

RANDOM LAKE

Aquatic Plant Survey

Whole Lake Demonstration Project/AIS Grant - 2005 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 2005. The results are included in this report.

In July of 2005, 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 2005 was determined to be 13 feet, that is, no plants were found growing in water deeper than 13 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 first 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 8 aquatic macrophytes were found during the survey in 2005, down from 16 species in 2004. All of the plants were found during the grid survey. No additional species were located during the general survey even though specific plant beds were searched for signs of additional pondweeds. 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 2005 are listed in Table 2. Chara (*Chara* sp.) dominated the plant community, throughout the depths. Water lilies (*Nuphar* and *Nymphaea* sp.) were common in the shallow areas, while sago pondweed (*Stuckenia pectinata*) was found in the deeper depths, from 6 to 11 feet deep. Two species were found that had not been previously identified in Random Lake, small duckweed (*Lemna minor*) and Nitella (*Nitella* sp.). Eleven species found in 2004, could not be located in the 2005 survey, including two nuisance, exotic species, Eurasian watermilfoil and curly-leaf pondweed.

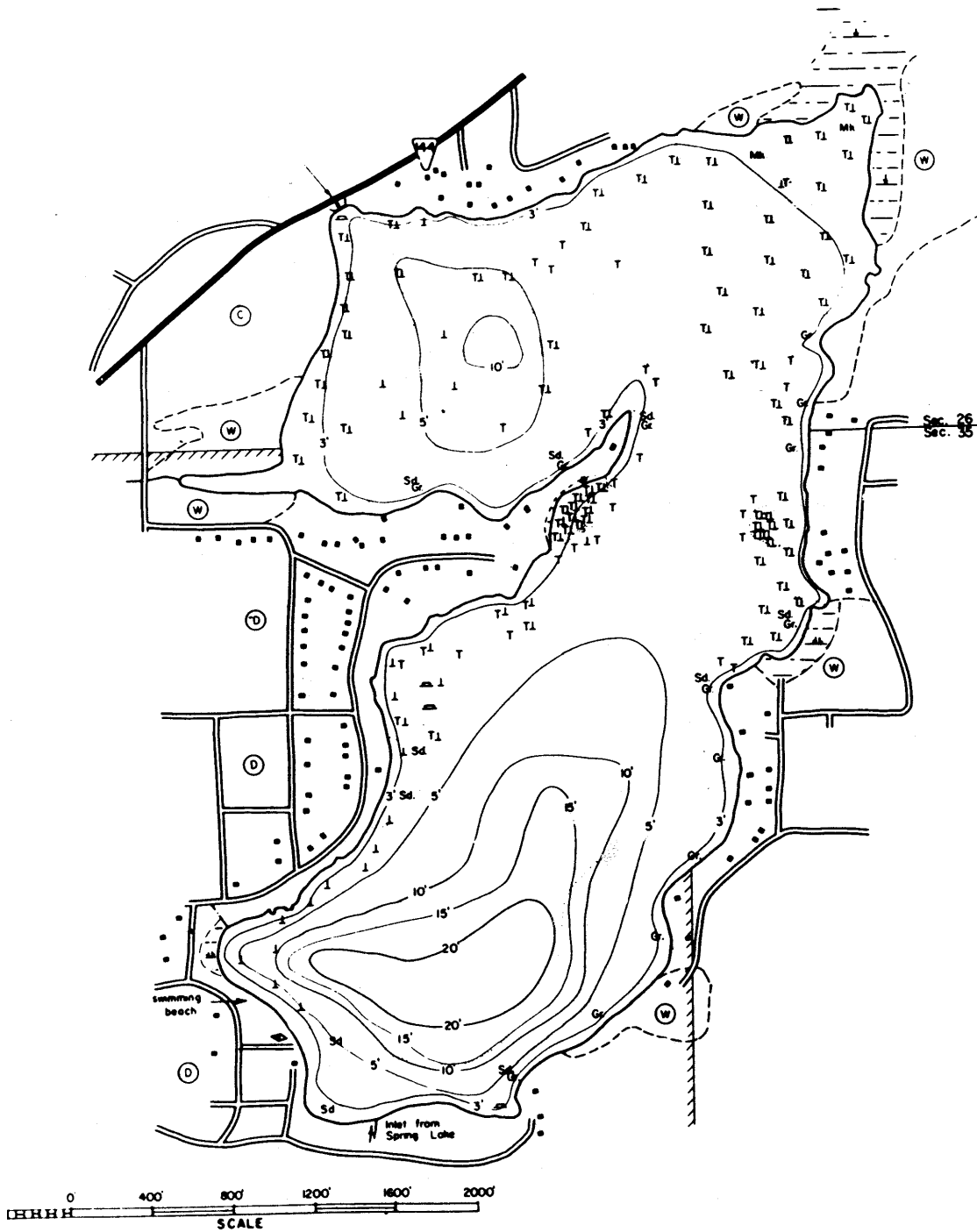
The results of the survey data for the July 2005 survey for all species at each sample depth are included at the end of this report.

The maximum rooting depth in 2005 was 13 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.

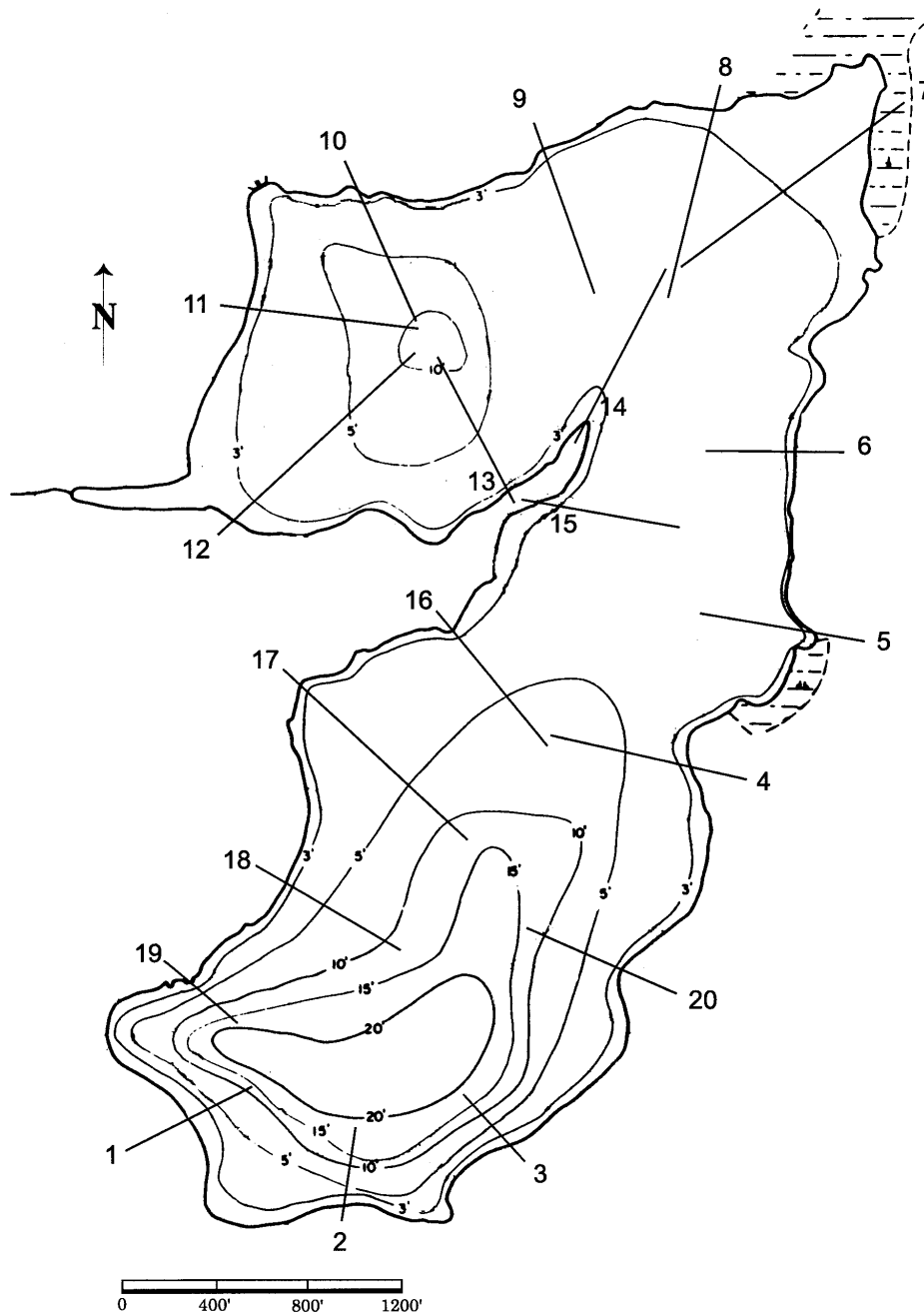
Table 1. Hydrographic and Morphometric Data Random Lake

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

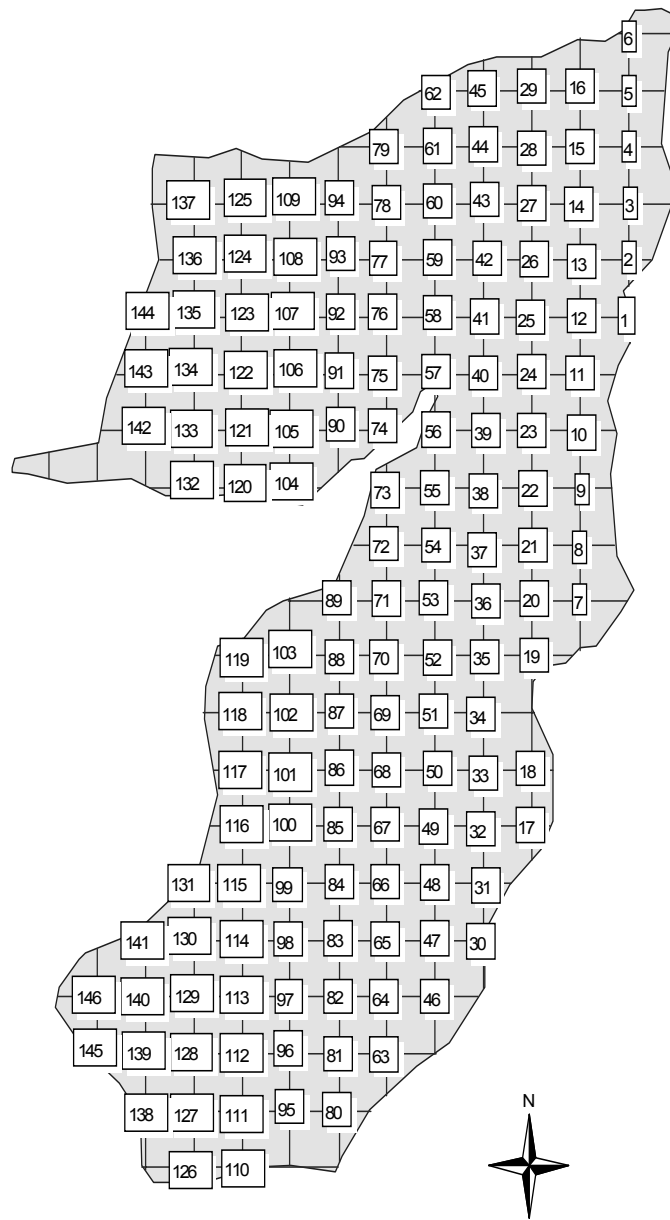


Map 1 - Bathymetric Map, Random Lake, Wisconsin.



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 2005

Species	Common Name	% Frequency					
		1999	2000	2001	2002	2004	2005
<i>Chara</i> sp.	Muskgrass, Chara	34	57	43	49	50	64
<i>Elodea canadensis</i>	Waterweed				3	1	
<i>Lemna minor</i>	Small Duckweed						1 ^a
<i>Myriophyllum spicatum</i>	Milfoil	60	1 ^a	9	69	8	
<i>Najas flexilis</i>	Slender Naiad	1		X	2	10	
<i>Najas marina</i>	Spiny Naid	10			X	13	
<i>Nitella</i> sp.	Nitella						10
<i>Nuphar advena</i>	Yellow Water Lily	5	5	6	7	4	3
<i>Nymphaea</i> sp.	White Water Lily	5	5	0	4	2	10
<i>Potamogeton crispus</i>	Curly-leaf Pondweed	1	4	19	25	1	
<i>P. amplifolius</i>	Large-leaf Pondweed			1	3	6	
<i>P. Illinoensis</i>	Illinois Pondweed	14	18	17	34	8	
<i>P. foliosus</i>	Leafy Pondweed				X	1	
<i>P. natans</i>	Floating-leaf Pondweed	1	5	5	7	6	5
<i>P. zosterformis</i>	Flat-stem Pondweed	X		10	7	X	
<i>Stuckenia pectinata</i>	Sago Pondweed	33	57	48	56	37	12
<i>Utricularia vulgaris</i>	Great Bladderwort	1		2	3	9	
<i>Vallisneria americana</i>	Wild Celery, Eel Grass				X	X	

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

WATER QUALITY 2005

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

Table 3. Random Lake Water Quality Data Summary for 2005*

Sampling Date	Secchi (ft)	Total Phosphorus (mg/l)	DO at surface (mg/l)	Temp at surface (°F)	Chlorophyll A (ug/l)
5/17/06	7	22	9.93	54.5	
5/31/06	4.25		10.89	67.5	
6/14/06	5.5	19	7.73	78.6	3.21
6/23/06	5		8.91	75.9	
7/8/06	5.25		8.05	75.2	
7/28/06	5.75	19	7.44	76.3	7.43
8/10/06	5		6.78	79.2	
8/23/06	4.5	23	7.35	73	9.2
9/6/06	3.5		7.95	74.8	
9/16/06	4.5		6.23	72	
10/1/06	4.5		7.45	61.2	
10/17/06	4.25	25	7.81	56.7	9.23
10/26/06	4.25		8.27	48.4	

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

Table 4. Comparison of 2004 and 2005 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

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 2005 data with the 1999 through 2004 project shows a number of differences:

— The 2004 and 2005 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.

—Clarity and Chlorophyll A concentrations increased from 2004 to 2005 while total phosphorus concentrations decreased (Table 4).

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