RANDOM LAKE

Aquatic Plant Survey

Whole Lake Demonstration Project/AIS Grant - 2006 Report

INTRODUCTION

In 2003, the Village of Random Lake received an Aquatic Invasive Species Grant from the Wisconsin Department of Natural Resources (WDNR) to conduct a demonstration whole-lake chemical treatment on Random Lake. The Grant application included the project plan upon which the WDNR treatment permit will be based. That plan, and the subsequent grant, requires extensive monitoring to be conducted: the year prior to treatment, the year of treatment, and three years post treatment. The aquatic plant community and the water quality (Self-Help Volunteer Monitoring Program) are to be monitored.

A local volunteer collected the water quality samples throughout the summer of 2006. The results are included in this report.

In July of 2006, Aron & Associates conducted the aquatic plant survey on Random Lake. This survey is part of an ongoing demonstration project to document changes in the aquatic plant community of Random Lake. This information can be compared with past studies and may be used by future investigators to determine if the aquatic plant population is changing. The impact of various management techniques may be evaluated based on their respective impacts on the aquatic plants. This information should be used to guide future lake management decisions on Random Lake.

Random Lake is located in the Village of Random Lake, Sheboygan County, in Southeast Wisconsin. Hydrographic and morphometric data are presented in Table 2. A map of Random Lake showing depth contours is presented in Map 1.

METHODOLOGY

General Survey

A preliminary survey of the lake was made by boat. An attempt was made to locate all plant communities on the lake by region. Nomenclature follows Crow & Hellquist (2000). No plants samples were collected and preserved since all species found had been collected during previous surveys. The maximum rooting depth on Random Lake in 2006 was determined to be 13.5 feet, that is, no plants were found growing in water deeper than 13.5 feet.

Point Intercept Survey

The methodology for the point intercept survey was developed by the WDNR Bureau of Research for the state's Whole Lake Treatment Protocol. A grid and global positioning satellite (GPS) coordinates for sampling, were developed by WDNR and provided to Aron & Associates for use in the Demonstration Whole Lake Treatment Project surveys on Random Lake.

The initial grid established 146 sample points. Of those, 13 were on land and were eliminated from the list, resulting in 133 sample points.
Samples points were located using a 2004 Garmin GPS LMS330 with an LGC-2000 Receiver. Four rake tows were conducted at each sample point. Each plant species retrieved was recorded and given a density rating in accordance with the WDNR criteria, between 1 and 5. The dominant species at each sample point was also identified.
The data collected were then used to the mean density and percent of frequency for each species. Lake depth at each sample point was determined by using the Garmin after calibration in the field.

The abundance of each species was determined using four estimates:

1) The frequency is the rating of how often a species occurs in the sample points.
2) The average density rating, or the average density of a species in the sample point where it occurred.
3) The relative density rating, or the average density of a species averaged over all sample points whether or not any species were present.
4) The relative density rating averaged over all sample points in which any species occurred.

EARLIER STUDIES

In October 1999, a whole-lake chemical treatment was conducted on Random Lake using Sonar™ (SePRO Corporation). Eurasian watermilfoil (*Myriophyllum spicatum*) was the primary target species. The goal of the project was to eliminate Eurasian watermilfoil, enhancing conditions for native species. A condition of the WDNR permit for the project required that aquatic plants in the lake be monitored. Pre-treatment monitoring was conducted in 1999 and continued through 2002. The results of that monitoring are provided in Table 1. The monitoring in 1999 through 2002 was conducted using the line-intercept method for the establishment of sample points.

As Eurasian watermilfoil re-infested Random Lake, the Village has used harvesting and 2-4,D chemical spot treatments to slow the return of Eurasian watermilfoil. Curly-leaf pondweed (*Potamogeton crispus*) increased significantly between 1999 and 2002. Long-

term historical data on the aquatic plant community is not available. It is, therefore unclear if this is a new increase or the continuation of a longer trend.
A re-treatment of Random Lake was conducted in 2005 using fluridone. This survey is the second post-treatment survey following treatment.
The 2005 treatment was done in spring 2005 while the 1999 treatment was conducted in fall. It is not yet known if this will influence the results of the treatment.

RESULTS OF THE PRESENT STUDY

A total of 14 aquatic macrophytes were found during the survey in 2006, up from the 8 found in 2005, but down from 16 species in 2004. Ten of the plants were found during the grid survey and four were found during the general survey. Wetland fringe species are not included in the list of species. It should be noted that large stands of bulrush are present in Random Lake. The bulrushes were abundant and healthy.

The plants found in the lake in 2006 are listed in Table 2. Chara (*Chara* sp.) and sago pondweed (*Stuckenia pectinata*) dominated the plant community, throughout the depths. Water lilies (*Nuphar* and *Nymphaea* sp.) were common in the shallow areas, Two species were found that had not been previously identified in Random Lake, small duckweed (*Lemna minor*) and Nitella (*Nitella* sp.). Curly-leaf pondweed (*P. crispus*), an exotic species, was found in nine sample points. Eurasian watermilfoil (*Myriophyllum spicatum*) was not found in 2006. A native milfoil, whorled watermilfoil (*Myriophyllum verticillatum*) was found in one area, on the Northeast side of the lake near the bulrushes.

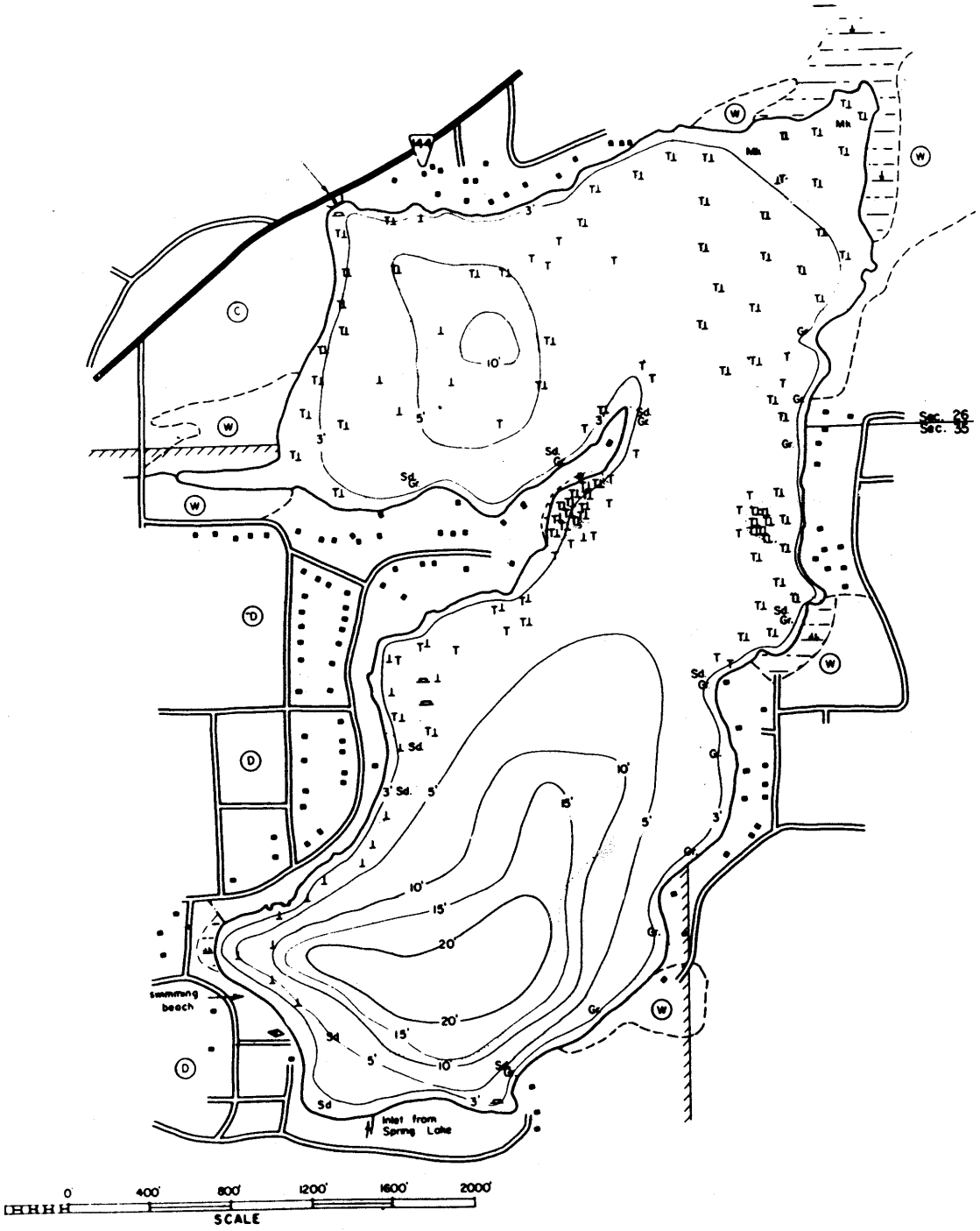
The results of the survey data for the July 2006 survey for all species at each sample depth are included at the end of this report.

The maximum rooting depth in 2005 was 13.5 feet. Sediments in Random Lake range from sand and gravel to muck. At 1.5 feet the substrate is primarily sand and gravel. At 15 feet the substrate is muck.

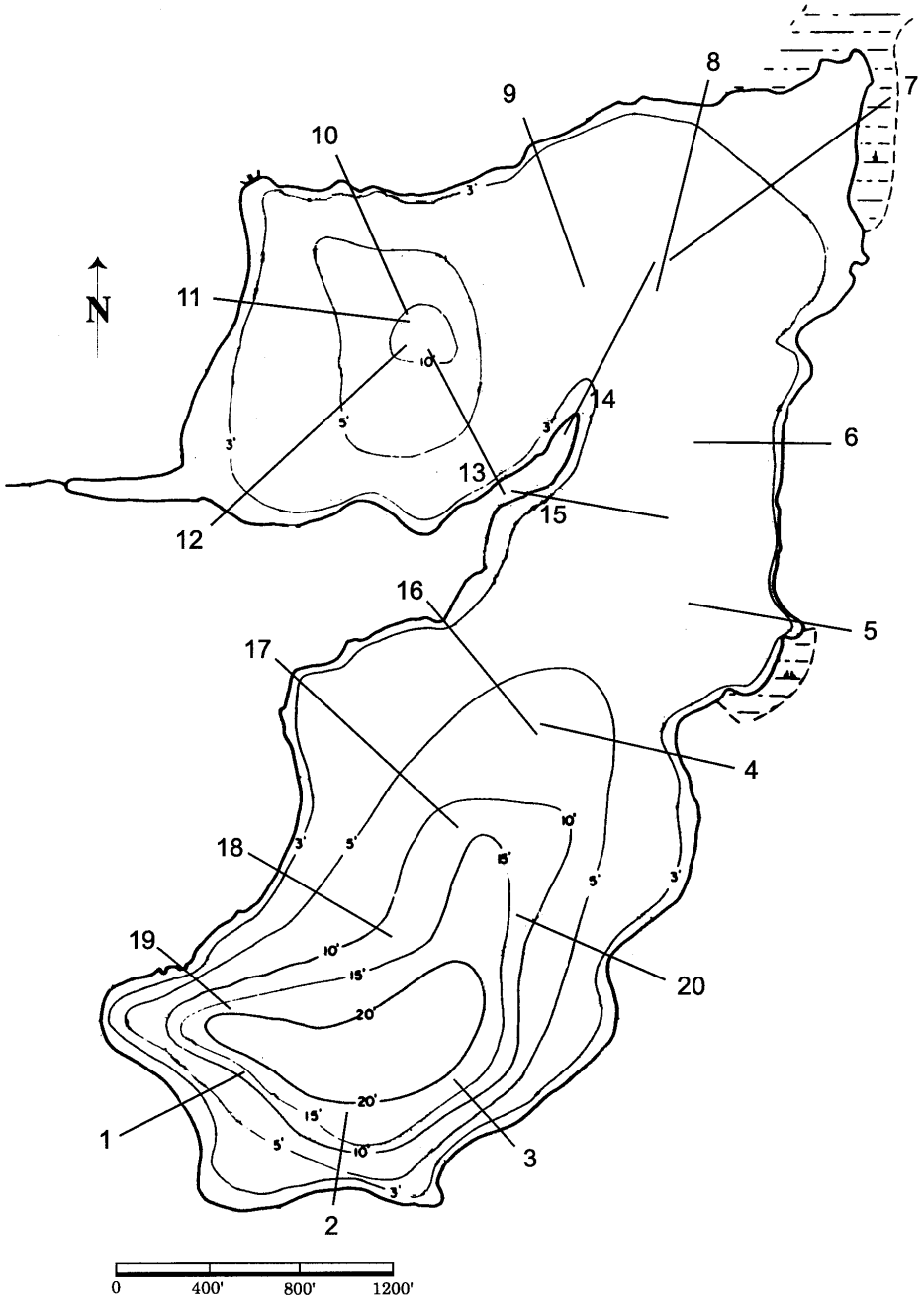
Table 1. Hydrographic and Morphometric Data Random Lake

Size of Lake	209 acres
Lake Volume	1279 acre feet
Length of Shoreline	3.6 miles
Maximum Depth	21 feet
Mean Depth	6 feet
Percent of area less than 3 feet deep	14%
Percent of area greater than 20 feet deep	4%

Source: WDNR

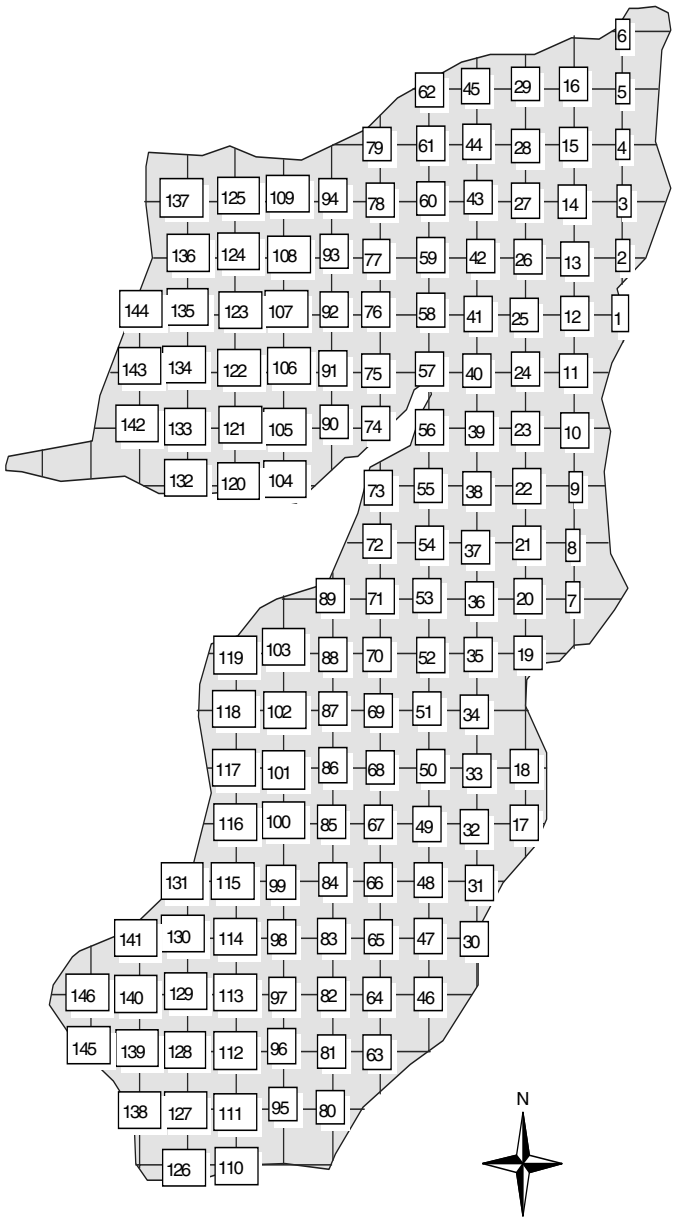


Map 1 - Bathymetric Map, Random Lake, Wisconsin.



Aron&Associates, 1999

Map 2 - Line Transect Survey Locations, Random Lake, Wisconsin, 1999.



Map 3 - Point Intercept Survey Sample Points on Random Lake, 2005.

Table 2. Random Lake Aquatic Plant Species - 1999 to 2006

	% Frequency						
Species	**1999**	**2000**	**2001**	**2002**	**2004**	**2005**	**2006**
Chara sp.	34	57	43	49	50	64	50
Elodea canadensis				3	1		
Lemna minor						1[a]	X
Myriophyllum spicatum	60	1[a]	9	69	8		
Myriophyllum verticillatum							X
Najas flexilis	1		X	2	10		2
Najas marina	10			X	13		6
Nitella sp.						10	
Nuphar advena	5	5	6	7	4	3	1
Nymphaea sp.	5	5	0	4	2	10	5
Potamogeton crispus	1	4	19	25	1		7
P. amplifolius			1	3	6		X
P. Illinoensis	14	18	17	34	8		X
P. foliosus				X	1		
P. natans	1	5	5	7	6	5	2
P. zosterformis	X		10	7	X		
Stuckenia pectinata	33	57	48	56	37	12	40
Utricularia vulgaris	1		2	3	9		1
Vallisneria americana				X	X		

Notes: [a] Found in only one sample point.
X Found only in the general survey.

WATER QUALITY 2006

The water quality on Random Lake was monitored under the Self-Help Volunteer Monitoring Program. The volunteer, Wayne Stroessner, collected the samples following the Self-Help protocol. Complete results are available on the WDNR website, http://dnr.wi.gov/org/water/fhp/lakes/lakesdatabase.asp.

Table 3 is a summary of the results for 2006. Table 4 is a comparison of the summary results for both 2004, 2005, and 2006. 2006 data are included in the Appendix.

Table 3. Random Lake Water Quality Data Summary for 2006*

Sampling Date	Secchi (ft)	Total Phosphorus (mg/l)	DO at surface (mg/l)	Temp at surface (^{o}F)	Chlorophyll A (ug/l)
5/29/06	4.25	8	5.55	70.8	
6/13/06	3.51	21	7.57	69.9	10.7
6/21/06	3.5		6.51	73.7	
6/30/06	3.75		7.98	76.2	
7/07/06	3.5		7.92	78.1	
7/15/06	4.75		7.03	79.2	
7/23/06	3.5	23	6.8	77	8.13
7/31/06	3.51		6.44	81.1	
8/16/06	3.75	25	7.11	75.9	7.41
8/24/06	3.75		7.1	74.6	
9/01/06	4		6.76	71.9	
9/14/06	4.25		6.52	63.7	
9/17/06	4		7.48	67.3	
9/25/06	4.25		7.31	60.9	
10/06/06	4.25	25	7.68	59.8	7.18
10/20/06	5.51		8.21	46	

*Complete data are provided in the Appendix or are available at www.dnr.state.wi.us.

Table 4. Comparison of 2004, 2005, and 2006 Water Quality Data on Random Lake

Sampling Date	Average Secchi (ft)	Average Total Phosphorus (mg/l)	Average Chlorophyll A (ug/l)
2004	5.2	26.8	5.2
2005	4.9	21.6	7.3
2006	4.0	20.4	8.4

SUMMARY

The Village of Random Lake has conducted significant aquatic plant management activities over the years to keep Random Lake open to recreational use. As Eurasian watermilfoil expanded its range, the management efforts have not always been able to keep pace with the growth of the exotic plant. A demonstration chemical treatment was conducted using Sonar in October 1999. Since 2002, the Village has used a combination of harvesting and chemical treatment (using 2,4-D products) to control Eurasian watermilfoil. A second Sonar treatment was conducted in spring 2005.

A comparison of 2006 plant data with the 1999 through 2005 project shows a number of differences:

— The 2004, 2005, and 2006 surveys were done using point-intercept while earlier surveys were done using the line-transect method.

— Significant differences in frequency over the years are present. The reasons for the disparity are unclear. It could be simply the difference in sampling protocols used, or other factors could come into play. Actual reasons are most likely a combination of factors.

— There is significant difference in the lake's response following the 2005 Sonar treatment to that following the 1999 Sonar treatment. The fall 1999 treatment, conducted at a higher rate, produced little impact on the native species. The Eurasian watermilfoil treatment in 1999 was not 100%. The spring 2005 treatment was done at a much lower rate, yet the impact on natives, at least the season of treatment, was significant. Whether that will result in long term impacts is unknown. The timing of the treatment may have been a factor in this difference. The native plants may already have started their seasonal growth when the May 5, 2005 treatment was conducted.

—More native plant species were found in 2006 than were found in 2005

—Clarity and Chlorophyll A concentrations increased from 2004 to 2006 while total phosphorus concentrations decreased (Table 4).

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RANDOM LAKE AQUATIC PLANT SURVEY - 2006

Plants

Transect #	Depth	CHARA	NITELA	MYRSP	STUPE	POTFO	NAJFL	NAJMA	NUPHAR	NYMPH	POTIL	POTAM	POTGR	POTNA	UTRIVU	POTCR	LEMNA	ELOCA
5	1.5				2					4								
73	1.5	4			3			2		2						2		
144	1.5				4					V								
19	2	4																
18	2.5																	
7	2.75	4			1			1		V								
10	2.75	5			V													
11	2.75	4			3													
4	3	1			2					4								
8	3	5			3								1			1		
9	3	5			2					V								
45	3	1			3													
137	3				4					1								
138	3.25	V			V							V				V		
143	3.25				V					V				V				
3	3.5	2			4													
13	3.5	4			3													
62	3.5	4			3					V				2		2		
142	3.5				4				2					2				
119	3.75	2			V					V								
12	4	4			3													
15	4				4					3								
16	4	2			3								1		1	1		
29	4	V			1				V	1								
31	4	1																
72	4	4																
79	4	V			V								V					
89	4	4			2													
94	4												2					
133	4	2			2					1								
14	4.5	1			4								1					
131	4.5	3								V								
134	4.5				2													
22	4.75	4														1		
24	4.75	4																
20	5	3																
21	5	5																
23	5	4																
25	5	5																
27	5				3													
28	5				V													
35	5	4																
39	5	5			3													
44	5	1																
54	5	5																

Transect #	Depth	CHARA	NITELA	MYRSP	STUPE	POTFO	NAJFL	NAJMA	NUPHAR	NYMPH	POTIL	POTAM	POTGR	POTNA	UTRIVU	POTCR	LEMNA	ELOCA
55	5	3																
61	5	4			4													
70	5	4						2										
77	5	4			1											1		
103	5	5																
118	5				1													
135	5	5			2			1										
136	5				4					V								
38	5.25	5																
40	5.25	4			2													
71	5.25	5														1		
75	5.25	5			2													
121	5.25				1			2										
26	5.5	1																
41	5.5	5																
76	5.5	3																
78	5.5	4			1								3					
80	5.5	2																
90	5.5																	
105	5.5	1						2										
117	5.75	1			1			3										
34	6	5					2											
36	6	5																
37	6	5																
43	6				3					1								
58	6	4			3													
59	6	4			4													
60	6	5																
116	6	5																
125	6	4			3													
126	6				1					1						1		
88	6.25	4																
32	6.5	1																
33	6.5	5			2		1											
48	6.5																	
109	6.5	1			2													
141	6.5				3													
42	7																	
46	7																	
53	7	5			2													
93	7	2			3			1										
122	7.5	5			3			2										
52	8	2														1		
123	8	1			4													
124	8	4			4													
49	8.25																	
63	8.5																	
69	8.75																	
102	8.75	2			3													

Transect #	Depth	CHARA	NITELA	MYRSP	STUPE	POTFO	NAJFL	NAJMA	NUPHAR	NYMPH	POTIL	POTAM	POTGR	POTNA	UTRIVU	POTCR	LEMNA	ELOCA
87	9				3													
115	9																	
127	9	4			4													
146	9				2											1		
51	9.25																	
111	9.25																	
47	9.5																	
139	9.5																	
99	10.25																	
50	10.75																	
86	11																	
101	11				2													
100	11.25				1													
108	11.5				4													
130	12.25																	
95	12.5								V			V						
114	13																	
85	13.25																	
98	13.25				2													
106	13.25																	
68	13.5																	
92	14.25																	
84	14.75																	
91	14.75																	
67	15.75																	
66	16.25																	
83	17.75																	
107	17.75																	
65	18.25																	
140	19																	
64	19.25																	
81	19.25																	
128	19.25																	
97	19.5																	
129	19.5																	
113	19.75																	
112	20																	
96	20.25																	
82	20.5																	
1	ON LAND																	
2	ON LAND																	
6	ON LAND																	
17	ON LAND																	
30	ON LAND																	
56	ON LAND	V								V	V		V					
57	ON LAND	V			V				V							V		
74	ON LAND																	
104	ON LAND																	
110	ON LAND																	

Transect #	Depth	CHARA	NITELA	MYRSP	STUPE	POTFO	NAJFL	NAJMA	NUPHAR	NYMPH	POTIL	POTAM	POTGR	POTNA	UTRIVU	POTCR	LEMNA	ELOCA
120	ON LAND																	
132	ON LAND																	
145	ON LAND																	

Total Sample Sites (146 - 13 on land) = 133
Sample Sites w/ No Plants 44

	CHARA	NITELLA	MYRSP	STUPE	POTFO	NAJFL	NAJMA	NUPHAR	NYMPH	POTIL	POTAM	POTGR	POTNA	UTRIVU	POTCR	LEMNA	ELOCA
Sites found(Frequency)	68	0	0	55	0	2	9	1	9	0	0	5	2	1	10	0	0
% Frequency	51.13	0.00	0.00	41.35	0.00	1.50	6.77	0.75	6.77	0.00	0.00	3.76	1.50	0.75	7.52	0.00	0.00
Density (Max = 5) at sites found	3.47	#DIV/0!	#DIV/0!	2.55	#DIV/0!	1.50	1.56	2.00	1.33	#DIV/0!	#DIV/0!	1.60	2.00	1.00	1.00	#DIV/0!	#DIV/0!
Relative Density (Max = 5) /hole Lake	1.77	0.00	0.00	1.05	0.00	0.02	0.11	0.02	0.09	0.00	0.00	0.06	0.03	0.01	0.08	0.00	0.00
Found Visually	V			V			V	V		V	V	V	V			V	

Lake Water Quality 2006 Annual Report

RANDOM LAKE
Sheboygan County
Waterbody Number: 30300

Lake Type: DRAINAGE
DNR Region: SE
GEO Region:SW

Site Name	Storet #
RANDOM LAKE - DEEP HOLE	603312

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
05/29/2006	4.25	1.3	N		8	56		44	HIGH	CLEAR	GREEN	3
06/13/2006	3.5	1.1	N	10.7	21	59	53	52	HIGH	MURKY	GREEN	3
06/21/2006	3.5	1.1	N			59			HIGH	MURKY	GREEN	3
06/30/2006	3.75	1.1	N			58			HIGH	MURKY	GREEN	3
07/07/2006	3.5	1.1	N			59			NORMAL	MURKY	GREEN	3
07/15/2006	4.75	1.4	N			55			NORMAL	MURKY	GREEN	3
07/23/2006	3.5	1.1	N	8.13	23	59	51	52	NORMAL	MURKY	BROWN	3
07/31/2006	3.5	1.1	N			59			NORMAL	MURKY	BROWN	3
08/16/2006	3.75	1.1	N	7.41	25	58	50	53	LOW	MURKY	BROWN	3
08/24/2006	3.75	1.1	N			58			LOW	MURKY	GREEN	3
09/01/2006	4	1.2	N			57			LOW	MURKY	GREEN	3
09/14/2006	4.25	1.3	N			56			LOW	CLEAR	GREEN	3
09/17/2006	4	1.2	N			57			LOW	MURKY	GREEN	3
09/25/2006	4.25	1.3	N			56			NORMAL	CLEAR	GREEN	3
10/06/2006	4.25	1.3	N	7.18	25	56	50	53	NORMAL	CLEAR	BROWN	3
10/20/2006	5.5	1.7	N			53			HIGH	CLEAR	BROWN	3

05/29/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	70.8	5.55
2	69.9	6.52
4	69.1	7.25
6	67.5	7.12
8	64.6	7.48
10	62.1	7.31
12	60	6.72
14	58.4	5.71
16	57.4	4.82
18	56.2	1.02
20	55.7	.35
22.2	55.1	.1

06/13/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	69.9	7.57
2	69.1	8.01
4	68.5	8.17
6	68.2	8.09
8	67.6	8
10	66.9	7.74
12	65.8	7.35
14	63.1	4
16	59.8	.11
18	57	.02
20	56.1	.01
22	55.5	.01
22.2	55.1	0

06/21/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	73.7	6.51
2	73.5	7.16
4	73.3	7.28
6	73.2	7.41
8	72.4	7.13
10	71.3	6.88
12	69.7	6.4
14	64.9	1.62
16	61.3	.14
18	58.8	.08
20	57.4	.06
22	56.4	.04
22.2	56.1	.03

06/30/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	76.2	7.98
2	75.9	8.08
4	75	8.2
6	74.3	8.26
8	73.3	8.38
10	72.1	7.64
12	70.1	5.54
14	67.5	.59
16	65.1	.1
18	61.5	.07
20	59.2	.06
22	57.5	.04
22.2	56.8	.02

07/07/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	78.1	7.92
2	78.1	7.95
4	77.9	8.02
6	77.5	7.99
8	76.6	7.77
10	75.5	6.89
12	74.1	5.41
14	71.2	.9
16	66.7	.07
18	62.6	.06
20	59.8	.03
22	58.4	.02
22.2	57.9	0

07/15/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	79.2	7.03
2	78.8	7.16
4	78.4	7.09
6	77.7	7.02
8	76.4	7.03
10	75	6.55
12	73.3	4.94
14	71.3	2.85
16	69.1	.11
18	64.4	.07
20	61	.06
22	59.6	.04
22.2	59	.02

07/23/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	77	6.8
2	77	6.86
4	77	6.89
6	76.8	6.89
8	76.8	6.83
10	76.4	6.69
12	75.2	5.73
14	73	1.51
16	68.9	.11
18	66	.11
20	63.1	.14
22	61.7	.16

07/31/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	81.1	6.44
2	81	6.56
4	80.4	6.63
6	80.1	6.5
8	79.9	6.3
10	79.3	5.68
12	77.3	3.93
14	74.4	.93
16	70.6	.04
18	67.3	.03
20	64.6	.02
22	62.6	.01
22.1	62.1	.01

08/16/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	75.9	7.11
2	75.9	7.13
4	75.5	7.18
6	75.5	7.19
8	75.2	7.17
10	75.2	7.08
12	74.8	6.87
14	74.3	6.93
16	73.2	4.69
18	70.1	.06
20	66	.03
22	63.9	.03
22.1	63	.02

08/24/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	74.6	7.1
2	74.4	7.18
4	74.4	7.2
6	74.3	7.17
8	74.1	7.08
10	73.9	6.51
12	73.7	5.91
14	73.3	4.79
16	72.8	3.71
18	71	.04
20	67.6	.02
22	64.9	.01

09/01/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	71.9	6.76
2	72.1	6.8
4	72.1	6.82
6	71.9	6.84
8	71.9	6.85
10	71.9	6.84
12	71.9	6.85
14	71.9	6.86
16	71.7	6.8
18	71	5.39
20	69.4	.6
22	67.5	.01

09/14/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	63.7	6.52
2	63.3	6.57
4	63	6.65
6	62.8	6.58
8	62.8	6.52
10	62.6	6.43
12	62.6	6.41
14	62.6	6.42
16	62.6	6.36
18	62.4	6.26
20	62.4	5.73
22	62.6	.07
22.1	62.6	.03

09/17/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	67.3	7.48
2	66.7	7.59
4	66.2	7.55
6	65.3	7.24
8	64	7.29
10	63.7	6.81
12	63.1	6.63
14	62.8	5.9
16	62.8	5.49
18	62.6	5.19
20	62.4	4.48
22	62.4	.09
22.1	62.4	.05

09/25/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	60.9	7.31
2	60.7	7.38
4	60.7	7.45
6	60.7	7.51
8	60.5	7.54
10	60.5	7.55
12	60.5	7.55
14	60.3	7.52
16	60.3	7.49
18	60.1	7.43
20	60	7.31
22	60	.13
22.1	59.8	.05

10/06/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	59.8	7.68
2	59.8	7.72
4	59.8	7.78
6	58.6	7.9
8	58.6	7.9
10	58.4	7.8
12	58.4	7.72
14	58.3	7.74
16	58.3	7.64
18	58.1	7.5
20	57.9	7.43
22	57.9	.16
22.2	58.1	.03

10/20/2006		
Depth FEET	Temp. DEGREES F	D.O. mg/l
0	46	8.21
2	46	8.32
4	46	8.38
6	46	8.45
8	46	8.48
10	46	8.52
12	46	8.53
14	46	8.55
16	46	8.56
18	46	8.55
20	46.2	8.49
22	46.2	6.1
22.2	46.6	.2

Date	Collector Comments
06/21/2006	Fish (small) between 10-14'; Sprigs of curly leaf pondweed; pH=7; Satellite day; pH = 7.0
06/30/2006	Fish between 10-15'; much curly leaf- broad leaf and Sago pondweeds- much Chara; heavy traffic on lake; pH = 6.8; (1 day after Satellite day
07/07/2006	Fish between 11-13'; much debris at surface (Potamogeton sprigs + grasslike leaves (not Aphanazomena); clumps of filamentous algae appox. 30 cm diam; Satellite day; pH - 6.8
07/15/2006	Fish between 10-18'; much Sago pondweed; Satellite day; pH = 7.1
07/23/2006	Fish between 9-19'; much Sago pondweed; warm weather; Chlorophyll + Phosphorus samples sent; Satellite day; pH = 6.9
07/31/2006	Fish between 10-18'; mostly Sago Pondweed; hot weather; Satellite day; pH = 7.3
08/16/2006	Fish between 7-17'; residents have asked for spraying of weeds - much Potamegeton but no Eurasian Water Milfoil; warm- dry-but cool nights; Satellite day; pH = 7.0; Chlorophyll + Phosphorus samples sent in;
08/24/2006	Fish between 7-17'; many pondweed varieties; Satellite day; pH = 6.9; low water level - deepest point = 22'
09/01/2006	Fish between 9-18'; Satellite day; pondweed going to seed + turning brown however- at north end - still green; pondweed spikes above water surface; one "whorled" water milfoil plant discovered on 8/25/06; pH = 7.1; low water- bottom = 22'
09/14/2006	Fish between 10-19'; mostly Sago and other pondweed abundant; pH = 7.1

09/17/2006	Fish between 6-17'; satellite day; no visible Eurasian Water Milfoil - same as rest of summer; pH = 6.9
09/25/2006	Fish between 11-19'; much Sago Pondweed 6-12" below surface; Village piers removed at park; maple leaves turning red; Satellite day; pH = 7.1
10/06/2006	Fish between 9-19'; Sago Pondweed not as apparent + not at surface; Canada Geese population is high (maybe migration); Phosphorus + Chlorophyll samples sent in; pH = 6.9; D.O. is very good down to 20'; no temmperature stratification since Sept 14th
10/20/2006	Fish between 9-15'; Mudhens migrating thru; new sprouts of Lily Pads + Cattails; Rushes = brown; Pondweeds = deep; good traveling + fishing

Date	Lab Comments
05/29/2006	METHOD BLANK EXCEEDED LOD CRITERIA

Date	Data Collectors	Project
05/29/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
06/13/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
06/21/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
06/30/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
07/07/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
07/15/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
07/23/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
07/31/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
08/16/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
08/24/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
09/01/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
09/14/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
09/17/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
09/25/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
10/06/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE
10/20/2006	Wayne Stroessner	CLMN AT RANDOM LAKE; DEEP HOLE

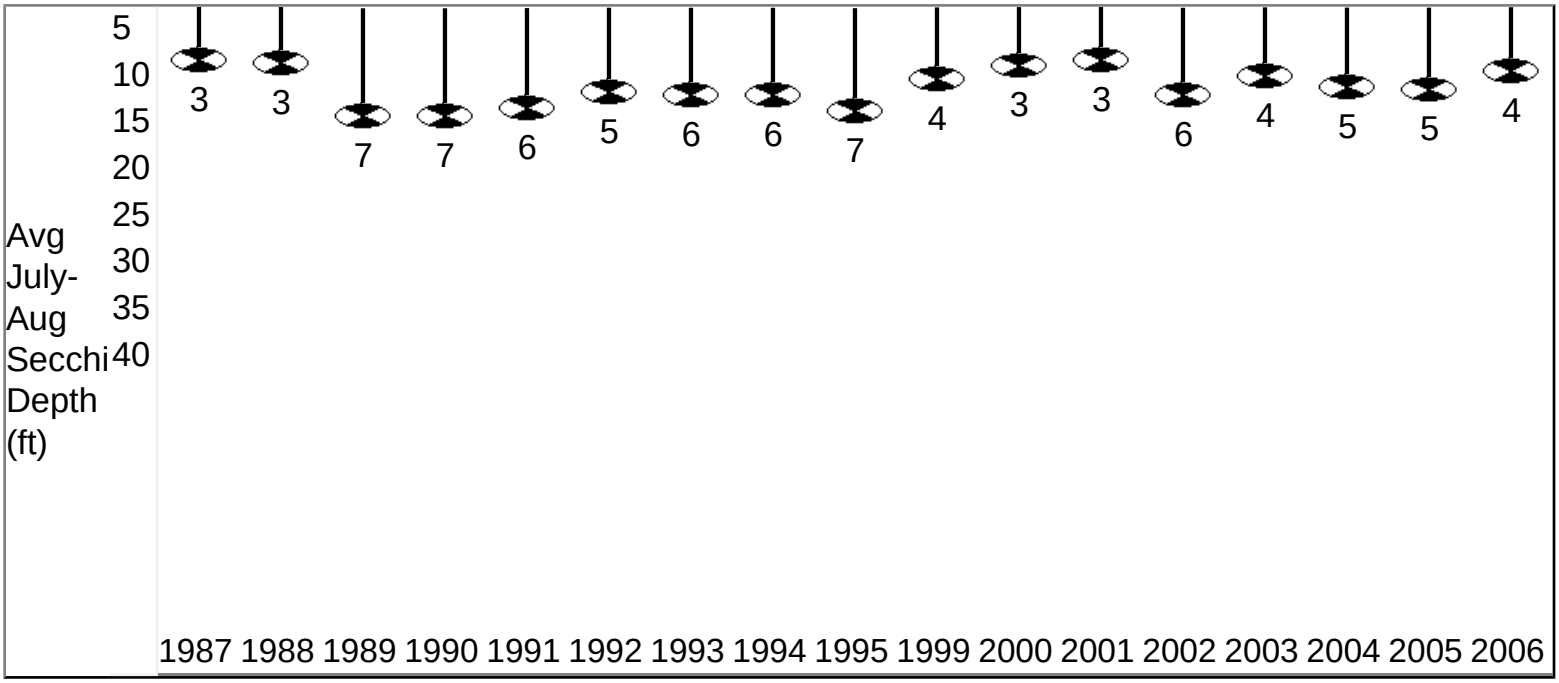
SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter(ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD), TSI(CHL), TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet.

Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

Report Generated: 08/03/2007

RANDOM LAKE
Sheboygan County
Waterbody Number: 30300

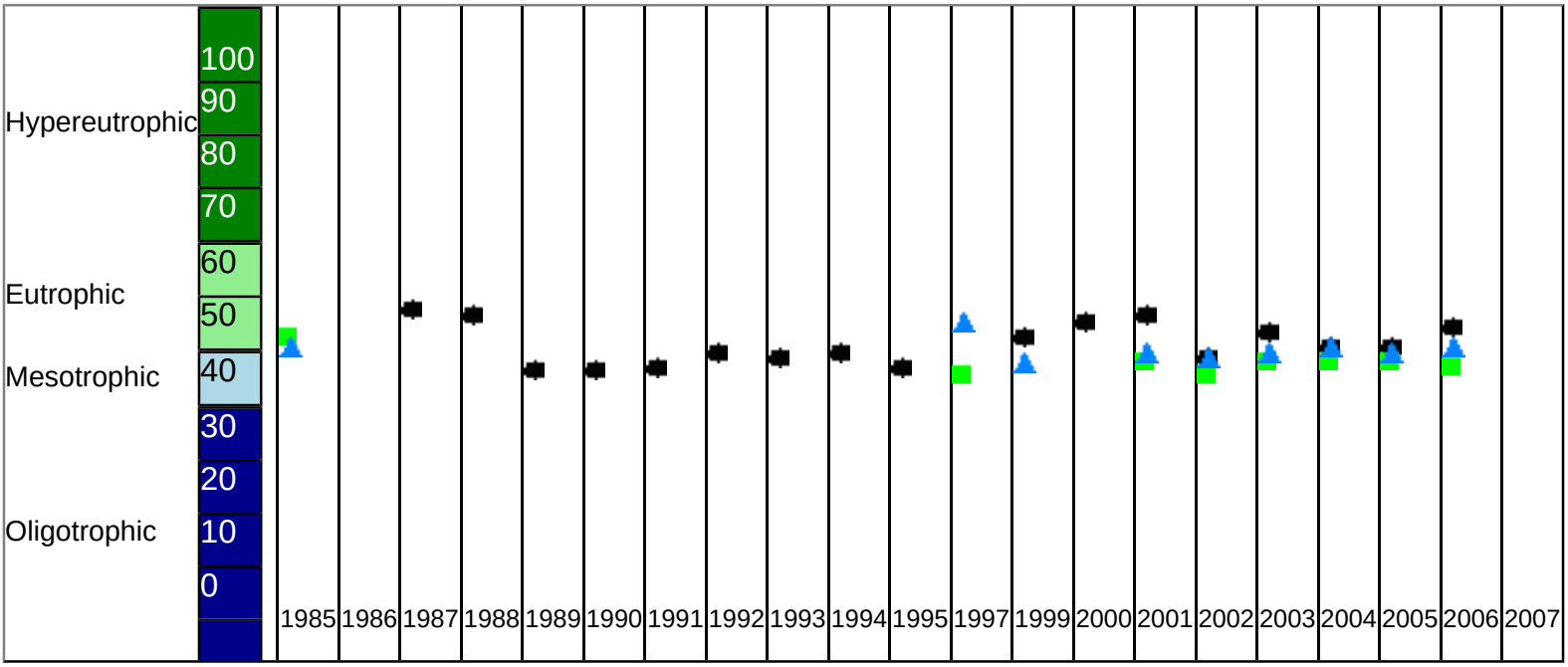
Lake Type: DRAINAGE
DNR Region: SE
GEO Region:SW



Past secchi averages in feet (July and August only).

Report Generated: 08/03/2007

Trophic State Index Graph



Monitoring Station: RANDOM LAKE - DEEP HOLE, Sheboygan County

Past Summer (July-August) Trophic State Index (TSI) averages.

◆ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

TSI(Chl) = TSI(TP) = TSI(Sec)	It is likely that algae dominate light attenuation.
TSI(Chl) > TSI(Sec)	Large particulates, such as Aphanizomenon flakes dominate
TSI(TP) = TSI(Sec) > TSI(Chl)	Non-algal particulate or color dominate light attenuation
TSI(Sec) = TSI(Chl) >= TSI(TP)	The algae biomass in your lake is limited by phosphorus
TSI(TP) > TSI(Chl) = TSI(Sec)	Zooplankton grazing, nitrogen, or some factor other than phosphorus is limiting algae biomass

TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).

TSI > 80	Algal scums, summer fishkills, few plants, rough fish dominant. Very poor water quality.

Trophic state index (TSI) is determined using a mathematical formula (Wisconsin has its own version). The TSI is a score from 0 to 110, with lakes that are less fertile having a low TSI. We base the overall TSI on the Chlorophyll TSI when we have Chlorophyll data. If we don't have chemistry data, we use TSI Secchi. We do this rather than averaging, because the TSI is used to predict biomass. This makes chlorophyll the best indicator. Visit Bob Carlson's website, dipin.kent.edu/tsi.htm, for more info.