

## Results of the Namekagon Lakes water-quality study by USGS

The United States Geological Survey (USGS) in cooperation with the Namekagon Lakes Association conducted a water-quality monitoring study of Namekagon Lakes during 1998 and 1999. The study was initiated by the Association in 1997 when the Association applied for, and was awarded, a grant through the Wisconsin Department of Natural Resources (WDNR) Lake Management Planning Grant Program. In addition to Lakes Association and planning grant funds, USGS cost-share funds also helped fund the study. Results of the two-year study are compiled in about 60 pages of mostly tables and graphs submitted by the USGS to the Association.

The intent of the monitoring of Namekagon Lakes was to determine the health of the lakes. This type of monitoring is sometimes regarded as the equivalent of a physical examination to determine the state of a human's health. Measurements of the lakes' conditions were made in winter during ice-cover; in spring during turnover when waters are mixed; and during summer, the time when lakes are thermally stratified (layered) and when lakes get most use by people.

Specifically, the study did the following:

- Determined the present condition of the lakes relative to each other and relative to other northwestern Wisconsin lakes.
- Established a beginning point for water-quality trend monitoring.
- Secured the data for future use by being archived in the USGS's national water-quality database and in EPA's database (STORET).

Each of the three lakes, Namekagon, Jackson, and Garden, were sampled over its deepest location. Namekagon Lake was sampled at two additional sites, owing to its large size and multi-basin configuration. Measurements and analyses were done to characterize the trophic status (degree of nutrient enrichment) of the lakes, the chemical composition of the water, and temperature and dissolve oxygen distribution within the lakes.

Three common measures of the quality of lake water, which are used as indices for lake-to-lake comparison of water quality, are phosphorus and chlorophyll a concentration and Secchi depth. Phosphorus is the key nutrient that influences plant growth in lakes. The amount of chlorophyll a in lake water indicates the amount of algae present. Secchi depth is a measure of water clarity. The spring and summer values for these indices are shown in Figure 1. Of the three lakes, phosphorus and chlorophyll a concentrations are highest in Jackson Lake and lowest in Namekagon Lake, with the values for Garden Lake being in between the values for Jackson and Namekagon Lakes. Likewise, lowest water clarity was found in Jackson Lake and greatest in Namekagon with Garden Lake's clarity being in between that of Jackson and Namekagon Lakes.

In terms of lake aging, oligotrophic lakes are the least aged and are characterized by clear water and low biological productivity. Mesotrophic lakes

are moderately productive, have occasional algal blooms and often have good fisheries. Eutrophic lakes are very productive, have poor clarity, and may experience oxygen depletion. Garden and Namekagon Lakes are lower eutrophic to upper mesotrophic range as seen in Figure 1. Jackson Lake is the most productive and is clearly eutrophic by all three of the trophic state parameters.

When compared with other northwestern Wisconsin lakes, Namekagon Lakes rank among the highest third of lakes in this region in terms of near-surface, late summer concentrations of phosphorus, as seen in Table 1. In terms of chlorophyll a concentration, Garden and Namekagon Lakes rank with the middle group of northwestern Wisconsin Lakes. Jackson Lake's average late-summer chlorophyll a concentration places the lake among the group of 11 percent of lakes with highest concentrations. Late summer Secchi-depth values place Namekagon Lakes among the lower half of northwestern Wisconsin Lakes. Average Secchi-depth values for Jackson, Garden, and Namekagon Lakes are 1.02, 1.62, and 1.88 meters, respectively.

#### **Future considerations:**

Having quantified the present condition Namekagon Lakes and compared them with other lakes in the region does not mean their condition is good or bad or that their quality is getting better or worse. Monitoring water quality in the future for comparison with data from the recently completed 2-year study will indicate whether water quality is improving, staying the same, or getting worse.

Another question commonly asked is "Have the lakes been adversely affected by activities of humans?" Evaluation of lakebed sediment cores in relation to present water quality can often provide insight as to whether or not a lake is undergoing accelerated aging beyond an expected "natural" aging rate.

Lakes can be influenced by development and land-use changes within their watersheds. These activities can influence nutrient loading to lakes, which, in turn, affects lake water quality. The effects from these kinds of changes can be evaluated through studies that quantify a lake's water and phosphorus budgets. Through the use of nutrient loading and lake water-quality response models it is possible to predict lake water-quality changes in response to various watershed land-use and development scenarios.

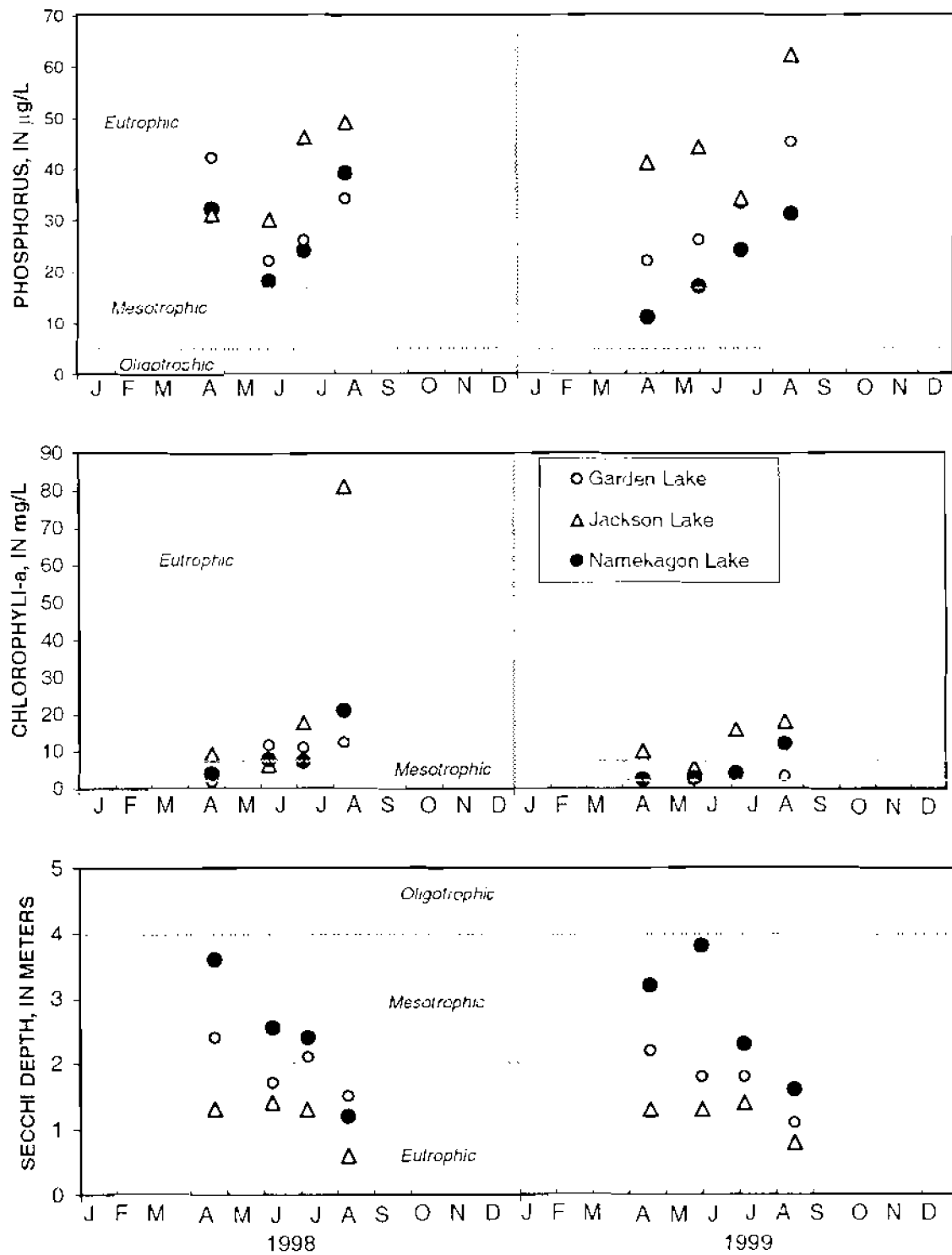


Figure 1. Surface total-phosphorus and chlorophyll a concentrations and water clarity (Secchi depth) for Namekagon, Garden, and Jackson Lakes, 1998-99.

**Table 1. Late summer condition of Namekagon Lakes relative to other northwestern Wisconsin Lakes**

[Average July and August values for 1998 and 1999] [µg/L; Micrograms per liter]

	Parameter (late Summer values)	Percentage distribution of lakes in northwestern Wisconsin within parameter ranges <sup>1</sup>	
<b>Total Phosphorus (µg/L)</b>			
	<5	best condition	12
	5 - 15	↓	35
	15 - 25		23
<b>Namekagon and Garden Lakes</b>	25 - 35		11
<b>Jackson Lake</b>	>35		worst condition
<b>Chlorophyll a (µg/L)</b>			
	0 - 5	best condition	29
<b>Garden Lake</b>	5 - 10	↓	36
<b>Namekagon Lake</b>	10 - 15		14
	15 - 25		11
<b>Jackson Lake</b>	>25		worst condition
<b>Secchi depth (meters)</b>			
	>4	best condition	8
	3 - 4	↓	14
	2 - 3		29
<b>Jackson, Garden, and Namekagon Lakes</b>	1 - 2		30
	0 - 1		worst condition

<sup>1</sup> Percentages for each range are rounded to nearest whole unit. Hence, the sum may not equal 100 percent. Data in this table are from Lillie, R.A. and Mason, J.W., 1983, *Limnological characteristics of Wisconsin Lakes*: Wisconsin Department of Natural Resources Tech. Bull. 138, 116 p.

## **Namekagon Lake near Cable, WI Water-Quality Data Summary**

This summary covers the period of water-quality monitoring of <sup>Namekagon</sup>~~Jackson~~ Lake by the U.S. Geological Survey (USGS). Emphasis in this summary is on data collected during 1998 and 1999. All data are given in the attached tables and shown in accompanying figures.

In reviewing the data, it may be helpful to refer to the methods and explanations of physical and chemical characteristics sections in the USGS annual lake data report "Water-Quality and Lake-Stage Data for Wisconsin Lakes, Water Year 1999" and to Shaw and others (1994) "Understanding Lake Data."

### **Lake description and sampling locations:**

Namekagon Lake is classified as a drainage lake, with 2 inlets and 1 outlets. The inlets are from Jackson Lake to the north and Garden Lake to the east. The average depth of Namekagon Lake is 4.9 meters, the surface area is 3227 acres (5.04 square miles), and the lake's watershed area is 46.8 square miles. The main water-quality sampling site is located at the deepest point in the lake at a depth of about 15 meters. There were two auxiliary sampling sites; one at the deepest location in the eastern basin of the lake and one at the deepest location in the northeastern basin. Lake stage was measured at the bridge over the channel joining Namekagon and Garden Lakes. The locations of the monitoring sites are shown in Figure 1.

### **Hydrologic conditions during water years :**

Annual variability in lake condition often reflects variability in climatic and hydrologic conditions. Air temperature in northwestern Wisconsin in 1998 was, on the average, 8.68 °F warmer than normal for the period December 1998 through March 1999; April and May was 5.00 °F warmer than normal; and the period June through August was 0.37 °F warmer than normal. In 1999 air temperature on the average, 4.31 °F warmer than normal for the period December 1998 through March 1999; April and May was 3.42 °F warmer than normal; and the period June through August was 0.74 °F warmer than normal (National Oceanic and Atmospheric Administration "Climatological Data--Wisconsin"). Precipitation during water year 1998 was 87 percent of normal precipitation for northwestern Wisconsin, and 122 percent in 1999. (National Oceanic and Atmospheric Administration, 1998 and 1999. Climatological Data-- Wisconsin). Watershed runoff in the region of Jackson Lake was 80 to 100 percent in 1998 and 101 to 120 percent of

long-term average in water year 1999 (Holmstrom and others, 1998 and 1999, "Water Resources Data--Wisconsin").

#### **Lake Data:**

The following summarizes some highlights of data given in the tables and shown in the figures:

##### Lake-stage fluctuations:

Lake stages were measured by the USGS on sampling dates. The stages ranged from 8.04 feet on August 11, 1998 to 8.86 feet on April 22, 1998. Stage values are shown in the tables on the top half of Figure 2a, 2b, and 2c.

##### Lake-depth profiles:

Vertical profiles of water temperature, dissolved oxygen, pH, and specific conductance for the main and northeast basin sampling sites exhibit patterns typical of thermally stratified lakes. The profiles for the east basin of the lake exhibit a pattern that is more typical of shallower weakly stratified lakes, as indicated by the absence of thermal stratification at the June 1998 and August 1999 sampling visits. Data for these profiles are listed in Tables 1a, 1b, and 1c, and shown in Figures 2a, 2b, and 2c. There was complete water-column mixing at all three sampling sites at the April (spring turnover) sampling visits of both years. During summer, lower waters became anoxic (devoid of oxygen). By late summer there was little oxygen below 6 to 8 meters. The anoxic zone is unable to support fish. The pH, which ranged between 7.1 and 7.8, is common for northwestern Wisconsin lakes and poses no problems for aquatic life.

##### Chemical constituents:

Analyses of water samples collected at the April spring-turnover sampling visits for selected chemical constituents for chemical characterization of the lake are shown in Figures 2a, 2b and 2c. The constituent values for color, chlorophyll *a*, chloride, calcium, magnesium, pH, alkalinity, total nitrogen, and total phosphorus are within regional values for this area as described by Lillie and Mason in "Limnological Characteristics of Wisconsin Lakes," 1983, Technical Bulletin No. 138, Department of Natural Resources.

The ratio of dissolved nitrogen to dissolved phosphorus was 12:1, based on the surface concentrations in July. This ratio suggests the lake is in transition between being phosphorus limited and nitrogen limited. Most Wisconsin lakes are phosphorus limited which means algal growth is dependent on available phosphorus rather than available nitrogen. Nitrogen-limited lakes have greater propensity for blue-green algal blooms than do phosphorus-limited lakes.

Three common measures of water quality used as indices are concentrations of near-surface total-phosphorus and chlorophyll *a*, a Secchi depth. The main, deep-hole sampling site exhibited, on average,

slightly better water quality by all three indices than the Northeast or East Basin sites, which were similar to each other.

Average surface total-phosphorus concentrations on open water sampling visits for the Deep-hole, Northeast Basin, and East Basin were 24.5, 25.0 and 26.1  $\mu\text{g/L}$  respectively; Chlorophyll *a* concentrations were 7.63, 8.59, and 7.93  $\mu\text{g/L}$  respectively; and Secchi depths were 2.58, 2.18, and 2.1 meters respectively. (Note: The July 7, 1999 phosphorus concentration at the Northeast Basin (.13 mg/L) is extremely high and unexplained. It is assumed that the value is in error, and is the result of sample handling error in the field or laboratory.)

Surface total phosphorus and chlorophyll *a* concentrations, and Secchi depths for the two-year period are shown in Figure 3 for site-to-site comparison, and in Figures 3a, 3b, and 3c for comparison of parameters at each site.

Total phosphorus concentration 0.5 meters above the lake bottom at the main deep-hole site ranged from 0.015 mg/L on April 20, 1999 to 0.227 mg/L on August 11, 1998. These total phosphorus concentrations observed during anoxic periods are indicative of moderate phosphorus release from the bottom sediments.

#### **Lake condition:**

##### Water-quality index:

Lillie and Mason (1983) classified all Wisconsin lakes using a random data set collected in the summer (July and August). The index, shown on page 14 of "Water-Quality and Lake-Stage data for Wisconsin Lakes, Water Year 1999," is based on surface total-phosphorus and chlorophyll *a* concentrations, and Secchi depths. According to the index, surface total-phosphorus and chlorophyll *a* concentrations at the Deep Hole of Namekagon Lake indicate "good" water quality, and Secchi depths indicate "fair" water quality. At the East and Northeast Basins, surface total-phosphorus indicate "good" water quality while chlorophyll *a* concentrations Secchi depths indicate "fair" water quality.

Lillie and Mason (1983) also provided a means of comparing the condition of Namekagon Lake with other lakes in North-West Wisconsin. The comparison in Table 3 shows the percentage distribution of North-West Wisconsin lakes within each condition group and the relative position of Namekagon Lake.

##### Trophic status:

Another means of assessing the nutrient, or trophic, status of a lake is to use Carlson's Trophic State Index (TSI). The 1999 TSI data is listed in Tables 2a, 2b, and 2c. The bottom plot of Figures 2a, 2b, and

2c are graphical illustrations of the variation in Trophic State Indices for Namekagon Lake during the study period. The data show the lake to be upper mesotrophic, or a lake with moderate to high nutrient levels.



Table 1a. Lake-depth profiles for Namekagon Lake, Deep Hole, near Cable, Wisconsin, 1998 water year

WATER-QUALITY DATA					
DATE	SAMPLING DEPTH (M) (00098)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAR					
05...	0.5	1.4	82	7.0	11.3
05...	1.0	2.8	89	6.9	10.7
05...	2.0	3.6	89	6.9	10.2
05...	3.0	3.7	89	6.9	10.0
05...	4.0	3.8	90	6.9	8.6
05...	5.0	3.9	91	6.8	7.3
05...	6.0	3.9	93	6.8	6.6
05...	7.0	4.0	96	6.8	6.8
05...	8.0	4.0	101	6.8	6.5
05...	9.0	4.1	104	6.8	6.2
05...	10.0	4.2	110	6.8	5.4
05...	10.5	--	--	--	--
APR					
22...	0.5	11.2	80	7.7	12.0
22...	1.0	10.2	80	7.7	12.3
22...	2.0	9.8	83	7.7	12.4
22...	3.0	9.2	85	7.7	12.5
22...	4.0	8.7	85	7.7	12.3
22...	5.0	8.2	86	7.6	11.7
22...	6.0	7.9	86	7.6	11.3
22...	7.0	7.6	86	7.6	11.2
22...	8.0	7.5	86	7.6	10.9
22...	9.0	7.4	86	7.5	10.4
22...	10.0	7.3	86	7.5	10.3
22...	11.0	7.3	85	7.5	9.9
22...	11.5	--	--	--	--
JUN					
09...	0.5	16.5	87	7.8	9.9
09...	1.0	16.5	87	7.8	9.9
09...	2.0	16.5	87	7.9	9.8
09...	3.0	16.5	87	7.9	9.8
09...	4.0	16.5	87	7.9	9.7
09...	5.0	16.5	87	7.8	9.7
09...	6.0	16.4	86	7.8	9.6
09...	7.0	16.2	86	7.8	9.2
09...	8.0	16.1	86	7.8	9.0
09...	9.0	16.0	86	7.7	8.7
09...	10.0	15.7	87	7.7	7.2
09...	11.0	15.3	90	7.6	5.6
09...	12.0	13.6	97	7.4	1.0
09...	13.0	12.7	100	7.3	0.5
09...	14.0	11.8	108	7.3	0.4
09...	15.0	11.4	124	7.2	0.4
09...	16.0	--	--	--	--

**Table 1a. Lake-depth profiles for Namekagon Lake, Deep Hole, near Cable, Wisconsin, 1998 water year -- continued**

DATE	SAM- PLING DEPTH (M) (00098)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
JUL					
08...	0.5	22.1	89	7.4	8.1
08...	1.0	22.1	89	7.4	8.1
08...	2.0	22.0	89	7.4	8.0
08...	3.0	22.0	89	7.4	7.9
08...	4.0	22.0	89	7.4	7.9
08...	5.0	21.9	89	7.3	7.6
08...	6.0	20.1	90	6.7	2.6
08...	7.0	18.1	93	6.5	1.3
08...	8.0	17.3	93	6.5	1.2
08...	9.0	16.4	95	6.5	1.2
08...	10.0	15.9	96	6.5	1.1
08...	11.0	15.6	97	6.5	0.8
08...	12.0	15.0	103	6.5	0.1
08...	13.0	13.9	119	6.7	0.0
08...	14.0	13.1	131	7.0	0.0
08...	15.0	13.0	133	7	0
08...	15.5	--	--	--	--
AUG					
11...	0.5	24.2	91	8.4	11.0
11...	1.0	24.0	91	8.7	10.9
11...	2.0	23.8	91	8.7	10.6
11...	3.0	23.6	91	8.6	10.2
11...	4.0	23.3	91	8.5	8.5
11...	5.0	22.8	91	8.3	7.4
11...	6.0	22.4	92	8.1	5.6
11...	7.0	21.8	93	7.9	4.4
11...	8.0	19.7	100	7.7	0.8
11...	9.0	17.4	105	7.6	0.3
11...	10.0	16.9	110	7.5	0.2
11...	11.0	15.4	137	7.3	0.1
11...	12.0	15.0	161	7.4	0.1
11...	13.0	16.0	165	7.4	0.1
11...	13.5	--	--	--	--

Table 1a. Lake-depth profile for Namekagon Lake, Deep Hole, near Cable, Wisconsin, 1999 water year

WATER-QUALITY DATA

DATE	SAMPLING DEPTH (M) (00098)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAR					
03...	0.5	0.2	98	7.1	12.1
03...	1.0	1.3	97	7.1	12.2
03...	2.0	2.2	96	7.1	11.7
03...	3.0	2.3	98	7.1	10.8
03...	4.0	2.6	98	7.0	10.0
03...	5.0	2.7	99	7.0	8.8
03...	6.0	3.1	100	6.9	7.7
03...	7.0	3.4	101	6.8	6.8
03...	8.0	3.5	105	6.8	5.7
03...	9.0	3.7	106	6.8	5.4
03...	9.5	3.8	109	5.2	5.3
03...	10.0	--	--	--	--
APR					
20...	0.5	6.0	97	7.3	10.2
20...	1.0	5.9	97	7.2	10.0
20...	2.0	5.8	97	7.2	10.1
20...	3.0	5.8	97	7.2	9.9
20...	4.0	5.8	97	7.2	9.8
20...	5.0	5.7	96	7.2	9.8
20...	6.0	5.7	96	7.2	9.9
20...	7.0	5.7	96	7.2	9.7
20...	8.0	5.7	97	7.1	9.7
20...	9.0	5.7	97	7.2	9.7
20...	10.0	5.6	97	7.1	9.6
20...	11.0	5.6	97	7.1	9.6
20...	12.0	5.6	97	7.1	9.5
20...	13.0	5.6	97	7.1	9.4
20...	14.0	5.5	98	7.1	8.9
20...	14.5	--	--	--	--

Table 1a. Lake-depth profile for Namekagon Lake, Deep Hole, near  
Cable, Wisconsin, 1999 water year -- continued

JUN					
02...	0.5	15.1	95	7.6	8.4
02...	0.5	15.1	95	7.6	8.4
02...	1.0	15.0	95	7.6	8.4
02...	2.0	15.0	95	7.6	8.3
02...	3.0	15.0	95	7.6	8.3
02...	4.0	15.0	95	7.6	8.2
02...	5.0	15.0	95	7.6	8.2
02...	6.0	14.9	95	7.5	8.1
02...	7.0	14.9	95	7.5	8.1
02...	8.0	14.4	96	7.3	6.8
02...	9.0	14.0	97	7.2	6.5
02...	10.0	13.9	96	7.1	6.1
02...	11.0	13.3	98	7.0	4.5
02...	12.0	11.5	102	6.8	1.7
02...	13.0	10.8	104	6.7	0.7
02...	14.0	10.0	108	6.7	0.3
02...	14.5	--	--	--	--
JUL					
07...	0.5	22.1	93	7.8	8.2
07...	1.0	22.1	93	7.8	8.2
07...	2.0	22.0	93	7.8	8.1
07...	3.0	21.9	93	7.8	8.0
07...	4.0	21.9	93	7.7	7.9
07...	5.0	21.8	93	7.7	7.5
07...	6.0	20.4	94	7.3	4.9
07...	7.0	17.8	99	7.0	2.0
07...	8.0	17.0	102	6.9	1.1
07...	9.0	15.1	106	6.9	0.4
07...	10.0	14.8	109	6.9	0.2
07...	11.0	14.3	111	6.9	0.1
07...	12.0	13.9	114	7.0	0.1
07...	13.0	13.4	121	7.0	0.1
07...	14.0	13.0	126	7.1	0.1
07...	15.0	--	--	--	--

**Table 1a. Lake-depth profile for Namekagon Lake, Deep Hole, near  
Cable, Wisconsin, 1999 water year -- continued**

AUG					
17...	0.5	20.7	91	7.6	7.8
17...	1.0	20.7	91	7.6	7.5
17...	2.0	20.7	91	7.6	7.4
17...	3.0	20.7	91	7.5	7.3
17...	4.0	20.6	91	7.5	7.3
17...	5.0	20.6	91	7.5	7.1
17...	6.0	20.6	91	7.5	7.1
17...	7.0	20.6	91	7.4	7.2
17...	8.0	20.3	92	7.3	6.1
17...	9.0	19.1	100	7.1	3.1
17...	10.0	16.7	119	6.9	0.3
17...	11.0	15.9	126	6.8	0.2
17...	12.0	15.3	133	7.0	0.1
17...	13.0	14.6	140	7.1	0.1
17...	14.0	14.3	146	7.2	0.1
17...	14.5	--	--	--	--

**Table 1b. Lake-depth profiles for Namekagon Lake, East Basin, near Cable, Wisconsin, 1998 water year**

WATER-QUALITY DATA					
DATE	SAM- PLING DEPTH (M) (00098)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
MAR					
04	05	0.6	64	7.8	11.6
04.	10	1.6	82	7.7	11.5
04..	15	2.6	88	7.4	10.7
04	20	2.8	92	7.3	10.3
04	25	2.9	94	7.2	9.8
04..	30	3.0	95	7.2	9.1
04..	35	3.1	97	7.1	7.5
04.	40	3.2	102	7.1	7.2
04..	45	3.3	102	7.0	5.7
04..	50	3.4	104	6.9	5.8
04..	55	3.5	107	6.9	5.3
04..	60	3.6	117	6.9	5.3
04..	65	3.7	124	6.9	2.9
04..	7.0	--	--	--	--
APR					
22..	0.5	11.6	82	7.5	11.7
22..	1.0	10.8	81	7.5	11.7
22..	1.5	10.3	81	7.5	11.8
22..	2.0	9.6	80	7.5	11.8
22..	2.5	9.1	80	7.5	11.6
22..	3.0	9.0	80	7.5	11.4
22..	3.5	8.9	80	7.5	11.3
22.	4.0	8.2	81	7.4	10.4
22..	4.5	8.1	80	7.4	10.2
22.	5.0	7.9	80	7.4	10.4
22..	5.5	7.9	80	7.4	10.4
22..	6.0	7.8	80	7.4	9.5
22..	6.5	7.7	80	7.3	9.6
22..	7.0	7.7	80	7.3	9.4
22..	7.5	--	--	--	--
JUN					
09.	0.5	16.2	86	7.8	9.5
09	1.0	16.1	86	7.8	9.5
09.	1.5	16.1	87	7.8	9.5
09.	2.0	16.1	87	7.8	9.4
09..	2.5	16.1	87	7.8	9.4
09..	3.0	16.1	87	7.8	9.4
09..	3.5	15.9	88	7.8	9.4
09	4.0	15.8	87	7.8	9.4
09.	4.5	15.8	87	7.7	9.3
09	5.0	15.8	87	7.7	9.2
09..	5.5	15.7	87	7.7	9.1
09.	6.0	15.7	87	7.7	8.9
09.	6.5	15.7	87	7.7	8.7
09..	7.0	15.7	87	7.6	8.0
09..	7.5	--	--	--	--

Table 1b. Lake-depth profiles for Namekagon Lake, East Basin, near Cable, Wisconsin, 1998 water year -- continued

DATE	SAM- PLING DEPTH (M) (00098)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
JUL					
08	0.5	21.9	90	6.9	7.6
08.	1.0	22.1	90	7.0	7.6
08.	2.0	22.0	90	7.0	7.5
08.	3.0	22.1	90	7.0	7.5
08.	4.0	22.1	90	7.1	7.5
08.	5.0	20.6	91	6.6	2.9
08.	5.0	17.5	96	6.4	0.1
08..	6.5	16.5	105	6.5	0.1
08..	7.0	--	--	--	--
AUG					
11	0.5	24.8	94	8.2	9.2
11.	1.0	24.2	93	8.4	9.4
11.	1.5	24.1	94	8.4	9.4
11	2.0	23.9	94	8.4	9.2
11	2.5	23.8	94	8.4	8.9
11	3.0	23.7	93	8.2	8.0
11..	3.5	23.6	94	8.2	7.0
11..	4.0	23.0	93	8.0	6.2
11.	4.5	22.8	94	7.9	4.5
11...	5.0	22.2	94	7.7	1.2
11..	5.5	21.0	101	7.5	0.2
11.	6.0	20.2	110	7.3	0.2
11..	6.5	18.5	133	7.3	0.2
11..	7.0	--	--	--	--

Table 1b. Lake-depth profile for Namekagon Lake, East Basin, near Cable, Wisconsin, 1999 water year

WATER-QUALITY DATA

DATE	SAM- PLING DEPTH (M) (00098)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
MAR					
04...	0.5	0.1	103	7.0	10.6
04...	1.0	0.8	102	7.0	11.5
04...	1.5	1.2	102	7.0	10.7
04...	2.0	1.6	102	7.0	10.3
04...	2.5	2.0	102	7.0	10.2
04...	3.0	2.3	102	7.0	10.1
04...	3.5	2.5	102	7.0	10.1
04...	4.0	2.6	102	7.0	9.2
04...	4.5	2.8	104	6.9	7.9
04...	5.0	3.0	108	6.8	6.6
04...	5.5	3.3	115	6.8	5.4
04...	6.0	3.7	123	6.7	3.9
04...	6.5	3.9	137	6.7	2.3
04...	7.0	--	--	--	--
APR					
20...	0.5	6.5	94	7.3	10.5
20...	1.0	6.4	94	7.2	10.5
20...	1.5	6.4	94	7.2	10.4
20...	2.0	6.4	94	7.2	10.4
20...	2.5	6.3	95	7.2	10.2
20...	3.0	6.4	95	7.1	10.3
20...	3.5	6.2	95	7.1	10.0
20...	4.0	6.1	95	7.1	9.8
20...	4.5	6.0	95	7.1	9.5
20...	5.0	5.9	95	7.0	9.5
20...	5.5	5.9	95	7.0	9.4
20...	6.0	5.9	95	7.0	9.4
20...	6.5	5.9	95	7.0	9.1
20...	7.0	5.9	95	7.0	8.1
20...	7.5	--	--	--	--



Table 1b. Lake-depth profile for Namekagon Lake, East Basin, near Cable, Wisconsin, 1999 water year -- continued

JUN					
02...	0.5	15.3	94	7.5	8.3
02...	0.5	15.3	94	7.5	8.3
02...	1.0	15.3	94	7.5	8.2
02...	1.5	15.3	94	7.5	8.1
02...	2.0	15.3	94	7.5	8.1
02...	2.5	15.2	94	7.5	8.1
02...	3.0	15.2	94	7.5	8.0
02...	3.5	15.2	94	7.5	8.0
02...	4.0	15.1	94	7.5	8.0
02...	4.5	15.1	94	7.5	8.0
02...	5.0	15.1	94	7.5	8.0
02...	5.5	14.8	94	7.5	7.9
02...	6.0	13.9	96	7.0	4.2
02...	6.5	13.3	96	6.9	3.0
02...	7.0	13.1	98	6.9	2.3
02...	7.5	--	--	--	--
JUL					
07...	0.5	22.4	92	7.8	7.8
07...	1.0	22.4	92	7.8	7.8
07...	1.5	22.4	92	7.8	7.7
07...	2.0	22.4	92	7.8	7.6
07...	2.5	22.4	92	7.8	7.8
07...	3.0	22.3	92	7.7	7.4
07...	3.5	22.3	92	7.7	7.4
07...	4.0	22.3	92	7.7	7.4
07...	4.5	22.3	92	7.7	7.4
07...	5.0	22.3	92	7.7	7.4
07...	5.5	18.7	101	6.9	0.2
07...	6.0	16.2	114	6.9	0.1
07...	6.5	14.9	128	7.1	0.1
07...	7.0	14.5	133	7.2	0.1
07...	7.5	--	--	--	--
AUG					
17...	0.5	21.0	88	7.5	7.9
17...	1.0	21.0	88	7.5	7.7
17...	1.5	21.0	88	7.5	7.4
17...	2.0	21.0	88	7.5	7.4
17...	2.5	21.0	88	7.4	7.4
17...	3.0	21.0	88	7.4	7.4
17...	3.5	20.9	88	7.4	7.2
17...	4.0	20.9	89	7.4	7.2
17...	4.5	20.9	89	7.4	7.2
17...	5.0	20.8	89	7.4	7.1
17...	5.5	20.8	88	7.4	7.0
17...	6.0	20.7	88	7.3	7.0
17...	6.5	--	--	--	--

Table 1c. Lake-depth profile for Namekagon Lake, Northeast Basin, near Cable, Wisconsin

WATER-QUALITY DATA

DATE	SAM- PLING DEPTH (M) (00098)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
MAR					
03...	0.5	0.4	97	7.0	11.6
03...	1.0	1.1	97	7.0	11.7
03...	2.0	2.1	95	7.1	11.0
03...	3.0	2.4	95	7.2	10.7
03...	4.0	2.7	96	7.3	9.8
03...	5.0	2.9	97	7.2	9.3
03...	6.0	3.3	101	7.0	6.1
03...	7.0	3.4	103	6.9	5.7
03...	8.0	3.7	105	6.9	5.0
03...	9.0	3.8	109	6.8	4.4
03...	10.0	3.9	110	6.8	3.6
03...	11.0	4.3	122	6.8	1.3
03...	11.5	4.6	140	7.2	0.7
03...	12.0	--	--	--	--
APR					
20...	0.5	6.9	89	7.2	10.3
20...	1.0	6.3	89	7.1	10.3
20...	1.5	6.0	88	7.1	10.2
20...	2.0	6.0	88	7.1	10.2
20...	2.5	6.0	88	7.1	10.1
20...	3.0	6.0	88	7.1	10.1
20...	3.5	6.0	89	7.0	10.1
20...	4.0	6.0	89	7.0	10.0
20...	4.5	6.0	89	7.0	10.0
20...	5.0	6.0	89	7.0	9.9
20...	5.5	6.0	89	7.0	9.9
20...	6.0	6.0	89	7.0	9.9
20...	6.5	6.0	89	7.0	9.8
20...	7.0	6.0	89	7.0	9.7
20...	7.5	5.9	89	7.0	9.6
20...	8.0	5.9	89	7.0	9.6
20...	8.5	5.9	89	7.0	9.5
20...	9.0	5.9	89	7.0	9.3
20...	9.5	--	--	--	--

Table 1c. Lake-depth profile for Namekagon Lake, Northeast Basin, near Cable, Wisconsin -- continued

JUN					
02...	0.5	15.7	92	7.5	8.2
02...	0.5	15.7	92	7.5	8.2
02...	1.0	15.7	92	7.5	8.2
02...	2.0	15.6	92	7.5	8.2
02...	3.0	15.5	92	7.5	8.1
02...	4.0	15.5	92	7.5	7.8
02...	5.0	15.4	92	7.5	7.9
02...	6.0	15.4	92	7.4	7.8
02...	7.0	13.7	93	7.1	5.0
02...	8.0	11.9	93	6.8	3.4
02...	9.0	10.1	100	6.7	1.0
02...	10.0	9.0	102	6.6	0.3
02...	10.5	--	--	--	--
JUL					
07...	0.5	22.9	89	7.6	7.5
07...	1.0	22.9	89	7.6	7.4
07...	2.0	22.9	89	7.6	7.4
07...	3.0	22.9	89	7.6	7.4
07...	4.0	22.8	89	7.6	7.4
07...	5.0	22.8	89	7.6	7.4
07...	6.0	22.7	89	7.6	7.3
07...	6.5	21.3	92	7.1	2.8
07...	7.0	16.6	102	6.9	0.3
07...	7.5	15.0	108	6.9	0.3
07...	8.0	13.7	111	6.9	0.1
07...	8.5	12.5	115	7.0	0.1
07...	9.0	12.0	117	7.0	0.1
07...	9.5	11.6	119	7.0	0.1
07...	10.0	11.5	120	7.1	0.1
07...	10.5	11.3	122	7.1	0.1
07...	11.0	11.3	122	7.1	0.1
07...	11.5	11.3	123	7.1	0.1
07...	12.0	--	--	--	--
AUG					
17...	0.5	21.1	85	7.7	8.0
17...	1.0	21.1	85	7.7	8.0
17...	2.0	21.1	85	7.6	7.9
17...	3.0	21.1	85	7.6	7.8
17...	4.0	21.1	85	7.6	7.7
17...	5.0	21.1	85	7.6	7.7
17...	6.0	21.1	85	7.6	7.7
17...	7.0	21.1	85	7.6	7.6
17...	8.0	15.1	124	7.0	0.5
17...	9.0	13.2	135	7.1	0.3
17...	10.0	12.8	139	7.1	0.2
17...	10.5	--	--	--	--

Table 2a. Water clarity and water-quality analyses and their associated Trophic State Indices (TSI) for Namekagon Lake, Deep Hole Site, 1998 through 1999

{ - indicates not applicable; -- indicates no data available}

Date	Secchi Disk			Sampling Depth (meters)	Total Phosphorus			Chlorophyll a		Dissolved Orthophosphate Phosphorus Conc. (mg/L)
	Depth (meters)	Depth (feet)	TSI		Conc. (mg/L)	Conc. (ug/L)	TSI	Conc. (ug/L)	TSI	
4/22/98	3.6	11.8	42	0.5	0.032	32	55	3.88	45	0.002
	-	-	-	11	0.051	51	-	-	-	--
6/9/98	2.5	8.2	47	0.5	0.018	18	51	7.68	50	--
	-	-	-	15	0.057	57	-	-	-	--
7/8/98	2.4	7.9	47	0.5	0.024	24	53	7.22	50	--
	-	-	-	15	0.187	187	-	-	-	--
8/11/98	1.2	3.9	57	0.5	0.039	39	57	21.1	58	--
	-	-	-	8	0.063	63	-	-	-	--
	-	-	-	13	0.227	227	-	-	-	--
4/20/99	3.2	10.5	43	0.5	0.011	11	47	2.34	41	<0.002
	-	-	-	14.0	0.015	15	-	-	-	--
6/2/99	3.8	12.5	41	0.5	0.017	17	50	2.81	43	--
	-	-	-	14.0	0.045	45	-	-	-	--
7/7/99	2.3	7.5	48	0.5	0.024	24	53	4.03	45	0.003
	-	-	-	14.0	0.152	152	-	-	-	--
8/17/99	1.6	5.2	53	0.5	0.031	31	55	12	54	--
	-	-	-	10.0	0.046	46	-	-	-	--
	-	-	-	14.0	0.035	35	-	-	-	--

Table 2b. Water clarity and water-quality analyses and their associated Trophic State Indices (TSI) for Namekagon Lake, Northeast Basin, 1998 through 1999

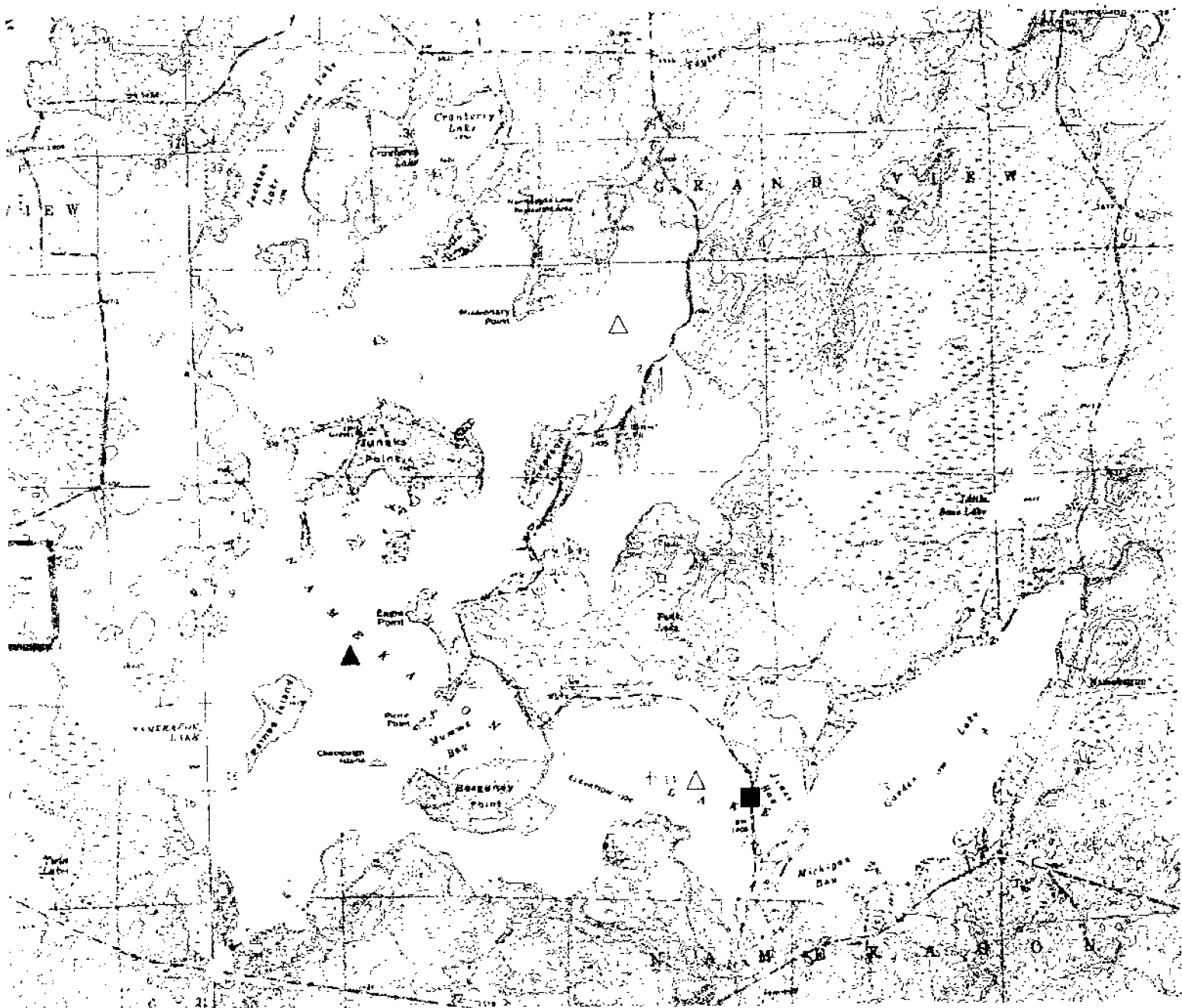
[- indicates not applicable; -- indicates no data available]

Date	Secchi Disk			Sampling Depth (meters)	Total Phosphorus			Chlorophyll a		Dissolved Ortho-phosphate Phosphorus Conc. (mg/L)
	Depth (meters)	Depth (feet)	TSI		Conc. (mg/L)	Conc. (ug/L)	TSI	Conc. (ug/L)	TSI	
4/22/98	2.7	8.9	46	0.5	0.029	29	54	3.11	43	--
	-	-	-	-	-	-	-	-	-	--
6/9/98	2.5	8.2	47	0.5	0.019	19	51	8.11	51	--
	-	-	-	-	-	-	-	-	-	--
7/8/98	2.1	6.9	49	0.5	0.021	21	52	4.91	47	--
	-	-	-	10	0.065	65	-	-	-	--
8/11/98	1.1	3.6	59	0.5	0.031	31	55	21.2	58	--
	-	-	-	11	0.197	197	-	-	-	--
4/20/99	2.3	7.5	48	0.5	0.018	18	51	5.04	47	--
	-	-	-	-	-	-	-	-	-	--
6/2/99	3	9.8	44	0.5	0.019	19	51	3.16	44	--
	-	-	-	10	0.034	34	-	-	-	--
7/7/99	2.4	7.9	47	0.5	0.13	130	66	5.21	47	--
	-	-	-	11.0	0.164	164	-	-	-	--
8/17/99	1.3	4.3	56	0.5	0.038	38	56	18	57	--
	-	-	-	10	0.265	265	-	-	-	--



**Table 3. Condition of Namekagon Lake relative to other northwestern Wisconsin Lakes**

Parameter	Percentage distribution of lakes in southeast Wisconsin within parameter ranges		
<b>Total Phosphorus (mg/L)</b>			
<0.010	best condition	12	
0.010-0.020	↓	35	
<b>East and Northeast Basin and Deep Hole Values</b> 0.020-0.030		23	
0.030-0.050		18	
0.050-0.100		8	
0.100-0.150		3	
>0.150		worst condition	1
<b>Chlorophyll a (µg/L)</b>			
0-5	best condition	29	
<b>Deep Hole Values</b> 5-10	↓	36	
<b>East and Northeast Basin Values</b> 10-15		14	
15-30		14	
>30		worst condition	9
<b>Secchi depth (meters)</b>			
3.0-6.0	best condition	22	
2.0-3.0	↓	29	
<b>East and Northeast Basin and Deep Hole Values</b> 1.0-2.0		30	
<1.0		worst condition	19



### EXPLANATION

- ▲ Main water quality monitoring site
- △ Auxiliary water-quality monitoring site
- Lake Stage monitoring site

Figure 1. Locations of water-quality and lake-stage monitoring sites on Namekagon Lake near Cable, Wisconsin



LOCATION --Lat 46°13'03", long 91°06'51", in NE 1/4 SE 1/4 sec 9, T43 N, R 6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.  
 PERIOD OF RECORD.--March to August 1998.  
 REMARKS.--Lake sampled near center of the lake at the deep hole. Lake ice-covered during March measurements. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER-QUALITY DATA, MARCH 05 TO AUGUST 11, 1998  
 (Milligrams per liter unless otherwise indicated)

	Mar. 05	Apr. 22	June 09	July 08	Aug. 11
Lake stage (ft)		8.88	8.44	8.41	8.04
Current depth (meters)	---	3.6	2.5	2.4	1.2
Chlorophyll a, phytoplankton (µg/L)	---	3.8*	7.8*	7.2*	21.1
Depth of sample (m)	0.5	0.5	11.0	0.5	15.0
Water temperature (°C)	1.4	11.2	7.3	15.5	11.4
Specific conductance (µS/cm)	82	80	85	87	124
pH (unitless)	7.0	7.7	7.5	7.9	7.2
Dissolved oxygen	11.9	12.0	9.9	9.9	8.1
Phosphorus, total (as P)	0.011	0.032	0.051	0.019	0.057
Phosphorus, ortho, dissolved (as P)	---	0.002	---	---	0.024
Nitrogen, NH <sub>4</sub> + NO <sub>3</sub> , Diss (as N)	---	0.064	---	---	0.018
Nitrogen, ammonia, dissolved (as N)	---	<0.013	---	---	<0.013
Nitrogen, Amm. + org., total (as N)	---	0.31	---	---	1.4
Nitrogen, total (as N)	---	0.37	---	---	1.4
Calcium (as Ca, scale)	---	36	---	---	---
Magnesium (Mg)	---	2.5	---	---	---
Sulfate, as CaCO <sub>3</sub>	---	38	---	---	---
Calcium, dissolved (Ca)	---	10	---	---	---
Magnesium, dissolved (Mg)	---	3.2	---	---	---
Sodium, dissolved (Na)	---	2.4	---	---	---
Potassium, dissolved (K)	---	0.4	---	---	---
Alkalinity, as CaCO <sub>3</sub>	---	36	---	---	---
Sulfate, dissolved (SO <sub>4</sub> )	---	-	---	---	---
Chloride, dissolved (Cl)	---	2.7	---	---	---
Silica, dissolved (SiO <sub>2</sub> )	---	12	---	---	---
Solids, dissolved, at 180°C	---	86	---	---	---
Iron, dissolved (Fe) µg/L	---	110	---	---	---
Manganese, dissolved (Mn) µg/L	---	19	---	---	---

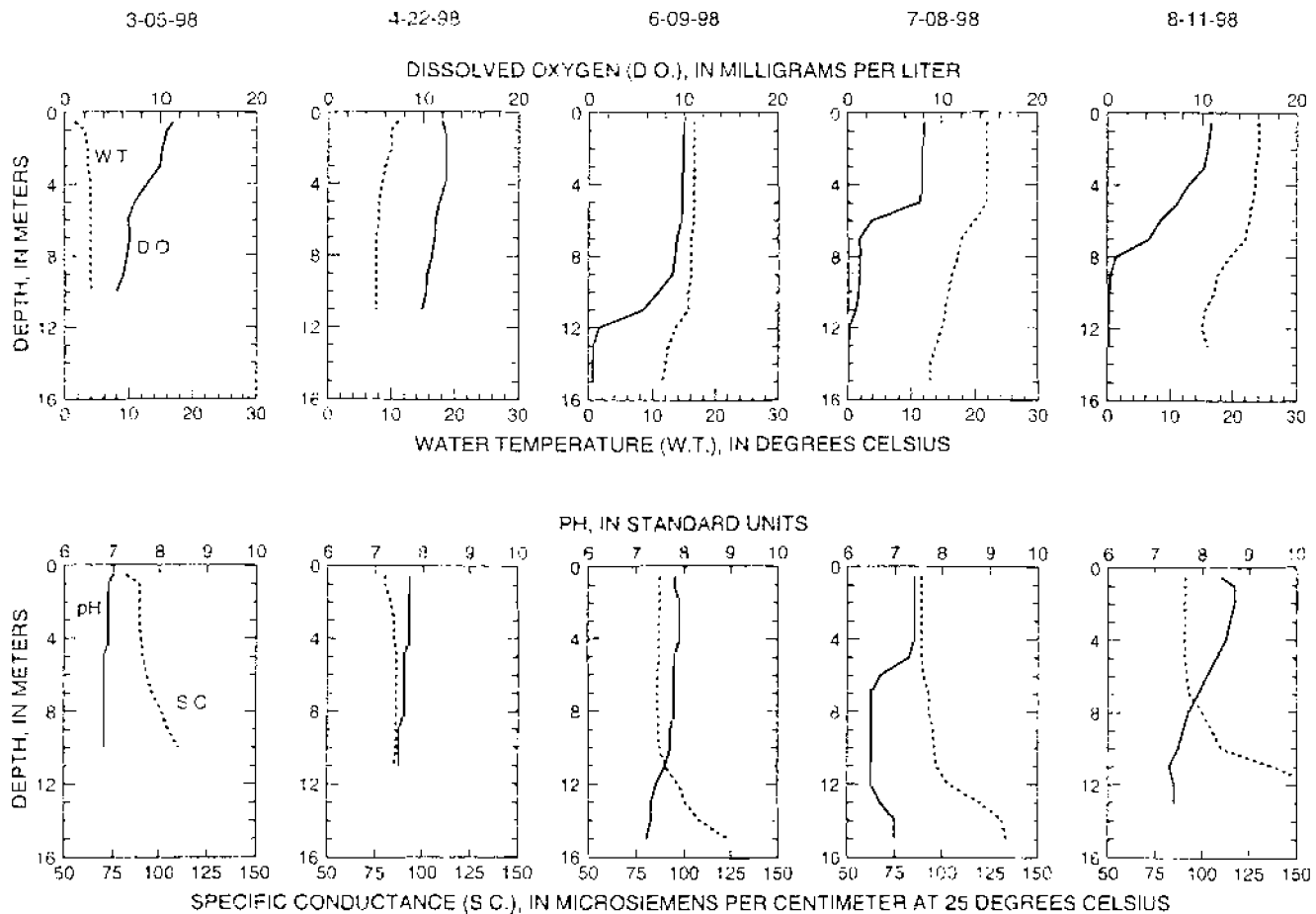


Figure 2a Water-quality data and depth profiles for Namekagon Lake, deep hole, near Cable, Wisconsin 1998 water year

LOCATION --Lat 46°15'08", long 91°06'51", in NE 1/4 SE 1/4 sec 9, T43 N., R 6 W., Bayfield County, Hydrologic Unit 07030002, near Cable  
 PERIOD OF RECORD. -March 1998 to current year.

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

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

	Mar-3	Apr-20	Jun-2	Jul-7	Aug-17
Lake stage (ft)	-	4.75	4.43	8.75	8.30
Secchi depth (m)	-	3.2	3.8	2.5	1.5
Chlorophyll a, phytoplankton (µg/L)	-	2.34	2.81	4.03	12.0
Depth of sample (m)	-	4.75	4.43	8.75	8.30
Water temperature (°C)	0.2	3.8	19.1	22.1	20.7
Specific conductance (µS/cm)	54	109	95	124	91
pH (units)	7.1	5.2	7.3	7.3	7.6
Dissolved oxygen (mg/L)	12.1	5.3	10.2	8.3	7.8
Phosphorus, total (as P)	0.018	0.018	0.017	0.045	0.031
Phosphorus, ortho, dissolved (as P)	-	-	-	-	-
Nitrogen, NO2 + NO3, dissolved (as N)	-	-	-	-	-
Nitrogen, ammonia, dissolved (as N)	-	-	-	-	-
Nitrogen, amm. + org. total (as N)	-	-	-	-	-
Nitrogen, total (as N)	-	-	-	-	-
Color (Pt-Co scale)	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-
Hardness, (as CaCO3)	-	-	-	-	-
Calcium, dissolved (Ca)	-	-	-	-	-
Magnesium, dissolved (Mg)	-	-	-	-	-
Sodium, dissolved (Na)	-	-	-	-	-
Potassium, dissolved (K)	-	-	-	-	-
Alkalinity, (as CaCO3)	-	-	-	-	-
Sulfate, dissolved (SO4)	-	-	-	-	-
Chloride, dissolved (Cl)	-	-	-	-	-
Silica, dissolved (SiO2)	-	-	-	-	-
Solids, dissolved, at 180°C	-	-	-	-	-
Iron, dissolved (Fe) µg/L	-	-	-	-	-
Manganese, dissolved (Mn) µg/L	-	-	-	-	-

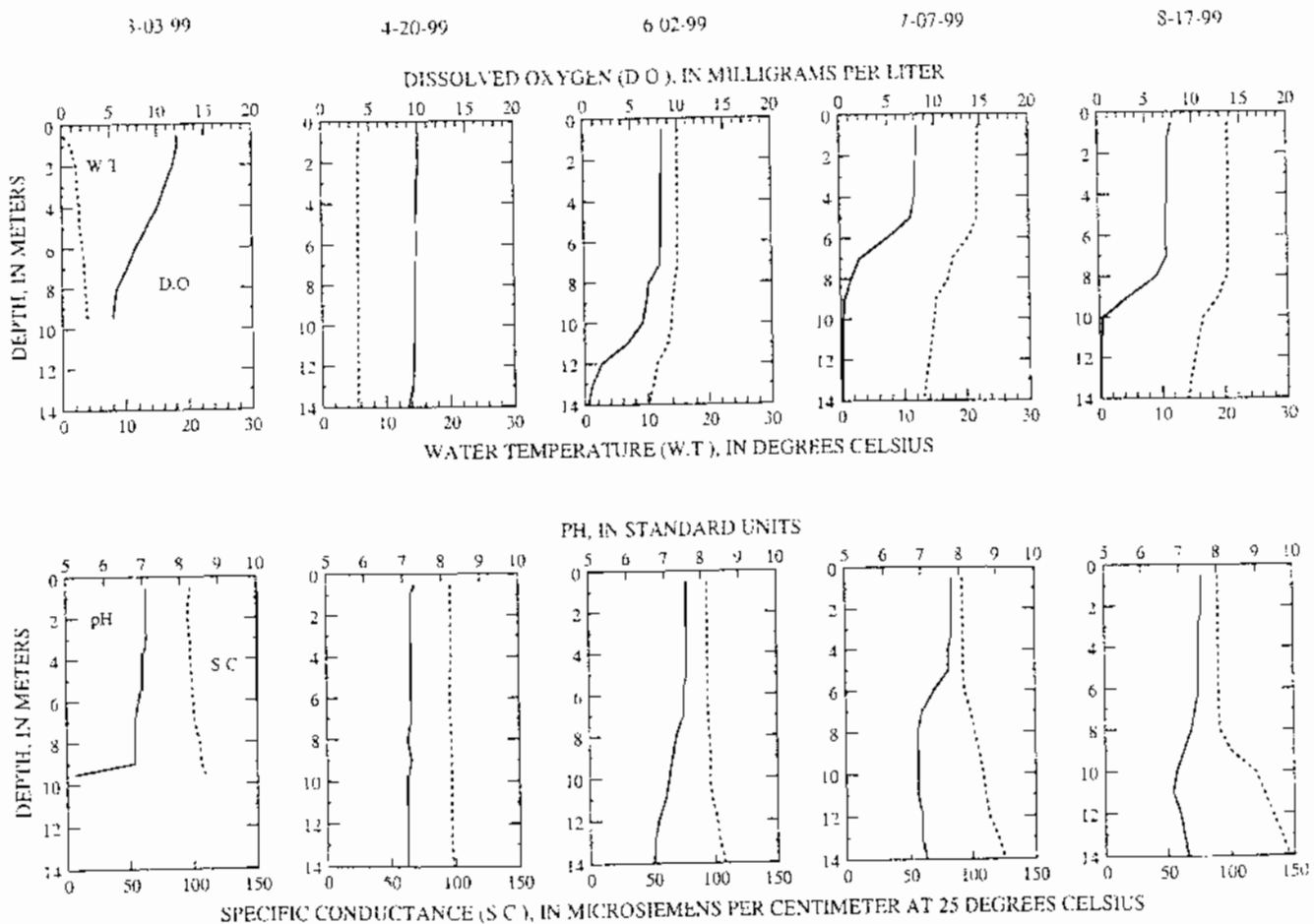


Figure 2a Water-quality data and depth profiles for Namekagon Lake, deep hole, near Cable, Wisconsin 1999 water year

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

PERIOD OF RECORD.--March to August 1998

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

WATER-QUALITY DATA, MARCH 04 TO AUGUST 11, 1998  
(Milligrams per liter unless otherwise indicated)

	Mar. 04	Apr. 22	June 09	July 08		Aug. 11	
Lake stage (ft)	---	8.86	8.44	8.41		8.04	
Secchi-depth (meters)	---	2.7	2.3	2.5		1.3	
Chlorophyll a, phytoplankton ( $\mu\text{g/L}$ )	---	2.64	8.44	6.69		6.88	
Depth of sample (m)	0.5	0.5	0.5	0.5	6.5	0.5	6.5
Water temperature ( $^{\circ}\text{C}$ )	0.6	11.6	16.2	21.9	16.5	24.8	18.5
Specific conductance ( $\mu\text{S/cm}$ )	64	82	96	90	105	94	133
pH (units)	7.8	7.5	7.8	6.9	6.5	8.2	7.3
Dissolved oxygen	11.6	11.7	9.5	7.6	0.1	9.2	0.2
Phosphorus, total (as P)	<0.005	0.037	0.022	0.022	0.102	0.026	0.206

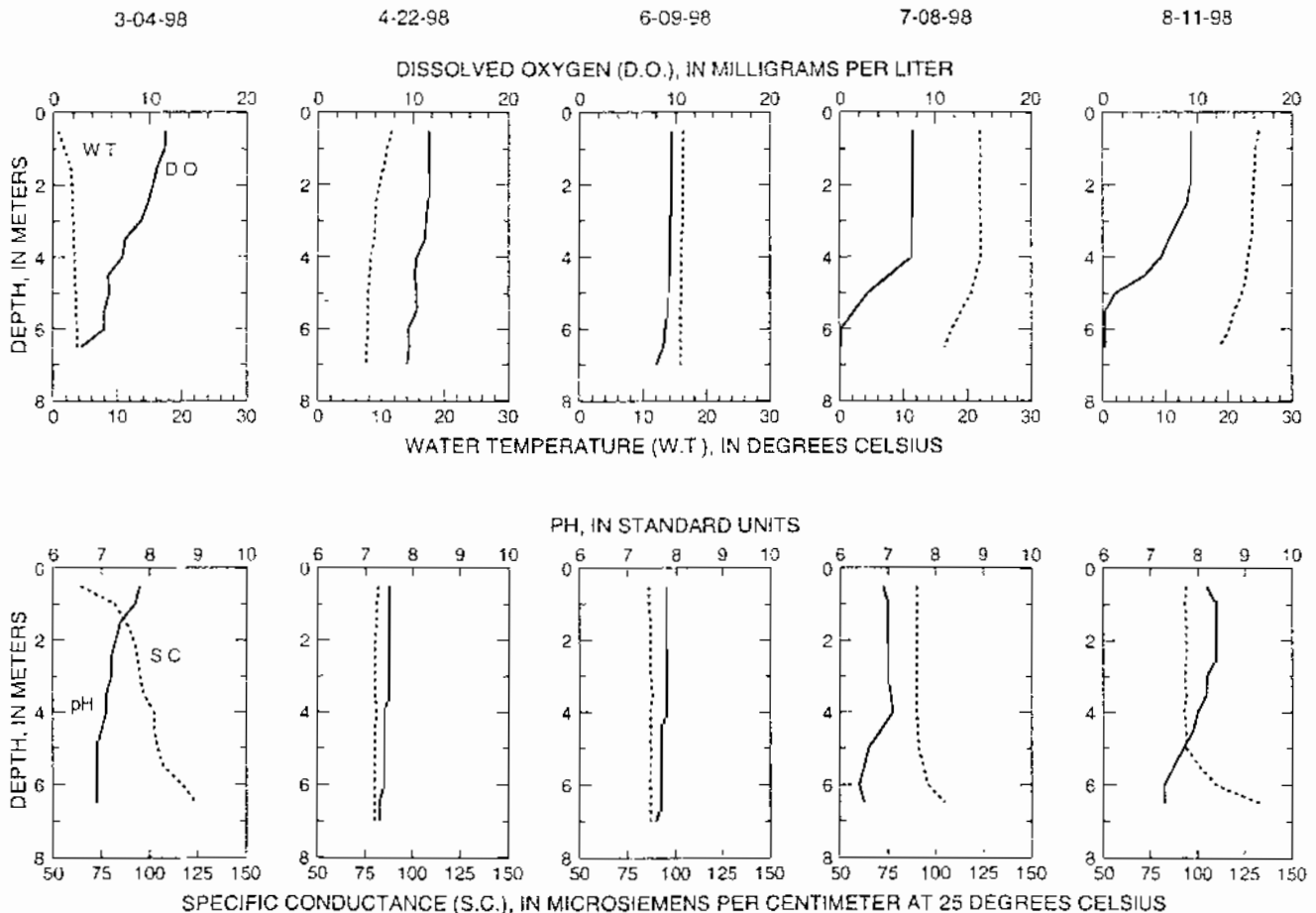


Figure 2b. Water-quality data and depth profiles for Namekagon Lake, east basin, near Cable, Wisconsin 1998 water year

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

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

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

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

	Mar-4	Apr-20	Jun-2	Jul-7	Aug-17
Lake stage (ft)	--	8.75	8.43	8.75	8.80
Secchi depth (m)	-	2.0	2.5	2.1	1.3
Chlorophyll a, phytoplankton (µg/L)	---	7.11	4.7	6.95	18.0
Depth of sample (m)	0.5	0.5	0.5	0.5	7.0
Water temperature (°C)	0.1	6.5	13.3	22.4	21.0
Specific conductance (µS/cm)	103	94	94	92	133
pH (units)	7.0	7.3	7.5	7.9	7.2
Dissolved oxygen (mg/L)	10.6	10.5	8.3	7.8	0.1
Phosphorus, Total (as P)	0.026	0.021	0.021	0.020	0.120

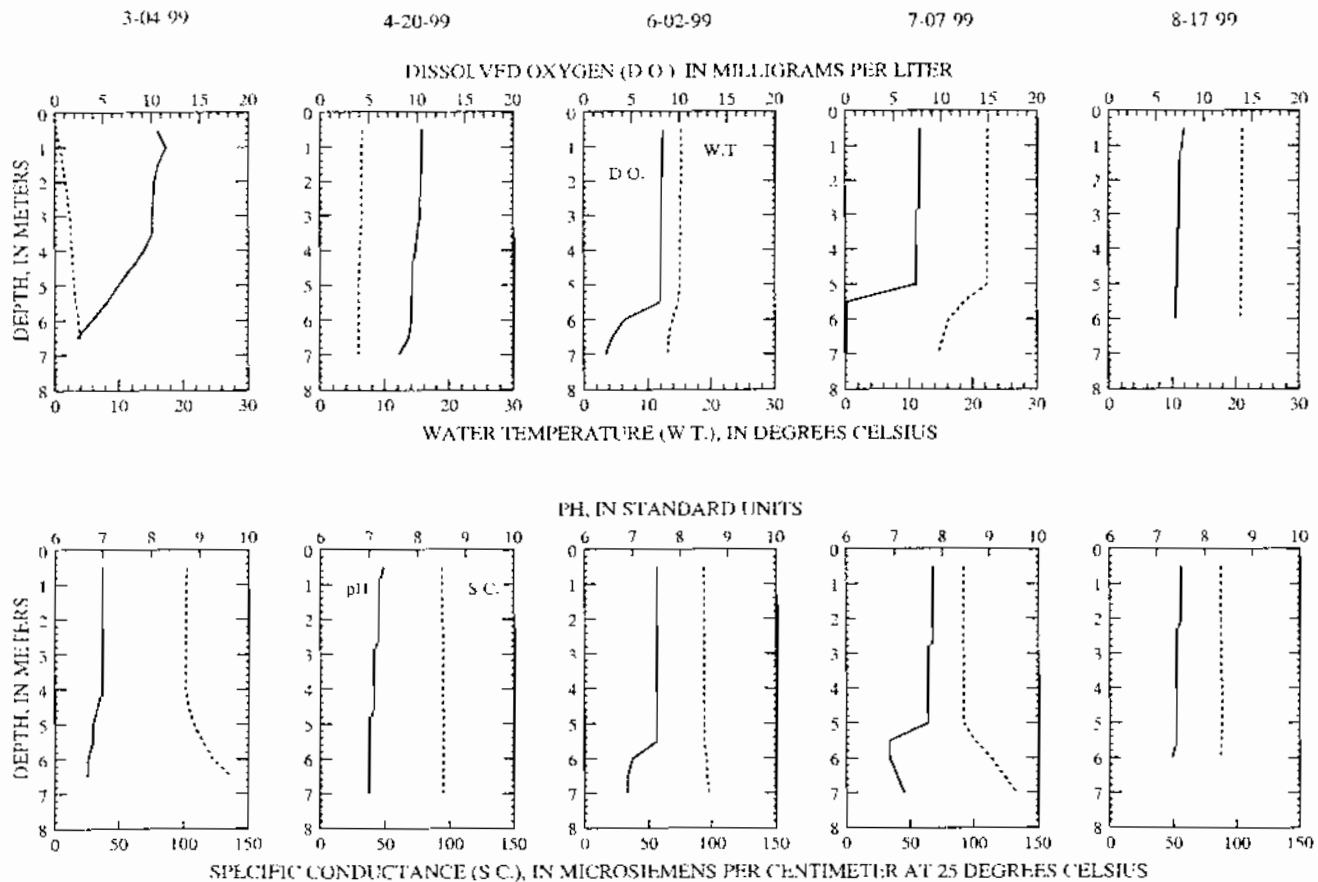


Figure 2b. Water-quality data and depth profiles for Namckagon Lake, east basin, near Cable, Wisconsin, 1999 water year

LOCATION:--Lat 46°14'10", long 91°05'07", in SE 1/4 NW 1/4 sec.2, T.43 N., R 6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.  
 PERIOD OF RECORD: -March to August 1998  
 REMARKS --Lake sampled at deepest part of the northeast bay. Lake ice-covered during March measurements. Water-quality analyses done by Wisconsin State Laboratory of Hygiene.

WATER QUALITY DATA, MARCH 05 TO AUGUST 11, 1998  
 (Milligrams per liter unless otherwise indicated)

	Mar. 05		Apr. 22	June 09	July 08		Aug. 11	
Lake stage (ft)			8.26	8.44	8.41		8.04	
Secchi depth (meters)			2.7	2.5	2.1		1.1	
Chlorophyll a, phytoplankton (µg/L)			3.11	8.11	4.91		21.2	
Depth of sample (m)	0.5	11.0	0.5	0.5	0.5	10.0	0.5	11.0
Water temperature (°C)	1.8	4.6	11.1	11.2	22.7	15.1	24.9	15.0
Specific conductance (µS/cm)	83	106	77	84	88	107	90	127
pH (units)	7.0	6.6	7.5	7.8	7.2	6.5	8.4	7.4
Dissolved oxygen	10.2	0.6	11.3	3.9	8.1	0.0	10.8	0.3
Phosphorus, total (µg P/l)	0.028	0.040	0.029	0.019	0.021	0.065	0.031	0.197

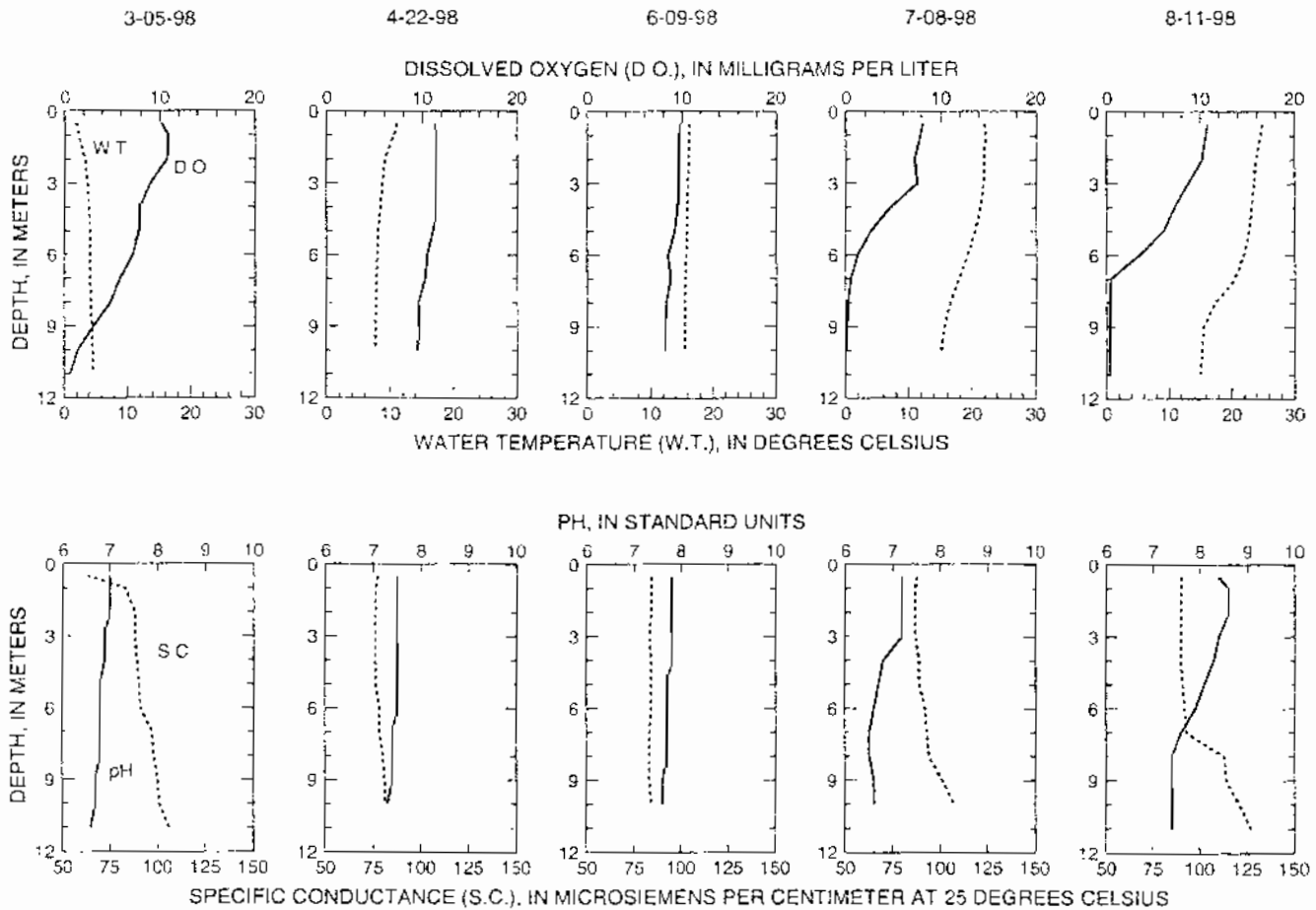


Figure 2c Water-quality data and depth profiles for Namekagon Lake, northeast basin, near Cable, Wisconsin 1998 water year

LOCATION --Lat 46°14'10", long 91°05'07", in SE 1/4 NW 1/4 sec.2, T43 N., R 6 W., Bayfield County, Hydrologic Unit 07030002, near Cable.

PERIOD OF RECORD --March 1998 to current year.

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

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

	Mar-3		Apr-20		Jun-2		Jul-7		Aug-17	
Leve stage (ft)			8.75		8.43		8.75		8.80	
Secchi depth (m)			2.3		3.0		2.4		1.3	
Chlorophyll a, phytoplankton (µg/L)			5.04		3.16		5.21		18	
Depth of sample (m)	0.5	11.5	0.5	0.5	10.0	3.5	11.0	0.5	10.0	
Water temperature (°C)	0.4	4.6	6.9	15.7	9.0	22.9	11.3	21.1	12.9	
Specific conductance (µS/cm)	97	140	99	92	102	89	123	85	139	
pH (units)	7.0	7.2	7.2	7.5	6.6	7.6	7.1	7.7	7.1	
Dissolved oxygen (mg/L)	11.6	0.7	10.3	8.2	0.3	7.5	0.1	8.0	0.2	
Phosphorus, total (as P)	0.015	0.032	0.018	0.019	0.034	0.130	0.164	0.038	0.265	

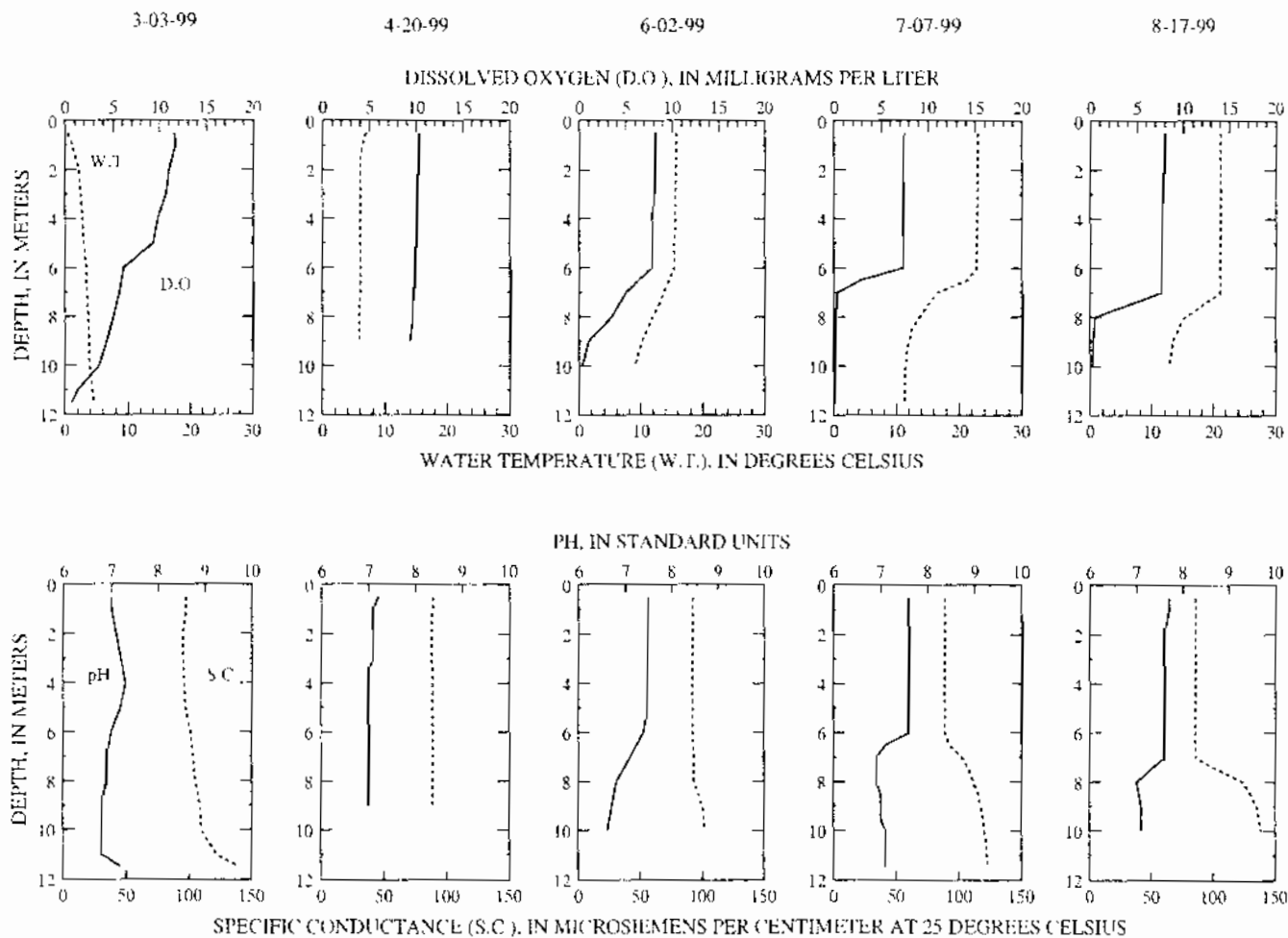


Figure 2c. Water-quality data and depth profiles for Namekagon Lake, northeast basin, near Cable, Wisconsin, 1999 water year

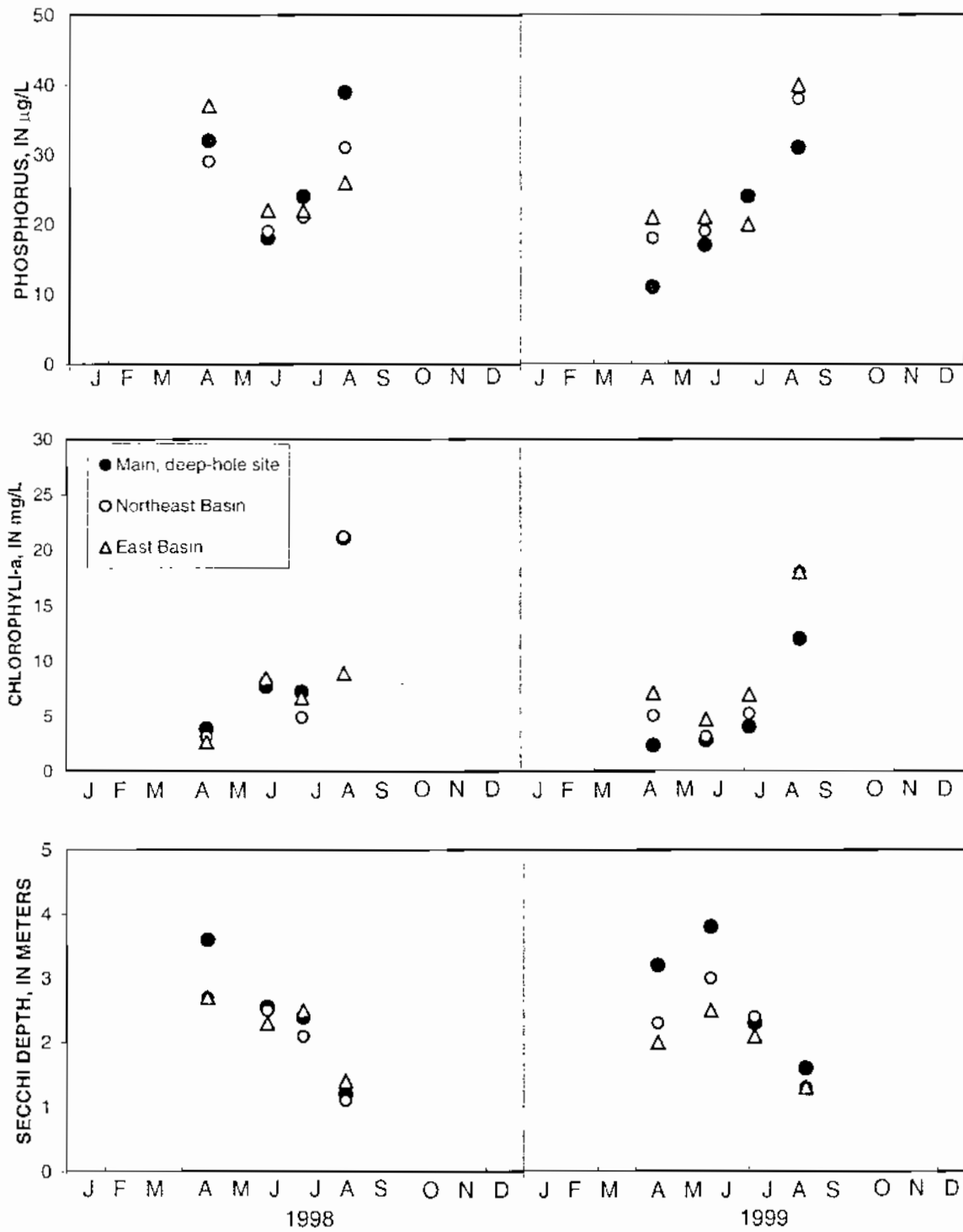


Figure 3. Surface total-phosphorus and chlorophyll a concentrations and water clarity at three sites in Namekagon Lake, 1998-99.

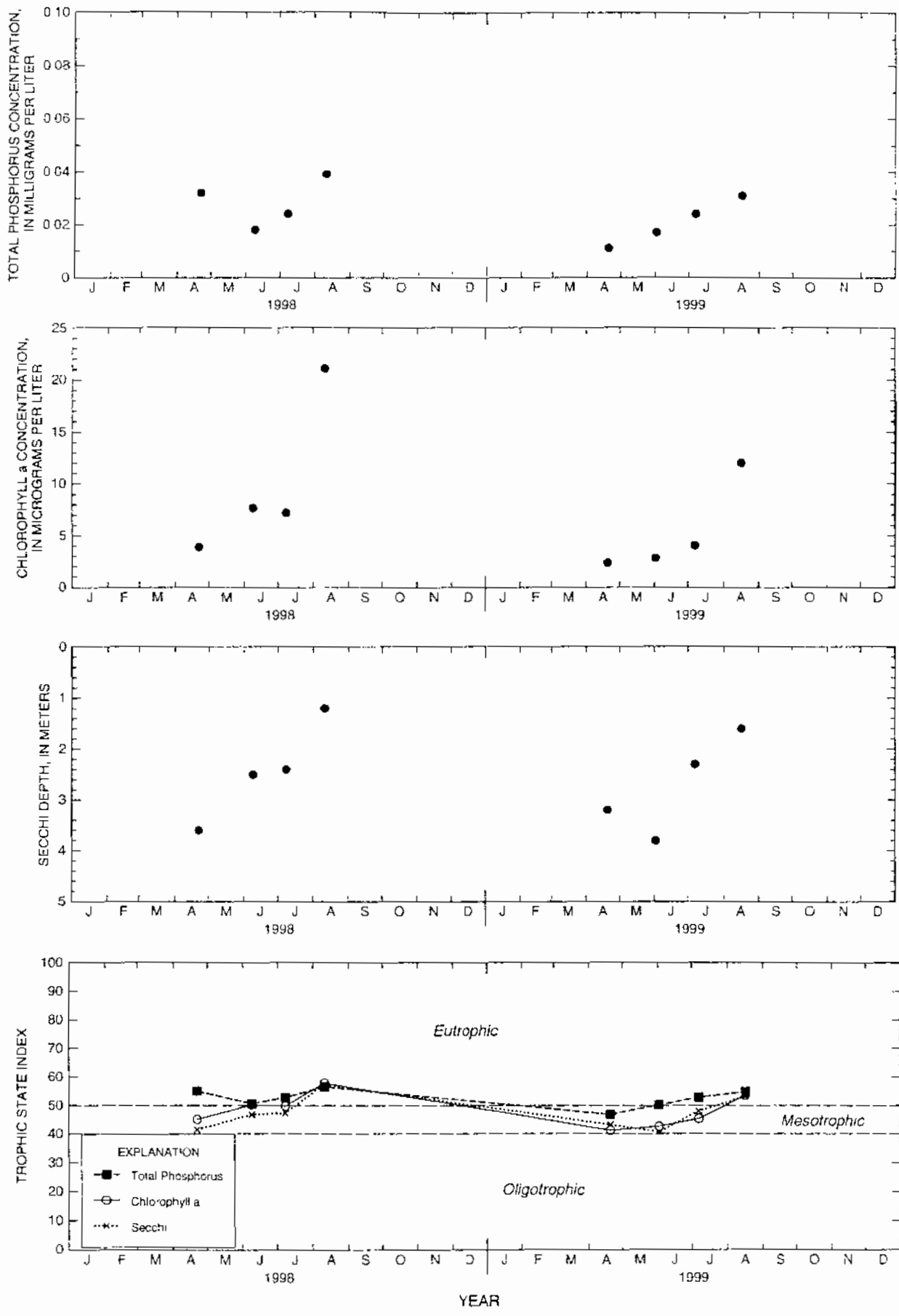


Figure 3a. Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lakes, Deep Hole, near Cable, Wisconsin.



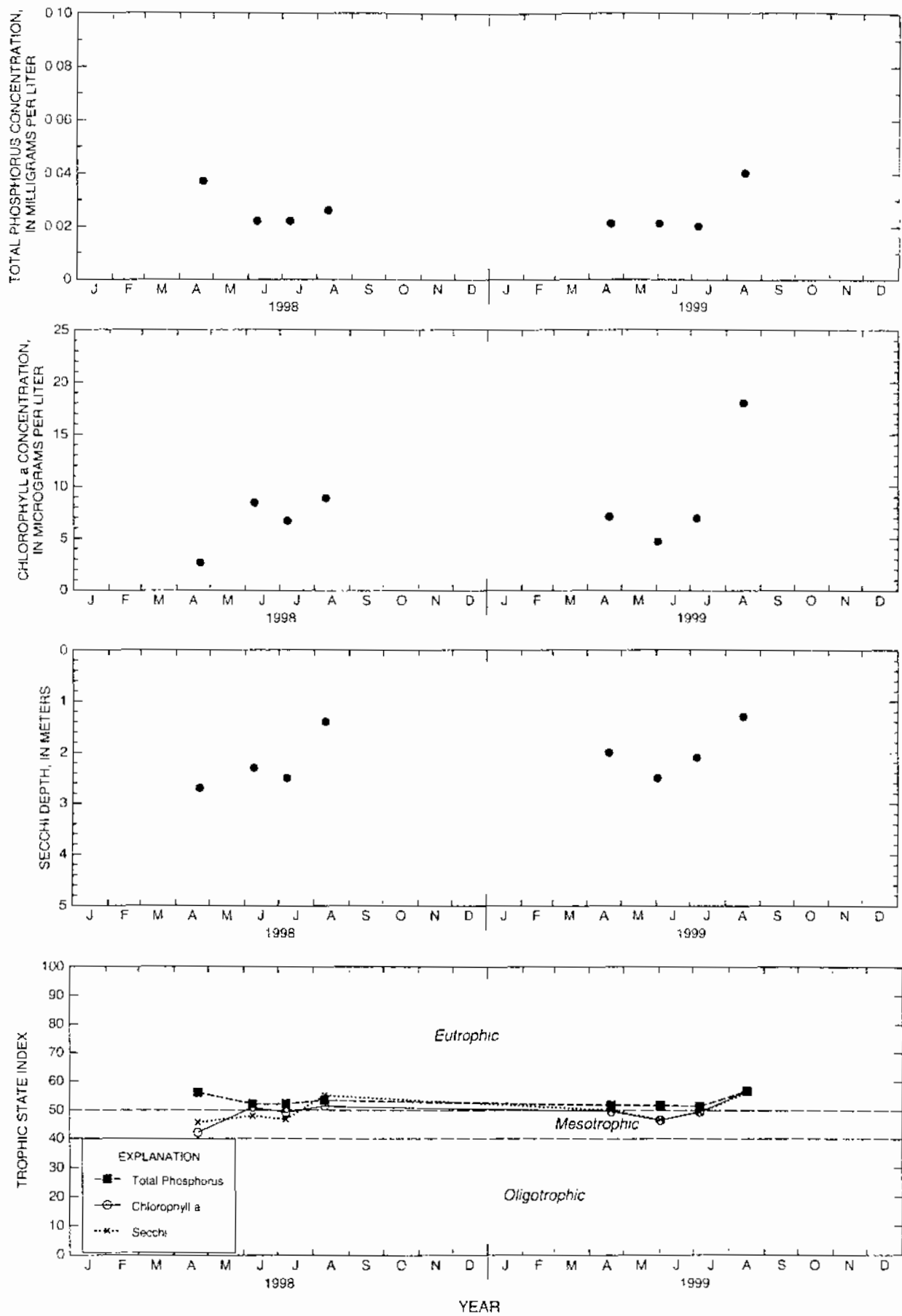


Figure 3b. Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lakes, East Basin, near Cable, Wisconsin.

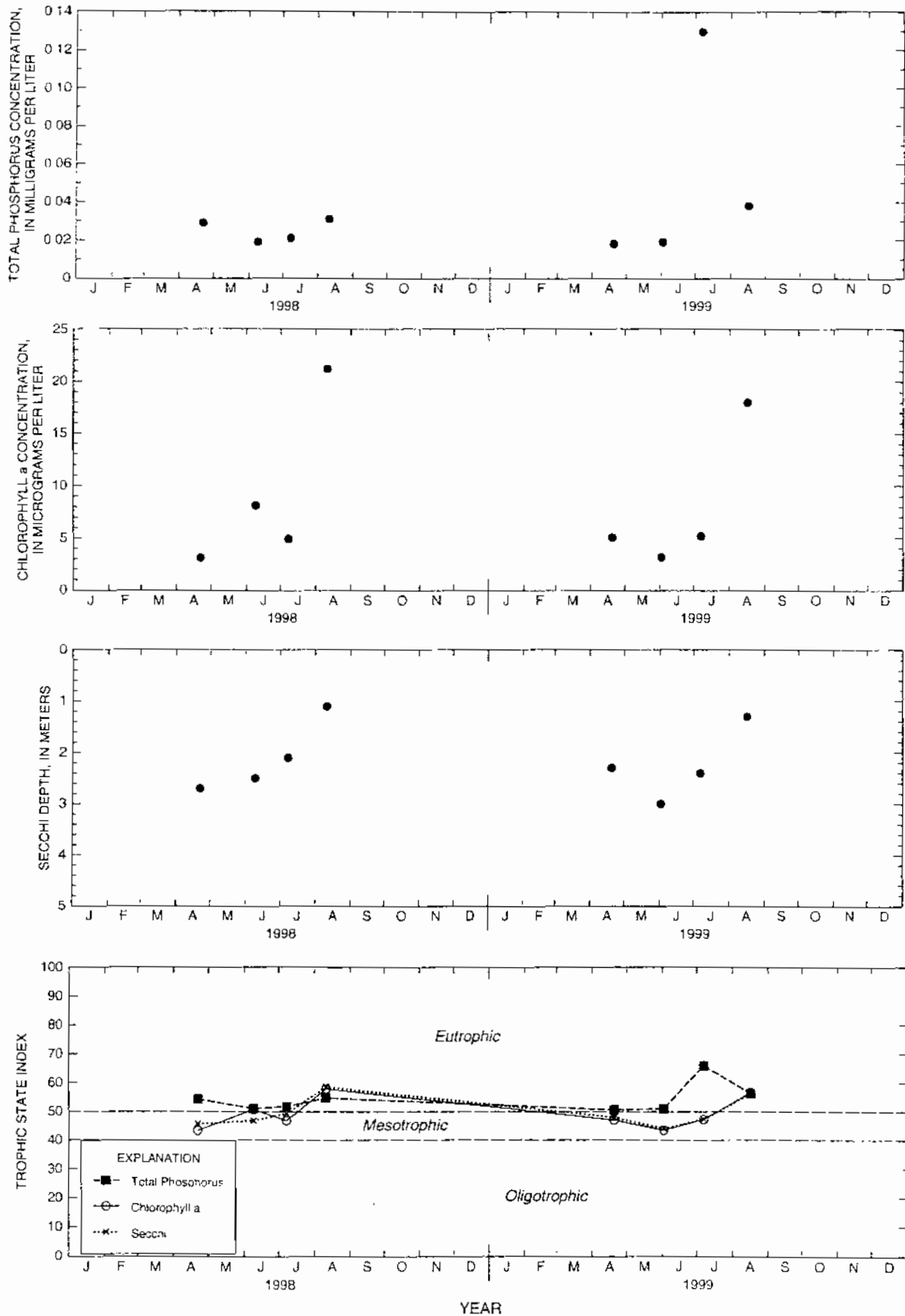


Figure 3c. Surface total phosphorus, chlorophyll a concentrations, Secchi depths, and TSI data for Namekagon Lakes, North-East Basin, near Cable, Wisconsin.