

HEATON LAKE, ELKHART COUNTY
AQUATIC VEGETATION MANAGEMENT
PLAN UPDATE - 2008



PREPARED FOR:

HEATON LAKE CONSERVATION CLUB
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ELKHART, INDIANA 46514

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Executive Summary

V3 Companies Ltd. (V3) was contracted by the Heaton Lake Conservation Club (HLCC) to complete aquatic vegetation sampling in order to update an aquatic vegetation management plan which was created in 2007. The purpose of the Aquatic Vegetation Management plan is to identify aquatic weed problem areas, describe management objectives, prescribe management strategies, and determine funding needs and the sources necessary to control nuisance and exotic vegetation. The update was funded in part by the Lake and River Enhancement (LARE) program as part of the Indiana Department of Natural Resources (IDNR), Division of Fish and Wildlife grant program. Funding for the LARE program is provided by an annual fee charged to boat owners. Additional funding was provided by the HLCC. This update will serve as a prerequisite to continue LARE program funding for the control of exotic species.

Heaton Lake is an 87-acre lake in Elkhart, Indiana. Aquatic vegetation is an essential part of lake ecosystems as it provides fish habitat, stabilizes sediment, and reduces shoreline erosion caused by wave and wind action. However, as a result of many factors, aquatic vegetation can develop to a nuisance level. Nuisance quantities of aquatic vegetation are described as plant growth that negatively impacts lake uses such as swimming, boating, and fishing. The primary nuisance species within Heaton Lake are native chara algae, Eurasian watermilfoil and curlyleaf pondweed. Eurasian watermilfoil and curlyleaf pondweed are both exotic species that disrupt the natural function of lake ecosystems.

Herbicide treatments are an effective management tool for managing nuisance species at Heaton Lake. A fluridone treatment was performed in late May of 2006 using Sonar AS at 6 parts per billion (ppb). The fluridone treatment was in response to the 25 acres of Eurasian watermilfoil that required treatment in 2005. The fluridone treatment effectively reduced Eurasian watermilfoil in 2007 as only one plant was treated with granular 2,4-D (Navigate®). Weed patrol performed three reconnaissance surveys on Heaton Lake in 2008 for exotic species; however, exotic species were not found until the July 17th chara treatment. Weed Patrol applied granular 2,4-D (Navigate®) to 17.5 acres of Eurasian watermilfoil on August 18, 2008. V3 conducted the post-treatment Tier II survey on August 27, 2008 to evaluate the vegetative community at Heaton Lake and determine the extent of exotic species. Eurasian watermilfoil was present at 22.5% of sampling locations at depths ranging from 0 to 7 feet during the 2008 Tier II survey. The current level of Eurasian watermilfoil indicates a return towards pre-fluridone densities. Eurasian watermilfoil had a 30% site frequency in 2005 which prompted the whole lake fluridone treatment in 2006.

The 2008 post treatment sampling effort had vegetation at 23 out of 40 sites and collected 12 species. The two exotic species collected were curlyleaf pondweed and Eurasian watermilfoil. Coontail was present at the highest percentage of sample sites (32.5%). Curlyleaf pondweed was present at 5% of sampling locations. Emergent species observed at Heaton Lake include white water lily and spatterdock. Sago pondweed was a submergent species that was observed seven times during the sampling effort but was not collected.



The following actions are proposed for 2009 to identify and treat areas with exotic or nuisance species as well as document the overall health, diversity, and distribution of desirable native vegetation. Distribution Map and Proposed Treatment Area Map will be created during early spring 2009 to determine the extent of follow-up chemical application that will be necessary to treat Eurasian watermilfoil and curlyleaf pondweed. An early spring (3rd week of April to mid-May) systemic herbicide application of granular 2,4-D (Navigate ®) is proposed to treat any Eurasian watermilfoil that has regrown from 2008. An early spring application of Aquathol K will be used to treat up to 5 acres of curlyleaf pondweed when water temperatures are at or below 56-67 degrees Fahrenheit. A post treatment Tier II survey is proposed during the summer of 2009 to document diversity, distribution, and abundance of aquatic vegetative species. A proposed treatment area map should be created to determine the extent of follow-up chemical application that is necessary to treat Eurasian watermilfoil. Follow-up plant surveys and herbicide applications should be conducted during 2010 to determine whether Eurasian watermilfoil is being controlled and native plant communities remain protected.

The proposed management schedule and budgets for 2009 and 2010 are summarized below. Chara is currently the only native species expected to require herbicide treatment at Heaton Lake. The budget for 2009 and 2010 herbicide treatment acreages for Heaton Lake increased from the original five-year management plan based on the return and increase of Eurasian watermilfoil beds. Heaton Lake's five year management plan estimated 5 acres of Eurasian watermilfoil would require treatment in 2008, however, 17.5 acres of Eurasian watermilfoil were treated in 2008. The 2009 treatment acreage was estimated based on the results of the Tier II survey and growth habits of Eurasian watermilfoil. Budget projections are estimated at maximum values and will fluctuate depending on treatment acreage.

2009

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Early Spring Systemic Herbicide Application of granular 2,4-D (Navigate ®) (assumed 20 acres)	\$10,000
Application of Aquathol K for Curlyleaf pondweed (up to 5 acres)	\$1,500
Application of Copper Sulfate for Chara (up to 25 acres)	\$1,000
Late season post treatment aquatic vegetation survey (Tier II) and plan update	\$7,000



2010

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Early Spring Systemic Herbicide Application of granular 2,4-D (Navigate ®) (assumed 20 acres)	\$10,000
Application of Aquathol K for Curlyleaf pondweed (up to 5 acres)	\$1,500
Application of Copper Sulfate for Chara (up to 25 acres)	\$1,000
Emergent Plant Surveys in Eastern and Western Ecozone Areas.	\$6,000
Inclusion of the findings of the Emergent Plant Surveys in Ecozone areas	\$1,500
Late season post treatment aquatic vegetation survey (Tier II) and plan update	\$7,000

Recommendation for conducting a fluridone treatment in 2010 will depend on Eurasian watermilfoil coverage and the outcome of the spot treatment approach in 2009.

These management activities and plant surveys are proposed to improve Heaton 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 vegetative 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

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Introduction and Background

The Heaton Lake Conservation Club (HLCC) received a grant from the IDNR, Division of Fish and Wildlife through the LARE Program. The grant covered herbicide treatment, aquatic vegetation mapping, Tier II inventoring, and development of an Aquatic Vegetation Management Plan Update. V3 was contracted by the HLCC to complete aquatic vegetation sampling in order to create the Heaton Lake Aquatic Vegetation Management Plan Update – 2008. Heaton Lake is an 87-acre lake in Elkhart County, Indiana with a history of issues related to exotic Eurasian watermilfoil and curlyleaf pondweed as well as the native algae chara. This plan will document changes in vegetative communities as well as serve as a plan for managing nuisance vegetation within Heaton Lake. The focus of aquatic vegetation management is control of exotic species as they disrupt lake ecosystems and provide poor habitat for fish and other organisms. Topics covered in this update include a review of the 2008 vegetation control, the 2008 sampling results, and updates to the budget and action plans. This update will serve as a prerequisite to continue Lake and River Enhancement (LARE) program funding to control exotic or nuisance species. An aquatic vegetation survey was conducted on August 27, 2008 to document the aquatic vegetative community post-treatment. The results of the survey will provide the data necessary to make scientifically based recommendations for aquatic vegetation management.

The nuisance species within Heaton Lake are exotic Eurasian watermilfoil (*Myriophyllum spicatum*) and Curlyleaf pondweed (*Potamogeton crispus*). Chara, a native alga, is a nuisance species within Heaton Lake as it carpets the lake bottom and inhibits the growth of other native species. Eurasian watermilfoil is an aggressive invasive aquatic species that has a detrimental effect on the native aquatic vegetation community, and inhibits boat navigation and other lake uses. Curlyleaf pondweed creates dense surface mats in the spring and early summer which limits the growth of native species by shading. Eurasian watermilfoil and curlyleaf pondweed were present during the aquatic vegetation survey and have the potential to reach nuisance levels if management is not applied. Aquatic vegetation management at Heaton Lake must have an integrated approach and include stakeholders' concerns and views for successful implementation. This plan provides effective management recommendations that integrate scientific data with public concerns to successfully reduce nuisance levels of exotic invasive species within Heaton Lake.

The overall goal of the LARE program is to ensure the continued viability of public-access lakes and streams by utilizing a watershed approach to reduce non-point source sediment and nutrient pollution of Indiana's and adjacent states' surface waters to a level that meets or surpasses state water quality standards. To accomplish this goal, the LARE program provides technical and financial assistance to qualified projects. These include: a) studies, management plans, sediment removal, and design and construction activities involving specific lakes and streams; b) land treatment practices or management plans for designated watersheds; and c) management plans and control of exotic plants and animals in targeted lakes. Funding for the LARE program is provided by an annual fee charged to boat owners.



Waterbody Characteristics

The Heaton Lake sub-watershed is 7,105 acres and is largely composed of cropland and pasture (63.4%). Heaton Lake is an 87 acre lake in Elkhart, Indiana. Heaton Lake has a maximum depth of 22 feet and an average depth of 7.4 feet. Heaton Lake's shoreline demographics are 75% developed and 25% undeveloped wetlands. The developed shoreline is residential with a water park located on the south eastern side that is owned by the City of Elkhart called Ideal Beach (Figure 1).



Figure 1. View of Ideal Beach on the south eastern side of Heaton Lake.

Heaton Lake is rated as mesotrophic by IDEM. Mesotrophic lakes are characterized by moderate nutrient levels (total phosphorus 10-30 $\mu\text{g/L}$), water is more turbid, supports healthy populations of algae and less dissolved oxygen in the hypolimnion (Jones and Medrano 2006). Other characteristics include extensive macrophyte concentrations in the bays and littoral areas of the lake which is an attribute of Heaton Lake. Heaton Lake is used heavily for recreational activities such as fishing, swimming, and boating. Recreational boating typically includes pontoon boats, fishing boats, canoes and kayaks. One public boat launch is located on the southwest shoreline which is an easement along a county road suitable for launching canoes or smaller boats.

Fisheries studies or other studies related to Heaton Lake have not occurred since the five-year plan was created. Any future study results will be included in Vegetation Management Plan Updates for Heaton Lake. Water body uses have remained consistent with activities described in the five-year plan. Ideal Beach offers recreational activities such as canoeing, horseshoes, kayaking, miniature golf, playground, volleyball, water slides, beach, children's pool, bike/paddle boats, picnic tables, grills, and a pavilion. A local homeowners association operates a private beach on the north side of Heaton Lake. No changes in important habitat area or priority use areas have occurred since the five-year plan.



Problem Statement

Aquatic vegetation is a vital component of lake ecosystems. Heaton Lake is used primarily for fishing and when vegetation reaches nuisance levels recreational uses are inhibited. The primary nuisance species within Heaton Lake is Eurasian watermilfoil. Eurasian watermilfoil is an aggressive, invasive aquatic species that spreads rapidly through fragmentation and is able to grow in low light conditions. This nuisance species grows and spreads rapidly, forming dense weed beds that out compete native species for light and nutrients. Eurasian watermilfoil was collected at 22.5% of sampling locations during the Tier II survey in late August. Herbicide treatments should be continued to keep Eurasian watermilfoil at a manageable level. In lakes where Eurasian watermilfoil is left unchecked, even well-diversified plant communities can become decimated and taken over by a single species. Stands of Eurasian watermilfoil provide poor habitat for waterfowl, fish, and other wildlife. Significant rates of plant sloughing and leaf turnover, as well as the decomposition of high biomass at the end of the growing season, increase the internal loading of phosphorus and nitrogen to the water column. Dense Eurasian watermilfoil mats alter water quality by raising pH, decreasing oxygen under the mats, and increasing temperature. Eurasian watermilfoil is an extremely adaptable plant, able to tolerate and even thrive in a variety of environmental conditions. It grows in still to flowing waters, can tolerate salinities of up to 15 parts per thousand, and can survive under ice. Eurasian watermilfoil is able to tolerate pHs from 5.4-11. Relative to other submersed plants, Eurasian watermilfoil has a high photosynthetic rate, and can grow over a broad temperature range (Madsen et al., 1991).

Curlyleaf pondweed is another submersed exotic species that is present in Heaton Lake and has the ability to create nuisance conditions. Curlyleaf pondweed was collected at 5% of sampling locations during the post-treatment survey in late August. Curlyleaf pondweed typically reaches peak biomass in the late spring or early summer months, forms turions, then declines and remains in a dormant state during the warmer months (Nichols and Shaw 1986). As water temperatures cool during the late summer or fall months, the turions germinate, grow through the winter months and reach peak biomass in the spring before most other submersed macrophytes begin their growth cycle. Once established the plants form colonies from rhizomes. Dense colonies of curlyleaf pondweed can restrict access to docks and sport fishing areas during spring and early summer months. Curlyleaf pondweed usually declines during the summer months and does not directly compete with many of the native submersed species. Long-term management of curlyleaf pondweed at Heaton Lake will require the reduction or elimination of turions to interrupt its life cycle. Aquathol K is the herbicide used for curlyleaf pondweed treatment and should be applied in early spring when water temperatures are at or below 56-67 degrees Fahrenheit to have maximum benefit.

Chara algae is an important food source for waterfowl and provides fish habitat but can quickly develop to a nuisance level. Chara algae has the ability to crowd out native species as it carpets the lake bottom. Chara has been treated at Heaton Lake with copper sulfate and requires multiple treatments in a year to maintain the population at a manageable level. Chara algae is plant like in appearance in that it has a main stem with whorled leaf like structures around it and a base that attaches to the lake substrate. Chara is often encrusted by calcium carbonate which gives the plant a rough feel. Chara can also be identified by the pungent odor released when crushed.



Aquatic Vegetation Management Goals and Objectives

The following management goals have been established by the IDNR for all lakes applying for LARE funding. Any management practices implemented at Heaton Lake must facilitate the achievement of these three goals.

1. Develop or maintain a stable, diverse aquatic vegetative 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.

Specific objectives are proposed as follows to facilitate achievement to determine the success of the actions listed below to achieve the overall LARE management goals for Heaton Lake.

1. **Reduce Exotic Invasive Species.** By 2010 reduce Eurasian watermilfoil to less than 10% of littoral zone surface area and curlyleaf pondweed to 5% of littoral zone surface area in the early recreational season.
2. **Increase Educational Outreach.** Reduce seeding of Eurasian watermilfoil and curlyleaf pondweed to other lakes by increasing awareness on how it is spread. Informational articles and signage at boat launches is a great method of educating lake users on how milfoil is spread and instructions to prevent the spread to other lakes.
3. **Control Vegetation around Public Access Site.** Control vegetation through educational outreach efforts at public access sites. Monitor the public access site for Eurasian watermilfoil and apply herbicide if present. Early detection and treatment will decrease the probability of transmission to other areas of Heaton Lake. Herbicide treatments focused within 100 feet of the public access site may reduce the spread of Eurasian watermilfoil to other areas of the lake as boats carry vegetation when entering and leaving the lake.



Specific actions are proposed as follows to facilitate achievement of the overall LARE management goals for Heaton Lake.

1. **Tier II Vegetation Surveys.** Tier II surveys should be conducted to monitor the distribution and abundance of Eurasian watermilfoil and curlyleaf pondweed as well as document any changes in the native plant community of Heaton Lake. Vegetation survey results will be used to determine future management strategies.
2. **Chemical/Follow-up Treatment of Eurasian Watermilfoil.** Eurasian watermilfoil and curlyleaf pondweed should be closely monitored during 2009, and more concentrated dosages or aggressive treatments should be applied if necessary. Treatment applications for curlyleaf pondweed should be conducted in spring or early summer to maximize treatment results and benefits.
3. **Promote and Maintain the Diversity of Native Aquatic Vegetation.** A healthy, diverse community of native aquatic vegetation is important to provide good fish habitat, stabilize the shoreline, and prevent the establishment and/or spread of Eurasian watermilfoil and other invasive species. Due to these multiple benefits, one of the specific goals of this plan is to promote and maintain a healthy diversity of native aquatic vegetative species, while recognizing that some vegetation management may be necessary to provide reasonable public access for recreation.



Heaton Lake Treatment History

Herbicides have been used as an effective management tool to control nuisance and exotic species at Heaton Lake. Eurasian watermilfoil was first found in Heaton Lake in the mid 1990's. Treatments have been conducted since 1998 for nuisance native and exotic species (Table 1). The contact herbicides used from 1998 to 2005 were combinations of Reward, Hydrothol 191, and Aquathol K which are all liquid formulations.

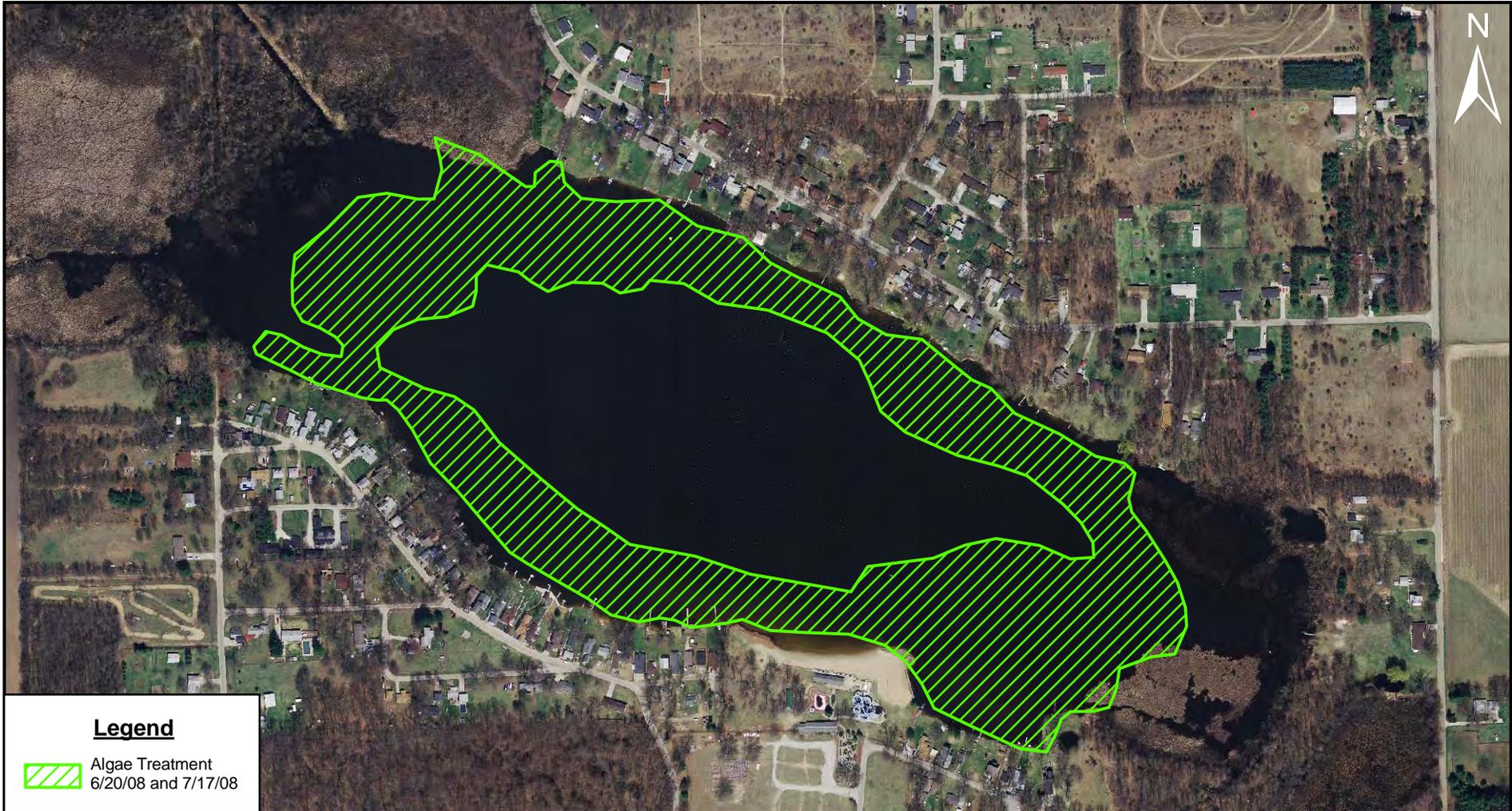
Table 1. Record of herbicide treatments at Heaton Lake.

Date	Acreage	Control Method	Target Species
6/8/98	25	Copper	Chara
6/17/98	15	Contacts	EWM, CL, Pondweeds
7/1/98	25	Copper	Chara
7/28/98	25	Copper	Chara
6/17/99	15	Contacts	EWM, CL, Pondweeds
6/17/99	25	Copper	Chara
7/9/99	25	Copper	Chara
5/26/00	25	Copper	Chara
6/16/00	17	Contacts	EWM, CL, Pondweeds
7/13/00	25	Copper	Chara
8/30/00	25	Copper	Chara
5/25/01	20	Contacts	EWM, CL, Pondweeds
6/4/02	20	Contacts	EWM, CL, Pondweeds
6/23/02	25	Copper	Chara
6/16/03	20	Contacts	EWM, CL, Elodea, Pondweeds
7/10/03	25	Copper	Chara
7/30/03	25	Copper	Chara
6/1/04	20	Contacts	EWM, CL, Pondweeds
6/1/04	25	Copper	Chara
6/25/04	25	Copper	Chara
6/15/05	25	Contacts	EWM, CL, Elodea, Pondweeds
6/15/05	25	Copper	Chara
6/24/05	25	Copper	Chara
5/24/06	Whole lake (87)	Sonar AS 6 ppb	EWM
6/16/06	Whole lake (87)	Sonar AS 1.46 ppb	EWM
6/16/06	25	Copper	Chara
7/13/06	25	Copper	Chara
5/18/07	25	Copper	Chara
5/31/07	0.1	Granular 2,4-D	EWM
5/31/07	25	Copper	Chara
6/20/08	25	Copper	Chara
7/17/08	25	Copper	Chara
8/18/08	17.5	Granular 2, 4-D	EWM

CL = curlyleaf pondweed, EWM = Eurasian watermilfoil, Contacts = Contact herbicide

Weed Patrol treated 25 acres of chara algae on June 20th and July 17th, 2008 using copper sulfate at 2.6 lbs per acre foot (Figure 2). Weed Patrol performed three reconnaissance surveys for exotic species; however, exotic species were not found until the July 17th chara treatment. Weed Patrol created an exotic species map which was used to locate areas that required treatment (Figure 3).

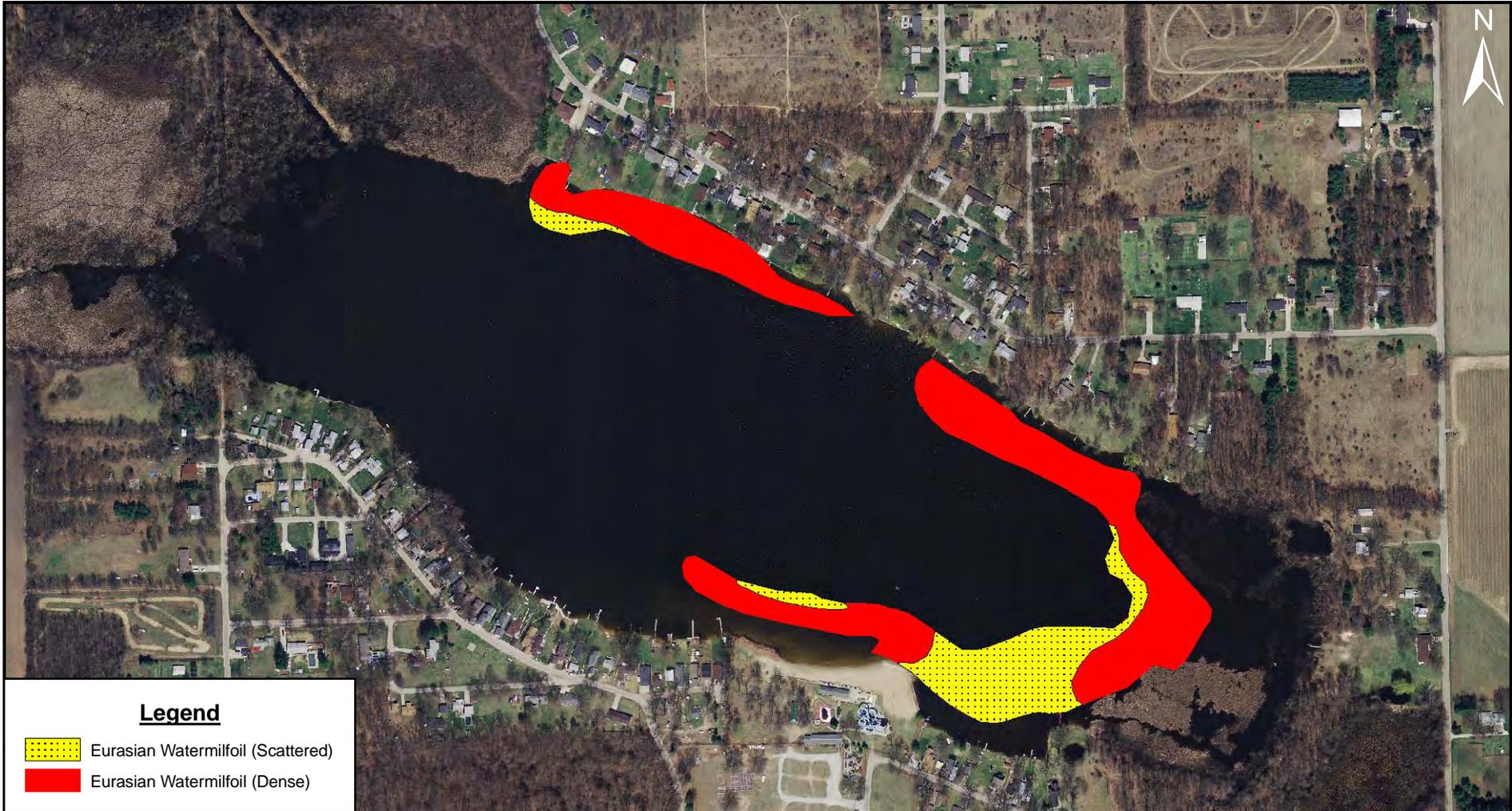




Legend

 Algae Treatment
6/20/08 and 7/17/08

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>TITLE:</p> <p style="text-align: center;">Heaton Lake Chara Treatment</p>		<p>PROJECT AND SITE LOCATION:</p> <p style="text-align: center;">Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	<p>BASE LAYER:</p> <p style="text-align: center;">Indiana Spatial Data 2006 Orthophotography</p>		<p>PROJECT NO.:</p> <p style="text-align: center;">07121.1</p>	<p>FIGURE:</p> <p style="text-align: center;">2</p>	<p>SHEET: 1 OF: 1</p>
	<p>CLIENT:</p> <p style="text-align: center;">Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		<p>QUADRANGLE:</p> <p style="text-align: center;">N/A</p>	<p>DATE:</p> <p style="text-align: center;">6/20/08</p>	<p>SCALE:</p> <p style="text-align: center;">1" = 500'</p>



Legend

-  Eurasian Watermilfoil (Scattered)
-  Eurasian Watermilfoil (Dense)

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>TITLE: Heaton Lake Exotic Species Map</p>		<p>PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	<p>BASE LAYER: Indiana Spatial Data 2006 Orthophotography</p>		<p>PROJECT NO.: 07121.1</p>	<p>FIGURE: 3</p>	<p>SHEET: 1 OF: 1</p>
	<p>CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		<p>QUADRANGLE: N/A</p>	<p>DATE: 7/17/08</p>	<p>SCALE: 1" = 500'</p>

2008 Eurasian Watermilfoil Control

Weed Patrol performed reconnaissance surveys for exotic species on Heaton Lake on April 18th, May 23rd, and June 20th; exotic species were not found until the chara treatment on July 17th. Weed Patrol applied granular 2,4-D (Navigate ®) to 17.5 acres of Eurasian watermilfoil on August 18, 2008 (Figure 4). The dosage of 2,4-D was 100 lbs per acre. V3 conducted the post-treatment Tier II survey on August 27, 2008 to evaluate the vegetative community at Heaton Lake and determine the extent of exotic species. The results of the 2008 Tier II survey had Eurasian watermilfoil present at 22.5% of sampling locations at depths ranging from 0 to 7 feet.

The current level of Eurasian watermilfoil indicates a return towards pre-fluridone densities. The 2005 site frequency of Eurasian watermilfoil was 30% (figure 5). The high site frequency of Eurasian watermilfoil in 2005 prompted the whole lake fluridone treatment in 2006. A whole lake fluridone treatment of Sonar AS was performed on May 24, 2006, with a concentration of 6 parts per billion (ppb). A second treatment of 1.46 ppb, or bump, was applied on June 16, 2006, to maintain a fluridone concentration of 6 ppb within the lake. The fluridone treatment was effective in 2007 as only 0.1 acres of Eurasian watermilfoil required treatment.

Heaton Lake's five-year aquatic vegetation management plan anticipated that five acres of Eurasian watermilfoil would require herbicide treatment in 2008 as only one plant required treatment in 2007. The return and increase in Eurasian watermilfoil beds to 17.5 acres in 2008 suggests that it may return to pre-fluridone treatment levels of 25 acres. Eurasian watermilfoil grows and spreads rapidly by fragmentation and must be considered in estimating future treatment acreages.





Legend

 Eurasian watermilfoil Treatment (17.5 Acres)

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>TITLE: Eurasian Watermilfoil Treatment Map</p>		<p>PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	<p>BASE LAYER: Indiana Spatial Data 2006 Orthophotography</p>		<p>PROJECT NO.: 07121.1</p>	<p>FIGURE: 4</p>	<p>SHEET: 1 OF: 1</p>
	<p>CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		<p>QUADRANGLE: N/A</p>	<p>DATE: 8/18/08</p>	<p>SCALE: 1" = 500'</p>



Legend

 Eurasian watermilfoil beds (25 acres)

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>TITLE: 2005 Pre-Fluridone Treatment Map</p>		<p>PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	<p>BASE LAYER: Indiana Spatial Data 2006 Orthophotography</p>		<p>PROJECT NO.: 07121.1</p>	<p>FIGURE: 5</p>	<p>SHEET: 1 OF: 1</p>
	<p>CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		<p>QUADRANGLE: N/A</p>	<p>DATE: 6/15/05</p>	<p>SCALE: 1" = 500'</p>

Sampling Results 2008

On August 27, 2008 a Tier II survey was conducted on Heaton 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 vegetative community to past conditions. A table outlining the scientific and common names of species collected or observed in Heaton Lake is listed below (Table 2).

Table 2. Species collected or observed in Heaton Lake during Tier II sampling.

Scientific Name	Common Name
<i>Ceratophyllum demersum</i>	Coontail
<i>Chara</i> sp.	Chara
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil
<i>Najas flexilis</i>	Slender naiad
<i>Najas marina</i>	Spiny naiad
<i>Nitella</i> sp.	Nitella
<i>Nuphar variegata</i> *	Yellow pond lily
<i>Nymphaea odorata</i> *	White water lily
<i>Potamogeton crispus</i>	Curlyleaf pondweed
<i>Potamogeton pectinatus</i> *	Sago pondweed
<i>Potamogeton pusillus</i>	Small pondweed
<i>Potamogeton richardsonii</i>	Richardson's pondweed
<i>Potamogeton zosteriformis</i>	Flatstem pondweed
<i>Utricularia vulgaris</i>	Bladderwort
<i>Vallisneria americana</i>	Eel grass

*Emergent species observed during sampling effort.

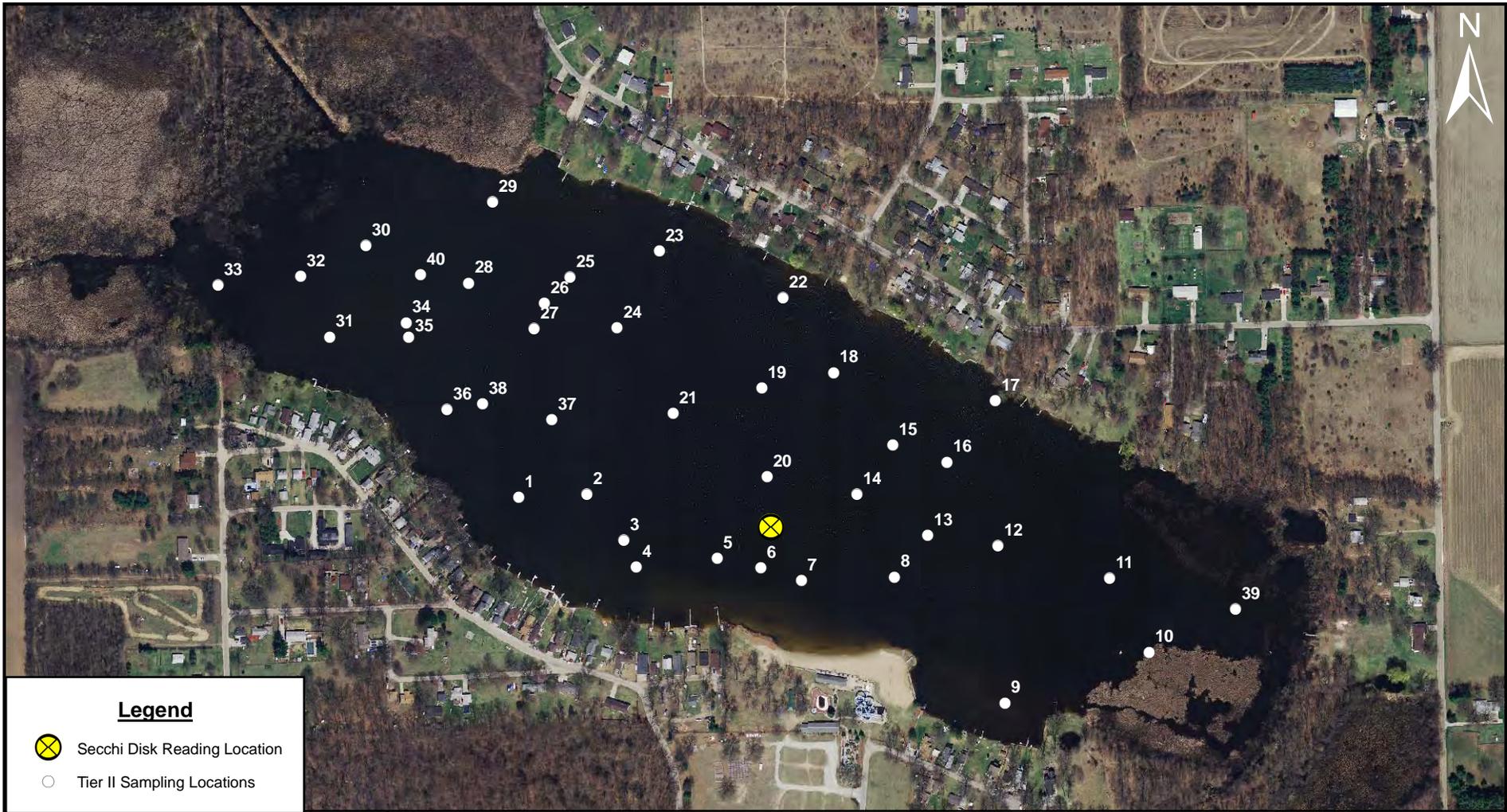
**Species observed and not collected.

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 which included a representative sample of the species within Heaton Lake. According to the IDNR protocol, the number and depth of sampling locations is based on trophic status and acreage. Heaton Lake is classified as Mesotrophic and is 87 acres which requires 40 sampling locations within the littoral zone (10 sites 0-5ft, 10 sites 5-10ft, 10 sites 10-15ft, and 10 sites 15-20ft) (Figure 6). Sampling locations for the 2007 aquatic vegetation survey were located with the GPS unit and used for the 2008 survey. Tier II data sheets and sampling locations' latitude and longitude can be found in Appendix I. Using the same survey locations allows for changes in vegetative community to be documented and treatment success to be determined. Ten additional sampling stations past 20 feet were raked to determine whether plants are growing at greater depths. Since no vegetation was recovered in greater depths there is no indication to extend sampling stations into deeper contours.

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 (20-100%), or 5 (>100%) based on the vegetation 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 the sampling effort a secchi disk reading and water quality measurements are taken (Figure 6).





Legend

-  Secchi Disk Reading Location
-  Tier II Sampling Locations

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>TITLE: Tier II Sampling Locations</p>		<p>PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	<p>BASE LAYER: Indiana Spatial Data 2006 Orthophotography</p>		<p>PROJECT NO.: 07121.1</p>	<p>FIGURE: 6</p>	<p>SHEET: 1 OF: 1</p>
	<p>CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		<p>QUADRANGLE: N/A</p>	<p>DATE: 8/27/08</p>	<p>SCALE: 1" = 500'</p>

Results of Summer Tier II Survey - August 27, 2008

A total of 12 species were identified up to a maximum depth of 12 feet. Twelve species were collected and sago pondweed was observed (Table 3). Emergent species observed during the sampling effort include white water lily and yellow pond lily. A secchi disk reading was taken after sampling and was found to be at 12 feet.

Table 3. Heaton Lake Tier II Survey Results

County: Elkhart		Total sites: 40	Mean species/site: 1.55				
Date: 8/27/2008		Sites with plants: 23	Standard error (ms/s): 0.29				
Secchi (ft): 12		Sites with native plants: 23	Mean native species/site: 1.28				
Maximum plant depth (ft): 12		Number of species: 12	Standard error (mns/s): 0.24				
Trophic status: Mesotrophic		Number of native species: 10	Species diversity: 0.9838				
		Maximum species/site: 9	Native species diversity: 0.9803				
All depths (0 to 20 ft)							
Species	Common Name	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
<i>Ceratophyllum demersum</i>	Coontail	32.5	67.5	27.5	2.5	2.5	9.5
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	22.5	77.5	17.5	5.0	0.0	6.5
<i>Chara sp.</i>	Chara	20.0	80.0	7.5	10.0	2.5	10.0
<i>Najas marina</i>	Spiny naiad	17.5	82.5	12.5	5.0	0.0	5.5
<i>Potamogeton richardsonii</i>	Richardson's pondweed	15.0	85.0	12.5	2.5	0.0	4.0
<i>Vallisneria americana</i>	Eel grass	10.0	90.0	7.5	2.5	0.0	3.0
<i>Najas flexilis</i>	Slender naiad	7.5	92.5	7.5	0.0	0.0	1.5
<i>Potamogeton pusillus</i>	Small pondweed	7.5	92.5	7.5	0.0	0.0	1.5
<i>Potamogeton crispus</i>	Curlyleaf pondweed	5.0	95.0	5.0	0.0	0.0	1.0
<i>Nitella sp.</i>	Nitella	2.5	97.5	0.0	2.5	0.0	1.5
<i>Potamogeton zosteriformis</i>	Flat-stemmed pondweed	2.5	97.5	0.0	2.5	0.0	1.5
<i>Utricularia vulgaris</i>	Bladderwort	2.5	97.5	2.5	0.0	0.0	0.5
Depth: 0 to 5 ft							
Species	Common Name	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
<i>Chara sp.</i>	Chara	80.0	20.0	30.0	40.0	10.0	40.0
<i>Najas marina</i>	Spiny naiad	40.0	60.0	30.0	10.0	0.0	12.0
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	20.0	80.0	10.0	10.0	0.0	8.0
<i>Ceratophyllum demersum</i>	Coontail	20.0	80.0	20.0	0.0	0.0	4.0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	20.0	80.0	20.0	0.0	0.0	4.0
<i>Potamogeton zosteriformis</i>	Flat-stemmed pondweed	10.0	90.0	0.0	10.0	0.0	6.0
<i>Potamogeton crispus</i>	Curlyleaf pondweed	10.0	90.0	10.0	0.0	0.0	2.0
<i>Potamogeton pusillus</i>	Small pondweed	10.0	90.0	10.0	0.0	0.0	2.0
<i>Utricularia vulgaris</i>	Bladderwort	10.0	90.0	10.0	0.0	0.0	2.0
<i>Vallisneria americana</i>	Eel grass	10.0	90.0	10.0	0.0	0.0	2.0
Depth: 5 to 10 ft							
Species	Common Name	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
<i>Ceratophyllum demersum</i>	Coontail	80.0	20.0	80.0	0.0	0.0	16.0
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	70.0	30.0	60.0	10.0	0.0	18.0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	40.0	60.0	30.0	10.0	0.0	12.0
<i>Najas marina</i>	Spiny naiad	30.0	70.0	20.0	10.0	0.0	10.0
<i>Vallisneria americana</i>	Eel grass	30.0	70.0	20.0	10.0	0.0	10.0
<i>Najas flexilis</i>	Slender naiad	30.0	70.0	30.0	0.0	0.0	6.0
<i>Potamogeton pusillus</i>	Small pondweed	20.0	80.0	20.0	0.0	0.0	4.0
<i>Nitella sp.</i>	Nitella	10.0	90.0	0.0	10.0	0.0	6.0
<i>Potamogeton crispus</i>	Curlyleaf pondweed	10.0	90.0	10.0	0.0	0.0	2.0
Depth: 10 to 15 ft							
Species	Common Name	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
<i>Ceratophyllum demersum</i>	Coontail	30.0	70.0	10.0	10.0	10.0	18.0
Depth: 15 to 20 ft							
*No species were found in this depth range							



Aquatic Vegetation Sampling Results Discussion

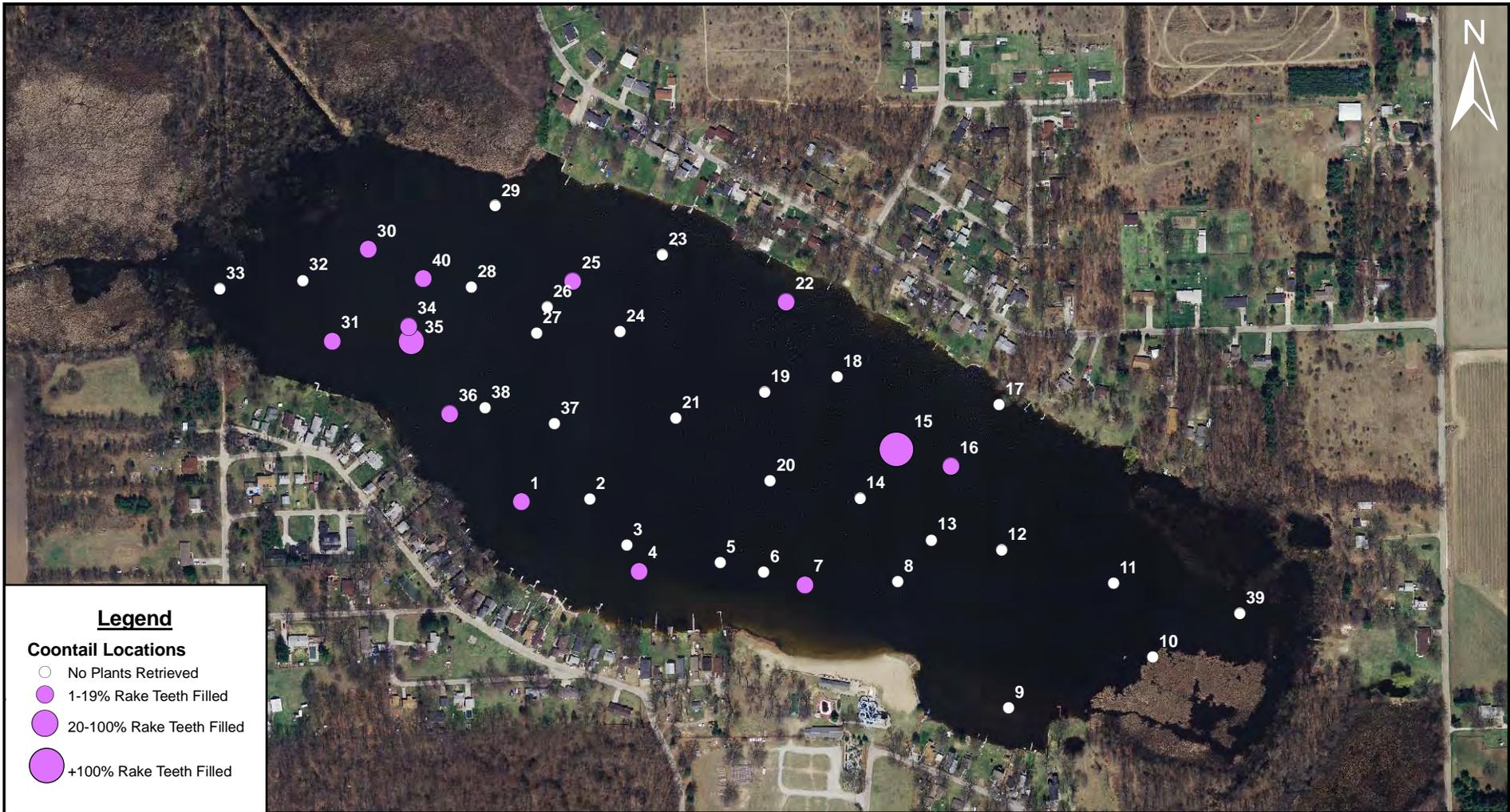
The goal of this plan is to reduce nuisance conditions while still maintaining the abundance of beneficial native species. A diverse native vegetative community is vital in providing proper fish habitat, shoreline stabilization, and preventing the spread and/or establishment of invasive species such as Eurasian watermilfoil.

The results of the Tier II sampling effort identified coontail at 32.5% of sample sites (Figure 7). Eurasian watermilfoil and chara algae followed in frequency of occurrence (22.5% and 20.0% respectively). Eurasian watermilfoil was present at depths ranging from 0 to 7 feet (Figure 8). The 0 to 5 foot depth zone was the most diverse and had eight native species. The most dominant species within the 0 to 5 foot depth range was chara algae and occurred at 80% of sampling locations within this depth range (Figure 9). Curlyleaf pondweed was collected at two sampling locations at depths of 4 and 7 feet (Figure 10). Coontail was the most frequently occurring species (80%) within the 5 to 10 foot depth zone followed by Eurasian watermilfoil with a frequency of occurrence of 70%. No species were present in the 16 to 20 foot depth zone.

Threatened and Endangered Species

The Indiana Natural Heritage Data Center database provides information on the presence of rare species, threatened and endangered species, and high quality natural communities and areas. The database serves as a tool for setting management priorities in areas where these species are encountered. There were no encounters with threatened or endangered species during the Tier II sampling. 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.



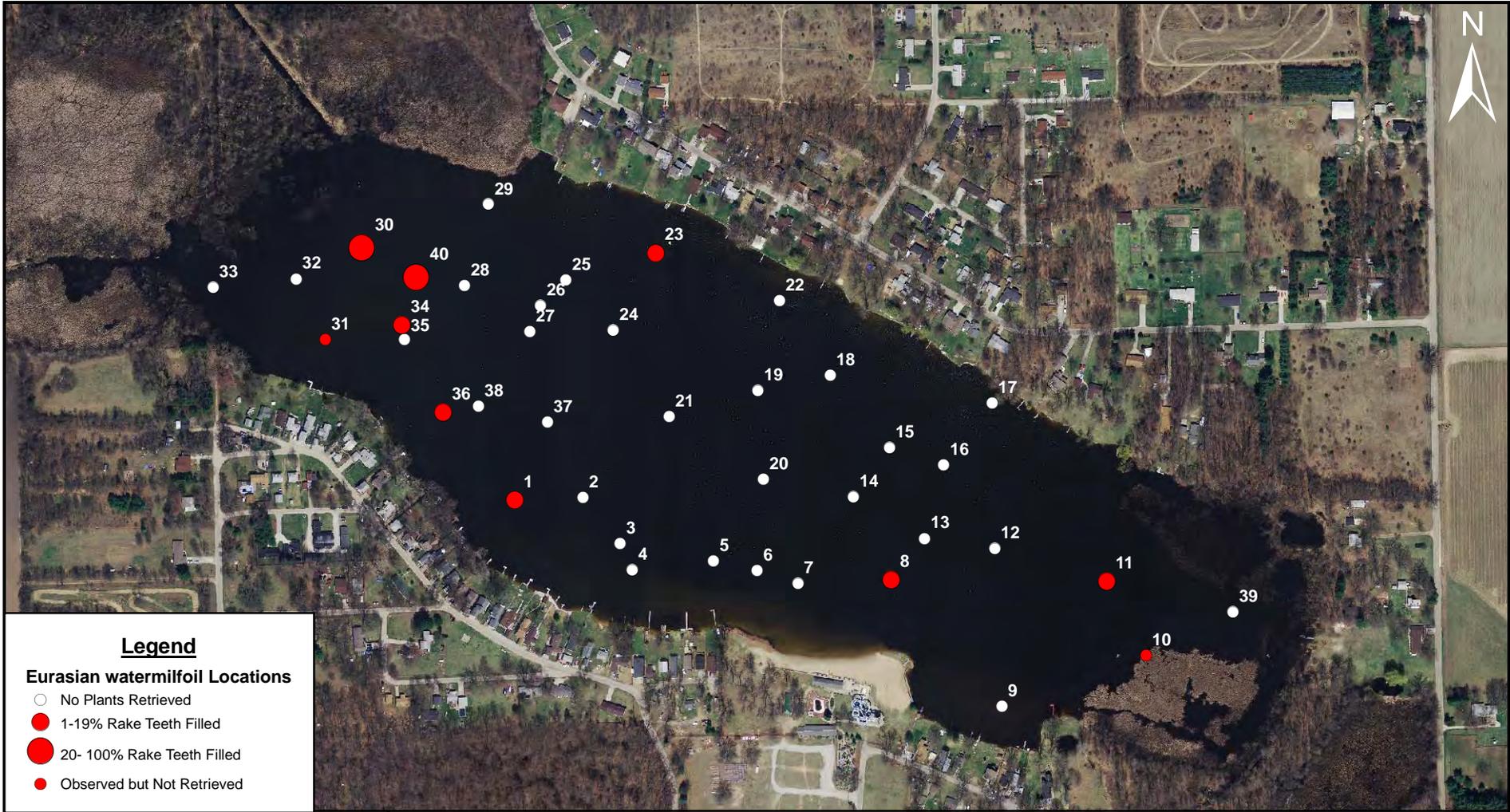


Legend

Coontail Locations

- 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: Post-treatment Distribution and Abundance of Coontail		PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO.: 07121.1	FIGURE: 7	SHEET: 1 OF: 1
	CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514		QUADRANGLE: N/A	DATE: 8/27/08	SCALE: 1" = 500'

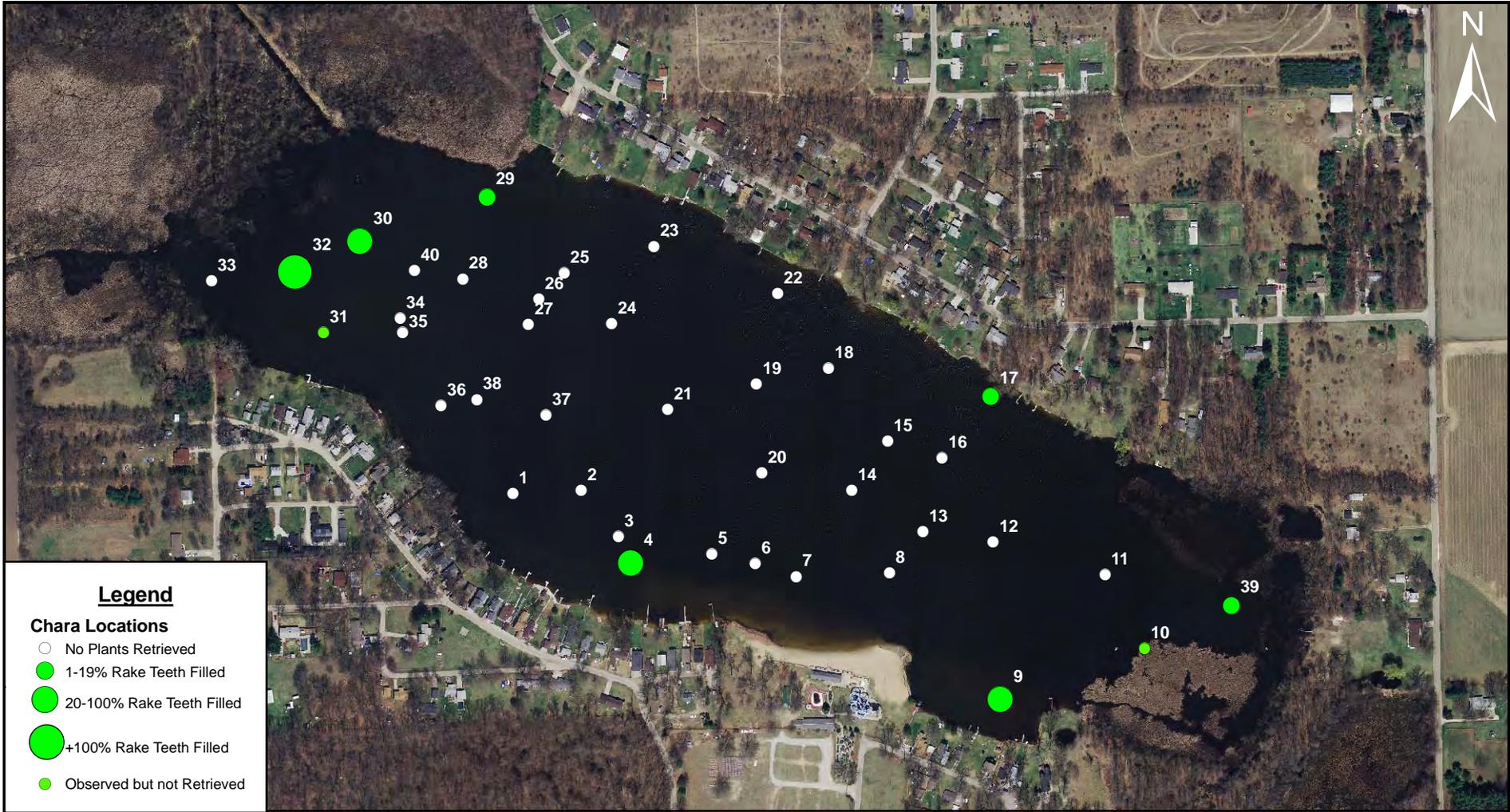


Legend

Eurasian watermilfoil Locations

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

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: Post-treatment Distribution and Abundance of Eurasian watermilfoil		PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008		
	BASE LAYER: Indiana Spatial Data 2006 Orthophotography		PROJECT NO.: 07121.1	FIGURE: 8	SHEET: 1 OF: 1
	CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514		QUADRANGLE: N/A	DATE: 8/27/08	SCALE: 1" = 500'



Legend

Chara Locations

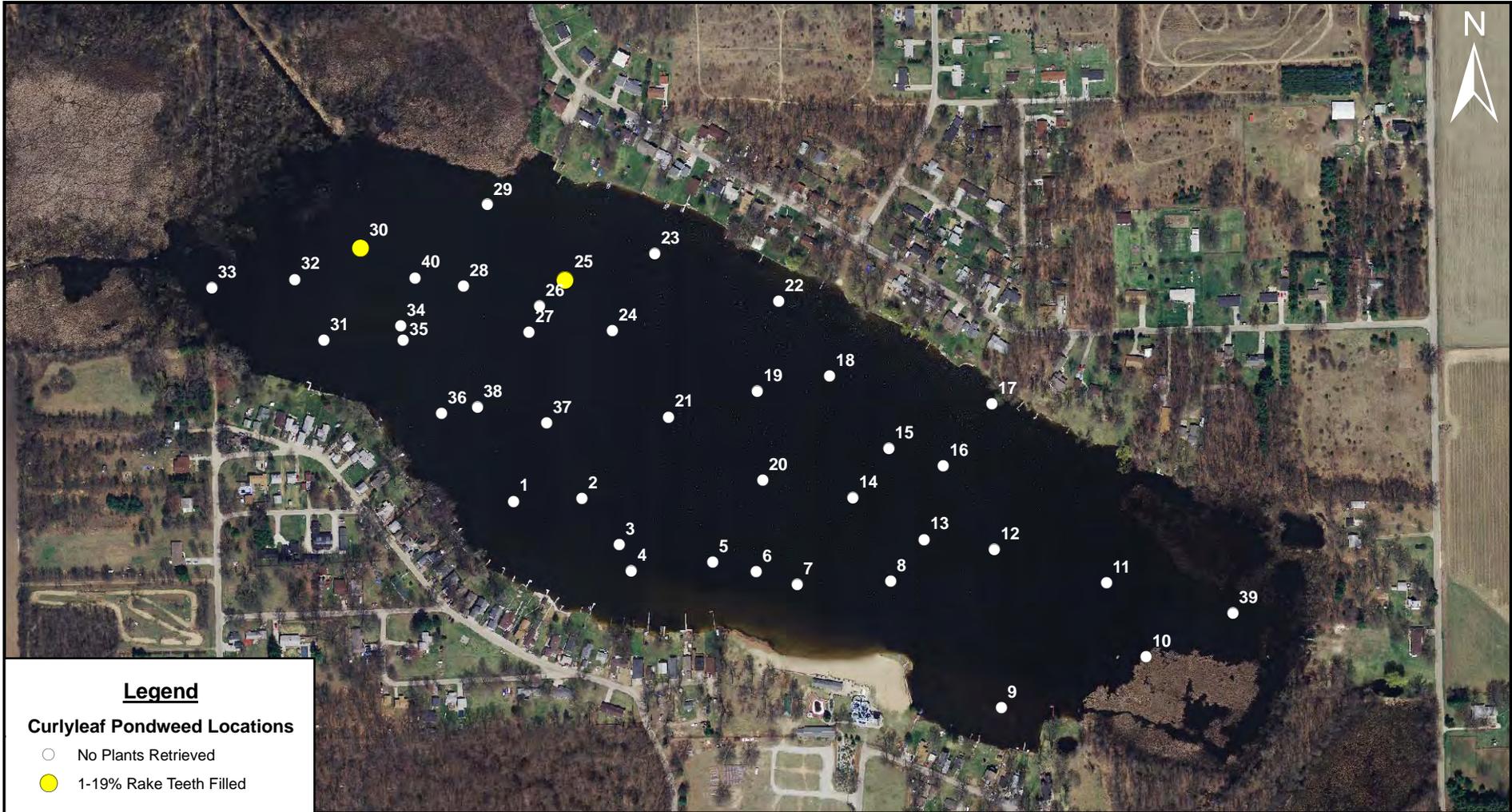
- No Plants Retrieved
- 1-19% Rake Teeth Filled
- 20-100% Rake Teeth Filled
- +100% Rake Teeth Filled
- Observed but not Retrieved



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

TITLE:	Post-treatment Distribution and Abundance of Chara		
BASE LAYER:	Indiana Spatial Data 2006 Orthophotography		
CLIENT:	Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514		

PROJECT AND SITE LOCATION:			
Heaton Lake Aquatic Plant Management Plan Update - 2008			
PROJECT NO.:	FIGURE:	SHEET: 1	
07121.1	9	OF: 1	
QUADRANGLE:	DATE:	SCALE:	
N/A	8/27/08	1" = 500'	



Legend

Curlyleaf Pondweed Locations

- No Plants Retrieved
- 1-19% Rake Teeth Filled



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

TITLE:	Post-treatment Distribution and Abundance of Curlyleaf Pondweed
BASE LAYER:	Indiana Spatial Data 2006 Orthophotography
CLIENT:	Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514

PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008		
PROJECT NO.:	FIGURE:	SHEET:
07121.1	10	1
OF:	DATE:	SCALE:
1	8/27/08	1" = 500'
QUADRANGLE:	N/A	

Comparison of 2004 – 2008 Quantitative Sampling Data

A summary of quantitative sampling conducted between 2004 and 2008 is shown in Table 4. The site frequency of each aquatic plant species collected is shown. Although some of the variability between sampling dates may be the result of varying sampling techniques and timing, management activities conducted at Heaton Lake may be the cause of more consistent trends.

Chara algae was the most frequently occurring species in 2004 and had a frequency value greater than 30% among all surveys except for 2008 (Table 4). Chara is a macro alga with no true leaves that prefers hard, calcium rich water and has been a nuisance species within Heaton Lake since 1998. Chara is a native species that has the ability to carpet the lake bottom and crowd out other native species. Chara's frequency of occurrence was 80% in 2004 and resulted in a decreased abundance of all other species. Chara's frequency of occurrence has experienced a steady decline from 2004 to 2008. The decline in chara abundance is attributed to chara's response to the herbicide treatment strategy.

Coontail had a frequency of occurrence of 2% in 2004 and increased to 33.3% in 2005. The increase in coontail is attributed to successful treatment of chara. Chara's frequency of occurrence decreased 30% from 2004 to 2005. Coontail's frequency of occurrence has averaged approximately 30% from 2005 to 2008 and has not been negatively impacted by herbicide treatments conducted at Heaton Lake.

Eurasian watermilfoil is an aggressive exotic species that disrupts lake ecosystems and negatively effects native aquatic vegetative communities. If left untreated Eurasian watermilfoil can rapidly become a monoculture within a lake. Eurasian watermilfoil's ability to grow and spread quickly is seen by its increase in frequency of occurrence from 2% in 2004 to 29.6% in 2005. Fluctuations in Eurasian watermilfoil's frequency of occurrence are likely a response to management activities conducted at Heaton Lake. A whole lake fluridone treatment of Sonar AS was performed on May 24, 2006, with a concentration of 6 parts per billion (ppb). The fluridone treatment effectively reduced Eurasian watermilfoil as it was not present at any sampling locations in August of 2006 and the 2007 Tier II sampling efforts. A significant increase of Eurasian watermilfoil was seen in 2008 as it was present at 22.5% of sampling locations. The current level of Eurasian watermilfoil indicates a return towards pre-fluridone densities.

Curlyleaf pondweed is an exotic species that grows through the winter months and reaches peak biomass in the spring. Curlyleaf pondweed usually declines during the summer months and does not directly compete with many of the native submersed species. Curlyleaf pondweed's frequency of occurrence has fluctuated throughout the surveys with its greatest presence in 2005 at 22.2%. The total amount of species collected increased in 2008. The increase in species collected may be in response to increased water clarity and effective herbicide treatments. The 2008 secchi disk reading of 12 feet was the second greatest depth recorded among all surveys. Continued management activities to control curlyleaf pondweed, Eurasian watermilfoil, and chara algae are necessary to promote the growth of native vegetation and diverse aquatic communities.



Table 4. Site frequency of plants at Heaton Lake 2004-2008 (Frequency values greater than 30 are shown in bold)

		Site Frequency (%)*						
Common Name	Scientific Name	6/25/04	5/20/05	5/30/06	8/1/06	6/5/07	8/28/07	8/27/08
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	2	29.6	30	-	-	-	22.5
Curlyleaf pondweed	<i>Potamogeton crispus</i>	2	22.2	15	4.8	17.5	7.5	5.0
Sago pondweed	<i>Potamogeton pectinatus</i>	2	-	-	-	-	-	-
Chara	<i>Chara sp.</i>	80	59.3	45	35.7	32.5	30	20
Elodea	<i>Elodea canadensis</i>	2	-	-	-	-	-	-
Coontail	<i>Ceratophyllum demersum</i>	2	33.3	30	33.3	27.5	20	32.5
Whitestem pondweed	<i>Potamogeton praelongus</i>	-	7.4	5	4.8	-	-	-
Illinois pondweed	<i>Potamogeton illinoensis</i>	-	3.7	-	-	15.0	27.5	-
Northern milfoil	<i>Myriophyllum sibiricum</i>	-	-	7.5	-	-	-	-
Variable pondweed	<i>Potamogeton gramineus</i>	-	-	5	-	-	-	-
Nitella	<i>Nitella sp.</i>	-	-	2.5	-	7.5	-	2.5
Naiad sp	<i>Najas sp.</i>	-	-	-	7.1	-	-	-
Common bladderwort	<i>Utricularia vulgaris</i>	-	-	-	2.4	2.5	10	2.5
White water lily	<i>Nymphaea odorata</i>	-	-	-	-	7.5	2.5	-
Eel grass	<i>Vallisneria americana</i>	-	-	-	-	2.5	-	10.0
Small pondweed	<i>Potamogeton pusillus</i>	-	-	-	-	2.5	-	7.5
Spiny naiad	<i>Najas marina</i>	-	-	-	-	-	12.5	17.5
Slender naiad	<i>Najas flexilis</i>	-	-	-	-	-	5.0	7.5
Richardson's pondweed	<i>Potamogeton richardsonii</i>	-	-	-	-	-	-	15.0
Flatstem pondweed	<i>Potamogeton zosteriformis</i>	-	-	-	-	-	-	2.5
Total Number of Species		6	6	8	6	9	8	12

*Data from 2005-2006 collected by DNR. Sampling locations and sampling methodology varied between the years.



Figures 11a-11d displays individual species frequency of occurrence over time. Graphs were created using the frequency of occurrence provided in Table 4. Fluctuations in frequency of occurrence for Eurasian watermilfoil and chara are likely a response to herbicide treatments.

Figure 11a: Frequency of occurrence of dominant species within Heaton Lake from 2004-2008.

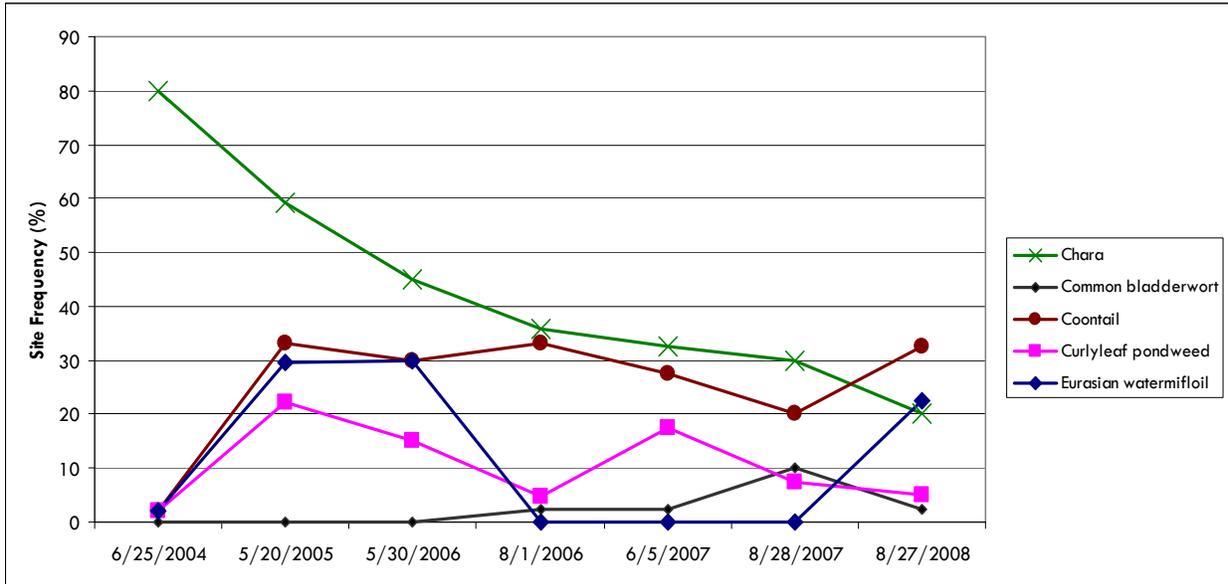


Figure 11b: Frequency of occurrence of species collected three times within Heaton Lake from 2004-2008.

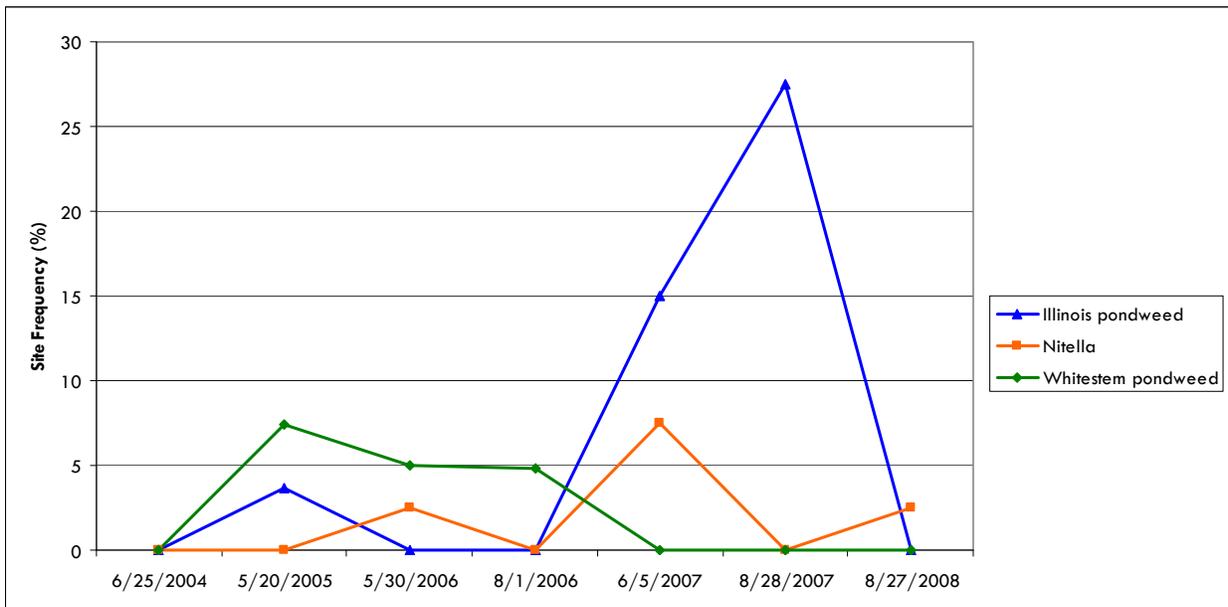


Figure 11c: Frequency of occurrence of species collected twice within Heaton Lake from 2004-2008.

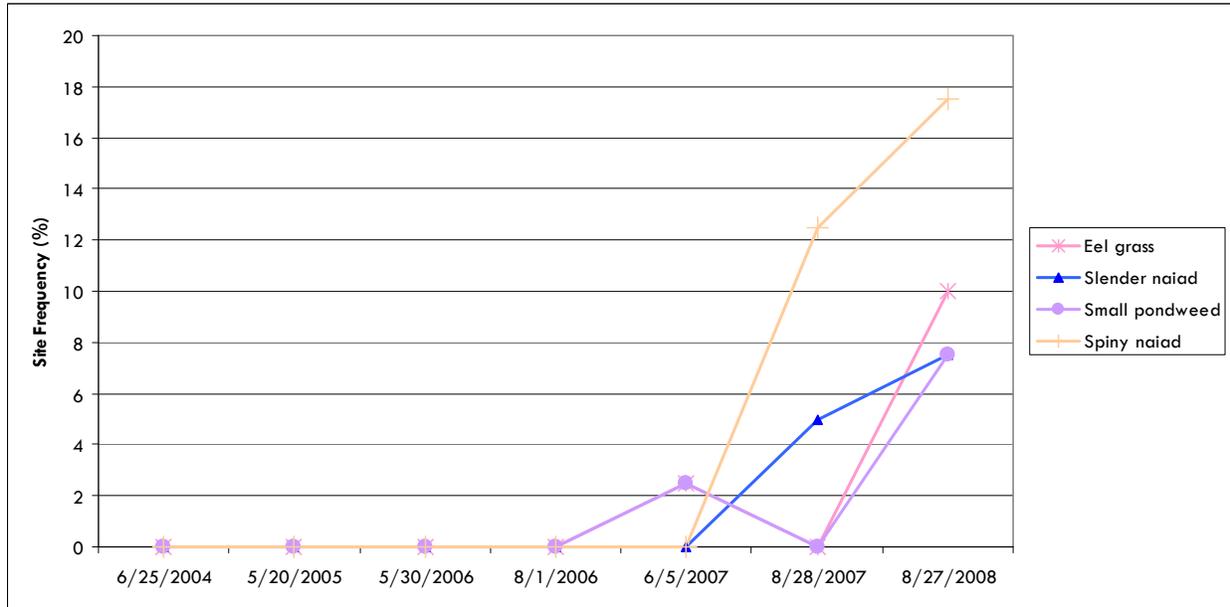
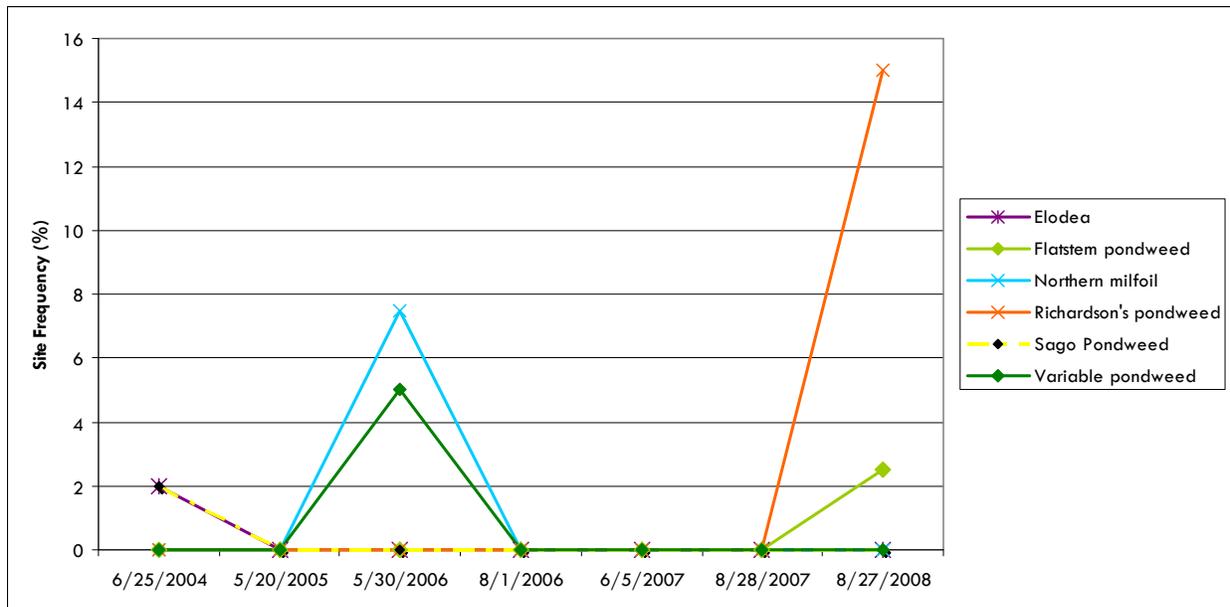


Figure 11d: Frequency of occurrence of species collected once within Heaton Lake from 2004-2008.



Heaton Lake Secchi Disk Readings 1994 - 2008

The Secchi disk is a measure of the amount of suspended material in the water. The suspended material may be eroded soil from the watershed, living algae, re-suspended lake sediments, or other materials. The more suspended material in the water, the more turbid or cloudy the lake appears and will decrease the clarity. Secchi disk depth measurements are determined by the depth at which a standard black and white disk is no longer visible in the water column. The Secchi depth measurement provides valuable data in water clarity trends.

Although there was variability between data sources the secchi disk depth measurements provide valuable insight into water clarity trends. Secchi disk data has been gathered at Heaton Lake by volunteers from 1994 to 2003. Data collected from Heaton Lake volunteers was averaged to obtain a yearly secchi depth value (Lawson, 2006). Secchi depths ranged from 5.5 feet to 13.7 feet from 1994 – 2008 with an average secchi depth of 9.3 feet. Algae growth increases during warm summer months and visibility correspondingly decreases, which is validated by the decrease in secchi disk depth readings from June to August in 2007 and 2008. The 2008 secchi disk reading increased by 5 feet from 2007 and was the second greatest secchi depth recorded of all the years data was collected. Factors that are related to increased water clarity include reduced nutrient input from the watershed, increased grazing of algae by zooplankton, and/or reduced soil erosion into the lake. A combination of these factors may have resulted in the 2008 secchi disk depth measurement of 12 feet.

Table 5. Secchi disk depth measurements 1994 – 2008.

Date	Secchi Depth (ft.)	Data Source
1994	11.9*	Heaton Lake Volunteers
1996	10.0*	Heaton Lake Volunteers
1997	5.5*	Heaton Lake Volunteers
1998	7.6*	Heaton Lake Volunteers
1999	10.7*	Heaton Lake Volunteers
2000	7.6*	Heaton Lake Volunteers
2003	7.1*	Heaton Lake Volunteers
5/30/06	13.7	2006 Heaton Lake Fisheries Study
8/1/06	10.5	2006 Heaton Lake Fisheries Study
6/5/07	9.0	V3 Tier II Aquatic Vegetation Survey
8/28/07	7.0	V3 Tier II Aquatic Vegetation Survey
8/27/08	12.0	V3 Tier II Aquatic Vegetation Survey

*Secchi depth is an average of yearly data collected by Heaton Lake Volunteers

~Years omitted from table represent years that secchi data was not collected.



Aquatic Vegetation Management Alternatives

At the present time, the health of Heaton Lake's aquatic plant communities is fair. Native plant diversity has improved but Eurasian watermilfoil and chara continue to have high site frequencies. Continued management efforts to maintain the Eurasian watermilfoil and curlyleaf pondweed population at a low level is desirable to prevent these exotic species from inhibiting lake uses. Additionally, watershed activities to improve the water quality of Heaton Lake are important to enhance the native plant diversity.

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, its 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 vegetation can be a nuisance where they inhibit lake access, aquatic vegetation is important in maintaining a healthy lake ecosystem. Aquatic vegetation provide habitat for plankton, insects, crustaceans, fish, and amphibians. They take nutrients such as phosphorus and nitrogen out of the water column, increase water clarity, prevent harmful algal blooms, produce oxygen, and provide food for waterfowl. Aquatic vegetation can also 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 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.

Chemical Controls – Aquatic Herbicides

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.

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 (Madsen, 1993). 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 lower dose 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 will bind with algae in the water column and not affect the milfoil. Although Reward is not marketed as an algacide, alga is shown on the label as controlled by this product. Since alga is moderately abundant during mid-summer at Heaton Lake, the effectiveness of a low-dose contact treatment may be compromised.

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.



Public Involvement and Education

A public meeting was held November 13, 2008 at the Eastwood Elementary School in Elkhart, Indiana. Twenty individuals attended the meeting which represented riparian homeowners and members of the Heaton Lake Conservation Club. V3 discussed current plant management activities, results of the Tier II survey, and future management options. A lake use survey was handed out after the meeting and sixteen individuals participated. Summary totals from the completed lake use survey are shown in Figure 12. All participants were lake property owners and current members of the Heaton Lake Conservation Club. Twenty-five percent (25%) of lake property owners had been at the lake from 2 to 5 years. The majority of survey participants (43%) were lake residents that have been at the lake for 10 years or more. The three main lake uses were fishing (100%), swimming (94%) and boating (81%). Thirty-one percent (31%) of those surveyed used the lake for irrigation. Nobody surveyed used the lake for drinking water. All of those surveyed were aware of the weed control project at Heaton Lake as well as LARE funds used for controlling invasive exotic species. All participants were in favor of continuing efforts to control vegetation. Eighty-eight percent (88%) of participants had aquatic vegetation at their shoreline in nuisance quantities and felt that aquatic vegetation interfered with their enjoyment of the lake. Heaton Lake residents also expressed gratitude for state funding which helped fund the sewer that was installed this past year. Installation of the sewer will reduce nutrient inputs into Heaton Lake and improve water quality. Overall individuals that attended the meeting expressed concern about Eurasian watermilfoil re-establishment after treatment and the need for dredging.

A desire for emergent bed mapping in the eastern and western portions of the lake where recreational uses have been inhibited was expressed at the meeting. Lake residents also expressed concern over a fluctuating lake level as lake level is high in the fall and was around two feet below lake level during Tier II sampling in late summer. High water levels may alter the beds of established emergent vegetation by negatively impacting the survivorship of this community. Low water levels and exposed lake bottom are undesirable to many lake residents and can interfere with recreational activities, however, fluctuating water levels are a normal function of lake ecosystems. Prolonged periods of low water level could negatively impact native vegetation and provide areas for exotic species such as Eurasian watermilfoil to establish. Negative impacts to native vegetation due to low lake level was not reflected in the 2008 Tier II results as 10 native species were collected.

Survey questions remained the same so trends could be identified. The 2008 lake use survey results are very similar to results of the 2007 lake use survey. The top recreational uses at Heaton Lake remain swimming, boating and fishing. The main issues concerning lake use cannot be compared to the 2007 results because the ranking system was misunderstood by participants and results were unable to be interpreted. A desire for dredging the accumulated sediments, reduction of nuisance waterfowl, and control of inlet/outlet structures for better lake level control was present in both lake use surveys. Heaton Lake is a shallow waterbody with a maximum depth of 22 feet and an average depth of 7.4 feet. Dredging would impact aquatic vegetation by removing native seed stock and altering the benthic condition. The disturbed dredged areas may be more susceptible to exploitation of invasive species.



Lake residents play an important role in establishing and maintaining a healthy lake community. Heaton Lake Conservation Club meets three times a year and meetings are held in the evenings at Ideal Beach Park. These meetings provide a forum where issues regarding conflicting uses and goals for the lake may be discussed. Heaton Lake Conservation Club is continually working towards improving the quality of Heaton Lake and has had an instrumental role in the development of this aquatic vegetation management plan.

Public involvement and educational needs are critical with respect to a new threat to Indiana lakes from an invasive aquatic species called Hydrilla (*Hydrilla verticillata*). 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 13 (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/>

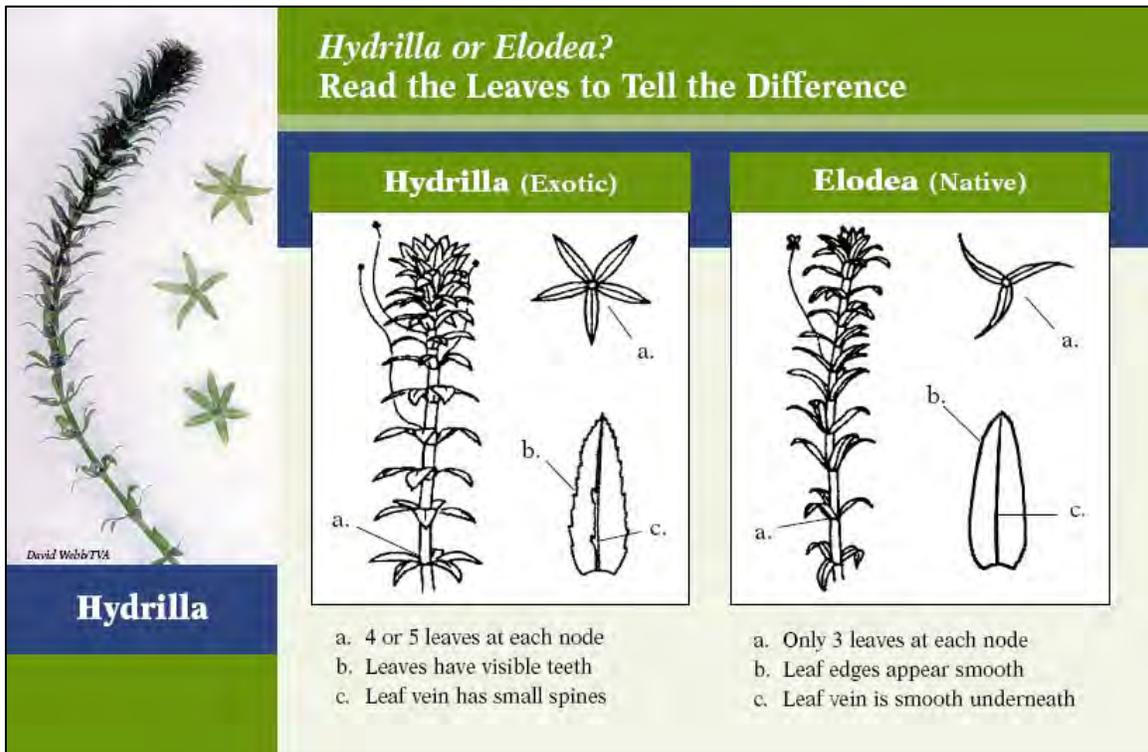


Figure 13: Illustration of Hydrilla compared to native elodea. (Illustrations provided by Michigan Sea Grant)



In addition to these state and lake-wide issues, residents can be educated regarding practical steps that can reduce nutrient loading and improve the Heaton 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.
6. **Protect Wetlands.** Establish ecological zones to protect existing wetlands and emergent vegetation from turbulence caused by boats. Wetlands are valuable components of a lake ecosystem because they filter water and stabilize shoreline areas. Submersed and emergent vegetation can be eliminated by heavy wave action, which destabilizes the shoreline. If possible, Heaton Lake Conservation Club should identify significant wetland areas and work with the IDNR to protect them from drainage and disturbance.

Heaton Lake Conservation Club is constantly reinforcing areas regarding proper maintenance of boat motors, limited lawn fertilizer, and proper disposal of grass clippings. Information is communicated verbally at meetings and distributed through handouts. The HLCC also redistributes information obtained through the county water and soil district and other water quality related sources.



Problematic Areas of Vegetation

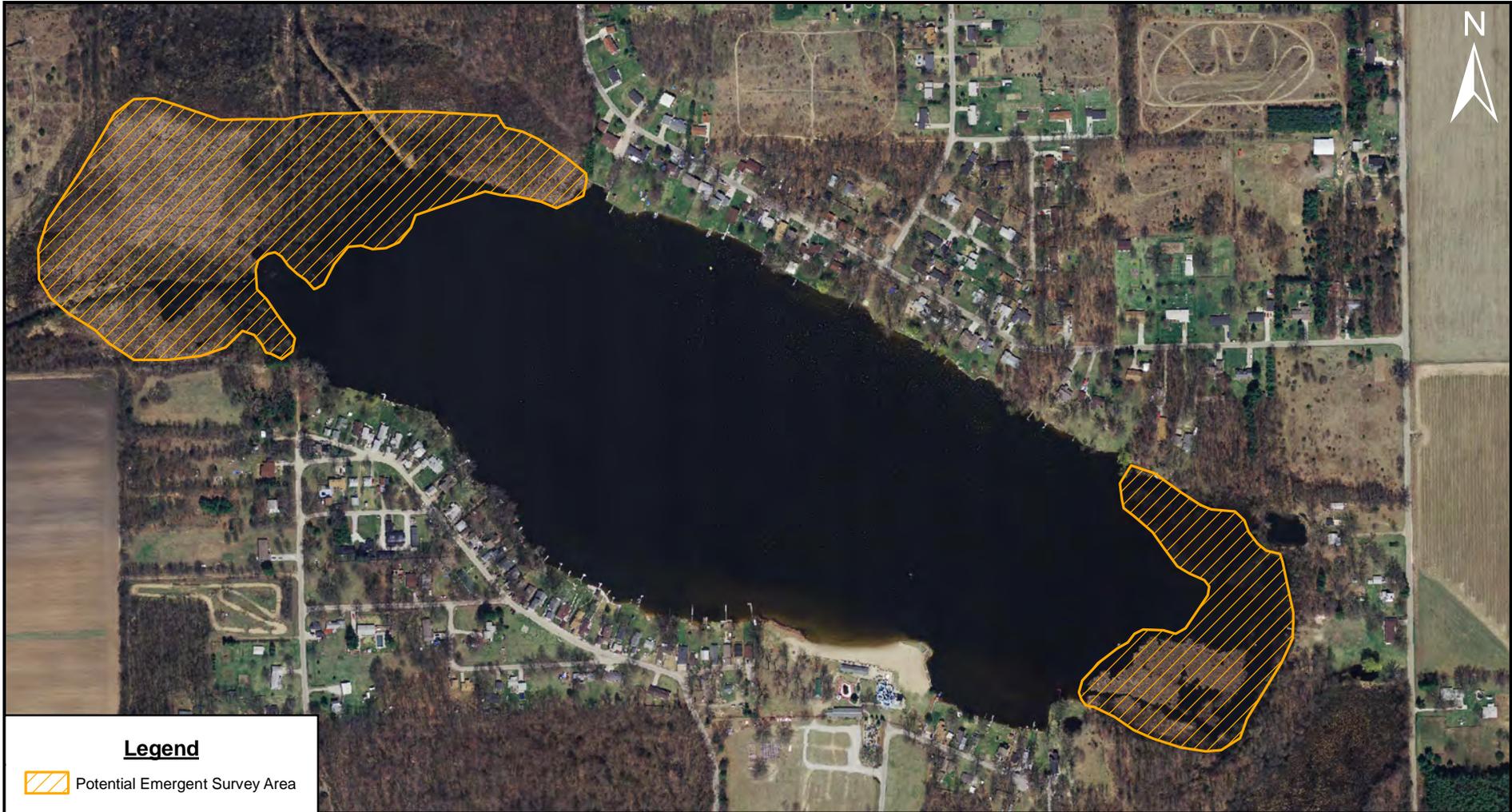
A desire for emergent bed mapping in the eastern and western portions of Heaton Lake was expressed at the meeting. Some residents felt the spread of emergent beds was negatively impacting the inlet in the southeast corner (Figure 14). Some residents noted that navigation was inhibited by the emergent beds and boats were at the weed level during periods of low lake level. During the Tier II sampling effort some locations were unable to be sampled because of the low water level made the location unable to be accessed (Figure 15). The vegetation that appears white represents chara that was exposed and dried due to reduced lake level.



Figure 15: Photograph from V3 Tier II sampling effort of low water condition.

Floating-leaf vegetation provides habitat for fish and other aquatic species as well as adding an aesthetic component which adds to a lake's unique features. In spite of the many benefits floating aquatic vegetation has it can become a nuisance due to their natural growth habit of growing lakeward of the shoreline. Access needed for boating, fishing and swimming become inhibited when dense vegetative beds spread across lake areas. A balance between recreational uses and the natural function of floating aquatic vegetation must be central to management efforts. Emergent plant surveys would map changes in bed acreages over time and is an option for future management in Heaton Lake.





Legend

 Potential Emergent Survey Area

 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: <p align="center">Potential Emergent Survey Area 2010</p>		PROJECT AND SITE LOCATION: <p align="center">Heaton Lake Aquatic Plant Management Plan Update - 2008</p>		
	BASE LAYER: <p align="center">Indiana Spatial Data 2006 Orthophotography</p>		PROJECT NO.: <p align="center">07121.1</p>	FIGURE: <p align="center">14</p>	SHEET: 1 OF: 1
	CLIENT: <p align="center">Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514</p>		QUADRANGLE: <p align="center">N/A</p>	DATE: <p align="center">8/27/08</p>	SCALE: <p align="center">1" = 550'</p>

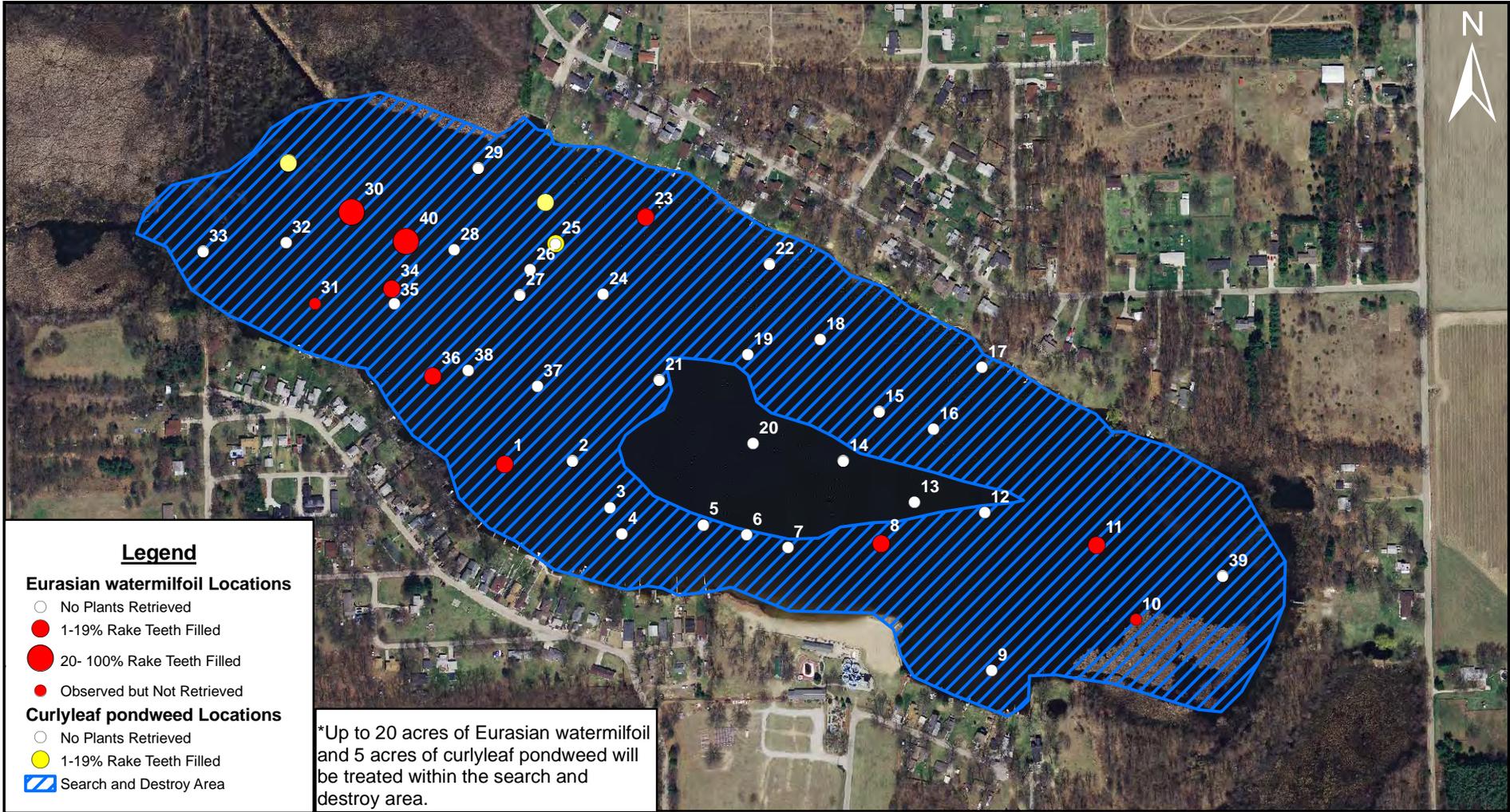
Action Plan

We recommend a search and destroy survey for Eurasian watermilfoil and curlyleaf pondweed in 2009 (Figure 16). The search and destroy area is approximately 35 acres and was created based on areas of Heaton Lake where depths shallower than 15 feet. The search and destroy area will cover the depths at which vegetation has been found as the maximum plant depth of the 2008 Tier II survey was 12 feet. A total of 20 acres are requested for Eurasian watermilfoil treatment in 2009 using granular 2,4-D (Navigate®). Aquathol K will be used to treat up to 5 acres of curlyleaf pondweed in 2009. Priority treatment area and acreage is described within the Application for Aquatic Vegetation Control Permit located in Appendix II. The 2009 treatment will be based on post-treatment survey work. Treatment maps will be sent to the DNR in the spring to provide accurate representation of areas requiring treatment. There are no problems anticipated with the vegetation control permit as was discussed at the permit meeting held November 7, 2008. The costs associated with treating exotic species and nuisance chara have been accepted by Heaton Lake Conservation Club and lake residents have expressed acceptance and support for the management plan.

V3's post-treatment Tier II survey on August 27, 2008 had Eurasian watermilfoil at 22.5% of sampling locations at depths ranging from 0 to 7 feet. The current level of Eurasian watermilfoil indicates a return towards pre-fluridone densities. Eurasian watermilfoil had a 30% site frequency in 2005 which prompted the whole lake fluridone treatment in 2006. The density and frequency of occurrence of Eurasian watermilfoil in 2009 will determine whether a fluridone treatment would be more cost effective than herbicide spot treatments. Heaton Lake is an 87-acre lake which would require minimal fluridone and would be a cost effective management strategy if Eurasian watermilfoil reaches 30 acres or more. Eurasian watermilfoil that is reintroduced after fluridone has dissipated can grow after treatment and needs to be spot treated to maintain Eurasian watermilfoil control. The fluridone treatment conducted in 2006 was effective in reducing Eurasian watermilfoil; however more aggressive treatment is necessary post-treatment to control Eurasian watermilfoil that was introduced after the fluridone treatment. As Heaton Lake's average depth is 7.4 feet, the majority of the lake is susceptible to being exploited by Eurasian watermilfoil therefore aggressive treatments post fluridone treatment is needed to increase the long term effectiveness of Eurasian watermilfoil control.

As the action plan is implemented, aquatic vegetation 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 2009 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 Heaton Lake. In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic vegetative beds are reacting to treatment. The surveys 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 Heaton Lake ecosystem.





Legend

Eurasian watermilfoil Locations

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

Curlyleaf pondweed Locations

- No Plants Retrieved
- 1-19% Rake Teeth Filled
- ▨ Search and Destroy Area

*Up to 20 acres of Eurasian watermilfoil and 5 acres of curlyleaf pondweed will be treated within the search and destroy area.



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

TITLE:	Tier II Eurasian Watermilfoil and Curlyleaf Pondweed Results with 2009 Priority Treatment Area		PROJECT AND SITE LOCATION:		
			Heaton Lake Aquatic Plant Management Plan Update - 2008		
BASE LAYER:	Indiana Spatial Data 2006 Orthophotography		PROJECT NO.:	FIGURE:	SHEET: 1
			07121.1	16	OF: 1
CLIENT:	Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514		QUADRANGLE:	DATE:	SCALE:
			N/A	8/27/08	1" = 500'

Implementation of Action Plan

1. Spring 2009 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.
2. Conduct the 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 (Navigate ®) is proposed during 2009 to treat the Eurasian watermilfoil that has re-grown since the 2008 herbicide application. 2,4-D is an effective herbicide because it is fast-acting and only requires a 48-hour contact time with the vegetation. Herbicides come in liquid or granular formulations. Liquid formulations dose the plant and have relatively quick effects whereas granular works through long term exposure. Aquathol K will be used to treat any curlyleaf pondweed.
3. Summer 2009 Tier II Aquatic Vegetation Survey. A Tier II aquatic vegetation survey should be conducted to document the diversity, distribution and abundance of aquatic vegetation. This data is important to determine if the native plant community is protected, and that the Eurasian watermilfoil population is kept under control.

The management goal for 2009 is to keep the Eurasian watermilfoil populations below nuisance quantities. The overall goal for Heaton Lake is that the results of the 2009 sampling are less than the 2008 Eurasian watermilfoil density and abundance which would demonstrate effective herbicide treatment 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 2009 and 2010 are summarized below. Budget projections are estimated at maximum values and will fluctuate depending on treatment acreage.

2009

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Early Spring Systemic Herbicide Application of granular 2,4-D (Navigate ®) (assumed 20 acres)	\$10,000
Application of Aquathol K for Curlyleaf pondweed (up to 5 acres)	\$1,500
Application of Copper Sulfate for Chara (up to 25 acres)	\$1,000
Late season post treatment aquatic vegetation survey (Tier II) and plan update	\$7,000

2010

Target Species Distribution Map and Proposed Treatment Area Map	\$1,000
Early Spring Systemic Herbicide Application of granular 2,4-D (Navigate ®) (assumed 20 acres)	\$10,000
Application of Aquathol K for Curlyleaf pondweed (up to 5 acres)	\$1,500
Application of Copper Sulfate for Chara (up to 25 acres)	\$1,000
Emergent Plant Surveys in Eastern and Western Ecozone Areas.	\$6,000
Inclusion of the findings of the Emergent Plant Surveys in Ecozone areas	\$1,500
Late season post treatment aquatic vegetation survey (Tier II) and plan update	\$7,000

Recommendation for conducting a fluridone treatment in 2010 will depend on Eurasian watermilfoil coverage and the outcome of the spot treatment approach in 2009.

The Heaton Lake Conservation Club is grateful for LARE funding that is used to control invasive exotic species. The Heaton Lake Conservation Club supports the cost share strategy and has funds prepared for the cost share.



Deviations from the original five-year management plan include the budget for herbicide treatment in 2009 and 2010 for Heaton Lake. The budget increase for treatment cost is based on the return and increase of Eurasian watermilfoil beds. Heaton Lake's five year management plan estimated 5 acres of Eurasian watermilfoil would require treatment in 2008 based on the minimal treatment required in 2007 (0.1 acre). However, 17.5 acres of Eurasian watermilfoil were treated in 2008. The 2009 treatment acreage was estimated based on the results of the Tier II survey as well as the rapid growth characteristics of Eurasian watermilfoil. Budget projections are estimated at maximum values and will fluctuate depending on treatment acreage and species response to treatment. The five year management plan also did not include a fluridone treatment but may be a management option for 2010 based on Eurasian watermilfoil abundances in 2009.

These management activities and plant surveys are proposed to improve Heaton 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 vegetative 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.



Timeline for LARE Grant Applications

LARE grants are available on a competitive basis for actions that can address the ecology and management of public lakes and their watersheds. The Heaton Lake Conservation Club must comply with IDNR grant deadlines to remain eligible for funding assistance with management of invasive aquatic plants such as Eurasian watermilfoil.

Associations must apply for funding assistance by January 15 and grant application forms can be obtained through the LARE website (www.in.gov/dnr/fishwild/3302.htm). Aquatic vegetation control permits should be ideally completed by January 31st and submitted to DNR Division of Fish and Wildlife commercial license clerk. Award notices are announced in March. If a lake has received funding a request for proposals that is prepared by LARE staff should ideally be submitted to contractors by the end of March. Contractor qualifications and experience should be thoroughly reviewed before a final selection is made. Contracts for a planning consultant and herbicide treatment contractor should ideally be signed by the month of April to accommodate early spring treatments and pre-treatment surveys if applicable.



Monitoring and Plan Updates

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

The results of the 2008 post-treatment sampling reflect more progress is needed to meet the goals stated in Heaton Lake's five year plan. Herbicide treatments will continue as an effort to meet the management goal of reducing Eurasian watermilfoil to less than 10% of littoral surface zone and curlyleaf pondweed to 5% of littoral zone by 2010. The target plant metrics have been modified from the five year plan to reflect the increase in Eurasian watermilfoil. The monitoring strategy remains unchanged from the five year plan. Eurasian watermilfoil was collected at 9 locations and may require fluridone treatment if dense beds become dominant within Heaton Lake in 2009. Despite the increase in Eurasian watermilfoil native species diversity was high (0.98). Native species accounted for 83% of species collected and wetland areas remained healthy and productive.

In years to follow, additional surveys will be conducted to determine how the Eurasian watermilfoil population and the native aquatic vegetative 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 Heaton Lake ecosystem.



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APPENDIX I

DATA SHEETS
TIER II LATITUDE / LONGITUDE

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:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

WATERBODY NAME: <u>Heaton</u>	DATE: <u>8-27-08</u>
COUNTY: <u>Elkhart</u>	SECCHI DEPTH (FT):
SITE ID:	MAX PLANT DEPTH (FT):
SURVEYING ORGANIZATION: <u>V3</u>	WEATHER: <u>Sunny Low 80's</u>
CREW LEADER: <u>Wally Levernier</u>	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: <u>Brad Millis</u>	

CONTACT INFO: SE Belmonte Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

Point #	R/T	Latitude	Longitude	Depth	Species Codes:								Notes
					MYRSP	POTPEC	NASFI	Cerden	Pot RS	Valone/Val	Char/Nat	Nit/Nat	
417				6	1*	9	1	1			3		
415				15									no veg
416				13									no veg
410				2				1	1	1	3/-		
411				17									no veg
408				17									no veg
409				12				1					
396				7	1					3			
395				7							3/1	1/-	- had to take point - Enter out - was shallow
394				2	9	9					-19	9/3	-19
398			3	7	1						1/1		
397				14									no veg
402				16									no veg
401				18									no veg
403				11				5					
400				9				1	1				
399				3		9					9/-	1/-	pres take @ 10:22 w/ GPS
406				12									no veg
405				16									no veg
407				18									no veg
413				16									no veg
404				6				1	1	1	1/-		
422		3		4	1	9							
412				16									no veg
421			1	7	1	9	1	1			-/3	-19	little 1/2 rooted - not free floating
432				12									no veg
420				13									no veg
431				11	9	9							no veg
423				2							1/-		no veg
425		1		4	3	9					3/1	1/1	no veg
428		9		3	9	9		1			9/9	9/-	no veg
426				3							-/1	5/1	1/1
684				2							3/-	9/-	- new point

Other plant species observed at lake:

* dying milfoil

**Heaton Lake Aquatic Plant Management Plan
Tier II Sampling, August 2008**

Tier II Sampling Location Number	Latitude	Longitude
1	41.73261	-85.90095
2	41.73223	-85.902
3	41.73179	-85.90374
4	41.73294	-85.90505
5	41.73321	-85.9038
6	41.7329	-85.90246
7	41.73452	-85.90381
8	41.73397	-85.9044
9	41.73369	-85.90549
10	41.73331	-85.90464
11	41.73413	-85.90505
12	41.73547	-85.90635
13	41.73466	-85.90662
14	41.73479	-85.90575
15	41.73386	-85.90657
16	41.73304	-85.90666
17	41.73292	-85.90617
18	41.73306	-85.90816
19	41.73313	-85.90718
20	41.73522	-85.90835

Tier II Sampling Location Number	Latitude	Longitude
21	41.73444	-85.90769
22	41.7344	-85.90915
23	41.73372	-85.90874
24	41.7333	-85.9083
25	41.7337	-85.90956
26	41.7345	-85.91041
27	41.73455	-85.90998
28	41.73522	-85.90935
29	41.73568	-85.90891
30	41.73591	-85.90783
31	41.73637	-85.90983
32	41.73572	-85.91071
33	41.73599	-85.91136
34	41.73572	-85.91215
35	41.73565	-85.91315
36	41.73517	-85.91181
37	41.73516	-85.91086
38	41.73529	-85.91089
39	41.73564	-85.91013
40	41.73545	-85.90922

APPENDIX II

IDNR 2009 VEGETATION 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 2
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 Dave Simmons		Lake Assoc. Name Heaton Lake Conservation Club	
Rural Route or Street 22892 Lake Shore Drive		Phone Number (574) 206-1198	
City and State Elkhart, IN		ZIP Code 46514	
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) Heaton Lake	Nearest Town Elkhart	County Elkhart
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

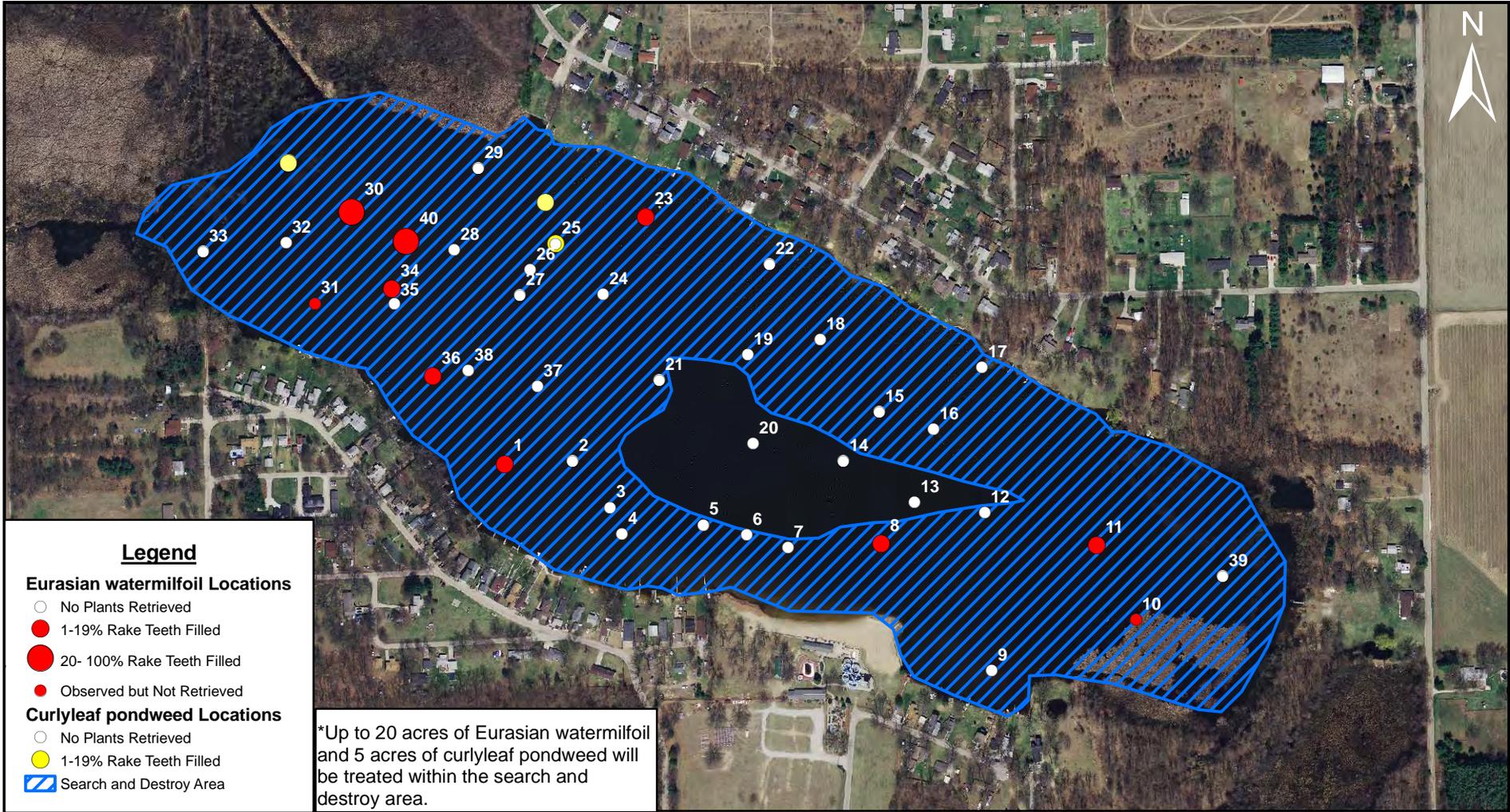
Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # (30 acres)	LAT/LONG or UTM's Lat: 41.73599 Lon: -85.91136		
Total acres to be controlled sum of 20 acres for lake	Proposed shoreline treatment length (ft) sum of 784 ft	Perpendicular distance from shoreline (ft)	adjacent
Maximum Depth of Treatment (ft) 15 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. A search and destroy area for Eurasian watermilfoil priority treatment for Heaton Lake in 2009 consists of 30 acres based on depths below 15 feet. The 20 acres of Eurasian watermilfoil within the search and destroy area will be treated with 2,4-D in 2009. Search and destroy area for Eurasian watermilfoil is shown in the attached exhibit.

Plant survey method: Rake Visual Other (specify) **Based on Tier II sampling conducted during August 2008**

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Coontail		32.5
Eurasian watermilfoil	x	22.5
Chara		20.0
Spiny naiad		17.5
Eel grass		15.0
Slender naiad		7.5
Small pondweed		7.5
Curlyleaf pondweed	x	5.0



Legend

Eurasian watermilfoil Locations

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

Curlyleaf pondweed Locations

- No Plants Retrieved
- 1-19% Rake Teeth Filled
- ▨ Search and Destroy Area

*Up to 20 acres of Eurasian watermilfoil and 5 acres of curlyleaf pondweed will be treated within the search and destroy area.



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TITLE: Tier II Eurasian Watermilfoil and Curlyleaf Pondweed Results with 2009 Priority Treatment Area		PROJECT AND SITE LOCATION: Heaton Lake Aquatic Plant Management Plan Update - 2008		
BASE LAYER: Indiana Spatial Data 2006 Orthophotography	PROJECT NO.: 07121.1	FIGURE: 16	SHEET: 1 OF: 1	
CLIENT: Heaton Lake Conservation Club 22892 Lake Shore Drive Elkhart, IN 46514	QUADRANGLE: N/A	DATE: 8/27/08	SCALE: 1" = 500'	

