

CENTER LAKE, KOSCIUSKO COUNTY
AQUATIC PLANT MANAGEMENT
PLAN UPDATE 2007



PREPARED FOR:

**CENTER LAKE CONSERVATION ASSOCIATION
1212 EDGEWATER DRIVE
WARSAW, IN 46580**

PREPARED BY:

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FEBRUARY, 2008

Executive Summary

Center Lake Conservation Association contracted V3 Companies Ltd. (V3) to complete aquatic vegetation sampling in order to update an aquatic vegetation management plan which was created in 2005. The update was funded in part by the Lake and River Enhancement fund (LARE) as part of the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife which was obtained by the Center Lake Conservation Association. 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.

Center Lake is a 120-acre natural lake in Warsaw, Kosciusko County, Indiana. Aquatic plants are an essential part of healthy lake ecosystems. They provide fish habitat, stabilize sediments, and reduce shoreline erosion. The purpose of the Aquatic Plant Management Plan is to identify aquatic weed problem areas, describe management objectives, prescribe management strategies, and determine funding needs and sources necessary for the control of invasive aquatic plants. Center Lake's primary nuisance species is Eurasian watermilfoil. Eurasian watermilfoil crowds out native plants reducing biodiversity, diminishes fish habitat and negatively impacts wetland habitats. Dense growths inhibit water recreation on Center Lake such as boating, swimming and fishing. The primary goal of Center Lake Conservation Association is to reduce the impact of Eurasian watermilfoil while preserving and enhancing native plant communities.

Herbicide treatments for 2007 include: 2,4-D granular applied to 4.75 acres of Eurasian watermilfoil and 1.75 acres of curlyleaf pondweed with Aquathol K. The 2007 sampling effort had vegetation at 42% of sites post treatment, which is the lowest of all surveys. Native plants accounted for 90% of species collected. Only one exotic species was observed within Center Lake, Eurasian watermilfoil. Seven species were collected during the Tier II survey. Coontail (*Ceratophyllum demersum*) and sago pondweed (*Potamogeton pectinatus*) were present at the highest percentage of sample sites (20%). Chara ranked second in frequency of occurrence (12%).

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 up to five acres of Eurasian watermilfoil that may re-grow from the 2007 herbicide application. Aquathol K will be used as an herbicide for up to 16 acres of curlyleaf pondweed, if necessary. 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 monitor Eurasian watermilfoil densities and that native plant communities are protected.

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 Herbicide Application of granular 2,4-D for Eurasian Watermilfoil (up to 5 acres of Eurasian watermilfoil)	\$2,000
Early Spring Herbicide Application of Aquathol K for curlyleaf pondweed (up to 16 acres of curlyleaf pondweed)	\$ 2,000
Late season post treatment aquatic plant survey (Tier II) and plan update	\$5,000

2009

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Late season (post treatment) aquatic plant survey (Tier II) and plan update	\$5,000

Any herbicide applications will depend on the results of the surveys.

These management activities and plant surveys are proposed to improve Center 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.

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 Center Lake Conservation Association as the local sponsor that provided assistance and guidance including: Troy Turley, Dale Long, Neal Carlson, Bill Hilliard, and Charlie Wheeler. We would like to recognize Tony Cunningham and Leslie Cunningham of Weed Patrol for their mapping, recommendation, consultation and treatments. 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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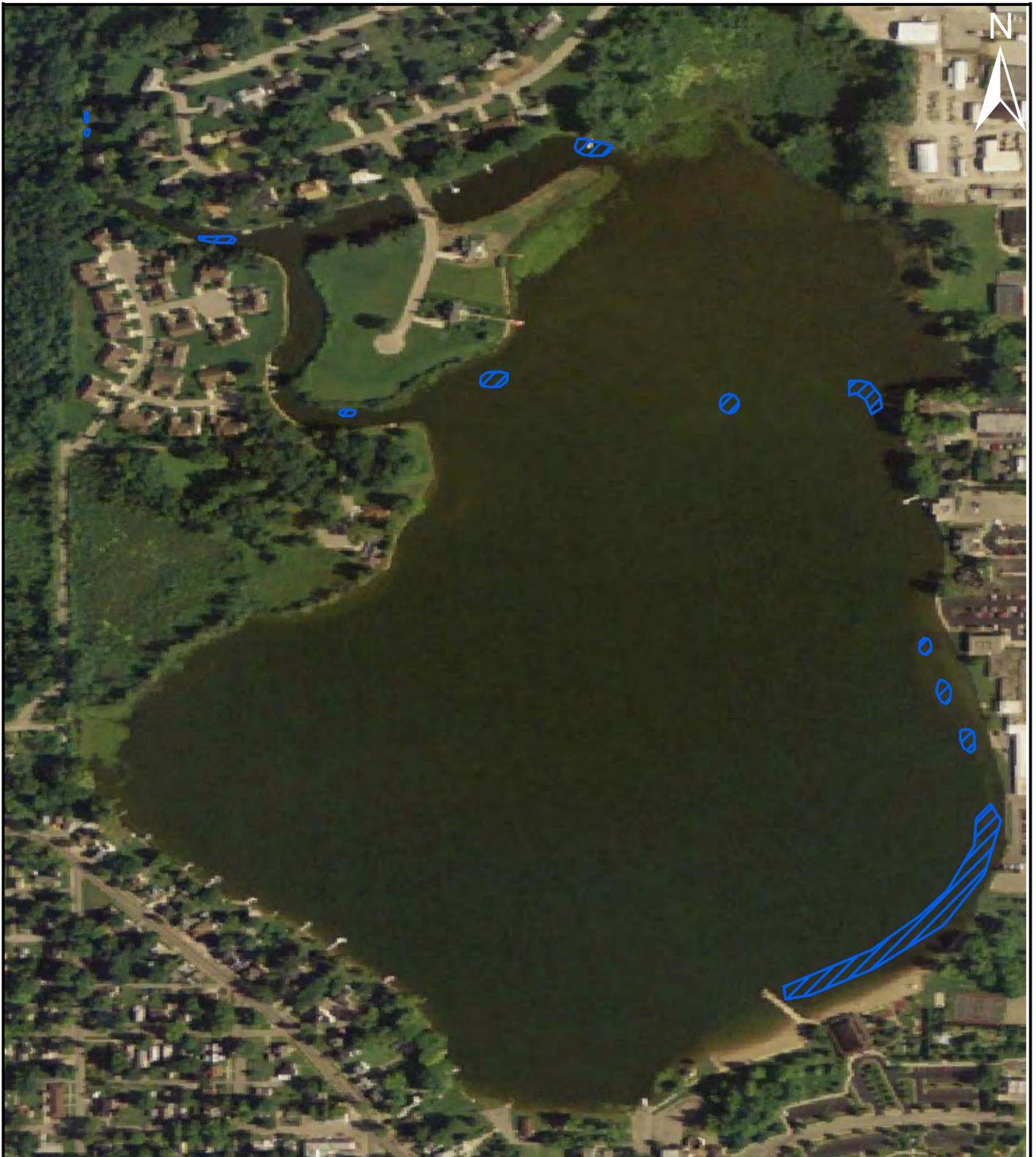
Introduction and Background

Center Lake is a 120-acre natural lake in Warsaw, Kosciusko County, Indiana. Center Lake has a maximum depth of 42 feet and average depth of 20 feet. The overall Center Lake watershed consists of 9,611 acres. The Center Lake watershed is comprised of three sub-watersheds: Center/Pike Lake (888 acres), Tippecanoe River (7,368 acres), and Walnut Creek (1,355 acres).

Eighteen acres of land along the southern shoreline of Center Lake are owned by the City of Warsaw for recreational uses including but not limited to public boat launch, public beach, gardens, picnic areas and open spaces (V3 2005). The public swimming beach is located along the southern shore. A powerboat restriction is enforced on the lake limiting the speed limit for boats to 10 mph. Recreational boating typically includes pontoon boats, fishing boats, canoes and kayaks. Center Lake is a great resource for recreational fishing and bluegills were the most abundant species in the 2005 fisheries study. There were no additional fisheries studies conducted on Center Lake during 2007.

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 Center Lake for many years and there have been several different approaches implemented to control its population. Biological (stocking weevils), chemical (various treatments) and physical (weed harvester) means of treatment have been implemented with varying levels of effectiveness. Pre-treatment distribution of Eurasian watermilfoil within Center Lake is seen in Exhibit I.

This report was created in order to update the Center Lake Aquatic Vegetation Management Plan which was funded by the IDNR's LARE Program and the Center Lake Conservation 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.



 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: Pre-treatment Distribution of Eurasian Watermilfoil		PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT: I	SHEET: 1 OF: 1
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=500'

Problem Statement

Water quality in Center Lake has declined since the 1990s (Benson 2006). As summarized by V3 (2005), nutrient loading and low dissolved oxygen levels below the thermocline have been identified as the predominant water quality impairments to Center Lake. Nutrient influx from the man-made ditch connecting Center Lake to Lones Ditch, which flows from Pike Lake, provides additional pollutants and sediment into Center Lake from outside its natural watershed, degrading its water quality (V3 2005).

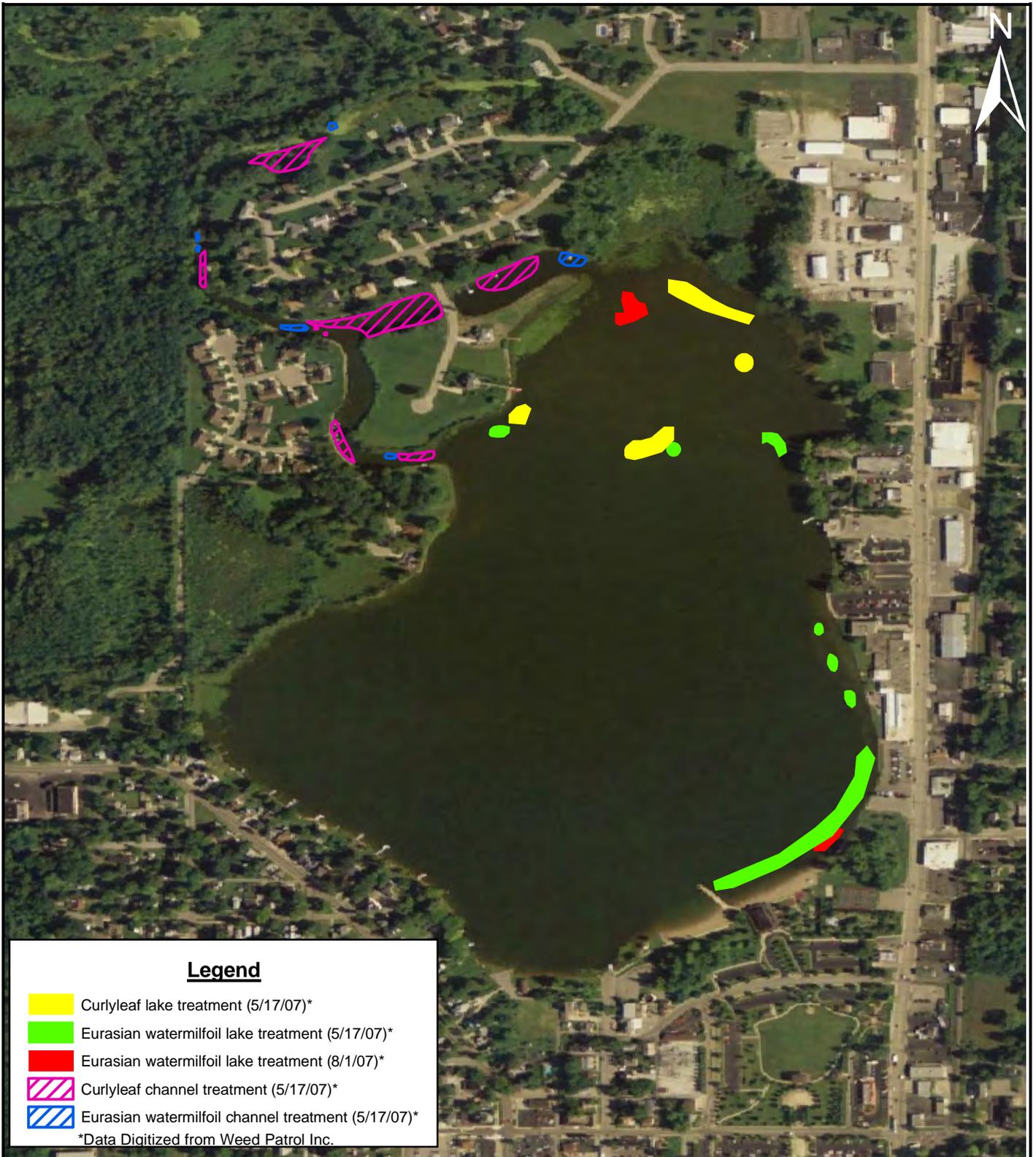
Eurasian watermilfoil is an aggressive, invasive aquatic species that can have a detrimental effect on the native aquatic plant community. This nuisance species grows and spreads rapidly, forming dense weed beds that outcompete native species for light and nutrients. In lakes where Eurasian watermilfoil is left unchecked, even well-diversified plant communities can become decimated and taken over by a single species.

In part due to water quality problems, Eurasian watermilfoil has been a dominant plant in Center Lake for many years (Figure 1). Center Lake was treated with Sonar aquatic herbicide in 1996, but Eurasian watermilfoil had reestablished its dominance by 2001 (Benson 2006). Approximately 35 acres infested with Eurasian watermilfoil were treated with Sonar during June 2005, and 22 acres were treated with Renovate3 during June 2006. Herbicide treatments for 2007 include: 2,4-D granular applied to 4.75 acres of Eurasian watermilfoil and 1.75 acres of curlyleaf pondweed with Aquathol K (Exhibit II). Treatments on Center Lake should be continued over three or four years so that Eurasian watermilfoil is maintained at manageable levels and recreational activities are not inhibited by nuisance levels of milfoil.



Figure 1: Milfoil crops at North end of Center Lake 10/6/07

*Photos courtesy of Center Lake Conservation Association



Legend

- Curlyleaf lake treatment (5/17/07)*
- Eurasian watermilfoil lake treatment (5/17/07)*
- Eurasian watermilfoil lake treatment (8/1/07)*
- Curlyleaf channel treatment (5/17/07)*
- Eurasian watermilfoil channel treatment (5/17/07)*

*Data Digitized from Weed Patrol Inc.

	V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com	TITLE: Eurasian Watermilfoil and Curlyleaf Herbicide Treatments	PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO. 02218.03	EXHIBIT: II	SHEET: 1 OF: 1	
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=675'	

Sampling Results

On July 25, 2007 a Tier II survey was conducted on Center 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 at a state wide scale. The information collected can be used to compare present trends in distribution and abundance of the aquatic plant community to past conditions. A table outlining the scientific and common names of species collected or observed in Center Lake is listed below (Table 1).

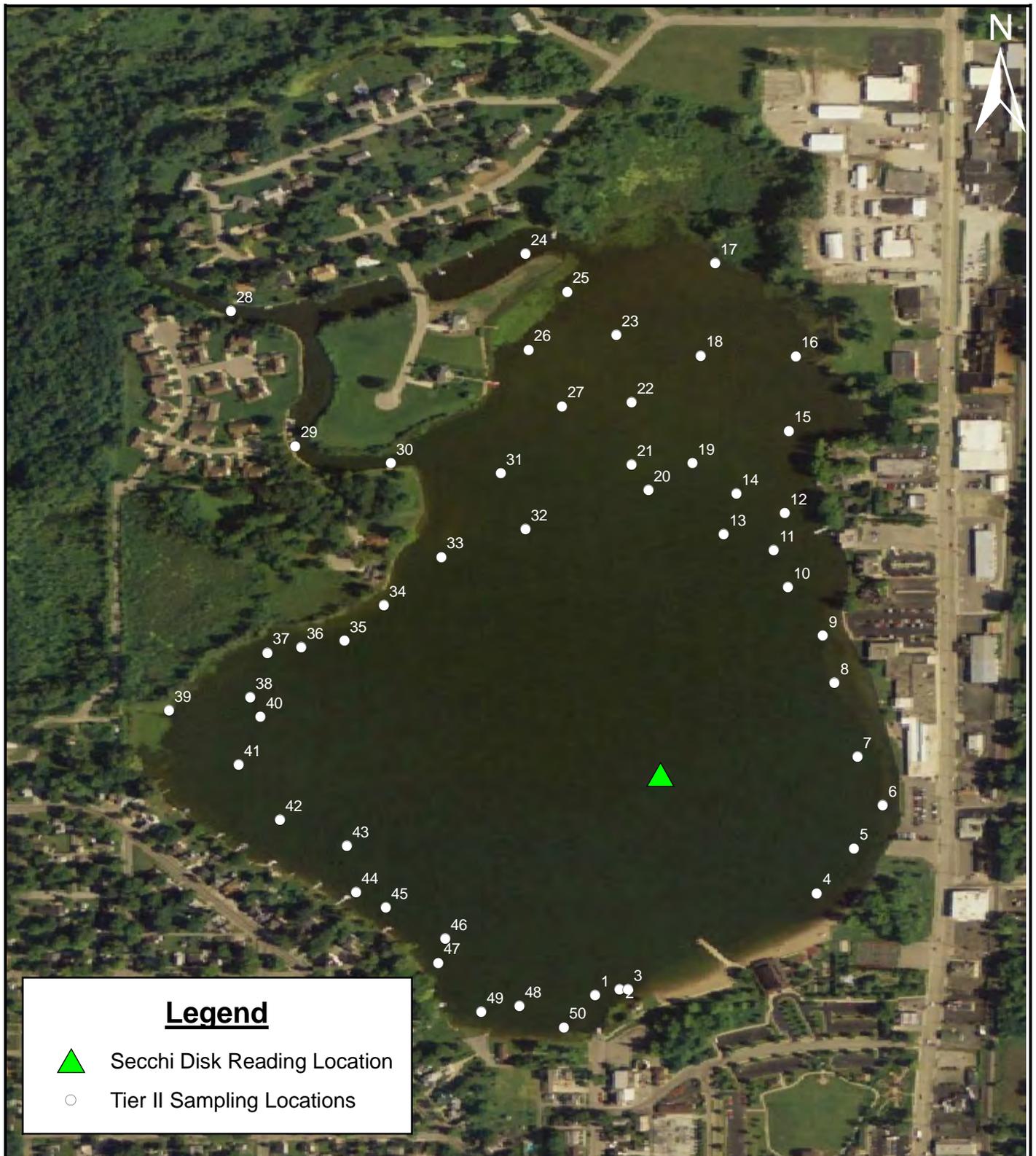
Table 1. Scientific and common names of species collected in Center Lake.

Scientific Name	Common Name
<i>Ceratophyllum demersum</i>	coontail
<i>Chara spp.</i>	chara species
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil
<i>Najas marina</i>	spiny naiad
<i>Nuphar variagnetum</i>	yellow pond lily
<i>Nymphaea tuberosa</i>	white water lily
<i>Potamogeton gramineus</i>	variable pondweed
<i>Potamogeton illinoensis</i>	Illinois pondweed
<i>Potamogeton pectinatus</i>	sago pondweed
<i>Utricularia vulgaris</i>	common bladderwort

Sampling Methodology for Summer Tier II Survey

Plant communities typically reach peak diversity between July 15 and August 31. One sampling effort occurred during this time frame which included a representative sample of the species within Center Lake. Center Lake required a total of fifty sampling stations based on trophic status and acreage. According to the IDNR protocol, Center Lake is classified as an oligotrophic trophic status which would require 10 sites from 15-20 feet and 20-25 feet. The maximum sampling depth for Center Lake is 15 feet based on previous studies data showing that plants weren't reaching depths past 8 feet. The Tier II sampling was conducted at the eutrophic status so that sampling locations were apportioned to the required depth class. Fifty sites were sampled within the littoral zone, including: 23 sites within 0 to 5 feet, 17 sites within 5 to 10 feet, and 10 sites within 10 to 15 feet. (Exhibit III).

At each station a sampling rake is used for collecting vegetation samples. Once a species is identified, 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.



Legend

 Secchi Disk Reading Location

 Tier II Sampling Locations

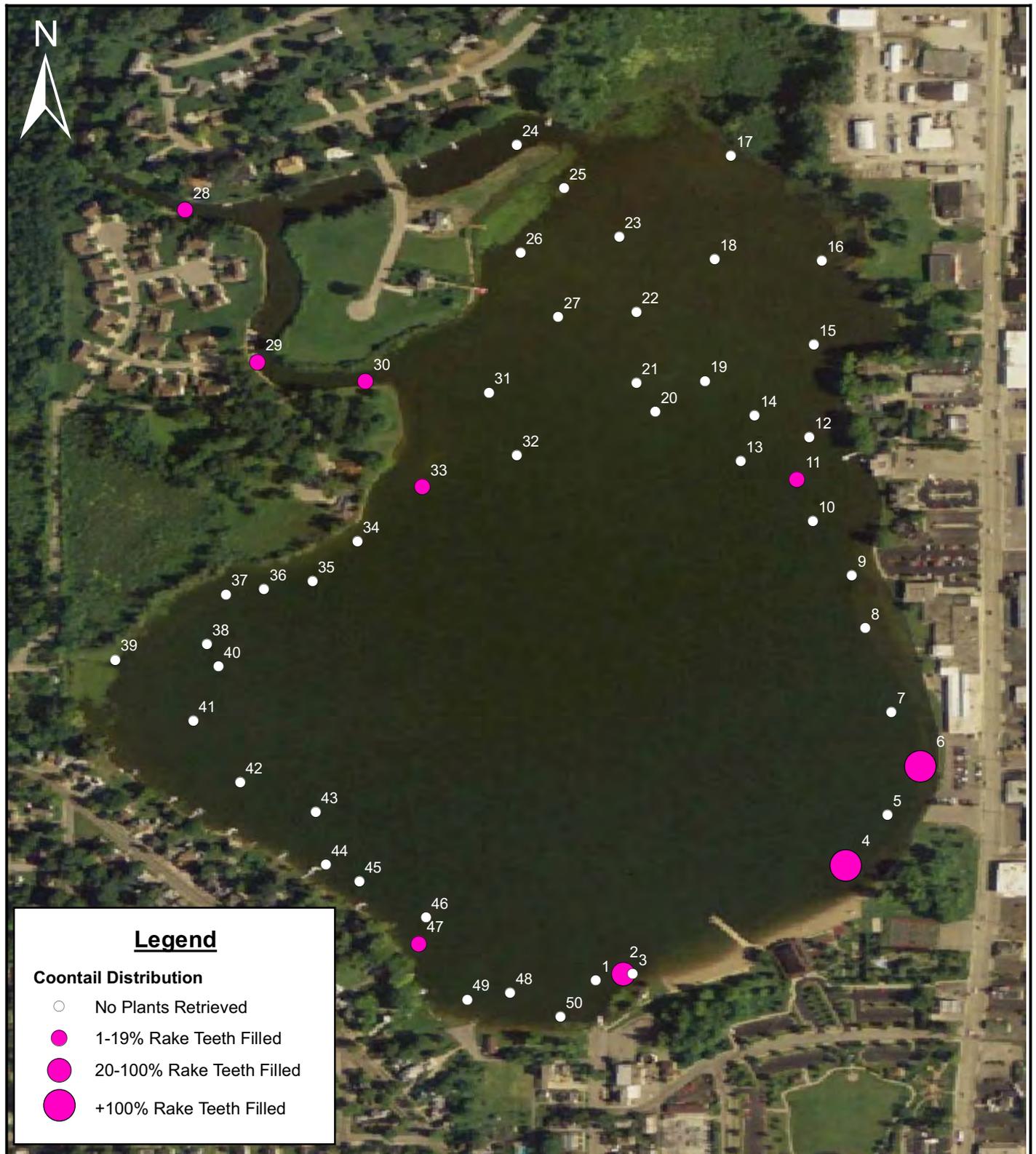
	V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com		TITLE: Tier II (2007) Sampling Locations		PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT: III	SHEET: 1 OF: 1		
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=600'		

Results of Summer Tier II Survey

The Tier II survey completed on July 25, 2007 identified a total of 10 species within Center Lake with vegetation present up to a depth of 7 feet. A secchi disk reading was taken after sampling and was found to be at 4 feet (Exhibit III). Sampling results for the seven species collected by rake are listed in Table 2.

Table 2: Occurrence and abundance of aquatic plants in Center Lake on July 25, 2007.							
County: Kosciusko				Total Sites: 50			
Date: 7/25/2007				Sites with plants: 21			
Secchi (ft): 4				Sites with native species: 21			
Maximum plant depth (ft): 7				Number of species collected: 7			
Trophic status: Oligotrophic				Number of species observed: 3			
Trophic status sampled: Eutrophic				Number of native species: 9			
				Maximum species/site: 4			
All depths (0 to 15 ft)		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
Sago pondweed	<i>Potamogeton pectinatus</i>	20.0	76.0	18.0	2.0	0.0	2.7
Coontail	<i>Ceratophyllum demersum</i>	20.0	80.0	14.0	2.0	4.0	4.4
Chara	<i>Chara spp.</i>	12.0	88.0	10.0	2.0	0.0	1.8
Variable pondweed	<i>Potamogeton gramineus</i>	2.0	98.0	0.0	2.0	0.0	0.7
Illinois pondweed	<i>Potamogeton illinoensis</i>	2.0	98.0	2.0	0.0	0.0	0.2
Yellow pond lily	<i>Nuphar variagnetum</i>	2.0	96.0	0.0	2.0	0.0	0.7
Spiny naiad	<i>Najas marina</i>	2.0	98.0	2.0	0.0	0.0	0.2
Depth: 0 to 5 ft		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
Sago pondweed	<i>Potamogeton pectinatus</i>	39.0	52.0	35.0	4.0	0.0	9.6
Coontail	<i>Ceratophyllum demersum</i>	21.0	79.0	17.0	0.0	4.0	7.8
Chara	<i>Chara spp.</i>	26.0	74.0	22.0	4.0	0.0	7.0
Variable pondweed	<i>Potamogeton gramineus</i>	4.0	96.0	0.0	4.0	0.0	2.6
Illinois pondweed	<i>Potamogeton illinoensis</i>	4.0	96.0	4.0	0.0	0.0	0.9
Yellow pond lily	<i>Nuphar variagnetum</i>	4.0	92.0	0.0	4.0	0.0	2.6
Spiny naiad	<i>Najas marina</i>	4.0	96.0	4.0	0.0	0.0	0.9
Depth: 5 to 10 ft		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
Sago pondweed	<i>Potamogeton pectinatus</i>	6.0	94.0	6.0	0.0	0.0	1.2
Coontail	<i>Ceratophyllum demersum</i>	30.0	70.0	18.0	6.0	6.0	12.9
Depth: 10 to 15 ft		Frequency of	Rake score frequency per species				Plant
Common Name	Species	Occurrence	0	1	3	5	Dominance
*No species were found in this depth range.							

A total of ten species were observed or collected during the Tier II survey. Nine of the ten species identified in the study were native species. Three species were observed during the Tier II sampling event. Seven species were collected on the rake during the Tier II survey. Coontail and sago pondweed were present at the highest percentage of sample sites (20%) (Exhibit IV, Exhibit V). Chara ranked second in frequency of occurrence (12%). Variable pondweed, Illinois pondweed, yellow pond lily, and spiny naiad were also collected but found at a small percentage of sites (2%). Species observed within the vicinity of the sampling locations include white water lily, common bladderwort, and Eurasian watermilfoil. Location of Eurasian watermilfoil is illustrated in Exhibit VI. Datasheets from V3's sampling effort are located in Appendix I. Ten additional sampling stations past the 15 foot depth zone were raked with no vegetation recovered. Since no vegetation was recovered in greater depths there is no indication to extend vegetation sampling stations into deeper contours.

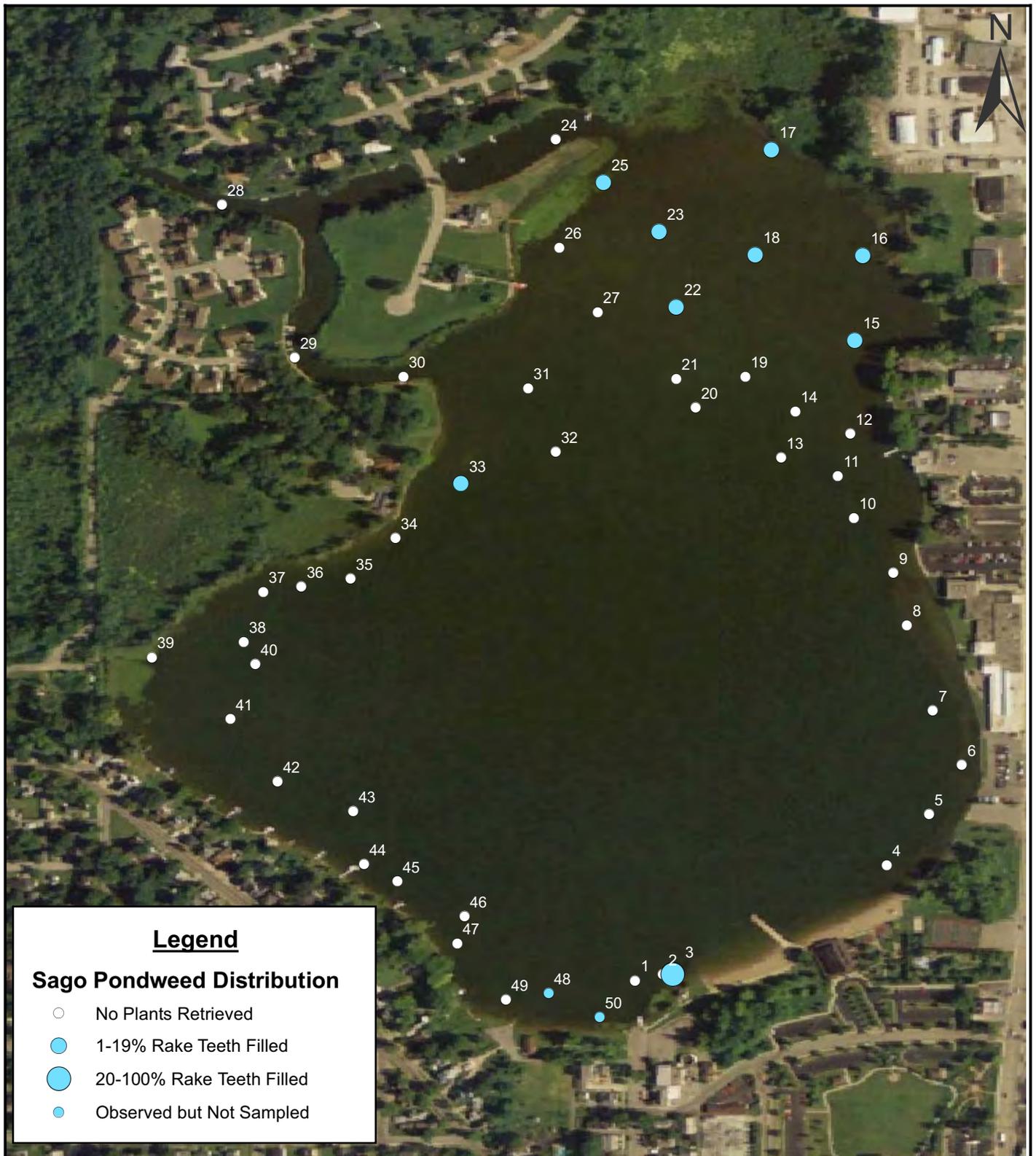


Legend

Coontail Distribution

- No Plants Retrieved
- 1-19% Rake Teeth Filled
- 20-100% Rake Teeth Filled
- +100% Rake Teeth Filled

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: Coontail Distribution		PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT: IV	SHEET: 1 OF: 1
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 2/9/08	SCALE: 1"=600'

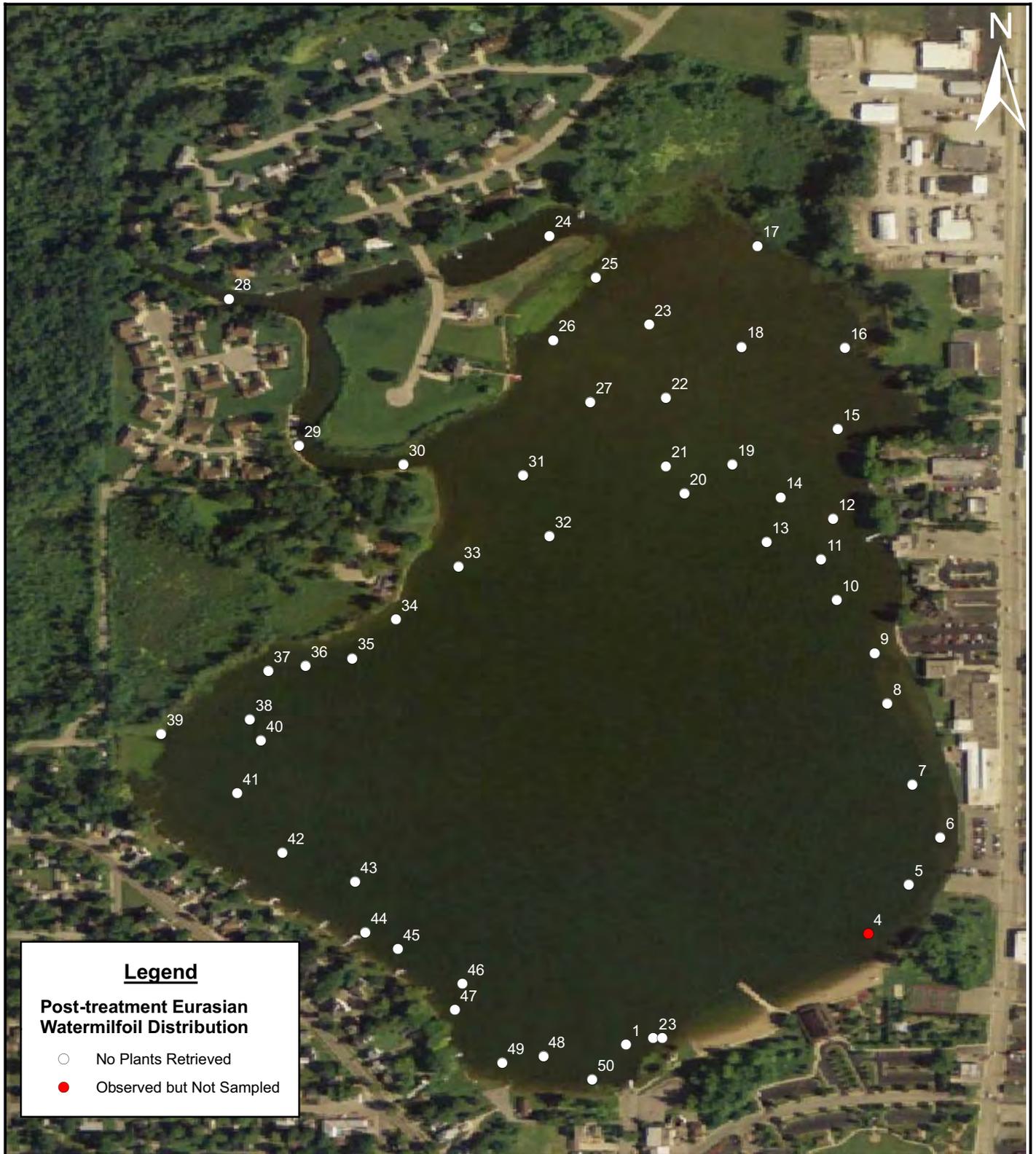


Legend

Sago Pondweed Distribution

- No Plants Retrieved
- 1-19% Rake Teeth Filled
- 20-100% Rake Teeth Filled
- Observed but Not Sampled

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: Sago Pondweed Distribution		PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT: V	SHEET: 1 OF: 1
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 2/9/08	SCALE: 1"=600'



Legend

Post-treatment Eurasian Watermilfoil Distribution

- No Plants Retrieved
- Observed but Not Sampled



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TITLE: Post-treatment Eurasian Watermilfoil Distribution and Abundance		PROJECT: Center Lake Aquatic Plant Management Plan		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT: VI	SHEET: 1 OF: 1
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=550'

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 proper fish habitat, shoreline stabilization, and preventing the spread and/or establishment of invasive species such as Eurasian watermilfoil. Quantitative sampling of the aquatic plant community was conducted in 2004 by Weed Patrol, Inc. (Weed Patrol 2005), 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 2004 to 2007

Sampling Date:	8/24/04**	5/11/05*	8/02/05*	07/31/06	7/25/07
Secchi (ft):	18‡	5	5	5	4
# of Sites:	41	60	60	50	50
Max Plant Depth (ft):	14	13	9.5	8	7
Sites with Plants (%):	73%	92%	85%	74%	42%
# of Species:	9	10	10	15	10
# of Native Species:	7	8	8	13	9

*Data from IDNR (Benson 2006)

**Data from Weed Patrol, Inc. (Weed Patrol 2005)

‡ Assumed to be incorrect measurement, since no other value higher than 7.2 was recorded from 1991-2007.

The 2007 secchi disk reading remained consistent with the average values of the past five surveys. However, the maximum depth of plants was reported to be 14 feet in 2004, whereas aquatic plants were recorded up to a depth of only seven feet in 2007. The 2007 sampling effort had vegetation at 42% of sites which is the lowest of all surveys. Native plants accounted for 90% of species collected. Only one exotic species was observed within Center Lake, Eurasian watermilfoil. No new problem areas interfering with lake uses were identified during Tier II sampling. Continued management efforts to maintain the Eurasian watermilfoil population at a low level is desirable to prevent Eurasian watermilfoil from becoming a predominant species.

The depth class from 0-5 feet was dominated by sago pondweed (39%) which is slightly less than the 41% found in this depth zone in 2006. Sago pondweed decreased from 66% occurrence of sample site in 2006 to 20% in 2007. Comparing sago pondweed from 1996 to the present the sampling station dominance has ranged from 15% to 66%. The decrease in 2007 sago pondweed is within the historical range and the decrease does not necessarily indicate any problematic growth conditions for sago pondweed.

The depth class from 5-10 feet was dominated by coontail (30%). Coontail increased from 2% occurrence of sampling sites in 2006 to 20% occurrence of sampling sites in 2007. Eurasian watermilfoil tolerates lower light conditions which gives this species a competitive advantage for growth in deeper areas. It is important to monitor and document the deeper plant bed since a lack of coontail in this area could allow for Eurasian watermilfoil populations to establish.

Aquatic Plant Management Alternatives

At the present time, the health of Center Lake's aquatic plant communities is fair. Native plant diversity is moderate. 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. Additionally, watershed activities to improve the water quality of Center Lake are important to enhance the native plant diversity and restore a coontail-dominated deeper bed.

Many management strategies have been used to control Eurasian watermilfoil in Indiana lakes. A management strategy should be chosen based on selectivity to the target species, 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 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.

Implementation projects involving best management practices for establishing native submergent or emergent aquatic plant communities within Center Lake or along the shoreline has not occurred and can not be discussed. Different types of aquatic plant management alternatives are discussed below. One or more of these alternatives may be employed to meet the objectives of Center Lake.

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. A major goal of this aquatic plant management plan is to prevent Eurasian watermilfoil from becoming a monoculture, and to maintain and enhance the current diversity of native aquatic plants. Therefore, it is imperative that Eurasian watermilfoil be controlled. Eurasian watermilfoil has a history of coming back after treatments, and diligent treatment of re-sprouts over several years is needed to provide long-term control.

Taking no action might allow the Eurasian watermilfoil population to re-sprout after the 2007 treatments and again expand to a problematic level.

2 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).

3 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. The infestation of Eurasian watermilfoil has been too large in recent years, and shown too high a potential for expansion for hand-pulling, cutting, or raking to be viable options.

4 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 Aquathol (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 moderately abundant during mid-summer at Center Lake, the effectiveness of a low-dose contact treatment may be compromised.

The contact herbicide used for curlyleaf pondweed control is Aquathol K which is commonly applied in late May and June. Aquathol K is composed of dipotassium salts of endothall and comes in both liquid and granular formulations. These endothall products are effective on curlyleaf pondweed and can be mixed with copper compounds for additional effectiveness. Contact herbicides, such as Aquathol K, act quickly and kill all plants cells that they come in contact with. Early treatment of curlyleaf would decrease chances of effecting non-target native species provided the herbicide is applied within the effective water temperature range.

Systemic herbicides are absorbed by the plant and transported to the root systems where they kill both the roots and the plant. Examples of systemic herbicides are Sonar and Avast (active ingredient: fluridone); Navigate, Aqua Kleen, DMA4 (active ingredient: 2,4-D), and Renovate (active ingredient: triclopyr). All of these products effectively kill Eurasian watermilfoil plants and roots. Whole lake treatments of fluridone are often used in lakes that have become severely infested with Eurasian watermilfoil. Fluridone can be applied at low rates to control the Eurasian watermilfoil while causing minimal damage to most of the native plant species present. Curly-leaf pondweed is also susceptible to fluridone at the low dose used on Eurasian watermilfoil.

Triclopyr and 2,4-D are both systemic herbicides that are often used for spot treatments in small areas of Eurasian watermilfoil. These herbicides kill all dicots (broadleaf plants such as coontail, waterweed, watermilfoils, etc.) but do not affect monocots (such as eel grass or pondweeds). In preliminary studies, triclopyr may have the ability to control Eurasian watermilfoil in select areas longer than 2,4-D, but this potential benefit is outweighed by higher cost. Neither chemical affects curly-leaf pondweed.

The public's primary concern with the use of aquatic herbicides is safety. Each chemical registered for aquatic applications has undergone extensive testing prior to becoming available for use. It is imperative that any aquatic herbicide be applied by a licensed professional in accordance with its label to minimize potential side-effects.

2007 Vegetation Control

Weed Patrol performed a 2,4-D treatment herbicide application for Eurasian watermilfoil on May 17, 2007 for 4 acres and again on August 1, 2007 for .75 acres. Weed Patrol also treated curlyleaf pondweed on May 17, 2007 with Aquathol K for a total of 1.75 acres. Center Lake's channels were treated with 2,4-D which was applied on May 17, 2007. Total acreage for channel treatments includes 1 acre for Eurasian watermilfoil and 1.25 acres for curlyleaf pondweed (Exhibit II). Eurasian watermilfoil was present at less than 1% of sampling locations during the July post-treatment survey. It was recorded within the vicinity of sampling station four at a depth of 6 feet. Our study's results compared with past surveys indicate the treatment was effective in reducing densities of Eurasian watermilfoil and was the lowest recorded occurrence in three years.

There are no known state or federally protected threatened or endangered species present within Center 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

Public meetings have been held annually by the Center Lake Conservation Association to discuss the vegetation management plan. A notice of the public meeting was published in the newspaper, and the public input was requested on proposed aspects of the aquatic plant management plan. A public meeting was held November 27, 2007 at the Warsaw Community Library in Warsaw, Indiana. Twenty individuals attended the meeting. V3 discussed current plant management activities, results of the Tier II survey, and future management. A lake use survey was handed out after the meeting and ten individuals participated. Summary totals from the completed lake use survey are shown in Figure 2. Ninety percent of participants were lake property owners and all were current members of the Center Lake Conservation Association. Fifty percent of lake property owners had been at the lake for 10 years or more. Forty percent had been at the lake from 5 to 10 years and the remaining 10% had been at the lake for 2 to 5 years. Questions concerning lake use found that 90% of those surveyed used the lake for boating, 80% for irrigation and fishing, and 40% for swimming. Nobody surveyed used the lake for drinking water. Questions concerning problems with the lake found that 100% thought dredging was needed, 80% felt there are too many aquatic plants, and 30% believed there is poor water quality. There were no other problems recorded for the lake. All of those surveyed were in favor of continuing efforts to control vegetation and were aware of LARE contributions for controlling invasive exotic species. All survey participants felt aquatic vegetation interfered with lake use, affected property values, and were aware of current weed control projects on Center Lake. Original survey sheets are located in Appendix I. Overall there is an increased appreciation for the efforts of the Center Lake Conservation Association in acquiring funding for aquatic plant management grants. There was also a noticeable appreciation for state funding for the LARE program, specifically providing grants for weed control treatments for lakes.

Lake residents play an important role in establishing and maintaining a healthy lake community. Lake association meetings and newsletters are excellent mechanisms through which information about management practices at Center Lake can be distributed. In addition, these meetings provide a forum where issues regarding conflicting uses and goals for the lake may be discussed and keep the public informed of lake issues.

At the November 27, 2007 public meeting, Jon Garber of Warsaw Park and Recreation and Ed Belmonte of V3 spoke of the naturalized shoreline stabilization project. This project is supported by the Center Lake Conservation Association and was well received by members of the public. This project involves establishing natural shoreline vegetation along 730 feet of Center Lake's southern shoreline. Warsaw Park and Recreation has applied for a LARE grant on the Feasibility and Design aspects of this proposed project. Upon project completion, signage will be provided along the City's property explaining the ecological benefits of naturalized shoreline stabilization.

Public involvement and educational needs are critical with respect to a new threat to Indiana lakes from an invasive aquatic plant called Hydrilla (*Hydrilla verticillata*). In 2006, on Lake Manitou (adjacent to Rochester in Fulton County), an area infested with this problematic aquatic plant was identified. Efforts are currently underway to resolve the problem, but it is critical if this plant is seen on Center Lake for the state to be notified as soon as possible.

Hydrilla can be differentiated from the native elodea in that there are typically 3 leaves per whorl on the native elodea and there are as many as eight leaves per whorl in Hydrilla. Elodea is also smooth to the touch where as Hydrilla is rough. Figure 3 (Michigan Sea Grant 2007) demonstrates a means of comparative identification.

Additional information can be found from the national campaign to *Stop Aquatic Hitchhikers!* at <http://www.protectyourwaters.net/>

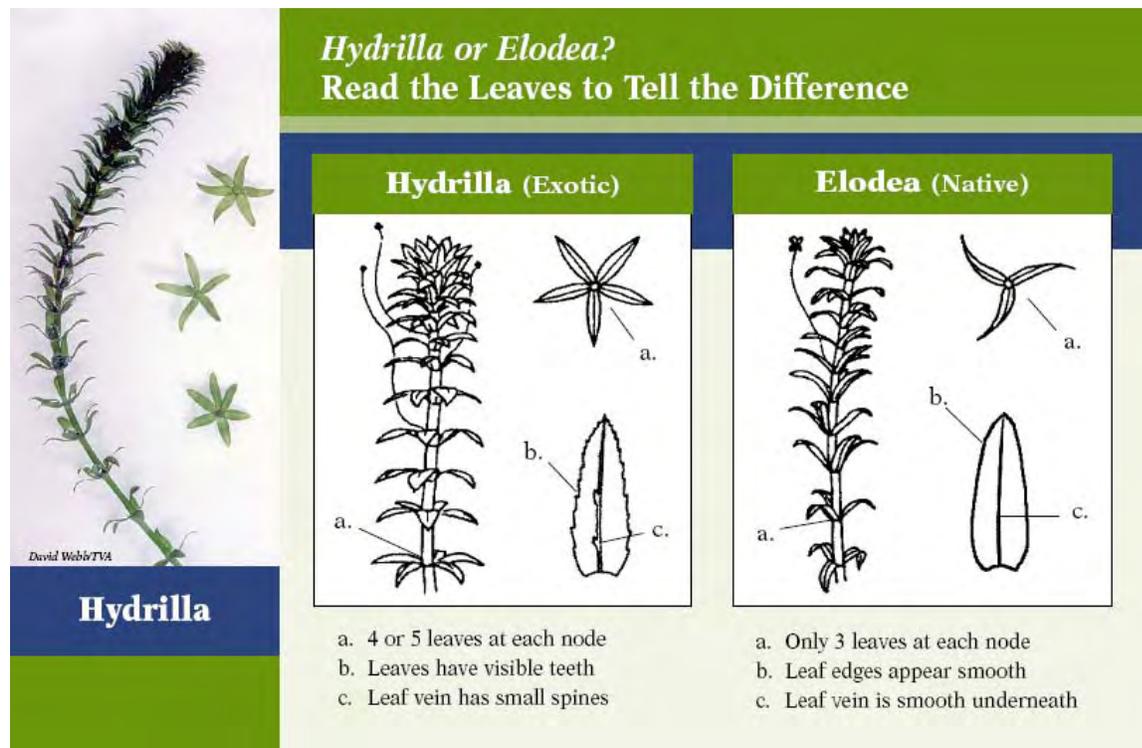


Figure 3: Illustration of Hydrilla compared to native elodea. (Illustrations provided by Michigan Sea Grant)

In addition to these state and lake-wide issues, residents can be educated regarding practical steps that can reduce nutrient loading and improve the Center Lake ecosystem, when such practices are implemented collectively.

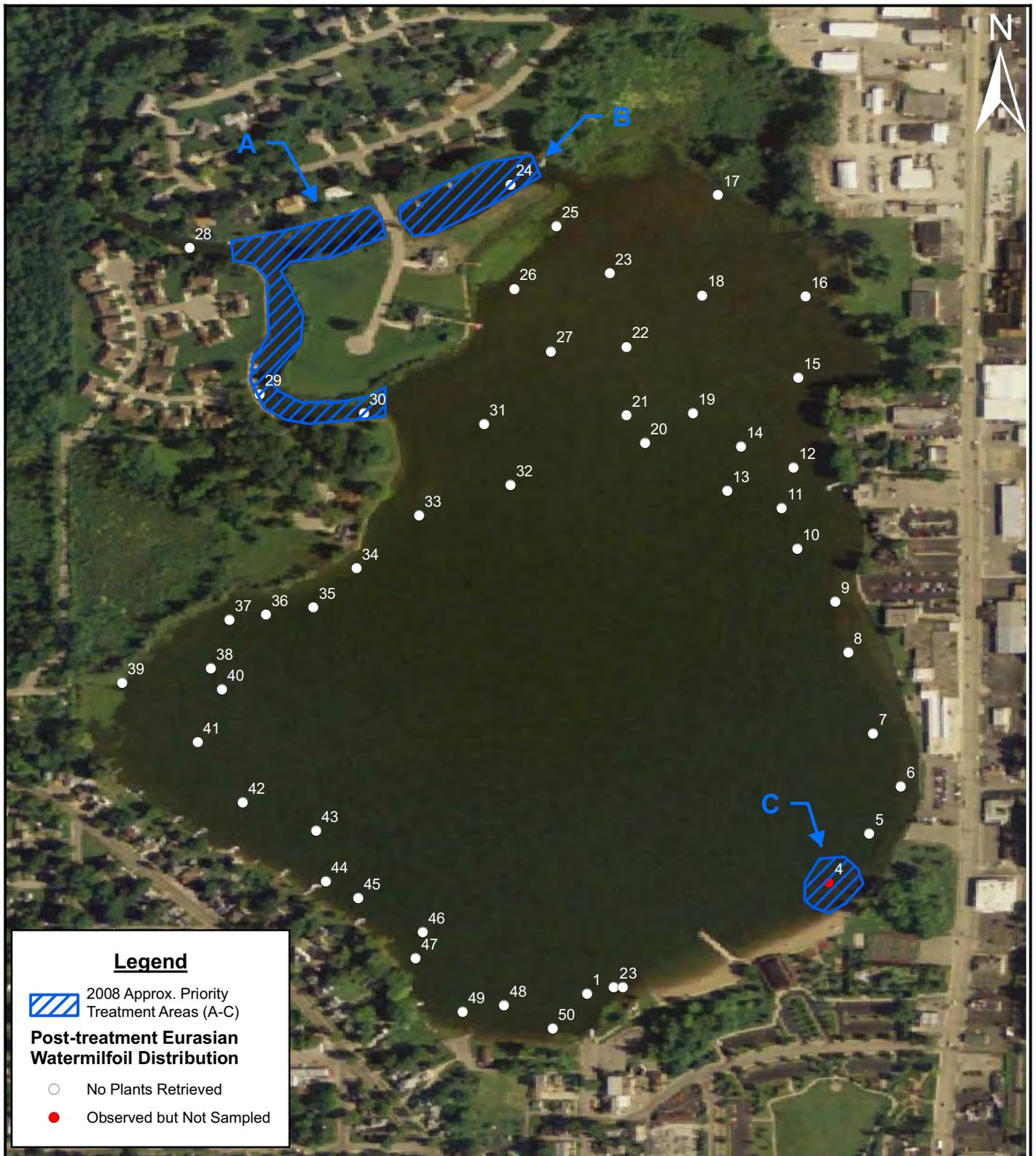
1. **Proper Maintenance of Boat Motors.** Improperly maintained boats may leak gasoline or oil directly into the lake, which is detrimental to the lake's ecosystem. Educating lake users about the importance of properly maintaining their boat motors is an easy and effective step to improve water quality.
2. **Limit Lawn Fertilizer Use Adjacent to Lake.** If a fertilizer application must be applied, avoid spreading fertilizer directly into the lake, on sidewalks, or seawall where it will wash into the lake. Fertilizer application should be avoided within 30 feet of the lakeshore, if possible. In addition, a buffer strip of native vegetation along the lakeshore allows runoff to be filtered before it enters the lake.
3. **Promote Agricultural Best Management Practices.** Work with farmers within the upstream watershed to increase filtration and purification of agricultural runoff before water reaches the lake. Indiana offers incentives for farmers to address soil and water concerns through the U.S. Department of Agriculture. The Indiana Conservation Reserve Program (CRP) provides technical and financial aid to reduce soil erosion, reduce sediment in lakes and streams, and improve overall water quality. Farmers owning highly erodible land or property adjacent to tributary streams or lakes may be eligible for funding to implement practices that increase water quality. Further information is available from the Indiana Natural Resources Conservation Service (NRCS).
4. **Disposal of Grass Clippings.** Avoid blowing grass clippings and tree leaves into the lake. Grass clippings blown into a pond or lake quickly can turn into a floating mat of algae because cut and decaying vegetation rapidly releases nutrients into the water.
5. **Urban Stormwater Best Management Practices.** Prevent or reduce urban and industrial runoff flowing directly into the lake. Urban runoff can be one of the most detrimental factors influencing water quality. Nutrients and sediment are conveyed into the lake through storm sewers. Additionally, oil, antifreeze, gasoline, road salt, and other pollutants are washed from pavement through the storm sewer system, and are detrimental to a lake's ecosystem.

Action Plan

V3 identified three approximate priority treatment areas for Eurasian watermilfoil based on the results of the post treatment aquatic vegetation survey (Exhibit VII). A total of five acres are requested for Eurasian watermilfoil treatment in 2008. V3 identified one priority treatment area for curlyleaf pondweed for up to 16 acres of treatment (Exhibit VIII). Priority treatment areas location and acreage are described in the Application for Aquatic Vegetation Control Permit located in Appendix II. The budget allotted for Eurasian watermilfoil is \$2,000 for up to five acres of treatment. The permit also includes treatment of up to 16 acres of curlyleaf pondweed provided that Eurasian watermilfoil treatment does not require the entire five acres requested. The budget for treatment remains the same whether Eurasian watermilfoil and/or curlyleaf pondweed is treated. The target species for herbicide treatment will be determined based on pre-treatment field efforts.

Aquathol K is the contact herbicide used for curlyleaf pondweed control and is commonly applied in late May and June. Curlyleaf pondweed actively grows during the winter months when most plants are dormant and reaches its maximum density in late spring. The main reproductive means of this plant are turions which are produced in late spring. Conducting herbicide treatments in May and June can be very effective at reducing curlyleaf biomass but turions are formed at this time and will result in reestablishment (Woolf and Madsen 2003). Turions are most depleted between January and April and treatment at this time would have a maximum impact on the curlyleaf pondweed population and lead to improved long term management (Madsen 1991). Low water temperatures (5-15C) are currently thought to reduce herbicide efficacy but results of late March treatments (18C water) are showing reduced turion densities by 86% whereas a mid-May treatment (25C water) reduced turions by 40% (Netherland et al. 2000). Early applications also improve the selective potential for contact herbicide because fewer native plant species are actively growing in cooler water temperatures and therefore are less susceptible to herbicide treatments (Poovey et al. 2002).

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 Center 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 Center Lake ecosystem.



Legend

 2008 Approx. Priority Treatment Areas (A-C)

Post-treatment Eurasian Watermilfoil Distribution

 No Plants Retrieved

 Observed but Not Sampled



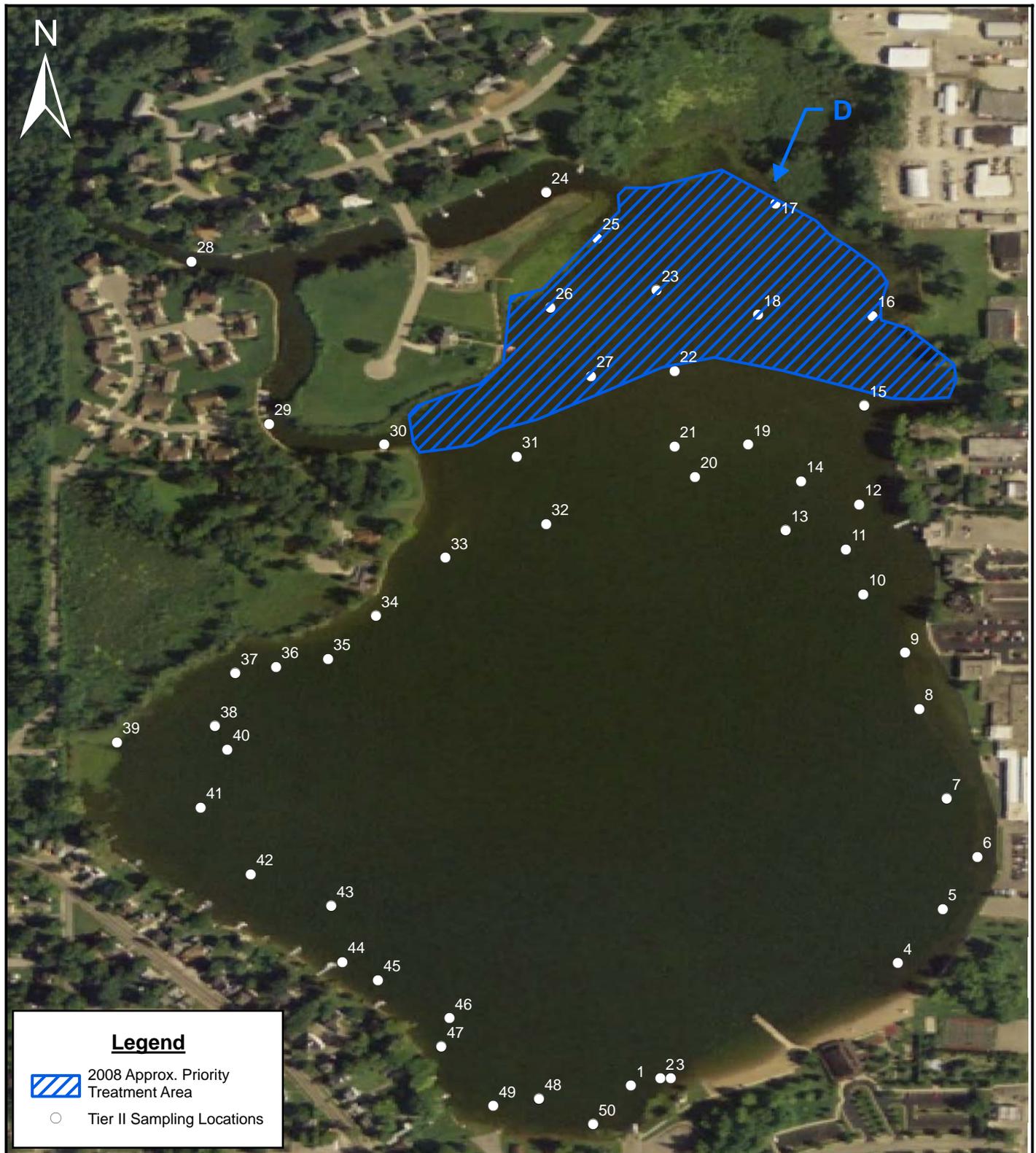
V3 Companies
 7325 Janes Avenue
 Woodridge, IL 60517
 630.724.9200 phone
 630.724.9202 fax
 www.v3co.com

TITLE: Tier II Eurasian Watermilfoil Results with Approximate Treatment Areas for 2008

BASE LAYER: Indiana Spatial Data
 2006 Orthophotography

CLIENT: Center Lake Conservation Association
 1212 Edgewater Drive
 Warsaw, IN 46580

PROJECT: Center Lake Aquatic Plant Management Plan		
PROJECT NO. 02218.03	EXHIBIT: VII	SHEET: 1 OF: 1
QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=550'



Legend

-  2008 Approx. Priority Treatment Area
-  Tier II Sampling Locations



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

TITLE: **Curlyleaf Pondweed
 2008 Approximate Priority
 Treatment Area**

BASE LAYER: Indiana Spatial Data
 2006 Orthophotography

CLIENT: Center Lake
 Conservation Association
 1212 Edgewater Drive
 Warsaw, IN 46580

PROJECT: Center Lake Aquatic Plant Management Plan		
PROJECT NO. 02218.03	EXHIBIT: VIII	SHEET: 1 OF: 1
QUADRANGLE: Warsaw	DATE: 2/17/08	SCALE: NTS

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 granular 2,4-D is proposed during 2008 to treat up to five acres of Eurasian watermilfoil that has re-grown since the 2007 herbicide application.
3. Follow-up Herbicide Treatment to Curlyleaf pondweed. An early spring (3rd week of April to mid-May) herbicide application of Aquathol K is proposed during 2008 to treat up to 16 acres of curlyleaf pondweed.
4. Summer 2008 Tier II Aquatic Plant Survey. A Tier II aquatic plant survey should be done in summer 2008 to document the diversity, distribution and abundance of aquatic plants. This data is important to monitor the health of native plant communities 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 Center 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. 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 Herbicide Application of granular 2,4-D for Eurasian Watermilfoil (up to 5 acres of Eurasian watermilfoil)	\$2,000
Early Spring Herbicide Application of Aquathol K for curlyleaf pondweed (up to 16 acres of curlyleaf pondweed)	\$ 2,000
Late season post treatment aquatic plant survey (Tier II) and plan update	\$5,000

2009

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Late season (post treatment) aquatic plant survey (Tier II) and plan update	\$5,000

Any herbicide applications will depend on the results of the surveys.

These management activities and plant surveys are proposed to improve Center 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, sago pondweed, and Chara, all native species, accounted for the three most dominant species within Center Lake. Native species accounted for 90% of the aquatic plants collected. There was only one location where Eurasian watermilfoil was found within the vicinity of a sampling location. There were no species found within the 10-15 foot depth zone and should be monitored within the following years so Eurasian watermilfoil doesn't establish.

After the Spring 2008 Target Species Distribution Map is created, the distribution and abundance of Eurasian watermilfoil and/or curlyleaf pondweed will be identified and treatment maps will be prepared. The late summer Tier II 2008 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 in the plant community of Center 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 Center Lake ecosystem.

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Appendices

- Appendix I- Data Sheets, Tier II Latitude/Longitude, and Survey Questionnaires
Appendix II- Vegetation Control Permit

APPENDIX I

**DATA SHEETS, TIER II LATITUDE/LONGITUDE,
AND SURVEY QUESTIONNAIRES**

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization:

Contact Information:

Waterbody Name:

Lake ID:

County(s):

Date:

Habitat Stratum:

Avg. Lake Depth (ft):

Lake Level:

GPS Metadata

Crew Leader:

Datum: Zone: Accuracy:

Recorder:

Method:

Secchi Depth (ft):

Total # of Points Surveyed:

Total # of Species:

Littoral Zone Size (acres):

- Measured
- Estimated

Littoral Zone Max. Depth (ft):

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

Notable Conditions:

DO-9.78
Temp-25.9°C

* Suspect herbicide treatment as cause of the dead sago pondweed at North Side of lake

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Center Lake	DATE: 07.25.2007
COUNTY: Kosciusko	SECCHI DEPTH (FT): 4
SITE ID: 02218	MAX PLANT DEPTH (FT):
SURVEYING ORGANIZATION: V3 companies	WEATHER: Partly 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.

GPS #

Point #	R/T	Latitude	Longitude	Depth	Species Codes:							Notes		
					POTPEC	CERDEM	CHARA	ALGA	MYRSP1	POTCA	POTGA		POTILL	
110	1	R			11'									no veg
111	2	R			6'		3							
112	3	R			3	3	7	1				3		
113	4	R			6'		5			9				
114	5	R			9'									no veg
115	6	R			4'	1	5							no veg
116	7	R			14'									no veg
117	8	R			7									no veg
118	9	R			4			1					1	no veg
119	10	R			11'									no veg
120	11	R			6'		1							no veg
121	12	R			4'									no veg
122	13	R			11'									no veg
123	14	R			6'									no veg
124	15	B			3'	1								no veg
125	16	R			2'	1								no veg (dead potpec)
126	17	R			2	1		1						NURVAR 3
127	18	R			3'	1								no veg (dead potpec)
128	19	R			6'									no veg
129	20	R			13'									no veg
130	21	R			6'									no veg
131	22	R			3'	1								no veg (dead potpec)
132	23	R			3'	1								no veg (dead potpec)
133	24	R			4'									NYMTUB 9
134	25	R			2'	1								NYMTUB 9 (dead potpec)
135	26	R			2'									no veg
136	27	B			3									no veg
137	28	R			3			1						UTRVUL 9
138	29	R			4'			1						NYMTUB 9, UTRVUL 9
139	30	R			4'			1						NYMTUB 9, UTRVUL 9
140	31	R			7'									no veg
141	32	R			11									no veg
142	33	R			7'	1	1							no veg (dead potpec)

Other plant species observed at lake:

120 acre, Oligotrophic

10-5

5-10

10-15

|||||

|||||

|||||

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: Center Lake	DATE: 7/25/2007
COUNTY: Kosciusko	SECCHI DEPTH (FT):
SITE ID:	MAX PLANT DEPTH (FT):
SURVEYING ORGANIZATION: Ve companies	WEATHER: Partly Cloudy
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.

Point #	R/T	Latitude	Longitude	Depth	Species Codes:								Notes	
					POTPEC	CERDEM	CHARA	ALGA	MYRSP	POTRI	POTGR	POTILL		
143 34	R			4			1							
144 35	R			14										no veg
145 36	R			9										no veg
146 37	R			4										no veg
147 38	R			8										no veg
148 39	R			2										NYMTUB-9, NUPVAR-
149 40	R			11										no veg
150 41	R			8										no veg
151 42	R			7										no veg
152 43	R			15										no veg
153 44	R			3			3							NYMTUB-9, NASMAR-
154 45	R			9										no veg
155 46	R			12										no veg
156 47	R			6	1	1								no veg
159 48	R			4	9		1							no veg
160? 49	R			8										no veg
161 50	R			4	9									no veg NYMTUB-9

Other plant species observed at lake:

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

Tier II Sampling Location Number	Latitude	Longitude
1	41.24266	-85.85664
2	41.24273	-85.85635
3	41.24273	-85.85625
4	41.24386	-85.85402
5	41.24439	-85.85358
6	41.2449	-85.85324
7	41.24547	-85.85354
8	41.24635	-85.85381
9	41.2469	-85.85395
10	41.24747	-85.85436
11	41.24791	-85.85453
12	41.24835	-85.8544
13	41.2481	-85.85512
14	41.24858	-85.85497
15	41.24932	-85.85435
16	41.2502	-85.85427
17	41.2513	-85.85522
18	41.25021	-85.85539
19	41.24894	-85.85549
20	41.24862	-85.85601
21	41.24892	-85.85621
22	41.24966	-85.85621
23	41.25045	-85.85639
24	41.25141	-85.85747
25	41.25096	-85.85697

Tier II Sampling Location Number	Latitude	Longitude
26	41.25028	-85.85743
27	41.24961	-85.85703
28	41.25073	-85.86095
29	41.24914	-85.86019
30	41.24894	-85.85906
31	41.24882	-85.85776
32	41.24816	-85.85747
33	41.24783	-85.85846
34	41.24726	-85.85914
35	41.24684	-85.85961
36	41.24676	-85.86012
37	41.2467	-85.86052
38	41.24618	-85.86072
39	41.24602	-85.86168
40	41.24595	-85.8606
41	41.24538	-85.86086
42	41.24473	-85.86037
43	41.24442	-85.85958
44	41.24387	-85.85947
45	41.24369	-85.85912
46	41.24332	-85.85842
47	41.24304	-85.8585
48	41.24253	-85.85754
49	41.24246	-85.85799
50	41.24228	-85.85701

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Are you a lake property owner? Yes _____ No X

Are you currently a member of your lake association? Yes X No _____

How many years have you been at the lake? 2 or less _____
2-5 years _____
5-10 years _____
Over 10 years X

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

- | | |
|---|---|
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Irrigation |
| <input type="checkbox"/> Boating | <input type="checkbox"/> Drinking water |
| <input checked="" type="checkbox"/> Fishing | <input type="checkbox"/> Other _____ |

Do you have aquatic plants at your shoreline in nuisance quantities? Yes X No _____

Do you currently participate in a weed control project on the lake? Yes X No _____

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

Does the level of vegetation in the lake affect your property values? Yes X No _____

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

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 X No _____

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

- Too many boats access the lake
- Use of jet skis on the lake
- Too much fishing
- Fish population problem
- Dredging needed
- Overuse by nonresidents
- Too many aquatic plants
- Not enough aquatic plants
- Poor water quality
- Pier/funneling problem

Please add any comments:

**Aquatic Plant Management Plan
Lake Use Survey for Center Lake**

Are you a lake property owner? Yes No

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

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

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

- | | |
|---|--|
| <input type="checkbox"/> Swimming | <input checked="" type="checkbox"/> Irrigation |
| <input checked="" type="checkbox"/> Boating | <input type="checkbox"/> Drinking water |
| <input checked="" type="checkbox"/> Fishing | <input type="checkbox"/> Other _____ |

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

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

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

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

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

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 No

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

- Too many boats access the lake
- Use of jet skis on the lake
- Too much fishing
- Fish population problem
- Dredging needed
- Overuse by nonresidents
- Too many aquatic plants
- Not enough aquatic plants
- Poor water quality
- Pier/funneling problem

Please add any comments:

Aquatic Plant Management Plan
Lake Use Survey for Center Lake

Center Lake

Are you a lake property owner? Yes No

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

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

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

Swimming Irrigation
 Boating Drinking water
 Fishing Other _____

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

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

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

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

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

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 No

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

- Too many boats access the lake
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- Too much fishing
- ? Fish population problem
- Dredging needed
- Overuse by nonresidents
- Too many aquatic plants
- Not enough aquatic plants
- Poor water quality
- Pier/funneling problem

Please add any comments:

*Would like to better understand DNR
monitoring + stocking plans*

Alan Matthew 5742676708

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 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 3
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 Charlie Wheeler		Lake Assoc. Name Center Lake Conservation Association	
Rural Route or Street 1212 Edgewater Drive		Phone Number (574) 267-2930	
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) Center Lake	Nearest Town Warsaw	County Kosciusko
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

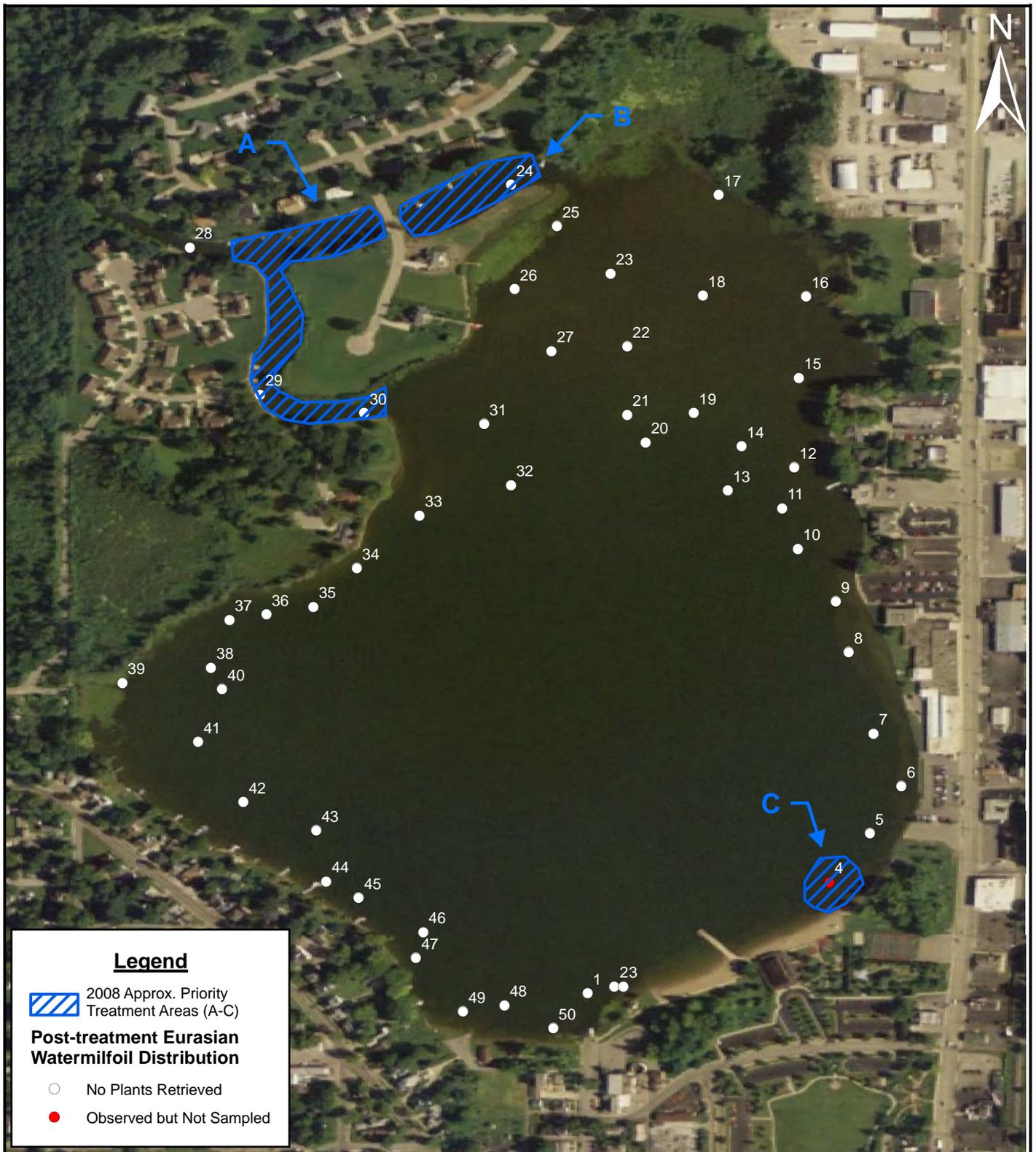
Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # A (3 acres)	LAT/LONG or UTM's Lat: 41.24894 Lon: -85.85906		
Total acres to be controlled sum of 5 acres for lake	Proposed shoreline treatment length (ft) 3,383 ft	Perpendicular distance from shoreline (ft) adjacent	
Maximum Depth of Treatment (ft) 5 ft	Expected date(s) of treatment(s) 03/15/08 - 08/15/08		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. There are three Eurasian watermilfoil priority treatment area for Center Lake in 2008. The 5 acres will be treated with an herbicide application of 2,4-D in 2008. Selected treatment locations for Eurasian watermilfoil are shown in the attached Eurasian watermilfoil priority treatment exhibit.

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

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Sago pondweed		39
Chara		26
Coontail		21
Variable pondweed		4
Illinois pondweed		4
Yellow water lily		4
Spiny naiad		4
Eurasian watermilfoil	x	observed



Legend

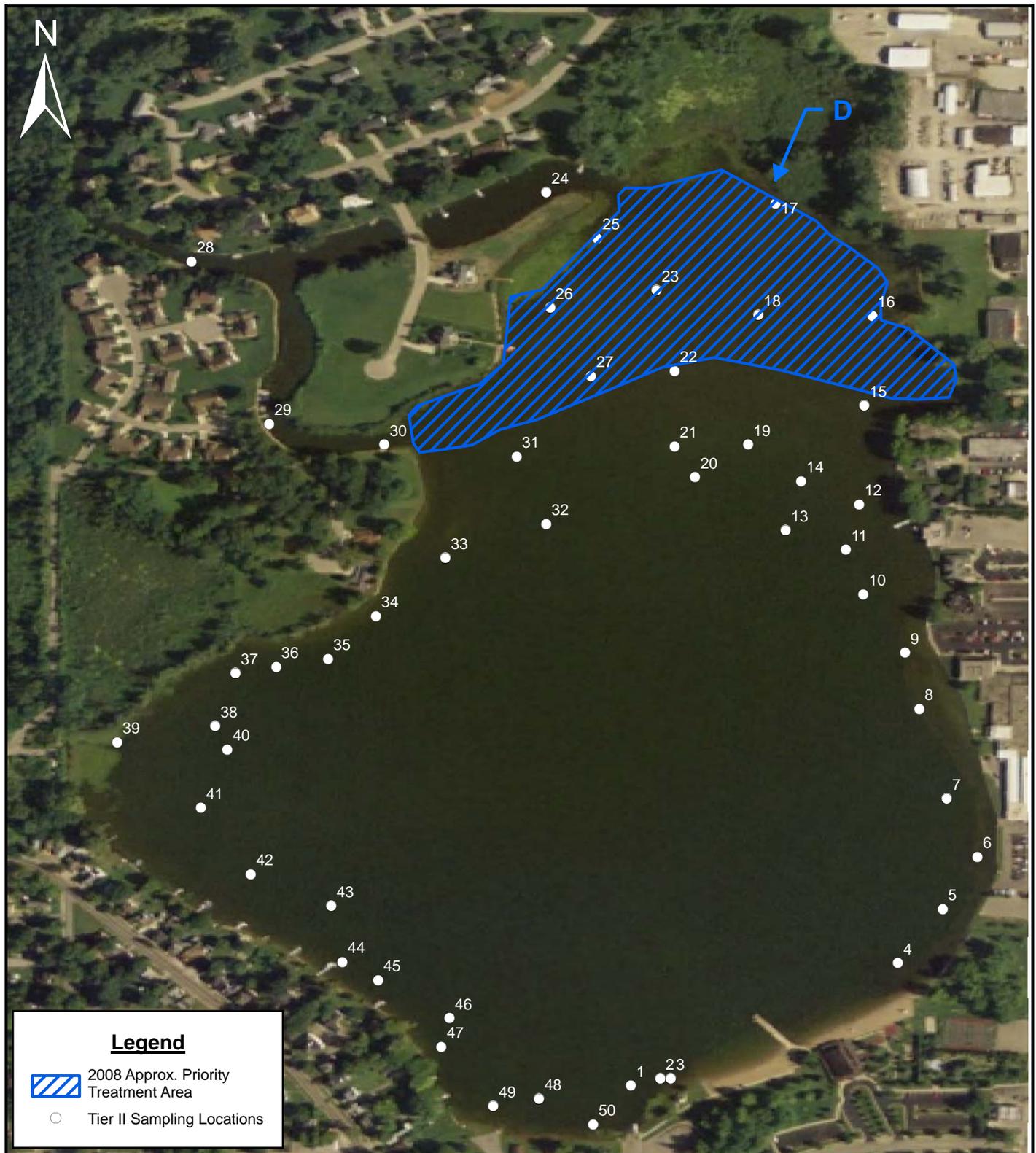
 2008 Approx. Priority Treatment Areas (A-C)

Post-treatment Eurasian Watermilfoil Distribution

 No Plants Retrieved

 Observed but Not Sampled

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: Tier II Eurasian Watermilfoil Results with Approximate Treatment Areas for 2008		PROJECT: Center Lake Aquatic Plant Management Plan		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO. 02218.03	EXHIBIT:	SHEET: 1 OF: 1
	CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580		QUADRANGLE: N/A	DATE: 12/12/07	SCALE: 1"=550'



Legend

-  2008 Approx. Priority Treatment Area
-  Tier II Sampling Locations



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

TITLE: Curlyleaf Pondweed 2008 Approximate Priority Treatment Area	
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	
CLIENT: Center Lake Conservation Association 1212 Edgewater Drive Warsaw, IN 46580	

PROJECT: Center Lake Aquatic Plant Management Plan		
PROJECT NO. 02218.03	EXHIBIT:	SHEET: 1 OF: 1
QUADRANGLE: Warsaw	DATE: 2/17/08	SCALE: NTS

