	2.17	3.31	2.95	3.08	3.00	2.80	2.74
29	2.53	2.06	1.99	1.77	---	2.17	3.33	2.93	3.03	3.00	2.84	2.78
30	2.44	2.12	1.99	1.76	---	2.17	3.28	2.92	2.99	2.98	2.83	2.70
31	2.39	---	1.99	1.75	---	2.16	---	2.98	---	2.96	2.79	---
Mean	2.59	2.24	2.02	1.89	1.67	1.87	2.69	2.99	3.02	3.04	2.95	2.79
Max	2.84	2.41	2.16	1.99	1.77	2.17	3.33	3.32	3.14	3.16	3.11	2.96
Min	2.39	2.06	1.98	1.75	1.58	1.67	2.17	2.78	2.87	2.96	2.79	2.65

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APPENDIX

Wisconsin Lakes Team Quality-Assurance Plan

Most lake studies and monitoring programs that are conducted by the USGS Wisconsin Water Science Center entail water sampling and analysis to determine water quality and biological productivity. Because all sampling and analysis is subject to error and random variability, a certain proportion of the sampling effort should include quality-assurance samples. Sampling by the USGS was done by the Lake Studies Team of the USGS Wisconsin Water Science Center. This team implements a quality-assurance plan each year that involves collecting three types of samples from a subset of the lakes studied each year, which include blanks, replicates, and spikes (U.S. Geological Survey, Wisconsin Water Science Center Lake Studies Team). These samples are collected and/or prepared solely for the purpose of assessing the magnitude of error and random variability so that the accuracy and precision of all data can be evaluated. The plan for this quality-assurance sampling is described below.

Three types of QA/QC samples are collected:

blanks

Provide information about accuracy and errors due to treatment or reagents

replicates

provide information about precision (variability)

standard additions (spikes)

provide information about accuracy and matrix interferences

Blank Sampling

B1. A **preservation blank** consists of deionized water or inorganic blank water, to which is added any reagents or preservatives that are normally added to natural water samples. The blank is not taken to the field, but is shipped to the laboratory for analysis along with the natural water samples.

This blank sample is analyzed for the Nutrient Group¹ and chlorophyll-a.

B2. A **field blank** consists of deionized water or inorganic blank water treated exactly the same as regular samples. During winter, the field blank is analyzed for total phosphorus (TP) only; during summer, it is analyzed for TP and chlorophyll-a, and in the spring it is analyzed for the Nutrient Group and chlorophyll-a.

¹Nutrient Group = all phosphorus and nitrogen species that are commonly determined in lakes (total phosphorus, nitrate + nitrite, ammonia, total Kjeldahl nitrogen, total nitrogen)

Replicate Sampling

Triplicate samples are taken near water surface in summer for analysis of total phosphorus and chlorophyll-a. For a portion of the sites where surface triplicates are collected, a set of triplicate samples is also taken from near-bottom water, for analysis of total phosphorus.

Triplicate samples collected in the spring are taken near the water surface for analysis of the Nutrient Group.

Standard Addition Testing

Replicate samples are collected for a **standard addition (spike) test**, which consists of an addition of a prepared phosphorus solution (standard) of known volume and concentration, such that the expected result of analysis is the natural water TP concentration plus the known addition. One sample from each set will receive no spike (the mean of these gives the natural water TP concentration).

Data and results of replicate sampling and field blank testing for the past five years are shown in Table A1.

Table A1. Analyses of replicate samples from Wisconsin lakes in water years 2007-2011. See text for procedures used. Phosphorus data in milligrams per liter; chlorophyll data in micrograms per liter. Symbol "<" indicates less than given detection limit (DL); mean and standard deviation not calculated for datasets containing values less than DL.

Parameter	Lake	Date	Replicate Data			Mean	Standard Deviation	Percent Standard Deviation
Total Phosphorus	Beulah	8/30/07	0.017	0.015		0.016	0.001	8.8
	Delavan	4/16/07	0.040	0.038		0.039	0.001	3.6
	Spring	9/6/07	0.008	0.007		0.008	0.001	9.4
	Beulah	3/4/08	0.010	0.011		0.011	0.001	6.7
	Beulah	8/26/08	0.011	0.012		0.012	0.001	6.1
	Beulah	2/23/09	0.013	0.013		0.013	0.000	0.0
	Beulah	8/24/09	0.017	0.017		0.017	0.000	0.0
	Delavan	9/15/09	0.035	0.031	0.031	0.032	0.002	7.1
	Beulah	8/19/10	0.015	0.016		0.016	0.001	4.6
	Big Cedar, South	8/24/10	0.015	0.014		0.015	0.001	4.9
	Powers	8/30/10	0.021	0.022		0.022	0.001	3.3
	Beulah	8/10/11	0.140	0.170		0.155	0.021	13.7
	Oconomowoc	7/25/11	0.013	0.010	0.012	0.012	0.002	13.1
	Powers	7/25/11	0.017	0.018	0.020	0.018	0.002	8.3
Wind	7/25/11	0.018	0.019	0.021	0.019	0.002	7.9	
Total Phosphorus, near bottom	Wind	7/10/06	0.380	0.378	0.394	0.384	0.009	2.3
	Big Cedar, South	8/24/10	0.081	0.067		0.074	0.010	13.4
	Powers	8/30/10	0.036	0.038		0.037	0.001	3.8
Dissolved Phosphorus	Beulah	8/30/07	<0.002	<0.002				
	Beulah	3/4/08	0.001	0.003		0.002	0.001	70.7
	Beulah	8/26/08	<0.002	<0.002				
	Beulah	2/23/09	<0.002	<0.002				
	Beulah	8/24/09	<0.002	<0.002				
	Beulah	8/19/10	<0.002	<0.002				
	Beulah	8/10/11	<0.002	<0.002				
Dissolved Ammonia	Beulah	8/30/07	0.170	0.190		0.180	0.014	7.9
	Beulah	3/4/08	0.083	0.046		0.065	0.026	40.6
	Beulah	8/26/08	<0.015	<0.015				
	Beulah	2/23/09	0.211	0.204		0.208	0.005	2.4
	Beulah	8/24/09	0.032	0.035		0.034	0.002	6.3
	Beulah	8/19/10	<0.015	0.030				
	Beulah	8/10/11	0.032	0.029		0.031	0.002	7.0
Total Kjeldahl Nitrogen	Beulah	8/30/07	0.510	0.420		0.465	0.064	13.7
	Beulah	3/4/08	0.570	0.450		0.510	0.085	16.6
	Beulah	8/26/08	0.530	0.580		0.555	0.035	6.4
	Beulah	2/23/09	0.660	0.690		0.675	0.021	3.1
	Beulah	8/24/09	0.160	0.530		0.345	0.262	75.8
	Beulah	8/19/10	0.580	0.680		0.63	0.071	11.2
	Beulah	8/10/11	0.560	0.460		0.510	0.071	13.9
Dissolved Nitrate plus Nitrite	Beulah	8/30/07	<0.019	<0.019				
	Beulah	3/4/08	0.675	0.670		0.673	0.004	0.5
	Beulah	8/26/08	<0.019	<0.019				
	Beulah	2/23/09	0.673	0.721		0.697	0.034	4.9
	Beulah	8/24/09	0.074	0.073		0.074	0.001	1.0
	Beulah	8/19/10	0.022	0.022		0.022	0.000	0.0
Beulah	8/10/11	0.067	0.066		0.067	0.001	1.1	

Table A1. -- continued

Parameter	Lake	Date	Replicate Data			Mean	Standard Deviation	Percent Standard Deviation
Chlorophyll-a (micrograms per liter)	Beulah	8/30/07	4.05	3.78		3.92	0.19	4.88
	Spring	9/6/07	2.47	2.79		2.63	0.23	8.60
	Beulah	8/26/08	6.97	7.45		7.21	0.34	4.71
	Beulah	2/23/09	0.55	0.55		0.55	0.00	0.0
	Beulah	8/24/09	2.66	2.90		2.78	0.17	6.1
	Delavan	9/15/09	10.80	10.10	9.8	10.23	0.51	5.0
	Beulah	8/19/10	5.35	5.56		5.46	0.15	2.72
	Big Cedar, South	8/24/10	3.93	3.9		3.92	0.02	0.54
	Beulah	8/10/11	4.45	5.24		4.85	0.56	11.53
Turbidity, NTU	Beulah	8/30/07	<1.0	<1.0				
	Beulah	3/4/08	<1.0	<1.0				
	Beulah	8/26/08	<1.0	<1.0				
	Beulah	2/23/09	<1.0	<1.0				
	Beulah	8/24/09	<1.0	<1.0				
	Beulah	8/19/10	<1.0	<1.0				
	Beulah	8/10/11	<1.0	<1.0				
Dissolved Calcium	Beulah	8/30/07	42.8	41		41.9	1.273	3.0
	Beulah	3/4/08	62.8	62.5		62.65	0.212	0.3
	Beulah	8/26/08	47.9	47.6		47.75	0.212	0.4
	Beulah	2/23/09	63	63.8		63.4	0.566	0.9
	Beulah	8/24/09	41.7	41.9		41.8	0.141	0.3
	Beulah	8/19/10	47	47.3		47.15	0.212	0.4
	Beulah	8/10/11	37.4	38		37.7	0.424	1.1
Diss. Magnesium	Beulah	8/30/07	32.7	31.2		31.95	1.061	3.3
	Beulah	3/4/08	35.6	35.5		35.55	0.071	0.2
	Beulah	8/26/08	32.8	32.5		32.65	0.212	0.6
	Beulah	2/23/09	34.7	35.1		34.9	0.283	0.8
	Beulah	8/24/09	31.2	31.3		31.25	0.071	0.2
	Beulah	8/19/10	34.1	33.8		33.95	0.212	0.6
	Beulah	8/10/11	36.7	37.1		36.90	0.283	0.8
Diss. Potassium	Beulah	8/30/07	1.5	1.4		1.45	0.071	4.9
	Beulah	3/4/08	1.8	1.9		1.85	0.071	3.8
	Beulah	8/26/08	1.4	1.4		1.4	0.000	0.0
	Beulah	2/23/09	1.7	1.7		1.7	0.000	0.0
	Beulah	8/24/09	1.4	1.4		1.4	0.000	0.0
	Beulah	8/19/10	1.4	1.5		1.45	0.071	4.9
	Beulah	8/10/11	1.5	1.6		1.55	0.071	4.6
Dissolved Sodium	Beulah	8/30/07	8.8	8.5		8.65	0.212	2.5
	Beulah	3/4/08	9.9	10		9.95	0.071	0.7
	Beulah	8/26/08	9	8.9		8.95	0.071	0.8
	Beulah	2/23/09	9.7	9.8		9.75	0.071	0.7
	Beulah	8/24/09	8.6	8.7		8.65	0.071	0.8
	Beulah	8/19/10	10.4	11.4		10.9	0.707	6.5
	Beulah	8/10/11	10.4	10.7		10.55	0.212	2.0
ANC as CaCO3	Beulah	8/30/07	192	193		192.5	0.707	0.4
	Spring	9/6/07	6.6	6.4		6.5	0.141	2.2
	Beulah	3/4/08	245	244		244.5	0.707	0.3
	Beulah	8/26/08	219	218		218.5	0.707	0.3
	Beulah	2/23/09	258	256		257	1.414	0.6
	Beulah	8/24/09	209	209		209	0.000	0.0
	Beulah	8/19/10	208	207		207.5	0.707	0.3
	Beulah	8/10/11	194	194		194	0.000	0.0

Table A1. -- continued

Parameter	Lake	Date	Replicate Data		Mean	Standard Deviation	Percent Standard Deviation
Diss. Chloride	Beulah	8/30/07	20.3	20.4	20.35	0.071	0.3
	Beulah	3/4/08	23.5	23.7	23.6	0.141	0.6
	Beulah	8/26/08	21	20.9	20.95	0.071	0.3
	Beulah	2/23/09	23	22.9	22.95	0.071	0.3
	Beulah	8/24/09	21.6	21.4	21.5	0.141	0.7
	Beulah	8/19/10	21.6	21.5	21.55	0.071	0.3
	Beulah	8/10/11	24.7	24.5	24.6	0.141	0.6
Dissolved Silica	Beulah	8/30/07	15.2	15.3	15.25	0.071	0.5
	Spring	9/6/07	0.105	0.111	0.108	0.004	3.9
	Beulah	3/4/08	15.3	15.2	15.25	0.071	0.5
	Beulah	8/26/08	10.3	10.3	10.3	0.000	0.0
	Beulah	2/23/09	14.8	15	14.9	0.141	0.9
	Beulah	8/24/09	11.3	11.3	11.3	0.000	0.0
	Beulah	8/19/10	18.1	18.1	18.1	0.000	0.0
Dissolved Sulfate	Beulah	8/10/11	12.7	12.7	12.7	0.00	0.0
	Beulah	8/30/07	26.1	26.2	26.15	0.071	0.3
	Beulah	3/4/08	29.5	29.5	29.5	0.000	0.0
	Beulah	8/26/08	26.3	26.3	26.3	0.000	0.0
	Beulah	2/23/09	30.5	30.8	30.65	0.212	0.7
	Beulah	8/24/09	27.7	27.8	27.75	0.071	0.3
	Beulah	8/19/10	25.9	25.8	25.85	0.071	0.3
Dissolved Iron	Beulah	8/10/11	29.3	29.2	29.25	0.071	0.2
	Beulah	8/30/07	<100	<100			
	Beulah	3/4/08	<100	<100			
	Beulah	8/26/08	<100	<100			
	Beulah	2/23/09	<100	<100			
	Beulah	8/24/09	<100	<100			
	Beulah	8/19/10	<100	<100			
Diss. Manganese	Beulah	8/10/11	<100	<100			
	Beulah	8/30/07	<0.5	<0.5			
	Beulah	8/26/08	<0.5	<0.5			
	Beulah	2/23/09	<1.0	<1.0			
	Beulah	8/24/09	<1.0	<1.0			
Dissolved Solids	Beulah	8/10/11	<1.0	<1.0			
	Beulah	8/26/08	302	298	300	2.83	0.9
	Beulah	2/23/09	350	346	348	2.83	0.8
	Beulah	8/24/09	312	312	312	0.00	0.0
	Beulah	8/19/10	284	286	285	1.41	0.5
Beulah	8/10/11	270	272	271	1.41	0.5	

Table A2. Data from tests of blanks, 2007-2011. All data in milligrams per liter, unless otherwise indicated.
 < = less than given detection limit; E = estimated value.

Delavan Lake. Analyses at USGS National Water Quality Laboratory, Lakewood, CO.

Parameter	4/7/06	6/13/06	8/14/06	4/16/07	9/14/09
Total P	< 0.004	E 0.002	< 0.004	<0.004	<0.008
Dissolved orthophosphate	<0.006	<0.006	E0.003	<0.006	<0.008
Chlorophyll a	< 0.0260		< 0.0260	<0.260	

Lake Beulah at Deep Hole near East Troy, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07	2/27/08	8/26/08	2/22/09	8/20/09	8/19/10	8/10/11
Total P	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dissolved orthophosphate	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Kjeldahl	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Dissolved Ammonia	<0.15	<0.015	<0.015	<0.015	<0.015	0.015	<0.015
Dissolved Nitrate plus Nitrite	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
Chlorophyll a (ug/L)	<0.260	---	<0.260	<0.260	<0.260	<0.260	<0.260
Dissolved Calcium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Magnesium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Potassium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Sodium	0.200	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ANC as CaCO3	<2	3	<2	<2	<2	<2	3
Dissolved Chloride	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Silica	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022
Dissolved Sulfate	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
Dissolved Iron	<100	<100	<100	<100	<100	<100	<100
Dissolved Manganese	<0.5	<0.5	<100	<1.0	<1.0	<1.0	<1.0
Dissolved Solids	---	---	<50	<50	<50	<50	<50
Turbidity, NTU	---	<1.0	<1.0		<1.0	<1.0	<1.0

Mercer Lake at Main Deep Hole at Mercer, WI, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/27/10
Total P	< 0.005

Rolling Stone Lake near Pickerel, WI. Analysis at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/29/07
Total P	<0.005
Chlorophyll a (ug/L)	<0.260
ANC as CaCO3	2
Dissolved Silica	<0.022

Wind Lake at Wind Lake, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	6/13/06	8/30/10
Total P	< 0.005	< 0.005
Chlorophyll a (ug/L)	<0.260	

Silver Lake near West Bend, WI. Analyses at Wisconsin State Laboratory of Hygiene, Madison, WI

Parameter	8/31/09
Total P	< 0.005
Chlorophyll a (ug/L)	<0.260

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<https://www.usgs.gov/centers/wisconsin-water-science-center>

