

Lake of the Woods Aquatic Vegetation Management Plan 2008 Update

Marshall County, Indiana



http://129.79.145.7/arcims/statewide_mxd/viewer.htm

Prepared for:

The Lake of the Woods Property Owners Association

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Executive Summary

Lake of the Woods was treated with Sonar A. S. (fluridone) on May 5, 2005 for the control of Eurasian Watermilfoil (EWM). Prior to the Sonar treatment, plant diversity was very low (0.29) and EWM dominated the littoral zone. The treatment was successful, and no Eurasian watermilfoil was found in Lake of the Woods in fall of 2005. The very first EWM re-growth was observed in late September of 2006 when very small areas of Eurasian watermilfoil were found in north end of the lake.

Eurasian watermilfoil was found in approximately 18 acres of Lake of the Woods in 2007. These 18 acres were treated with 2, 4-D on July 18, 2007. Major areas of re-growth were in the channel systems adjacent to Lake of the Woods and the far north end of the lake. Re-growth in these areas was expected in 2007, as Eurasian watermilfoil growth was very heavy in these areas prior to the whole lake Sonar (fluridone) treatment in 2005. This was the first time Sonar had been used in Lake of the Woods.

A visual survey and EWM spot treatments were conducted on June 20, 2008. The visual survey identified areas of EWM re-growth to outline a treatment map. Based on observations from this survey, approximately 30 acres of EWM in Lake of the Woods were treated with liquid DMA4 herbicide (2, 4-D) on June 20, 2008.

A Tier II vegetation survey was conducted by Aquatic Weed Control on August 1, 2008. This survey found EWM present in low abundance, being collected at 5% of the sample locations. Six native plant species were found in both the 2007 and 2008 Tier II survey, which is an increase from 4 native species in fall of 2006. Site frequency of Sago pondweed dropped from 30% in fall of 2007 to just 6.3% in the 2008 late season survey.

Six acres of Eurasian watermilfoil re-growth were treated on September 15, 2008 to further control EWM. This treatment took place in the north end of the lake near the conservation club. This was also a spot treatment using liquid 2, 4-D and was funded by the Lake of the Woods Property Owners Association.

Below, actual treatment costs for the Lake of the Woods Sonar Project are listed on the left. On the right are theoretical treatment costs had the Eurasian watermilfoil acreage in Lake of the Woods been treated with 2, 4-D on an annual basis to provide the same level of control as did the Sonar program. These figures illustrate the cost savings at Lake of the Woods through the use of a Sonar program as opposed to a EWM maintenance program using 2, 4-D.

Sonar Project Cost History

2, 4-D Annual Treatment Costs

2005 Whole lake Sonar treatment	\$27,600	2005 Treat 60 acres with 2, 4-D	\$21,000
2006 Treated 0 acres with 2, 4-D	no cost	2006 Treat 60 acres with 2, 4-D	\$21,000
2007 Treated 16 acres with 2, 4-D	\$5,600	2007 Treat 60 acres with 2, 4-D	\$21,600
2008 Treated 36 acres with 2, 4-D	\$12,200	2008 Treat 60 acres with 2, 4-D	\$22,200
Total 4 year Treatment Costs	\$45,400	Total 4 year 2, 4-D Treatment Costs	\$85,800
Lake and River Enhancement Share	\$40,005	Lake and River Enhancement Share	\$77,220
Association's Share	\$5,395	Association's Share	\$8,580

2009 Management Recommendations

In 2009 a visual inspection of Lake of the Woods should be made before herbicide treatments take place. A late season Tier II aquatic vegetation survey should also be conducted to document changes in both native and exotic species as a result of any management practices. Estimated cost for surveys and planning on Lake of the Wood in 2009 is \$6,000. Multiple treatment options are available in 2009 depending on funding availability. These options are outlined below.

Option #1: 2009 Whole Lake Sonar Treatment for Eurasian Watermilfoil

Because of the success of the 2005 Sonar treatment, Lake of the Woods is considered a good candidate for a second Sonar treatment in 2009. Conducting a Sonar treatment in 2009 would provide the most complete and long term control of EWM, while also providing the most cost effective long term control. However this treatment would be the most expensive management strategy for 2009 and would depend on funding availability. A “Six Bump Six” program would be used to control Eurasian Watermilfoil. This is the identical program used at Lake of the Woods in 2005. The 2004 and 2005 Lake of the Woods AVMP’s can be referenced for more details on this treatment program.

Whole Lake Sonar Treatment	\$35,000
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$41,000
LARE share	\$36,900
Association’s Share	\$4,100

Option #2 Treat up to 60 acres of Eurasian Watermilfoil with 2, 4-D

Another approach would be to treat all areas of EWM infestation with 2, 4-D in 2009. Exact areas of EWM re-growth are not yet known but no less than 36 acres are expected in 2009. Treating these areas with 2, 4-D in 2009 will provide effective season long control but should not be expected to provide any residual control for 2010. Areas treated with 2, 4-D are normally treated each year, as 2, 4-D does not normally provide control for multiple seasons.

Treat up to 60 acres for EWM with 2, 4-D	\$22,200
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$28,200
LARE Share	\$25,380
Association’s Share	\$2,820

Option #3: Treat heaviest areas of infestation (up to 20 acres) with 2, 4-D

Another approach would be to treat the areas which have historically been most severely infested with milfoil. The far north end of the lake will likely be a candidate for spot treatments in 2009, as will other infested areas that were treated with 2, 4-D in 2008. This approach may help with recreational use. The north end of the lake is commonly used as a turn-around for skiers. Reducing EWM in the north end of the lake may also prevent fragmentation from boat props as well.

Treat up to 20 acres with 2, 4-D	\$7,400
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$13,400
LARE Share	\$12,060
Association’s Share	\$1,340

Acknowledgements

Aquatic vegetation surveys conducted on Lake of the Woods were made possible by funding from the Lake of the Woods Property Owner's Association and the Indiana Department of Natural Resources through the Lake and River Enhancement Program. Aquatic Weed Control would like to extend special thanks to Indiana Department of Natural Resources (IDNR) District 3 biologist Jed Pearson for providing procedural training for Tier II aquatic vegetation surveys. Gwen White and Angela Sturdevant, aquatic biologists for the IDNR Division of Fish and Wildlife, provided valuable consultation regarding the requirements and objectives of this lake management plan. District 1 Fisheries Biologist Bob Robertson also provided valuable input for this project and provided IDNR survey data. Aquatic Weed Control would also like to thank the members of the Lake of the Woods Property Owners Association for their commitment to improving Lake of the Woods and for valuable discussion and input brought forward at the informational meeting held on November 1, 2008.

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1.0 Introduction

Lake of the Woods has been involved in the Lake and River Enhancement Program (LARE) since 2004, when the first LARE funded aquatic vegetation survey took place on August 25, 2004. Based on the results of this survey, a whole lake Sonar treatment was conducted in the following spring on May 5, 2005 for the control of Eurasian watermilfoil (EWM). The treatment was successful, and EWM was not found in the fall survey that year or in either of the surveys in 2006. A visual survey on June 13, 2007 found EWM growing in approximately 18 acres of Lake of the Woods. These 18 acres were treated with 2, 4-D on July 18, 2007 for the control of EWM.

Based on observations and Tier II survey results, the treatments greatly reduced EWM abundance. Two acres of Lake of the Woods were treated on August 24, 2007 to further reduce the EWM population.

In 2008, a visual inspection found EWM in approximately 30 acres of Lake of the Woods. These thirty acres were treated with 2, 4-D for EWM control on June 20, 2008. A tier II aquatic vegetation survey was conducted on August 1, 2008 and found Eurasian watermilfoil at 5% of sample locations. Six acres were treated at the north end of Lake of the Woods on September 15, 2008 to further reduce the EWM Population. This treatment was funded by the Lake of the Woods Property Owners Association. Figure 1 describes 2008 EWM treatment areas.

Figure 1: 2008 EWM Treatment Areas



Table 1 summarizes all LARE funded activities on Lake of the Woods.

Table 1: Lake of the Woods LARE History

Year	Action	Date	Funding Source
2004	Fall Aquatic Vegetation Survey. Aquatic Vegetation Management Plan	Fall Survey August 25, 2004	Lake and River Enhancement LOTW Property Owner's Association
2005	Spring and Fall Aquatic Vegetation Surveys as well as whole Lake Sonar Treatment AVMP Update	Spring Survey April 28, 2005 Sonar Application May 5, 2005 Fall Survey July 29, 2005	Lake and River Enhancement LOTW Property Owner's Association
2006	No chemical treatments necessary as EWM did not return AVMP Update	Spring Survey May 18, 2006 Fall Survey July 27, 2006	Lake and River Enhancement LOTW Property Owner's Association
2007	Spring Visual Vegetation Survey 18 acres of EWM treated with 2, 4-D Fall Tier II survey 2 acres of EWM treated with 2, 4-D AVMP Update	Spring survey June 13, 2007 Treatment July 18, 2007 Fall survey August 15, 2007 Treatment August 24, 2007	Lake and River Enhancement LOTW Property Owner's Association
2008	Visual Inspection: 30 acres of EWM treated with 2, 4-D Late Season Tier II survey 6 acres of EWM treated with 2, 4-D AVMP Update	Spring treatment June 20, 2008 Tier II Survey August 1, 2008 Fall Treatment September 15, 2008	Lake and River Enhancement LOTW Property Owner's Association

Both common and scientific plant names of species mentioned in this report are included in Table 2.

Table 2: Common and Scientific Plant Names

Scientific Name	Common Name
<i>Myriophyllum spicatum</i>	Eurasian Watermilfoil
<i>Ceratophyllum demersum</i>	Coontail
<i>Potamogeton pectinatus</i>	Sago Pondweed
<i>Potamogeton foliosus</i>	Leafy Pondweed
<i>Chara sp.</i>	Chara
<i>Potamogeton Illinoensis</i>	Illinois Pondweed
<i>Najas flexilis</i>	Slender Naiad
<i>Elodea Canadensis</i>	Elodea

2.0 Watershed and Lake Characteristics Update

A new watershed management plan was completed for Lake of the Wood in 2005, entitled “Lake of the Woods, Marshall County Indiana, a Watershed Management Plan.” This project was completed by D. J. Case and Associates of Mishawaka, Indiana and J.F. New of Walkerton, Indiana. It provides valuable information about the Lake of the Woods Watershed and provides specific water quality goals for the future. It can be found at the Lake and River Enhancement Program website at the following link:
http://www.in.gov/dnr/fishwild/lare/lare_reports.html

3.0 Lake Uses Update

The idle zone in Lake of the Woods has been expanded to include the area within 350 feet of the shoreline. This change was implemented to allow for longer pier lengths in areas of the lake where shallow water makes boat access very difficult. Figure 2 was provided by the IDNR and outlines the idle zone expansion area.

Figure 2: Lake of the Woods Idle Zone Expansion



Data from rake samples taken inside the 350 foot buffer zone were analyzed separately for both the August 2007 and August 2008 Tier II surveys. The data in the following tables includes every rake sample taken within 350 feet of the shoreline. They are included in the Lake Uses section to avoid confusion with data analysis of the entire lake.

The most noticeable change from 2007 to 2008 is the decrease in sago pondweed site frequency, which dropped from 40% in 2007 to just 8.3% in 2008. The reason for this drop is unclear. Slender naiad frequency increased from 11.7 percent in 2007 to 20.0% in 2008. Illinois pondweed frequency decreased slightly from 13.3% in 2007 to 10.0% in 2008.

Figure 3: 2007 Data Analysis: Buffer Zone

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	LOTW Buffer	Secchi:	2.5	SE Mean Species/site:	0.13
Date:	8/15/07	Littoral sites with plants:	32	Mean natives/site:	0.78
Littoral depth (ft):	9.0	Number of species:	8	SE Mean natives/site:	0.12
Littoral sites:	55	Maximum species/site:	4.0	Species diversity:	0.73
Total sites:	60	Mean number species/site:	0.87	Native diversity:	0.67
Score Frequency					
Common Name	Site Frequency	1	3	5	Dominance
Sago Pondweed	40.0	18.3	18.3	3.3	18.0
Illinois Pondweed	13.3	6.7	3.3	3.3	6.7
Slender Naiad	11.7	10.0	0.0	1.7	3.7
Coontail	8.3	3.3	5.0	0.0	3.7
Curly Leaf	5.0	5.0	0.0	0.0	1.0
Chara	3.3	3.3	0.0	0.0	0.7
Eurasian Watermilfoil	3.3	3.3	0.0	0.0	0.7
Elodea	1.7	1.7	0.0	0.0	0.3
Filamentous Algae	8.3				

Figure 4: 2008 Data Analysis: Buffer Zone

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	LOTW Buffer	Secchi:	3.5	SE Mean Species/site:	0.12
Date:	8/1/2008	Littoral sites with plants:	20	Mean natives/site:	0.48
Littoral depth (ft):	5.0	Number of species:	7	SE Mean natives/site:	0.10
Littoral sites:	42	Maximum species/site:	3	Species diversity:	0.78
Total sites:	60	Mean number species/site:	0.55	Native diversity:	0.74
Score Frequency					
Common Name	Site Frequency	1	3	5	Dominance
Slender Naiad	20.0	11.7	6.7	1.7	8.0
Illinois Pondweed	10.0	5.0	5.0	0.0	4.0
Sago Pondweed	8.3	6.7	1.7	0.0	2.3
Eurasian Watermilfoil	6.7	5.0	1.7	0.0	2.0
Chara	5.0	5.0	0.0	0.0	1.0
Coontail	3.3	0.0	3.3	0.0	2.0
Small Pondweed	1.7	1.7	0.0	0.0	0.3
Filamentous Algae	3.3				

Recreational use in Lake of the Woods was improved for boaters and skiers after the whole lake sonar treatment. Eurasian watermilfoil abundance was greatly reduced in high use areas like the sandbar at the south end of the lake and the channel systems adjacent to Lake of the Woods. In 2008, more dense EWM beds were starting to appear in the north end of the lake, as well as in some channel systems. These areas of EWM infestation are expected to increase in 2009.

4.0 Fisheries Update

District 1 Fisheries Biologist, Bob Robertson and assistant fisheries biologist Chip Long were contacted for the most recent fisheries survey data. They stated that new data on walleye age and size distributions may be available before completion of the 2008 AVMP update. Should this information become available before the final draft is due, it will be included in this report.

5.0 Problem Statement

Prior to the Sonar treatment EWM was present in approximately 60 acres or 63% of the littoral zone. Eurasian watermilfoil no longer dominates the plant community at Lake of the Woods. However, its abundance will likely increase in 2009. At least 36 acres of re-growth are expected with much more EWM acreage being possible. Another whole lake Sonar treatment is recommended although smaller spot treatments using 2, 4-D may be performed depending upon funding availability.

6.0 Management Goals and Objectives

The management goals outlined by the IDNR Division of Fish and Wildlife have not changed. They are restated below:

1. Develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality and is resistant to minor habitat disturbances and invasive species.
2. Direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species.
3. Provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

Specific Objectives

Specific measurable goals are dependant on what management strategy will be used. Should a whole lake Sonar treatment be funded in 2009, the goal would be to reduce Eurasian watermilfoil to an undetectable level in fall of 2009.

If 2, 4-D treatments are used, EWM abundance would be expected to be higher in fall of 2009 than it was in August of 2008. A EWM site frequency of around 10% in the late season tier II survey in 2009 may be a realistic goal depending on what acreage is treated with 2, 4-D. This may be around 9.5 acres of EWM since the littoral zone is estimated at 95 acres. At this time it is unknown exactly how much re-growth may occur. It is estimated that at least 36 acres of EWM will be present in 2009 and as much as 60 acres or more of re-growth are possible.

7.0 Plant Management History Update

No herbicide treatments were conducted on Lake of the Woods in 2008 other than the LARE funded liquid DMA4 (2, 4-D) treatments to control Eurasian Watermilfoil. Treatment of native species has been discouraged since the whole lake Sonar treatment. In 2008 overall vegetation abundance was minimal, making treatment of excessive native growth unnecessary.

Treatment maps for both 2007 and 2008 are included to show the progression of EWM re-growth. The major expansion of EWM acreage in 2008 was in the north end of the lake in depths of 5 feet and less as well as the area outside the channel system in the large bay on the west side of Lake of the Woods. Listed below are the LARE funded treatment acreages and cost figures for Eurasian watermilfoil control in Lake of the Woods, starting with the whole lake Sonar A.S. (fluridone) treatment in 2005.

*note: 6 of the 36 acres treated in 2008 were funded entirely by the Lake of the Woods Property Owners Association

2005 - Whole lake Sonar A.S. treatment	\$27,600
2006 - Treated 0 acres with liquid DMA4	no cost
2007 - Treated 16 acres with liquid DMA4	\$5,600
2008 - Treated 36 acres with liquid DMA4	\$12,200

Figure 5: 2007 EWM Treatment Areas: 16 acres

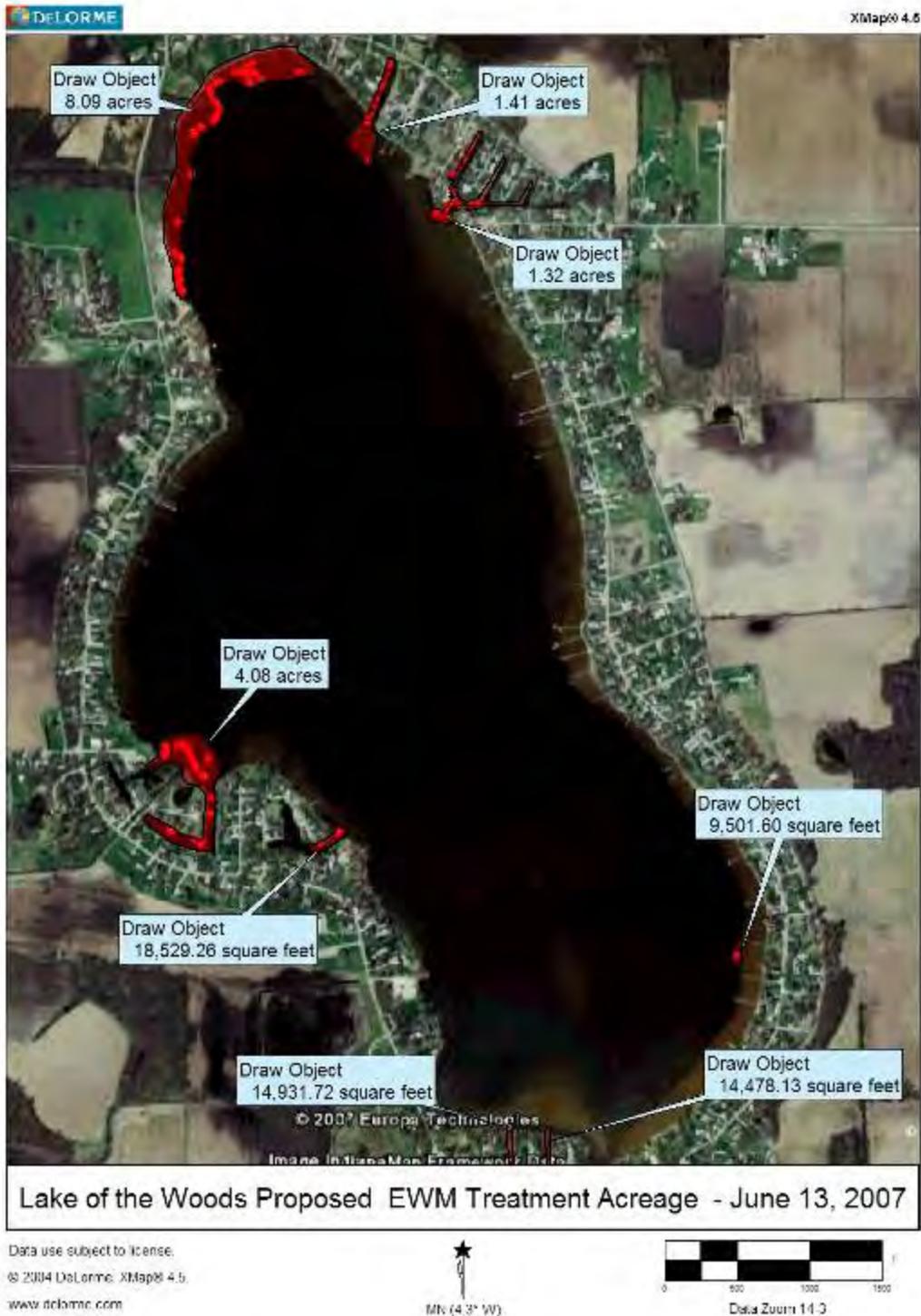


Figure 6: 2008 EWM Treatment Areas: 36 acres



8.0 Aquatic Plant Community Characterization Update

Survey and data analysis techniques have not changed since the completion of the 2007 Aquatic Vegetation Management Plan Update. Eurasian watermilfoil was the only invasive plant collected in 2008. Figure 7 shows EWM distribution in August of 2008 after the liquid 2, 4-D spring treatments (1.76 parts per million). Figure 8 shows approximated EWM beds prior to the Sonar treatment in 2005.

Figure 7: EWM Distribution: August 1, 2008



Figure 8: Approximated Pre-Sonar Treatment EWM Locations



8.1 Methods Update

The Tier II survey protocol was last updated by the IDNR in 2007. These changes are outlined in Section 8.1 of the 2007 Lake of the Woods Aquatic Vegetation Management Plan Update.

Lake of the Woods is characterized by the IDNR as eutrophic with 416 surface acres. Eighty total sample sites are distributed throughout each depth contour of the littoral zone. Forty-three sample sites were taken in the 0 – 5 foot depth contour. Twenty-seven sample sites were taken in the 5 – 10 foot depth contour, and 10 sample sites were taken in the 10 – 15 foot depth contour. In Lake of the Woods the same sample sites were used in 2006, 2007, and 2008.

8.2 Results

8.2.1 Tier II Results

The 2008 Tier II vegetation survey took place on August 1, 2008. Secchi depth was measured at 3.5 feet which is up from 2.5 feet in 2007. Eighty rake samples were distributed throughout the lake. Rake samples were divided between each 5 foot depth contour of the littoral zone. Sample sites remained the same from the fall 2006 survey. Figure 9 shows all rake sample locations for Lake of the Woods.

Figure 9: Lake of the Woods Rake Sample Locations



Data Analysis

The following tables are data summaries for the 2008 Tier II aquatic vegetation survey. These tables help to describe the plant community and will help identify any changes that take place in the years to come. Tables labeled “Overall” include every sample site, while the others describe the 5 foot depth contours of the littoral zone.

Although samples sites were taken in depths reaching 15 feet of water, no plants were found in water more than 5 feet deep in 2008. In 2007 some plants to found in depths of approximately 9 feet deep. This would seemingly be due to water clarity although secchi depth was actually greater in 2008. However, Lake of the Woods is prone to algae blooms throughout the summer and prolonged periods of low water clarity likely contributed to a reduction in plant abundance in 2008.

Table 3: 2008 Data Analysis: Overall

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	Lake of the Woods			SE Mean Species/site:	0.09
County:	Marshall				
Date:	8/1/2008	Sites with plants:	20	Mean natives/site:	0.36
Secchi:	3.5				
Maximum plant depth (ft):	5.0	Number of species:	7	SE Mean natives/site:	0.08
Littoral sites:	43	Maximum species/site:	3	Species diversity:	0.78
Total sites:	80	Mean number species/site:	0.41	Native diversity:	0.74
Trophic Status	Eutrophic				
			Score Frequency		
Common Name	Site Frequency	1	3	5	Dominance
Slender Naiad	15.0	8.8	5.0	1.3	6.0
Illinois Pondweed	7.5	3.8	3.8	0.0	3.0
Sago Pondweed	6.3	5.0	1.3	0.0	1.8
Eurasian Watermilfoil	5.0	3.8	1.3	0.0	1.5
Chara	3.8	3.8	0.0	0.0	0.8
Coontail	2.5	0.0	2.5	0.0	1.5
Small Pondweed	1.3	1.3	0.0	0.0	0.3
Filamentous Algae	2.5				

Table 4: 2008 Data Analysis: 0 - 5 Feet

Occurrence and Abundance of Submersed Aquatic Plants 0-5 Feet					
			Score Frequency		
Common Name	Site Frequency	1	3	5	Dominance
Slender Naiad	27.9	16.3	9.3	2.3	11.2
Illinois Pondweed	14.0	7.0	7.0	0.0	5.6
Sago Pondweed	11.6	9.3	2.3	0.0	3.3
Eurasian Watermilfoil	9.3	7.0	2.3	0.0	2.8
Chara	7.0	7.0	0.0	0.0	1.4
Coontail	4.7	0.0	4.7	0.0	2.8
Small Pondweed	2.3	2.3	0.0	0.0	0.5
Filamentous Algae	4.7				

No plants were found deeper than 5 feet.

Site Frequency

Site frequency is a measure of how often a species was collected during the Tier II survey. It can be calculated by the following equation:

$$\text{Site Frequency} = \frac{(\# \text{ of sites where the species was collected})}{\text{Total \# of littoral sample sites}} \times 100$$

Figure 10 and Table 5 describe site frequencies for every plant collected in any of the fall Tier II surveys since the lake was involved in the LARE program. Eurasian watermilfoil was the most frequently collected species in fall of 2004. The whole lake Sonar treatment took place in spring of 2005. Slender naiad was also very common in fall of 2004 and started to come back in fall 2005. Its frequency has increased steadily since the Sonar treatment. Sago pondweed abundance steadily increased until 2008, when its site frequency dropped to just 6.3%. Sago pondweed is known to be resistant to fluridone, which may also account for its increasing abundance until 2008. The reason for its decline in 2008 is not known. Eurasian watermilfoil frequencies remain low. Spot treatments in 2007 and 2008 greatly reduce EWM fall abundance.

Figure 10: Lake of the Woods Site Frequencies

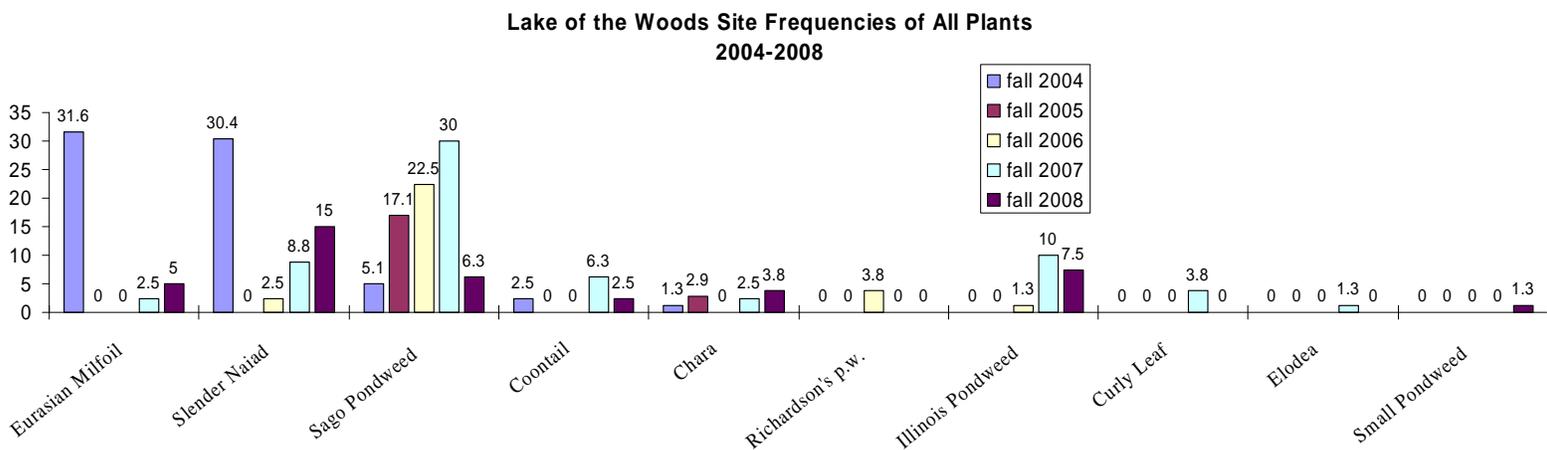


Table 5: Lake of the Woods Site Frequency Histories

Lake of the Woods Site Frequency History					
	Fall 2004	Fall 2005	Fall 2006	Fall 2007	Fall 2008
Eurasian Milfoil	31.6	0	0	2.5	5
Slender Naiad	30.4	0	2.5	8.8	15
Sago Pondweed	5.1	17.1	22.5	30	6.3
Coontail	2.5	0	0	6.3	2.5
Chara	1.3	2.9	0	2.5	3.8
Richardson's p.w.	0	0	3.8	0	0
Illinois Pondweed	0	0	1.3	10	7.5
Curly Leaf	0	0	0	3.8	0
Elodea	0	0	0	1.3	0
Small Pondweed	0	0	0	0	1.3

Species Diversity

The species diversity indices listed in the data analysis tables help to describe the overall plant community. A species diversity index is actually measured as a value of uncertainty (H). If a species is chosen at random from a collection containing a certain number of species, the diversity index (H) is the probability that a chosen species will be different from the previous random selection. The diversity index (H) will always be between 0 and 1. The higher the H value, the more likely it is that the next species chosen from the collection at random will be different from the previous selection (Smith, 2001). This index is dependent upon species richness and species evenness, meaning that species diversity is a function of how many different species are present and how evenly they are spread throughout the ecosystem.

The species diversity index for Lake of the Woods in the fall of 2007 was 0.78 which is up from 0.73 in 2007 and 0.41 in 2006. Native plant diversity in fall of 2008 was 0.74 which is also up from 0.67 in 2007 and 0.41 in 2006. Even though plant diversity increased slightly in 2008, overall plant abundance was down from 2007.

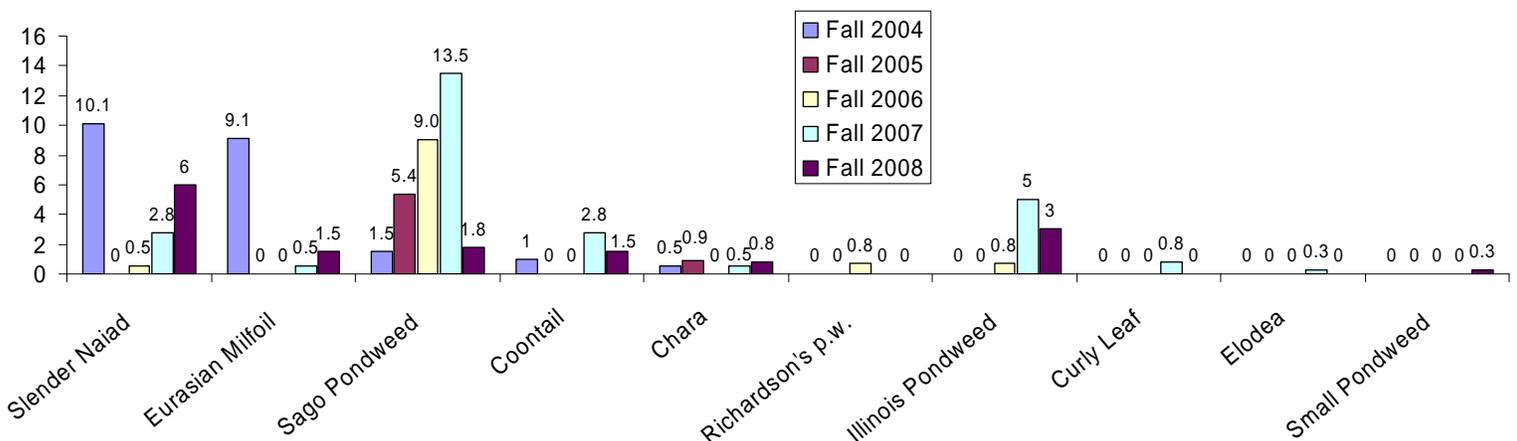
Species Dominance

Species dominance is dependent upon how many times a species occurs, and its relative coverage area or biomass within the system. In this survey, the abundance rating given to each species at each sample site was used to determine dominance. The dominance of a particular species in this Tier II survey increases as its site frequency and relative abundance increase.

Figure 11 tracks dominance values for each plant collected at Lake of the Woods during its involvement in the LARE program. Trends are similar to sight frequency, with Eurasian watermilfoil and slender naiad dominances dropping sharply after the Sonar treatment. Sago pondweed dominance increased steadily after the whole lake Sonar treatment until 2008 when it dropped sharply. Slender naiad dominance has increased slowly each year following the Sonar treatment. Eurasian watermilfoil dominance increased slightly in 2008 and is expected to do so again in 2009.

Figure 11: Lake of the Woods Dominance Histories

Lake of the Woods Dominance Values for All Plants 2004-2008



Species Distribution Maps

Figures 14 through 20 show the distribution of species collected in the 2008 Tier II vegetation survey. It is important to note that these locations should not be considered exhaustive. The locations shown random rake sample locations where each plant was collected.

Figure 12: Lake of the Woods 2008 Chara Locations



Figure 13: Lake of the Woods 2008 Coontail Locations



Figure 14: Lake of the Woods 2008 Eurasian Watermilfoil Locations

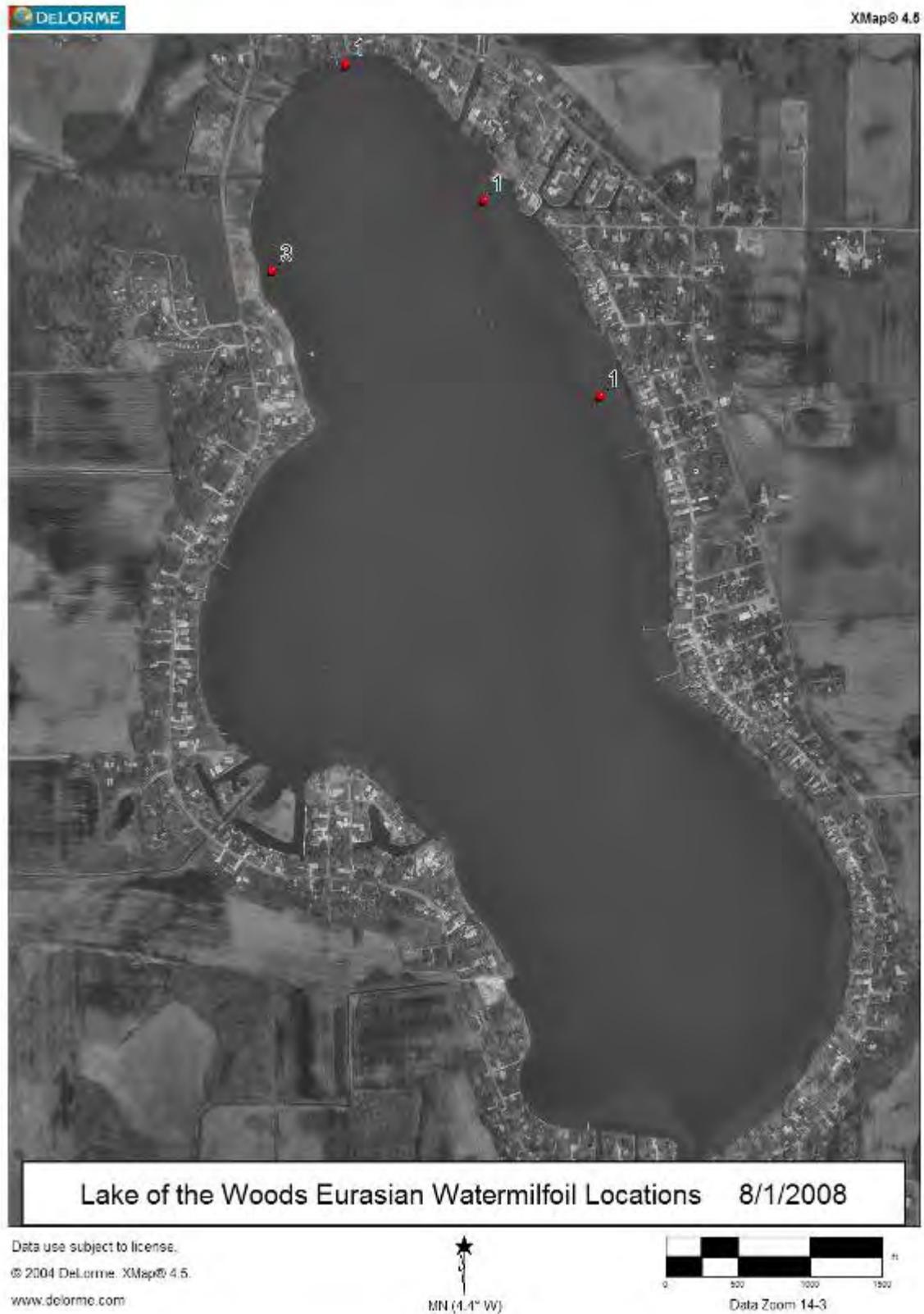


Figure 15: Lake of the Woods 2008 Illinois Pondweed Locations

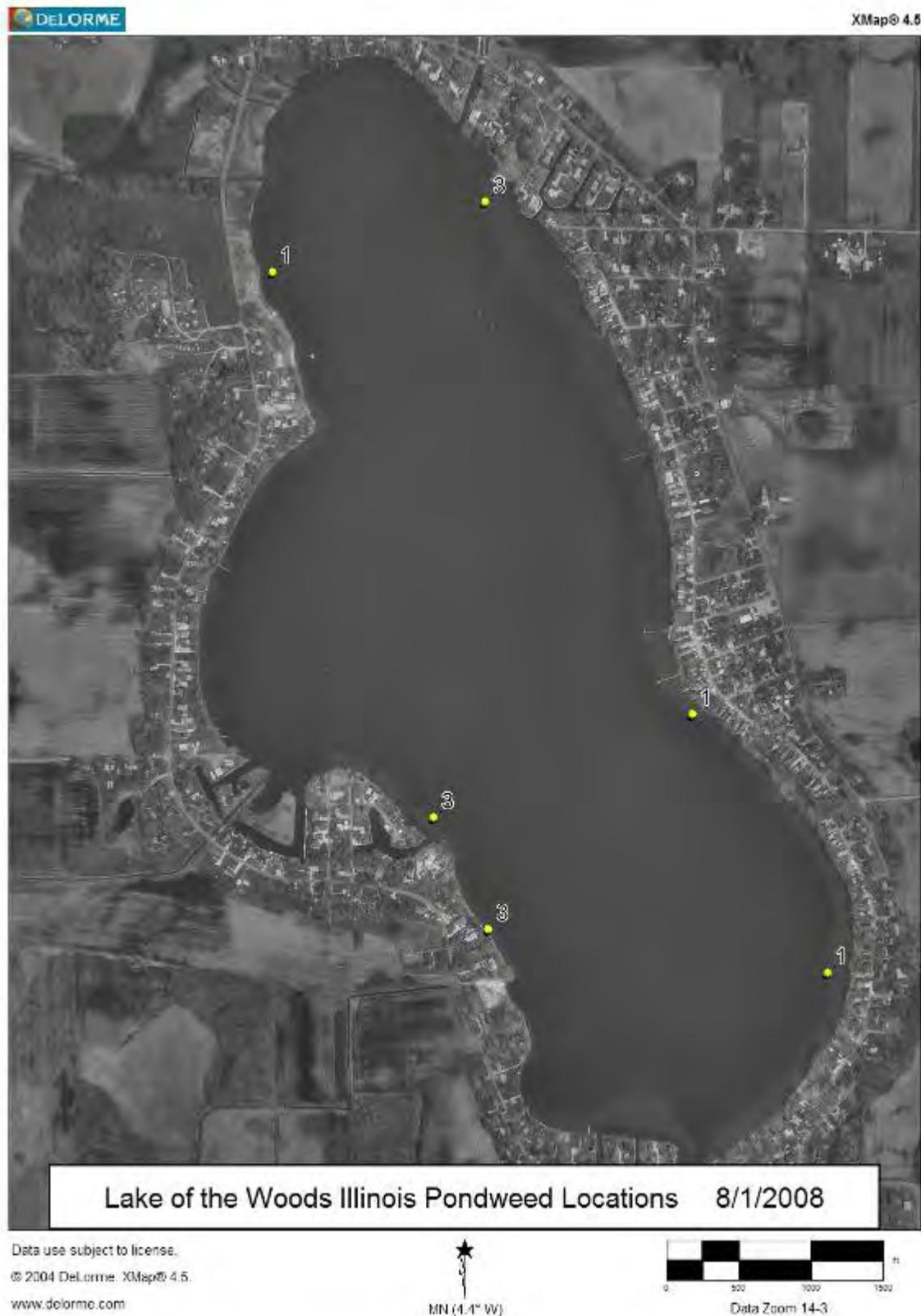


Figure 16: Lake of the Woods 2008 Sago Pondweed Locations

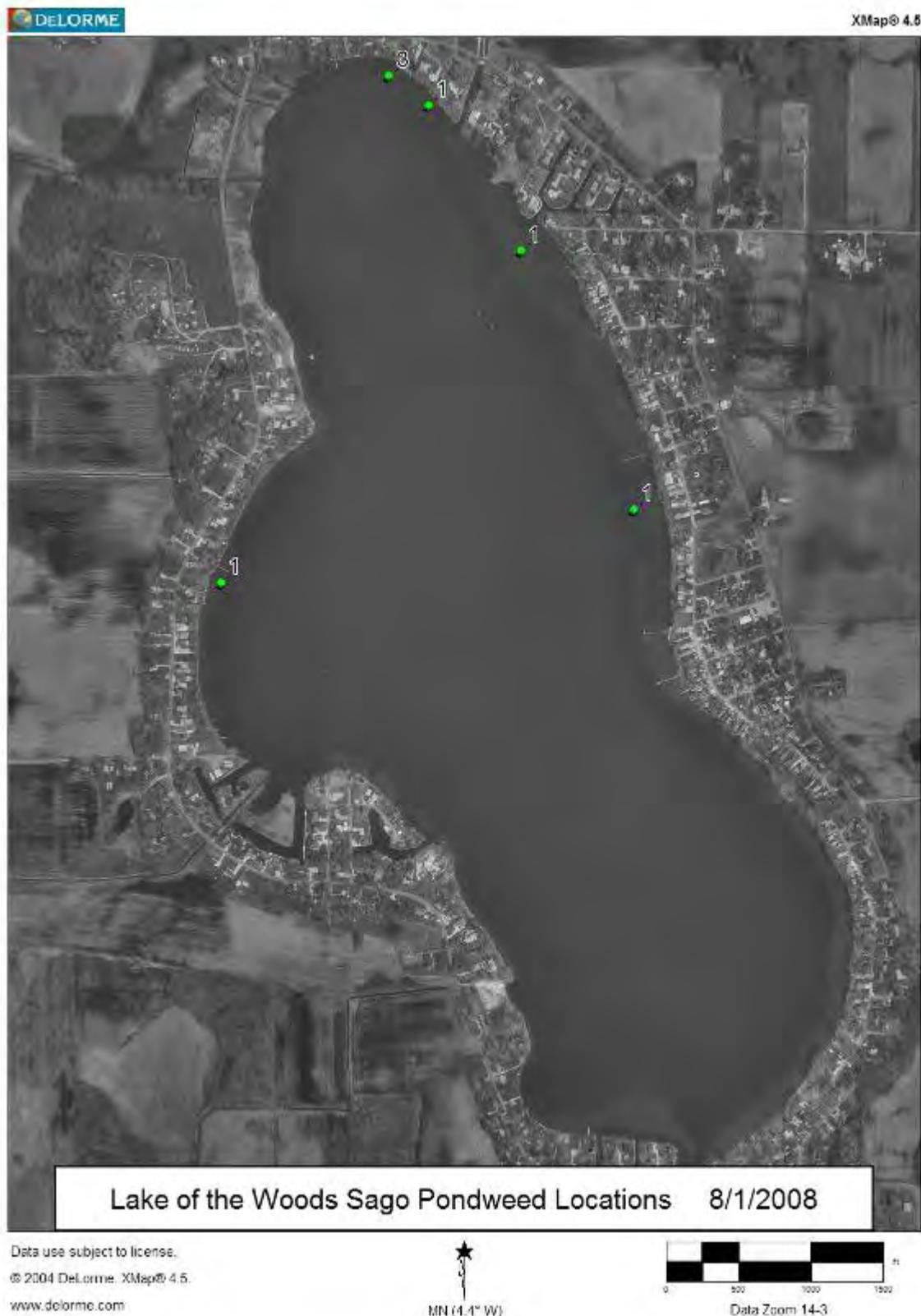


Figure 17: Lake of the Woods 2008 Slender Naiad Locations

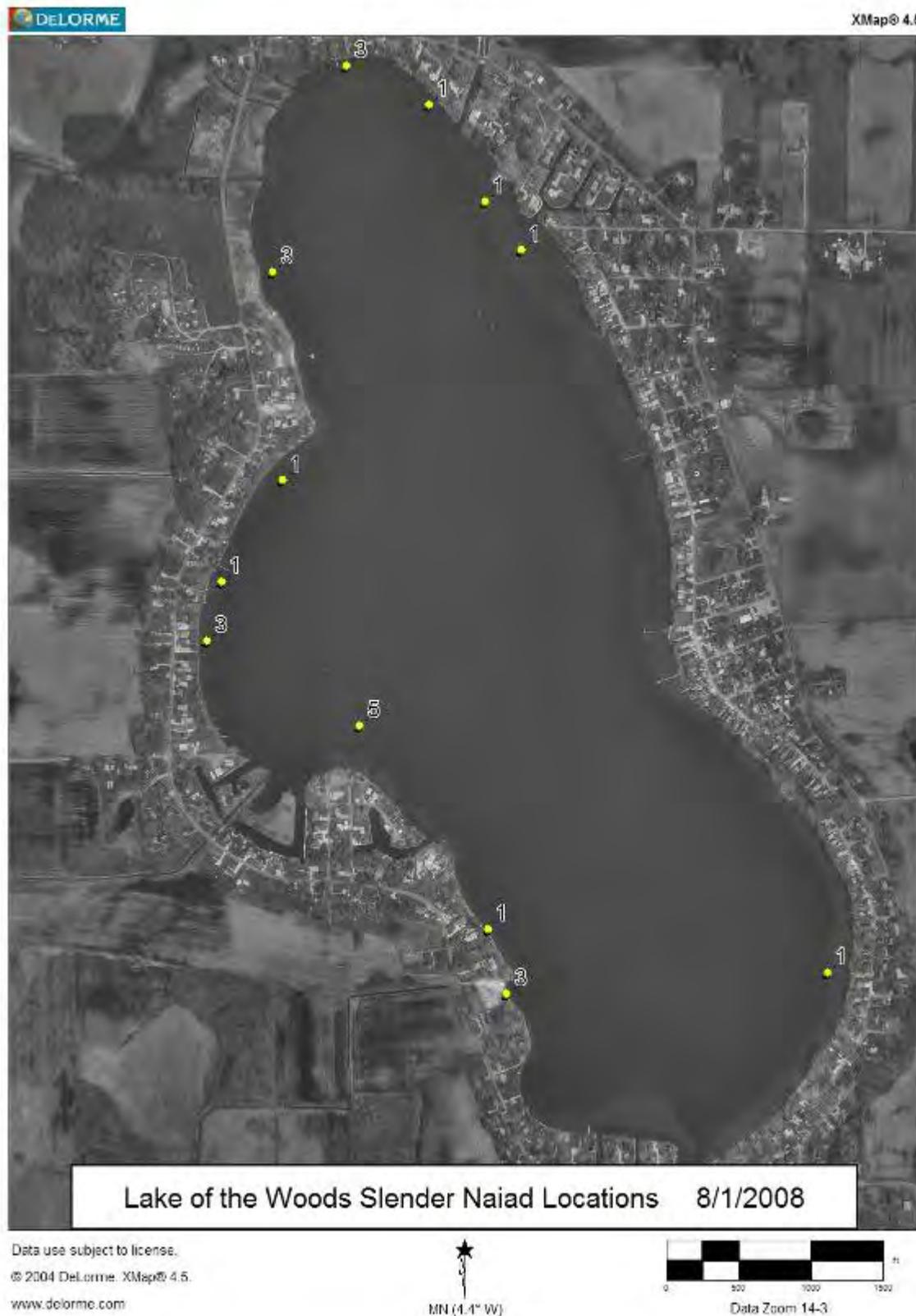


Figure 18: Lake of the Woods 2008 Small Pondweed Locations



8.3 Macrophyte Inventory Discussion

Overall vegetative abundance in Lake of the Woods decreased from 2007 to 2008. Four native plants showed a decrease in site frequency and dominance from August 2007 to August of 2008. Sago pondweed site frequency decreased from a site frequency of 30% in 2007 to just 6.3% in 2008. Illinois pondweed, coontail and elodea also declined in site frequency.

The reason for the drop in vegetative abundance in 2008 is unknown. The most likely cause would be severe planktonic algal blooms that reduce water clarity. These blooms have been common in the past. The severity of algal blooms are highly weather dependent. It is also unclear whether spot treatments of EWM could be contributing to algal blooms. This is definitely a possibility as EWM plants die off and release nutrients into the water.

Slender naiad, which was common before the Sonar treatment is once again increasing in Lake of the Woods. Its site frequency increased from 8.8% in 2007 to 15.0% in 2008. Chara, another native plant also showed a very slight site frequency increase from 2.5% in 2007 to 3.8% in 2008. Eurasian watermilfoil site frequency increased slightly from 2.5% in 2007 to 5.0% in August 2008. Of the native plants present in Lake of the Woods no long term damage was expected from the Sonar treatment. Although abundance was expected to temporarily decrease after the treatment, no plants were expected to disappear from the lake. It has been encouraging to see the native plants recover after the Sonar treatment, especially in the case of slender naiad which is more sensitive to sonar than most other native plants.

Water clarity remains low. Secchi depth was measured in August 2008 at 3.5 feet, which is actually higher than the 2.5 feet measured in August 2007. However, water clarity in Lake of the Woods is heavily tied to planktonic algae which can bloom or die off in a matter of days. There is a water level control structure in Lake of the Woods, although the water level was not extremely low (in comparison to recent years) there was a lack of rainfall in July and August. Even in years of relatively good water clarity, plants are not expected to grow in depths of more than 9 to 10 feet in Lake of the Woods. Lake of the Woods has historically had low water clarity, which has been documented by the IDNR as well as Aquatic Weed Control during the lake's involvement in the LARE Program. A lack of rain in July and August of 2008 could have contributed to the proliferation of planktonic algae which was abundant at the time of the late season survey.

Figure 19 shows planktonic algae that contribute to low water clarity in Lake of the Woods.

Figure 19: Lake of the Woods Algal Bloom: 8/15/2007



Eurasian watermilfoil has returned to the lake and its abundance is expected to increase in 2009. In 2008, 36 acres of EWM were treated with 2, 4-D and EWM acreage will likely increase from 2008.

One area in which boaters should use caution is the inlet area of Walt Kimble and Martin Ditches in the north end of the lake. This was one of the first areas to show Eurasian watermilfoil re-growth in the years following the Sonar treatment. More re-growth is expected in this area in 2009, and boat traffic through this area could potentially spread fragments of milfoil. This area should have a high treatment priority no matter which treatment strategy is implemented. Boaters should avoid or use caution in this area to avoid spreading the Eurasian watermilfoil prior to any treatments in 2009.

Threatened and Endangered Species

The Indiana Natural Heritage Data Center is part of the Natural Heritage Network, a worldwide system of Heritage Programs. This program is designed to provide information about Indiana's diversity of natural ecosystems, species, landscape features, and outdoor amenities, and to assure adequate methods for evaluating this information and setting sound land protection priorities. The inventory is a continuous attempt to determine the state's most significant natural areas through an intensive statewide inventory.

The Indiana Natural Heritage Data Center has compiled a list of Indiana plant species that are federally or state listed as endangered, threatened or rare. The following is an excerpt taken directly from the Indiana Natural Heritage Database website. Link: [Indiana Natural Heritage Data Center](#).

“The Indiana Natural Heritage Data Center, set up in 1978, represents a comprehensive process, becoming an increasingly valuable tool for decision makers and scientists as it progresses.”

No state or federally listed plant species were found in Lake of the Woods in 2008.

9.0 Aquatic Vegetation Management Alternatives

(See 2004 Lake Management Plan)

Eurasian watermilfoil control practices have not changed significantly from the practices outlined in the original aquatic vegetation management plan.

A new watershed management plan was completed for Lake of the Wood in 2005, entitled “Lake of the Woods, Marshall County Indiana, a Watershed Management Plan.” this project was completed by D. J. Case and Associates of Mishawaka, Indiana and J.F. New of Walkerton, Indiana. It provides valuable information about the Lake of the Woods Watershed and provides specific water quality goals for the future. It can be found at the Lake and River Enhancement program website at the following link:

http://www.in.gov/dnr/fishwild/lare/lare_reports.html

10.0 Public Involvement

A LARE meeting was held on November 10, 2008 to discuss issues pertaining to Lake of the Woods. District 1 Fisheries staff, lake representatives, Aquatic Weed Control, and LARE Aquatic biologists were all present and discussed the plant community of Lake of the Woods. This meeting helped to develop possible treatment strategies for 2009.

A public lake meeting was held for Lake of the Woods on November 1, 2008. Twenty people were in attendance. All in attendance indicated that they owned property around Lake of the Woods. Jim Donahoe of Aquatic Weed Control summarized LARE management activities and outlined possible treatments that may be necessary as the Eurasian watermilfoil begins to re-grow in the lake. Residents were very happy with the results of the Sonar treatment, as Eurasian watermilfoil was reduced to an undetectable level in summers of 2005 and 2006. Some residents were also concerned about the lack of vegetative growth in 2008. This is likely due to the decline in sago pondweed from 2007 to 2008. Figure 20 shows a summary of responses from the public questionnaire handed out at the November 1st meeting. Responses continue to show support for the EWM control program, as well as concerns for water clarity and other lake conservation issues such as sport fishing, nutrient input, and algal blooms.

Figure 20: 2008 Public Questionnaire

Total: 20

Lake Use Survey Lake name Lake of the Woods

Are you a lake property owner? Yes 20 No 0

Are you currently a member of your lake association? Yes 19 No 0

How many years have you been at the lake? 2 or less - 0
2-5 years - 6
5-10 years - 4
Over 10 years - 10

How do you use the lake (mark all that apply)
19 Swimming 4 Irrigation
18 Boating 0 Drinking water
16 Fishing 0 Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 10 No 9

Do you currently participate in a weed control project on the lake? Yes 18 No 2

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 9 No 9

Does the level of vegetation in the lake affect your property values? Yes 13 No 4

Are you in favor of continuing efforts to control vegetation on the lake? Yes 18 No 0

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 16 No 2

Mark any of these you think are problems on your lake:

- 3 Too many boats access the lake
- 7 Use of jet skis on the lake
- 0 Too much fishing
- 9 Fish population problem
- 13 Dredging needed
- 3 Overuse by nonresidents
- 7 Too many aquatic plants
- 5 Not enough aquatic plants
- 16 Poor water quality
- 2 Pier/fencing problem

Please add any comments:

need wetlands to filter water coming into the lake;
extend the dates for opening & closing spillway to decrease sediment;
too short a season; agree with milfoil eradication;
too many aquatic plants in channels;
need more native good weeds - more fish; green water;
clarity is very poor; I support a conservancy for
this lake; high algae levels; channels have needed
dredged for many years - could the D.N.R. step up and
help us for once!?!; conservancy district needed; needs
restocked with game fish; stop fishing derbies;

11.0 Public Education

The Lake of the Woods Property Owners Association has been very aggressive in preventing the spread of invasive aquatic vegetation. They have monthly meetings year round with good attendance. They have privately helped to fund herbicide treatments and have submitted a proposal to the LARE program for additional herbicide treatment of Eurasian watermilfoil. This proposal resulted in the whole lake Sonar treatment.

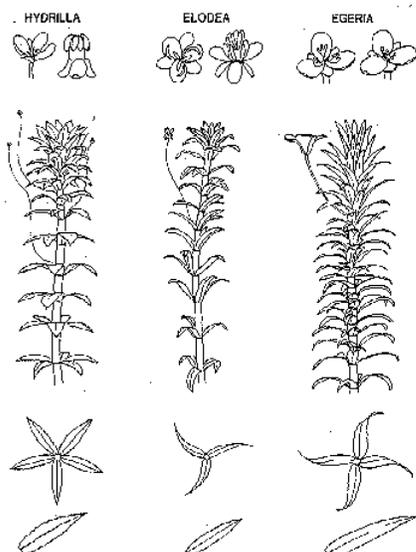
More information on stopping the spread of invasive aquatic organisms can be found at <http://www.protectyourwaters.net/>. These items include thoroughly cleaning equipment after use in a lake and removing all water from bilges, livewells, etc.

Hydrilla

Hydrilla (*Hydrilla verticillata*) is an invasive aquatic plant species common throughout the southern United States. It is listed as a federally noxious weed and causes severe ecological and recreational problems wherever it grows. It is considered to be much more destructive than other invasives like Eurasian watermilfoil and curly leaf pondweed because of its reproductive adaptations. It grows by fragmentation, as does Eurasian watermilfoil, but it also produces turions which can remain dormant in the sediment for 4 years or more (Van and Steward, 1990). It produces tubers at its root tips which can also reproduce after multiple years of dormancy. It can grow 1 inch each day and it quickly out-competes native plants. It forms dense beds that eliminate native plants, stunt fish populations, impede recreation and cause a drastic decrease in biodiversity (Colle and Shireman, 1980). Millions of dollars are spent each year for hydrilla maintenance each year in Florida alone. Eradication is unlikely once a population has been well established, although eradication has been achieved in newly infested waters using a herbicide called Sonar. Sonar



is applied at a rate of 6 parts per billion and this concentration is maintained in the water for 180 days. Early detection can be crucial to an effective eradication program, and all lake residents and users are encouraged to be on the look-out for this invader.



In fall of 2006, this plant was found in Lake Manitou, in Rochester, Indiana. This is the first instance of hydrilla in the upper Midwest. Prior to its appearance in Lake Manitou, The closest infestations of hydrilla were in Tennessee and Pennsylvania.

Hydrilla can easily be confused with native elodea. The major difference is that elodea has sets of leaves on the stem in whorls of three, while hydrilla usually has whorls of 5 leaves, although 4 to 9 leaves per whorl are possible with hydrilla. Hydrilla will also have small serrations on the leaf

edges. More information on hydrilla can be found at the University of Florida's Center for Aquatic Invasive Plants (<http://plants.ifas.ufl.edu/>). More general information on aquatic invaders can be found at www.protectyourwaters.net.

12.0 Integrated Management Action Strategy

At least 36 acres of EWM re-growth are expected in Lake of the Woods in 2009 with 60 acres or more being possible. With such a large amount of EWM acreage expected, a whole lake Sonar treatment would be ideal. Three treatment strategies are proposed, and the selection of a treatment strategy will likely depend on funding availability.

Option #1: 2009 Whole Lake Sonar Treatment for Eurasian Watermilfoil

Because of the success of the 2005 sonar treatment, Lake of the Woods is considered a good candidate for a second Sonar treatment in 2009. Conducting a Sonar treatment in 2009 would provide the most complete and long term control of EWM, while also providing the most cost effective long term control. However this treatment would be the most expensive management strategy for 2009 and would depend on funding availability. Lake residents are supportive of this option and it has been indicated that the association would be able to fund the \$4,100 cost share. A "Six Bump Six" program would be used to control Eurasian Watermilfoil. This is the identical program used at Lake of the Woods in 2005. The 2004 and 2005 Lake of the Woods AVMP's can be referenced for more details on this treatment program.

Option #2 Treat up to 60 acres of Eurasian Watermilfoil with 2, 4-D

Another approach would be to treat all areas of EWM infestation with 2, 4-D in 2009. Exact areas of EWM re-growth are not yet known but no less than 36 acres are expected in 2009. Treating these areas with 2, 4-D in 2009 will provide effective season long control but should not be expected to provide any residual control for 2010. Areas treated with 2, 4-D are normally treated each year, as 2, 4-D does not normally provide control for multiple seasons.

Option #3: Treat heaviest areas of infestation (up to 20 acres) with 2, 4-D

Another approach would be to treat the areas which have historically been most severely infested with milfoil. The far north end of the lake will likely be a candidate for spot treatments in 2009, as will other infested areas that were treated with 2, 4-D in 2008. A pre-treatment visual inspection should be used to identify infested areas in need of herbicide treatment.

Herbicide Treatment Specifications

If 2, 4-D is used for herbicide treatments, then a concentration of 1.76 parts per million should be used to ensure adequate control. If Sonar is used, then concentration of 6 parts per billion should be used within a six bump six program to control EWM while minimizing damage to native plants.

Lake and River Enhancement Deadlines

December 15 – Rough drafts of LARE AMVPs and AVMP updates due to LARE staff

January 15 – Grant application due to LARE Staff

February 15 – Revisions of AVMPs and updates due back to contractors

March 1 – Final drafts of AVMPs and AVMP updates due to LARE Staff

March 15 – LARE funding decisions announced

13.0 Project Budget

Option #1: 2009 Whole Lake Sonar Treatment for Eurasian Watermilfoil

Whole Lake Sonar Treatment	\$35,000
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$41,000
LARE share	\$36,900
Association's Share	\$4,100

Option #2 Treat up to 60 acres of Eurasian Watermilfoil with 2, 4-D

Treat up to 60 acres for EWM with 2, 4-D	\$22,200
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$28,200
LARE Share	\$25,380
Association's Share	\$2,820

Option #3: Treat heaviest areas of infestation (up to 20 acres) with 2, 4-D

Treat up to 20 acres with 2, 4-D	\$7,400
Vegetation Surveys and AVMP Update	<u>\$6,000</u>
Total Cost	\$13,400
LARE Share	\$12,060
Association's Share	\$1,340

14.0 Monitoring and Plan Update Procedures

It would appear that the original goals of reducing the EWM population in Lake of the Woods without causing long term damage to the native plant population have been successful, based on Tier II survey results and visual observations from 2004 to present. With the exception of slender naiad, most native plant frequencies are presently at or above pre-Sonar frequencies. Eurasian watermilfoil declined from a site frequency of 31% before the Sonar treatment to 0% in both 2005 and 2006. Eurasian watermilfoil is returning to the lake as expected, and 2, 4-D treatments are helping to reduce its abundance.

A visual survey should take place in spring of 2009 to map EWM locations and develop a treatment strategy. Areas of EWM re-growth should be mapped with GPS. Mapping software can then be used to estimate acreages for treatment areas.

A late season Tier II aquatic vegetation survey should also be conducted in 2009 to evaluate treatment effectiveness and evaluate native and invasive plant populations. Data from this survey can be compared to past survey data to continue to show long term trends following whole lake Sonar treatments.

15.0 References

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16.0 Appendices

16.1 Calculations

Fluridone Calculations:

The following paragraph is taken directly from the Sonar A.S. label. It outlines the specific procedures for calculating the amount of Fluridone needed to treat a body of water.

Application Rate Calculation - Ponds, Lakes and Reservoirs

The amount of Sonar A.S. to be applied to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

Quarts of Sonar A.S. required per treated surface acre =
Average water depth of treatment site (feet)
x Desired ppb concentration of active ingredient
x 0.0027

For example, the quarts per acre of Sonar A.S. required to provide a concentration of 25 ppb of active ingredient in water with an average depth of 5 feet is calculated as follows:

$5 \times 25 \times 0.0027 = 0.33$ quarts per treated surface acre
When measuring quantities of Sonar A.S., quarts may be converted to fluid ounces by multiplying quarts to be measured x 32. For example, $0.33 \text{ quarts} \times 32 = 10.5$ fluid ounces.

Note: Calculated rates should not exceed the maximum allowable rate in quarts per treated surface acre for the water depth listed in the application rate table for the site to be treated.

The following chart outlines rate calculations for DMA – 4 IVM Herbicide. It was taken directly from the DMA – 4 IVM specimen label on Dow AgroSciences website. <http://www.dowagro.com/ivm/invasive/prod/dma.htm>

Submerged Aquatic Weeds; Including Eurasian Water Milfoil (*Myriophyllum spicatum*)

Treatment Site	Maximum Application Rate ¹	Specific Use Directions
Aquatic Weed Control in Ponds, Lakes, Reservoirs, Marshes, Bayous, Drainage Ditches, Canals, Rivers and Streams that are Quiescent or Slow Moving, Including Programs of the Tennessee Valley Authority.	2.84 gallons (10.8 lb of acid equivalent) per acre foot	<p>Application Timing: For best results, apply in spring or early summer when aquatic weeds appear. Check for weed growth in areas heavily infested the previous year. A second application may be needed when weeds show signs of recovery, but no later than mid-August in most areas.</p> <p>Subsurface Application: Apply DMA 4 IVM undiluted directly to the water through a boat mounted distribution system. Shoreline areas should be treated by subsurface injection application by boat to avoid aerial drift.</p> <p>Surface Application: Use power operated boat mounted boom sprayer. If rate is less than 5 gallons per acre, dilute to a minimum spray volume of 5 gallons per surface acre.</p> <p>Aerial Application: Use drift control spray equipment or thickening agents mixed with sprays to reduce drift. Apply through standard boom systems in a minimum spray volume of 5 gallons per surface acre. For Microfoil® drift control spray systems, apply DMA 4 IVM in a total spray volume of 12 to 15 gallons per acre.</p> <p>Apply to attain a concentration of 2 to 4 ppm (see table below).</p>

¹DMA 4 IVM contains 3.8 lb of acid equivalent per gallon of product.

Amount to Apply to Attain a Concentration of 2 to 4 ppm			
Surface Area	Average Depth (ft)	2,4-D Acid Equivalent to Apply (lb/acre)	Amount of DMA 4 IVM to Apply (gal/acre)
1 acre	1	5.4 to 10.8	1.42 to 2.84
	2	10.8 to 21.6	2.84 to 5.68
	3	16.2 to 32.4	4.26 to 8.53
	4	21.6 to 43.2	5.68 to 11.37
	5	27.0 to 54.0	7.10 to 14.21

The following table outlines rate calculations for Renovate 3 herbicide based on desired PPM and average depth of treatment area. It is taken directly from the Renovate 3 specimen label on SePRO Corporation's website: www.sepro.com

Concentration of Triclopyr Acid in Water (ppm ae)					
	Gallons of Renovate 3 per surface acre at specified depth				
Water Depth (feet)	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	0.7	0.9	1.4	1.8	2.3
2	1.4	1.8	3.3	3.6	4.6
3	2.1	2.9	4.1	5.4	6.8
4	2.7	3.6	5.4	7.2	9.1
5	3.4	4.5	6.8	9.0	11.3
6	4.1	5.4	8.1	10.9	13.6
7	4.8	6.3	9.5	12.7	15.8
8	5.5	7.2	10.9	14.5	18.1
9	6.1	8.1	12.2	16.3	20.4
10	6.8	9.0	13.6	18.1	22.6
15	10.2	13.6	20.4	27.2	33.9
20	13.6	18.1	27.2	36.2	45.3

16.2 Common Aquatic Plants of Indiana

(See 2004 Management Plan)

16.3 Pesticide Use Restrictions Summary:

The following table was produced by Purdue University and included in the Professional Aquatic Applicators Training Manual. It gives a summary of water use restrictions on all major chemicals available for use in the aquatics market.

Table 6: Pesticide Use Restrictions

Table 1. Aquatic Herbicides and Their Use Restrictions. Always check the label because these restrictions are subject to change.

	Human		Fish Consumption	Animal	Irrigation		
	Drinking	Swimming		Drinking	Turf	Forage	Food Crops
----- waiting period, in days -----							
Copper Chelate	0	0 ^a	0	0	0	0	0
Copper Sulfate	0	0 ^a	0	0	0	0	0
Diquat	1-3	0 ^a	0	1	1-3	1-3	5
Endothall (granular) ^b	7	0 ^a	3	0	7	7	7
Endothall (liquid) ^b	7-25	0 ^a	3	7-25	7-25 ^d	7-25	7-25
Endothall 191 (granular) ^c	7-25	0 ^a	3	7-25	7-25	7-25	7-25
Endothall 191 (liquid) ^c	7-25	0 ^a	3	7-25	7-25	7-25	7-25
Fluridone	0 ^e	0 ^a	0	0	7-30	7-30	7-30
Glyphosate	0 ^e	0 ^a	0	0	0	0	0
2,4-D (granular)	*	0 ^a	0	*	*	*	*

^aAlthough this compound has no waiting period for swimming, it is always advisable to wait 24 hours before permitting swimming in the direct area of treatment.

^bTrade name is Aquathol[®].

^cTrade name is Hydrothol[®].

^dMay be used for sprinkling bent grass immediately.

^eDo not apply this product within 1/4 (fluridone) to 1/2 (glyphosate) mile upstream of potable water intakes.

*Do not use treated water for domestic purposes, livestock watering (2,4-D, dairy animals only), or irrigation.

16.4 Resources for Aquatic Management

In addition to the LARE Program, there are many other sources of potential funding to help improve the quality of Indiana Lakes. Many government agencies assist in projects designed to improve environmental quality.

The USDA has many programs to assist environmental improvement. More information on the following programs can be found at www.usda.gov.

Watershed Protection and Flood Prevention Program (USDA)

Conservation Reserve Program (USDA)

Wetlands Reserve Program (USDA)

Grassland Reserve Program (USDA)

Wildlife Habitat Incentive Program (USDA)

Small Watershed Rehabilitation Program (USDA)

The following programs are offered by the U.S. Fish and Wildlife Service. More information about the Fish and Wildlife service can be found at www.fws.gov

Partners for Fish and Wildlife Program (U.S. Fish and Wildlife Service)

Bring Back the Natives Program (U.S. Fish and Wildlife Service)

Native Plant Conservation Program (U.S. Fish and Wildlife Service)

The Environmental Protection Agency, the Indiana Department of Environmental Management, and the U.S. Forest Service also have numerous programs for funding. A few of these are listed below. More information can be found at www.in.gov/idem and www.fs.fed.us/

U.S. Environmental Protection Agency Environmental Education Program (EPA)

NPDES Related State Program Grants (IDEM)

Community Forestry Grant Program (U.S. Forest Service)

16.5 State Regulations for Aquatic Plant Management

The following information is found on the IDNR website and outlines general regulations for the management of aquatic plants in public waters.

AQUATIC PLANT CONTROL PERMIT REGULATIONS Indiana Department of Natural Resources

Note: In addition to a permit from IDNR, public water supplies cannot be treated without prior written approval from the IDEM Drinking Water Section. **Amended state statute adds biological and mechanical control (use of weed harvesters) to the permit requirements, reduces the area allowed for treatment without a permit to 625 sq ft, and updates the reference to IDEM. These changes become effective on July 1, 2002.**

Chapter 9. Regulation of Fishing IC 14-22-9-10

Sec. 10. (a) This section does not apply to the following:

- (1) A privately owned lake, farm pond, or public or private drainage ditch.
- (2) A landowner or tenant adjacent to public waters or boundary waters of the state, who chemically, mechanically, or physically controls aquatic vegetation in the immediate vicinity of a boat landing or bathing beach on or adjacent to the real property of the landowner or tenant if the following conditions exist:

(A) The area where vegetation is to be controlled does not exceed:

- (i) twenty-five (25) feet along the legally established, average, or normal shoreline;
- (ii) a water depth of six (6) feet; and
- (iii) a total surface area of six hundred twenty-five (625) square feet.

(B) Control of vegetation does not occur in a public waterway of the state.

(b) A person may not chemically, mechanically, physically, or biologically control aquatic vegetation in the public waters or boundary waters of the state without a permit issued by the department. All procedures to control aquatic vegetation under this section shall be conducted in accordance with rules adopted by the department under IC 4-22-2.

(c) Upon receipt of an application for a permit to control aquatic vegetation and the payment of a fee of five dollars (\$5), the department may issue a permit to the applicant. However, if the aquatic vegetation proposed to be controlled is present in a public water supply, the department may not, without prior written approval from the department of environmental management, approve a permit for control of the aquatic vegetation.

(d) This section does not do any of the following:

- (1) Act as a bar to a suit or cause of action by a person or governmental agency.
 - (2) Relieve the permittee from liability, rules, restrictions, or permits that may be required of the permittee by any other governmental agency.
 - (3) Affect water pollution control laws (as defined in IC 13-11-2-261) and the rules adopted under water pollution control laws (as defined in IC 13-11-2-261).
- As added by P.L.1-1995, SEC.15. Amended by P.L.1-1996, SEC.64.

312 IAC 9-10-3 Aquatic vegetation control permits

Authority: IC 14-22-2-6; IC 14-22-9-10

Affected: IC 14-22-9-10

Sec. 3. (a) Except as provided under IC 14-22-9-10(a), a person shall obtain a permit under this section before applying a substance to waters of this state to seek aquatic vegetation control.

(b) An application for an aquatic vegetation control permit shall be made on a departmental form and must include the following information:

- (1) The common name of the plants to be controlled.
- (2) The acreage to be treated.
- (3) The maximum depth of the water where plants are to be treated.
- (4) The name and amount of the chemical to be used.

(c) A permit issued under this section is limited to the terms of the application and to conditions imposed on the permit by the department.

(d) Five (5) days before the application of a substance permitted under this section, the permit holder must post clearly, visible signs at the treatment area indicating the substance that will be applied and

what precautions should be taken.

(e) A permit issued under this section is void if the waters to be treated are supplied to the public by a private company or governmental agency. (*Natural Resources Commission; 312*)

16.6 Data Sheets

Figure 21: 2008 Data Cover

Aquatic Vegetation Random Sampling (Tier 2)			
<u>Waterbody Cover Sheet</u>			
Surveying Organization:	Aquatic Weed Control		
Contact Information:	574-533-2597		
Waterbody Name:	Lake of the Woods	Lake ID:	LOTW
County(s):	Marshall County	Date:	8-1-08
Habitat Stratum:	IL	Avg. Lake Depth (ft):	16 ft
		Lake Level:	Aug
GPS Metadata			
Crew Leader:	Dave Keister	Datum:	NAD83
		Zone:	16
		Accuracy:	30 ft
Recorder:	Dave Keister	Method:	WAAS Enabled GPS
Secchi Depth (ft):	3.5	Total # of Points Surveyed:	80
		Total # of Species:	7
Littoral Zone Size (acres):	95	Littoral Zone Max. Depth (ft):	5
<input type="checkbox"/> Measured		<input type="checkbox"/> Measured	
<input checked="" type="checkbox"/> Estimated		<input type="checkbox"/> Estimate (historical Secchi)	
		<input checked="" type="checkbox"/> Estimated (current Secchi)	max plant depth
Notable Conditions:	Heavy planktonic Algae plant growth minimal		

Figure 22: 2008 Data Sheet 1

Submersed Aquatic Vegetation Survey (Tier II) Datasheet Page 1 of 3

WATERBODY NAME: <i>...</i>				DATE: <i>...</i>										
COUNTY: <i>...</i>				SECCHI DEPTH (FT): <i>5.2 + 4</i>										
SITE ID: <i>...</i>				MAX PLANT DEPTH (FT): <i>5.4</i>										
SURVEYING ORGANIZATION: <i>...</i>				WEATHER: <i>...</i>										
CREW LEADER: <i>...</i>				COMMENTS (include voucher codes - V1, V2...): <i>...</i>										
RECORDER: <i>...</i>														
CONTACT INFO:					Rake score (1, 3, 5): 9 = algae, emergent or species observed but not sampled.									
Point #	R/T	Latitude	Longitude	Depth	Species Codes:							Notes		
					NAT	POT	ST-PR	E-WE	EMER	ALGAE	OTHR			
1	R	GPS waypoints		3	3									
2				3	-									
3				3	-									
4	V			3	-									
5				3	-									
6				3	1	1								
7				3	1									
8				3	-									
9				3	-									
10				3	-									
11				3	-									
12				3	-									
13				3	-									
14				3	-									
15				3	-									
16				3	1									
17				3	-									
18				3	1									
19				3	1	3								
20				3	1									
21				3	-									
22				3	3									
23				3	-									
24				3	-									
25				3	-									
26				3	-									
27				3	-									
28				3	3	1								
29				3	-									
30				3	-									
31				3	-									
32				3	-									
33				3	3									

Other plant species observed at lake:

Figure 23: 2008 Data Sheet 2

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 2 of 3

WATERBODY NAME: <i>Lake of the Woods</i>				DATE: <i>8-1-08</i>								
COUNTY: <i>Marshall County</i>				SECCHI DEPTH (FT): <i>3.5</i>								
SITE ID: <i>L07W</i>				MAX PLANT DEPTH (FT): <i>5ft</i>								
SURVEYING ORGANIZATION: <i>Aquatic Weed Control</i>				WEATHER: <i>Sunny - mid 80s</i>								
CREW LEADER: <i>Dave Keister</i>				COMMENTS (include voucher codes - V1, V2...): <i>Water temp 83°</i>								
RECORDER: <i>Dave Keister</i>												
CONTACT INFO: <i>574-533-2097</i>				Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.								
Point #	R/T	Latitude	Longitude	Depth	Species Codes:						Notes	
					MACR	PROTE	SP-PL	COBIA				
301	R	<i>GPS waypoints</i>		3	1							
350	↓	↓	↓	3	3							
360				5	-							
370				5	-							
380				9	-							P
390				3	5							
400				1	5							
410				3		3						
420				2	1	3			1			
430				2	1							
440				2	1							
450				2	1							
460				2	1							
470				2	1							
480				2	1							
490				2	1							
500				2	1							
510				2	1							
520				2	1							
530				2	1							
540				2	1							
550				2	1							
560				2	1							
570				2	1							
580				2	1							
590				2	1							
600				2	1							
610				2	1							
620				2	1							
630				2	1							
640				2	1							
Other plant species observed at lake:												

Figure 24: 2008 Data Sheet 3

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: <i>Lake of The Woods</i>					DATE: <i>8-1-08</i>					
COUNTY: <i>Marshall County</i>					SECCHI DEPTH (FT): <i>3.5 ft</i>					
SITE ID: <i>LOTW</i>					MAX PLANT DEPTH (FT): <i>5 ft</i>					
SURVEYING ORGANIZATION: <i>Aquatic Weed Control</i>					WEATHER: <i>Sunny</i>					
CREW LEADER: <i>Dave Krister</i>					COMMENTS (include voucher codes - V1, V2...):					
RECORDER: <i>Dave Krister</i>					<i>H₂O - 83°</i>					
CONTACT INFO: <i>574-533-2597</i>					Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.					
Point #	R/T	Latitude	Longitude	Depth	Species Codes:					Notes
<i>67</i>	<i>R</i>	<i>GPS Way Points</i>		<i>7</i>	-					
<i>68</i>	<i>↓</i>	<i>↓</i>	<i>↓</i>	<i>10</i>	-					
<i>69</i>	<i>↓</i>	<i>↓</i>	<i>↓</i>	<i>8</i>	-					
<i>70</i>				<i>7</i>	-					
<i>71</i>				<i>15</i>	-					
<i>72</i>				<i>14</i>	-					
<i>73</i>				<i>17</i>	-					
<i>74</i>				<i>11</i>	-					
<i>75</i>				<i>14</i>	-					
<i>76</i>				<i>11</i>	-					
<i>77</i>				<i>13</i>	-					
<i>78</i>				<i>15</i>	-					
<i>79</i>				<i>15</i>	-					
<i>80</i>				<i>15</i>	-					
<i>81</i>				<i>15</i>	-					
<i>82</i>				<i>15</i>	-					
<i>83</i>				<i>15</i>	-					
<i>84</i>				<i>15</i>	-					
<i>85</i>				<i>15</i>	-					
<i>86</i>				<i>15</i>	-					
<i>87</i>				<i>15</i>	-					
<i>88</i>				<i>15</i>	-					
<i>89</i>				<i>15</i>	-					
<i>90</i>				<i>15</i>	-					
<i>91</i>				<i>15</i>	-					
<i>92</i>				<i>15</i>	-					
<i>93</i>				<i>15</i>	-					
<i>94</i>				<i>15</i>	-					
<i>95</i>				<i>15</i>	-					
<i>96</i>				<i>15</i>	-					
<i>97</i>				<i>15</i>	-					
<i>98</i>				<i>15</i>	-					
<i>99</i>				<i>15</i>	-					
<i>100</i>				<i>15</i>	-					
Other plant species observed at lake:										

Sample Site GPS Coordinates

Table 7: GPS Coordinates for Rake Sample Locations

Latitude	Longitude	Site
41.416935	-86.228809	1
41.415395	-86.228303	2
41.415275	-86.225817	3
41.414685	-86.22335	4
41.415866	-86.22153	5
41.417338	-86.220732	6
41.419017	-86.220846	7
41.420295	-86.222035	8
41.421359	-86.222965	9
41.422238	-86.224127	10
41.423553	-86.225509	11
41.424694	-86.22569	12
41.426108	-86.225595	13
41.427202	-86.225723	14
41.428203	-86.226447	15
41.428991	-86.227327	16
41.429976	-86.227682	17
41.430992	-86.228449	18
41.431901	-86.229363	19
41.432952	-86.230164	20
41.433733	-86.230767	21
41.434295	-86.231773	22
41.434473	-86.232836	23
41.434099	-86.23385	24
41.433395	-86.234268	25
41.432532	-86.23454	26
41.431728	-86.234697	27
41.430582	-86.234704	28
41.429743	-86.234484	29
41.428548	-86.233917	30
41.427449	-86.233392	31
41.426652	-86.23445	32
41.425623	-86.23521	33
41.424735	-86.235992	34
41.423616	-86.236354	35
41.422796	-86.235813	36
41.421781	-86.235315	37
41.42116	-86.233986	38
41.422014	-86.232508	39
41.421115	-86.232014	40
41.420272	-86.230666	41
41.419139	-86.230026	42
41.418155	-86.229289	43
41.416464	-86.228176	44
41.415281	-86.227058	45
41.416517	-86.225334	46

41.417217	-86.224204	47
41.417336	-86.222498	48
41.419745	-86.22147	49
41.421787	-86.223828	50
41.422916	-86.225212	51
41.424338	-86.226087	52
41.425764	-86.226381	53
41.427456	-86.226853	54
41.430417	-86.229601	55
41.432748	-86.231036	56
41.433232	-86.232582	57
41.432125	-86.233227	58
41.430261	-86.233909	59
41.428287	-86.233542	60
41.426395	-86.233618	61
41.424829	-86.234863	62
41.423811	-86.235225	63
41.423086	-86.234743	64
41.422543	-86.233677	65
41.421899	-86.232108	66
41.42066	-86.231317	67
41.419885	-86.229983	68
41.418643	-86.229596	69
41.417699	-86.228658	70
41.417134	-86.227745	71
41.416526	-86.22667	72
41.418076	-86.225367	73
41.422457	-86.224664	74
41.425484	-86.227144	75
41.429311	-86.229221	76
41.431501	-86.231183	77
41.429824	-86.232099	78
41.425578	-86.232878	79
41.423534	-86.232544	80

END

16.7 IDNR Aquatic Vegetation Control Permit



APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)
 Approved State Board of Accounts 2004
 Whole Lake Multiple Treatment Areas
 Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY	
License No.	
Date Issued	
Lake County	

Return to: Page 1 of
 DEPARTMENT OF NATURAL RESOURCES
 Division of Fish and Wildlife
 Commercial License Clerk
 402 West Washington Street, Room W273
 Indianapolis, IN 46204

FEE: \$5.00

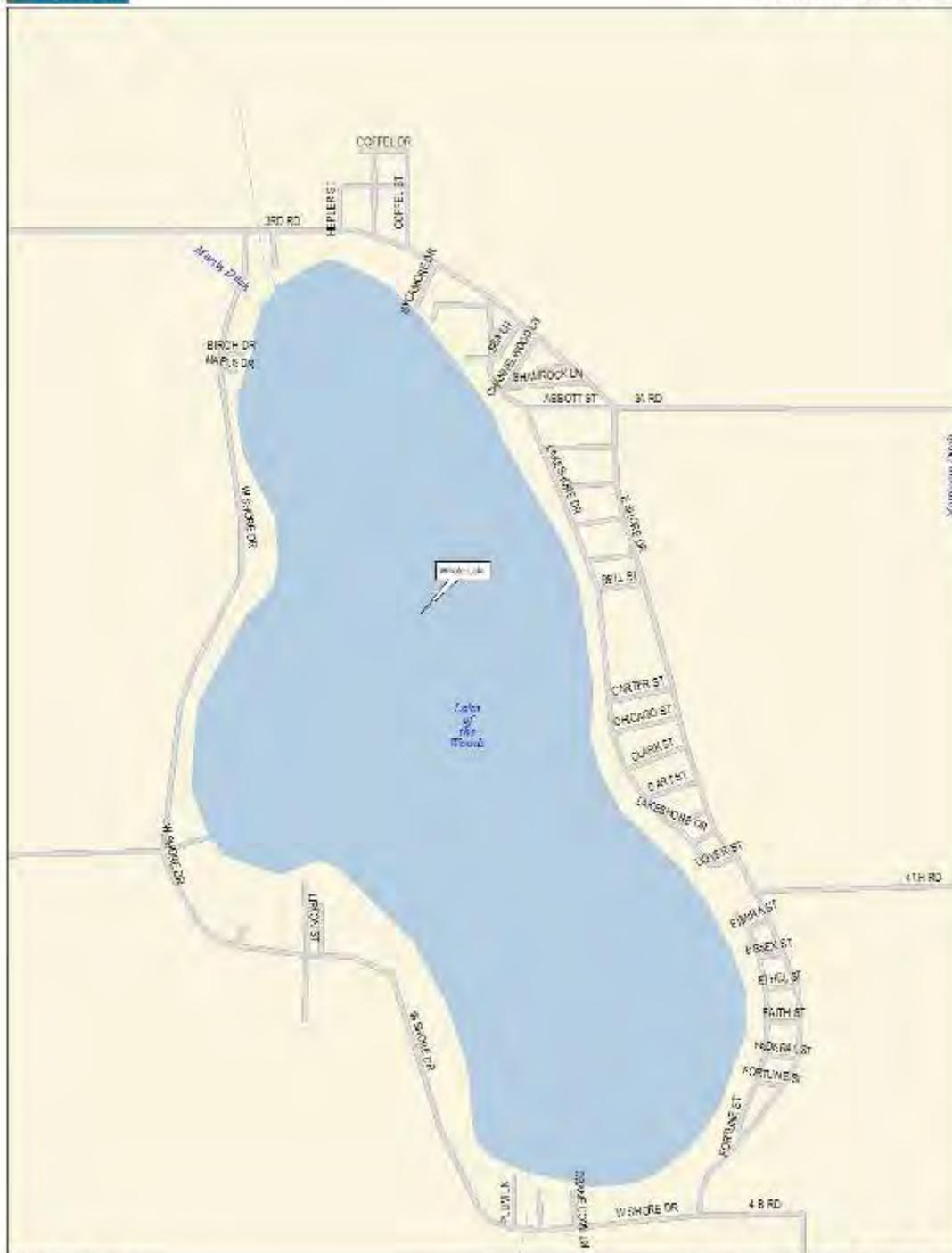
Applicant's Name Lake of The Woods Property Owners Association		Lake Assoc. Name Lake of The Woods Property Owners Association	
Rural Route or Street 3119 Sea Lane		Phone Number 574-546-4100	
City and State Bremen IN		ZIP Code 46506	
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake) Lake of The Woods	Nearest Town Bremen	County Marshall
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's N41 25.472 W86 13.774	
Total acres to be controlled 60	Proposed shoreline treatment length (ft) whole	Perpendicular distance from shoreline (ft) whole
Maximum Depth of Treatment (ft) 5 feet	Expected date(s) of treatment(s) late May early June	
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D		
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____		

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Areas based on Surveys		
Plant species based on surveys		
Eurasian Milfoil	X	100% where treatment needed



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