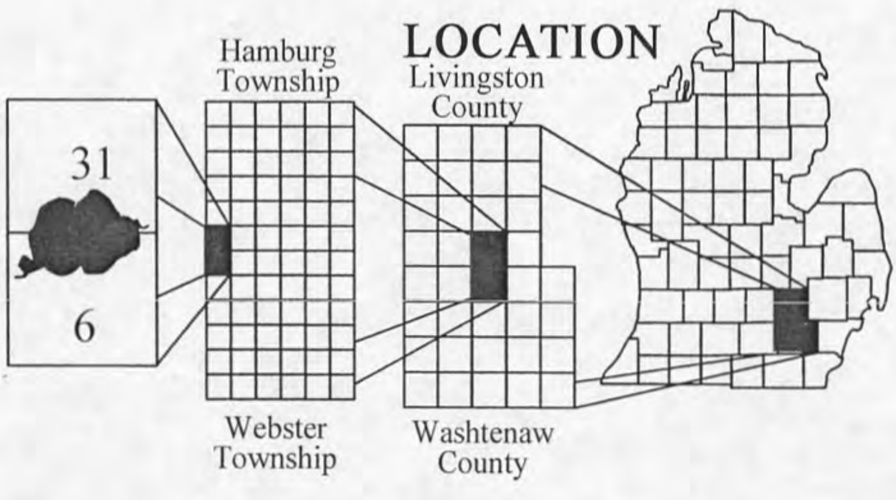
BASE LAKE

HAMBURG TOWNSHIP
LIVINGSTON COUNTY AND
WEBSTER TOWNSHIP
WASHTENAW COUNTY
MICHIGAN

WATER QUALITY STUDIES
1994-2010



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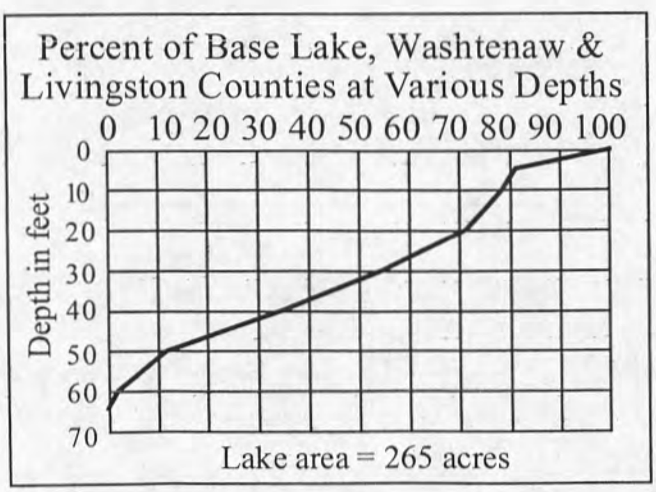
BASE LAKE

WEBSTER TOWNSHIP
WASHTENAW COUNTY
AND HAMBURG TOWNSHIP
LIVINGSTON COUNTY

1994 – 2010 WATER QUALITY STUDIES

BASE LAKE DATA

Base Lake, also called Baseline Lake, is a 265-acre natural hard-water kettle lake located in Section 31, Hamburg Township (T1N R5E) Livingston County, and Section 6, Webster Township (T1S R5E), Washtenaw County, Michigan. The lake consists of two basins. A small mid-lake island, plus two sunken islands rising within five feet or less of the surface, plus indentations in the north and south shorelines separates the lake into a 57-foot deep west basin and a 64-foot deep east basin. A second island is located on the northwest corner and was created when a dug canal isolated a parcel of land.

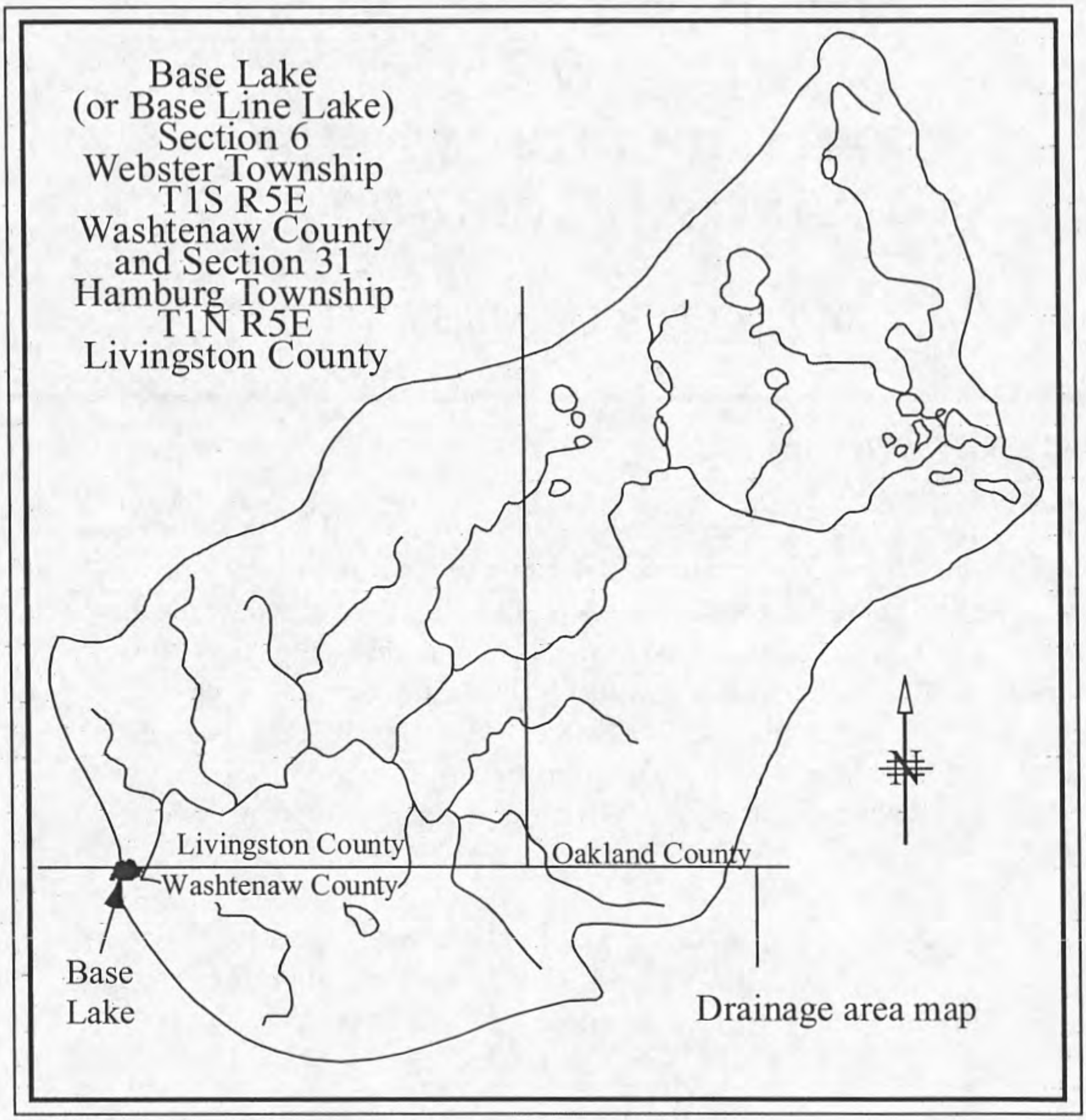


The hypsographic (depth-area) graph shows about 22 percent of the lake is ten feet deep or less.

The lake contains 7975 acre feet of water, and has a mean depth of 30.1 feet. The shoreline length is 17,790 feet.

The Huron River flows through the lake from east to west, so it is both an inlet and the outlet. The lake has no other inlets.

The entire Huron River upstream watershed is included in the Base Lake watershed. The Huron River watershed above Base Lake is 259,575 acres.

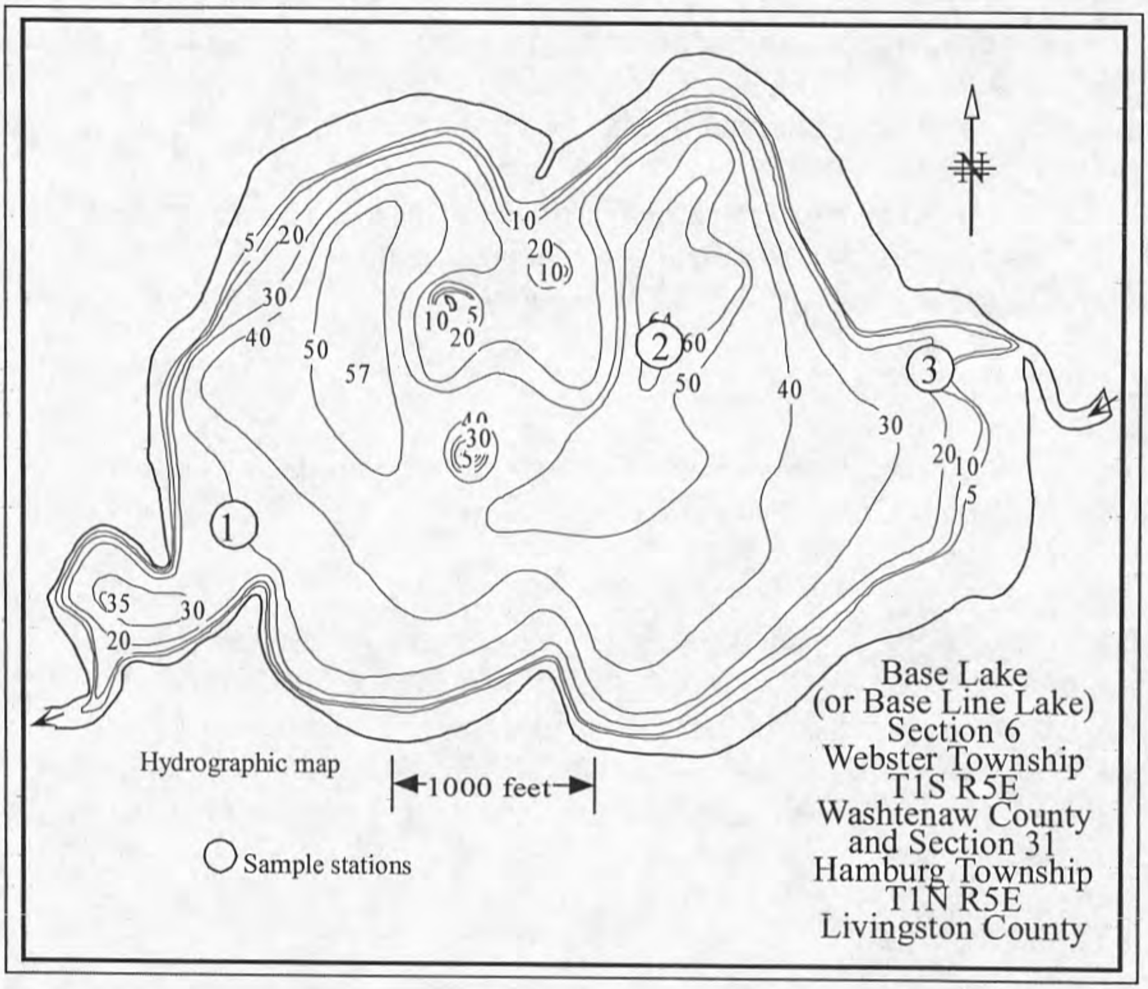


The drainage area, which includes the watershed plus the surface area of Base Lake, is 259,840 acres. The watershed to lake ratio is large, 980 to 1. Because of this large ratio the flushing rate of the lake is rapid, on the order of 0.038 years (or once every 14 days) on an average.

The longitude and latitude of the 64-foot deep hole is 83° 53.557W and 42° 25.590N. The elevation of the lake is 852 feet above sea level.

THE SAMPLE STATIONS

The locations of the three in-lake sample stations are shown as circles on the hydrographic map of the lake.



THE SAMPLE DATES

Base Lake residents took three spring surface samples for water quality testing at the sites shown on the map June 7, 1994 and June 19 and July 31, 1995. WQI limnologists took three spring surface samples plus surface temperatures, dissolved oxygen concentrations and Secchi disk readings at the sites shown on the map June 9, 1996, May 12, 1997, April 19, 1998, April 25, 1999, April 15, 2000, May 13, 2001, April 15, 2002, April 28, 2003, April 16, 2004, April 18, 2005, April 19, 2006, April 21, 2007, April 18, 2008, April 18, 2009 and April 20, 2010.

WQI limnologists collected late summer surface samples at three stations August 1, 1994, August 14, 1995, August 7, 1996, August 25, 1997, August 10, 1998, August 27, 1999, August 4, 2000, August 1, 2001, August 2, 2002, August 1, 2003, August 2, 2004, August 3, 2005, August 1, 2006, August 1, 2007, August 1, 2008, August 3, 2009 and August 2, 2010. Temperature and dissolved oxygen profile data were collected each time the lake was sampled in late summer at the 64-foot deep hole. Three bottom sediment samples were collected at the sample sites on Base Lake in spring 2005.

Davis Creek (at Merrill Road) and the Huron River (at M-36) were sampled 11 times beginning in June 2005 and continuing until April 2006. Davis Creek was sampled 12 times May 2009 through April 2010

THE ANALYSES

The tests performed on the samples included total phosphorus, total nitrate nitrogen, total alkalinity, pH, conductivity, chlorophyll a, Secchi disk depth, temperature, and dissolved oxygen.

Temperature, dissolved oxygen and Secchi disk depths were measured in the field. Chlorophyll a, phosphorus, nitrate nitrogen, alkalinity, pH and conductivity tests were performed at the Water Quality Investigators laboratory in Dexter, Michigan. All test procedures followed those outlined in APHA's *Standard Methods for the Examination of Water and Wastewater* (1985).

THE TEST RESULTS

The results of the tests are found in the text, in the tables at the end of this report and on the enclosed atlas pages.

TEMPERATURE AND DISSOLVED OXYGEN

Temperature exerts a wide variety of influences on most lakes, such as the separation of layers of water (stratification), solubility of gasses and biological activity.

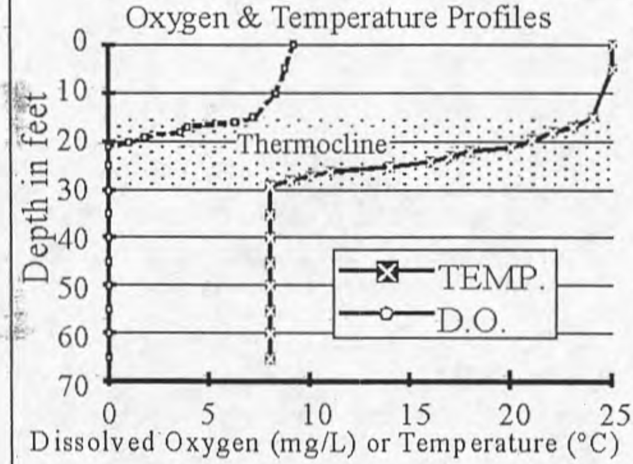
Dissolved oxygen is the test most often selected by lake scientists as being important. Besides providing oxygen for aquatic organisms, in natural lakes oxygen is involved the capture and release of various chemicals, such as iron and phosphorus.

In spring top to bottom temperature and dissolved oxygen concentrations were not measured but surface temperatures and oxygen concentrations were, beginning in 1996. On the other hand, top to bottom dissolved oxygen and temperature data were collected from the deep hole each time the lake was sampled in late summer.

1994

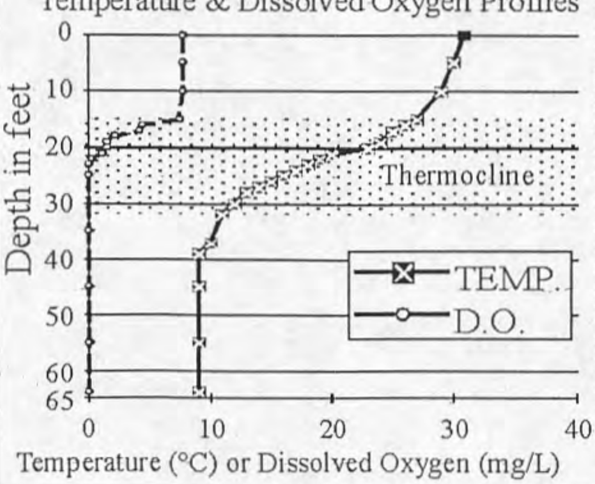
In late summer 1994, the lake formed a 15-foot-thick thermocline (defined as a layer of water in a lake where the temperature changes rapidly with depth and shown shaded on the graphs) from 15 to 30 feet. Dissolved oxygen was plentiful above the thermocline. In 1994, the lake ran out of dissolved oxygen at 21 feet. That condition remained to the bottom. The hypsographic (depth-area) graph shows about 68 percent of the lake is deeper than 21 feet.

Base Lake August 2, 1994 Dissolved Oxygen & Temperature Profiles



Temp.	Depth	D.O.	Depth
25	0	9.2	0
25	5	8.8	5
24	15	8.3	10
23	17	7.2	15
22	18	6.3	16
21	19	3.9	17
21	20	3.5	18
20	21	1.8	19
18	22	1	20
17	23	0	21
16	24	0	25
14	25	0	30
11	26	0	35
10	27	0	40
9	28	0	45
8	29	0	50
8	40	0	55
8	50	0	60
8	65	0	65

Base Lake, August 15, 1995 Temperature & Dissolved Oxygen Profiles

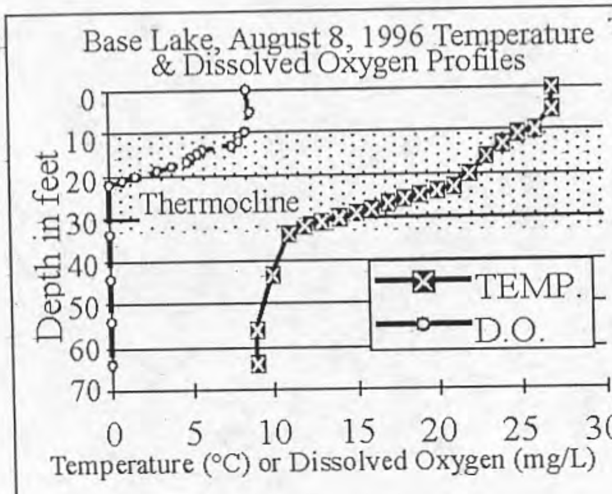


Temp.	Depth	D.O.	Depth
31	0	7.8	0
30	5	7.8	5
29	10	7.8	10
27	15	7.6	15
26	16	4.4	16
25	17	4.1	17
24	19	2.2	18
23	20	1.5	19
20	21	1.5	20
19	22	1.1	21
18	23	0.2	22
17	24	0.0	23
16	25	0.0	25
15	26	0.0	35
14	27	0.0	45
13	28	0.0	55
12	30	0.0	64
11	32		
10	37		
9	39		
9	45		
9	55		
9	64		

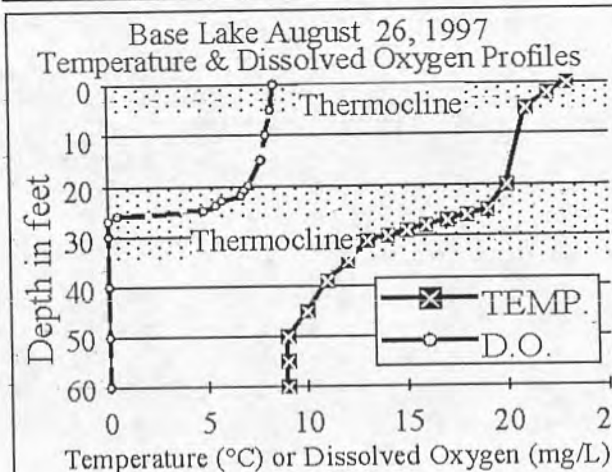
1995

In late summer 1995, the lake formed a 16-foot-thick thermo-cline from 15 to 31 feet.

Dissolved oxygen was plentiful above the thermocline. This year the lake ran out of dissolved oxygen at 23 feet. That condition remained to the bottom. About 65 percent of the lake is deeper than 23 feet.



Temp.	Depth	D.O.	Depth
27	0	8.6	0
27	5	8.8	5
26	10	8.5	10
25	11	8.0	11
24	13	8.0	12
23	16	7.6	13
22	20	5.8	14
21	23	5.5	15
20	24	5.1	16
19	25	4.8	17
18	26	3.9	18
17	27	3.0	19
16	28	1.7	20
15	29	0.8	21
14	30	0.0	22
13	31	0.0	34
12	32	0.0	44
11	34	0.0	54
10	43	0.0	64
9	56		
9	64		



Temp.	Depth	D.O.	Depth
23	0	8.5	0
22	2	8.3	5
21	5	8.1	10
20	20	7.8	15
19	25	7.2	20
18	26	6.9	21
17	27	6.8	22
16	28	5.8	23
15	29	5.5	24
14	30	4.8	25
13	31	0.5	26
12	35	0.0	27
11	39	0.0	30
10	45	0.0	40
9	50	0.0	50
9	55	0.0	60
9	60		

1996

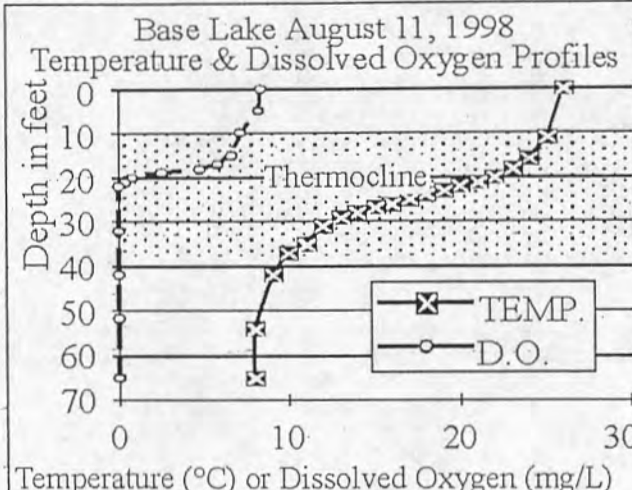
In late summer 1996, the lake formed a 22-foot-thick thermocline from 10 to 32 feet. Dissolved oxygen was again plentiful above the thermocline. This year the lake ran out of dissolved oxygen at 22 feet and that condition remained to the bottom.

1997

In late summer 1997, the lake formed two thermoclines. The first was five feet thick, from the surface to five feet. The second was 13 feet thick, from 20 to 33 feet. Dissolved oxygen was plentiful above the deeper thermocline. In 1997, the lake ran out of dissolved oxygen at 27 feet. That condition remained to the bottom. The hypsographic (depth-area) graph shows about 60 percent of the lake is deeper than 27 feet.

1998

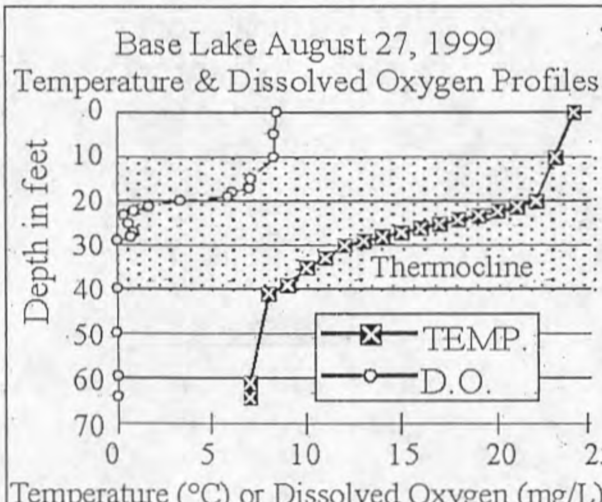
In late summer 1998, the lake formed a 28-foot-thick thermocline from 10 to 38 feet. Dissolved oxygen was plentiful above the thermocline. The lake ran out of dissolved oxygen at 22 feet and that condition remained to the bottom. About 68 percent of the lake is deeper than 22 feet.



Temp.	Depth	D.O.	Depth
26	0	8.4	0
25	11	8.3	5
24	16	7.2	10
23	18	6.6	15
22	20	5.9	17
21	21	4.8	18
20	22	2.5	19
19	23	0.8	20
18	24	0.4	21
17	25	0.0	22
16	26	0.0	32
15	27	0.0	42
14	28	0.0	52
13	29	0.0	65
12	31		
11	35		
10	37		
9	42		
8	54		
8	65		

1999

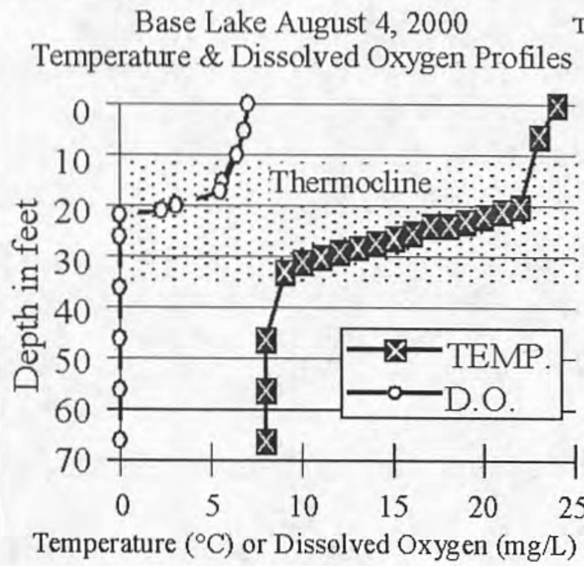
In late summer, 1999, the lake formed a 30-foot-thick thermocline from 10 to 40 feet. Dissolved oxygen was plentiful above the thermocline. The lake ran out of dissolved oxygen at 29 feet. That condition remained to the bottom. About 57 percent of the lake is deeper than 29 feet.



Temp.	Depth	D.O.	Depth
24	0	8.5	0
23	10	8.3	5
22	20	8.3	10
21	21	7.1	15
20	22	7.0	17
19	23	6.1	18
18	24	5.9	19
17	25	3.4	20
16	26	1.7	21
15	27	0.9	22
14	28	0.4	23
13	29	0.6	25
12	30	0.9	27
11	33	0.8	28
10	35	0.0	29
9	39	0.0	40
8	41	0.0	50
7	61	0.0	60
7	64	0.0	64

2000

In late summer 2000 the lake formed a 25-foot-thick thermocline from 10 to 35 feet. The lake ran out of dissolved oxygen in the middle of the thermocline at 22 feet, and that condition remained to the bottom. About 68 percent of the lake is deeper than 22 feet.

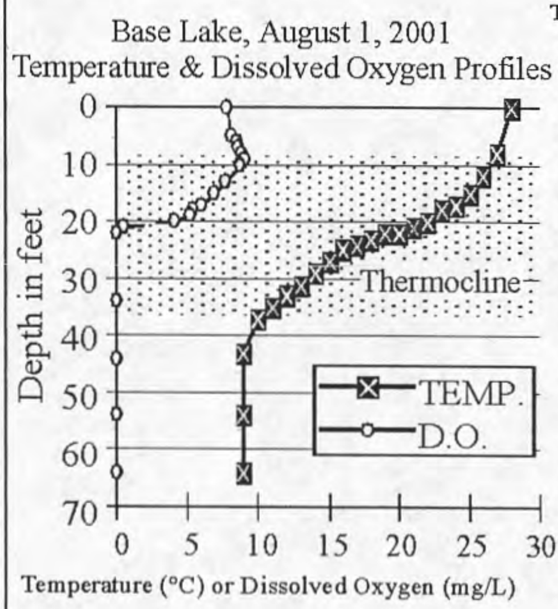


Temp.	Depth	D.O.	Depth
24	0	7.1	0
23	6	6.9	5
22	20	6.5	10
21	21	5.6	15
20	22	5.5	17
19	23	3.1	20
18	24	2.3	21
17	24	0.0	22
16	25	0.0	26
15	26	0.0	36
14	27	0.0	46
13	28	0.0	56
12	29	0.0	66
11	30		
10	31		
9	33		
8	46		
8	56		
8	66		

In this case, dissolved oxygen concentrations rather than temperature determined the top of the thermocline.

2001

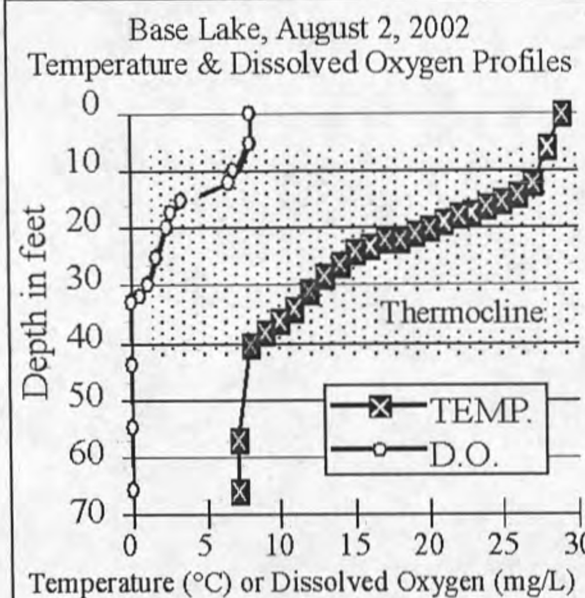
In late summer 2001 the lake formed a 28-foot-thick thermocline from 9 to 37 feet. Dissolved oxygen was plentiful above 12 feet. The lake ran out of dissolved oxygen in the middle of the thermocline at 22 feet, and that condition remained to the bottom. About 68 percent of the lake is deeper than 22 feet.



Temp.	Depth	D.O.	Depth
28	0	7.9	0
27	8	8.2	5
26	12	8.6	6
25	15	8.7	7
24	17	8.9	8
23	18	9.1	9
22	20	8.8	10
21	21	7.8	13
20	22	7.0	15
19	22	6.1	17
18	23	5.5	18
17	24	5.3	19
16	25	4.1	20
15	27	0.5	21
14	29	0.0	22
13	31	0.0	34
12	33	0.0	44
11	35	0.0	54
10	37	0.0	64
9	43		
9	54		
9	64		

2002

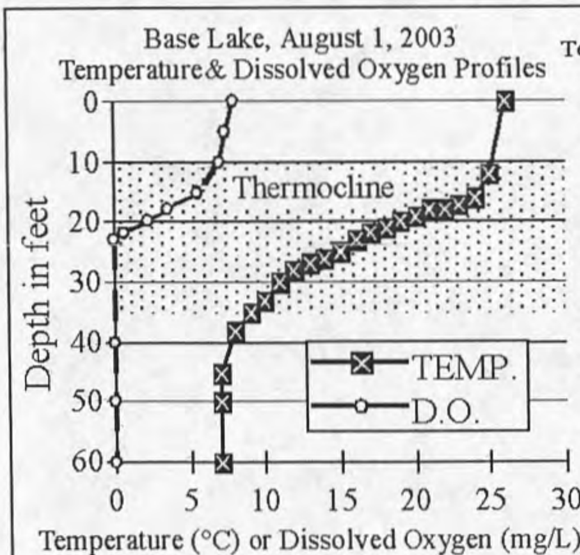
In late summer 2002 the lake formed a 35-foot-thick thermocline from 6 to 41 feet. The lake ran out of dissolved oxygen near the bottom of the thermocline at 33 feet, and that condition remained to the bottom. About 48 percent of the lake is deeper than 33 feet.



Temp.	Depth	D.O.	Depth
29	0	8.1	0
28	6	8.1	5
27	12	6.9	10
26	14	6.6	12
25	15	3.4	15
24	16	2.7	17
23	17	2.5	20
22	18	1.8	25
21	19	1.2	30
20	20	0.6	32
19	21	0.0	33
18	22	0.0	44
17	22	0.0	55
16	23	0.0	66
15	24		
14	26		
13	28		
12	31		
11	34		
10	36		
9	38		
8	40		
7	57		
7	66		

2003

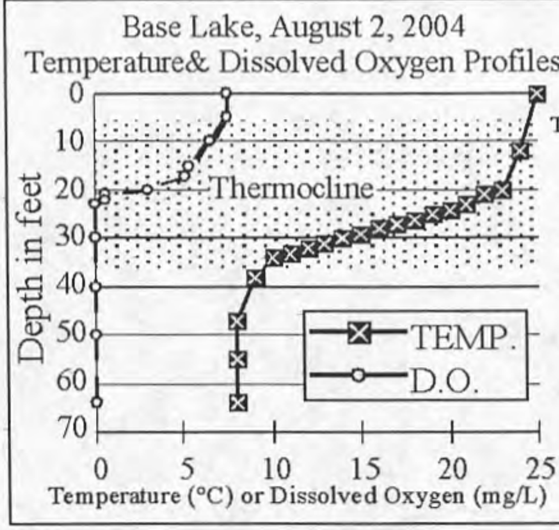
In late summer 2003 the lake formed a 25-foot-thick thermocline from 10 to 35 feet. The lake ran out of dissolved oxygen at 23 feet, and that condition remained to the bottom. About 66 percent of the lake is deeper than 23 feet.



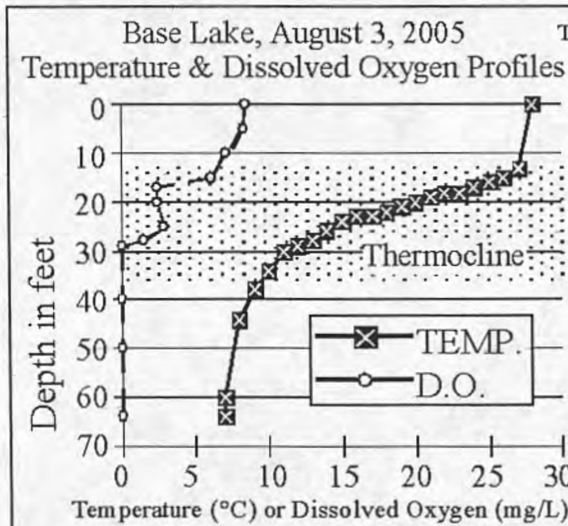
Temp.	Depth	D.O.	Depth
26	0	8.0	0
25	12	7.4	5
24	16	7.1	10
23	17	5.6	15
22	18	3.6	18
21	18	2.2	20
20	19	0.7	22
19	20	0.0	23
18	21	0.0	40
17	22	0.0	50
16	23	0.0	60
15	25		
14	26		
13	27		
12	28		
11	30		
10	33		
9	35		
8	38		
7	45		
7	50		
7	60		

2004

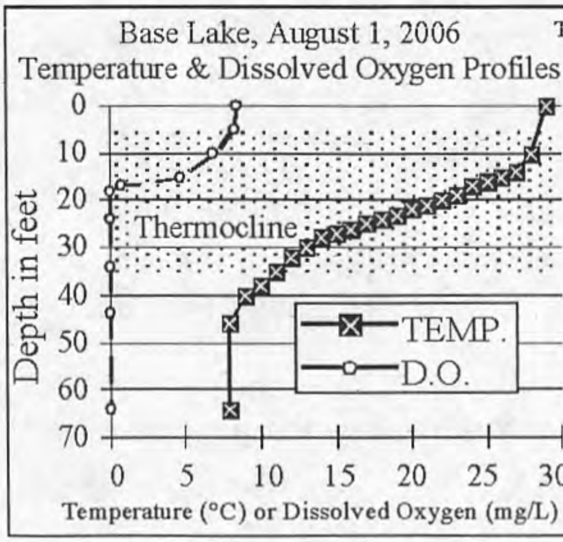
In late summer 2004 the lake formed a 30-foot-thick thermocline from 5 to 35 feet. Above five feet dissolved oxygen was plentiful and uniform. At five feet the dissolved oxygen concentration started to decrease. The lake ran out of dissolved oxygen at 23 feet, and that condition remained to the bottom.



Temp.	Depth	D.O.	Depth
25	0	7.6	0
24	12	7.6	5
23	20	6.7	10
22	21	5.4	15
21	23	5.2	17
20	24	3.0	20
18	26	0.6	21
16	28	0.6	22
14	30	0.0	23
12	32	0.0	30
10	34	0.0	40
9	38	0.0	50
8	47	0.0	64
8	55		
8	64		



Temp.	Depth	D.O.	Depth
28	0	8.5	0
27	13	8.4	5
26	15	7.2	10
25	16	6.2	15
24	17	2.5	17
22	18	2.5	20
21	19	2.9	25
20	20	1.5	28
18	22	0.0	29
16	23	0.0	40
15	24	0.0	50
14	26	0.0	64
13	28		
11	30		
10	34		
9	38		
8	44		
7	60		
7	64		



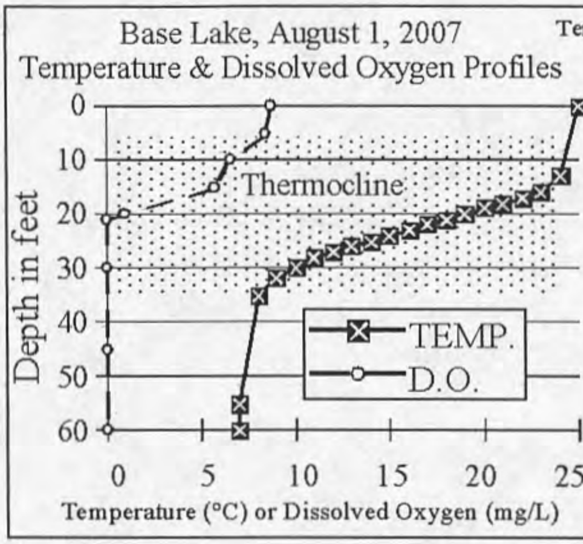
Temp.	Depth	D.O.	Depth
29	0	8.5	0
28	10	8.3	5
27	14	6.9	10
26	15	4.8	15
25	16	0.7	17
24	17	0.0	18
23	19	0.0	24
22	20	0.0	34
21	21	0.0	44
20	22	0.0	64
19	23		
18	24		
17	25		
16	26		
15	27		
14	28		
13	30		
12	32		
11	35		
10	38		
9	40		
8	46		
8	64		

2005

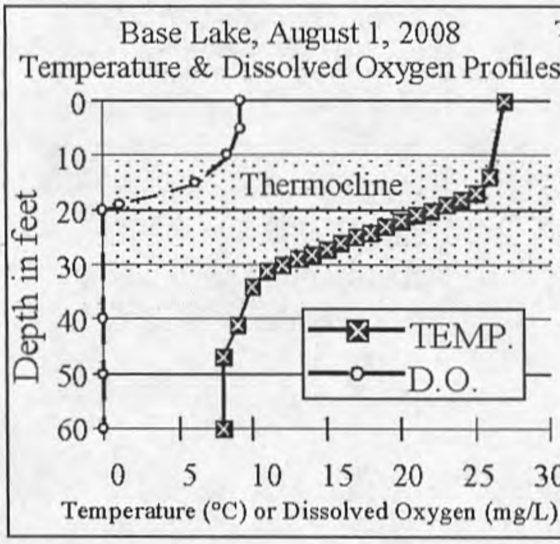
In late summer 2005 the lake formed a 17-foot-thick thermocline from 13 to 30 feet. Above 13 feet dissolved oxygen was plentiful. At five feet the dissolved oxygen concentration started to decrease. The lake ran out of dissolved oxygen at 29 feet, and that condition remained to the bottom. About 57 percent of the lake is deeper than 29 feet.

2006

In late summer 2006 Base Lake formed a 30-foot thick thermocline from 5 to 35 feet. Dissolved oxygen supplies were plentiful above five feet, and adequate to 15 feet. The lake ran out of dissolved oxygen at 18 feet, and that condition remained to the bottom. About 72 percent of the lake is deeper than 18 feet.



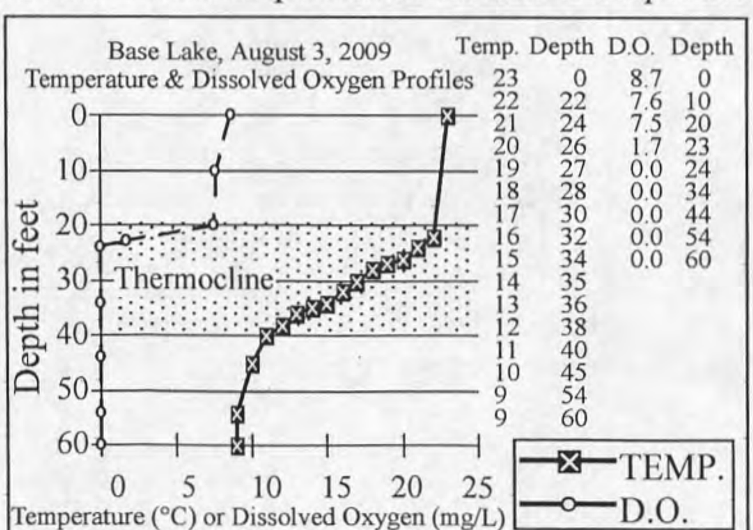
Temp.	Depth	D.O.	Depth
25	0	8.8	0
24	13	8.4	5
23	16	6.5	10
22	17	5.7	15
21	18	1.0	20
20	19	0.0	21
19	20	0.0	30
18	21	0.0	45
17	22	0.0	60
16	23		
15	24		
14	25		
13	26		
12	27		
11	28		
10	30		
9	32		
8	35		
7	55		
7	60		



Temp.	Depth	D.O.	Depth
27	0	9.3	0
26	14	9.3	5
25	17	8.4	10
24	18	6.2	15
23	19	1.2	19
22	20	0.0	20
21	21	0.0	40
20	22	0.0	50
19	23	0.0	60
18	24		
17	25		
16	26		
15	27		
14	28		
13	29		
12	30		
11	31		
10	34		
9	41		
8	47		
8	60		

2007

In late summer 2007 Base Lake formed a 35-foot thick thermocline from 5 to 40 feet. Oxygen was uniform and plentiful above the thermocline, and started to decrease at 5 feet. It was zero at 21 feet, and that condition remained to the bottom. About 69 percent of the lake is deeper than 21 feet.



Temp.	Depth	D.O.	Depth
23	0	8.7	0
22	22	7.6	10
21	24	7.5	20
20	26	1.7	23
19	27	0.0	24
18	28	0.0	34
17	30	0.0	44
16	32	0.0	54
15	34	0.0	60
14	35		
13	36		
12	38		
11	40		
10	45		
9	54		
9	60		

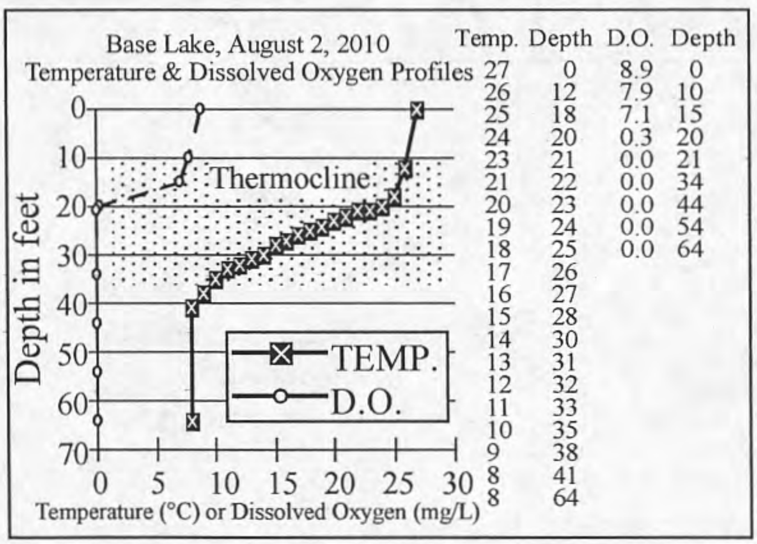
2008

In late summer 2008 Base Lake formed a 20-foot thick thermocline from 10 to 30 feet. Dissolved oxygen was supersaturated above 10 feet, and started to decrease below that depth. It was zero at 20 feet, and that condition remained to the bottom.

2009

In late summer 2009 the lake formed a 20-foot-thick thermocline from 20 to 40 feet. Dissolved oxygen supplies were adequate to support fish life above 20 feet, which was the layer of water above the thermocline. The concentration of dissolved oxygen started to decrease below 20 feet and was zero at 24 feet. That condition remained to the bottom.

2010



Temp.	Depth	D.O.	Depth
27	0	8.9	0
26	12	7.9	10
25	18	7.1	15
24	20	0.3	20
23	21	0.0	21
21	22	0.0	34
20	23	0.0	44
19	24	0.0	54
18	25	0.0	64
17	26		
16	27		
15	28		
14	30		
13	31		
12	32		
11	33		
10	35		
9	38		
8	41		
8	64		

In late summer 2010 Base Lake formed a 31-foot thick thermocline from 10 to 41 feet. Dissolved oxygen was plentiful above the thermocline and started to decrease at 10 feet, which was the top of the thermocline. It was zero at 21 feet and that condition remained to the bottom.

A NOTE ABOUT THE FOLLOWING GRAPHS

The lake data on the graphs below are first sorted by spring and summer then by date. The purpose this is to see if there are differences and/or trends between the spring and summer data. And the graphs show more summer than spring data. The reason for this is some of the spring samples in earlier years were taken when the surface temperature was over 20 degrees C. Those samples were considered summer rather than spring samples because the conditions were similar to summer rather than spring conditions.

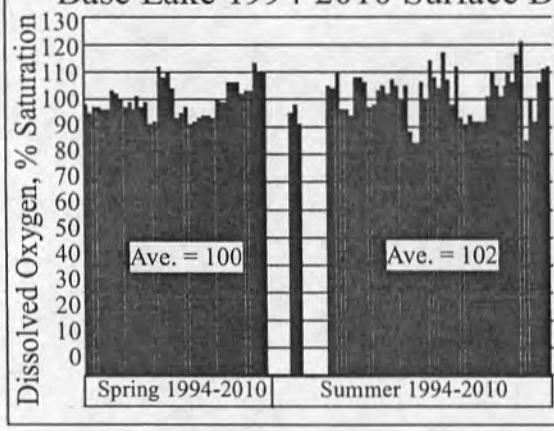
The graph also show the average for the spring and summer data for each test.

The Davis Creek and Huron River data are first sorted by the years (1995-96 and 2009-10), then by date. Again the purpose of this was to show any differences in the Davis Creek data between the two sample periods, and compare those data to the 1995-96 Huron River data.

DISSOLVED OXYGEN SATURATION

Since the amount of oxygen dissolved in the water is dependent on temperature, with cold water holding more oxygen than warm water, dissolved oxygen saturation, with near 100% being ideal, is often a better way to determine if dissolved oxygen supplies are adequate.

Base Lake 1994-2010 Surface Dissolved Oxygen Saturation



Spring		4/16/04	93	Summer		8/25/97	97	8/2/04	91
5/12/97	98	4/16/04	95	6/7/94	---	8/25/97	98	8/2/04	94
5/12/97	95	4/16/04	97	6/7/94	---	8/25/97	103	8/3/05	92
5/12/97	97	4/18/05	91	6/7/94	---	8/10/98	105	8/3/05	92
4/19/98	97	4/18/05	92	8/1/94	95	8/10/98	102	8/3/05	92
4/19/98	96	4/18/05	93	8/1/94	98	8/10/98	107	8/1/06	101
4/19/98	96	4/19/06	94	8/1/94	91	8/27/99	105	8/1/06	109
4/25/99	103	4/19/06	94	6/19/95	---	8/27/99	100	8/1/06	105
4/25/99	102	4/19/06	93	6/19/95	---	8/27/99	105	8/1/07	101
4/25/99	100	4/21/07	100	6/19/95	---	8/4/00	88	8/1/07	105
4/15/00	97	4/21/07	99	7/31/95	---	8/4/00	84	8/1/07	109
4/15/00	99	4/21/07	99	7/31/95	---	8/4/00	84	8/1/08	106
4/15/00	96	4/18/08	106	7/31/95	---	8/1/01	106	8/1/08	116
5/13/01	101	4/18/08	106	8/14/95	105	8/1/01	100	8/1/08	121
5/13/01	97	4/18/08	106	8/14/95	104	8/1/01	114	8/3/09	85
5/13/01	99	4/18/09	102	8/14/95	109	8/2/02	108	8/3/09	100
4/15/02	91	4/18/09	103	6/9/96	96	8/2/02	104	8/3/09	92
4/15/02	92	4/18/09	103	6/9/96	96	8/2/02	117	8/2/10	106
4/15/02	112	4/20/10	113	6/9/96	94	8/1/03	107	8/2/10	111
4/28/03	108	4/20/10	109	8/7/96	108	8/1/03	98	8/2/10	112
4/28/03	109	4/20/10	110	8/7/96	108	8/1/03	112		
4/28/03	104			8/7/96	106	8/2/04	93		

The graph shows spring dissolved oxygen saturations range from 91 to 112 percent, which are good. Summer saturations vary more, ranging from 84 to 121 percent, probably because of algal blooms, because algae like warmer water. However the averages for spring and summer were 100% and 102%, respectively.

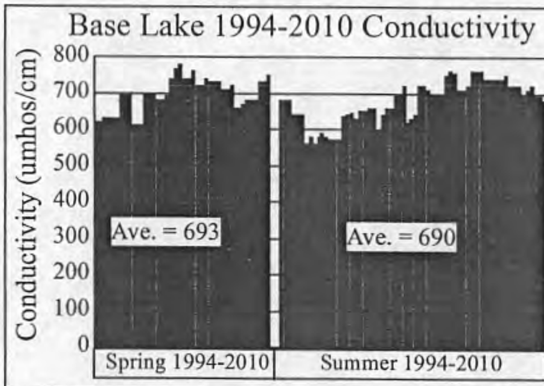
2010 saturations ranged from 109 to 113 percent in spring and from 106 to 112 percent in summer. Lower would be better.

CONDUCTIVITY

Conductivity, measured with a meter, detects the capacity of a water to conduct an electric current. More importantly however, it measures the amount of materials dissolved in the water (salts), since only dissolved materials will permit an electric current to flow. Theoretically, pure water will not conduct an electric current. It is the perception of the experts that poor quality water has more dissolved materials than good quality water. I agree. Lower is usually better.

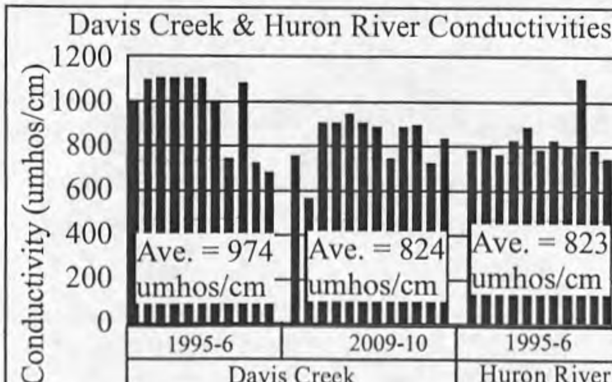
Normal conductivities in Michigan inland lakes range from 75 to 450 micromhos per centimeter.

The graph shows spring conductivities ranged from 610 to 780 micromhos per centimeter. Summer conductivities ranged from 560 to 760 umhos/cm. The average conductivity of the spring samples was 693 umhos/cm while the average conductivity of the summer samples was 690 umhos/cm. These are essentially the same.



Spring		4/16/04	740	Summer		8/25/97	660	8/2/04	710
5/12/97	620	4/16/04	740	6/7/94	680	8/25/97	660	8/2/04	720
5/12/97	620	4/16/04	760	6/7/94	680	8/25/97	600	8/3/05	760
5/12/97	630	4/18/05	720	6/7/94	680	8/10/98	640	8/3/05	760
4/19/98	630	4/18/05	720	8/1/94	640	8/10/98	660	8/3/05	760
4/19/98	630	4/18/05	740	8/1/94	640	8/10/98	660	8/1/06	740
4/19/98	630	4/19/06	730	8/1/94	640	8/27/99	690	8/1/06	740
4/25/99	690	4/19/06	730	6/19/95	560	8/27/99	695	8/1/06	740
4/25/99	690	4/19/06	730	6/19/95	580	8/27/99	720	8/1/07	740
4/25/99	690	4/21/07	710	6/19/95	560	8/4/00	620	8/1/07	740
4/15/00	610	4/21/07	710	7/31/95	580	8/4/00	630	8/1/07	750
4/15/00	610	4/21/07	720	7/31/95	590	8/4/00	640	8/1/08	720
4/15/00	610	4/18/08	660	7/31/95	580	8/1/01	720	8/1/08	720
5/13/01	700	4/18/08	660	8/14/95	570	8/1/01	720	8/1/08	720
5/13/01	700	4/18/08	670	8/14/95	570	8/1/01	710	8/3/09	700
5/13/01	700	4/18/09	680	8/14/95	570	8/2/02	700	8/3/09	710
4/15/02	680	4/18/09	680	6/9/96	635	8/2/02	700	8/3/09	720
4/15/02	680	4/18/09	680	6/9/96	640	8/2/02	700	8/2/10	690
4/15/02	690	4/20/10	730	6/9/96	645	8/1/03	750	8/2/10	690
4/28/03	740	4/20/10	730	8/7/96	630	8/1/03	760	8/2/10	680
4/28/03	765	4/20/10	750	8/7/96	650	8/1/03	755		
4/28/03	780			8/7/96	650	8/2/04	710		

The graph shows conductivity (salts) were increasing in the lake in both spring and summer through about 2003 to 2005. Since then they appear to be decreasing, with spring conductivities decreasing more. If that is the case, it's a plus. These high salt concentrations are probably coming from upstream sources rather than from near-shore lake properties.

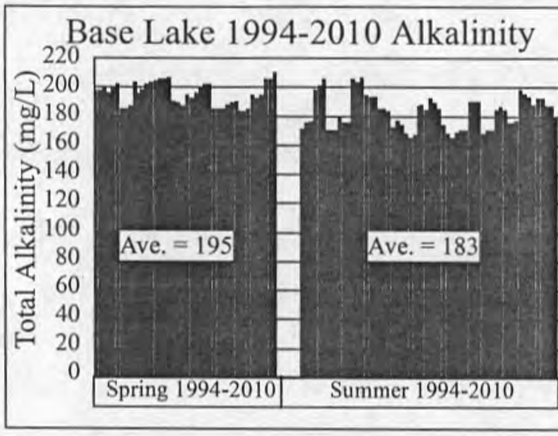


Davis Cr.		5/28/09	750	Huron R.	
6/30/05	1000	6/29/09	560	6/30/05	780
7/29/05	1090	7/31/09	900	7/29/05	790
8/29/05	1100	8/28/09	900	8/29/05	760
9/27/05	1100	9/23/09	940	9/27/05	820
10/24/05	1100	10/21/09	900	10/24/05	880
11/30/05	1100	11/23/09	880	11/30/05	780
12/27/05	1000	12/26/09	740	12/27/05	820
1/27/06.	740	1/23/10	880	1/27/06.	800
2/28/06.	1080	3/9/10	890	2/28/06.	1100
3/30/06.	720	3/31/10	720	3/30/06.	780
4/19/06.	680	4/20/10	830	4/19/06.	740

The graph of Davis Creek and Huron River conductivities shows in 1995 and 1996, Davis Creek had higher conductivities (and hence more salts) than the Huron River. In 2009-10 Davis Creek conductivities were about the same as the Huron River, which is good. However both Davis Creek and the Huron River had higher average conductivities than Base Lake. This again indicates the sources of the salts are from upstream sources.

TOTAL ALKALINITY

Alkalinity measures carbonates and bicarbonates in water. Soft water lakes have alkalinities below 75 milligrams per liter. Moderately hard water lakes have alkalinities between 75 and 150 milligrams per liter. Hard water lakes have alkalinities above 150 milligrams per liter.



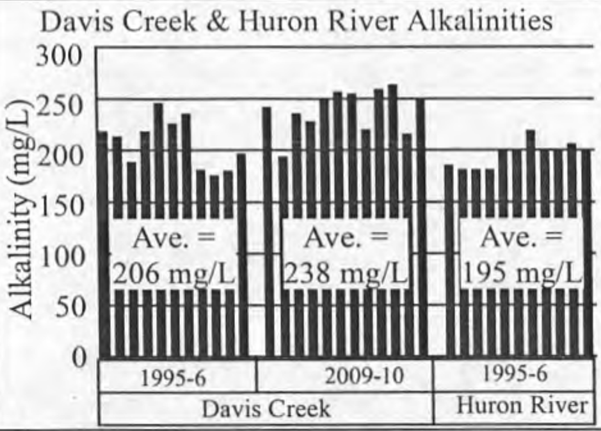
Spring		4/16/04	194	Summer		8/25/97	185	8/2/04	190
5/12/97	197	4/16/04	192	6/7/94	---	8/25/97	185	8/2/04	190
5/12/97	197	4/16/04	196	6/7/94	---	8/25/97	183	8/3/05	168
5/12/97	200	4/18/05	200	6/7/94	---	8/10/98	172	8/3/05	170
4/19/98	196	4/18/05	202	8/1/94	171	8/10/98	177	8/3/05	170
4/19/98	200	4/18/05	202	8/1/94	175	8/10/98	174	8/1/06	184
4/19/98	202	4/19/06	185	8/1/94	176	8/27/99	168	8/1/06	186
4/25/99	185	4/19/06	185	6/19/95	198	8/27/99	165	8/1/06	184
4/25/99	185	4/19/06	185	6/19/95	201	8/27/99	167	8/1/07	175
4/25/99	187	4/21/07	188	6/19/95	205	8/4/00	187	8/1/07	175
4/15/00	203	4/21/07	189	7/31/95	170	8/4/00	188	8/1/07	177
4/15/00	195	4/21/07	190	7/31/95	170	8/4/00	184	8/1/08	198
4/15/00	198	4/18/08	183	7/31/95	170	8/1/01	192	8/1/08	195
5/13/01	202	4/18/08	183	8/14/95	180	8/1/01	189	8/1/08	193
5/13/01	203	4/18/08	185	8/14/95	175	8/1/01	185	8/3/09	188
5/13/01	204	4/18/09	194	8/14/95	175	8/2/02	174	8/3/09	192
4/15/02	205	4/18/09	192	6/9/96	205	8/2/02	168	8/3/09	192
4/15/02	205	4/18/09	194	6/9/96	203	8/2/02	165	8/2/10	187
4/15/02	206	4/20/10	205	6/9/96	206	8/1/03	169	8/2/10	187
4/28/03	190	4/20/10	205	8/7/96	194	8/1/03	170	8/2/10	180
4/28/03	189	4/20/10	210	8/7/96	193	8/1/03	170		
4/28/03	187			8/7/96	193	8/2/04	190		

The graph of spring and summer surface alkalinities of Base Lake show spring alkalinities (183 to 206 mg/L, average = 195 mg/L) are generally higher than summer alkalinities (165 to 198 mg/L, average = 182 mg/L), which is normal because carbonates and bicarbonates in the surface waters precipitate to the bottom sediments when the lake warms in summer.

The alkalinities in both spring and summer are above 150 milligrams per liter. These data indicate the lake is a hard water lake. The high alkalinities are a result of the Huron River, which is mostly fed by groundwater, flowing through the lake.

Hard water lakes are tougher than soft water lakes because they have the ability to precipitate some phosphorus to the bottom sediments as calcium phosphate where it is permanently tied up.

The graph does not show alkalinities are increasing or decreasing.

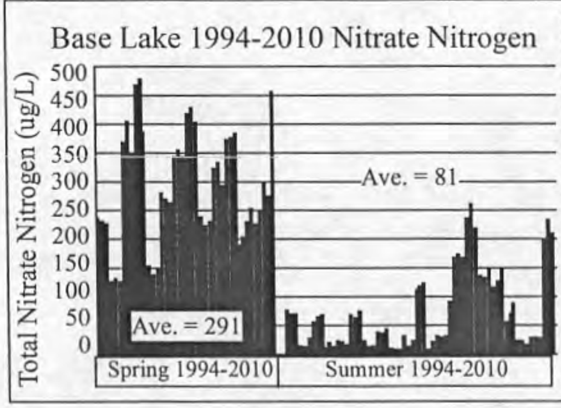


Davis Cr.				Huron R.	
6/30/05	217	5/28/09	241	6/30/05	184
7/29/05	212	6/29/09	193	7/29/05	180
8/29/05	188	7/31/09	235	8/29/05	180
9/27/05	217	8/28/09	227	9/27/05	180
10/24/05	245	9/23/09	250	10/24/05	200
11/30/05	225	10/21/09	256	11/30/05	200
12/27/05	235	11/23/09	254	12/27/05	218
1/27/06.	180	12/26/09	219	1/27/06.	200
2/28/06.	175	1/23/10	258	2/28/06.	200
3/30/06.	179	3/9/10	263	3/30/06.	205
4/19/06.	196	3/31/10	215	4/19/06.	198
		4/20/10	250		

The graph of Davis Creek and Huron River alkalinities shows similar concentrations in both streams in 1995-6 but higher Davis Creek alkalinities in 2009-10. This isn't a problem. It's just that alkalinities in streams don't usually change as much as these data did. The reason for this is unknown.

NITRATE NITROGEN

Most Michigan inland lakes have spring nitrate nitrogen concentrations around 200 micrograms per liter (or parts per billion). Summer nitrate nitrogen concentrations are generally much lower, in the 10 to 40 micrograms per liter range.

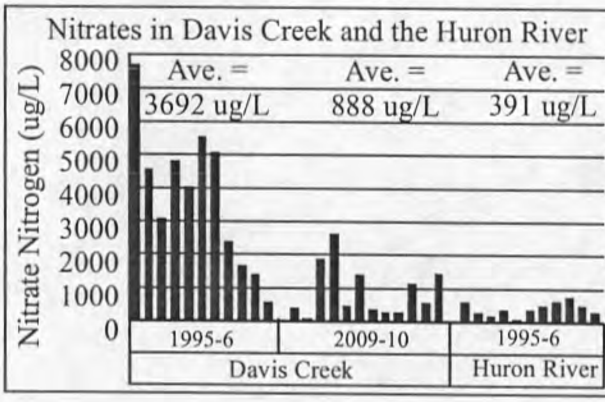


Spring		4/16/04	419	Summer		8/25/97	39	8/2/04	262
5/12/97	236	4/16/04	429	6/7/94	76	8/25/97	36	8/2/04	218
5/12/97	231	4/16/04	404	6/7/94	70	8/25/97	43	8/3/05	137
5/12/97	226	4/18/05	238	6/7/94	70	8/10/98	10	8/3/05	133
4/19/98	127	4/18/05	224	8/1/94	15	8/10/98	9	8/3/05	146
4/19/98	132	4/18/05	231	8/1/94	13	8/10/98	9	8/1/06	116
4/19/98	127	4/19/06	324	8/1/94	28	8/27/99	32	8/1/06	126
4/25/99	368	4/19/06	333	6/19/95	56	8/27/99	14	8/1/06	147
4/25/99	405	4/19/06	293	6/19/95	65	8/27/99	23	8/1/07	57
4/25/99	347	4/21/07	373	6/19/95	69	8/4/00	111	8/1/07	70
4/15/00	469	4/21/07	376	7/31/95	11	8/4/00	118	8/1/07	88
4/15/00	479	4/21/07	383	7/31/95	20	8/4/00	124	8/1/08	23
4/15/00	386	4/18/08	190	7/31/95	14	8/1/01	8	8/1/08	23
5/13/01	153	4/18/08	203	8/14/95	23	8/1/01	21	8/1/08	17
5/13/01	139	4/18/08	230	8/14/95	21	8/1/01	32	8/3/09	28
5/13/01	147	4/18/09	253	8/14/95	17	8/2/02	30	8/3/09	30
4/15/02	280	4/18/09	226	6/9/96	69	8/2/02	32	8/3/09	28
4/15/02	270	4/18/09	249	6/9/96	64	8/2/02	92	8/2/10	198
4/15/02	263	4/20/10	300	6/9/96	75	8/1/03	168	8/2/10	234
4/28/03	343	4/20/10	275	8/7/96	23	8/1/03	173	8/2/10	210
4/28/03	355	4/20/10	456	8/7/96	13	8/1/03	168		
4/28/03	343			8/7/96	15	8/2/04	236		

The graph shows spring nitrate nitrogen concentrations range from a low of 127 micrograms per liter to a high of 479 micrograms per liter. Summer values are lower, ranging from 9 to 262 micrograms per liter.

The graph seems to show spring nitrates are increasing. And for some reason, summer 2003, 2004, 2005, 2006 and 2010 nitrates were higher than normal. These data indicates Base Lake is probably phosphorus limited in spring and nitrogen limited in summer. It also means no fertilizers containing either nitrogen or phosphorus should be used on near-lake areas.

The graph shows the average spring nitrate nitrogen concentration was 291 ug/L while the average summer nitrate nitrogen concentration was 81 ug/L. These are not unusual nitrate nitrogen concentrations for a lake with a river flowing through it.



Davis Creek				Huron River	
6/30/05	7700	5/28/09	370	6/30/05	581
7/29/05	4532	6/29/09	47	7/29/05	256
8/29/05	3060	7/31/09	1845	8/29/05	160
9/27/05	4800	8/28/09	2600	9/27/05	344
10/24/05	4007	9/23/09	450	10/24/05	55
11/30/05	5527	10/21/09	1375	11/30/05	352
12/27/05	5061	11/23/09	350	12/27/05	470
1/27/06	2368	12/26/09	263	1/27/06	611
2/28/06	1632	1/23/10	250	2/28/06	726
3/30/06	1376	3/9/10	1122	3/30/06	458
4/19/06	549	3/31/10	548	4/19/06	288
5/28/09	370	4/20/10	1438		

The graph of Davis Creek and Huron River nitrate nitrogen concentrations shows some good news. The 1995-6 data shows a much higher concentration of nitrates in Davis Creek (average = 3692 ug/L, almost ten times higher) compared to the Huron River. The 2009-10 data shows nitrates are significantly lower in Davis Creek (average 888 ug/L). This is a plus for the lake.

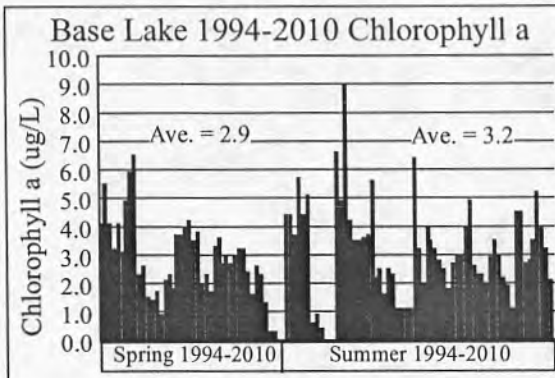
The DNR/DEQ suggests only limiting the amount of phosphorus going into a lake, but I feel both nitrogen and phosphorus should be limited. The reason is although algae may capture phosphorus from the water column, rooted aquatic plants can get phosphorus from the bottom sediments, so limiting phosphorus inputs won't affect the aquatic plant community. Thus limiting nitrogen inputs is important if controlling aquatic plant communities is a goal.

It is a real plus that the Portage, Base and Whitewood Association Board passed a resolution recommending no fertilizer use (nitrogen or phosphorus) within 400 feet of the lakes or from streams feeding the lakes. This is the first lake association I am aware of to do this. Hopefully others will follow.

CHLOROPHYLL A

Chlorophyll a, reported in micrograms per liter (or parts per billion) generally gives an estimate of algal densities. Best is below 1 microgram per liter.

The graph of chlorophyll a data shows Base Lake had algal blooms since 1994 in both spring and summer. The graph also shows chlorophyll a



Spring		4/16/04	4.2	Summer		8/25/97	2.2	8/2/04	4.9
5/12/97	4.1	4/16/04	3.5	6/7/94	4.4	8/25/97	2.5	8/2/04	2.6
5/12/97	5.5	4/16/04	3.8	6/7/94	4.4	8/25/97	1.6	8/3/05	2.3
5/12/97	4.1	4/18/05	2.0	6/7/94	3.7	8/10/98	2.5	8/3/05	2.3
4/19/98	3.2	4/18/05	2.3	8/1/94	5.7	8/10/98	2.3	8/3/05	2.0
4/19/98	4.1	4/18/05	1.7	8/1/94	4.4	8/10/98	1.1	8/1/06	2.9
4/19/98	3.1	4/19/06	3.3	8/1/94	5.1	8/27/99	1.1	8/1/06	3.5
4/25/99	4.9	4/19/06	3.6	6/19/95	0.6	8/27/99	1.1	8/1/06	3.0
4/25/99	5.9	4/19/06	2.7	6/19/95	0.9	8/27/99	1.1	8/1/07	2.2
4/25/99	6.5	4/21/07	3.0	6/19/95	0.4	8/4/00	6.4	8/1/07	1.9
4/15/00	2.3	4/21/07	2.7	7/31/95	---	8/4/00	3.2	8/1/07	1.1
4/15/00	2.6	4/21/07	3.0	7/31/95	---	8/4/00	2.0	8/1/08	4.5
4/15/00	1.5	4/18/08	3.2	7/31/95	---	8/1/01	4.0	8/1/08	4.5
5/13/01	1.4	4/18/08	3.2	8/14/95	6.6	8/1/01	3.5	8/1/08	2.7
5/13/01	1.7	4/18/08	2.4	8/14/95	4.9	8/1/01	3.2	8/3/09	2.8
5/13/01	0.9	4/18/09	1.6	8/14/95	9.0	8/2/02	2.8	8/3/09	3.5
4/15/02	2.1	4/18/09	2.6	6/9/96	4.2	8/2/02	2.5	8/3/09	5.2
4/15/02	2.3	4/18/09	2.3	6/9/96	3.5	8/2/02	1.8	8/2/10	3.9
4/15/02	1.8	4/20/10	1.3	6/9/96	3.5	8/1/03	2.7	8/2/10	3.2
4/28/03	3.7	4/20/10	0.3	8/7/96	3.6	8/1/03	3.0	8/2/10	2.1
4/28/03	3.7	4/20/10	0.3	8/7/96	3.7	8/1/03	3.0		
4/28/03	4.0			8/7/96	5.6	8/2/04	4.0		

concentrations vary a lot. This may be related to the high flushing rate of the lake.

The graph does not show any significant trend at this in either spring or summer, although lower chlorophylls would be better.

pH (Hydrogen ion concentration) (No graph)

pH has traditionally been a measure of water quality. Today it is an excellent indicator of the effects of acid rain on lakes. About 99% of the rain events in southeastern Michigan are below a pH of 5.6 and are thus considered acid. However, there seems to be no lakes in southern Michigan which are being affected by acid rain. Most lakes have pH values between 7.5 and 9.0.

1994 through 2010 spring and summer surface pH values ranged from 7.6 to 8.6. These are normal pH values for a Michigan inland lake with a river flowing through it.

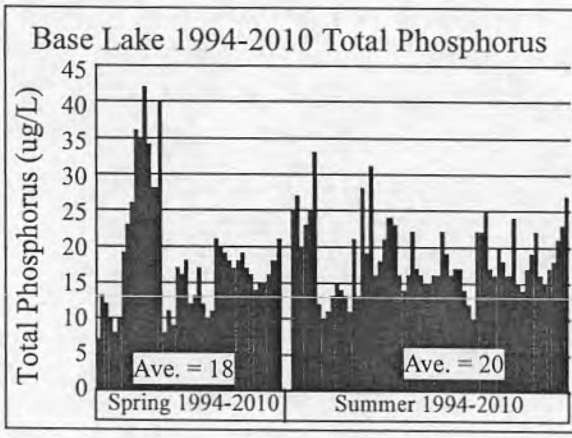
Lakes with extensive plant communities often have high summer pH values (greater than 9) because the plants use the carbonates in the water as a carbon source. This causes a decrease in the buffering capacity of the water, and allows the pH to rise.

TOTAL PHOSPHORUS

Although there are several forms of phosphorus found in lakes, the experts selected total phosphorus as being most important. This is probably because all forms of phosphorus can be converted to the other forms. Currently, most lake scientists feel phosphorus, which is measured in parts per billion or micrograms per liter (ug/L), is the one nutrient which might be controlled. If its addition to lake water could be limited, the lake might not become covered with the algal communities so often found in eutrophic lakes.

However, based on our studies of many Michigan inland lakes, we've found many lakes were phosphorus limited in spring (so don't add phosphorus) and nitrate limited in summer (so don't add nitrogen).

10 parts per billion is considered a low concentration of phosphorus in a lake and 50 parts per billion is considered high by many limnologists.

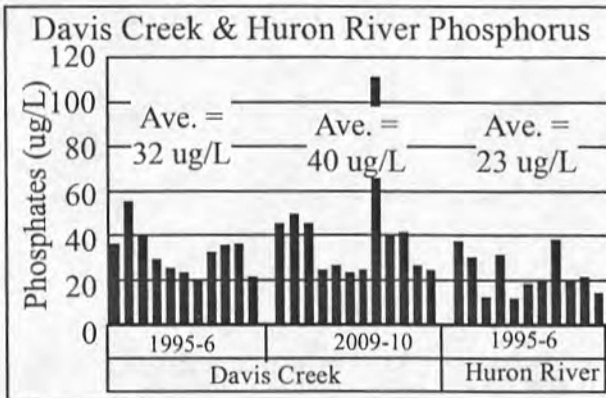


Spring		4/16/04	12	Summer		8/25/97	21	8/2/04	25
5/12/97	7	4/16/04	13	6/7/94	25	8/25/97	24	8/3/05	17
5/12/97	13	4/16/04	17	6/7/94	27	8/25/97	23	8/3/05	16
5/12/97	12	4/18/05	12	6/7/94	20	8/10/98	16	8/3/05	20
4/19/98	10	4/18/05	10	8/1/94	23	8/10/98	14	8/1/06	18
4/19/98	8	4/18/05	11	8/1/94	25	8/10/98	16	8/1/06	16
4/19/98	10	4/19/06	21	8/1/94	33	8/27/99	22	8/1/06	24
4/25/99	19	4/19/06	20	6/19/95	12	8/27/99	17	8/1/07	15
4/25/99	23	4/19/06	19	6/19/95	10	8/27/99	16	8/1/07	14
4/25/99	26	4/21/07	18	6/19/95	11	8/4/00	15	8/1/07	17
4/15/00	36	4/21/07	17	7/31/95	13	8/4/00	15	8/1/08	19
4/15/00	35	4/21/07	18	7/31/95	15	8/4/00	16	8/1/08	22
4/15/00	42	4/18/08	19	7/31/95	14	8/1/01	16	8/1/08	16
5/13/01	34	4/18/08	17	8/14/95	13	8/1/01	22	8/3/09	15
5/13/01	28	4/18/08	16	8/14/95	11	8/1/01	19	8/3/09	17
5/13/01	40	4/18/09	14	8/14/95	21	8/2/02	16	8/3/09	18
4/15/02	8	4/18/09	15	6/9/96	13	8/2/02	17	8/2/10	21
4/15/02	11	4/18/09	15	6/9/96	28	8/2/02	17	8/2/10	23
4/15/02	9	4/20/10	16	6/9/96	19	8/1/03	14	8/2/10	27
4/28/03	17	4/20/10	18	8/7/96	31	8/1/03	12		
4/28/03	16	4/20/10	21	8/7/96	16	8/1/03	10		
4/28/03	18			8/7/96	18	8/2/04	22		

The 1994-2010 total phosphorus graph shows Base Lake had phosphorus concentrations ranging from 7 to 42 micrograms/L in spring and from 11 to 33 ug/L in summer. However most of the time the graph shows phosphorus concentrations are in the 10 to 20 microgram per liter range.

The graph shows some variation, but no trend in the phosphorus concentration over the years although the 2002, 2003, 2005, 2007 and 2009 phosphorus concentrations were all at or below 20 micrograms per liter, which is better than in past years. 2006 phosphorus concentrations ranged from 16 to 24 ug/L while 2007 phosphorus concentrations ranged from 14 to 18 ug/L. 2008 phosphorus concentrations ranged from 16 to 22 ug/L while 2009 phosphorus concentrations were 14 or 15 ug/L in spring and 15 to 18 ug/L in summer. In 2010 spring phosphorus concentrations ranged from 16 to 21 ug/L while summer values ranged from 21 to 27 ug/L.

As phosphorus concentrations approach 20 ug/L, algal blooms and aquatic plants will reach nuisance levels, if other nutrients are also present in sufficient quantities.



Davis Cr.		5/28/09	45	Huron R.	
6/30/05	36	6/29/09	49	6/30/05	37
7/29/05	55	7/31/09	45	7/29/05	30
8/29/05	40	8/28/09	24	8/29/05	12
9/27/05	29	9/23/09	26	9/27/05	31
10/24/05	25	10/21/09	23	10/24/05	11
11/30/05	23	11/23/09	24	11/30/05	18
12/27/05	20	12/26/09	111	12/27/05	19
1/27/06.	32	1/23/10	39	1/27/06.	38
2/28/06.	35	3/9/10	41	2/28/06.	20
3/30/06.	36	3/31/10	26	3/30/06.	21
4/19/06.	21	4/20/10	24	4/19/06.	14

The graph of Davis Creek and Huron River phosphorus concentrations shows in 1995-6 Davis creek has phosphorus concentrations almost fifty percent higher than the Huron River (32 ug/L average vs 23 ug/L average). And in 2009-10 Davis Creek phosphorus concentrations averaged 40 ug/L but most of that increase was because of a 111 ug/L spike in December 2009. Discounting that single high value the phosphorus concentration in Davis Creek still averaged 32 ug/L. Base Lake does not need high phosphorus inputs.

SECCHI DISK TRANSPARENCY (originally Secchi's disk)

In 1865, Angelo Secchi, the Pope's astronomer in Rome, Italy devised a 20 centimeter (8 inch) white disk for studying the transparency of the water in the Mediterranean Sea. Later an American limnologist (lake scientist) named Whipple divided the disk into black and white quadrants which many are familiar with today.

The Secchi disk transparency is a lake test widely used and accepted by limnologists. The experts generally felt the greater the Secchi disk depth, the better quality the water. However, one Canadian scientist pointed out acid lakes have very deep Secchi disk readings. Most lakes in southeast Michigan have Secchi disk transparencies of less than ten feet. On the other hand, Elizabeth Lake in Oakland County had 34 foot Secchi disk readings in summer 1996, evidently caused by a zebra mussel invasion a couple of years earlier.

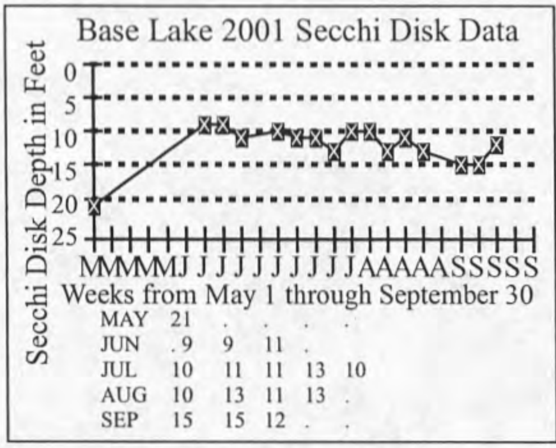
Most limnology texts recommend the following: to take a Secchi disk transparency reading, lower the disk into the water on the shaded side of an anchored boat to a point where it disappears. Then raise it to a point where it's visible. The average of these two readings is the Secchi disk transparency depth.

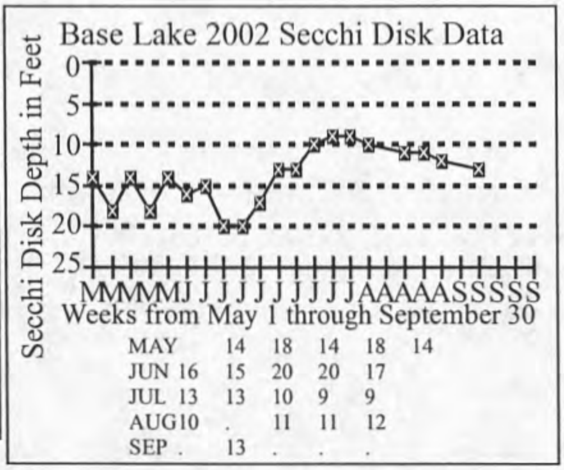
We do it slightly differently. We lower the disk on the shaded side of an anchored boat until the disk disappears, and note the depth, then report the depth to the next deepest foot. For example if the disk disappears at six and a half feet, we report the Secchi disk depth as 7 feet. The reason we do this is that some suggest using a water telescope (a device that works like an underwater mask and eliminates water roughness) to view the disk as it disappears. Since we don't use this device, we compensate for it by noting the slightly deeper depth.

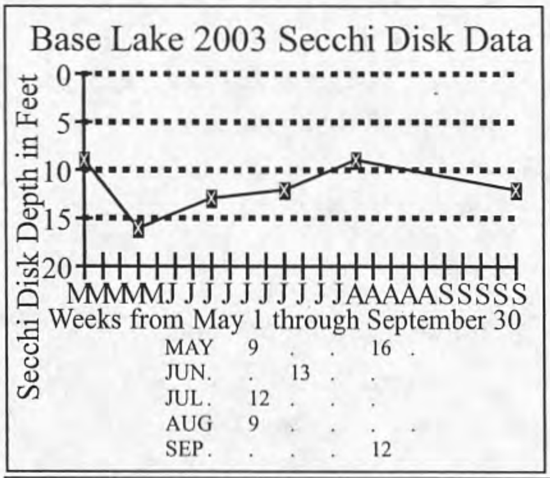
We feel it is only necessary to report Secchi disk measurements to the closest foot. Secchi disk measurements should be taken between 10 AM and 4 PM. Rough water will give slightly shallower readings than smooth water. Sunny days will give slightly deeper readings than cloudy days. However, roughness influences the visibility of the disk more than sunny or cloudy days. Furthermore, it's been reported that most adults can see the Secchi disk disappear at about the same depth, but grand-children see it disappear 3-4 feet deeper than grand-parents.

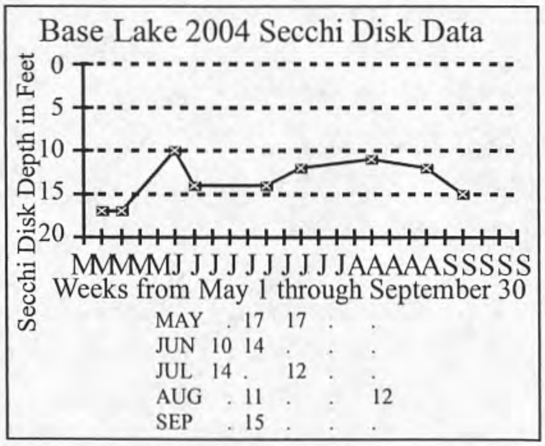
If there are sample sites where the lake is too shallow and the disk is visible when resting on the bottom, the reading should be taken at a nearby deeper site. Since the sampling procedure is designed to obtain "representative samples" moving the boat to an area where a Secchi disk transparency reading can be properly taken is appropriate. In the case of Secchi disk readings, this procedure is more valid than reporting the disk is visible on the lake bottom.

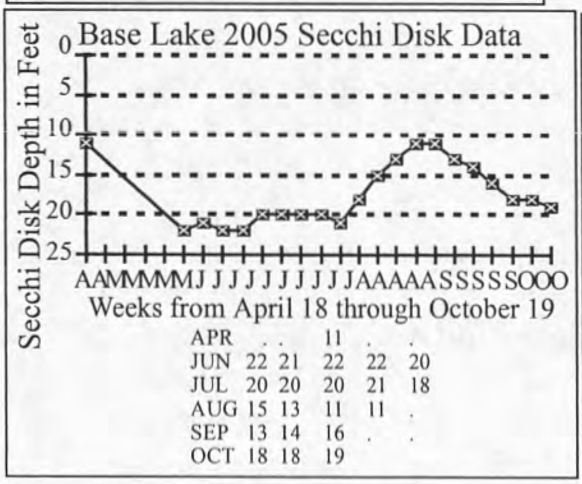
BASE LAKE SECCHI DISK DATA

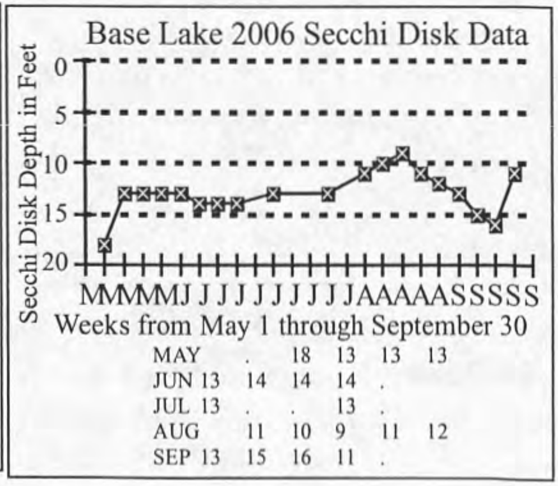












2001

Roberta Barstow did an excellent job taking Secchi disk readings through the warm months at the three sample sites. The graph below shows the data she collected in 2001. It shows deep (21 foot) spring readings, then shallower readings (9-13) feet through the warm months. The shallower summer readings are probably the result of an algal bloom.

2002

Base Lake residents did an excellent job taking Secchi disk readings through the warm months. The graph shows the data collected in 2002. It shows deep (20 foot) readings in June, then shallower readings (9-13) feet through the warm months. The shallower summer readings are probably the result of an algal bloom.

2003

WQI limnologists collected Secchi disk data in 2003. The graph shows the data. It shows a 9-foot reading in early May (probably caused by a diatom bloom), then deeper (15-foot) readings in mid-May, and shallower readings as the water warmed in June. The shallower summer readings are probably the result of an algal bloom. The graph shows there is not a lot of difference in the water clarity between spring, summer and fall, probably due to the high flushing rate.

Jim Meyer collected Secchi disk data in Base Lake 2004 through 2010.

2004

Meyer's 2004 data indicated deeper Secchi disk readings in early spring (17 feet), then slightly shallower readings (10-15 feet) as the water warmed in summer.

Other than the deeper spring readings, the data indicated little change through the warm months.

2005

Meyer's 2005 data were among the best so far, with the Secchi disk readings being 20 feet or deeper from the end of May to the end of July. (The 11-foot April Secchi disk reading was when WQI collected spring samples.)

They decreased in August to 11 feet, before increasing to 18-19 feet in October.

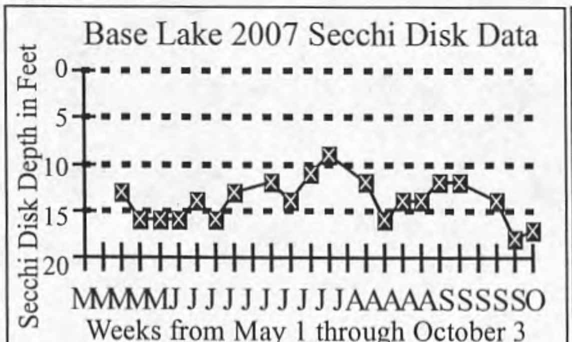
2006

The graph of Meyer's 2006 data shows the deepest reading were in spring when WQI took the samples, 18 feet. After that water clarity readings were in the 11 to 14 foot range until mid August, when they dropped to a low of 9 feet. They then increased steadily to 16 feet in mid-September.

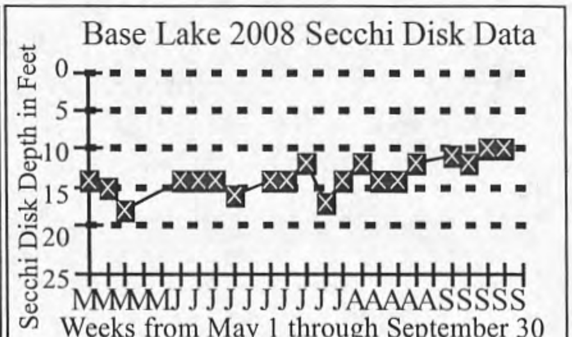
2007

2007 water clarity was 13 feet in early May, increasing to 14 to 16 feet till mid-June when it decreased to a minimum of 9 feet in late July. August and September water clarity readings ranged from 12 to 16 feet. Late September and early October readings increased to 18 and 17 feet.

2008



MAY	.	.	13	16	16	
JUN	16	14	16	13	.	
JUL	12	14	11	9	.	
AUG	12	16	14	14	12	
SEP	12	.	14	18		
OCT	17	.	.	.	.	..



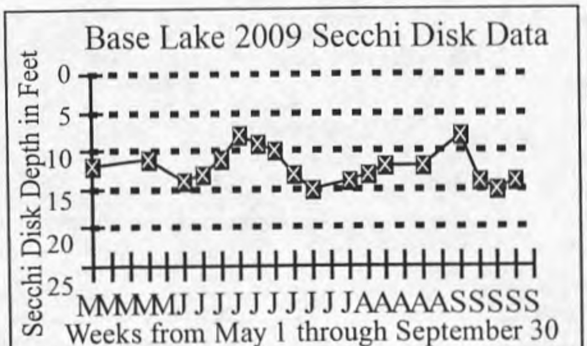
MAY	14	15	18	.	.
JUN	14	14	14	16	.
JUL	14	14	12	17	14
AUG	12	14	14	12	.
SEP	11	12	10	10	.

The water clarity of Base Lake in 2008 started at 14 feet in early May, increased to 18 feet by mid-May, then gradually decreased to a minimum of 10 feet in September.

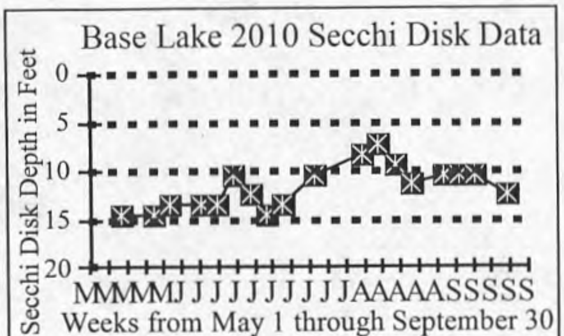
2009

The water clarity of Base Lake in 2009 was 11 to 14 feet in May, decreasing to 8 feet by mid-June, increasing to 15 feet in July, then gradually decreasing to 8 feet in early September and finally ending up at 14-15 feet the end of

September.



MAY	12	.	.	11	.
JUN	14	13	11	8	9
JUL	10	13	15	.	14
AUG	13	12	.	12	.
SEP	8	14	15	14	.



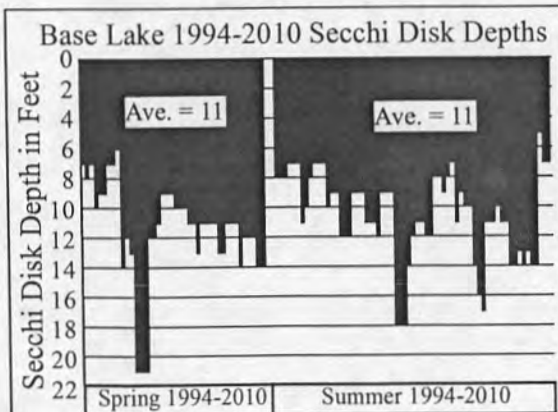
MAY	14	.	14	13	.
JUN	13	13	10	12	14
JUL	13	.	10	.	.
AUG	8	7	9	11	.
SEP	10	10	10	.	12

2010

The graph shows the data collected by Meyer in 2010. It shows Secchi disk readings were in the 10 to 15 foot range through July and decreased to a minimum of 7 feet in August before returning to 10 and 11 feet, and finally 12 feet in September.

BASE LAKE SECCHI DISK READINGS COLLECTED WITH THE SAMPLES

We have Secchi disk data collected with the samples from 1994 through 2010. The graph shows those data. The graph shows although the deepest readings were 21 feet in spring 2001 and 18 feet in summer 1999, the clarity of Base Lake is generally improving in both spring and summer. This is a plus. However summer 2010 readings were only 5 and 7 feet.

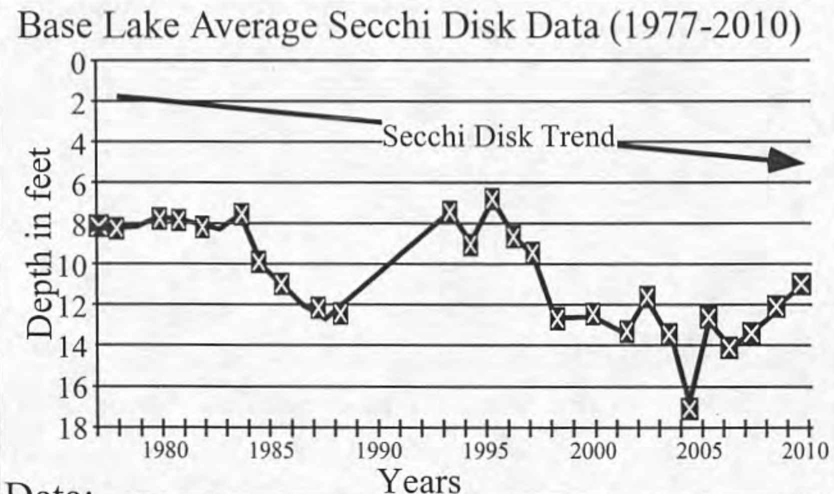


Spring		4/16/04	10	Summer		8/25/97	11	8/2/04	10
5/12/97	7	4/16/04	10	6/7/94	8	8/25/97	11	8/2/04	10
5/12/97	8	4/16/04	10	6/7/94	8	8/25/97	12	8/3/05	14
5/12/97	7	4/18/05	11	6/7/94	8	8/10/98	9	8/3/05	16
4/19/98	10	4/18/05	11	8/1/94	7	8/10/98	9	8/3/05	17
4/19/98	9	4/18/05	13	8/1/94	7	8/10/98	9	8/1/06	11
4/19/98	9	4/19/06	11	8/1/94	7	8/27/99	18	8/1/06	11
4/25/99	7	4/19/06	11	6/19/95	11	8/27/99	18	8/1/06	10
4/25/99	7	4/19/06	11	6/19/95	10	8/27/99	18	8/1/07	11
4/25/99	6	4/21/07	11	6/19/95	8	8/4/00	14	8/1/07	11
4/15/00	14	4/21/07	13	7/31/95	7	8/4/00	12	8/1/07	14
4/15/00	12	4/21/07	13	7/31/95	7	8/4/00	11	8/1/08	14
4/15/00	13	4/18/08	11	7/31/95	7	8/1/01	11	8/1/08	13
5/13/01	21	4/18/08	11	8/14/95	10	8/1/01	12	8/1/08	14
5/13/01	21	4/18/08	11	8/14/95	9	8/1/01	12	8/3/09	13
5/13/01	21	4/18/09	14	8/14/95	9	8/2/02	8	8/3/09	14
4/15/02	12	4/18/09	12	6/9/96	12	8/2/02	8	8/3/09	14
4/15/02	12	4/18/09	12	6/9/96	12	8/2/02	9	8/2/10	5
4/15/02	11	4/20/10	12	6/9/96	12	8/1/03	8	8/2/10	7
4/28/03	9	4/20/10	14	8/7/96	9	8/1/03	7	8/2/10	7
4/28/03	9	4/20/10		8/7/96	9	8/1/03	11		
4/28/03	9			8/7/96	9	8/2/04	9		

The graph shows the spring and summer average readings are the same, 11 feet. Usually summer readings are shallower than spring readings, because algae, which are what usually limits clarity, like warm water.

THE SECCHI DISK TREND GRAPH

Because Base Lake residents have been taking Secchi disk readings on a regular basis since 1977 we were able to construct a Secchi disk trend graph.



Data:

1977	1979	1980	1981	1983	1984	1985	1987	1988	1994	1995	1996	
8.4	8.3	7.8	7.9	8.4	7.6	10.1	12.1	12.7	7.5	9.0	7.0	
1997	1998	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
8.4	9.1	12.6	12.3	13.7	11.8	13.7	17.7	12.7	14.0	13.6	12.1	11.4

The Secchi disk trend graph shows Base Lake is getting clearer as the years pass, with 2005 dramatically so. Since then the clarity has gradually been getting worse, and 2010 continued that trend. Let's hope this trend doesn't continue.

THE LAKE WATER QUALITY INDEX

The Lake Water Quality Index used in this study to define the water quality of Base Lake was developed for two reasons. First, there was no agreement among lake scientists regarding which tests should be used to define the water quality of lakes, and second, there was no agreement among lake scientists regarding what the results of various tests meant in terms of lake water quality.

Development of the index invoked the use of two questionnaires sent to a panel of 555 lake scientists who were members of the American Society of Limnology and Oceanography. The panel was specifically selected because they were chemists and biologists with advanced degrees who studied lake water quality.

The first questionnaire asked the scientists to select tests which they felt should be used to define lake water quality. The tests most often selected by the panel became the index parameters (or tests). They were:

Dissolved oxygen (percent saturation)
Total phosphorus
Chlorophyll a
Secchi disk depth
Total nitrate nitrogen
Total alkalinity
Temperature
Conductivity
pH

The second questionnaire, sent out after the first was returned, asked the scientists what the results of the tests they selected as good indicators of lake water quality meant.

After the responses to the second questionnaire were returned and tabulated, the nine parameters and the accompanying rating curves were combined into a Lake Water Quality Index.

The index ranges from 1 to 100 and rates lakes about the same way professors rate students: 90-100=A, 80-90=B, 70-80=C, 60-70=D, and below 60 = E. The lake with the highest LWQI was Long Lake in Grand Traverse County, with a spring LQWI of 100. The lowest was 16 at an Ottawa County lake.

THE LAKE WATER QUALITY INDEX CALCULATION SHEETS

The Lake Water Quality Index calculation sheets which follow were developed to show graphically what the results of the nine different lake water quality tests mean in terms of lake water quality.

HOW TO READ THE LAKE WATER QUALITY INDEX CALCULATION SHEETS.

Listed across the top of the calculation sheets are the tests selected by the panel of experts as being good indicators of lake water quality. The results of the tests are entered into the square boxes immediately under the names of the tests.

The figures which look like thermometers are actually graphs which convert the test results (the numbers found outside the thermometer) to a uniform 1-100 lake water quality rating (found inside the thermometer).

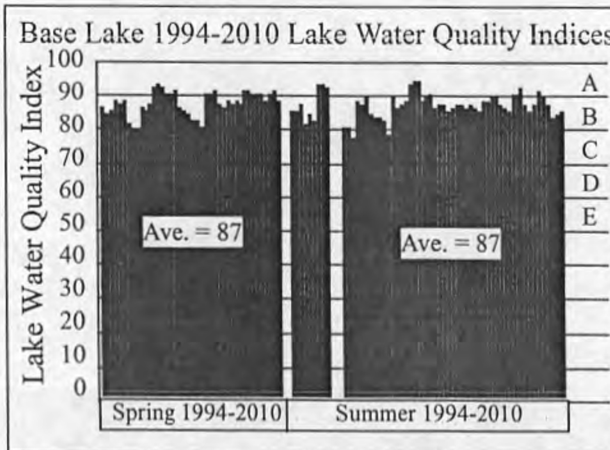
The calculation sheet permits calculation of the Lake Water Quality Index, using the results of all nine lake water quality tests.

The position of the red lines across the thermometer indicates how the results of each test compare in terms of lake water quality. Test results indicating excellent water quality are indicated by red lines near the top of the thermometer. Test results indicating poor water quality are indicated by red lines lower on the thermometer. And the lower the red line on the thermometer, the greater the water quality problem. A glance at the top of the calculation sheet indicates the test and the actual test results.

The thermometer rating scales also allow you to determine what test results would be considered excellent in terms of lake water quality. They are the numbers found outside the thermometer near the top.

The index is shown three different ways, as a number between 1 and 100 in the circle marked LWQI, and by a color and position on the sheet edge scale. The purpose of the sheet edge scale is to review quickly large numbers of lakes or test sites within a lake, and determine how the water quality of the various lakes, or test sites within a lake compare.

THE 1994-2010 BASE LAKE WATER QUALITY INDICES



Spring		4/16/04	82	Summer		8/25/97	82	8/2/04	85
5/12/97	86	4/16/04	82	6/7/94	85	8/25/97	78	8/2/04	88
5/12/97	84	4/16/04	80	6/7/94	85	8/25/97	89	8/3/05	88
5/12/97	85	4/18/05	90	6/7/94	87	8/10/98	86	8/3/05	89
4/19/98	88	4/18/05	90	8/1/94	81	8/10/98	87	8/3/05	89
4/19/98	87	4/18/05	91	8/1/94	84	8/10/98	88	8/1/06	87
4/19/98	88	4/19/06	87	8/1/94	82	8/27/99	93	8/1/06	86
4/25/99	81	4/19/06	86	6/19/95	93	8/27/99	94	8/1/06	85
4/25/99	79	4/19/06	88	6/19/95	93	8/27/99	94	8/1/07	90
4/25/99	79	4/21/07	87	6/19/95	92	8/4/00	88	8/1/07	90
4/15/00	86	4/21/07	88	7/31/95	---	8/4/00	89	8/1/07	92
4/15/00	85	4/21/07	87	7/31/95	---	8/4/00	90	8/1/08	87
4/15/00	87	4/18/08	91	7/31/95	---	8/1/01	86	8/1/08	85
5/13/01	92	4/18/08	91	8/14/95	80	8/1/01	87	8/1/08	87
5/13/01	93	4/18/08	90	8/14/95	80	8/1/01	87	8/3/09	91
5/13/01	92	4/18/09	90	8/14/95	77	8/2/02	85	8/3/09	89
4/15/02	90	4/18/09	90	6/9/96	88	8/2/02	86	8/3/09	87
4/15/02	90	4/18/09	88	6/9/96	87	8/2/02	87	8/2/10	83
4/15/02	91	4/20/10	90	6/9/96	89	8/1/03	87	8/2/10	84
4/28/03	86	4/20/10	91	8/7/96	84	8/1/03	86	8/2/10	85
4/28/03	85	4/20/10	88	8/7/96	83	8/1/03	87		
4/28/03	84			8/7/96	83	8/2/04	86		

The graph shows the Lake Water Quality Indices for Base Lake ranges from a low of 79 to a high of 93 in spring (C to A range) and from 77 to 94 in summer (C to A range). The graph shows the water quality varies somewhat but is generally in the 80s (B range). Spring LWQIs vary more than summer values. And spring values may be getting better, while summer values are pretty much stable.

In 2010 spring LWQIs were 88, 90 or 91, or in the A to B range, while summer values 83, 84 and 85, or in the B range.

THE LAKE WATER QUALITY INDEX CALCULATION SHEETS

Because the 2010 Lake Water Quality Indices were relatively uniform in spring (90 91 88) and in summer (83 84 85), only two Lake Water Quality Index calculation sheets are included in this report, one for the three spring 2010 surface samples, using averaged data, and a second for the three summer 2010 surface samples, using averaged data.

In the report marked MASTER, all 6 of the 2010 LWQI calculation sheets are included. That is the only difference between the MASTER and the rest of the reports.

BOTTOM SEDIMENTS

Many times bottom sediments tell us more about what is happening in a lake than the water quality tests do. That's because bottom sediments provide sort of a history of what's been happening in a lake, while water testing just provides a snapshot.

Bottom sediments are collected with a Pederson dredge, transferred to pint freezer containers and allowed to air dry. Once they are dry, the (usually) shrunken block of material is measured to determine volume, then ground, placed in porcelain dishes, dried at 100 degrees C, weighed, burned at 550 degrees C, and weighed again. Color after air-drying and after burning is also noted.

Bottom sediments almost always come up from the lake bottom black, and many people consider these black sediments "muck". However that's not usually the case.

The bottom sediments are black because no oxygen penetrates them, so the decomposition processes which occur use sulfur rather than oxygen, and in this process, they produce iron sulfides, which are black. However once the sediments are exposed to air, they usually turn some other color.

If the sediments remain black after air drying it usually means they are less than about 65 percent mineral (or more than 35% organic material). Sediments also remain black if they are from soft water lakes, but there's a reason for that.

If the sediments turn gray after air drying it usually means they are made up primarily of carbonates. This is what we usually see in moderately hard water and hard water lakes.

If the sediments turn tan, it usually means they are made up primarily of clays. Further evidence of this occurs when we burn the sediments at 550 degrees C.

We determine how much bottom sediments shrink when they air dry because this information is useful when considering dredging a lake. Normal shrinkage after air-drying is in the range of 50 to 80 percent. However sands and gravels don't shrink at all. Excessive shrinkage is more than 95 percent. In other words, there is only five percent or less of the material remaining after air-drying.

If the gray bottom sediments remain gray after burning they are considered carbonates, and the loss of material during this process is considered organic material. The results are expressed in the percentage of minerals in the bottom sediments.

If the tan bottom sediments turn red after burning, it means the lake is filling with clay. Clay enters the lake from near-lake activities such as road building, home building or farming. Usually clay is not a material that makes up the bottom sediments of most inland lakes.

Highly organic sediments that remained black after air drying usually turn tan after burning, but the mineral content is usually quite low.

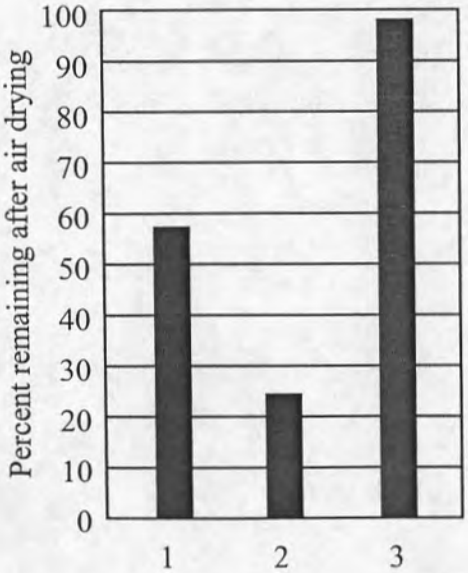
I consider high quality bottom sediments from natural lakes to be above 85 percent mineral. And I consider bottom sediments less than 50 percent mineral to be muck.

BASE LAKE BOTTOM SEDIMENTS

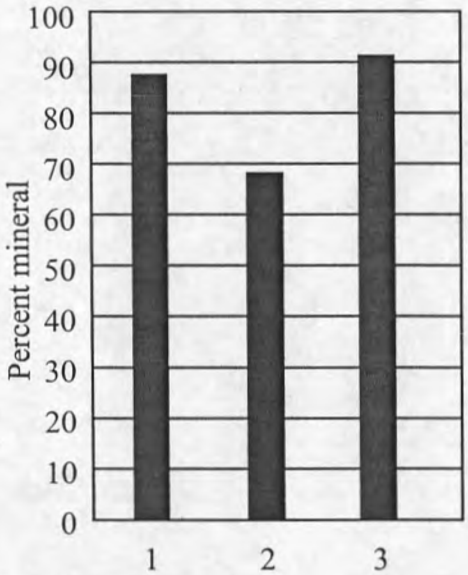
Bottom sediments were collected from Base Lake in spring 2005. The graph shows the data.

The sample from Station 1, collected in 25 feet of water, was black when recovered, turned gray and shrunk 42 percent after air-drying, and remained gray after burning at 550 degrees C. It was 88 percent mineral.

How Much Did Base Lake Bottom Sediments Shrink After Air Drying?



Percent Mineral Of Base Lake Bottom Sediments



Sample stations

Characteristics of Base Lake Bottom Sediments (2005)

Sample I.D.	Percent Shrinkage	Percent Mineral	Dried at 100°C Color & Description	Color after burning at 550°C	Depth of water (feet)
1	42	88	Gray	Gray	25
2	77	69	Gray	Red	60
3	2	91	Gray	Gray	17

Average mineral content of bottom sediments = 83%.

The sample from Station 2, collected in 60 feet of water, was black when recovered, turned gray and shrunk 77 percent after air-drying, and turned red after burning at 550 degrees C. It was 69 percent mineral.

The red color after burning indicates the presence of clay in the sediments. Clay is not a normal constituent of inland lake bottom sediments. It usually enters the lake from home or road building activities, or farming.

The sample from Station 3, collected in 17 feet of water, was black when recovered, turned gray and shrunk 2 percent after air-drying, and remained gray after burning at 550 degrees C. It was 91 percent mineral.

The mineral content of the two shallow-water sediments (88 and 91 percent) shows the effectiveness of these sediments being exposed to oxygen for much longer periods than the sediments from Station 2 in 60 feet of water. The data from Station 2 indicates, at least in the deeper water, that Base Lake is starting to accumulate organic material in the sediments at a faster than normal rate.

Wallace E. Fusilier

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Consulting Limnologist
Water Quality Investigators
Dexter, Michigan
April 2011

Surface Lake Water Quality Data

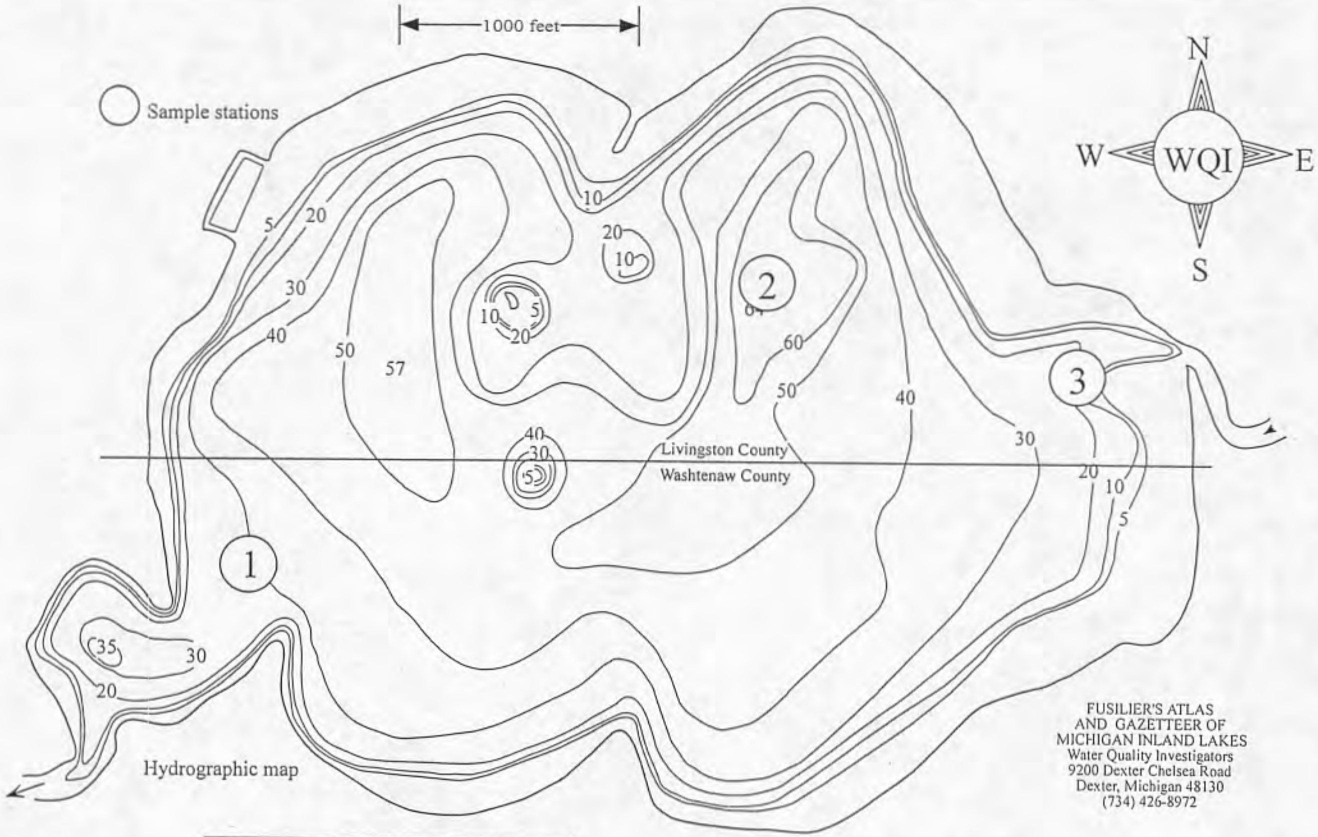
Date	Sample Station Number	Temperature °C	Dissolved Oxygen		Chlorophyll a ug/L	Secchi Disk Depth (feet)	Total Nitrate Nitrogen ug/L	Alkalinity mg/L	pH	Conductivity umhos per cm at 25°C	Total Phosphorus ug/L	Lake Water Quality Index	Grade
			(mg/L)	Percent Saturation									
6/7/94	1	---	---	---	4.4	8	76	---	8.1	680	25	85	B
6/7/94	2	---	---	---	4.4	8	70	---	8.0	680	27	85	B
6/7/94	3	---	---	---	3.7	8	70	---	8.0	680	20	87	B
8/1/94	1	25	8.8	95	5.7	7	15	171	8.2	640	23	81	B
8/1/94	2	25	8.6	98	4.4	7	13	175	8.3	640	25	84	B
8/1/94	3	25	9.2	91	5.1	7	28	176	8.3	640	33	82	B
6/19/95	1	---	---	---	0.6	11	56	148	7.6	560	12	93	A
6/19/95	2	---	---	---	0.9	10	65	151	7.7	580	10	93	A
6/19/95	3	---	---	---	0.4	8	69	150	7.6	560	11	92	A
7/31/95	1	---	---	---	---	7	11	170	7.6	580	13	---	---
7/31/95	2	---	---	---	---	7	20	170	7.6	590	15	---	---
7/31/95	3	---	---	---	---	7	14	170	7.8	580	14	---	---
8/14/95	2	31	7.8	104	4.9	9	21	175	8.6	570	11	80	B
8/14/95	3	31	8.2	109	9.0	9	17	175	8.5	570	21	77	C
6/9/96	1	21	8.6	96	4.2	12	69	205	8.3	635	13	88	B
6/9/96	2	21	8.6	96	3.5	12	64	203	8.3	640	28	87	B
6/9/96	3	21	8.5	94	3.5	12	75	206	8.2	645	19	89	B
8/7/96	1	27	8.6	108	3.6	9	23	194	8.3	630	31	84	B
8/7/96	2	27	8.6	108	3.7	9	13	193	8.3	650	16	83	B
8/7/96	3	27	8.5	106	5.6	9	15	193	8.3	650	18	83	B
5/12/97	1	13	10.4	98	4.1	7	236	197	8.3	620	7	86	B
5/12/97	2	12	10.3	95	5.5	8	231	197	8.3	620	13	84	B
5/12/97	3	13	10.3	97	4.1	7	226	200	8.3	630	12	85	B
8/25/97	1	21	8.7	97	2.2	11	39	185	8.4	660	21	82	B
8/25/97	2	23	8.5	98	2.5	11	36	185	8.4	660	24	78	C
8/25/97	3	22	9.1	103	1.6	12	43	183	8.3	600	23	89	B
4/19/98	1	13	10.3	97	3.2	10	127	196	8.4	630	10	88	B
4/19/98	2	13	10.2	96	4.1	9	132	200	8.2	630	8	87	B
4/19/98	3	13	10.2	96	3.1	9	127	202	8.2	630	10	88	B
8/10/98	1	26	8.6	105	2.5	9	10	172	8.6	640	16	86	B
8/10/98	2	26	8.4	102	2.3	9	9	177	8.6	660	14	87	B
8/10/98	3	26	8.8	107	1.1	9	9	174	8.6	660	16	88	B
4/25/99	1	14	10.7	103	4.9	7	368	185	8.3	690	19	81	B
4/25/99	2	13	10.8	102	5.9	7	405	185	8.4	690	23	79	C
4/25/99	3	12	10.8	100	6.5	6	347	187	8.3	690	26	79	C
8/27/99	1	25	8.8	105	1.1	18	32	168	8.2	690	22	93	A
8/27/99	2	24	8.5	100	1.1	18	14	165	8.2	695	17	94	A
8/27/99	3	24	8.8	105	1.1	18	23	167	8.0	720	16	94	A
4/15/00	1	10	11.0	97	2.3	14	469	203	8.3	610	36	86	B
4/15/00	2	10	11.0	99	2.6	12	479	195	8.4	610	35	85	B
4/15/00	3	11	10.7	96	1.5	13	386	198	8.3	610	42	87	B
8/4/00	1	25	7.4	88	6.4	14	111	187	8.3	620	15	88	B
8/4/00	2	24	7.1	84	3.2	12	118	188	8.2	630	15	89	B
8/4/00	3	24	7.1	84	2.0	11	124	184	8.2	640	16	90	A
5/13/01	1	19	9.5	101	1.4	21	153	202	8.3	700	34	92	A
5/13/01	2	19	9.1	97	1.7	21	139	203	8.4	700	28	93	A
5/13/01	3	19	9.3	99	0.9	21	147	204	8.3	700	40	92	A
8/1/01	1	28	8.4	106	4.0	11	8	192	8.2	720	16	86	B
8/1/01	2	28	7.9	100	3.5	12	21	189	8.0	720	22	87	B
8/1/01	3	28	9.0	114	3.2	12	32	185	8.0	710	19	87	B
4/15/02	1	8	10.8	91	2.1	12	280	205	8.3	680	8	90	A
4/15/02	2	8	10.9	92	2.3	12	270	205	8.3	680	11	90	A
4/15/02	3	13	11.9	112	1.8	11	263	206	8.3	690	9	91	A
8/2/02	1	29	8.4	108	2.8	8	30	174	7.7	700	16	85	B
8/2/02	2	29	8.1	104	2.5	8	32	168	7.6	700	17	86	B
8/2/02	3	29	9.1	117	1.8	9	92	165	7.6	700	17	87	B
4/28/03	1	14	11.2	108	3.7	9	343	190	8.4	740	17	86	B
4/28/03	2	14	11.3	109	3.7	9	355	189	8.3	765	16	85	B
4/28/03	3	14	10.8	104	4.0	9	343	187	8.3	780	18	84	B
8/1/03	1	26	8.8	107	2.7	8	168	169	8.6	750	14	87	B
8/1/03	2	26	8.0	98	3.0	7	173	170	8.6	760	12	86	B
8/1/03	3	27	9.0	112	3.0	11	168	170	8.6	755	10	87	B
4/16/04	1	10	10.5	93	4.2	10	419	194	8.3	740	12	82	B
4/16/04	2	10	10.7	95	3.5	10	429	192	8.2	740	13	82	B
4/16/04	3	10	10.9	97	3.8	10	404	196	8.2	760	17	80	B
8/2/04	1	25	7.8	93	4.0	9	236	190	8.2	710	22	86	B
8/2/04	2	25	7.6	91	4.9	10	262	190	8.2	710	22	85	B
8/2/04	3	24	8.0	94	2.6	10	218	190	8.2	720	25	88	B

Surface Lake and Creek Water Quality Data

Date	Sample Station Number	Temperature °C	Dissolved Oxygen		Chlorophyll a ug/L	Secchi Disk Depth (feet)	Total Nitrate Nitrogen ug/L	Alkalinity mg/L	pH	Conductivity umhos per cm at 25°C	Total Phosphorus ug/L	Lake Water Quality Index	Grade
			(mg/L)	Percent Saturation									
4/18/05	1	15	9.3	91	2.0	11	238	200	8.2	720	12	90	A
4/18/05	2	15	9.4	92	2.3	11	224	202	8.2	720	10	90	A
4/18/05	3	15	9.5	93	1.7	13	231	202	8.2	740	11	91	A
8/3/05	1	28	8.5	92	2.3	14	137	168	8.2	760	17	88	B
8/3/05	2	28	8.5	92	2.3	16	133	170	8.2	760	16	89	B
8/3/05	3	28	8.5	92	2.0	17	146	170	8.2	760	20	89	B
4/19/06	1	13	10.0	94	3.3	11	324	185	8.1	730	21	87	B
4/19/06	2	13	10.0	94	3.6	11	333	185	8.1	730	20	86	B
4/19/06	3	13	9.9	93	2.7	11	293	185	8.1	730	19	88	B
8/1/06	1	28	8.0	101	2.9	11	116	184	8.4	740	18	87	B
8/1/06	2	29	8.5	109	3.5	11	126	186	8.5	740	16	86	B
8/1/06	3	29	8.2	105	3.0	10	147	184	8.4	740	24	85	B
4/21/07	1	11	11.1	100	3.0	11	373	188	8.2	710	18	87	B
4/21/07	2	11	11.0	99	2.7	13	376	189	8.2	710	17	88	B
4/21/07	3	12	10.7	99	3.0	13	383	190	8.2	720	18	87	B
8/1/07	1	26	8.3	101	2.2	11	57	175	8.4	740	15	90	A
8/1/07	2	25	8.8	105	1.9	11	70	175	8.3	740	14	90	A
8/1/07	3	25	8.1	109	1.1	14	88	177	8.2	750	17	92	A
4/18/08	1	13	11.2	106	3.2	11	190	183	7.9	660	19	91	A
4/18/08	2	13	11.2	106	3.2	11	203	183	7.9	660	17	91	A
4/18/08	3	13	11.2	106	2.4	11	230	185	7.9	670	16	90	A
8/1/08	1	27	8.5	106	4.5	14	23	198	8.3	720	19	87	B
8/1/08	2	27	9.3	116	4.5	13	23	195	8.3	720	22	85	B
8/1/08	3	27	9.7	121	2.7	14	17	193	8.3	720	16	87	B
4/18/09	1	12	11.0	102	1.6	14	253	194	8.1	680	14	90	A
4/18/09	2	11	11.4	103	2.6	12	226	192	8.1	680	15	90	A
4/18/09	3	11	11.4	103	2.3	12	439	194	8.1	680	15	88	B
8/3/09	1	23	7.4	85	2.8	13	28	188	8.1	700	15	91	A
8/3/09	2	23	8.7	100	3.5	14	30	192	8.1	710	17	89	B
8/3/09	3	23	8.0	92	5.2	14	28	192	8.2	720	18	87	B
4/20/10	1	15	11.5	113	1.3	12	300	205	8.3	730	16	90	A
4/20/10	2	13	11.6	109	0.3	14	275	205	8.3	730	18	91	A
4/20/10	3	13	11.7	110	0.3	14	456	210	8.2	750	21	88	B
8/2/10	1	26	8.7	106	3.9	5	198	187	8.4	690	23	83	B
8/2/10	2	27	8.9	111	3.2	7	234	187	8.4	690	27	84	B
8/2/10	3	27	9.0	112	2.1	7	210	180	8.4	680		85	B
6/30/05	Huron R.	---	---	---	---	---	581	184	8.1	780	37	---	---
7/29/05	Huron R.	---	---	---	---	---	256	180	7.9	790	30	---	---
8/29/05	Huron R.	---	---	---	---	---	160	180	8.2	760	12	---	---
9/27/05	Huron R.	---	---	---	---	---	344	180	8.0	820	31	---	---
10/24/05	Huron R.	---	---	---	---	---	55	200	8.1	880	11	---	---
11/30/05	Huron R.	---	---	---	---	---	352	200	8.1	780	18	---	---
12/27/05	Huron R.	---	---	---	---	---	470	218	8.1	820	19	---	---
1/27/06	Huron R.	---	---	---	---	---	611	200	8.0	800	38	---	---
2/28/06	Huron R.	---	---	---	---	---	726	200	8.0	1100	20	---	---
3/30/06	Huron R.	---	---	---	---	---	458	205	8.1	780	21	---	---
4/19/06	Huron R.	---	---	---	---	---	288	198	8.1	740	14	---	---
6/30/05	Davis Cr.	---	---	---	---	---	7700	217	7.9	1000	36	---	---
7/29/05	Davis Cr.	---	---	---	---	---	4532	212	7.8	1090	55	---	---
8/29/05	Davis Cr.	---	---	---	---	---	3060	188	7.9	1100	40	---	---
9/27/05	Davis Cr.	---	---	---	---	---	4800	217	7.8	1100	29	---	---
10/24/05	Davis Cr.	---	---	---	---	---	4007	245	7.8	1100	25	---	---
11/30/05	Davis Cr.	---	---	---	---	---	5527	225	7.9	1100	23	---	---
12/27/05	Davis Cr.	---	---	---	---	---	5061	235	7.8	1000	20	---	---
1/27/06	Davis Cr.	---	---	---	---	---	2368	180	7.7	740	32	---	---
2/28/06	Davis Cr.	---	---	---	---	---	1632	175	7.8	1080	35	---	---
3/30/06	Davis Cr.	---	---	---	---	---	1376	179	7.8	720	36	---	---
4/19/06	Davis Cr.	---	---	---	---	---	549	196	7.9	680	21	---	---
6/30/05	Davis Cr.	---	---	---	---	---	7700	217	7.9	1000	36	---	---
7/29/05	Davis Cr.	---	---	---	---	---	4532	212	7.8	1090	55	---	---
8/29/05	Davis Cr.	---	---	---	---	---	3060	188	7.9	1100	40	---	---
9/27/05	Davis Cr.	---	---	---	---	---	4800	217	7.8	1100	29	---	---
10/24/05	Davis Cr.	---	---	---	---	---	4007	245	7.8	1100	25	---	---
11/30/05	Davis Cr.	---	---	---	---	---	5527	225	7.9	1100	23	---	---
12/27/05	Davis Cr.	---	---	---	---	---	5061	235	7.8	1000	20	---	---
1/27/06	Davis Cr.	---	---	---	---	---	2368	180	7.7	740	32	---	---
2/28/06	Davis Cr.	---	---	---	---	---	1632	175	7.8	1080	35	---	---
3/30/06	Davis Cr.	---	---	---	---	---	1376	179	7.8	720	36	---	---
4/19/06	Davis Cr.	---	---	---	---	---	549	196	7.9	680	21	---	---
5/28/09	Davis Cr.	---	---	---	---	---	370	241	7.9	750	45	---	---
6/29/09	Davis Cr.	---	---	---	---	---	47	193	7.8	560	49	---	---
7/31/09	Davis Cr.	---	---	---	---	---	1845	235	7.9	900	45	---	---
8/28/09	Davis Cr.	---	---	---	---	---	2600	227	7.9	900	24	---	---
9/23/09	Davis Cr.	---	---	---	---	---	450	250	7.8	940	26	---	---
10/21/09	Davis Cr.	---	---	---	---	---	1375	256	7.8	900	23	---	---
11/23/09	Davis Cr.	---	---	---	---	---	350	254	7.9	880	24	---	---
12/26/09	Davis Cr.	---	---	---	---	---	263	219	7.7	740	111	---	---
1/23/10	Davis Cr.	---	---	---	---	---	250	258	7.8	880	39	---	---
3/9/10	Davis Cr.	---	---	---	---	---	1122	263	8.0	890	41	---	---
3/31/10	Davis Cr.	---	---	---	---	---	548	215	8.0	720	26	---	---
4/20/10	Davis Cr.	---	---	---	---	---	1438	250	8.2	830	24	---	---

TABLE OF LAKE DATA

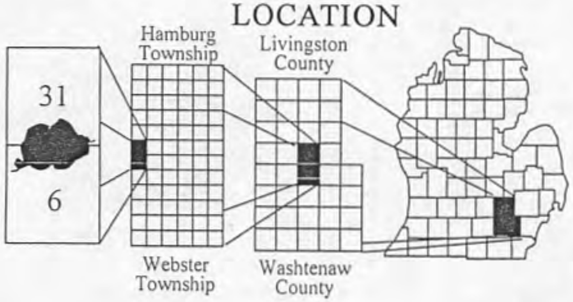
Lake Name	Base Lake
or	Base Line Lake
County	Washtenaw
and	Livingston
U.S.G.S. Map	Pinckney
Type of lake	Natural kettle
River basin	Huron
Lake area (acres)	265
Maximum depth (feet)	64
Mean depth (feet)	30.1
Lake volume (acre feet)	7975
Shoreline length (feet)	17790
Watershed area (acres)	259575
Drainage area (acres)	259840
Watershed to lake ratio	980
Flushing rate	0.038 years
Elevation	852
Longest dimension (feet)	4984
Ice out date	4/18/96
	3/18/97
	2/18/98
	3/19/99
	3/31/05
	3/11/06
	3/25/07
	4/1/08
	3/17/09
Date lake mixed	4/29/96
	3/29/97
	3/31/05
	3/11/06
	3/25/07
	4/1/08
Bottom Sediments, % mineral	88 69 91
Latitude	42° 25.590N
Longitude	83° 53.557W
Official lake monitor	Jim Meyer



Hydrographic map

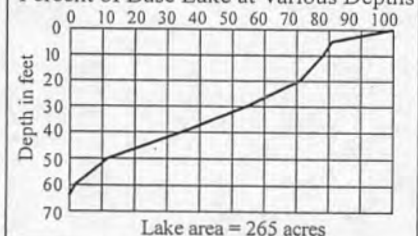
FUSILIER'S ATLAS
AND GAZETTEER OF
MICHIGAN INLAND LAKES
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

LOCATION



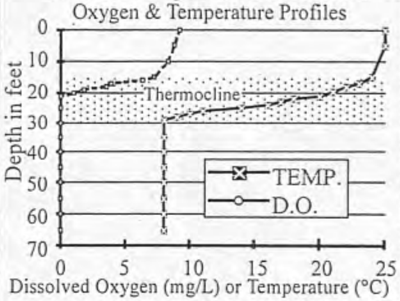
Base Lake Contour Areas And Volumes	
Area of various contours	Volume in Acre Feet
Surface = 264.72 acres	1199
5 feet = 214.78 acres	1051
10 feet = 205.47 acres	1971
20 feet = 188.81 acres	1667
30 feet = 144.64 acres	1191
40 feet = 93.62 acres	631
50 feet = 32.52 acres	194
60-64 feet = 6.18 acres	12
50-57 feet = 9.70 acres	39
Lake volume = 7975 acre feet	

Percent of Base Lake at Various Depths



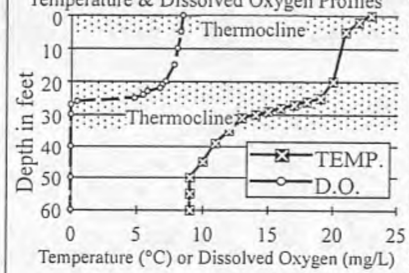
Base Lake
(or Base Line Lake)
Section 6
Webster Township
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

Base Lake August 2, 1994 Dissolved Oxygen & Temperature Profiles



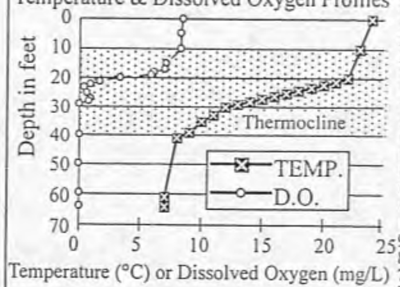
Temp.	Depth	D.O.	Depth
25	0	9.2	0
25	5	8.8	5
24	15	8.3	10
23	17	7.2	15
22	18	6.3	16
21	19	3.9	17
21	20	3.5	18
20	21	1.8	19
18	22	1	20
17	23	0	21
16	24	0	25
14	25	0	30
11	26	0	35
10	27	0	40
9	28	0	45
8	29	0	50
8	40	0	55
8	50	0	60
8	65	0	65

Base Lake August 26, 1997 Temperature & Dissolved Oxygen Profiles



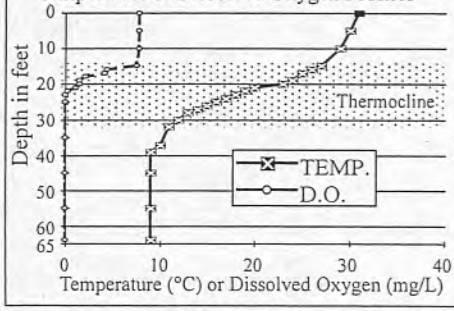
Temp.	Depth	D.O.	Depth
23	0	8.5	0
22	2	8.3	5
21	5	8.1	10
20	20	7.8	15
19	25	7.2	20
18	26	6.9	21
17	27	6.8	22
16	28	5.8	23
15	29	5.5	24
14	30	4.8	25
13	31	0.5	26
12	35	0.0	27
11	39	0.0	30
10	45	0.0	40
9	50	0.0	50
9	55	0.0	60
9	60		

Base Lake August 27, 1999 Temperature & Dissolved Oxygen Profiles



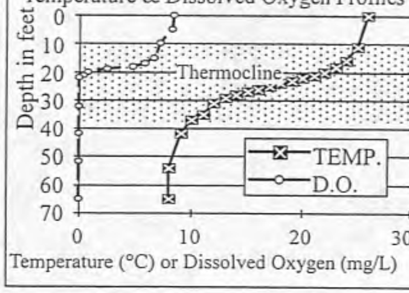
Temp.	Depth	D.O.	Depth
24	0	8.5	0
23	10	8.3	5
22	20	8.3	10
21	21	7.1	15
20	22	7.0	17
19	23	6.1	18
18	24	5.9	19
17	25	3.4	20
16	26	1.7	21
15	27	0.9	22
14	28	0.4	23
13	29	0.6	25
12	30	0.9	27
11	33	0.8	28
10	35	0.0	29
9	39	0.0	40
8	41	0.0	50
7	61	0.0	60
7	64	0.0	64

Base Lake, August 15, 1995 Temperature & Dissolved Oxygen Profiles



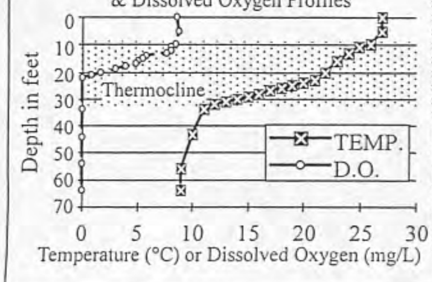
Temp.	Depth	D.O.	Depth
31	0	7.8	0
30	5	7.8	5
29	10	7.8	10
27	15	7.6	15
26	16	4.4	16
25	17	4.1	17
24	19	2.2	18
23	20	1.5	19
20	21	1.5	20
19	22	1.1	21
18	23	0.2	22
17	24	0.0	23
16	25	0.0	25
15	26	0.0	35
14	27	0.0	45
13	28	0.0	55
12	30	0.0	64
11	32		
10	37		
9	39		
9	45		
9	55		
9	64		

Base Lake August 11, 1998 Temperature & Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
26	0	8.4	0
25	11	8.3	5
24	16	7.2	10
23	18	6.6	15
22	20	5.9	17
21	21	4.8	18
20	22	2.5	19
19	23	0.8	20
18	24	0.4	21
17	25	0.0	22
16	26	0.0	32
15	27	0.0	42
14	28	0.0	52
13	29	0.0	65
12	31		
11	35		
10	37		
9	42		
8	54		
8	65		

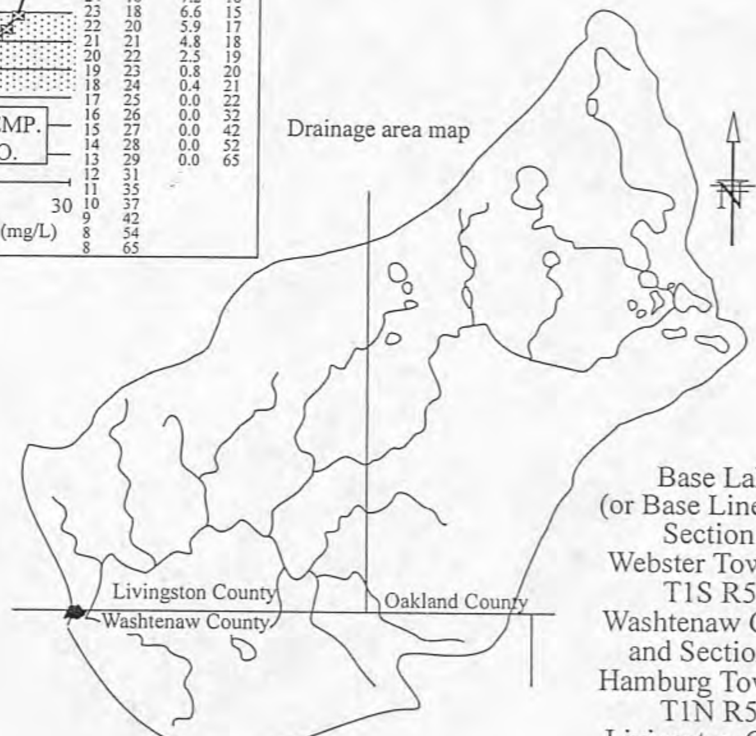
Base Lake, August 8, 1996 Temperature & Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
27	0	8.6	0
27	5	8.8	5
26	10	8.5	10
25	11	8.0	11
24	13	8.0	12
23	16	7.6	13
22	20	5.8	14
21	23	5.5	15
20	24	5.1	16
19	25	4.8	17
18	26	3.9	18
17	27	3.0	19
16	28	1.7	20
15	29	0.8	21
14	30	0.0	22
13	31	0.0	34
12	32	0.0	44
11	34	0.0	54
10	43	0.0	64
9	56		
9	64		

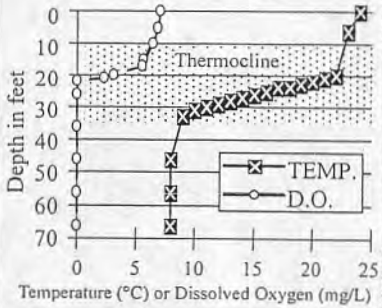
FUSILIER'S ATLAS
AND GAZETTEER OF
MICHIGAN INLAND LAKES
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

Drainage area map



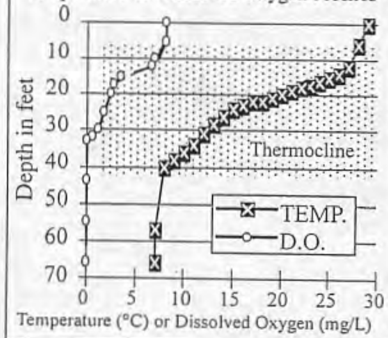
Base Lake
(or Base Line Lake)
Section 6
Webster Township
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

Base Lake August 4, 2000
Temperature & Dissolved Oxygen Profiles



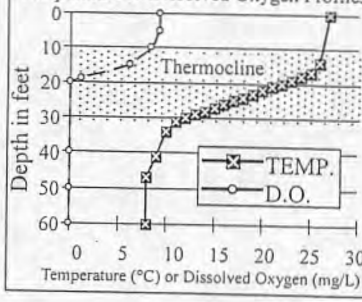
Temp.	Depth	D.O.	Depth
24	0	7.1	0
23	6	6.9	5
22	20	6.5	10
21	21	5.6	15
20	22	5.5	17
19	23	3.1	20
18	24	2.3	21
17	24	0.0	22
16	25	0.0	26
15	26	0.0	36
14	27	0.0	46
13	28	0.0	56
12	29	0.0	66
11	30		
10	31		
9	33		
8	46		
8	56		
8	66		

Base Lake, August 2, 2002
Temperature & Dissolved Oxygen Profiles



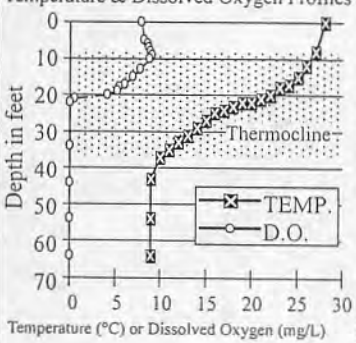
Temp.	Depth	D.O.	Depth
29	0	8.1	0
28	6	8.1	5
27	12	6.9	10
26	14	6.6	12
25	15	3.4	15
24	16	2.7	17
23	17	2.5	20
22	18	1.8	25
21	19	1.2	30
20	20	0.6	32
19	21	0.0	33
18	22	0.0	44
17	22	0.0	55
16	23	0.0	66
15	24		
14	26		
13	28		
12	31		
11	34		
10	36		
9	38		
8	40		
7	57		
7	66		

Base Lake, August 1, 2008
Temperature & Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
27	0	9.3	0
26	14	9.3	5
25	17	8.4	10
24	18	6.2	15
23	19	1.2	19
22	20	0.0	20
21	21	0.0	40
20	22	0.0	50
19	23	0.0	60
18	24		
17	25		
16	26		
15	27		
14	28		
13	29		
12	30		
11	31		
10	34		
9	41		
8	47		
8	60		

Base Lake, August 1, 2001
Temperature & Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
28	0	7.9	0
27	8	8.2	5
26	12	8.6	6
25	15	8.7	7
24	17	8.9	8
23	18	9.1	9
22	20	8.8	10
21	21	7.8	13
20	22	7.0	15
19	22	6.1	17
18	23	5.5	18
17	24	5.3	19
16	25	4.1	20
15	27	0.5	21
14	29	0.0	22
13	31	0.0	34
12	33	0.0	44
11	35	0.0	54
10	37	0.0	64
9	43		
9	54		
9	64		

FUSILIER'S ATLAS
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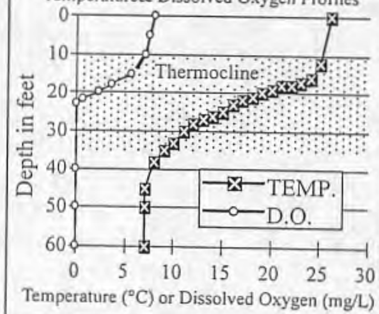
MICHIGAN INLAND LAKES

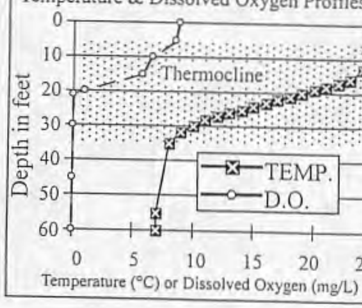
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

Base Lake, August 1, 2003
Temperature& Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
26	0	8.0	0
25	12	7.4	5
24	16	7.1	10
23	17	5.6	15
22	18	3.6	18
21	18	2.2	20
20	19	0.7	22
19	20	0.0	23
18	21	0.0	40
17	22	0.0	50
16	23	0.0	60
15	25		
14	26		
13	27		
12	28		
11	30		
10	33		
9	35		
8	38		
7	45		
7	50		
7	60		

Base Lake, August 1, 2007
Temperature & Dissolved Oxygen Profiles



Temp.	Depth	D.O.	Depth
25	0	8.8	0
24	13	8.4	5
23	16	6.5	10
22	17	5.7	15
21	18	1.0	20
20	19	0.0	21
19	20	0.0	30
18	21	0.0	45
17	22	0.0	60
16	23		
15	24		
14	25		
13	26		
12	27		
11	28		
10	30		
9	32		
8	35		
7	55		
7	60		

Base Lake
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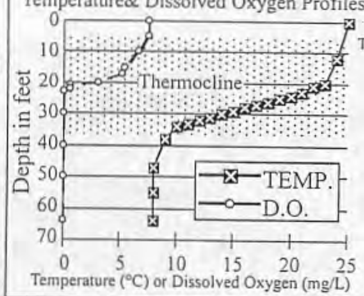
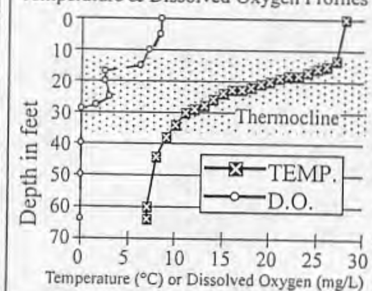
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

Base Lake, August 2, 2004
Temperature& Dissolved Oxygen Profiles



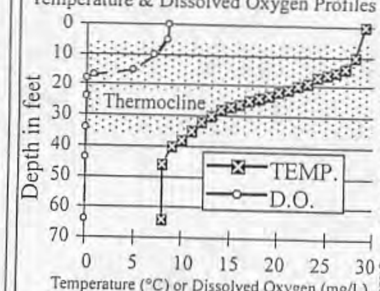
Temp.	Depth	D.O.	Depth
25	0	7.6	0
24	12	7.6	5
23	20	6.7	10
22	21	5.4	15
21	23	5.2	17
20	24	3.0	20
18	26	0.6	21
16	28	0.6	22
14	30	0.0	23
12	32	0.0	30
10	34	0.0	40
9	38	0.0	50
8	47	0.0	64
8	55		
8	64		

Base Lake, August 3, 2005
Temperature & Dissolved Oxygen Profiles



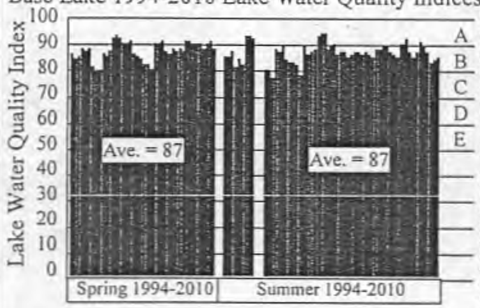
Temp.	Depth	D.O.	Depth
28	0	8.5	0
27	13	8.4	5
26	15	7.2	10
25	16	6.2	15
24	17	2.5	17
22	18	2.5	20
21	19	2.9	25
20	20	1.5	28
18	22	0.0	29
16	23	0.0	40
15	24	0.0	50
14	26	0.0	64
13	28		
11	30		
10	34		
9	38		
8	44		
7	60		
7	64		

Base Lake, August 1, 2006
Temperature & Dissolved Oxygen Profiles



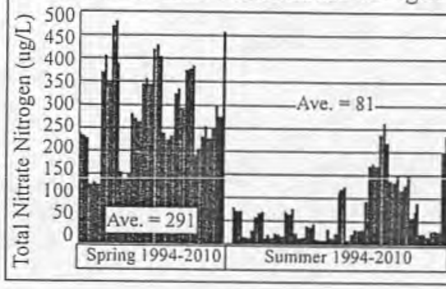
Temp.	Depth	D.O.	Depth
29	0	8.5	0
28	10	8.3	5
27	14	6.9	10
26	15	4.8	15
25	16	0.7	17
24	17	0.0	18
23	19	0.0	24
22	20	0.0	34
21	21	0.0	44
20	22	0.0	64
19	23		
18	24		
17	25		
16	26		
15	27		
14	28		
13	30		
12	32		
11	35		
10	38		
9	40		
8	46		
8	64		

Base Lake 1994-2010 Lake Water Quality Indices



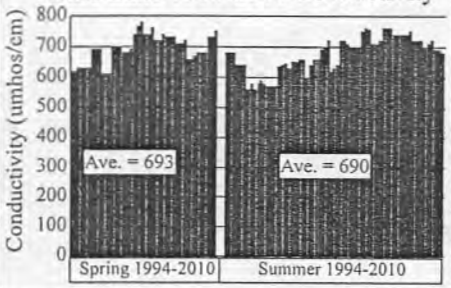
Spring		4/16/04	82	Summer		8/25/97	82	8/2/04	85
5/12/97	86	4/16/04	82	6/7/94	85	8/25/97	78	8/2/04	88
5/12/97	84	4/16/04	80	6/7/94	85	8/25/97	89	8/3/05	88
5/12/97	85	4/18/05	90	6/7/94	87	8/10/98	86	8/3/05	89
4/19/98	88	4/18/05	90	8/1/94	81	8/10/98	87	8/3/05	89
4/19/98	87	4/18/05	91	8/1/94	84	8/10/98	88	8/1/06	87
4/19/98	88	4/19/06	87	8/1/94	82	8/27/99	93	8/1/06	86
4/25/99	81	4/19/06	86	6/19/95	93	8/27/99	94	8/1/06	85
4/25/99	79	4/19/06	88	6/19/95	93	8/27/99	94	8/1/07	90
4/25/99	79	4/21/07	87	6/19/95	92	8/4/00	88	8/1/07	90
4/15/00	86	4/21/07	88	7/31/95	---	8/4/00	89	8/1/07	92
4/15/00	85	4/21/07	87	7/31/95	---	8/4/00	90	8/1/08	87
4/15/00	87	4/18/08	91	7/31/95	---	8/1/01	86	8/1/08	85
5/13/01	92	4/18/08	91	8/14/95	80	8/1/01	87	8/1/08	87
5/13/01	93	4/18/08	90	8/14/95	80	8/1/01	87	8/3/09	91
5/13/01	92	4/18/09	90	8/14/95	77	8/2/02	85	8/3/09	89
4/15/02	90	4/18/09	90	6/9/96	88	8/2/02	86	8/3/09	87
4/15/02	90	4/18/09	88	6/9/96	87	8/2/02	87	8/2/10	83
4/15/02	91	4/20/10	90	6/9/96	89	8/1/03	87	8/2/10	84
4/28/03	86	4/20/10	91	8/7/96	84	8/1/03	86	8/2/10	85
4/28/03	85	4/20/10	88	8/7/96	83	8/1/03	87		
4/28/03	84			8/7/96	83	8/2/04	86		

Base Lake 1994-2010 Nitrate Nitrogen



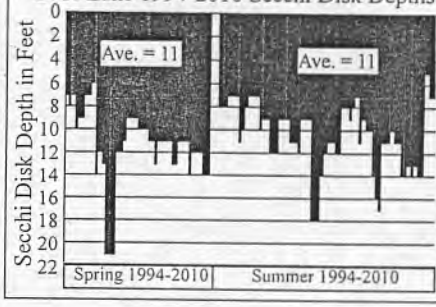
Spring		4/16/04	419	Summer		8/25/97	39	8/2/04	262
5/12/97	236	4/16/04	429	6/7/94	76	8/25/97	36	8/2/04	218
5/12/97	231	4/16/04	404	6/7/94	70	8/25/97	43	8/3/05	137
5/12/97	226	4/18/05	238	6/7/94	70	8/10/98	10	8/3/05	133
4/19/98	127	4/18/05	224	8/1/94	15	8/10/98	9	8/3/05	146
4/19/98	132	4/18/05	231	8/1/94	13	8/10/98	9	8/1/06	116
4/19/98	127	4/19/06	324	8/1/94	28	8/27/99	32	8/1/06	126
4/25/99	368	4/19/06	333	6/19/95	56	8/27/99	14	8/1/06	147
4/25/99	405	4/19/06	293	6/19/95	65	8/27/99	23	8/1/07	57
4/25/99	347	4/21/07	373	6/19/95	69	8/4/00	111	8/1/07	70
4/15/00	469	4/21/07	376	7/31/95	11	8/4/00	118	8/1/07	88
4/15/00	479	4/21/07	383	7/31/95	20	8/4/00	124	8/1/08	23
4/15/00	386	4/18/08	190	7/31/95	14	8/1/01	8	8/1/08	23
5/13/01	153	4/18/08	203	8/14/95	23	8/1/01	21	8/1/08	17
5/13/01	139	4/18/08	230	8/14/95	21	8/1/01	32	8/3/09	28
5/13/01	147	4/18/09	253	8/14/95	17	8/2/02	30	8/3/09	30
4/15/02	280	4/18/09	226	6/9/96	69	8/2/02	32	8/3/09	28
4/15/02	270	4/18/09	249	6/9/96	64	8/2/02	92	8/2/10	198
4/15/02	263	4/20/10	300	6/9/96	75	8/1/03	168	8/2/10	234
4/28/03	343	4/20/10	275	8/7/96	23	8/1/03	173	8/2/10	210
4/28/03	355	4/20/10	456	8/7/96	13	8/1/03	168		
4/28/03	343			8/7/96	15	8/2/04	236		

Base Lake 1994-2010 Conductivity



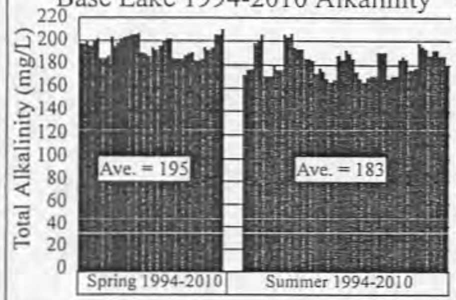
Spring		4/16/04	740	Summer		8/25/97	660	8/2/04	710
5/12/97	620	4/16/04	740	6/7/94	680	8/25/97	660	8/2/04	720
5/12/97	620	4/16/04	760	6/7/94	680	8/25/97	600	8/3/05	760
5/12/97	630	4/18/05	720	6/7/94	680	8/10/98	640	8/3/05	760
4/19/98	630	4/18/05	720	8/1/94	640	8/10/98	660	8/3/05	760
4/19/98	630	4/18/05	740	8/1/94	640	8/10/98	660	8/1/06	740
4/19/98	630	4/19/06	730	8/1/94	640	8/27/99	690	8/1/06	740
4/25/99	690	4/19/06	730	6/19/95	560	8/27/99	695	8/1/06	740
4/25/99	690	4/19/06	730	6/19/95	580	8/27/99	720	8/1/07	740
4/25/99	690	4/21/07	710	6/19/95	560	8/4/00	620	8/1/07	740
4/15/00	610	4/21/07	710	7/31/95	580	8/4/00	630	8/1/07	750
4/15/00	610	4/21/07	720	7/31/95	590	8/4/00	640	8/1/08	720
4/15/00	610	4/18/08	660	7/31/95	580	8/1/01	720	8/1/08	720
5/13/01	700	4/18/08	660	8/14/95	570	8/1/01	720	8/1/08	720
5/13/01	700	4/18/08	670	8/14/95	570	8/1/01	710	8/3/09	700
5/13/01	700	4/18/09	680	8/14/95	570	8/2/02	700	8/3/09	710
4/15/02	680	4/18/09	680	6/9/96	635	8/2/02	700	8/3/09	720
4/15/02	680	4/18/09	680	6/9/96	640	8/2/02	700	8/2/10	690
4/15/02	690	4/20/10	730	6/9/96	645	8/1/03	750	8/2/10	690
4/28/03	740	4/20/10	730	8/7/96	630	8/1/03	760	8/2/10	680
4/28/03	765	4/20/10	750	8/7/96	650	8/1/03	755		
4/28/03	780			8/7/96	650	8/2/04	710		

Base Lake 1994-2010 Secchi Disk Depths



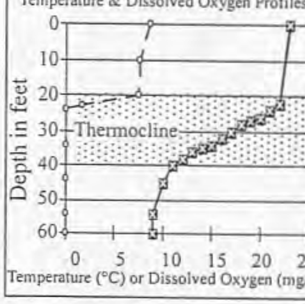
Spring		4/16/04	10	Summer		8/25/97	11	8/2/04	10
5/12/97	7	4/16/04	10	6/7/94	8	8/25/97	11	8/2/04	10
5/12/97	8	4/16/04	10	6/7/94	8	8/25/97	12	8/3/05	14
5/12/97	7	4/18/05	11	6/7/94	8	8/10/98	9	8/3/05	16
4/19/98	10	4/18/05	11	8/1/94	7	8/10/98	9	8/3/05	17
4/19/98	9	4/18/05	13	8/1/94	7	8/10/98	9	8/1/06	11
4/19/98	9	4/19/06	11	8/1/94	7	8/27/99	18	8/1/06	11
4/25/99	7	4/19/06	11	6/19/95	11	8/27/99	18	8/1/06	10
4/25/99	7	4/19/06	11	6/19/95	10	8/27/99	18	8/1/07	11
4/25/99	6	4/21/07	11	6/19/95	8	8/4/00	14	8/1/07	11
4/15/00	14	4/21/07	13	7/31/95	7	8/4/00	12	8/1/07	14
4/15/00	12	4/21/07	13	7/31/95	7	8/4/00	11	8/1/08	14
4/15/00	13	4/18/08	11	7/31/95	7	8/1/01	11	8/1/08	13
5/13/01	21	4/18/08	11	8/14/95	10	8/1/01	12	8/1/08	14
5/13/01	21	4/18/08	11	8/14/95	9	8/1/01	12	8/3/09	13
5/13/01	21	4/18/09	14	8/14/95	9	8/2/02	8	8/3/09	14
4/15/02	12	4/18/09	12	6/9/96	12	8/2/02	8	8/3/09	14
4/15/02	12	4/18/09	12	6/9/96	12	8/2/02	9	8/2/10	5
4/15/02	11	4/20/10	12	6/9/96	12	8/1/03	8	8/2/10	7
4/28/03	9	4/20/10	14	8/7/96	9	8/1/03	7	8/2/10	7
4/28/03	9	4/20/10		8/7/96	9	8/1/03	11		
4/28/03	9			8/7/96	9	8/2/04	9		

Base Lake 1994-2010 Alkalinity



Spring		4/16/04	194	Summer		8/25/97	185	8/2/04	190
5/12/97	197	4/16/04	192	6/7/94	---	8/25/97	185	8/2/04	190
5/12/97	197	4/16/04	196	6/7/94	---	8/25/97	183	8/3/05	168
5/12/97	200	4/18/05	200	6/7/94	---	8/10/98	172	8/3/05	170
4/19/98	196	4/18/05	202	8/1/94	171	8/10/98	177	8/3/05	170
4/19/98	200	4/18/05	202	8/1/94	175	8/10/98	174	8/1/06	184
4/19/98	202	4/19/06	185	8/1/94	176	8/27/99	168	8/1/06	186
4/25/99	185	4/19/06	185	6/19/95	198	8/27/99	165	8/1/06	184
4/25/99	185	4/19/06	185	6/19/95	201	8/27/99	167	8/1/07	175
4/25/99	187	4/21/07	188	6/19/95	205	8/4/00	187	8/1/07	175
4/15/00	203	4/21/07	189	7/31/95	170	8/4/00	188	8/1/07	177
4/15/00	195	4/21/07	190	7/31/95	170	8/4/00	184	8/1/08	198
4/15/00	198	4/18/08	183	7/31/95	170	8/1/01	192	8/1/08	195
5/13/01	202	4/18/08	183	8/14/95	180	8/1/01	189	8/1/08	193
5/13/01	203	4/18/08	185	8/14/95	175	8/1/01	185	8/3/09	188
5/13/01	204	4/18/09	194	8/14/95	175	8/2/02	174	8/3/09	192
4/15/02	205	4/18/09	192	6/9/96	205	8/2/02	168	8/3/09	192
4/15/02	205	4/18/09	194	6/9/96	203	8/2/02	165	8/2/10	187
4/15/02	206	4/20/10	205	6/9/96	206	8/1/03	169	8/2/10	187
4/28/03	190	4/20/10	205	8/7/96	194	8/1/03	170	8/2/10	180
4/28/03	189	4/20/10	210	8/7/96	193	8/1/03	170		
4/28/03	187			8/7/96	193	8/2/04	190		

Base Lake, August 3, 2009
Temperature & Dissolved Oxygen Profiles

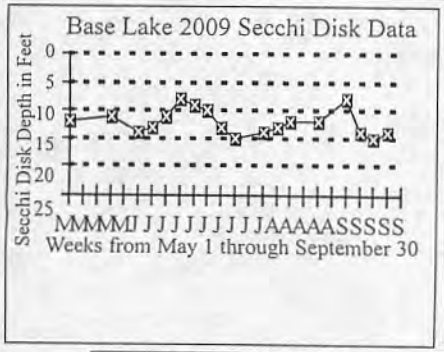


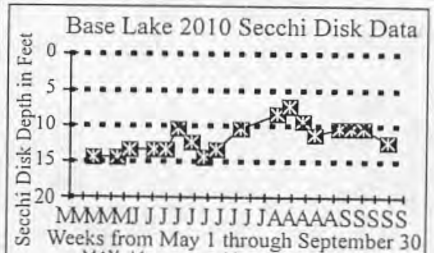
Temp.	Depth	D.O.	Depth
23	0	8.7	0
22	22	7.6	10
21	24	7.5	20
20	26	1.7	23
19	27	0.0	24
18	28	0.0	34
17	30	0.0	44
16	32	0.0	54
15	34	0.0	60
14	35		
13	36		
12	38		
11	40		
10	45		
9	54		
9	60		

TEMP.
D.O.

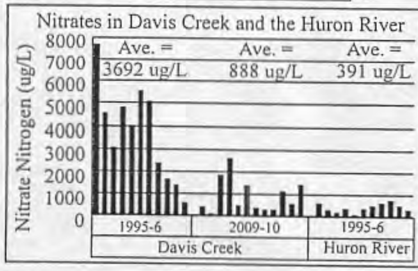
FUSILIER'S ATLAS
AND GAZETTEER OF
MICHIGAN INLAND LAKES
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

Base Lake
(or Base Line Lake)
Section 6
Webster Township
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

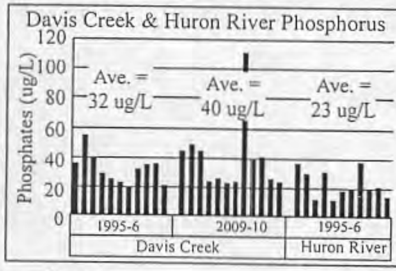




MAY	14	.	14	13	.
JUN	13	13	10	12	14
JUL	13	.	10	.	.
AUG	8	7	9	11	.
SEP	10	10	10	.	12



Davis Creek					
6/30/05	7700	5/28/09	370	Huron River	
7/29/05	4532	6/29/09	47	6/30/05	581
8/29/05	3060	7/31/09	1845	7/29/05	256
9/27/05	4800	8/28/09	2600	8/29/05	160
10/24/05	4007	9/23/09	450	9/27/05	344
11/30/05	5527	10/21/09	1375	10/24/05	55
12/27/05	5061	11/23/09	350	11/30/05	352
1/27/06	2368	12/26/09	263	12/27/05	470
2/28/06	1632	1/23/10	250	1/27/06	611
3/30/06	1376	3/9/10	1122	2/28/06	726
4/19/06	549	3/31/10	548	3/30/06	458
5/28/09	370	4/20/10	1438	4/19/06	288



Davis Cr.		5/28/09	45	Huron R.	
6/30/05	36	6/29/09	49	6/30/05	37
7/29/05	55	7/31/09	45	7/29/05	30
8/29/05	40	8/28/09	24	8/29/05	12
9/27/05	29	9/23/09	26	9/27/05	31
10/24/05	25	10/21/09	23	10/24/05	11
11/30/05	23	11/23/09	24	11/30/05	18
12/27/05	20	12/26/09	111	12/27/05	19
1/27/06.	32	1/23/10	39	1/27/06.	38
2/28/06.	35	3/9/10	41	2/28/06.	20
3/30/06.	36	3/31/10	26	3/30/06.	21
4/19/06.	21	4/20/10	24	4/19/06.	14

Base Lake
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Section 6
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Washtenaw County
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Hamburg Township
T1N R5E
Livingston County

FUSILIER'S ATLAS
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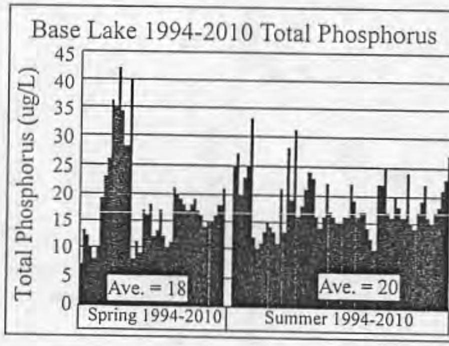
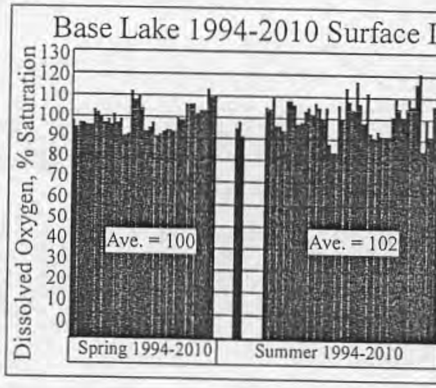
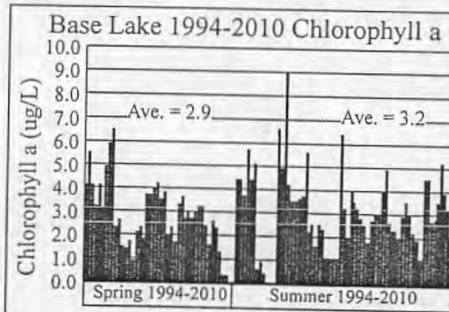


Spring				Summer					
		4/16/04	12			8/25/97	21	8/2/04	25
5/12/97	7	4/16/04	13	6/7/94	25	8/25/97	24	8/3/05	17
5/12/97	13	4/16/04	17	6/7/94	27	8/25/97	23	8/3/05	16
5/12/97	12	4/18/05	12	6/7/94	20	8/10/98	16	8/3/05	20
4/19/98	10	4/18/05	10	8/1/94	23	8/10/98	14	8/1/06	18
4/19/98	8	4/18/05	11	8/1/94	25	8/10/98	16	8/1/06	16
4/19/98	10	4/19/06	21	8/1/94	33	8/27/99	22	8/1/06	24
4/25/99	19	4/19/06	20	6/19/95	12	8/27/99	17	8/1/07	15
4/25/99	23	4/19/06	19	6/19/95	10	8/27/99	16	8/1/07	14
4/25/99	26	4/21/07	18	6/19/95	11	8/4/00	15	8/1/07	17
4/15/00	36	4/21/07	17	7/31/95	13	8/4/00	15	8/1/08	19
4/15/00	35	4/21/07	18	7/31/95	15	8/4/00	16	8/1/08	22
4/15/00	42	4/18/08	19	7/31/95	14	8/1/01	16	8/1/08	16
5/13/01	34	4/18/08	17	8/14/95	13	8/1/01	22	8/3/09	15
5/13/01	28	4/18/08	16	8/14/95	11	8/1/01	19	8/3/09	17
5/13/01	40	4/18/09	14	8/14/95	21	8/2/02	16	8/3/09	18
4/15/02	8	4/18/09	15	6/9/96	13	8/2/02	17	8/2/10	21
4/15/02	11	4/18/09	15	6/9/96	28	8/2/02	17	8/2/10	23
4/15/02	9	4/20/10	16	6/9/96	19	8/1/03	14	8/2/10	27
4/28/03	17	4/20/10	18	8/7/96	31	8/1/03	12		
4/28/03	16	4/20/10	21	8/7/96	16	8/1/03	10		
4/28/03	18			8/7/96	18	8/2/04	22		

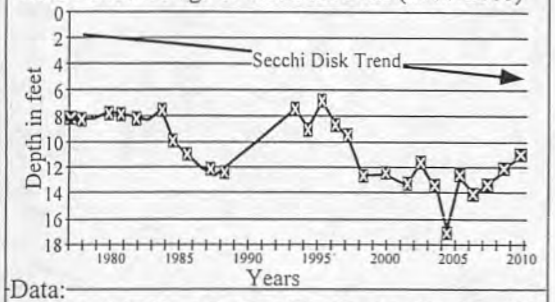


Spring				Summer					
		4/16/04	93			8/25/97	97	8/2/04	91
5/12/97	98	4/16/04	95	6/7/94	---	8/25/97	98	8/2/04	94
5/12/97	95	4/16/04	97	6/7/94	---	8/25/97	103	8/3/05	92
5/12/97	97	4/18/05	91	6/7/94	---	8/10/98	105	8/3/05	92
4/19/98	97	4/18/05	92	8/1/94	95	8/10/98	102	8/3/05	92
4/19/98	96	4/18/05	93	8/1/94	98	8/10/98	107	8/1/06	101
4/19/98	96	4/19/06	94	8/1/94	91	8/27/99	105	8/1/06	109
4/25/99	103	4/19/06	94	6/19/95	---	8/27/99	100	8/1/06	105
4/25/99	102	4/19/06	93	6/19/95	---	8/27/99	105	8/1/07	101
4/25/99	100	4/21/07	100	6/19/95	---	8/4/00	88	8/1/07	105
4/15/00	97	4/21/07	99	7/31/95	---	8/4/00	84	8/1/07	109
4/15/00	99	4/21/07	99	7/31/95	---	8/4/00	84	8/1/08	106
4/15/00	96	4/18/08	106	7/31/95	---	8/1/01	106	8/1/08	116
5/13/01	101	4/18/08	106	8/14/95	105	8/1/01	100	8/1/08	121
5/13/01	97	4/18/08	106	8/14/95	104	8/1/01	114	8/3/09	85
5/13/01	99	4/18/09	102	8/14/95	109	8/2/02	108	8/3/09	100
4/15/02	91	4/18/09	103	6/9/96	96	8/2/02	104	8/3/09	92
4/15/02	92	4/18/09	103	6/9/96	96	8/2/02	117	8/2/10	106
4/15/02	112	4/20/10	113	6/9/96	94	8/1/03	107	8/2/10	111
4/28/03	108	4/20/10	109	8/7/96	108	8/1/03	98	8/2/10	112
4/28/03	109	4/20/10	110	8/7/96	108	8/1/03	112		
4/28/03	104			8/7/96	106	8/2/04	93		



Spring				Summer					
		4/16/04	4.2			8/25/97	2.2	8/2/04	4.9
5/12/97	4.1	4/16/04	3.5	6/7/94	4.4	8/25/97	2.5	8/2/04	2.6
5/12/97	5.5	4/16/04	3.8	6/7/94	4.4	8/25/97	1.6	8/3/05	2.3
5/12/97	4.1	4/18/05	2.0	6/7/94	3.7	8/10/98	2.5	8/3/05	2.3
4/19/98	3.2	4/18/05	2.3	8/1/94	5.7	8/10/98	2.3	8/3/05	2.0
4/19/98	4.1	4/18/05	1.7	8/1/94	4.4	8/10/98	1.1	8/1/06	2.9
4/19/98	3.1	4/19/06	3.3	8/1/94	5.1	8/27/99	1.1	8/1/06	3.5
4/25/99	4.9	4/19/06	3.6	6/19/95	0.6	8/27/99	1.1	8/1/06	3.0
4/25/99	5.9	4/19/06	2.7	6/19/95	0.9	8/27/99	1.1	8/1/07	2.2
4/25/99	6.5	4/21/07	3.0	6/19/95	0.4	8/4/00	6.4	8/1/07	1.9
4/15/00	2.3	4/21/07	2.7	7/31/95	---	8/4/00	3.2	8/1/07	1.1
4/15/00	2.6	4/21/07	3.0	7/31/95	---	8/4/00	2.0	8/1/08	4.5
4/15/00	1.5	4/18/08	3.2	7/31/95	---	8/1/01	4.0	8/1/08	4.5
5/13/01	1.4	4/18/08	3.2	8/14/95	6.6	8/1/01	3.5	8/1/08	2.7
5/13/01	1.7	4/18/08	2.4	8/14/95	4.9	8/1/01	3.2	8/3/09	2.8
5/13/01	0.9	4/18/09	1.6	8/14/95	9.0	8/2/02	2.8	8/3/09	3.5
4/15/02	2.1	4/18/09	2.6	6/9/96	4.2	8/2/02	2.5	8/3/09	5.2
4/15/02	2.3	4/18/09	2.3	6/9/96	3.5	8/2/02	1.8	8/2/10	3.9
4/15/02	1.8	4/20/10	1.3	6/9/96	3.5	8/1/03	2.7	8/2/10	3.2
4/28/03	3.7	4/20/10	0.3	8/7/96	3.6	8/1/03	3.0	8/2/10	2.1
4/28/03	3.7	4/20/10	0.3	8/7/96	3.7	8/1/03	3.0		
4/28/03	4.0			8/7/96	5.6	8/2/04	4.0		

Base Lake Average Secchi Disk Data (1977-2010)

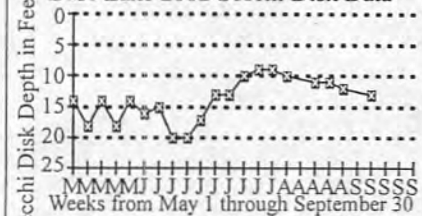


Data:

1977	1979	1980	1981	1983	1984	1985	1987	1988	1994	1995	1996
8.4	8.3	7.8	7.9	8.4	7.6	10.1	12.1	12.7	7.5	9.0	7.0

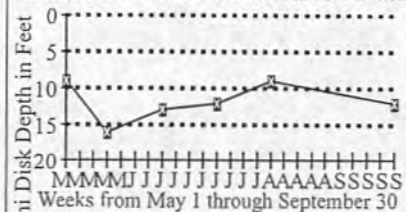
1997	1998	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
8.4	9.1	12.6	12.3	13.7	11.8	13.7	17.7	12.7	14.0	13.6	12.1	11.4

Base Lake 2002 Secchi Disk Data



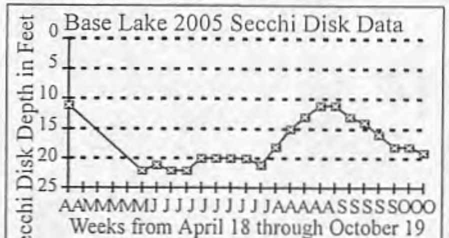
MAY		14	18	14	18	14
JUN	16	15	20	20	17	
JUL	13	13	10	9	9	
AUG	10	.	11	11	12	
SEP	.	13	.	.	.	

Base Lake 2003 Secchi Disk Data



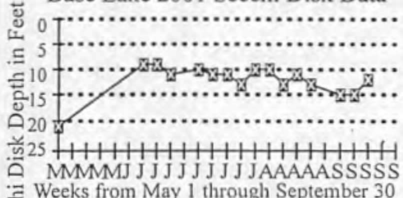
MAY	9	.	.	16	.
JUN.	.	13	.	.	
JUL.	12	.	.	.	
AUG	9	.	.	.	.
SEP.	.	.	.	12	

Base Lake 2005 Secchi Disk Data



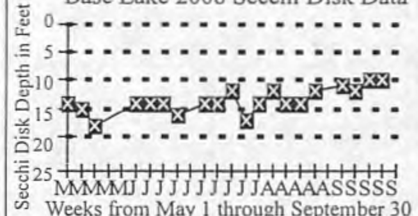
APR	.	.	11	.	.
JUN	22	21	22	22	20
JUL	20	20	20	21	18
AUG	15	13	11	11	.
SEP	13	14	16	.	.
OCT	18	18	19		

Base Lake 2001 Secchi Disk Data



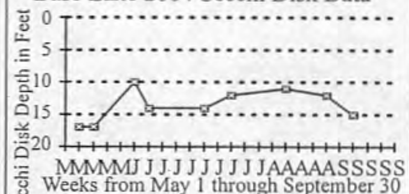
MAY	21	.	.	.	.
JUN	.9	9	11	.	
JUL	10	11	11	13	10
AUG	10	13	11	13	.
SEP	15	15	12	.	.

Base Lake 2008 Secchi Disk Data



MAY	14	15	18	.	.
JUN	14	14	14	16	.
JUL	14	14	12	17	14
AUG	12	14	14	12	.
SEP	11	12	10	10	.

Base Lake 2004 Secchi Disk Data



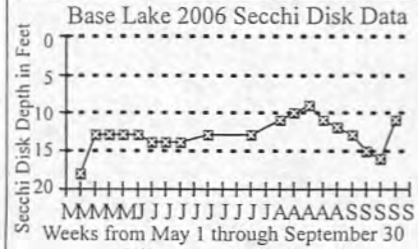
MAY	.	17	17	.	.
JUN	10	14			
JUL	14	.	12	.	.
AUG	.	11	.	.	12
SEP	.	15	.	.	.

TABLE OF LAKE DATA (cont)

Lake Name	Base Lake
Lake Water Quality Indices	
Spring 1994	85 85 87
Summer 1994	81 84 82
Spring 1995	93 93 92
Summer 1995	80 80 77
Spring 1996	88 87 89
Summer 1996	84 83 83
Spring 1997	86 84 85
Summer 1997	82 78 89
Spring 1998	88 87 88
Summer 1998	86 87 88
Spring 1999	81 79 79
Summer 1999	93 94 94
Spring 2000	86 85 87
Summer 2000	88 89 90
Spring 2001	92 93 92
Summer 2001	86 87 87
Spring 2002	90 90 91
Summer 2002	85 86 87
Spring 2003	86 85 84
Summer 2003	87 86 87
Spring 2004	82 82 80
Summer 2004	86 85 88
Spring 2005	90 90 91
Summer 2005	88 89 89
Spring 2006	87 86 87
Summer 2006	87 86 85
Spring 2007	87 88 87
Summer 2007	90 90 92
Spring 2008	91 91 90
Summer 2008	87 85 87
Spring 2009	90 90 88
Summer 2009	91 89 87
Spring 2010	90 91 88
Summer 2010	83 84 85
Bottom Sediments, % mineral	88 89 91

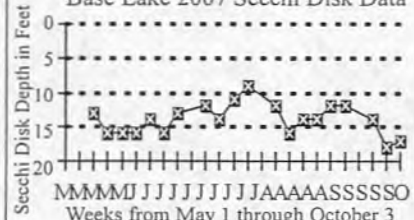
Base Lake
(or Base Line Lake)
Section 6
Webster Township
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

Base Lake 2006 Secchi Disk Data



MAY	.	18	13	13	13
JUN	13	14	14	14	.
JUL	13	.	.	13	.
AUG	11	10	9	11	12
SEP	13	15	16	11	.

Base Lake 2007 Secchi Disk Data

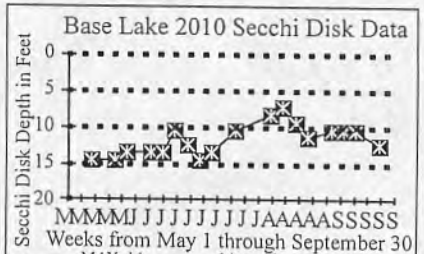


MAY	.	.	13	16	16
JUN	16	14	16	13	.
JUL	12	14	11	9	.
AUG	12	16	14	14	12
SEP	12	.	14	18	
OCT	17	.	.	.	..

FUSILIER'S ATLAS
AND GAZETTEER OF
MICHIGAN INLAND LAKES
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

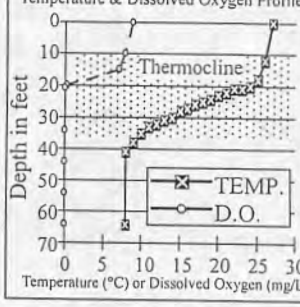
Surface Lake Water Quality Data

Date	Sample Station Number	Temperature °C	Dissolved Oxygen (mg/L)	Dissolved Oxygen Percent Saturation	Chlorophyll a ug/L	Secchi Disk Depth (feet)	Total Nitrate Nitrogen ug/L	Alkalinity mg/L	pH	Conductivity umhos per cm at 25°C	Total Phosphorus ug/L	Lake Water Quality Index	Grade
6/30/05	Davis Cr.	---	---	---	---	---	7700	217	7.9	1000	36	---	---
7/29/05	Davis Cr.	---	---	---	---	---	4532	212	7.8	1090	55	---	---
8/29/05	Davis Cr.	---	---	---	---	---	3060	188	7.9	1100	40	---	---
9/27/05	Davis Cr.	---	---	---	---	---	4800	217	7.8	1100	29	---	---
10/24/05	Davis Cr.	---	---	---	---	---	4007	245	7.8	1100	25	---	---
11/30/05	Davis Cr.	---	---	---	---	---	5527	225	7.9	1100	23	---	---
12/27/05	Davis Cr.	---	---	---	---	---	5061	235	7.8	1000	20	---	---
1/27/06	Davis Cr.	---	---	---	---	---	2368	180	7.7	740	32	---	---
2/28/06	Davis Cr.	---	---	---	---	---	1632	175	7.8	1080	35	---	---
3/30/06	Davis Cr.	---	---	---	---	---	1376	179	7.8	720	36	---	---
4/19/06	Davis Cr.	---	---	---	---	---	549	196	7.9	680	21	---	---
6/30/05	Davis Cr.	---	---	---	---	---	7700	217	7.9	1000	36	---	---
7/29/05	Davis Cr.	---	---	---	---	---	4532	212	7.8	1090	55	---	---
8/29/05	Davis Cr.	---	---	---	---	---	3060	188	7.9	1100	40	---	---
9/27/05	Davis Cr.	---	---	---	---	---	4800	217	7.8	1100	29	---	---
10/24/05	Davis Cr.	---	---	---	---	---	4007	245	7.8	1100	25	---	---
11/30/05	Davis Cr.	---	---	---	---	---	5527	225	7.9	1100	23	---	---
12/27/05	Davis Cr.	---	---	---	---	---	5061	235	7.8	1000	20	---	---
1/27/06	Davis Cr.	---	---	---	---	---	2368	180	7.7	740	32	---	---
2/28/06	Davis Cr.	---	---	---	---	---	1632	175	7.8	1080	35	---	---
3/30/06	Davis Cr.	---	---	---	---	---	1376	179	7.8	720	36	---	---
4/19/06	Davis Cr.	---	---	---	---	---	549	196	7.9	680	21	---	---
5/28/09	Davis Cr.	---	---	---	---	---	370	241	7.9	750	45	---	---
6/29/09	Davis Cr.	---	---	---	---	---	47	193	7.8	560	49	---	---
7/31/09	Davis Cr.	---	---	---	---	---	1845	235	7.9	900	45	---	---
8/28/09	Davis Cr.	---	---	---	---	---	2600	227	7.9	900	24	---	---
9/23/09	Davis Cr.	---	---	---	---	---	450	250	7.8	940	26	---	---
10/21/09	Davis Cr.	---	---	---	---	---	1375	256	7.8	900	23	---	---
11/23/09	Davis Cr.	---	---	---	---	---	350	254	7.9	880	24	---	---
12/26/09	Davis Cr.	---	---	---	---	---	263	219	7.7	740	111	---	---
1/23/10	Davis Cr.	---	---	---	---	---	250	258	7.8	880	39	---	---
3/9/10	Davis Cr.	---	---	---	---	---	1122	263	8.0	890	41	---	---
3/31/10	Davis Cr.	---	---	---	---	---	548	215	8.0	720	26	---	---
4/20/10	Davis Cr.	---	---	---	---	---	1438	250	8.2	830	24	---	---



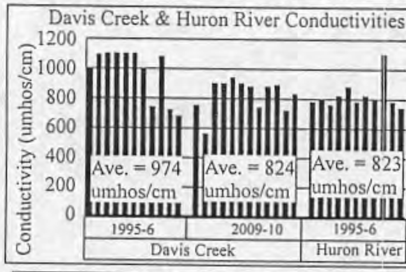
MAY	14	.	14	13	.
JUN	13	13	10	12	14
JUL	13	.	10	.	.
AUG	8	7	9	11	.
SEP	10	10	10	.	12

Base Lake, August 2, 2010
Temperature & Dissolved Oxygen Profiles



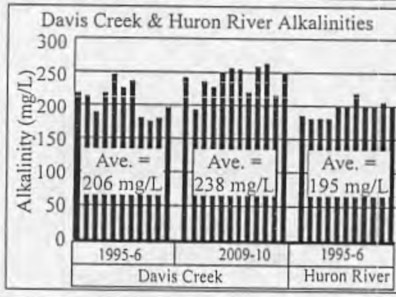
Temp.	Depth	D.O.	Depth
27	0	8.9	0
26	12	7.9	10
25	18	7.1	15
24	20	0.3	20
23	21	0.0	21
21	22	0.0	34
20	23	0.0	44
19	24	0.0	54
18	25	0.0	64
17	26		
16	27		
15	28		
14	30		
13	31		
12	32		
11	33		
10	35		
9	38		
8	41		
8	64		

Davis Creek & Huron River Conductivities



Davis Cr.				Huron R.	
		5/28/09	750		
6/30/05	1000	6/29/09	560	6/30/05	780
7/29/05	1090	7/31/09	900	7/29/05	790
8/29/05	1100	8/28/09	900	8/29/05	760
9/27/05	1100	9/23/09	940	9/27/05	820
10/24/05	1100	10/21/09	900	10/24/05	880
11/30/05	1100	11/23/09	880	11/30/05	780
12/27/05	1000	12/26/09	740	12/27/05	820
1/27/06.	740	1/23/10	880	1/27/06.	800
2/28/06.	1080	3/9/10	890	2/28/06.	1100
3/30/06.	720	3/31/10	720	3/30/06.	780
4/19/06.	680	4/20/10	830	4/19/06.	740

Davis Creek & Huron River Alkalinities



Davis Cr.				Huron R.	
6/30/05	217	5/28/09	241		
7/29/05	212	6/29/09	193	6/30/05	184
8/29/05	188	7/31/09	235	7/29/05	180
9/27/05	217	8/28/09	227	8/29/05	180
10/24/05	245	9/23/09	250	9/27/05	180
11/30/05	225	10/21/09	256	10/24/05	200
12/27/05	235	11/23/09	254	11/30/05	200
1/27/06.	180	12/26/09	219	12/27/05	218
2/28/06.	175	1/23/10	258	1/27/06.	200
3/30/06.	179	3/9/10	263	2/28/06.	200
4/19/06.	196	3/31/10	215	3/30/06.	205
		4/20/10	250	4/19/06.	198

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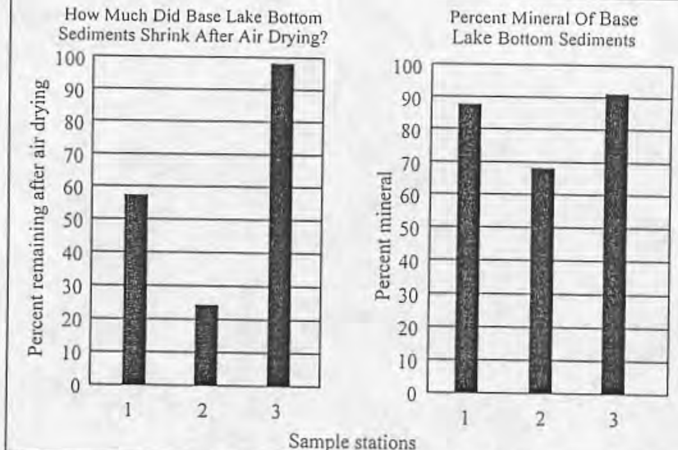


Characteristics of Base Lake Bottom Sediments (2005)

Sample I.D.	Percent Shrinkage	Percent Mineral	Dried at 100°C Color & Description	Color after burning at 550°C	Depth of water (feet)
1	42	88	Gray	Gray	25
2	77	69	Gray	Red	60
3	2	91	Gray	Gray	17

Average mineral content of bottom sediments = 83%.

Surface Lake Water Quality Data

Date	Sample Station Number	Temperature °C	Dissolved Oxygen (mg/L)	Dissolved Oxygen Percent Saturation	Chlorophyll a ug/L	Secchi Disk Depth (feet)	Total Nitrate Nitrogen ug/L	Alkalinity mg/L	pH	Conductivity umhos per cm at 25°C	Total Phosphorus ug/L	Lake Water Quality Index	Grade
6/7/94	1	---	---	---	4.4	8	76	---	8.1	680	25	85	B
6/7/94	2	---	---	---	4.4	8	70	---	8.0	680	27	85	B
6/7/94	3	---	---	---	3.7	8	70	---	8.0	680	20	87	B
8/1/94	1	25	8.8	95	5.7	7	15	171	8.2	640	23	81	B
8/1/94	2	25	8.6	98	4.4	7	13	175	8.3	640	25	84	B
8/1/94	3	25	9.2	91	5.1	7	28	176	8.3	640	33	82	B
6/19/95	1	---	---	---	0.6	11	56	148	7.6	560	12	93	A
6/19/95	2	---	---	---	0.9	10	65	151	7.7	580	10	93	A
6/19/95	3	---	---	---	0.4	8	69	150	7.6	560	11	92	A
7/31/95	1	---	---	---	---	7	11	170	7.6	580	13	---	---
7/31/95	2	---	---	---	---	7	20	170	7.6	590	15	---	---
7/31/95	3	---	---	---	---	7	14	170	7.8	580	14	---	---
8/14/95	2	31	7.8	104	4.9	9	21	175	8.6	570	11	80	B
8/14/95	3	31	8.2	109	9.0	9	17	175	8.5	570	21	77	C
6/9/96	1	21	8.6	96	4.2	12	69	205	8.3	635	13	88	B
6/9/96	2	21	8.6	96	3.5	12	64	203	8.3	640	28	87	B
6/9/96	3	21	8.5	94	3.5	12	75	206	8.2	645	19	89	B
8/7/96	1	27	8.6	108	3.6	9	23	194	8.3	630	31	84	B
8/7/96	2	27	8.6	108	3.7	9	13	193	8.3	650	16	83	B
8/7/96	3	27	8.5	106	5.6	9	15	193	8.3	650	18	83	B
5/12/97	1	13	10.4	98	4.1	7	236	197	8.3	620	7	86	B
5/12/97	2	12	10.3	95	5.5	8	231	197	8.3	620	13	84	B
5/12/97	3	13	10.3	97	4.1	7	226	200	8.3	630	12	85	B
8/25/97	1	21	8.7	97	2.2	11	39	185	8.4	660	21	82	B
8/25/97	2	23	8.5	98	2.5	11	36	185	8.4	660	24	78	C
8/25/97	3	22	9.1	103	1.6	12	43	183	8.3	600	23	89	B
4/19/98	1	13	10.3	97	3.2	10	127	196	8.4	630	10	88	B
4/19/98	2	13	10.2	96	4.1	9	132	200	8.2	630	8	87	B
4/19/98	3	13	10.2	96	3.1	9	127	202	8.2	630	10	88	B
8/10/98	1	26	8.6	105	2.5	9	10	172	8.6	640	16	86	B
8/10/98	2	26	8.4	102	2.3	9	9	177	8.6	660	14	87	B
8/10/98	3	26	8.8	107	1.1	9	9	174	8.6	660	16	88	B
4/25/99	1	14	10.7	103	4.9	7	368	185	8.3	690	19	81	B
4/25/99	2	13	10.8	102	5.9	7	405	185	8.4	690	23	79	C
4/25/99	3	12	10.8	100	6.5	6	347	187	8.3	690	26	79	C
8/27/99	1	25	8.8	105	1.1	18	32	168	8.2	690	22	93	A
8/27/99	2	24	8.5	100	1.1	18	14	165	8.2	695	17	94	A
8/27/99	3	24	8.8	105	1.1	18	23	167	8.0	720	16	94	A
4/15/00	1	10	11.0	97	2.3	14	469	203	8.3	610	36	86	B
4/15/00	2	10	11.0	99	2.6	12	479	195	8.4	610	35	85	B
4/15/00	3	11	10.7	96	1.5	13	386	198	8.3	610	42	87	B
8/4/00	1	25	7.4	88	6.4	14	111	187	8.3	620	15	88	B
8/4/00	2	24	7.1	84	3.2	12	118	188	8.2	630	15	89	B
8/4/00	3	24	7.1	84	2.0	11	124	184	8.2	640	16	90	A
5/13/01	1	19	9.5	101	1.4	21	153	202	8.3	700	34	92	A
5/13/01	2	19	9.1	97	1.7	21	139	203	8.4	700	28	93	A
5/13/01	3	19	9.3	99	0.9	21	147	204	8.3	700	40	92	A
8/1/01	1	28	8.4	106	4.0	11	8	192	8.2	720	16	86	B
8/1/01	2	28	7.9	100	3.5	12	21	189	8.0	720	22	87	B
8/1/01	3	28	9.0	114	3.2	12	32	185	8.0	710	19	87	B
4/15/02	1	8	10.8	91	2.1	12	280	205	8.3	680	8	90	A
4/15/02	2	8	10.9	92	2.3	12	270	205	8.3	680	11	90	A
4/15/02	3	13	11.9	112	1.8	11	263	206	8.3	690	9	91	A
8/2/02	1	29	8.4	108	2.8	8	30	174	7.7	700	16	85	B
8/2/02	2	29	8.1	104	2.5	8	32	168	7.6	700	17	86	B
8/2/02	3	29	9.1	117	1.8	9	92	165	7.6	700	17	87	B
4/28/03	1	14	11.2	108	3.7	9	343	190	8.4	740	17	86	B
4/28/03	2	14	11.3	109	3.7	9	355	189	8.3	765	16	85	B
4/28/03	3	14	10.8	104	4.0	9	343	187	8.3	780	18	84	B
8/1/03	1	26	8.8	107	2.7	8	168	169	8.6	750	14	87	B
8/1/03	2	26	8.0	98	3.0	7	173	170	8.6	760	12	86	B
8/1/03	3	27	9.0	112	3.0	11	168	170	8.6	755	10	87	B
4/16/04	1	10	10.5	93	4.2	10	419	194	8.3	740	12	82	B
4/16/04	2	10	10.7	95	3.5	10	429	192	8.2	740	13	82	B
4/16/04	3	10	10.9	97	3.8	10	404	196	8.2	760	17	80	B
8/2/04	1	25	7.8	93	4.0	9	236	190	8.2	710	22	86	B
8/2/04	2	25	7.6	91	4.9	10	262	190	8.2	710	22	85	B
8/2/04	3	24	8.0	94	2.6	10	218	190	8.2	720	25	88	B

Surface Lake Water Quality Data

Date	Sample Station Number	Temperature °C	Dissolved Oxygen (mg/L)	Dissolved Oxygen Percent Saturation	Chlorophyll a ug/L	Secchi Disk Depth (feet)	Total Nitrate Nitrogen ug/L	Alkalinity mg/L	pH	Conductivity umhos per cm at 25°C	Total Phosphorus ug/L	Lake Water Quality Index	Grade
4/18/05	1	15	9.3	91	2.0	11	238	200	8.2	720	12	90	A
4/18/05	2	15	9.4	92	2.3	11	224	202	8.2	720	10	90	A
4/18/05	3	15	9.5	93	1.7	13	231	202	8.2	740	11	91	A
8/3/05	1	28	8.5	92	2.3	14	137	168	8.2	760	17	88	B
8/3/05	2	28	8.5	92	2.3	16	133	170	8.2	760	16	89	B
8/3/05	3	28	8.5	92	2.0	17	146	170	8.2	760	20	89	B
4/19/06	1	13	10.0	94	3.3	11	324	185	8.1	730	21	87	B
4/19/06	2	13	10.0	94	3.6	11	333	185	8.1	730	20	86	B
4/19/06	3	13	9.9	93	2.7	11	293	185	8.1	730	19	88	B
8/1/06	1	28	8.0	101	2.9	11	116	184	8.4	740	18	87	B
8/1/06	2	29	8.5	109	3.5	11	126	186	8.5	740	16	86	B
8/1/06	3	29	8.2	105	3.0	10	147	184	8.4	740	24	85	B
4/21/07	1	11	11.1	100	3.0	11	373	188	8.2	710	18	87	B
4/21/07	2	11	11.0	99	2.7	13	376	189	8.2	710	17	88	B
4/21/07	3	12	10.7	99	3.0	13	383	190	8.2	720	18	87	B
8/1/07	1	26	8.3	101	2.2	11	57	175	8.4	740	15	90	A
8/1/07	2	25	8.8	105	1.9	11	70	175	8.3	740	14	90	A
8/1/07	3	25	8.1	109	1.1	14	88	177	8.2	750	17	92	A
4/18/08	1	13	11.2	106	3.2	11	190	183	7.9	660	19	91	A
4/18/08	2	13	11.2	106	3.2	11	203	183	7.9	660	17	91	A
4/18/08	3	13	11.2	106	2.4	11	230	185	7.9	670	16	90	A
8/1/08	1	27	8.5	106	4.5	14	23	198	8.3	720	19	87	B
8/1/08	2	27	9.3	116	4.5	13	23	195	8.3	720	22	85	B
8/1/08	3	27	9.7	121	2.7	14	17	193	8.3	720	16	87	B
4/18/09	1	12	11.0	102	1.6	14	253	194	8.1	680	14	90	A
4/18/09	2	11	11.4	103	2.6	12	226	192	8.1	680	15	90	A
4/18/09	3	11	11.4	103	2.3	12	439	194	8.1	680	15	88	B
8/3/09	1	23	7.4	85	2.8	13	28	188	8.1	700	15	91	A
8/3/09	2	23	8.7	100	3.5	14	30	192	8.1	710	17	89	B
8/3/09	3	23	8.0	92	5.2	14	28	192	8.2	720	18	87	B
4/20/10	1	15	11.5	113	1.3	12	300	205	8.3	730	16	90	A
4/20/10	2	13	11.6	109	0.3	14	275	205	8.3	730	18	91	A
4/20/10	3	13	11.7	110	0.3	14	456	210	8.2	750	21	88	B
8/2/10	1	26	8.7	106	3.9	5	198	187	8.4	690	23	83	B
8/2/10	2	27	8.9	111	3.2	7	234	187	8.4	690	27	84	B
8/2/10	3	27	9.0	112	2.1	7	210	180	8.4	680		85	B
6/30/05	Huron R.	---	---	---	---	---	581	184	8.1	780	37	---	---
7/29/05	Huron R.	---	---	---	---	---	256	180	7.9	790	30	---	---
8/29/05	Huron R.	---	---	---	---	---	160	180	8.2	760	12	---	---
9/27/05	Huron R.	---	---	---	---	---	344	180	8.0	820	31	---	---
10/24/05	Huron R.	---	---	---	---	---	55	200	8.1	880	11	---	---
11/30/05	Huron R.	---	---	---	---	---	352	200	8.1	780	18	---	---
12/27/05	Huron R.	---	---	---	---	---	470	218	8.1	820	19	---	---
1/27/06	Huron R.	---	---	---	---	---	611	200	8.0	800	38	---	---
2/28/06	Huron R.	---	---	---	---	---	726	200	8.0	1100	20	---	---
3/30/06	Huron R.	---	---	---	---	---	458	205	8.1	780	21	---	---
4/19/06	Huron R.	---	---	---	---	---	288	198	8.1	740	14	---	---

FUSILIER'S ATLAS
AND GAZETTEER OF
MICHIGAN INLAND LAKES
Water Quality Investigators
9200 Dexter Chelsea Road
Dexter, Michigan 48130
(734) 426-8972

Base Lake
(or Base Line Lake)
Section 6
Webster Township
T1S R5E
Washtenaw County
and Section 31
Hamburg Township
T1N R5E
Livingston County

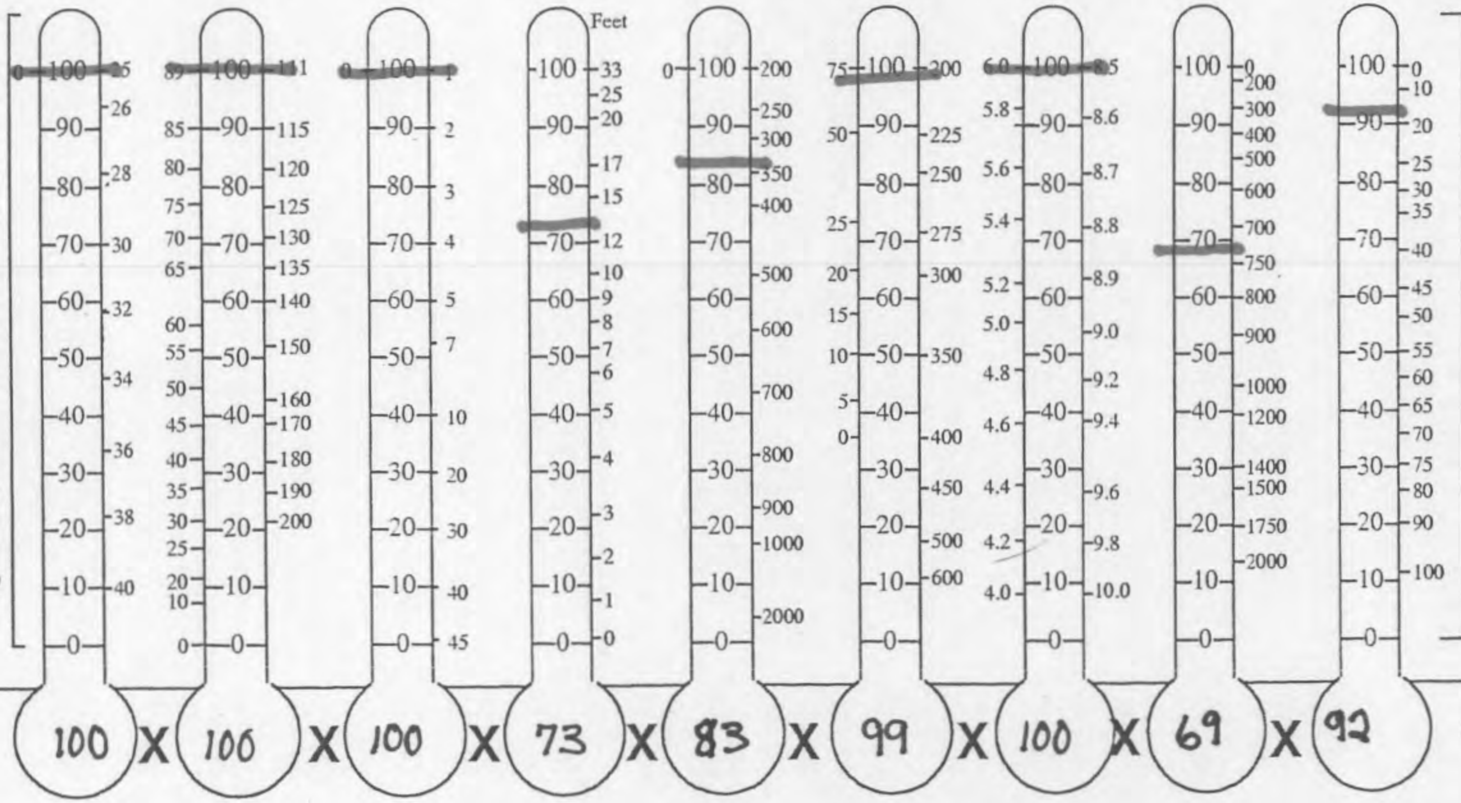
CALCULATION SHEET FOR THE UNWEIGHTED MULTIPLICATIVE LAKE WATER QUALITY INDEX

W. Fusilier, Ph.D.

QUALITY RATING CURVES

(Individual Quality Ratings never exceed 100)

Parameter	Value	Quality Rating
Temperature in degrees C	14°	100
Dissolved Oxygen, % Saturation	116/10.4 111	106
Chlorophyll a ug/L	0.6	100
Secchi Disk Depth in feet	13'	73
Nitrate-N ug/L	343	83
Alkalinity mg/L	206	99
pH S. U.	8.3	100
Specific Conductivity umhos/cm@ 25C	736	69
Total Phosphorus ug/L	18	92



$\sqrt[9]{100 \times 106 \times 100 \times 73 \times 83 \times 99 \times 100 \times 69 \times 92} = 98$

LWQI: 98

980 Watershed to lake ratio

0.038 years Flushing rate

Huron Drainage Basin

259840 Drainage Area

7975 Lake Volume

Washtenaw · Livingston County

Dexter-Hamburg Township

WQI Analyst

64' Lake Depth

265 Lake Area

SET THE PARAMETER QUALITY RATING AT 1 IF THE EXTERNAL EXTREME VALUE RANGE IS EXCEEDED

LAKE WATER QUALITY INDEX

0–15	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85–100
Red	Red Orange	Orange	Orange Yellow	Yellow	Yellow green	Green	Blue Green	Blue

DATE 20 April 2010

STATION AVE 1-3

LAKE Base

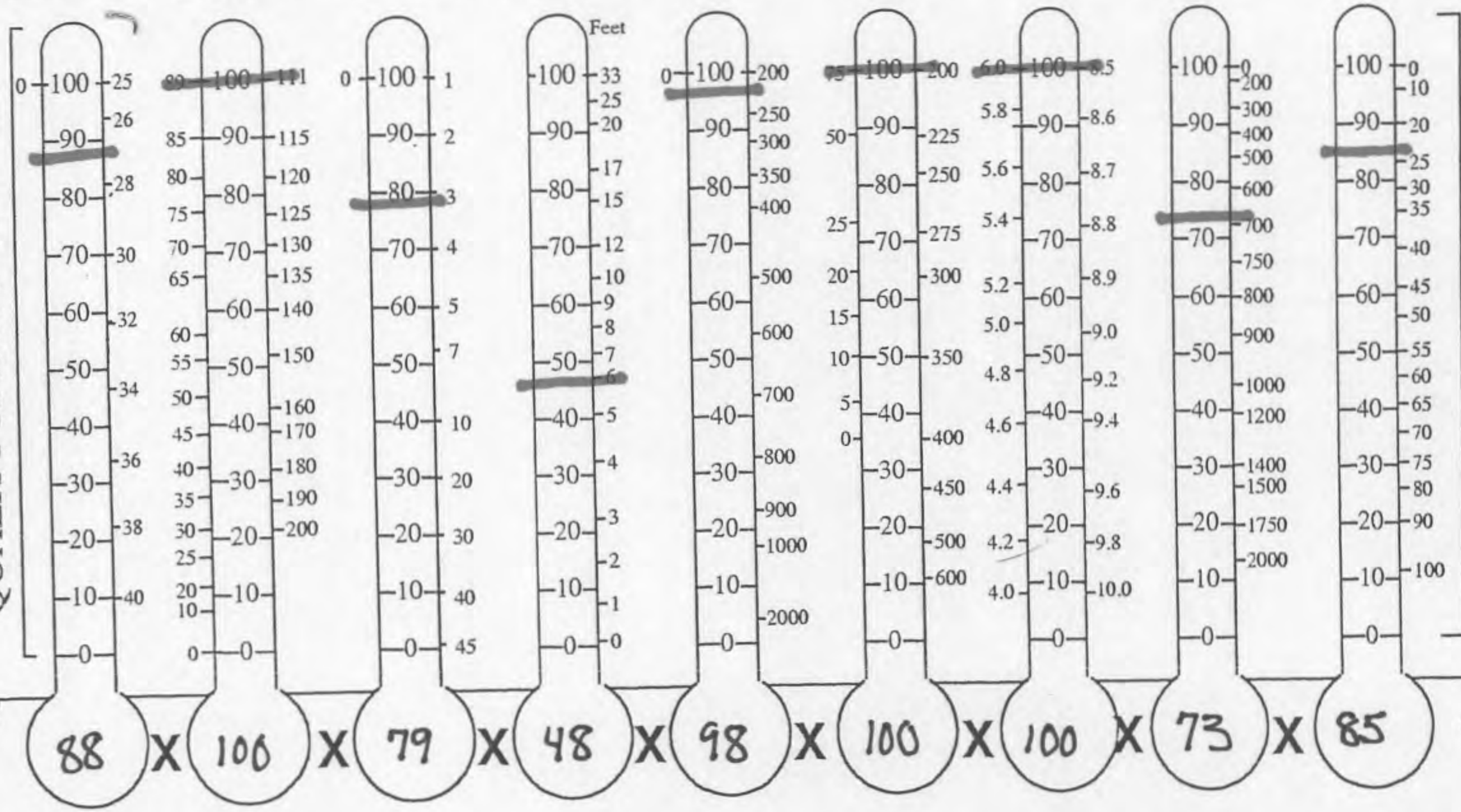
CALCULATION SHEET FOR THE UNWEIGHTED MULTIPLICATIVE LAKE WATER QUALITY INDEX

W. Fusilier, Ph.D.

QUALITY RATING CURVES

(Individual Quality Ratings never exceed 100)

Temperature in degrees C	Dissolved Oxygen, % Saturation	Chlorophyll a ug/L	Secchi Disk Depth in feet	Nitrate-N ug/L	Alkalinity mg/L	pH S. U.	Specific Conductivity umhos/cm@ 25C	Total Phosphorus ug/L
27°	8.8/8.0 110	3.1	6'	214	185	8.4	687	24



$\sqrt[9]{88 \times 106 \times 79 \times 48 \times 98 \times 100 \times 100 \times 73 \times 85} = 84$

LWQI: 84

980
Watershed to lake ratio

0.038 years
Flushing rate

Huron
Drainage Basin

259840
Drainage Area

7975
Lake Volume

Washtenaw-Livingston
County

Dexter-Hamburg
Township

WQI
Analyst

64'
Lake Depth

265
Lake Area

SET THE PARAMETER QUALITY RATING AT 1 IF THE EXTERNAL EXTREME VALUE RANGE IS EXCEEDED

LAKE WATER QUALITY INDEX

0–15	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85–100
Red	Red Orange	Orange	Orange Yellow	Yellow	Yellow green	Green	Blue Green	Blue

DATE 2 August 2010

STATION AVE1-3

LAKE Base