– DRAFT –

SUBJECT TO REVISION

WINONA LAKE, KOSCIUSKO COUNTY
AQUATIC PLANT MANAGEMENT
PLAN UPDATE 2007

PREPARED FOR:

WINONA LAKE PRESERVATION ASSOCIATION
2012 NORTH BAY DRIVE
WARSAW, IN 46580

PREPARED BY:

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DECEMBER 14, 2007

Executive Summary

Winona Lake is a 562-acre mesotrophic lake in Warsaw, Kosciusko County, Indiana. Winona Lake Preservation Association contracted V3 Companies Ltd. (V3) to complete aquatic vegetation sampling in order to update an aquatic vegetation management plan which was created in 2006. The update was funded as part of the Lakes and River Enhancement fund (LARE) which was obtained by the Winona Lake Preservation Association and the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife. Funding for the LARE program is provided by an annual fee charged to boat owners. This update will also serve as a prerequisite to continue LARE program funding to control exotic or nuisance species.

The 2007 vegetation surveys performed by V3 identified a diverse aquatic plant community covering the shallow areas of Winona Lake that was less than 16 feet deep. Eurasian watermilfoil is an aggressive invasive aquatic species that has a detrimental effect on the native aquatic plant community, provides poor fish habitat, inhibits boat navigation, and causes annoyances and serious health hazards to water skiers, swimmers, and other members of the general public who wish to enjoy the lake. Eurasian watermilfoil has been present in Winona Lake for many years, experienced a die-off in 1997-98, and had re-established by the fall of 2004. Approximately 47 acres of contact herbicide was applied to Winona Lake in June. These treatments were effective, since after the herbicide treatments, only a few scattered individuals were observed during the August 2007 vegetation survey.

The following actions are proposed for 2008 to identify and treat areas with Eurasian watermilfoil re-growth, and document the overall health, diversity, and distribution of desirable native aquatic plants. A Target Species Distribution Map and Proposed Treatment Area Map will be created during early spring 2008 to determine the extent of follow-up chemical application that will be necessary to treat Eurasian watermilfoil. An early spring (3rd week of April to mid-May) systemic herbicide application of 2,4-D granular is proposed to treat any Eurasian watermilfoil that may re-grow from the 2007 herbicide application. A proposed treatment area map should be created to determine the extent of follow-up chemical application that is necessary to treat Eurasian watermilfoil. A post treatment Tier II survey is proposed during the summer of 2008 to document diversity, distribution, and abundance of plant communities. Follow-up plant surveys and herbicide applications should be conducted during 2009 to ensure Eurasian watermilfoil is being controlled and native plant communities remain protected.

Acknowledgements

We would like to acknowledge Angela Sturdevant and Gwen White with IDNR's LARE program for providing funding and assistance in the completion of this study. We would like to recognize Ed Braun and Rod Edgell, IDNR District Fisheries Biologists, for consultation and information. We would like to acknowledge the Winona Lake Preservation Association as the local sponsor that provided assistance and guidance including: Chris Cummins. We would like to recognize Tony Cunningham and Leslie Cunningham of Weed Patrol for their mapping, recommendation and consultation. Finally, we would like to acknowledge V3 staff involved in the research, sampling and document preparation including: Juli Mason, Wally Levernier, Desiree Poole, Amy Halsall, Jessica Dunn and Ed Belmonte.

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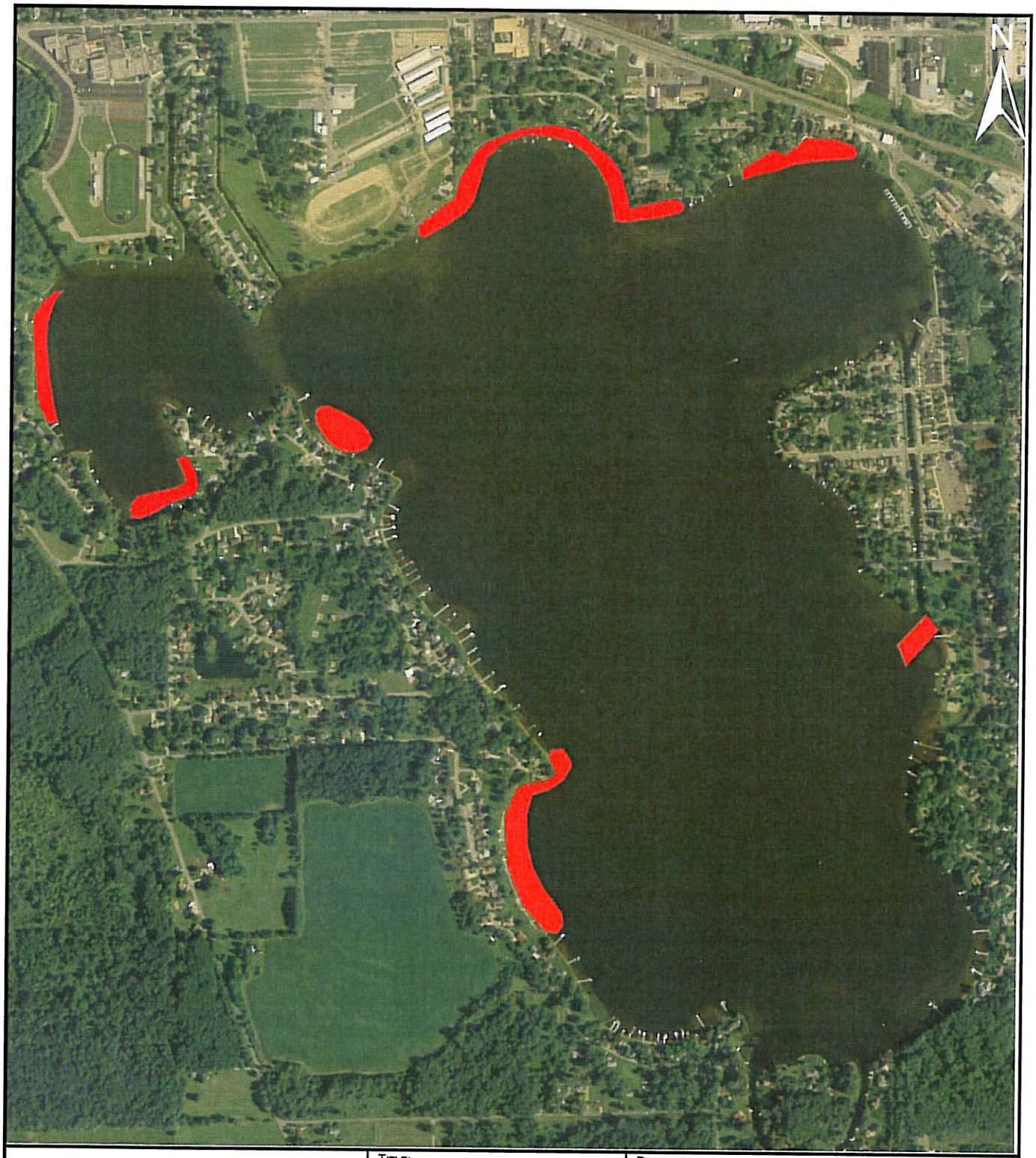
Introduction and Background

Winona Lake is a 562-acre mesotrophic lake in Warsaw, Kosciusko County, Indiana. Winona Lake has a maximum depth of 79 feet and an average depth of 30 feet. The Winona Lake watershed consists of 18,730 acres of agricultural, forested, and urban land.

The lake is used heavily for recreational activities such as fishing, swimming, skiing and boating. The state-owned access at Kiwanis Park at the northwestern corner of the lake provides a handicap accessible boat ramp, dock, and parking. The near shoreline areas of the lake are heavily populated with the urban portion of Warsaw along the northern shore. The historic district of Winona Lake Village is located on the northeastern edge of the lake. Walkways and viewing areas provide opportunities for residents to appreciate the water.

Eurasian watermilfoil is an aggressive invasive aquatic species that can have a detrimental effect on the native aquatic plant community, provides poor fish habitat, inhibits boat navigation, and causes annoyances and serious health hazards to swimmers, and other members of the general public who wish to enjoy the lake. Eurasian watermilfoil has been present in Winona Lake for many years. During the spring and early summer of 2006, Eurasian watermilfoil was present in moderate abundances. Pre-treatment distribution of Eurasian watermilfoil within Winona Lake is seen in Exhibit I.

This report was created in order to update the Winona Lake Aquatic Vegetation Management Plan which was funded by the IDNR's LARE Program and the Winona Lake Preservation Association. This report will serve as a tool to track changes in vegetation community, monitor for invasive or nuisance species, to adjust the action plan, and to maintain eligibility for any additional LARE funding. Topics covered in this update include the 2007 sampling results, a review of the 2007 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, this report should be included in the original vegetation management plan, following the 2006 update.



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TITLE: **Pre-treatment Distribution of Eurasian Watermilfoil**	PROJECT: **Winona Lake Aquatic Plant Management Plan**		
BASE LAYER: Indiana Spatial Data Service 2005 Orthophotography	PROJECT NO. 06099.01	EXHIBIT: I	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580	QUADRANGLE: N/A	DATE: 12/12/07	SCALE: NTS

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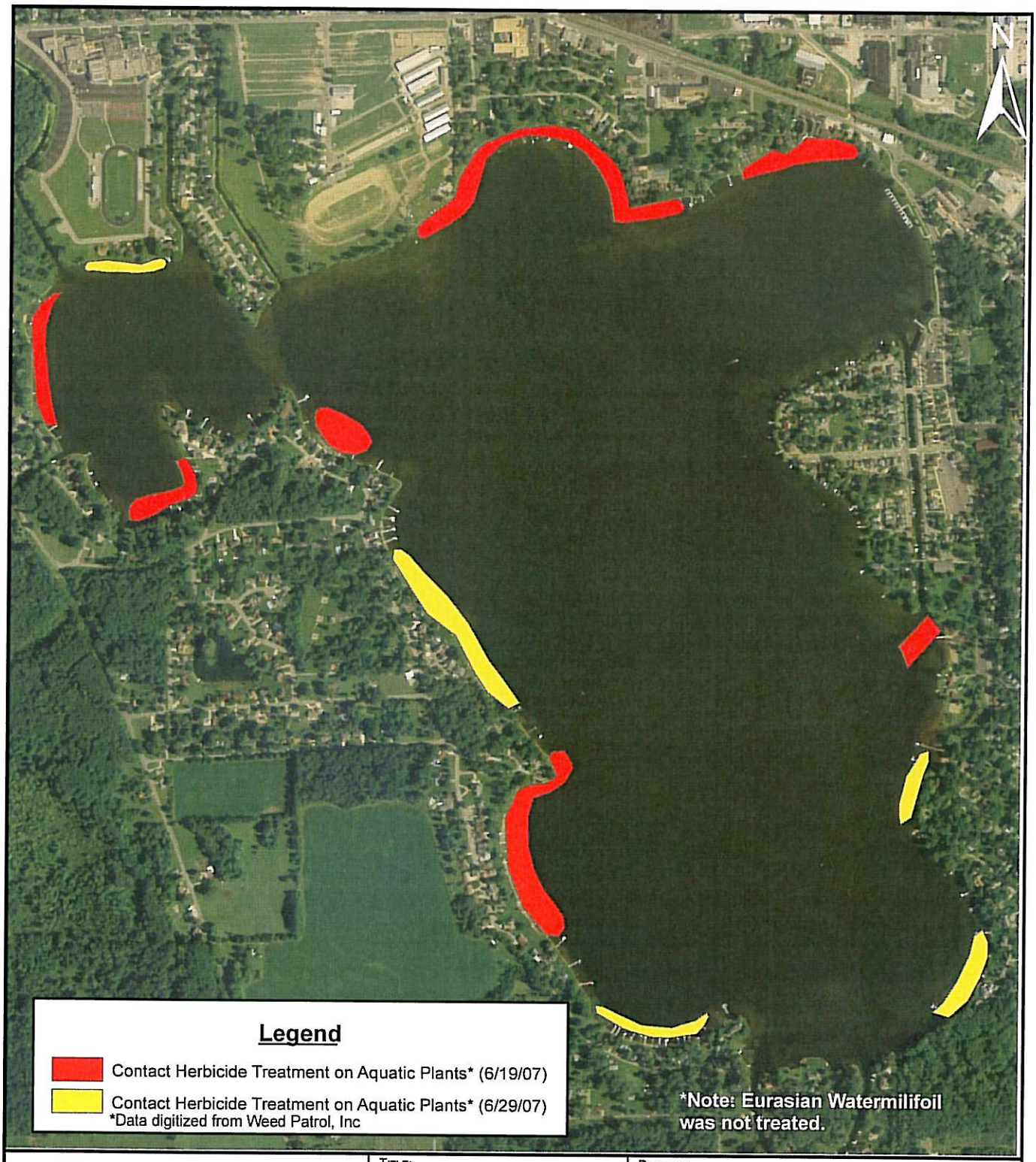
Problem Statement

In part due to water quality problems, Eurasian watermilfoil has been present in Winona Lake for many years. As summarized by International Science & Technology (IST 1991), sediment and nutrient loading have been identified as the predominant water quality impairments to Winona Lake. Sediment loading has also been observed at the mouth of Wyland Ditch for over 50 years.

The biology and life cycle of Eurasian watermilfoil provide it with a significant advantage over native species. Eurasian watermilfoil lies dormant during the winter months, instead of dying back completely like many native species. As spring arrives, the dormant Eurasian watermilfoil is able to grow earlier and reach the surface faster than other native species. It then grows horizontally across the water surface to form a canopy and effectively shade out other plants. Eurasian watermilfoil grows profusely, provides poor fish habitat, inhibits boat navigation, and causes annoyances and serious health hazards to skiers, swimmers, and other members of the general public who wish to enjoy the lake.

In order to maintain the recreational opportunities at Winona Lake it is vital that Eurasian watermilfoil populations are controlled. Herbicide treatments for 2007 include: 2,4-D contact herbicide to 47 acres of Winona Lake (Exhibit II) and 68 acres of algae treatment (Exhibit III). Treatments on Winona Lake should be continued over three to four years to effectively eliminate all of the Eurasian watermilfoil.



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TITLE: Contact Herbicide Treatment Map	PROJECT: Winona Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data Service 2005 Orthophotography	PROJECT NO. 06099.01	EXHIBIT: II	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580	QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=12000'

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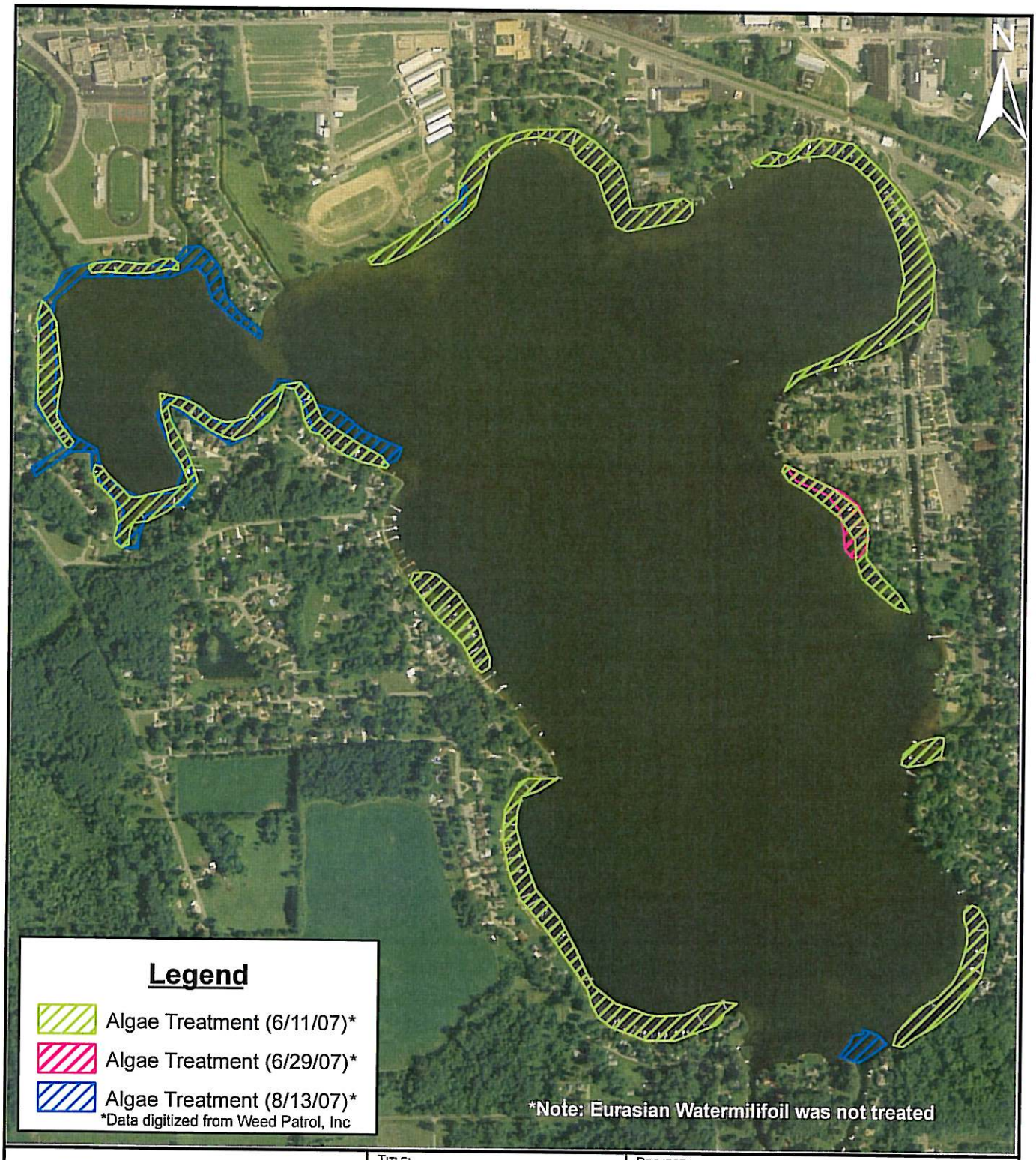

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TITLE: Algae Herbicide Treatments	PROJECT: Winona Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data Service 2005 Orthophotography	PROJECT NO. 06099.01	EXHIBIT: III	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580	QUADRANGLE: N/A	DATE: 12/12/07	SCALE: NTS

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Sampling Results

On July 25, 2007 a Tier II survey was conducted on Winona Lake. The Tier II Aquatic Vegetation Survey Protocol, designated by the IDNR, serves as a standardized method to document the distribution and abundance of aquatic vegetation within selected areas and a state scale. The information collected can be used to compare present distribution and abundance to past and identify current trends within the lakes. A table outlining the scientific and common names of species collected or observed in Winona Lake is listed below (Table 1).

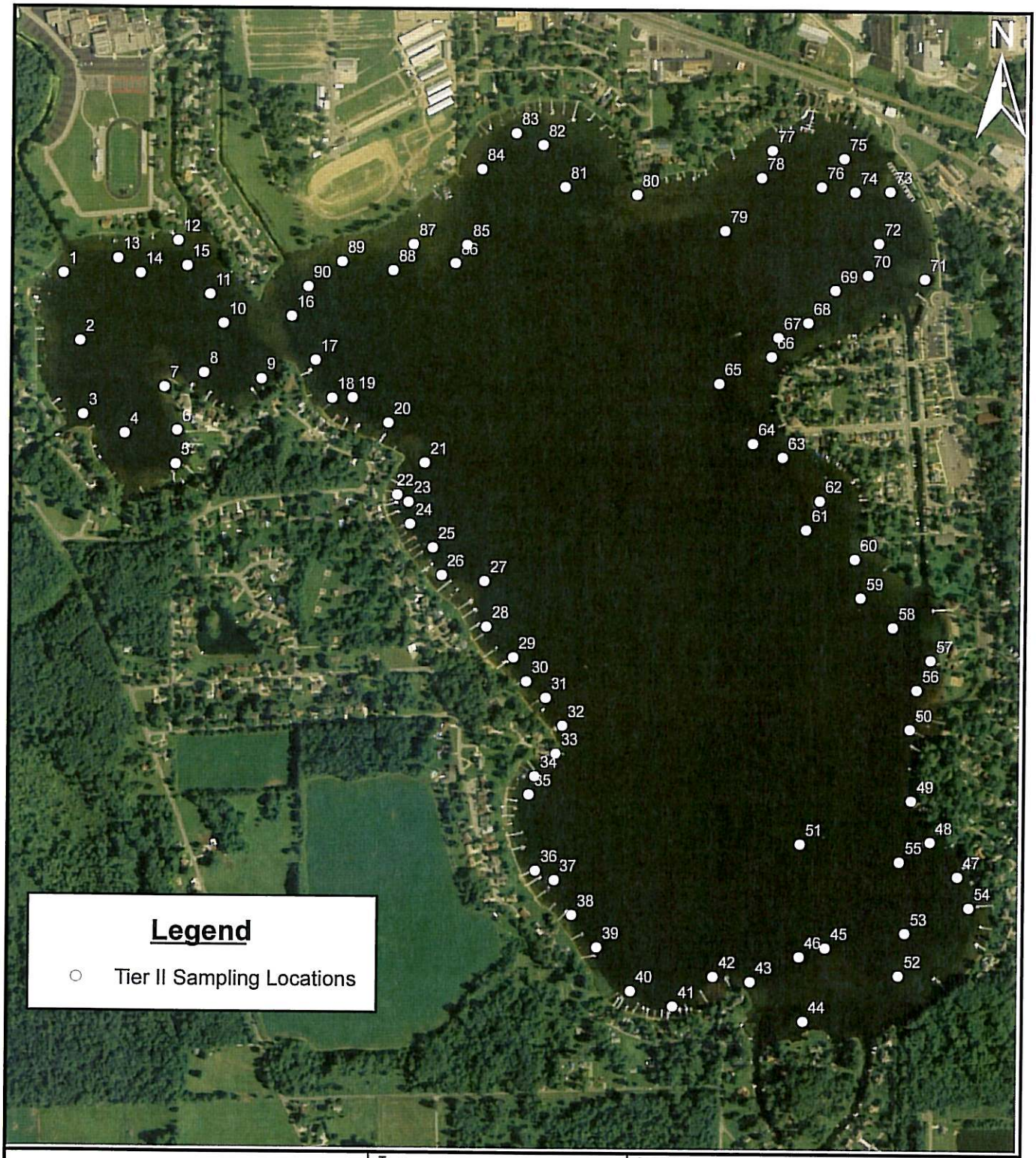
Table 1. Scientific and common names of species collected in Winona Lake.

Scientific Name	Common Name
Ceratophyllum demersum	Coontail
Chara sp.	chara
Myriophyllum spicatum	Eurasian watermilfoil
Najas flexilis	slender naiad
Nymphaea tuberosa	white water lily
Potamogeton nodosus	long leaf pondweed
Potamogeton pectinatus	sago pondweed
Potamogeton pusillus	small pondweed
Vallisneria americana	eel grass
Zosterella dubia	water stargrass

Sampling Methodology for Summer Tier II Survey

Plant communities typically reach peak diversity between July 15 and August 31. One sampling effort occurred but it included a representative sample of the species within Winona Lake. Winona Lake required a total of 90 sampling stations based on trophic status and acreage. According to the IDNR protocol, Winona Lake is classified as Eutrophic which would reach a maximum sampling depth of 15 feet. The maximum sampling depth for Winona Lake is 20 feet. The Tier II sampling was conducted at the mesotrophic trophic status so that sampling locations were apportioned to the required depth class. Ninety sites were sampled within the littoral zone (29 sites 0-5ft, 27 sites 5-10ft, 24 sites 10-15 ft, and 10 sites 15-20 ft) (Exhibit IV).

A double-headed thatched rake with attached nylon rope was used to sample the aquatic vegetation at each sampling location. Once a species is identified a vegetation abundance is scored as a 1 (1-19%), 3 (20-99%), or 5 (+100%) based on density on the rake. Species are scored as a 9 if they are observed within the vicinity of the sampling station but not collected. After completion of all sampling stations a secchi disk reading and water quality measurements are taken to complete the field effort.



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TITLE: Tier II (2007) Sampling Locations	PROJECT: Winona Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 06099.01	EXHIBIT: IV	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=12000'

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Results of Summer Tier II Survey

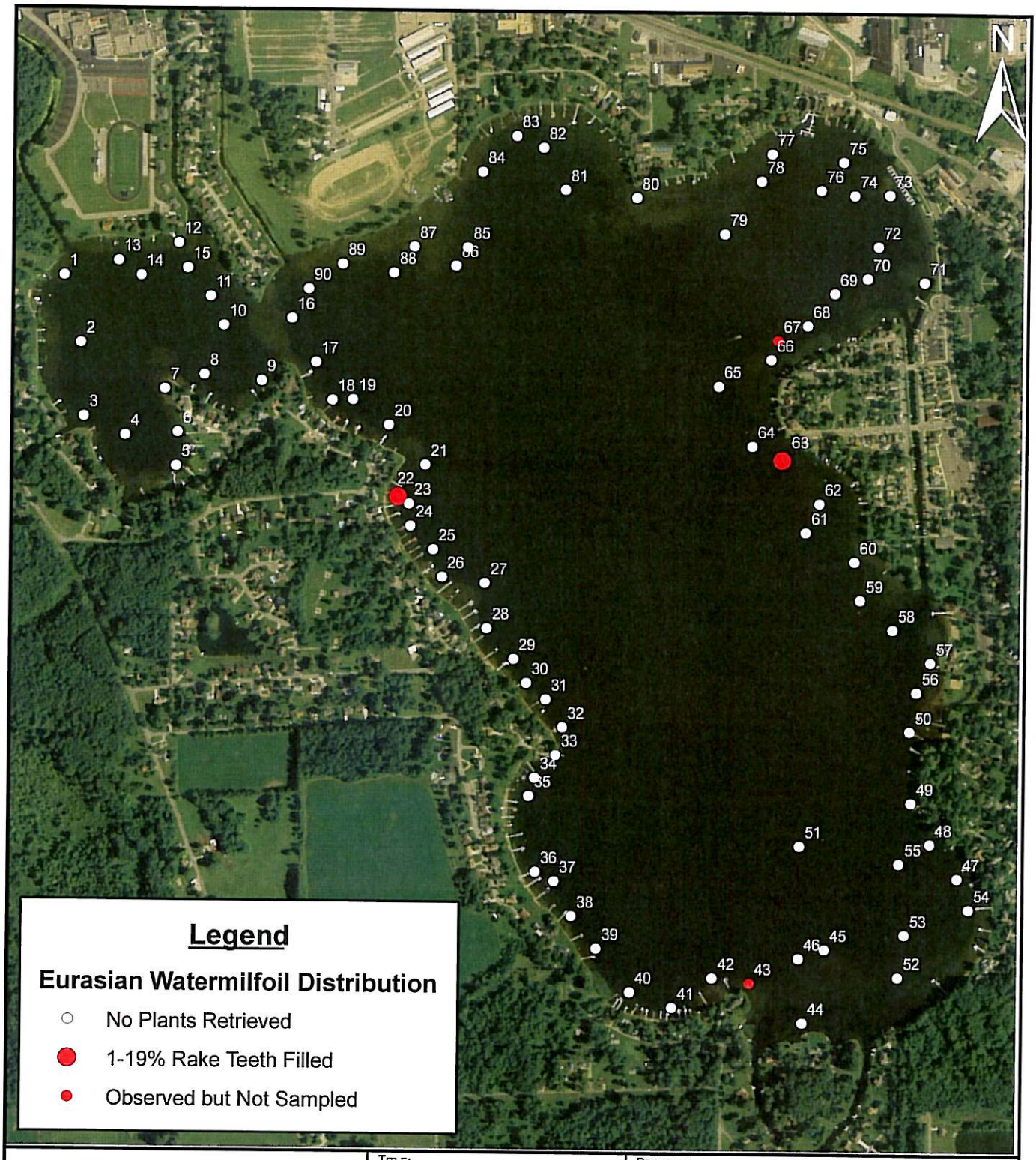
The Tier II survey completed on July 25, 2007 identified a total of eleven species within Winona Lake (Table 2). Vegetation was present up to a maximum depth of 16 feet. A secchi disk reading was taken after sampling and was found to be at 9 feet. Results of the sampling are listed in Table 2.

Table 2: Occurrence and abundance of aquatic plants in Winona Lake on July 25, 2007.

County:	Kosciusko	Sites with plants:	75
Date:	7/25/2007	Sites with native species:	75
Secchi (ft):	9	Number of species collected:	11
Maximum plant depth (ft):	16	Number of native species:	10
Trophic status:	Eutrophic	Maximum species/site:	9
Trophic status sampled:	Mesotrophic	Total Sites:	90

All depths (0 to 20 ft)		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
Chara	Chara spp.	20.0	78.0	16.0	4.0	0.0	5.78
Sago pondweed	Potamogeton pectinatus	7.0	90.0	6.0	1.0	0.0	1.78
Eel grass	Vallisneria americana	22.0	70.0	8.0	12.0	2.0	11.11
Coontail	Ceratophyllum demersum	53.0	47.0	29.0	16.0	8.0	24.0
Small pondweed	Potamogeton pusillus	7.0	90.0	7.0	0.0	0.0	1.33
Slender naiad	Najas flexilis	28.0	66.0	17.0	9.0	2.0	12.0
American pondweed	Potamogeton nodosus	1.0	96.0	1.0	0.0	0.0	0.22
Eurasian watermilfoil	Myriophyllum spicatum	2.0	96.0	2.0	0.0	0.0	0.44
Water stargrass	Zosterella dubia	3.0	97.0	3.0	0.0	0.0	0.67
Depth: 0 to 5 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	Chara spp.	48.0	45.0	34.0	14.0	0.0	15.17
Sago pondweed	Potamogeton pectinatus	18.0	72.0	14.0	4.0	0.0	4.83
Eel grass	Vallisneria americana	55.0	28.0	17.0	31.0	7.0	28.97
Coontail	Ceratophyllum demersum	48.0	52.0	41.0	7.0	0.0	12.41
Small pondweed	Potamogeton pusillus	7.0	83.0	7.0	0.0	0.0	1.38
Slender naiad	Najas flexilis	58.0	28.0	20.0	28.0	10.0	31.03
American pondweed	Potamogeton nodosus	4.0	86.0	4.0	0.0	0.0	0.69
Eurasian watermilfoil	Myriophyllum spicatum	3.0	90.0	3.0	0.0	0.0	0.69
Water stargrass	Zosterella dubia	10.0	90.0	10.0	0.0	0.0	2.07
Depth: 5 to 10 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	Chara spp.	11.0	89.0	11.0	0.0	0.0	2.22
Sago pondweed	Potamogeton pectinatus	4.0	96.0	4.0	0.0	0.0	0.74
Eel grass	Vallisneria americana	11.0	85.0	7.0	4.0	0.0	3.70
Coontail	Ceratophyllum demersum	70.0	30.0	26.0	26.0	18.0	39.26
Small pondweed	Potamogeton pusillus	7.0	93.0	7.0	0.0	0.0	1.48
Slender naiad	Najas flexilis	22.0	74.0	22.0	0.0	0.0	4.44
Eurasian watermilfoil	Myriophyllum spicatum	4.0	96.0	4.0	0.0	0.0	0.74
Depth: 10 to 15 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	Chara spp.	4.0	96.0	4.0	0.0	0.0	0.83
Eel grass	Vallisneria americana	4.0	92.0	0.0	4.0	0.0	2.50
Coontail	Ceratophyllum demersum	56.0	44.0	28.0	20.0	8.0	22.50
Small pondweed	Potamogeton pusillus	8.0	92.0	8.0	0.0	0.0	1.67
Slender naiad	Najas flexilis	12.0	88.0	12.0	0.0	0.0	2.50
Depth: 15 to 20 ft		**Frequency of**	**Rake score frequency per species**				**Plant**
Common Name	**Species**	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	Ceratophyllum demersum	11.0	89.0	0.0	0.0	11.0	20.0

Nine species were collected during the Tier II survey. Coontail was present at the highest percentage of sample sites (53%). Slender naiad ranked second in frequency of occurrence (28%). Eel grass ranked third in frequency of occurrence (22%) followed closely by chara (20%). Sago pondweed, small pondweed, water stargrass, Eurasian watermilfoil and American pondweed were also collected but found at a small percentage of sites. Location and density of Eurasian watermilfoil is illustrated in Exhibit V. Species observed within the vicinity of the sampling locations include white water lily and algae. Datasheets from V3's sampling effort are located in Appendix I.



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TITLE: Eurasian Watermilfoil Distribution and Abundance		PROJECT: Winona Lake Aquatic Plant Management Plan	
BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 06099.01	EXHIBIT: V	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580		QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=12000'

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Aquatic Vegetation Sampling Discussion

The goals of the plan are to reduce nuisance conditions caused by invasive plant species while still maintaining the abundance of beneficial native species. A diverse native plant community is vital in providing a source of food, habitat, improve water clarity, and nutrient absorption. A healthy plant community inhibits the spread of exotic species such as Eurasian watermilfoil. Quantitative sampling of the aquatic plant community was conducted in 2005 by the IDNR (Benson 2006) and in 2006 and 2007 by V3. Although the sampling methods varied through the years, a summary of sampling data is provided in Table 3.

Table 3. Tier II Data Comparison from 2005 to 2007

Sampling Date:	July 25, 2007	August 1, 2006	July 28,2005
Secchi disk depth (ft):	9	6	6
Number of Sites:	90	90	100
Max Plant Depth (ft):	16	19	13
Percent of Sites Sampled with Vegetation	83	92	86
Number of Species	11	14	18
Number of Native Species:	10	12	17

The 2007 secchi disk reading was the highest measurement of the past three surveys by three feet. The maximum plant depth for 2007 was 16 feet and represented the average of the past three surveys. Nearly all of the sampling stations were vegetated (75/90, 83%). The depth range from 15 to 20 feet accounted for the sampling stations that remained unvegetated (8/10, 80%). The depth class from 15 to 20 feet, where vegetated, was dominated by coontail. Native plants accounted for 91% of species collected. The only exotic species collected was Eurasian watermilfoil. Eurasian watermilfoil was present in depths ranging from 0 to 10 feet but overall was only representative of a small percentage of sites (2%).

Aquatic Plant Management Alternatives

At the present time, the health of Winona Lake's aquatic plant communities is fair. Native plant diversity is relatively high, despite the presence of Eurasian watermilfoil. Additionally, a relatively good diversity of native plants is present despite an extensive history of herbicide applications to control these invasive plant species as well as dense native plants that have been perceived as a nuisance. Undoubtedly, continued management efforts to maintain the Eurasian watermilfoil population at a low level is desirable to prevent Eurasian watermilfoil from becoming the predominant species in the lake.

Many management strategies have been used to control Eurasian watermilfoil in Indiana lakes. A management strategy should be chosen based on its selectivity to the target species, it long-term effectiveness, and potential for detrimental side-effects (i.e., effects on non-target species). The foremost objective is to choose a management strategy that will effectively control the Eurasian watermilfoil population with minimal negative effects on non-target plants or fish species.

Although dense beds of native aquatic plants can be a nuisance where they inhibit lake access, aquatic vegetation is important to maintaining a healthy lake ecosystem. Aquatic plants provide habitat for plankton, insects, crustaceans, fish, and amphibians. They take nutrients like phosphorus and nitrogen out of the water column, increase water clarity, prevent harmful algal blooms, produce oxygen and provide food for waterfowl. Aquatic plants can even remove pollutants from contaminated water and prevent the suspension of particulate matter by stabilizing sediment and preventing erosion from wave action or current.

Because of the overall importance of beneficial aquatic vegetation, one of the most basic goals of the LARE aquatic vegetation program is to maintain healthy aquatic ecosystems by maintaining or improving biodiversity in Indiana lakes, which includes protecting beneficial aquatic vegetation. As such, it is recognized that competing uses of the lakes including access for boating and maintaining plant beds to provide habitat for juvenile fish must be incorporated into an overall management strategy for the lake.

Different types of aquatic plant management alternatives are discussed below. One or more of these alternatives may be employed to meet the objectives of Winona Lake. This discussion of management alternatives is adapted from Aquatic Weed Control (2005).

1 No Action

If no action is taken, the Eurasian watermilfoil abundance may remain stable, or it may increase from year to year. Eurasian watermilfoil spreads by fragmentation; when the plant is cut, the fragment has the ability to form an entirely new plant. Eurasian watermilfoil also over-winters as an adult plant and sprouts early in the spring. These reproductive characteristics cause milfoil beds to become denser over time, creating a monoculture as it out-competes and eliminates native species. A major goal of this aquatic plant management plan is to prevent Eurasian watermilfoil from becoming a monoculture, as it was prior to 1996, and to maintain and enhance

the current diversity of native aquatic plants. Therefore, it is imperative that Eurasian watermilfoil be controlled while its population is still small. Taking no action might allow the Eurasian watermilfoil population to expand and become as dominant as it had been prior to 1996.

The nutrient levels and lake morphology naturally promote dense vegetation growth in almost all shallow areas (i.e., < 20' deep). If no action is taken, it is likely that individual residents and groups will continue to apply herbicides to native plant beds in a haphazard fashion to improve their lake access. By formulating a more comprehensive, integrated management strategy that incorporates all competing uses of Winona Lake, the goal of this plan is to facilitate vegetation management as needed to meet lake objectives, but minimize haphazard management that may have detrimental side-effects.

2 Institutional Protection of Beneficial Vegetation

Lake users can play an important role in the protection of beneficial aquatic vegetation. Aquatic invasive species often gain a foothold in an ecosystem in areas disturbed by human activity or natural processes. Such disturbed areas may include areas where the perennial native plant beds are treated with herbicide due to perceived nuisance conditions.

In many cases, boating may be restricted in certain areas of a lake to prevent harm to native plants, especially many emergent species. Boating lanes may be established through important aquatic plant beds, and protected ecological zones may be created to prevent erosion of shoreline vegetation caused by intense wave action from boating activities. Shallow areas of a lake may also be marked with buoys to prevent injury to boaters and water skiers. It is important that all lake users obey boating restrictions to protect beneficial plant species and prevent personal injury. There currently are no boating restricted areas with the specific intent of protecting beneficial plant areas. However, there are a few nearshore areas demarcated with buoys, such as the northwestern corner of the lake, to prevent injury to boaters and water skiers.

3 Environmental Manipulation

Draw down of the lake water level is one option that may decrease the Eurasian watermilfoil population. Lower water levels expose the Eurasian watermilfoil roots to freezing and thawing, which may kill milfoil root systems. However, a lake drawdown will not only kill Eurasian watermilfoil but all native plants as well. Also, reducing the lake level may make new areas of the lake available for vegetative growth, and Eurasian watermilfoil may have an advantage in the colonization of these new areas.

The water level at Winona Lake is lowered one foot between November 1 and May 1 to reduce ice damage to seawalls and prevent damage to the control mechanisms of the dam (D.J. Case & Assoc. 2005). However, to expose the milfoil roots to freezing, the lake water level would have to be lowered several additional feet. This would severely damage the beneficial, diverse native plant beds at Winona Lake.

4 Nutrient Reduction

An overabundance of nutrients can greatly increase the possibility that an invasive species will proliferate in a body of water. Limiting factors for plant growth include light, lake morphometry and depth, substrate, and the availability of nutrients like phosphorus and nitrogen. While lake morphometry is most highly correlated with plant biomass, the availability of phosphorus and nitrogen have a significant impact on the amount of plant growth in a body of water. If the vast majority of phosphorus in a system is tied up in plant matter, it may be difficult for an invasive species to become established and spread rapidly in a lake. If phosphorus is constantly being added to the system and is readily available in the water, invasive species can use the nutrient excess and take over an aquatic system within a few growing seasons. Additionally, herbicide applications to native plant beds can cause a single large release of nutrients as the killed vegetation decomposes, coupled with available space for the germination of new species. This combination of conditions presents a ripe opportunity for the establishment of an invasive species such as Eurasian watermilfoil.

Phosphorus and nitrogen are added to aquatic systems by many natural sources, such as the decomposition of plant material and animal waste. Human activity, however, is often responsible for excessive phosphorus loading that contributes to blue-green algal blooms, overabundant vegetation growth, and a general decline in water quality. Major contributions of excess phosphorus come from sources such as septic system inputs, agricultural runoff, storm water drainage, lawn fertilizer applications, and improper disposal of grass clippings and tree leaves. Owners of lake front property can reduce the amount of phosphorus entering the lake by taking actions outlined in the public education section. In addition, implementation of best management practices throughout the watershed, such as filter strips, no till agriculture, wetland preservation or restoration, and streambank stabilization, would reduce the sediment and nutrient inputs into the lake, improve water quality, and lessen conditions that favor invasive species. Implementation of best management practices in the watershed was recommended by the Winona Lake Feasibility/Design Study (IST 1991).

5 Mechanical Cutting and Harvesting

Mechanical harvesting involves using a large machine to cut and collect unwanted aquatic plants. The machine picks up the cut weeds but leaves small fragments behind. Since Eurasian watermilfoil is able to reproduce from cut fragments, mechanical harvesting can spread this invasive species. Additionally, mechanical harvesting is not selective and will cut both native and exotic plant species. Where both are growing together, mechanical harvesting will give an advantage to Eurasian watermilfoil over any native species that are present, given its growth and reproductive characteristics. Each fragment clipping of Eurasian watermilfoil is capable of becoming reestablished as a complete plant. For these reasons, mechanical harvesting is not recommended in any area inhabited by Eurasian watermilfoil. Harvesting can be accomplished by individual owners around their dock areas. A lake property owner can legally harvest a 625 square foot area (25 feet by 25 feet).

6 Hand-Pulling, Cutting, Raking

Manual controls such as hand pulling, cutting, and raking can be effective ways to control unwanted plants in certain situations. In very shallow clear water, small areas of vegetation can be identified and cleared by hand. Large areas of vegetation, especially those in deeper water, can be extremely difficult to control using these methods. Many of the harvested weeds will break apart, leaving the root system in the lake bottom. Failure to remove root structures will result in re-growth.

Plants such as Eurasian watermilfoil that possess the ability to reproduce through fragmentation can seldom be effectively controlled by these methods if they are distributed throughout a lake. Identifying every area of infestation would be difficult, as would harvesting the plants without causing fragmentation of plant parts. Any plant fragments not removed from the water can form new plants, meaning that hand pulling and cutting can facilitate the spread of unwanted plant species such as Eurasian watermilfoil.

7 Bottom Barriers

Bottom barriers prevent the growth of aquatic plants by lining the bottom of a lake or pond with a material that prohibits light from reaching the lake bottom, which is difficult for plants to penetrate. Often plastic or concrete barriers are installed during construction of a lake or pond to prevent subsequent growth of aquatic vegetation. This form of control is best implemented during construction of a new pond or lake. Placing a bottom barrier in an existing lake would involve significant logistical challenges and would be extremely expensive. A draw down of the lake may be necessary to install the barrier. Once in place, the barrier would prevent plant growth of both invasive and native species, and would deprive the lake ecosystem of the benefits provided by native aquatic plants. Sediment would gradually accumulate on top of the barrier, and aquatic plant growth would return as plants begin to take root in the sediment on top of the barrier; bottom barriers generally do not provide effective long-term control. Bottom barriers may not be placed without a permit for shoreline construction from the IDNR Division of Water.

8 Biological Controls – Water Milfoil Weevil

The water milfoil weevil is a native North American insect that consumes Eurasian watermilfoil and northern milfoil. The milfoil weevil burrows into the stem and consumes tissue of the plant. Holes in the milfoil stem bored by weevil larvae allow disease an entrance pathway. These same holes also cause a release of the plant's gases, which reduces buoyancy and causes the plant to sink. All biological controls, including water milfoil weevil stocking, may not be implemented without an aquatic plant control permit from the IDNR Division of Fish & Wildlife.

Studies conducted to evaluate the effectiveness of the water milfoil weevil have not yielded consistent results. Factors influencing the weevil's success or failure in a body of water are not well documented. In 2003, Scribailo and Alix conducted a weevil test on Round Lake in Indiana and found no conclusive evidence that the Eurasian watermilfoil populations were reduced. However, the water milfoil weevil was suspected to cause the crash of the Eurasian watermilfoil

population in 1996. Like many insects used as biological control agents, it is likely that a large population of Eurasian watermilfoil must be present to support the water milfoil weevil population. Water milfoil weevil populations likely may not be supported by small or sparse stands of Eurasian watermilfoil. Additionally, where they co-exist, it is likely that the two populations may naturally cycle in boom and bust cycles, causing nuisance levels of Eurasian watermilfoil to be present until the water milfoil weevil population spikes.

9 Biological Controls – Grass Carp

The Asian grass carp (*Ctenopharyngodon idella*) is an herbivorous fish that is native to eastern Russia and China. This fish has been introduced into the U.S. to help control aquatic vegetation. To prevent their uncontrolled proliferation, all fish stocked in Indiana must be triploid, meaning that they are sterile and cannot reproduce. Stocking is restricted to privately owned bodies of water, and suppliers must obtain a special permit from the IDNR. All biological controls, including grass carp stocking, may not be implemented without an aquatic plant control permit from the IDNR Division of Fish & Wildlife.

Grass carp are completely vegetarian, feeding on many species of submersed plants, in addition to some floating plants such as duckweed. Hydrilla, a highly invasive plant found in many southern states, is a preferred food of grass carp, and efforts to control hydrilla with grass carp have been successful. However, grass carp avoid Eurasian watermilfoil and show strong preferences for many native plants in addition to hydrilla. Therefore, when Eurasian watermilfoil occurs with native plant populations, grass carp are not recommended.

10 Chemical Controls – Aquatic Herbicides

There are two major categories of aquatic herbicides: contact and systemic herbicides. Contact herbicides are not selective, and thus are best used to control plants around piers and in navigation channels. Given the lack of selectivity and their inability to eliminate the root systems of treated plants, contact herbicides have the potential to cause unnecessary damage to native species. Additionally, there is potential for re-infestation of Eurasian watermilfoil. Reward (active ingredient: diquat) and Aquathal (active ingredient: endothal) are two examples of contact herbicides.

Although contact herbicides generally are not selective, timing and dosage can be adjusted to make them affect the target species with less damage to non-target species. The phenological timing method of contact herbicide treatment for Eurasian watermilfoil has shown some success. Recent tests have shown that by adjusting the dosage higher and timing the treatment exactly, a systemic effect on Eurasian watermilfoil can be achieved with contact herbicides. This method involves treating the plants very early in the spring when carbohydrate reserves of Eurasian watermilfoil have left the root structure, promoting rapid growth in the other plant structures. Since Eurasian watermilfoil is growing more actively earlier in the spring than other species, the risk to non-target plants is relatively low if timed properly.

The contact herbicide commonly used for selective low-dose control of Eurasian watermilfoil in mid-season is Reward. A low-dose contact herbicide application can be relatively selective, since Eurasian watermilfoil is susceptible to some herbicides at a dose lower than most native plants due to their high growth rate. As a complicating factor, low-dose applications to control Eurasian watermilfoil with Reward are difficult in lakes where high levels of single-cell algae are present. Reward's mode of action is that it binds with positively charged particles in the water column. Since single-cell algae are positively charged, Reward will bind with algae in the water column and not affect the milfoil. Although Reward is not marketed as an algaecide, alga is shown on the label as controlled by this product. Since alga is relatively abundant during mid-summer at Winona Lake, the effectiveness of a low-dose contact treatment would be compromised.

2007 Vegetation Control

Weed Patrol performed a contact herbicide treatment for nuisance native species using Renovate 2,4-D on June 19, 2007 for 43 acres and again on June 29, 2007 for 3.6 acres (Exhibit II). Treatment was limited to around piers and swimming areas by IDNR. Weed Patrol provided algae treatments on June 11, June 29, and August 13 for a total of 67.7 acres (Exhibit III). Weed Patrol also treated the channels monthly from May to September with the exception of July. No herbicide treatment for Eurasian watermilfoil was performed on Winona Lake during 2007.

Eurasian watermilfoil was present at 2% of the 2007 Tier II sampling stations. Our study's results compared to the previous year's survey indicate the treatment was effective in reducing densities of Eurasian watermilfoil.

There are no known state or federally protected threatened or endangered species present within Winona Lake. No voucher specimens were collected during the efforts of this project. There are no anticipated adverse impacts to any state or federally protected threatened or endangered species as it relates to the use of the vegetation control herbicides recommended within this plan.

Public Involvement

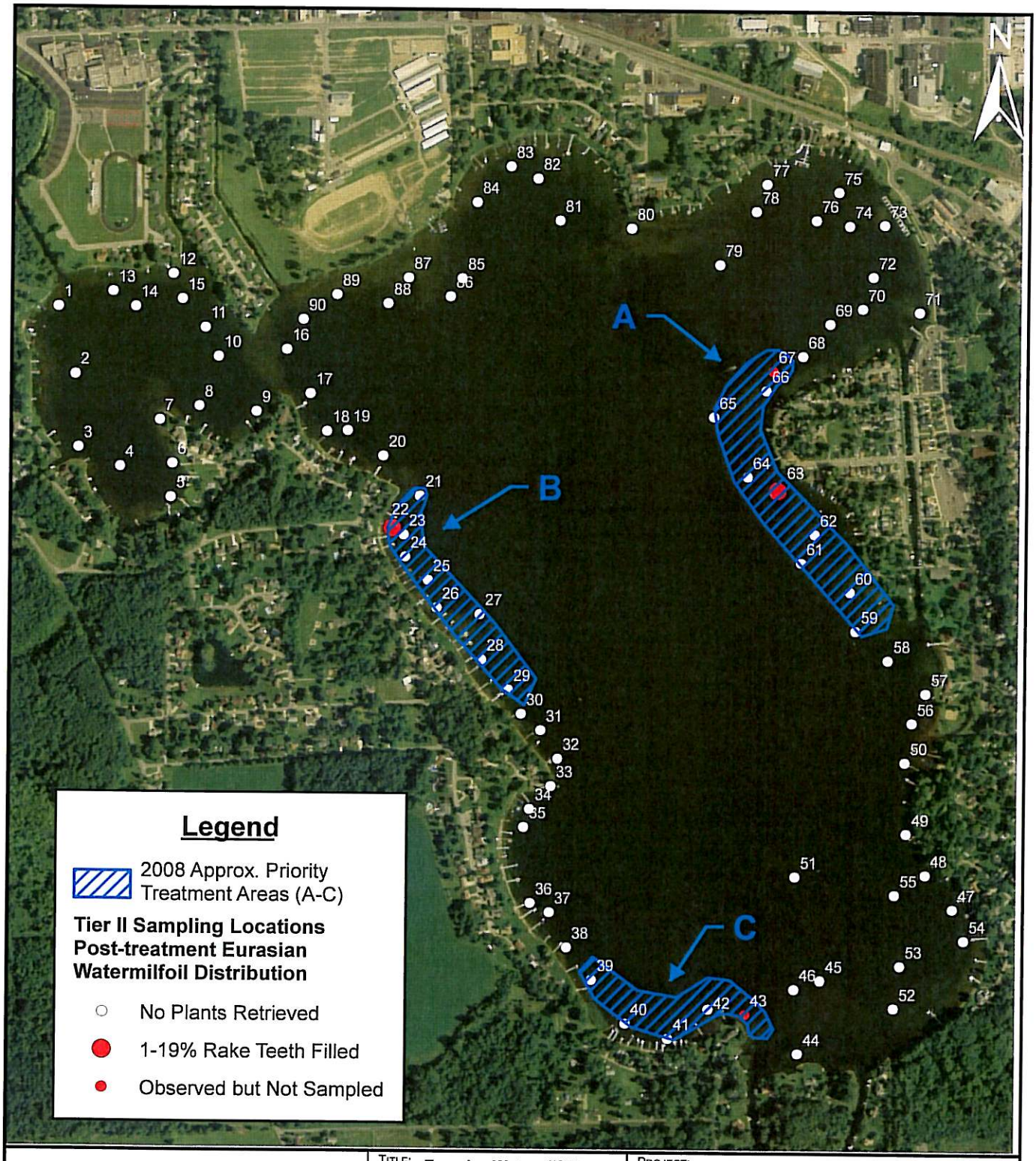
A public meeting was held October 17, 2007 in Warsaw, Indiana. Approximately ten individuals attended the meeting. The meeting discussed current plant management activities, results of the 2007 Tier II survey, and future management.

Results for this section will be included in the final draft. No lake use survey forms have been returned at this time.

Action Plan

V3 identified three approximate priority treatment areas for 2008 based on the results of the post treatment aquatic vegetation survey (Exhibit VI). A total of 35 acres are requested for 2,4-D or Renovate treatment in 2008. Priority treatment areas location and acreage are described with the Application for Aquatic Vegetation Control Permit located in Appendix II.

As the action plan is implemented, aquatic plant surveys will help to monitor the effectiveness of the management strategy. The abundance distribution of Eurasian watermilfoil will be recorded using the current IDNR Tier II sampling protocol. After the Spring 2008 Target Species Distribution Map is created, the distribution and abundance of Eurasian watermilfoil will be identified and treatment maps will be prepared. The survey will also document whether native plants have re-colonized areas of previous Eurasian watermilfoil infestation. The new data analysis results will be incorporated into the current lake management plan. This will provide property owners, applicators, and the IDNR with detailed records describing the changes within the plant communities of Winona Lake. In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic plant beds are reacting to any treatment. These surveys will provide a basis for evaluation of the management strategy and can be presented to the public should the management strategy need to be modified. They will also serve to keep the public informed about management practices at the lake so they will be motivated and educated to actively participate in conservation of the Winona Lake ecosystem.



V3 Companies
7325 Janes Avenue
Woodridge, IL 60517
630.724.9200 phone
630.724.9202 fax
www.v3co.com

TITLE: Eurasian Watermilfoil Results with Priority Treatment Areas for 2008	PROJECT: Winona Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 06099.01	EXHIBIT: VI	SHEET: 1 OF: 1
CLIENT: Winona Lake Preservation Association 2012 North Bay Drive Warsaw, IN 46580	QUADRANGLE: Warsaw	DATE: 12/12/07	SCALE: 1"=12000

E:\2006\06099\06099.01\Reports\Natural Resources\Wetland\Exhibits\06099.01 Priority Treatment 2008.mxd

Implementation of Action Plan

1. Spring 2008 Target Species Distribution Map, and Proposed Treatment Area Map. The site visit and investigation necessary to create these two maps will allow for the determination of the extent of follow-up chemical treatment that will be necessary to treat Eurasian watermilfoil. As of July, the 2007 chemical treatment effectively reduced the Eurasian watermilfoil population. The Spring 2008 mapping will determine the extent and location of milfoil re-growth.

2. Follow-up Herbicide Treatment to Eurasian watermilfoil. An early spring (3rd week of April to mid-May) systemic herbicide application of 2,4-D is proposed during 2008 to treat the Eurasian watermilfoil that has re-grown since the 2007 herbicide application.

3. Summer 2008 Tier II Aquatic Plant Survey. A Tier II aquatic plant survey should be conducted during the Summer 2008 to document the diversity, distribution and abundance of aquatic plants. This data is important to ensure that the native plant community is protected, and that the Eurasian watermilfoil population is kept under control.

The management goal for 2008 is to keep the Eurasian watermilfoil populations below nuisance quantities. The overall goal for Winona Lake is the results of the 2008 sampling are equal to or less than the 2007 Eurasian watermilfoil density and abundance which would demonstrate effective herbicide treatments and management.

Budget Update

The following costs are estimated based on lake size, average depth, chemical and application costs, as well as LARE survey requirements. In an attempt to assist LARE staff with alternatives in the event of grant funding limitations, the implementation of the 2007 Herbicide Application and Tier II survey is of a higher priority than the 2008 Tier II survey. The proposed management schedule and budgets for 2008 and 2009 are summarized below.

2008

Target Species Distribution Map and Proposed Treatment Area Map	$1,000
Early Spring Systemic Herbicide Application of 2,4-D or Renovate (assumed 35 acres)	$14,000
Late season post treatment aquatic plant survey (Tier II) and plan update	$6,000

2009

Target Species Distribution Map and Proposed Treatment Area Map	$1,000
Late season (post treatment) aquatic plant survey (Tier II) and plan update	$6,000

Any herbicide applications will depend on the results of the surveys. Sources for future funding of Aquatic Plant Management Plans are located in Appendix III.

These management activities and plant surveys are proposed to improve Winona Lake's ecosystem and facilitate the achievement of overall goals established by the IDNR. These overall goals established by the IDNR for all lakes applying for LARE funding are: 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; and 3) provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

Monitoring and Plan Updates

As the action plan is implemented, aquatic plant surveys will help to monitor the effectiveness of the management strategy. The abundance distribution of Eurasian watermilfoil will be recorded using the current IDNR Tier II sampling protocol.

The results of the 2007 post-treatment sampling reflect progress toward the goals stated in the 5 year plan. Coontail, eel grass, and slender naiad, all native species, accounted for the three most dominant species within Winona Lake. Native species accounted for 90% of the aquatic plants collected. Eurasian watermilfoil was only found up to 10 feet and was found within the vicinity of a sampling location twice. Species were found within all sampling depth ranges.

After the Spring 2008 Target Species Distribution Map is created, the distribution and abundance of Eurasian watermilfoil will be identified and treatment maps will be prepared. The survey will also document whether native plants have re-colonized areas of previous Eurasian watermilfoil infestation. The new data analysis results will be incorporated into the current lake management plan. This will provide property owners, applicators, and the IDNR with detailed records describing the changed in the plant community of Winona Lake.

In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic plant beds are reacting to any treatment regimes. These surveys will provide a basis for evaluation of the management strategy and can be presented to the public should the management strategy need to be modified. They will also serve to keep the public informed about management practices at the lake so they will be motivated and educated to actively participate in conservation of the Winona Lake ecosystem.

References

International Science & Technology, Inc. (IST). 1991. Winona Lake Feasibility Study.

Scribailo, R.W. and M.S. Alix. 2003. Final Report on the Weevil Release Study for Indiana Lakes. Department of Botany and Plant Pathology. Purdue University, West Lafayette, IN.

V3 Consultants, Ltd. 2005. Winona Lake Aquatic Plant Management Plan Update-2006. Woodridge, IL.

Appendices

Appendix I-	Data Sheets, Tier II Latitude/Longitude, and Survey Questionnaires
Appendix II-	Vegetation Control Permit
Appendix III-	Resources for Aquatic Vegetation Management

APPENDIX I

DATA SHEETS, TIER II LATITUDE/LONGITUDE AND SURVEY QUESTIONNAIRES

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization: V3 Companies

Contact Information: Ed Belmonte (630) 729-6160

Waterbody Name: Winona

Lake ID:

County(s): Kosciusko

Date: 7-26-07

Habitat Stratum: IL

Avg. Lake Depth (ft):

Lake Level:

Crew Leader: Walter Levernier

GPS Metadata

Datum:

Zone: 16

Accuracy:

Recorder: Jessica Dunn

Method:

Secchi Depth (ft):

Total # of Points Surveyed: 90

Total # of Species: 11

Littoral Zone Size (acres):

- ☐ Measured
- ☐ Estimated

Littoral Zone Max. Depth (ft):

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

Notable Conditions:

DO 8.46
Water temp 24.5°C

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Winona	DATE: 07252007
COUNTY: Kosciusko	SECCHI DEPTH (FT): 9
SITE ID: a0099	MAX PLANT DEPTH (FT): 16
SURVEYING ORGANIZATION: V3 Companies	WEATHER: Mostly Sunny
CREW LEADER: Walter Levernier	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Jessica Dunn	
CONTACT INFO:	

Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

Species Codes:

GPS #	Point #	R/T	Latitude	Longitude	Depth	CHARA	ALGA	POTPEC	VALAME	CERDEM	POTPUS	NAJFLE	NYMTUB	Notes
1	1	R			3'	1	9	9	9			3		
163	2	R			11'					3				
169	3	R			6'					1				
173	4	R			11'	1	9			3				
5	5	R			4'		9	1		1				
6	6	R			6'		9			1				
7	7	R			2'	3	9	9			9	9		lots of algae
8	8	R			9'					3				
9	9	R			3'	3	9	9	3	3		9	9	
174	10	R			16'									no veg
11	11	R			13'									no veg
12	12	R			3'	3	9		1	1		9	9	
13	13	R			8'									no veg
210	14	R			16'									no veg
211	15	R			13'									no veg
	16	R			9'		9					1		
	17	R			6'		9			3				
	18	R			2'	1			5			1		
	19	R			16'									no veg
	20	R			12'		9					1		
	21	R			6'		9			1		1		algae abundant
	22	R			3'		9		1			3		POTMOD-9, MYRSPI, 1
	23	R			17'									no veg
	24	R			7'				1	1				
	25	R			14'					1				
	26	R			3'		9	1		1		3		
	27	R			13'									no veg
	28	R			9'					5				
	29	R			18'									no veg.
	30	R			2'							5		
	31	R			11'							1		
	32	R			7'	1	9					1		
	33	R			3'	1	9					3		

Other plant species observed at lake:

562 acre, Eutrophic

29 pts → 0-5 ft

27 pts → 5-10 ft

24 pts → 10-15 ft.

10 pts → 15-20 ft.

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Winona	DATE: 07-25-2007
COUNTY: Kosciusko	SECCHI DEPTH (FT):
SITE ID:	MAX PLANT DEPTH (FT): 18
SURVEYING ORGANIZATION: V3 Companies	WEATHER:
CREW LEADER: Walter Leverhier	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Jessica Dunn	
CONTACT INFO:	*Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.*

Species Codes:

Point #	R/T	Latitude	Longitude	Depth	CHARA	ALGA	POTPEC	VALAME	CERDEM	POTPUS	NAJFLE	NYMTUB	Notes
34	R			8'					1				
35	R			12'					1				
36	R			4'	1	9		1	1		3		POTNOD-9
37	R			8'		9	1		3				
38	R			3'	3	9					1		
39	R			12'						1			
40	R			4'	1	9		1			3		ZOSDUB-1
41	R			9'				1	3		1		
42	R			9'	~~9~~	~~9~~	~~1~~	~~9~~	~~1~~	~~9~~	~~3~~		~~NO VEG~~ ~~1, MYRSPI-~~ JLD
43	R			2'	9	9	1	9	1	9	3		ZOSDUB-1, MYRSPI-
44	R			4'		9		3	1		1		
45	R			6'					1				
46	R			13'		9			1				
47	R			7'				3	3				
48	R			12'									no veg
49	R			2'	1	9		9		1	5		ZOSDUB-1
50	R			12'		9		9		1			
213-51	R			16'					5				
52	R			3'		9	3	3	3				POTNOD-9
53	R			10'									no veg
54	R			4'		9		3					zebra mussels
212-55	R			14'					5				
56	R			11'					1				
57	R			3'		9		5	1		9		
58	R			7'									no veg
59	R			11'					3				
60	R			5	3	9		3		1	1		zebra mussels POTPUS
61	R			17'				5					
62	R			4'			1	3					
63	R			8'				5	5	1			MYRSPI-1
64	R			12'				3	3				
65	R			6'		9			5	1			POTI
66	R			3'	9	9		3			9		POTNOD-9

Other plant species observed at lake:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Winona	**DATE:** 07-26-2007 (pts 72-90)
COUNTY: Kosciusko	**SECCHI DEPTH (FT):**
SITE ID:	**MAX PLANT DEPTH (FT):** 11.0
SURVEYING ORGANIZATION: V3 Companies	**WEATHER:** Cloudy (pts 72-90)
CREW LEADER: Walter Leverrier	**COMMENTS (Include voucher codes - V1, V2...):**
RECORDER: Jessica Dunn	
CONTACT INFO:	

Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

Point #	R/T	Latitude	Longitude	Depth	Species Codes: CHARA	ALGA	POTPEC	CALAMA	CERDEM	POTPUS	NAJFLE	NYMTUB	Notes
67	R			11.0'									no veg
68	R			12'					1				
69	R			12'					5				
70	R			7'	1	9		9			9		
71	R			3'	1	9		9					
72	R			8'					5				
73	R			3'					1		5		POTMOD-1, MYRSPI-9
74	R			11'					1				
75	R			7'	1	9			5		1		
76	R			17'									
77	R			3'		9		1	1				no veg
78	R			8'		9					1		lots of algae
79	R			11'					3				
80	R			2'	1			9			1		
81	R			11'		9							some algae
82	R			16'									no veg
83	R			8'					3				
84	R			5'				3	1				
85	R			8'		9			3				lots of algae
86	R			12'					1				
87	R			3'		9			1		3		
88	R			12'		9		3			1		
89	R			3'	1	9		3	1		1		
90	R			6'		9			1				

Other plant species observed at lake:

Winona Lake Aquatic Plant Management Plan Update-2007
Tier II Sampling, July 2007

Tier II Sampling Location Number	Latitude	Longitude
1	41.22898	-85.84527
2	41.22763	-85.84484
3	41.22617	-85.84477
4	41.22579	-85.84367
5	41.22517	-85.84233
6	41.22584	-85.84228
7	41.22671	-85.84261
8	41.22698	-85.84156
9	41.22686	-85.84005
10	41.22796	-85.84104
11	41.22854	-85.84139
12	41.22961	-85.84223
13	41.22927	-85.84383
14	41.22897	-85.84323
15	41.22911	-85.84199
16	41.22809	-85.83924
17	41.22721	-85.83862
18	41.22646	-85.83819
19	41.22647	-85.83765
20	41.22596	-85.83672
21	41.22516	-85.83576
22	41.22453	-85.83649
23	41.22439	-85.8362
24	41.22395	-85.83616
25	41.22348	-85.83556
26	41.22293	-85.83533
27	41.2228	-85.8342
28	41.2219	-85.83416
29	41.22129	-85.83346
30	41.22081	-85.83312
31	41.22048	-85.83261
32	41.21992	-85.83217
33	41.21937	-85.83235
34	41.21892	-85.83291
35	41.21856	-85.83307
36	41.21705	-85.83291
37	41.21686	-85.83241
38	41.21616	-85.83195
39	41.21551	-85.83129
40	41.21464	-85.83041
41	41.21433	-85.82929
42	41.21491	-85.82822
43	41.2148	-85.82725
44	41.21401	-85.82587
45	41.21546	-85.82527

Tier II Sampling Location Number	Latitude	Longitude
46	41.21529	-85.82596
47	41.21686	-85.82177
48	41.21755	-85.82249
49	41.21837	-85.82298
50	41.21979	-85.82301
51	41.21753	-85.82592
52	41.2149	-85.82334
53	41.21624	-85.82148
54	41.21574	-85.82317
55	41.21716	-85.8233
56	41.22057	-85.82282
57	41.22116	-85.82245
58	41.22182	-85.82344
59	41.22241	-85.82429
60	41.22318	-85.82444
61	41.22377	-85.82572
62	41.22434	-85.82536
63	41.22521	-85.82633
64	41.22549	-85.82711
65	41.22669	-85.82799
66	41.22721	-85.82661
67	41.22759	-85.82643
68	41.22788	-85.82565
69	41.22852	-85.82493
70	41.22882	-85.82407
71	41.22874	-85.82257
72	41.22945	-85.82378
73	41.23048	-85.82348
74	41.23047	-85.8244
75	41.23114	-85.82468
76	41.23058	-85.82528
77	41.23131	-85.82657
78	41.23077	-85.82685
79	41.22972	-85.82782
80	41.23045	-85.83014
81	41.23062	-85.83203
82	41.23146	-85.83261
83	41.2317	-85.83332
84	41.23099	-85.83422
85	41.22948	-85.83462
86	41.22912	-85.83493
87	41.2295	-85.83603
88	41.22899	-85.83657
89	41.22917	-85.83791
90	41.22868	-85.8388

APPENDIX II

VEGETATION CONTROL PERMIT

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)
Approved State Board of Accounts 2004

[ ] 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:
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: Chris Cummins	Lake Assoc. Name: Winona Lake Preservation Association	
Rural Route or Street: 2012 North Bay Drive		Phone Number: (574) 267-7500
City and State: Warsaw, IN		ZIP Code: 46580
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): Winona Lake	Nearest Town: Warsaw	County: Kosciusko
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 # A (17 acres)		LAT/LONG or UTM's Lat: 41.22521 Lon: -85.82633	
Total acres to be controlled: sum of 35 acres for lake		Proposed shoreline treatment length (ft): 2,203 ft	Perpendicular distance from shoreline (ft): adjacent
Maximum Depth of Treatment (ft): 20 ft		Expected date(s) of treatment(s): 03/15/08 - 08/15/08	

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.

There are three Eurasian watermilfoil priority treatment areas for Winona Lake in 2008. The 35 acres will be treated with an herbicide application of 2,4-D or Renovate in 2008. Selected treatment locations for Eurasian watermilfoil are shown in the attached Eurasian watermilfoil priority treatment exhibit.

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Based on Tier II sampling conducted during July 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		70
Slender naiad		22
Eel grass		11
Chara		11
Sago pondweed		4
Eurasian watermilfoil	x	4

Treatment Area # B (13 acres)	LAT/LONG or UTM's Lat: 41.22439 Lon:-85.8362		
Total acres to be controlled: sum of 35 acres for lake	Proposed shoreline treatment length (ft) 1,983 ft	Perpendicular distance from shoreline (ft) adjacent	
Maximum Depth of Treatment (ft): 10 ft	Expected date(s) of treatment(s) 03/15/08 - 08/15/08		

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. same as previously stated on page 1

Plant survey method: [x] Rake [ ] Visual [ ] Other (specify) Based on Tier II sampling conducted during August 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Slender naiad		58
Eel grass		55
Chara		48
Coontail		48
Sago pondweed		18
Water stargrass		10
Small pondweed		7
American pondweed		4
Eurasian watermilfoil	x	3

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

Treatment Area #	C (8 acres)	LAT/LONG or UTM's	Lat: 41.2148 Lon: -85.82725
Total acres to be controlled	sum of 65 acres for lake	Proposed shoreline treatment length (ft)	1,583 ft
Perpendicular distance from shoreline (ft)	adjacent		
Maximum Depth of Treatment (ft)	10 ft	Expected date(s) of treatment(s)	03/15/08 - 08/15/08

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. same as previously stated on page 1

Plant survey method: [x] Rake [ ] Visual [ ] Other (specify) Based on Tier II sampling conducted during August 2007

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Slender naiad		58
Eel grass		55
Chara		48
Coontail		48
Sago pondweed		18
Water stargrass		10
Small pondweed		7
American pondweed		4
Eurasian watermilfoil	x	3

Treatment Area #		LAT/LONG or UTM's	Lat: Lon:
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.

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

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

APPENDIX III

RESOURCES FOR AQUATIC VEGETATION MANAGEMENT

Appendix III - Resources for Aquatic Vegetation 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)