Shipshewana Lake Aquatic Vegetation Management Plan 2008 Update

Lagrange County, Indiana

http://129.79.145.7/arcims/statewide%5Fmxd/viewer.htm

Prepared for:

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Executive Summary

On May 3, 2007 Shipshewana Lake was treated for control of Eurasian watermilfoil (EWM) with an herbicide called Sonar at a rate of 6 parts per billion. The Shipshewana Community Lake Improvement Association privately funded the addition of 2 parts per billion of Sonar to prevent coontail (a native species) from increasing dramatically in 2007 once the Eurasian watermilfoil was removed.

Two aquatic vegetation surveys were conducted during 2007 to monitor changes in the plant community as a result of this treatment. The first survey was conducted prior to treatment on May 3, 2007, and the second was conducted on August 17, 2007. The August 2007 vegetation survey found that Eurasian watermilfoil had been reduced to the point that it was undetectable in Shipshewana Lake. The coontail population was reduced from a site frequency of 73.3% on May 3 to 36.7% on August 17, 2007.

Visual inspections of Shipshewana Lake in June of 2008 were unable to detect any Eurasian watermilfoil re-growth. Because no re-growth was found, no spot treatments for Eurasian watermilfoil were conducted during summer of 2008.

A Tier II aquatic vegetation survey was conducted on Shipshewana Lake on July 24, 2008. This survey confirmed that Eurasian watermilfoil was still undetectable in Shipshewana Lake in summer of 2008. Coontail site frequency was reduced from 36.7% in August of 2007 to 8.3% on July 24, 2008. Only two other plant species were collected during the July 2008 tier II survey. Sago Pondweed was collected at 6.7% of the sample sites, down from 11.7% in August of 2007. Chara, which had not previously been collected in Shipshewana Lake, had a site frequency of just 1.7%.

No negative impacts to the fish population have been observed since the whole lake Sonar treatment. The possibility of a fish kill as a result heavy algal blooms was a concern, but no fish kills have been observed even though planktonic algae continues to be prevalent in Shipshewana Lake.

As outlined in the 2006 management plan, poor water quality will likely prevent many native plants from colonizing areas previously infested by Eurasian watermilfoil. Coontail a native plant which does very well in nutrient rich water will likely continue to be the most dominant plant in Shipshewana Lake. Its population should be monitored in 2009 to document how it responds over time to the Sonar treatment.

No herbicide treatments for native species will be allowed on Shipshewana Lake in 2009. This will continue to give native plants a chance to re-establish themselves. Based on results from other whole lake Sonar treatments, more re-growth of Eurasian watermilfoil is expected in 2009. Spot treatments using 2, 4-D will be used to manage any areas of Eurasian watermilfoil re-growth. Funding should be set aside to treat these areas.

It is recommended that $3,700 be set aside to treat up to 10 acres of Eurasian watermilfoil re-growth since no areas were treated in 2008. Original estimates called for treating 5 acres in both 2008 and 2009. Since no re-growth was observed in 2008, it is difficult to estimate exact

Eurasian watermilfoil acreage for 2009. Up to $4,500 dollars should also be set aside for survey and planning costs.

2009 Management Options

1. Chemically treat any areas of Eurasian milfoil re-growth
   A. Treat up to 10 acres for Eurasian milfoil with 2, 4-D up to $3,700

2. Conduct a spring visual survey for EWM and a late season Tier II vegetation survey to monitor both Eurasian milfoil and native plant populations.
   A. Aquatic Vegetation Survey and Plan Update Up to $4,500

Total Cost Estimates

2,4-D spot treatments for Eurasian watermilfoil	$3,700
Surveys and AVMP update	$4,500
Total cost	$8,200
Lake and River Enhancement Share	$7,380
Association's Share	$820

The original 3 year budget estimates are included below for Reference.

Project	**2007**	**2008**	**2009**	**3 Year Cost Totals**
Whole Lake Fluridone Treatment - 6ppb				
Total Estimated Costs	$ 26,300	$0	$0	**$ 33,250**
LARE share – subject to availability	$ 23,670			**$ 27,045**
Association's Share	$ 2,630			**$ 6,205**
Additional 2 ppb to Control Coontail Additional Cost to Association (Not Eligible for LARE Funding)	$3,200			
Follow Up Spot Treatments using 2, 4-D		Up to 5 acres if needed		
Total Estimated Costs	$0	$ 1,875	$ 1,875	
LARE Share – subject to availability		$1687.50	$1687.50	
Association's Share		$187.50	$187.50	

Acknowledgements

Aquatic vegetation surveys conducted on Shipshewana Lake were made possible by funding from the Shipshewana Community Lake Improvement Association and the Indiana Department of Natural Resources through the Lake and River Enhancement Program (LARE). 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 both Tier I and Tier II aquatic vegetation surveys. Gwen White and Angela Sturdevant, aquatic biologists for the LARE program, provided valuable consultation regarding the requirements and objectives of this lake management plan. District 2 Fisheries Biologists, Neil Ledet and Larry Koza, also provided valuable input and consultation regarding management strategies at Shipshewana Lake. Aquatic Weed Control would also like to thank the members of the Shipshewana Community Lake Improvement Association for their commitment to improving this lake and for valuable discussion and input brought forward at the informational meeting held on September 15, 2008.

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1.0 Introduction

The first aquatic vegetation survey conducted by Aquatic Weed Control on Shipshewana Lake took place on May 17, 2007. In summer of 2006, approximately 15 acres of Shipshewana Lake were treated with 2, 4-D to try to alleviate severe matting of Eurasian watermilfoil (EWM) and coontail in the south end of Shipshewana Lake. In 2006, Shipshewana Lake did not have a completed vegetation management plan, and no funding was available for a whole lake treatment. Based on 2006 survey results, a whole lake Sonar treatment was proposed by Aquatic Weed Control and accepted by IDNR biologists.

On May 3, 2007, the entire lake was treated with Sonar to control Eurasian watermilfoil (EWM) and reduce the coontail population. After the Sonar treatment, Eurasian watermilfoil was not found in the late season plant survey of 2007.

In 2008, no herbicide treatments were conducted for native species in Shipshewana Lake. No EWM was found in Shipshewana Lake in 2008 by visual inspection or by the late season Tier II survey, so no spot treatments using 2, 4-D were conducted.

In 2009 no herbicide treatments to control native plant species are recommended. This may help native plants to re-establish themselves in areas where EWM was previously dominant. Table 1 summarizes all LARE funded activities on Shipshewana Lake.

Table 1:Shipshewana Lake LARE History

Year	Action	Date	Funding Source
2006	Spring and Late Season Aquatic Vegetation Surveys 15 acres treated for EWM with 2, 4-D Management Plan Development	Spring Survey May 17, 2006 July 12, 2006 Late Season Survey August 2, 2006	Lake and River Enhancement Shipshewana Community Lake Improvement Association
2007	Whole Lake Sonar Treatment Aquatic Vegetation Surveys and Management Plan Update	Spring Survey May 3, 2007 Sonar Treatment Mary 3, 2007 Late Season Survey August 17, 2007	Lake and River Enhancement Shipshewana Community Lake Improvement Association
2008	Spring visual inspection for EWM re-growth Late Season Tier II aquatic vegetation survey and plan update	Visual inspection June 2008 Late Season Survey July 24, 2008	Lake and River Enhancement Shipshewana Community Lake Improvement Association

Table 2 is provided for reference regarding plant names commonly used in this document.

Table 2: Common and Scientific Plant Names

Scientific Name	Common Name
Myriophyllum spicatum	Eurasian Watermilfoil
Ceratophyllym demersum	Coontail
Potamogeton pectinatus	Sago Pondweed
Potamogeton foliosus	Leafy Pondweed
Chara sp.	Chara

2.0 Watershed and Lake Characteristics Update

Shipshewana Lake is located in western Lagrange County, near the town of Shipshewana, Indiana. It has 202 surface acres with a maximum depth of 14 feet and an average depth of 7 feet (Tyllia, 2000). Cotton Lake Ditch is the lake's major inlet entering from the south (Koza, 2002). The lakes outlet is Page Ditch which exits the lake along the east shore and flows into Taylor Lake and the Pigeon River.

Shipshewana Lake has had a history of poor water quality and high levels of nutrient loading. In 1983, a request was submitted to the Indiana Department of Environmental Management to evaluate the Shipshewana Lake watershed (Koza, 2002). International Science and Technology conducted a feasibility study to improve water quality at Shipshewana Lake. This study recommended that dredging should take place to remove excess sediment from the lake. The dredging project was conducted in 1999 and removed approximately 227, 500 cubic yards of sediment from Shipshewana Lake. However, the project was never completely finished due to a lack of funding. Total costs for the project was around $2.4 million (Koza, 2002).

One exciting new note for the Shipshewana Lake watershed is the possibility installation of a lake wide sewer system, which could begin within the next two to three years. The addition of this sewer system could help reduce nutrient inputs to Shipshewana Lake. This would have a very positive long term effect on nutrient loading for Shipshewana Lake. Currently, additional funding sources are being explored by the lake association to help reduce cost of this sewer system for lake residents.

3.0 Lake Uses Update

Shipshewana Lake has 2 public access points. One DNR public access site is located on the south shore of the lake and has very limited parking. A newer boat ramp has been constructed on the west shore of the lake with a larger parking area. The new boat ramp will increase public access to Shipshewana Lake. Figure 1 shows the west boat ramp at Shipshewana Lake.

Conversations with lake residents in 2008 indicate that bass fishing in Shipshewana Lake is still popular and productive. Spring fishing can be especially good with many bass in the 2 to 3 pound range being caught, along with other larger bass.

Figure 1: Newest Shipshewana Lake Public Access Site

4.0 Fisheries

District 2 Fisheries Biologist, Neil Ledet and Assistant Fisheries Biologist Larry Koza were contacted to determine the most recent fisheries survey data for Shipshewana Lake. Six fisheries surveys have been conducted on Shipshewana Lake with the most recent fisheries survey taking place on June 3-7 of 2002. These surveys are discussed in detail in the 2007 Shipshewana AVMP update. No new fisheries data has been collected in 2008.

5.0 Problem Statement

Eurasian watermilfoil has not been found in Shipshewana Lake since the Sonar Treatment in 2007. It is expected to return to the lake in some capacity in 2009. The fact that no EWM at all was found in 2008 makes predicting EWM re-growth acreages very challenging for 2009. The challenge for 2009 will be to identify areas of EWM re-growth through proper vegetation survey techniques and manage them effectively with herbicide treatments. Since some EWM re-growth is expected in 2009, spot treatments should be used to manage these smaller areas, as opposed to a whole lake treatment. Spot treatments will use 2, 4-D to control Eurasian watermilfoil.

6.0 Vegetation Management Goals and Objectives

The following management goals have been established by the IDNR for all Indiana lakes, including those applying for LARE funding. Any management practices implemented on Shipshewana Lake are to directly facilitate the achievement of these three goals:

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

One measurable goal for 2009 would be that no more than 10 acres of Eurasian watermilfoil would need treatment in Shipshewana Lake. Re-growth is expected over time, and no re-growth at all was observed in 2008. EWM control for 2008 was more complete than expected, but EWM is expected to return to Shipshewana Lake in 2009.

The major objective for Shipshewana Lake has changed from a large scale treatment effort to reduce the dominant milfoil population, to smaller scale treatments in areas where re-growth is observed in the future. These areas of re-growth will be treated with 2, 4-D herbicide.

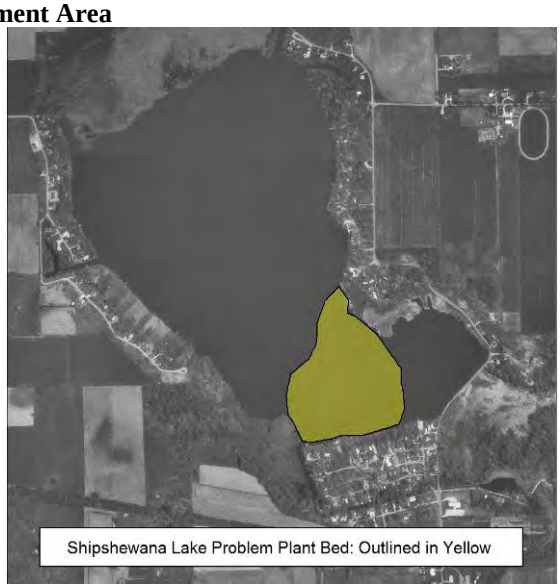
7.0 Past Management Efforts

District 2 Fisheries Biologist, Neil Ledet, was contacted to determine any significant changes to vegetation control permits on Shipshewana Lake. No herbicide treatments of any kind have been conducted on Shipshewana Lake in 2008. Control of native vegetation has been stopped to allow native plants to re-establish themselves. No EWM has been found since the Sonar treatment, so no spot treatments using 2, 4-D have been conducted since 2006.

On July 12, 2006, approximately 15 acres of Shipshewana Lake were treated with 2, 4-D to alleviate severe matting of Eurasian watermilfoil and coontail in the south end of Shipshewana Lake. This treatment area was located inside the problem plant area outlined in yellow in Figure 2. This dense plant bed was nearly cutting the lake in half, making it

extremely difficult for a boat to travel from the public access site to the north end of the lake. This treatment was sponsored by the LARE program and the lake association to provide some temporary relief until a larger management strategy could be developed. Even after this treatment, matted vegetation still impeded boat traffic. This area is outlined in Figure 2.

Figure 2: 2006 2, 4-D Treatment Area



Even though the bed in Figure 2 was very problematic, it was not the only plant bed where Eurasian watermilfoil was found. Eurasian watermilfoil was present throughout the lake.

Sediment and Nutrients

In addition to the dredging project and herbicide treatments, two small ponds have been constructed on the ditch that enters Shipshewana Lake on its south side. These ponds act as a catch basin for nutrients and sediment coming through this ditch. These ponds were found to be infested with Eurasian watermilfoil and were treated with Sonar to prevent rapid re-infestation after the whole lake Sonar treatment.

Several other studies have been conducted on Shipshewana Lake Since 1989. They contain useful information on management activities that have taken place in the past on Shipshewana Lake. Some of these studies are listed below. These studies can be found on the LARE program website at the following address:
http://www.in.gov/dnr/fishwild/lare/lare_reports.html

Shipshewana Lake Restoration Feasibility Study. March 1989. International Science and Technology Inc. 11260 Roger Bacon Drive Suite 201. Reston Virginia 22090
Shipshewana Lake Pre-Design Report. January 1996. F.X. Browne Inc. 220 South Broad Street. Lausdale, PA. 19446

Shipshewana Lake Shoreline Stabilization Report. January 1996. F.X. Browne Inc. 220 South Broad Street. Lausdale, PA. 19446

Contract Documents and Specifications for the Construction of Shipshewana Lake Restoration Project: Two Constructed Wetlands. March 1998. F.X. Browne Inc. 220 South Broad Street. Lausdale, PA. 19446

Shipshewana Lake Dredging Project. April 1998. F.X. Browne Inc. 220 South Broad Street. Lausdale, PA. 19446

2007 Sonar Application

On May 3, 2007, the entire lake was treated with Sonar at a total rate of 8 parts per billion (ppb). The LARE program helped to fund a rate of 6ppb to control Eurasian watermilfoil and gave approval for the lake association to privately fund the addition of 2 ppb to help reduce the coontail population. The herbicide was applied using underwater injection systems from 2 of Aquatic Weed Control's application boats. It was applied in a zigzag pattern over the entire lake. Sonar was also applied in the small pond that flows into Shipshewana Lake's south end to protect against re-infestation. FasTESTS were taken approximately 3 weeks after treatment and found that Sonar rates in Shipshewana Lake ranged from 6 to 12 parts per billion. Because the results were slightly higher than anticipated, SePRO advised Aquatic Weed Control not to bump the concentration but to take another FasTEST later to ensure that the herbicide was remaining in the water column. A second round of FasTESTS were collected on June 8 and still showed Sonar concentrations from 1.3 to 3.1 parts per billion, so a bump was not recommended.

Sonar works by prohibiting the plant from making chlorophyll, which in turn prevents the plant from making food. This whitening of plant material due to a lack of chlorophyll is called chlorosis. Figure 3 shows coontail collected from Shipshewana Lake approximately 3 weeks after treatment. This coontail was exhibiting Sonar damage, as indicated by the whitening of the leaves.

Figure 3: Coontail Showing Chlorosis from Sonar

Before the whole lake Sonar treatment, herbicide applications were limited to contact herbicides applied along lake frontages at the request of property owners. These treatments have been very limited. One area treated on a regular basis is the beach area for the Brethren Camp on Shipshewana Lake. Other treatments are very sporadic and usually only involve 50-100 feet of frontage.

8.0 Aquatic Plant Community Characterization

Survey and data analysis techniques have not changed since the completion of the 2007 Aquatic Vegetation Management Plan Update. No invasive map is included in this section because no EWM was found in 2008.

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 Shipshewana Lake Aquatic Vegetation Management Plan Update.

Shipshewana Lake is classified as hypereutriophic by the IDNR with and has 202 acres. Based on these characteristics, 60 sites are divided between the 0 – 5 foot and the 5 – 10 Foot depth contours of the Lake, with 50 of these sites being taken between 0 and 5 feet deep.

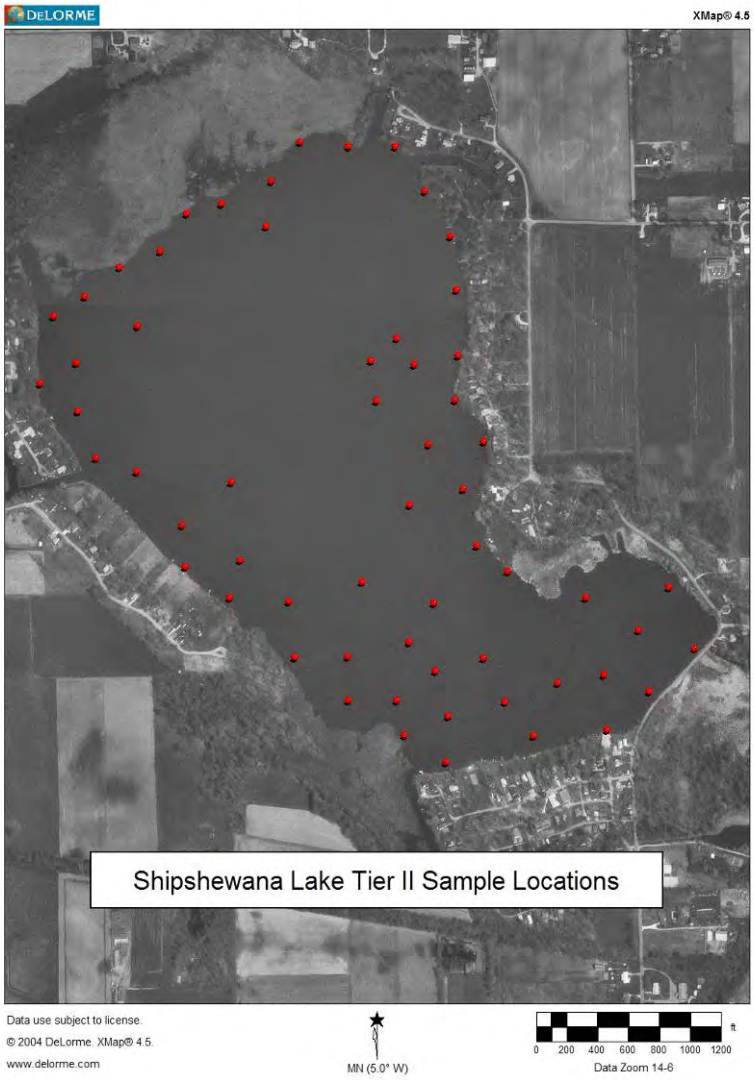
8.2 Results

8.2.1 Tier II Results

One Tier II survey was conducted on Shipshewana Lake in 2008. This was a late season Tier II survey conducted on July 24, 2008. Secchi disk measurements were recorded at 2.1 feet which was down slightly from the August of 2007 when secchi depth was measured at 2.3 feet. Maximum plant depth was approximately 5 feet, which was also down slightly from 6 feet in 2007.

In both 2007 and 2008, sixty rake samples were distributed throughout each 5 foot depth contour of the littoral zone. A total of 3 species of submersed aquatic plants (coontail, sago pondweed, and chara) were collected during the 2008 Tier II survey, which is up slightly from the 2 species that were found in the late season survey in 2007. Figure 4 shows the locations of all sample sites for the 2007 and 2008 Tier II surveys.

Figure 4: Shipshewana Lake Rake Sample Locations



2008 Tier II Data Analysis

The following tables are data summaries for the July 24, 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 other tables describe each depth contour of the lake's littoral zone (0-5 feet, 5-10 feet, etc).

Table 3: 2008 Data Analysis: Overall

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	Shipshewana Lake	Secchi:	2.1	SE Mean Species/site:	0.05
Date:	7/24/2008	Littoral sites with plants:	10	Mean natives/site:	0.17
Littoral depth (ft):	5.0	Number of species:	3	SE Mean natives/site:	0.05
Littoral sites:	50	Maximum species/site:	1	Species diversity:	0.58
Total sites:	60	Mean number species/site:	0.17	Native diversity:	0.58
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	8.3	5.0	3.3	0.0	3.0
Sago Pondweed	6.7	0.0	6.7	0.0	4.0
Chara	1.7	1.7	0.0	0.0	0.3
Filamentous Algae	3.3				

Table 4: 2008 Data Analysis: 0 - 5 feet

Occurrence and Abundance of Submersed Aquatic Plants 0-5 Feet					
Lake:	Shipshewana Lake	Secchi:	2.1	SE Mean Species/site:	0.06
Date:	7/24/2008	Littoral sites with plants:	10	Mean natives/site:	0.20
Littoral depth (ft):	5.0	Number of species:	3	SE Mean natives/site:	0.06
Littoral sites:	50	Maximum species/site:	1	Species diversity:	0.58
Total sites:	50	Mean number species/site:	0.20	Native diversity:	0.58
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	10.0	6.0	4.0	0.0	3.6
Sago Pondweed	8.0	0.0	8.0	0.0	4.8
Chara	2.0	2.0	0.0	0.0	0.4
Filamentous Algae	4.0				

No plants were found in Shipshewana Lake at depths greater than 5 feet in 2008.

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:

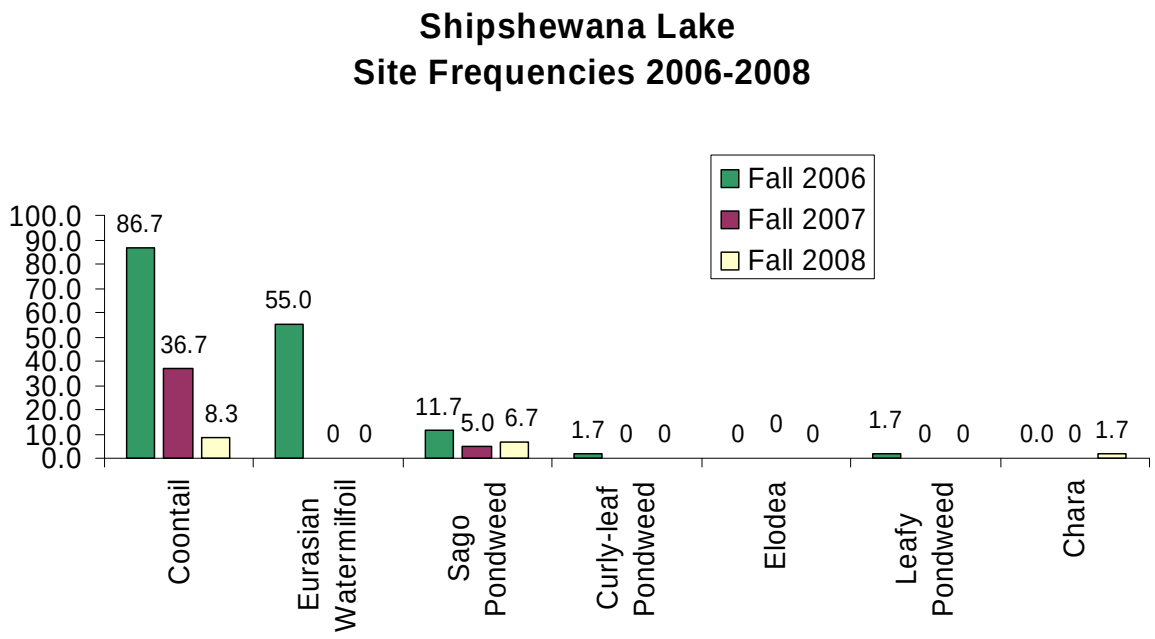
$$\text{Site Frequency} = \frac{(\text{\# of sites where the species was collected})}{\text{Total \# of littoral sample sites}} \times 100$$

Figure 5 shows site frequencies for every plant collected in between fall 2006 and fall 2008. The Sonar treatment took place after the spring 2007 survey. Fall 2006 data shows frequencies prior to the whole lake Sonar treatment on May 3, 2007.

Coontail was the most commonly collected plant in all surveys. Its site frequency has dropped from 86.7% before the sonar treatment to 8.3% in 2008.

Sago pondweed has been collected in each Tier II survey at low levels. Eurasian watermilfoil site frequency dropped from 55.0 in fall of 2006 to 0 in fall of 2007 and was not found in the lake in 2008.

Figure 5: Shipshewana Lake Site Frequencies



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.

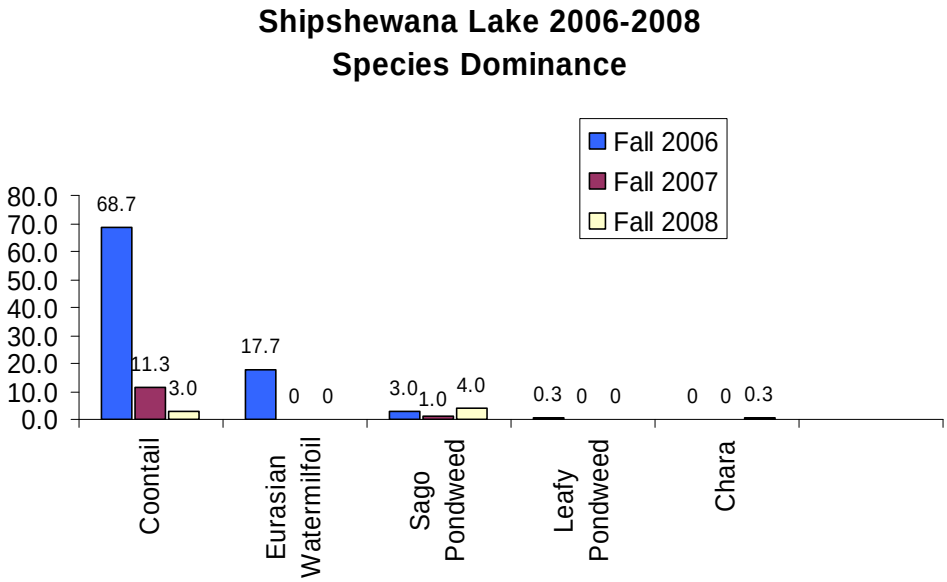
The overall species diversity index for Shipshewana Lake on July 24, 2008 was 0.58 which is up from 0.21 in August 2007. Diversity was very similar to fall of 2006 before treatment when species diversity was 0.56. These values are low when compared to other Indiana lakes (Pearson 2004). No invasive plants were found in July of 2008, so native diversity was the same as overall diversity (0.58). Native plant diversity in 2008 was greater than August of 2007 (0.21) and August of 2006 (0.24).

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 6 tracks dominance values for each plant collected at Shipshewana Lake during the fall 2006, 2007 and 2008 surveys. Trends are similar to sight frequency, with coontail dominance dropping sharply after the sonar treatment in 2007. Eurasian watermilfoil dominance dropped to 0 after treatment in 2007 and was not present in 2008.

Figure 6: Shipshewana Lake Species Dominance



8.3 Macrophyte Inventory Discussion

Eurasian watermilfoil covered an estimated 40 acres of Shipshewana Lake prior to the Sonar treatment on May 3, 2007. Since the whole lake Sonar treatment, EWM has been undetectable in Shipshewana Lake. Up to 5 acres of re-growth were expected in 2008, but no EWM re-growth was found by visual inspection or in the late season 2008 Tier II survey.

Coontail abundance has declined from 86.7% site frequency before the Sonar treatment to just an 8.3% site frequency on July 24, 2008. Coontail was the most frequently collected plant in Shipshewana Lake, both before and after the Sonar treatment. Its abundance should

be monitored in the years to come. It is an important native species. In Shipshewana Lake, it was present in nuisance levels and impeded boating significantly. Ideally coontail abundance would increase, but not to the point of severely impairing recreation.

Sago pondweed has been present in low abundance in each of the late season Tier II surveys since 2006. Based on data from other whole lake sonar treatments, sago pondweed may be expected to increase in Shipshewana Lake. So far its site frequency level has remained relatively stable.

Leafy pondweed and chara are other species that have been collected in Shipshewana Lake, but very sparingly. It is unclear whether these species may increase to and abundance that may be collected more regularly.

Based upon Tier II survey data, Shipshewana Lake continues to have a very low diversity of submersed aquatic plants when compared with many area lakes. Species richness in Shipshewana Lake is low with only 5 submersed species collected in May of 2007 and only 2 species collected in August of 2007 after treatment. Three native plant species were found in July of 2008. Coontail is by far the most dominant species and will likely continue its dominance. Planktonic algal blooms have historically occurred each summer and will likely continue, giving the water lime green coloration. Figure 9 shows green planktonic algae concentrated at a windward shoreline in Shipshewana Lake. Algal blooms were heavy in 2008, and may have contributed to the overall lack of plant growth in July of 2008.

Figure 7: Shipshewana Lake Planktonic Algae

As mentioned in the 2006 vegetation management plan, the nutrient rich water of Shipshewana Lake poses many challenges to vegetation management. The re-colonization of native plants in areas previously occupied by EWM may be inhibited by the turbidity of the water. Coontail, a native plant which does well in turbid water, could increase to nuisance

levels very quickly. Based on results of other whole lake Sonar treatments, sago pondweed abundance may be expected to increase in the lake. It is hoped that it might become dominant in areas where EWM was prevalent. However, a quick re-colonization of the lake by beneficial native plants other than coontail should not be expected.

Threatened and Endangered Species

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 attempt to determine the state's most significant natural areas through an intensive statewide inventory. 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 process, becoming an increasingly valuable tool for decision makers and scientists as it progresses."

No state or federally listed plant species were found in Shipshewana Lake in 2008.

9.0 Aquatic Plant Management Alternatives

Management practices for the control of EWM have not changed significantly since the 2006 lake management plan.

As outlined in the treatment strategy, 2, 4-D will be used to treat areas of Eurasian watermilfoil re-growth in 2009. Plants in Shipshewana Lake grow to a depth of at least 6 feet. Using 2, 4-D should provide very similar control to Renovate, while greatly reducing cost in the deeper treatment areas.

The Shipshewana Community Lake Improvement Association has helped to co-sponsor many sediment and nutrient removal activities on the lake and has participated in a volunteer monitoring program in the early 1990's.

Sediment and nutrient control is very important for Shipshewana Lake. There are two ponds designed to act as a sediment trap on the inlet on the south side of the lake near the IDNR public access site. This sediment trap was infested with Eurasian watermilfoil as well and was treated with Sonar in 2007 to prevent re-infestation in Shipshewana Lake.

10.0 Public Involvement

A LARE meeting was held on November 10, 2008 to discuss issues pertaining to Shipshewana Lake. District 2 Fisheries Biologist, Neil Ledet, a lake representative, Aquatic Weed Control and LARE Aquatic Biologist, Gwen White, were all present and discussed the plant community of Shipshewana Lake.

A public lake meeting was held for Shipshewana Lake on September 15, 2008. Six people were in attendance, which is down from 15 people on 2007. All six people in attendance indicated that they owned property around Shipshewana Lake. Jim Donahoe of Aquatic Weed Control summarized LARE management activities and outlined the future management strategy for maintaining the Eurasian watermilfoil population at a low level with spot herbicide treatments. Residents were pleased with the outcome of the whole lake treatment. Figure 8 shows responses to the public questionnaire.

Figure 8: Shipshewana Lake Public Questionnaire

Total: 6

Lake Use Survey — Lake name Shipshewana Lake

Are you a lake property owner? Yes 6 No 0

Are you currently a member of your lake association? Yes 6 No 0

How many years have you been at the lake?
- 2 or less - 0
- 2 – 5 years - 1
- 5-10 years - 2
- Over 10 years - 3

How do you use the lake (mark all that apply)

3 Swimming	0 Irrigation
4 Boating	0 Drinking water
6 Fishing	0 Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 0 No 6

Do you currently participate in a weed control project on the lake? Yes 5 No 0

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 0 No 6

Does the level of vegetation in the lake affect your property values? Yes 4 No 2

Are you in favor of continuing efforts to control vegetation on the lake? Yes 6 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 6 No 0

Mark any of these you think are problems on your lake:
- 0 Too many boats access the lake
- 0 Use of jet skis on the lake
- 0 Too much fishing
- 0 Fish population problem
- 2 Dredging needed
- 0 Overuse by nonresidents
- 1 Too many aquatic plants
- 0 Not enough aquatic plants
- 5 Poor water quality
- 0 Pier/funneling problem

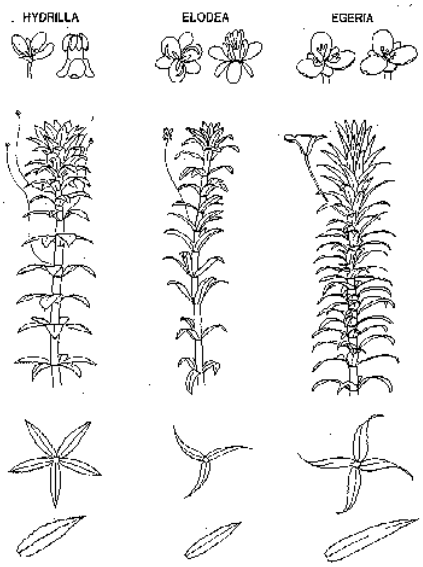
Please add any comments:
Weed growth diminished with treatment; algae

11.0 Public Education

The Shipshewana Lake association is active and holds two meetings per year with good attendance (~50 %). 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 it federally listed as a 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 Treatment Action Strategy

Eurasian watermilfoil was not found in Shipshewana Lake in fall of 2007 or during the entire year of 2008. This was longer lasting, more complete control than expected, and makes estimating EWM acreage in 2009 very challenging. Based on results from other whole lake Sonar treatments, EWM may re-grow and infest up to 10 acres of Shipshewana Lake in 2009. Any areas of Eurasian watermilfoil re-growth should be identified and treated with 2, 4-D herbicide. 2, 4-D and Renovate are the most common herbicides used for spot treatments of Eurasian watermilfoil. Both herbicides provide effective control, but using 2, 4-D will greatly reduce costs to the association.

A vegetation control permit will be submitted in 2009 listing possible areas of EWM re-growth as one treatment area, and possible areas of heavy coontail infestation as a separate treatment area. The permit will request treatment of up to 10 acres of Eurasian watermilfoil. Exact locations of treatment areas are not yet known, as Eurasian watermilfoil has not yet begun to re-grow, and coontail is not currently present at nuisance levels.

Maintenance of the Eurasian watermilfoil population should be the highest priority. Spot herbicide treatments should be limited to areas of Eurasian watermilfoil infestation to protect the native species that are re-colonizing the lake. Treatment of native plants along shorelines of the main lake could possibly be permitted in 2009 on a case by case basis, but is not recommended unless coontail is severely inhibiting recreation.

In addition to herbicide treatments, all stakeholders in the Shipshewana Lake watershed are encouraged to take actions to reduce nutrient flow into Shipshewana Lake. Those living near the lake should try to minimize runoff of nutrients into the lake from their property. Using low phosphorus fertilizer and ensuring proper septic maintenance are small steps that could help improve water quality. Farmers within the watershed may want to take advantage of financial assistance from the Indiana Conservation Reserve Program. Cost shares and yearly payments are available for the construction of sod waterways and warm season grass plantings that can help reduce agricultural runoff to Shipshewana Lake.

Herbicide Specifications

In treatment areas on Shipshewana Lake 2, 4-D should be applied at a rate of 1.76 parts per million to achieve adequate control of Eurasian Watermilfoil.

13.0 Project Budget

It is recommended that $3,700 be set aside to treat up to 10 acres of Eurasian watermilfoil re-growth since no areas were treated in 2008. Original estimates called for treating 5 acres in both 2008 and 2009. Since no re-growth was observed in 2008, it is difficult to estimate exact Eurasian watermilfoil acreage for 2009. Up to $4,500 dollars should also be set aside for survey and planning costs.

2009 Management Options

1. Chemically treat any areas of Eurasian milfoil re-growth
   A. Treat up to 10 acres for Eurasian milfoil with 2, 4-D up to $3,700

2. Conduct a spring visual survey for EWM and a late season Tier II vegetation survey to monitor both Eurasian milfoil and native plant populations.
   A. Aquatic Vegetation Survey and Plan Update Up to $4,500

Total Cost Estimates

2,4-D spot treatments for Eurasian watermilfoil	$3,700
Surveys and AVMP update	$4,500
Total 2009 Cost	$8,200
Lake and River Enhancement Share	$7,380
Association's Share	$820

14.0 Monitoring and Plan Update Procedures

In 2009, a spring visual survey will be conducted to search for any areas of Eurasian watermilfoil re-growth. Should any Eurasian watermilfoil be found, a treatment map will be submitted to the IDNR prior to treatment if the area is greater than 10 acres. Herbicide treatment would follow the approval of the treatment map.

A late season Tier II vegetation survey is recommended for Shipshewana Lake in 2009. This survey will help describe how the plant community is responding to the whole lake treatment.

In the years that follow, additional surveys should be conducted to determine how the Eurasian milfoil population is reacting to the management strategy over a long period of time. These surveys will provide a basis for evaluation of the management strategy and can be presented to the public should the need arise to modify the management strategy. They will also serve to keep the public interested and informed about management practices at the lake so they will be motivated and equipped to actively participate in the conservation of the Shipshewana Lake ecosystem. The intensity and frequency of vegetation surveys may

change from year to year. Survey and planning needs should be re-evaluated each year to reduce unnecessary cost to the lake association while still providing adequate data to characterize the plant community.

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 **x** 25 **x** 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 quarts **x** 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 †	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	**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. **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. **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. **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. Apply to attain a concentration of 2 to 4 ppm (see table below).

†DMA 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 2006 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 5: Pesticide Use Restrictions

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

	Human			Animal	Irrigation		
	Drinking	Swimming	Fish Consumption	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	*	*	*	*

[a]Although 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.

[b]Trade name is Aquathol®.

[c]Trade name is Hydrothol®.

[d]May be used for sprinkling bent grass immediately.

[e]Do 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 Public Questionnaire

Total: 6

Lake Use Survey — Lake name Shipshewana Lake

Are you a lake property owner? Yes 6 No 0

Are you currently a member of your lake association? Yes 6 No 0

How many years have you been at the lake?
- 2 or less - 0
- 2 – 5 years - 1
- 5-10 years - 2
- Over 10 years - 3

How do you use the lake (mark all that apply)
- 3 Swimming
- 4 Boating
- 6 Fishing
- 0 Irrigation
- 0 Drinking water
- 0 Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 0 No 6

Do you currently participate in a weed control project on the lake? Yes 5 No 0

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 0 No 6

Does the level of vegetation in the lake affect your property values? Yes 4 No 2

Are you in favor of continuing efforts to control vegetation on the lake? Yes 6 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 6 No 0

Mark any of these you think are problems on your lake:
- 0 Too many boats access the lake
- 0 Use of jet skis on the lake
- 0 Too much fishing
- 0 Fish population problem
- 2 Dredging needed
- 0 Overuse by nonresidents
- 1 Too many aquatic plants
- 0 Not enough aquatic plants
- 5 Poor water quality
- 0 Pier/funneling problem

Please add any comments:
Weed growth diminished with treatment; algae

16.7 Species Distribution Maps

Figure 9: Shipshewana Lake Rake Sample Locations

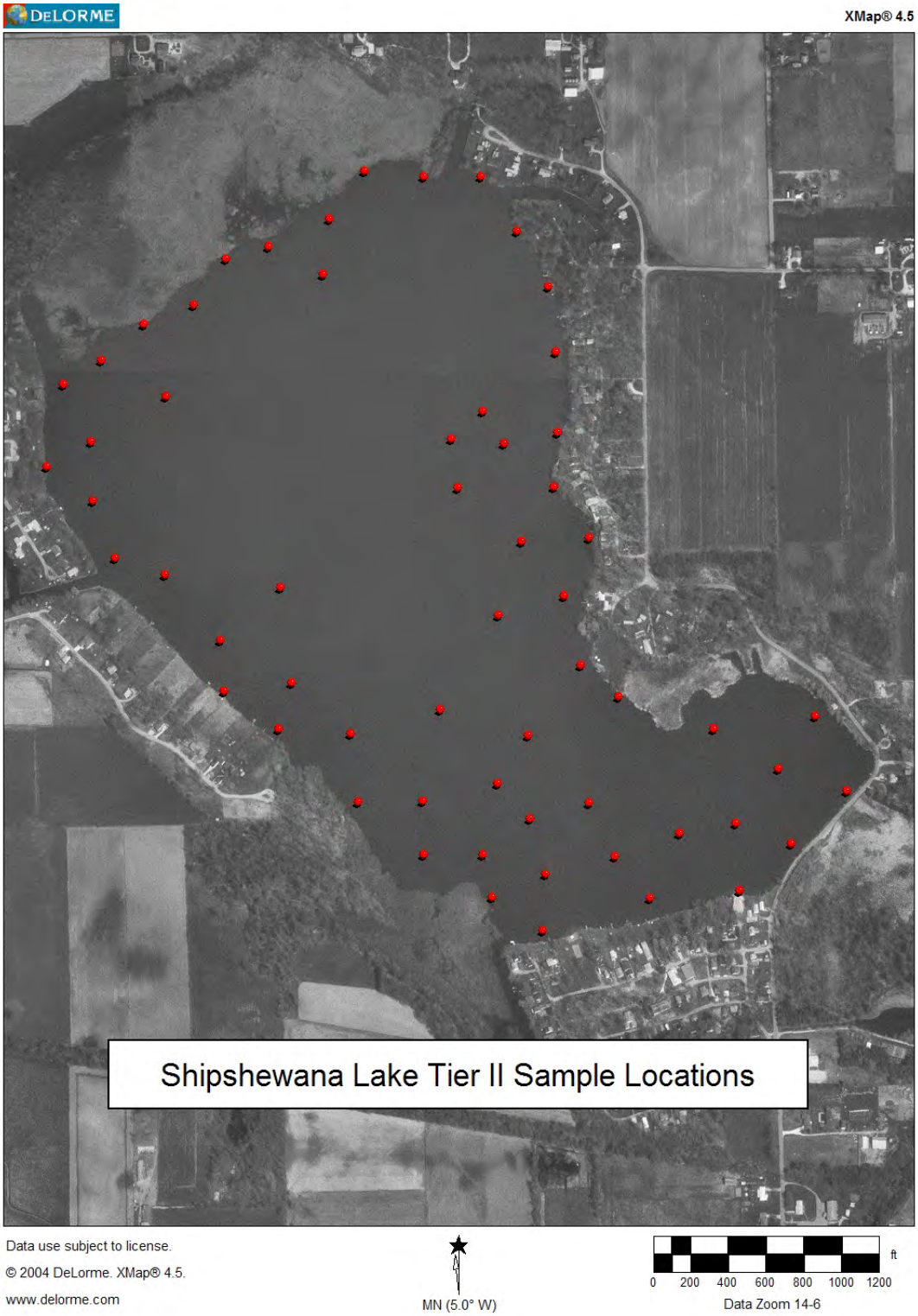


Figure 10: Shipshewana Lake 2008 Chara Locations

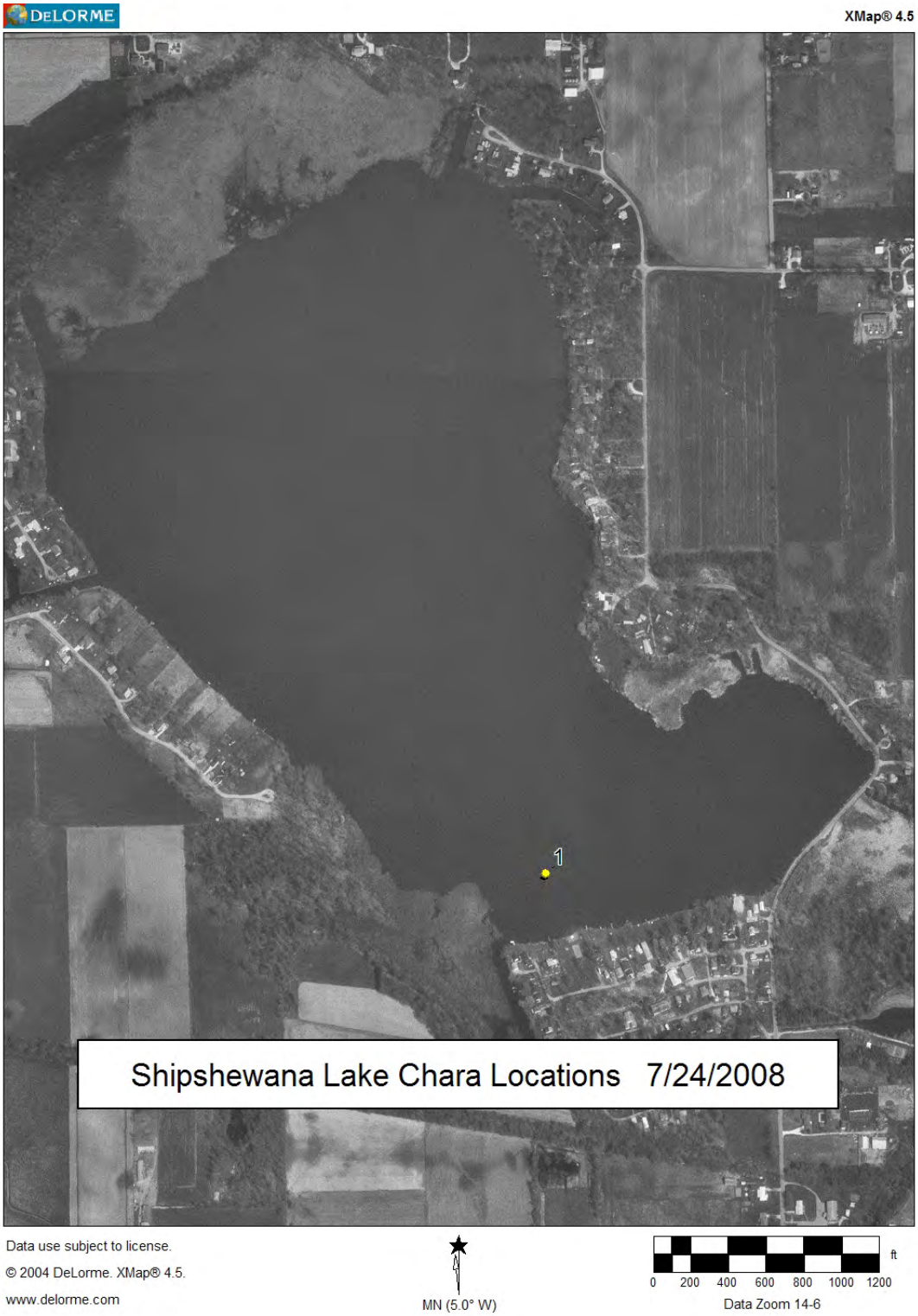


Figure 11: Shipshewana Lake 2008 Coontail Locations

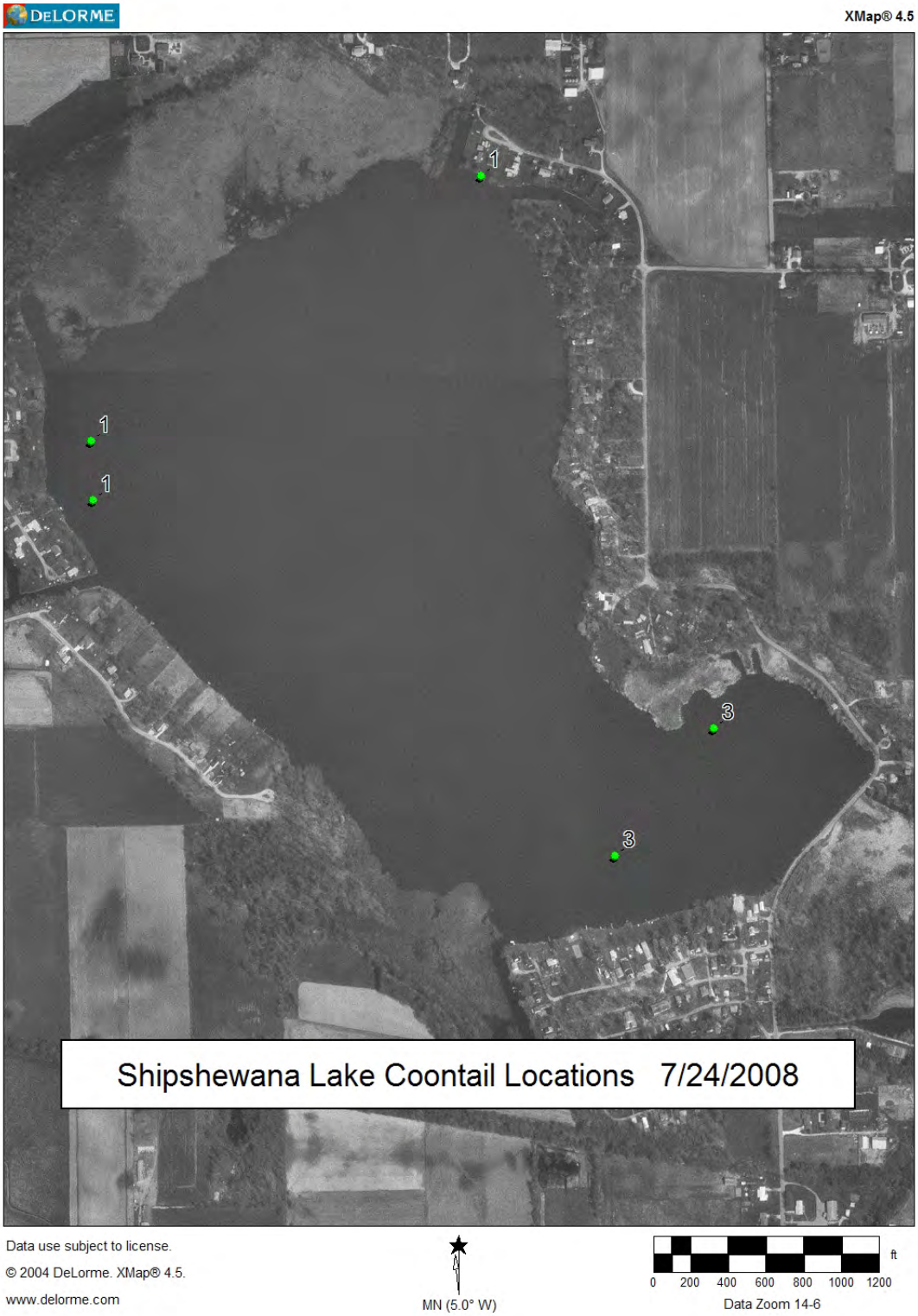
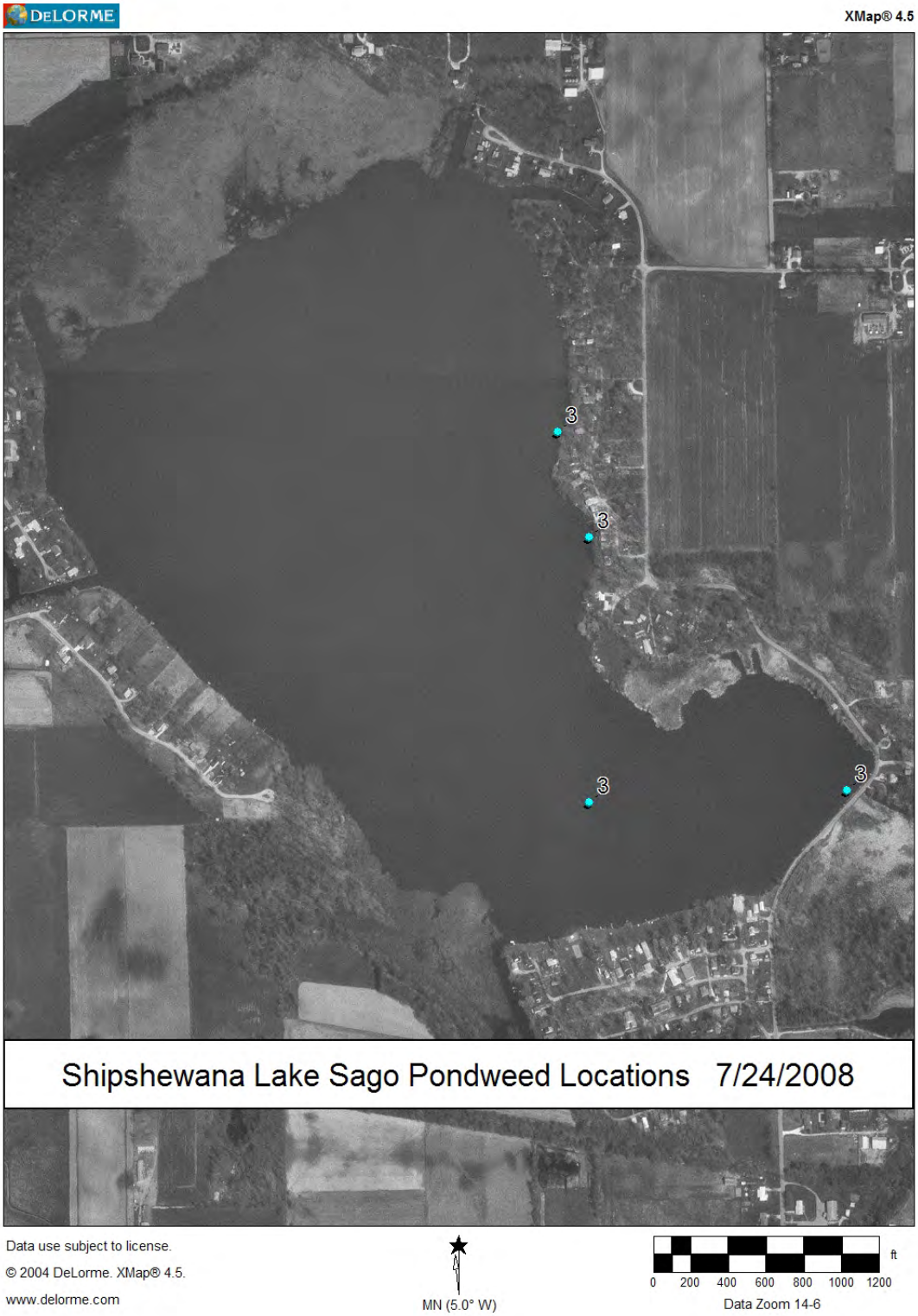


Figure 12: Shipshewana Lake 2008 Sago Pondweed Locations



16.8 Data Sheets

Figure 13: 2008 Data Sheet Cover

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization: Aquatic Weed Control

Contact Information: 574-533-2597

Waterbody Name: Shipshewana Lake

Lake ID: Ship

County(s): LaGrange County

Date: 7-24-08

Habitat Stratum: IL

Avg. Lake Depth (ft): 7

Lake Level: Avg

Crew Leader: Dave Keister

GPS Metadata

Datum: NAD83

Zone: 16

Accuracy: 30ft

Recorder: Dave Keister

Method: WAAS Enabled GPS

Secchi Depth (ft): 2.1

Total # of Points Surveyed: 60

Total # of Species: 3

Littoral Zone Size (acres): 75

- ☐ Measured
- ☒ Estimated

Littoral Zone Max. Depth (ft): 6

- ☐ Measured
- ☐ Estimate (historical Secchi)
- ☒ Estimated (current Secchi)

Notable Conditions: planktonic algae heavy, Low secchi
water temp 82°
Dead debris found on rake

Figure 14: 2008 Data Sheet 1

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 1 of 2

WATERBODY NAME: Shipshewana Lake	DATE: 7-24-08
COUNTY: La Grange	SECCHI DEPTH (FT): 2.1 ft
SITE ID: Shipshewana Lake	MAX PLANT DEPTH (FT): 5 ft
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Sunny 80° - H/20 Temp 82°
CREW LEADER: Dave Reister	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Dave Reister	
CONTACT INFO: 574-533-2597	*Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.*
	Species Codes:

Point #	R/T	Latitude	Longitude	Depth (ft)	CERDEM	CHARA	StuPec										All Notes
1	R	GPS Waypoints		2	–												
2	↓	↓	↓	3	–												
3	↓	↓	↓	4	–												
4	↓	↓	↓	4	1												
5				3	–												
6				2	–												
7				3	3												
8				4	–												
9				3			3										
10				4			3										
11				3	–												
12				7	–												
13				5	–												
14				4	–												
15				2			3										
16				2	–												
17				3	–												
18				4	–												
19				4	–												
20				6	–												
21				4	–												
22				2	–												
23				5	–												
24				3	–												
25				7	–												
26				5	–												
27				4	–												
28				5	–												
29				5			3										
30				4	–												

Other plant species observed at lake:

Figure 15: 2008 Data Sheet 2

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 2 of 2

WATERBODY NAME: Shipshewana Lake	DATE: 7-24-08
COUNTY: LaGrange County	SECCHI DEPTH (FT): 2.1 ft
SITE ID: Shipshewana	MAX PLANT DEPTH (FT): 5 ft
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Sunny 80° – H_2O 82°
CREW LEADER: Dave Keister	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Dave Keister	
CONTACT INFO: 574-533-2597	*Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.*

Species Codes:

Point #	R/T	Latitude	Longitude	Depth (ft)	CERDEM	CHARA											Notes
31	R	GPS Waypoints		4	–												
32	↓	↓	↓	5	–												
33				7	–												
34				4	–												
35				4	1												
36				5	–												
37				4	–												
38				5	–												
39				8	–												
40				5	–												P
41				5													
42				5	–												
43				5	–												
44				5	–												
45				6	–												
46				5		1											
47				3	3												P
48				5	–												
49				3	–												
50				4	–												
51				5	–												
52				4	–												
53				4	–												
54				6	–												
55				5	–												
56				7	–												
57				8	–												
58				5	–												
59				9	–												
60				5	–												

Other plant species observed at lake:

Tier II Rake Sample GPS Coordinates

Table 6: GPS Coordinates for Rake Samples

Site	Latitude	Longitude
1	41.68165	-85.601
2	41.68233	-85.6
3	41.6831	-85.5989
4	41.68419	-85.5995
5	41.684	-85.6015
6	41.68447	-85.6033
7	41.68493	-85.6041
8	41.68594	-85.6044
9	41.68679	-85.6039
10	41.68753	-85.6046
11	41.68831	-85.6045
12	41.68862	-85.606
13	41.68949	-85.6045
14	41.69044	-85.6047
15	41.69124	-85.6053
16	41.69203	-85.606
17	41.69204	-85.6071
18	41.69212	-85.6083
19	41.69142	-85.6089
20	41.69061	-85.6091
21	41.69101	-85.6101
22	41.69084	-85.611
23	41.69017	-85.6116
24	41.68989	-85.6126
25	41.68884	-85.6121
26	41.68937	-85.6134
27	41.68901	-85.6141
28	41.68818	-85.6136
29	41.68782	-85.6145
30	41.68731	-85.6135
31	41.68649	-85.6131
32	41.68625	-85.6122
33	41.68606	-85.6099
34	41.6853	-85.6111
35	41.68456	-85.611
36	41.68468	-85.6097
37	41.68401	-85.6099
38	41.68394	-85.6085
39	41.68428	-85.6068
40	41.68294	-85.6084
41	41.68295	-85.6071
42	41.68218	-85.6071
43	41.68218	-85.606
44	41.68321	-85.6057
45	41.68391	-85.6051
46	41.6827	-85.605
47	41.68156	-85.6058
48	41.68189	-85.6047
49	41.68107	-85.6048
50	41.68293	-85.6039
51	41.68215	-85.6034
52	41.68154	-85.6027
53	41.68248	-85.6021

54	41.68264	-85.601
55	41.68342	-85.6002
56	41.68566	-85.6057
57	41.68673	-85.6052
58	41.68751	-85.6064
59	41.68822	-85.6066
60	41.68816	-85.6056

16.9 IDNR Aquatic Vegetation Control Permit

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987
[ ] Whole Lake [X] 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: Steven Weiderman	Lake Assoc. Name: Shipshewana Lake Association	
Rural Route or Street: 3560 North 920 West		Phone Number: 260-768-9137
City and State: Shipshewana		ZIP Code: 46565
Certified Applicator (if applicable): Jim Donahoe	Company or Inc. Name: Aquatic Weed Control	Certification Number: F-19215
Rural Route or Street: P. O. Box 325		Phone Number: 574-533-2597
City and State: Syracuse IN		ZIP Code: 46567
Lake (One application per lake): Shipshewana	Nearest Town: Shipshewana	County: Lagrange
Does water flow into a water supply		[ ] Yes [X] 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 N41degrees 41.041 W85 degrees 30.952		
Total acres to be controlled 10	Proposed shoreline treatment length (ft) Bay	Perpendicular distance from shoreline (ft) Bay	
Maximum Depth of Treatment (ft) 5	Expected date(s) of treatment(s) late june		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] 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 , Nautique

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) ____

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian Milfoil	X	50
Coontail		40
Algae	X	10

Page ____ of ____

Treatment Area #	LAT/LONG or UTM's	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ 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. Reward, Aquathal K, Copper sulfate, 2-4D, renovate, Nautique

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

☐ Approved ☐ Disapproved	Fisheries Staff Specialist
☐ Approved ☐ Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

Aquatic Weed Control

DeLORME
Street Atlas USA® 2004 Plus
W 375 N
W 375 N
W 360 N
W 380 N
W 350 N
W 350 N
W 335 N
W 325 N
1 whole Lake
Shipshewana Lake
CR 325 N
N 915 W
Beatys Beach
W 280 N
W 260 N
W 250 N
W 250 N
W 250 N
United Brethren Camp
Cotton Lake
© 2003 DeLorme
www.delorme.com
MN (4.9° W)
0 400 800 1200 1600 2000 2400 2800
ft
Data Zoom 13-5