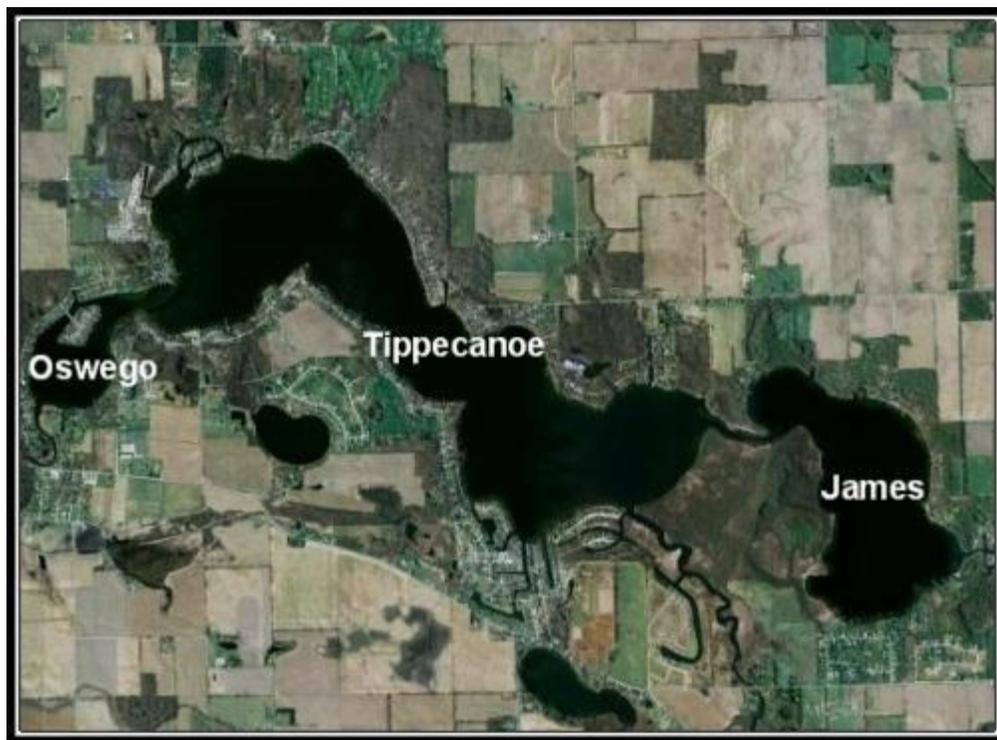


*Lake Tippecanoe  
Aquatic Vegetation Management Plan  
2015 Update  
Kosciusko County, Indiana*

January 31, 2016



**Prepared for:**  
Lake Tippecanoe Property Owners Association  
PO Box 224  
Leesburg, IN 46538

**Prepared by:**  
**AQUATIC  
CONTROL**  
PO Box 100  
Seymour, Indiana 47274

## Executive Summary

Lake Tippecanoe, including James and Oswego lakes, is a 1,110 acre chain of natural lakes located 2 miles west of North Webster, Indiana, in Kosciusko County. The primary invasive species within the chain are Eurasian watermilfoil (*Myriophyllum spicatum*), starry stonewort (*Nitella obtusa*) and curly-leaf pondweed (*Potamogeton crispus*). Eel grass (*Vallisneria americana*) and filamentous blue-green algae are also abundant in Lake Tippecanoe and can reach nuisance levels. Lake Tippecanoe Property Owners Association (LTPOA) funded invasive treatments were initiated in 2003 and continued through present day.

In 2015, LTPOA was awarded a Lake and River Enhancement (LARE) grant of \$31,500 for creation of a plan update and early season spot treatment of curly-leaf pondweed and Eurasian watermilfoil. An invasive species survey completed on April 30<sup>th</sup> found 37.7 acres of Eurasian watermilfoil and 22.4 acres of curly-leaf pondweed and treatment of these species was completed on May 7<sup>th</sup>. A Tier 2 survey of all three lakes was completed on June 3<sup>rd</sup>. An additional 4.3 acres of Eurasian watermilfoil was detected and treated later in the month. Starry stonewort was detected along the south side of Lake Tippecanoe. The channel areas were treated by Aquatic Weed Control on June 8<sup>th</sup> and IDNR funded treatment of the main lake area on July 10<sup>th</sup>. Another Tier 2 survey was completed on August 4<sup>th</sup>. The survey found invasive curly-leaf pondweed and Eurasian watermilfoil to be well below the 10% frequency of occurrence objective. Native coverage objectives were met on Tippecanoe and James, but not Oswego. One new 4.25 acre area of Eurasian watermilfoil was mapped and treated shortly after on Lake Tippecanoe. In addition, 25.1 acres of starry stonewort was detected along the south shore. This area was reported to IDNR, but it was not treated due to a lack of funds.

The current strategy has effectively controlled invasive curly-leaf pondweed and Eurasian watermilfoil throughout the chain of lakes; however, starry stonewort is spreading along the south shore of Lake Tippecanoe and has been discovered in other small isolated locations around the lake. IDNR had historically funded treatment of all starry stonewort areas but funds were lacking in 2015. An additional funding source will likely be needed if all areas of starry stonewort are to be managed in 2016. IDNR limited basin treatments to just 30 acres in 2015 (starry stonewort and channels not included in limitation). A total of 26.8 acres of Eurasian watermilfoil was treated in the basin in 2015 which removed the potential for treating substantial eel grass areas. It is important to continue monitoring and treating invasive species with early season selective herbicide treatments. Invasive surveys should be completed in late April/early May, mid-June, and late July/early August. In addition, late spring and summer Tier 2 surveys should be continued in order to document changes in the plant community. In addition, the ecozone should continue to be monitored with an ecozone survey in 2016.

## **Acknowledgements**

Funding for the vegetation sampling and preparation of an aquatic vegetation management plan was provided by the LTPOA and the Indiana Department of Natural Resources Lake and River Enhancement Program. Aquatic Control, Inc. completed the fieldwork, data processing, and map generation. Special thanks are due to Holly LaSalle and Jeff Thornburgh with the LTPOA for their help in initiating and completing this project. Special thanks are given to Indiana Department of Natural Resources-Division of Fish and Wildlife staff, for assistance and review of this plan. Author of this report is Nathan Long of Aquatic Control. The author would like to acknowledge the valuable input from Brendan Hastie, Joey Leach, Jarrod Richeson, and Barbie Huber of Aquatic Control for their field assistance, map generation, review, and editing of this report.

## TABLE OF CONTENTS

<b><u>SECTION</u></b>	<b><u>PAGE</u></b>
Executive Summary .....	i
Acknowledgements.....	ii
Table of Contents .....	iii
List of Figures .....	iv
List of Tables .....	iv
1.0 Problem Statement and Management History .....	1
2.0 Aquatic Plant Community Characterization.....	10
3.0 Plant Management Discussion and Action Plan.....	32
4.0 Public Involvement.....	37
5.0 References Cited.....	39
6.0 Appendices.....	40

## List of Figures

Figure 1. Illustrations of Eurasian watermilfoil and curly-leaf pondweed .....	1
Figure 2. Image of starry stonewort.....	1
Figure 3. Lake Tippecanoe Eurasian watermilfoil and curly-leaf pondweed treatment areas, May 7, 2015.....	6
Figure 4. Starry stonewort areas detected on June 3, 2015.....	7
Figure 5. Starry stonewort 2015 treatment areas .....	8
Figure 6. Eurasian watermilfoil treatment areas, June 26, 2015.....	9
Figure 7. Invasive species areas, August 4, 2015 .....	10
Figure 8. Tier 2 sample sites.....	11
Figure 9. Eurasian watermilfoil location on Oswego Lake, June 3, 2015.....	12
Figure 10. Starry stonewort location on Tippecanoe Lake, June 3, 2015.....	15
Figure 11. Eurasian watermilfoil location on Tippecanoe Lake, June 3, 2015. ....	15
Figure 12. Curly-leaf pondweed locations on Tippecanoe Lake, June 3, 2015.....	16
Figure 13. Curly-leaf pondweed location on James Lake, June 3, 2015. ....	19
Figure 14. Eurasian watermilfoil location on James Lake, June 3, 2015. ....	19
Figure 15. Starry stonewort location on Tippecanoe Lake, August 4, 2015. ....	24
Figure 16. Eurasian watermilfoil location on Tippecanoe Lake, August 4, 2015. ....	24
Figure 17. Eurasian watermilfoil location on James Lake, August 4, 2015. ....	27
Figure 18. Curly-leaf pondweed location on James Lake, August 4, 2015. ....	27
Figure 19. Starry stonewort areas 2013-2015.....	34
Figure 20. Starry stonewort high priority treatment areas. ....	35

## List of Tables

Table 1. Invasive plant controls since 2003.....	3
Table 2. Summary of individual lot and channel permit reports .....	4
Table 3. Oswego, Tippecanoe, & James Lakes May 7, 2015 invasive species treatment ..	5
Table 4. Starry stonewort 2015 treatment areas.....	8
Table 5. Eurasian watermilfoil treatment, June 26, 2015 .....	9
Table 6. Tier 2 survey results, Oswego Lake, June 3, 2015 .....	13
Table 7. Tier 2 survey results, Tippecanoe Lake, June 3, 2015.....	17
Table 8. Tier 2 survey results, James Lake, June 3, 2015.....	20
Table 9. Tier 2 survey results, Oswego Lake, August 4, 2015 .....	22
Table 10. Tier 2 survey results, Tippecanoe Lake, August 4, 2015 .....	25
Table 11. Tier 2 survey results, James Lake, August 4, 2015 .....	28
Table 12. Tier 2 survey comparison, Oswego Lake 2004-2015 .....	30
Table 13. Tier 2 survey comparison, Tippecanoe Lake 2004-2015 .....	31
Table 14. Tier 2 survey comparison, James Lake 2004-2015 .....	32
Table 15. Lake user survey, September 29, 2015 .....	38

## 1.0 Problem Statement and Management History

### 1.1 Problem Statement

Historically, the primary invasive species within the Tippecanoe chain was Eurasian watermilfoil and curly-leaf pondweed (Figure 1). Starry stonewort is a newly discovered invasive species observed growing in Lake Tippecanoe in 2013 and has rapidly spread throughout Lake Tippecanoe (Figure 2). These invasive species can create dense surface mats that can impact navigation, swimming, fishing, native vegetation, and property values. Eel grass and filamentous blue-green algae are also abundant in Lake Tippecanoe and can reach nuisance levels.



**Figure 1.** Illustrations of Eurasian watermilfoil (left) and curly-leaf pondweed (right) (Illustrations provided by Applied Biochemist).



**Figure 2.** Image of starry stonewort (picture supplied by Grand Valley State University).

### ***1.2 Goals and Objectives***

An effective aquatic vegetation management plan must include well-defined goals and objectives. Listed below are three goals formulated by LARE program staff and Division of Fish and Wildlife Biologists:

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

The vegetation management objectives of the plan are:

- Maintain Eurasian watermilfoil, starry stonewort, and curly-leaf pondweed below 10% frequency of occurrence in all three lakes.
- Maintain at least 11, 10, and 12 native plants collected each year in the summer Tier 2 survey at James, Oswego, and Tippecanoe Lakes, respectively.
- Maintain a native species diversity of 0.77, 0.81, and 0.79 each year in the summer Tier 2 survey at James, Oswego, and Tippecanoe Lakes, respectively.
- Maintain native coverage of 80%, 70%, and 80% each year in the summer Tier 2 survey at James, Oswego, and Tippecanoe Lakes, respectively.

### ***1.3 Plant Management History***

LTPOA has been funding invasive treatments on the Tippecanoe chain since 2003. Up until 2012 these treatments have focused on main lake areas of the chain. IDNR has been funding treatment of starry stonewort since 2013. These treatments are summarized in Table 1. LTPOA is not the only party funding vegetation management on these lakes. Individual lot owners and channel associations have historically funded treatment of a wide variety of vegetation. It is somewhat difficult to summarize these small scale treatments, but Table 2 is that attempt. The information in Table 2 was obtained from IDNR permit reports.

**Table 1. Invasive plant controls since 2003.**

Year	Species Targeted	Lakes Treated	Acres Treated	Chemical	Conc. (ppm)
2003 <sup>1</sup>	Eurasian watermilfoil & Curly-leaf	Tippe & Oswego	35.0	Renovate & Aquathol	1.5 & 0.5
2004 <sup>1</sup>	Eurasian watermilfoil & Curly-leaf	Tippe & Oswego	32.0	Renovate & Aquathol	1.5 & 0.5
2005 <sup>1</sup>	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	21.5	Renovate & Aquathol	1.5 & 0.5
2006*	Milfoil	Tippe, James, & Oswego	37.0	Renovate	1.5
2007* <sup>2</sup>	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	CLP-104 & EWM-34.0	Renovate & Aquathol	1.5 & 1.0
2008* <sup>2</sup>	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	CLP-104 & EWM-32.5	Renovate & Aquathol	1.5 & 1.0
2009* <sup>2</sup>	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	CLP-104 & EWM-51.8	Renovate & Aquathol	1.5 & 1.0
2010	Eurasian watermilfoil	Tippe, James, & Oswego	EWM-34.8	Renovate	1.5
2011	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	EWM-16.5 & CLP-46	2,4-D & Aquathol	1.0-2.0 & 1.0
2012* <sup>3</sup>	Eurasian watermilfoil & Curly-leaf	Tippe, James, & Oswego	EWM-101.1 & CLP-98.6	2,4-D & Aquathol	1.0-2.0 & 1.0
2013* <sup>3, 4</sup>	Eurasian watermilfoil, Curly-leaf, & Starry stonewort	Tippe, James, & Oswego	EWM-77.7, CLP-84.9, & SSW-4.65	2,4-D, Aquathol, Cutrine Ultra, & Hydrothol	1.0-2.0, 1.0, 0.8, & 0.2
2014* <sup>3, 4</sup>	Eurasian watermilfoil, Curly-leaf, & Starry stonewort	Tippe, James, & Oswego	EWM-37.0, CLP-18.8, & SSW-6.7	2,4-D, Aquathol, Cutrine Ultra, & Hydrothol	1.0-2.0, 1.0, 0.8, & 0.2
2015* <sup>3, 4</sup>	Eurasian watermilfoil, Curly-leaf, & Starry stonewort	Tippe, James, & Oswego	EWM-46.25 CLP-22.4, & SSW-20.9	2,4-D, Aquathol, Cutrine Ultra, & Hydrothol, Clipper	1.0-2.0, 1.0, 0.8, 0.2, & 0.4

\*LARE funds used to cover portion of treatment

<sup>1</sup> Only areas of Eurasian watermilfoil treated, added 0.5 ppm Aquathol to knock down curly-leaf which was also present in those areas

<sup>2</sup> All main lake areas of curly-leaf pondweed were treated in early season in an attempt to reduce turion bank

<sup>3</sup> Included main lake and channel areas of Eurasian watermilfoil and curly-leaf pondweed

<sup>4</sup>Starry stonewort treatments funded by IDNR

**Table 2. Summary of individual lot and channel IDNR permit reports for Oswego, Tippecanoe, and James Lake (treatments not funded by LTPOA).**

**Oswego Lake**

<b>Year</b>	<b>Species Listed on Permit Report</b>	<b>Acres</b>
2009	Coontail & algae	4.91
2010	Eurasian watermilfoil, curly-leaf pondweed, sago pondweed	0.68
2011	Eurasian watermilfoil, curly-leaf pondweed, algae, chara	8.80
2012	Coontail, algae, Eurasian watermilfoil, curly-leaf pondweed, eel grass, naiad	9.61
2013	Eurasian watermilfoil, curly-leaf pondweed, algae, naiad, and eel grass	12.44
2014	Eurasian watermilfoil, curly-leaf pondweed, algae, naiad, eel grass	4.45
2015	Naiad, algae, coontail	7.95

**Lake Tippecanoe**

<b>Year</b>	<b>Species Listed on Permit Report</b>	<b>Acres</b>
2009	Eurasian watermilfoil, eel grass, northern milfoil, naiad, curly-leaf, sago pondweed, and coontail	19.03
2010	Eel grass, coontail, northern watermilfoil, curly-leaf, Eurasian watermilfoil, algae	11.25
2011	Eurasian watermilfoil, curly-leaf pondweed, algae coontail	48.35
2012	Coontail, algae, Eurasian watermilfoil, curly-leaf pondweed, sago pondweed, naiad	15.77
2013	Eurasian watermilfoil, curly-leaf pondweed, naiad, sago pondweed, eel grass, algae, and coontail	24.16
2014	Eurasian watermilfoil, curly-leaf pondweed, algae, coontail, sago pondweed, naiad, eel grass	17.94
2015	Naiad, algae, sago pondweed, eel grass, coontail	9.98

**James Lake**

<b>Year</b>	<b>Species Listed on Permit Report</b>	<b>Acres</b>
2009	Coontail and algae	4.91
2010	Eurasian watermilfoil, curly-leaf pondweed, & algae	0.68
2011	Eurasian watermilfoil, curly-leaf, algae, eel grass, & naiad	8.80
2012	Curly-leaf, Eurasian watermilfoil, coontail, algae, sago, naiad, Canada waterweed	8.54
2013	Eurasian watermilfoil, curly-leaf pondweed, coontail, algae, and sago pondweed	1.61
2014	Chara, whorled watermilfoil, Eurasian watermilfoil, Canada waterweed, naiad, eel grass	0.23
2015	No treatments reported	na

An invasive species survey was completed on April 30. Water temperatures ranged from 55-58 degrees. The survey found 37.7 acres of Eurasian watermilfoil (18.2 main lake & 19.5 channels) and 22.4 acres of curly-leaf pondweed (all growing in channels). All of the Eurasian watermilfoil and curly-leaf pondweed was treated. The spring treatment was completed on May 7<sup>th</sup> with a combination of 1.0 ppm liquid 2,4-D and Aquathol in channel areas that contained both species, 1.0 ppm of Aquathol in areas containing only curly-leaf pondweed, and 2.0 ppm of liquid 2,4-D in main lake areas that contained only Eurasian watermilfoil. Aquatic Control (AC) completed treatment on the main lake areas and Aquatic Weed Control (AWC) completed treatments in most of the channels. This treatment is summarized in Table 3 and illustrated in Figure 3.

**Table 3. Oswego, Tippecanoe, & James Lakes May 7, 2015 Invasive Species Treatment.**

Area	Species	Acres	Avg Depth (ft)	Acre Ft	Product	Concentration (ppm)	Channel/ Main Lake
AC1	EWM	3.4	4	13.6	DMA	2.0	Lake
AC2	EWM	2.2	3	6.6	DMA	2.0	Lake
AC3	EWM	2.6	4	10.4	DMA	2.0	Lake
AC4	EWM	3.2	3	9.6	DMA	2.0	Lake
AC5	EWM	1.3	4	5.2	DMA	2.0	Lake
AC6	EWM	5.5	4	22.0	DMA	2.0	Lake
AC7	EWM & CLP	2.3	3	6.9	Aquathol & DMA	1.0 & 1.0	Channel
AWC1	CLP	1.7	3	5.1	Aquathol	1.0	Channel
AWC2	EWM & CLP	3.3	3	9.9	Aquathol & DMA	1.0 & 1.0	Channel
AWC3	EWM & CLP	2.1	3	6.3	Aquathol & DMA	1.0 & 1.0	Channel
AWC4	EWM & CLP	5	3	15.0	Aquathol & DMA	1.0 & 1.0	Channel
AWC5	EWM & CLP	1	3	3.0	Aquathol & DMA	1.0 & 1.0	Channel
AWC6	CLP	1.2	3	3.6	Aquathol	1.0	Channel
AWC7	EWM & CLP	4.4	3	13.2	Aquathol & DMA	1.0 & 1.0	Channel
AWC8	EWM & CLP	1.4	3	4.2	Aquathol & DMA	1.0 & 1.0	Channel

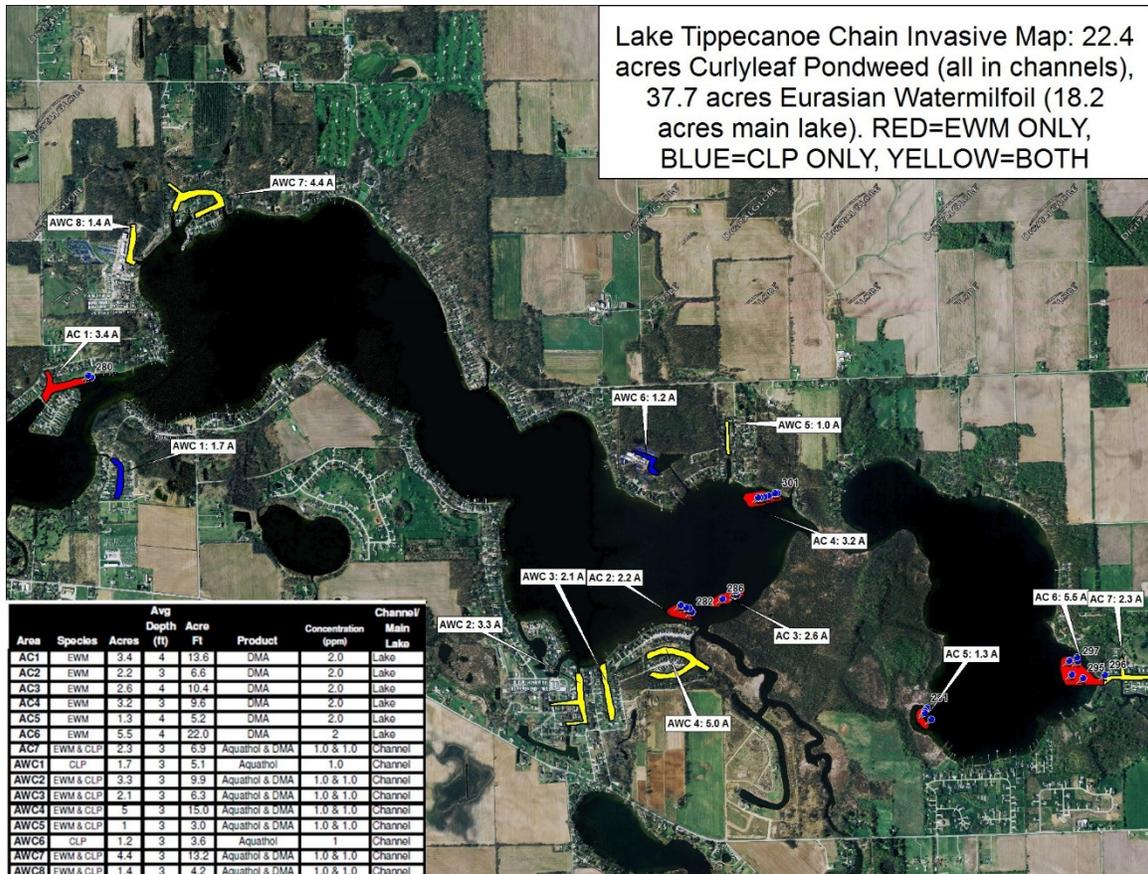


Figure 3. Lake Tippecanoe Eurasian watermilfoil and curly-leaf pondweed treatment areas, May 7, 2015 (Red= EWM, Blue=CLP, Yellow=CLP & EWM).

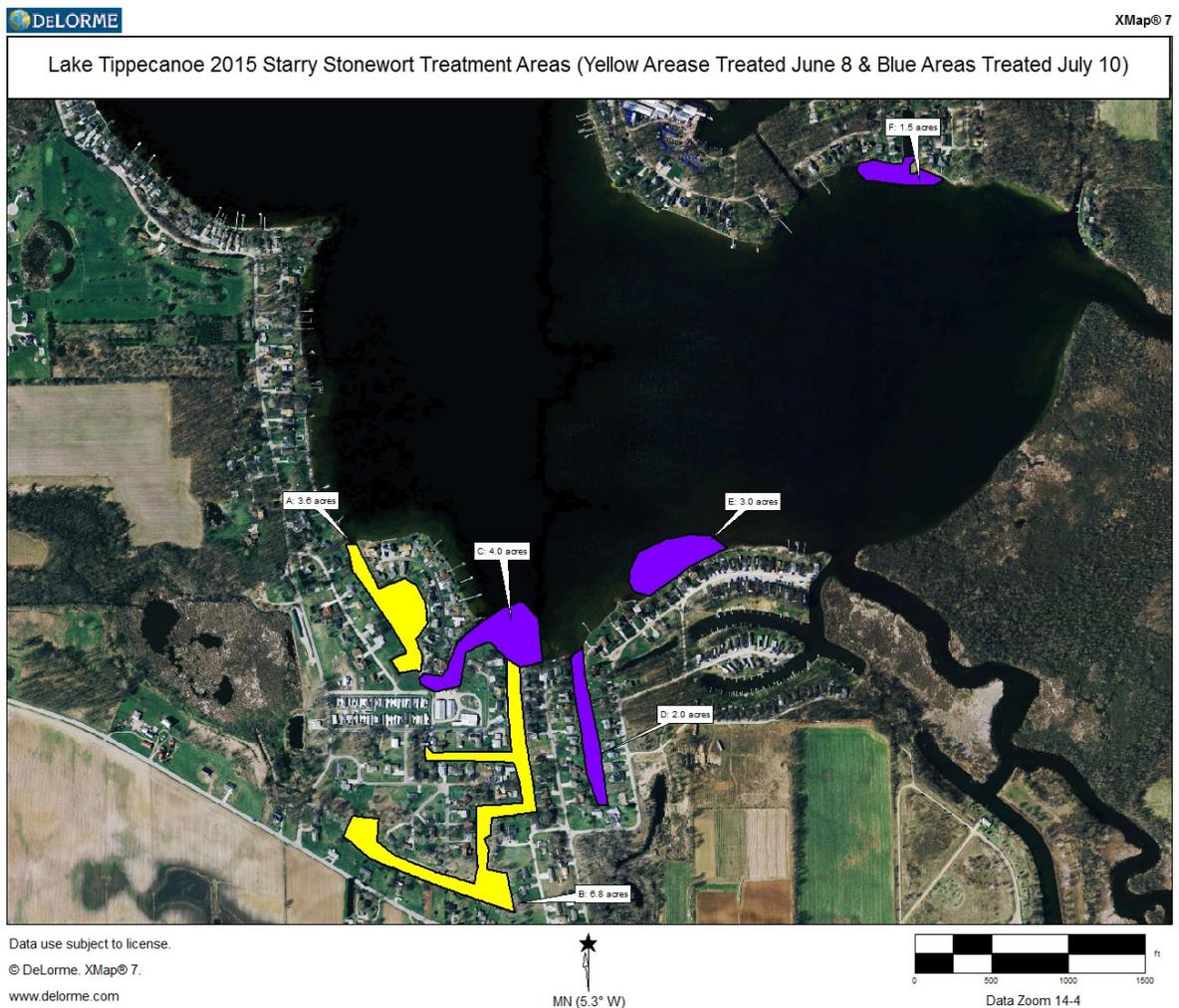
A second invasive survey was completed on June 3<sup>rd</sup> in order to detect any new invasive growth, primarily focusing on starry stonewort. Starry stonewort was found growing in two channels where it was originally found in 2013. In addition, it was also found in the main lake outside of these channels (Figure 4). The channel areas were treated with 0.4 ppm of Clipper herbicide on June 8. The main lake areas were treated with 0.8 ppm of Cutrine Ultra and 0.2 ppm of Hydrothol on July 10 (Table 4 & Figure 5). This treatment included an additional area on the north side of the lake discovered by IDNR later in June. The June treatment was funded with private funds while the July treatment was funded by IDNR through a federal Great Lakes Restoration Initiative (GLRI) grant. Aquatic Weed Control completed both treatments. In addition to the starry stonewort, four small areas of Eurasian watermilfoil were also detected. Eurasian watermilfoil was treated June 26<sup>th</sup> along with a small spot that was previously treated in May but still remained (Table 5 & Figure 6).



Figure 4. Starry stonewort areas detected on June 3, 2015.

**Table 4. Starry Stonewort 2015 Treatment Areas.**

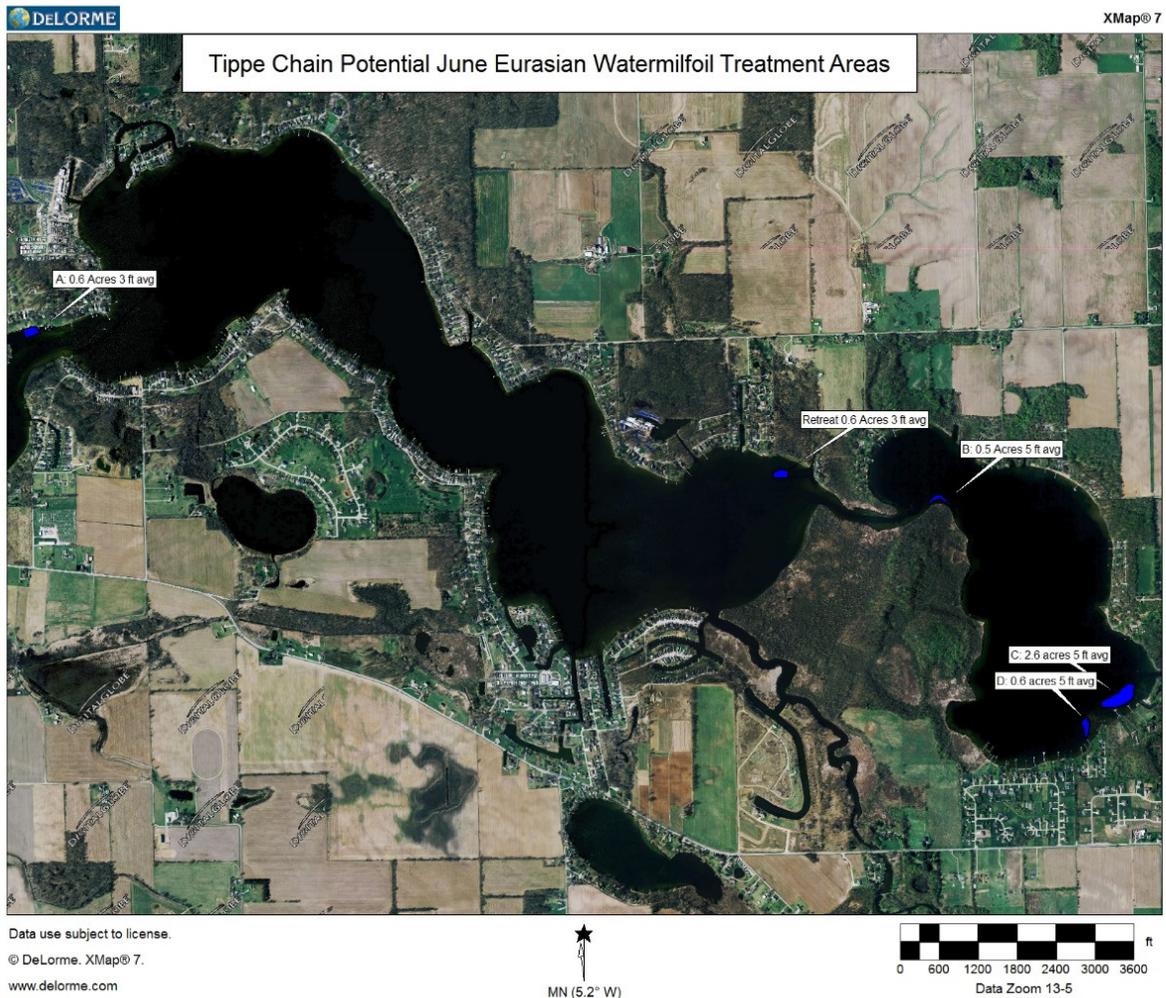
Area	Map Color	Treatment Date	Acres	Avg. Depth	Acre Feet	Herbicide	Treatment Rate (ppm)	Treatment Funded By
A	Yellow	6/8/2015	3.6	3	10.8	Clipper	0.4	Private
B	Yellow	6/8/2015	6.8	3	20.4	Clipper	0.4	Private
C	Blue	7/10/2015	4.0	3	12.0	DMA 4	2.0	GLRI
D	Blue	7/10/2015	2.0	3	6.0	Cutrine Ultra/Hydrothol	0.8/0.2	GLRI
E	Blue	7/10/2015	3.0	3	9.0	Cutrine Ultra/Hydrothol	0.8/0.2	GLRI
F	Blue	7/10/2015	1.5	3	4.5	Cutrine Ultra/Hydrothol	0.8/0.2	GLRI



**Figure 5. Starry stonewort 2015 treatment areas (yellow areas treated June 8 with Clipper herbicide, blue areas treated July 10 with Cutrine Ultra and Hydrothol).**

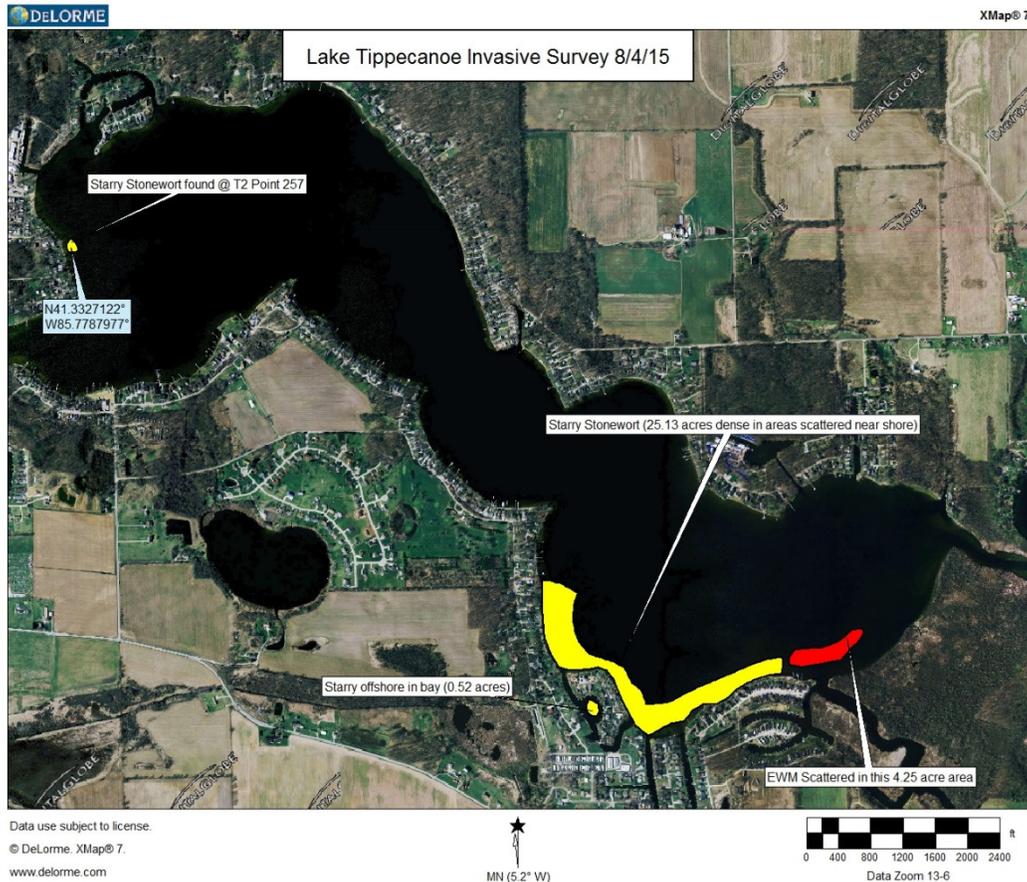
**Table 5. Eurasian watermilfoil treatment, June 26, 2015.**

Area	Acres	Avg. Depth	Acre Feet	Herbicide	Treatment Rate (ppm)
A	0.6	3	1.8	DMA 4	2.0
B	0.5	5	2.5	DMA 4	2.0
C	2.6	5	13.0	DMA 4	2.0
D	0.6	5	3.0	DMA 4	2.0



**Figure 6. Eurasian watermilfoil treatment areas, June 26, 2015.**

A third invasive survey was completed on August 4<sup>th</sup>. A single Eurasian watermilfoil bed was detected in Lake Tippecanoe. This area was treated on August 21<sup>st</sup> with 2.0 ppm of 2,4-D herbicide. Starry stonewort had expanded from its June areas and now covered over 25 acres of the southeast shore. In addition, a small area of starry stonewort was detected along the west shore of Lake Tippecanoe and in one of the southern channels (Figure 7). These areas were sent to IDNR for treatment. It was later discovered the IDNR did not have sufficient funding to complete treatment.



**Figure 7. Invasive species areas, August 4, 2015: yellow areas-starry stonewort, red area-Eurasian watermilfoil** (Eurasian watermilfoil area was treated on August 21st with 2.0ppm 2,4-D figuring an avg. depth of 4 feet).

## 2.0 AQUATIC PLANT COMMUNITY CHARACTERIZATION

Aquatic vegetation sampling must be completed in order to create an effective aquatic vegetation management plan. Sampling provides valuable data that allows managers to accomplish several tasks: locate areas of nuisance and beneficial vegetation; monitor changes in abundance of native and exotic species; monitor and react to changes in the overall plant community; monitor the effectiveness of management techniques; and compare the plant communities to other populations. In 2015, LARE and the LTPOA funded three invasive species mapping surveys and two Tier 2 surveys. The invasive mapping surveys were covered in Section 1.3.

## 2.1 Tier 2 Sampling Results

### 2.1.1 Methods

The Tier 2 survey helps meet the following objectives:

1. To document the distribution and abundance of submersed aquatic vegetation.
2. To compare present distribution and abundance with past distribution and abundance within select areas.

The same sites used in past Tier 2 surveys were used again in the 2015 surveys (Figure 8). Once a site was reached the boat was slowed to a stop and the coordinates were recorded on a hand-held GPS unit and later downloaded into a mapping program. A depth measurement was taken by dropping a two-headed standard sampling rake that was attached to a rope marked off in 1-foot increments. An additional ten feet of rope was released and the boat was reversed at minimum operating speed for a distance of ten feet. Once the rake was retrieved individual species abundance on the rake was scored with either a 0 (no plants retrieved), 1 (1-20% of rake teeth filled), 3 (21-99% of rake teeth filled), or 5 (100% of rake teeth filled) (IDNR 2014).

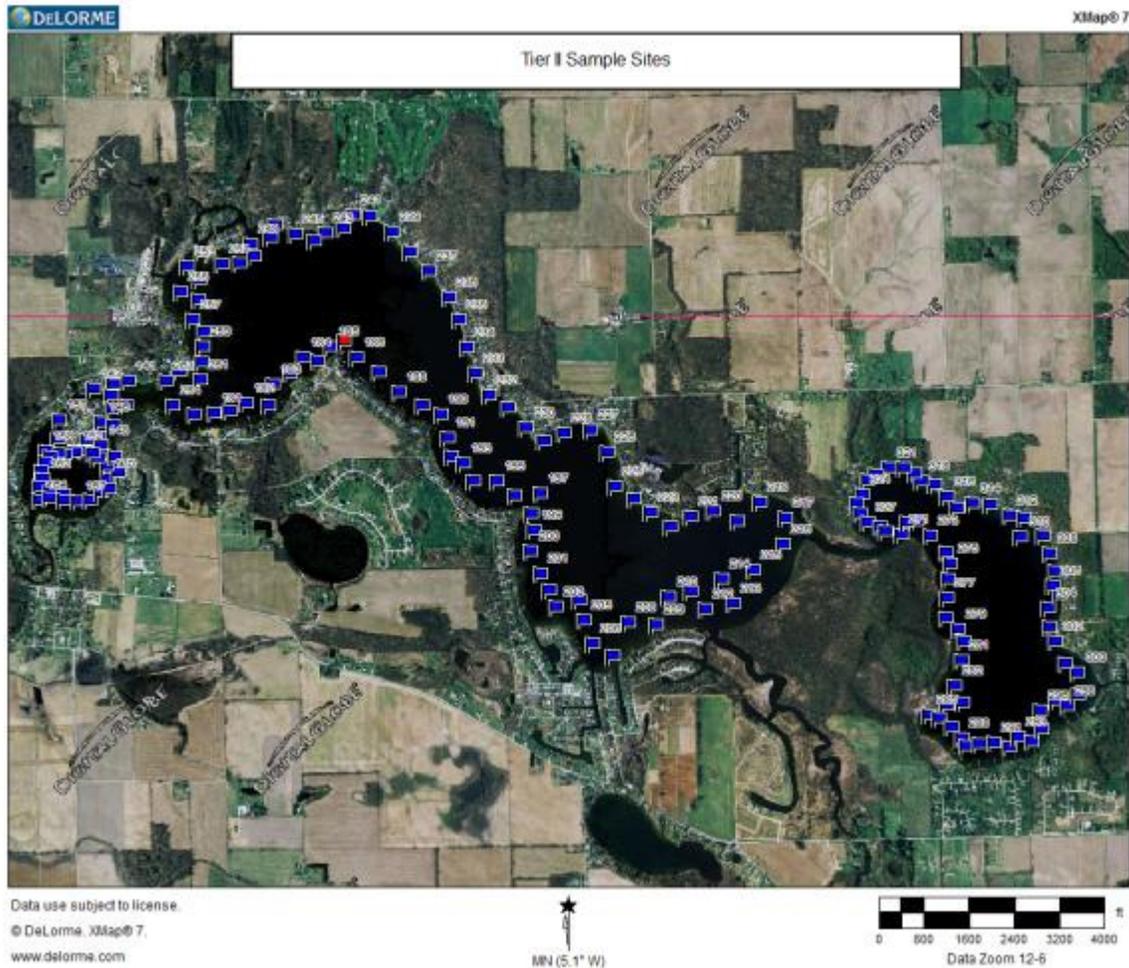


Figure 8. Tier 2 Sample Sites.

### 2.1.2 June 3, 2015 Survey

#### Oswego Lake

On June 3, 2015, forty sites were sampled on Oswego Lake. Nine species were collected and plants were present at 21 of the 40 sites yielding 53% littoral coverage. *Chara sp.* was the most frequently occurring species (27.5%). Eurasian watermilfoil was the only invasive species collected and was found at a single site. (Figure 9). Results of the survey are summarized in Table 4.

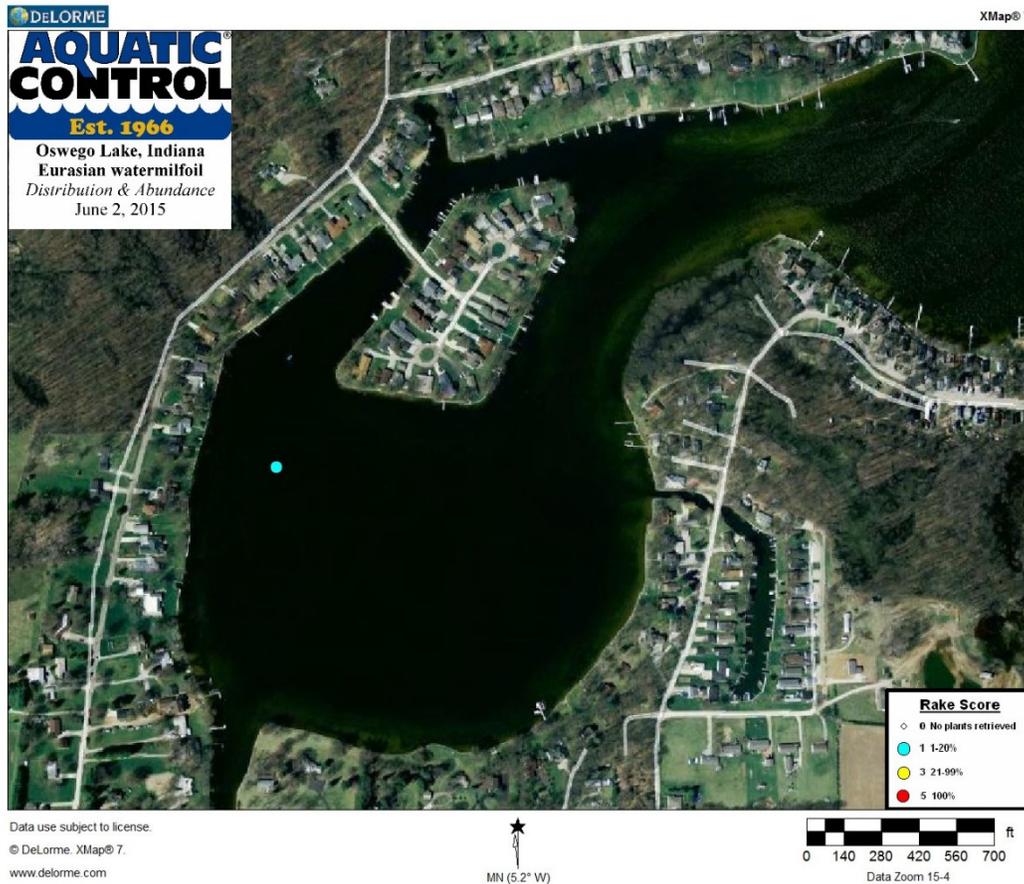


Figure 9. Eurasian watermilfoil location on Oswego Lake, June 3, 2015.

**Table 4. Tier 2 Survey Results, Oswego Lake, June 3, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (all depths).</b>								
County:	Kos	Total Sites:	40	Mean species/site:	0.83			
Date:	6.3.15	Sites with plants:	21	SE Mean species/site:	0.17			
Secchi (ft):	17.5	Sites with native plants:	21	Mean native species/site:	0.80			
Max Plant Depth (ft):	16.0	Number of species:	9	SE Mean natives/site:	0.16			
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.77			
Littoral Sites:	35	Maximum species/site:	4	Native species diversity:	0.76			
All Depths (0 to 20 ft)		Frequency of Occurrence		Rake score freq per sp.				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Chara		27.5	72.5	17.5	5.0	5.0	11.5	
Coontail		22.5	77.5	10.0	2.5	10.0	13.5	
Illinois pondweed		15.0	85.0	15.0	0.0	0.0	3.0	
Sago pondweed		5.0	95.0	5.0	0.0	0.0	1.0	
Eel grass		2.5	97.5	2.5	0.0	0.0	0.5	
Eurasian watermilfoil		2.5	97.5	2.5	0.0	0.0	0.5	
Flat-stemmed pondweed		2.5	97.5	2.5	0.0	0.0	0.5	
Richardson's pondweed		2.5	97.5	2.5	0.0	0.0	0.5	
Slender naiad		2.5	97.5	2.5	0.0	0.0	0.5	
Filamentous Algae		60.0						
Other species observed: Spatterdock, scared lotus, w hite water lily, buttton bush, and smartw eed								
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (0-5 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	1.80			
Date:	6.3.15	Sites with plants:	9	SE Mean species/site:	0.42			
Secchi (ft):	17.5	Sites with native plants:	9	Mean native species/site:	1.80			
Max Plant Depth (ft):	16.0	Number of species:	8	SE Mean natives/site:	0.42			
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.73			
Littoral Sites:	10	Maximum species/site:	4	Native diversity:	0.73			
Depth: 0 to 5 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Chara		80.0	20.0	50.0	20.0	10.0	32.0	
Illinois pondweed		40.0	60.0	40.0	0.0	0.0	8.0	
Coontail		10.0	90.0	10.0	0.0	0.0	2.0	
Eel grass		10.0	90.0	10.0	0.0	0.0	2.0	
Flat-stemmed pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Richardson's pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Sago pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Slender naiad		10.0	90.0	10.0	0.0	0.0	2.0	
Filamentous Algae		70.0						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (5-10 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	0.90			
Date:	6.3.15	Sites with plants:	6	SE Mean species/site:	0.31			
Secchi (ft):	17.5	Sites with native plants:	6	Mean native species/site:	0.80			
Max Plant Depth (ft):	16.0	Number of species:	5	SE Mean natives/site:	0.29			
Trophic Status:	Meso	# of native species:	4	Species diversity:	0.74			
Littoral Sites:	10	Maximum species/site:	3	Native diversity:	0.69			
Depth: 5 to 10 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		30.0	70.0	10.0	0.0	20.0	22.0	
Chara		30.0	70.0	20.0	0.0	10.0	14.0	
Eurasian watermilfoil		10.0	90.0	10.0	0.0	0.0	2.0	
Illinois pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Sago pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Filamentous Algae		80.0						

**Table 4 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (10-15 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	0.40			
Date:	6.3.15	Sites with plants:	4	SE Mean species/site:	0.16			
Secchi (ft):	17.5	Sites with native plants:	4	Mean native species/site:	0.40			
Max Plant Depth (ft):	16.0	Number of species:	2	SE Mean natives/site:	0.16			
Trophic Status:	Meso	# of native species:	2	Species diversity:	0.38			
Littoral Sites:	10	Maximum species/site:	1	Native diversity:	0.38			
Depth: 10 to 15 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		30.0		70.0	10.0	0.0	20.0	
Illinois pondweed		10.0		90.0	10.0	0.0	0.0	
Filamentous Algae		40.0						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (15-20 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	0.20			
Date:	6.3.15	Sites with plants:	2	SE Mean species/site:	0.13			
Secchi (ft):	17.5	Sites with native plants:	2	Mean native species/site:	0.20			
Max Plant Depth (ft):	16.0	Number of species:	1	SE Mean natives/site:	0.13			
Trophic Status:	Meso	# of native species:	1	Species diversity:	0.00			
Littoral Sites:	5	Maximum species/site:	1	Native diversity:	0.00			
Depth: 15 to 20 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		20.0		80.0	10.0	10.0	0.0	
Filamentous Algae		50.0						

**Tippecanoe Lake**

Ninety sites were sampled on Tippecanoe Lake. Eleven species were collected and plants were present at 62 of the 90 sites yielding 69% coverage. Coontail was the most frequently occurring species and was found at 30% of the sites. Three invasive species were collected. Starry stonewort was found at two sites, while Eurasian watermilfoil and curly-leaf pondweed were only found in a single location (Figures 10-12). The results of the survey are summarized in Table 5.

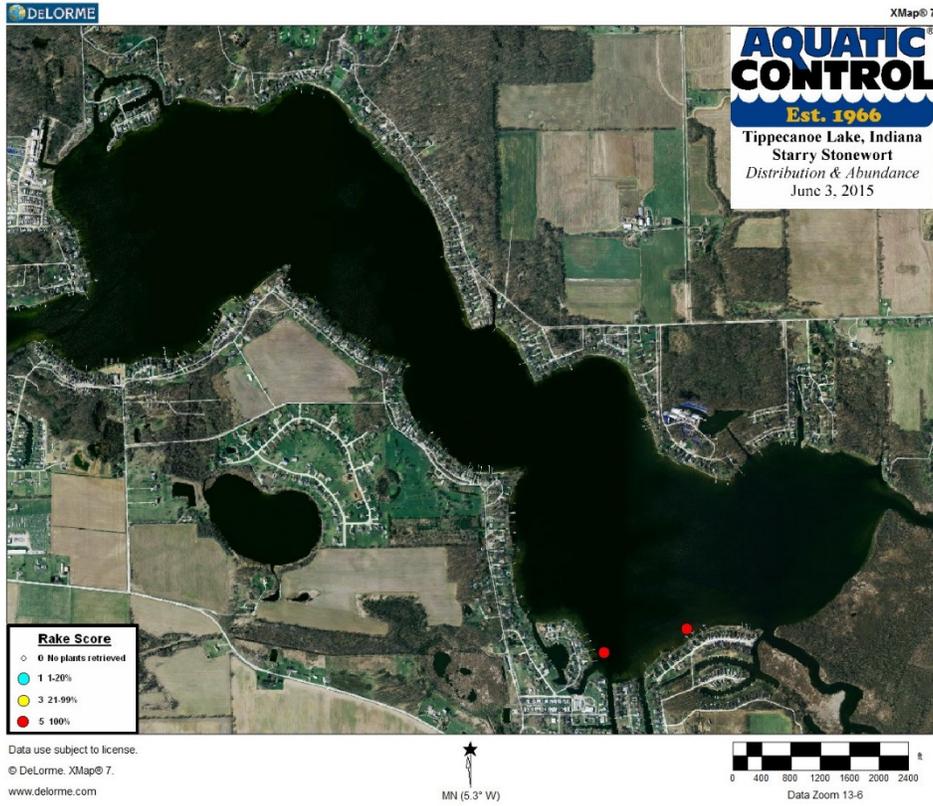


Figure 10. Starry stonewort location on Tippecanoe Lake, June 3, 2015.

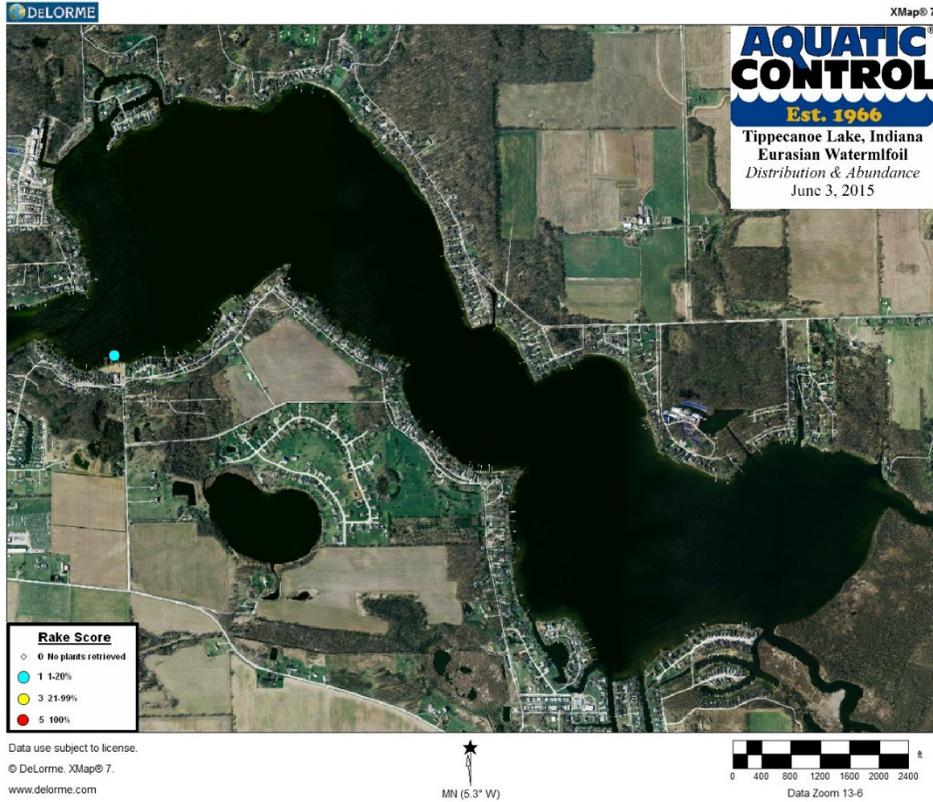


Figure 11. Eurasian watermilfoil location on Tippecanoe Lake, June 3, 2015.

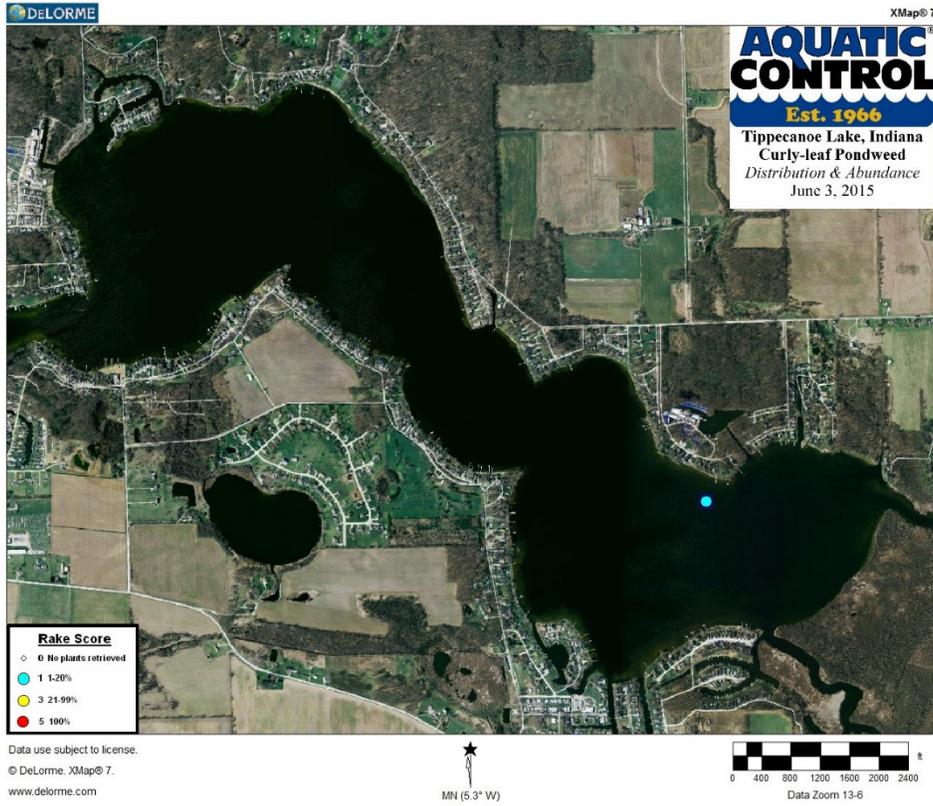


Figure 12. Curly-leaf pondweed location on Tippecanoe Lake, June 3, 2015.

**Table 5. Tier 2 Survey Results, Lake Tippecanoe, June 3, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (all depths).</b>							
County:	Kos	Total Sites:	90	Mean species/site:	1.03		
Date:	6.3.15	Sites with plants:	62	SE Mean species/site:	0.11		
Secchi (ft):	19.5	Sites with native plants:	60	Mean native species/site:	0.99		
Max Plant Depth (ft):	17.0	Number of species:	11	SE Mean natives/site:	0.10		
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.82		
Littoral Sites:	87	Maximum species/site:	4	Native species diversity:	0.81		
All Depths		Frequency of Occurrence		Rake score freq per sp.			Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		30.0	70.0	15.6	6.7	7.8	14.9
Sago pondweed		21.1	78.9	17.8	3.3	0.0	5.6
Chara		14.4	85.6	10.0	3.3	1.1	5.1
Eel grass		14.4	85.6	11.1	2.2	1.1	4.7
Richardson's pondweed		8.9	91.1	2.2	6.7	0.0	4.4
Slender Naiad		7.8	92.2	6.7	1.1	0.0	2.0
Starry stonewort		2.2	97.8	0.0	0.0	2.2	2.2
Curly-leaf pondweed		1.1	98.9	1.1	0.0	0.0	0.2
Eurasian watermilfoil		1.1	98.9	1.1	0.0	0.0	0.2
Illinois pondweed		1.1	98.9	1.1	0.0	0.0	0.2
Variable pondweed		1.1	98.9	1.1	0.0	0.0	0.2
Filamentous Algae		58.9					
Species Observed: Spatterdock and white water lily							
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (0-5 ft).</b>							
County:	Kos	Total Sites:	29	Mean species/site:	1.28		
Date:	6.3.15	Sites with plants:	21	SE Mean species/site:	0.22		
Secchi (ft):	19.5	Sites with native plants:	20	Mean native species/site:	1.24		
Max Plant Depth (ft):	17.0	Number of species:	9	SE Mean natives/site:	0.22		
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.80		
Littoral Sites:	29	Maximum species/site:	4	Native diversity:	0.79		
Depth: 0 to 5 ft		Frequency of Occurrence		Rake score frequency per s			Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Sago pondweed		37.9	62.1	31.0	6.9	0.0	10.3
Chara		31.0	69.0	17.2	10.3	3.4	13.1
Eel grass		20.7	79.3	20.7	0.0	0.0	4.1
Richardson's pondweed		13.8	86.2	6.9	6.9	0.0	5.5
Coontail		10.3	89.7	6.9	3.4	0.0	3.4
Illinois pondweed		3.4	96.6	3.4	0.0	0.0	0.7
Slender Naiad		3.4	96.6	3.4	0.0	0.0	0.7
Starry stonewort		3.4	96.6	0.0	0.0	3.4	3.4
Variable pondweed		3.4	96.6	3.4	0.0	0.0	0.7
Filamentous Algae		86.2					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).</b>							
County:	Kos	Total Sites:	27	Mean species/site:	1.33		
Date:	6.3.15	Sites with plants:	24	SE Mean species/site:	0.19		
Secchi (ft):	19.5	Sites with native plants:	24	Mean native species/site:	1.26		
Max Plant Depth (ft):	17.0	Number of species:	8	SE Mean natives/site:	0.17		
Trophic Status:	Meso	# of native species:	6	Species diversity:	0.80		
Littoral Sites:	27	Maximum species/site:	4	Native diversity:	0.78		
Depth: 5 to 10 ft		Frequency of Occurrence		Rake score frequency per s			Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		44.4	55.6	18.5	14.8	11.1	23.7
Sago pondweed		25.9	74.1	25.9	0.0	0.0	5.2
Slender Naiad		18.5	81.5	14.8	3.7	0.0	5.2
Chara		14.8	85.2	14.8	0.0	0.0	3.0
Eel grass		11.1	88.9	7.4	3.7	0.0	3.7
Richardson's pondweed		11.1	88.9	0.0	11.1	0.0	6.7
Curly-leaf pondweed		3.7	96.3	3.7	0.0	0.0	0.7
Starry stonewort		3.7	96.3	0.0	0.0	3.7	3.7
Filamentous Algae		66.7					

**Table 5 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft).</b>								
County:	Kos	Total Sites:	24	Mean species/site:	0.75			
Date:	6.3.15	Sites with plants:	15	SE Mean species/site:	0.14			
Secchi (ft):	19.5	Sites with native plants:	14	Mean native species/site:	0.71			
Max Plant Depth (ft):	17.0	Number of species:	6	SE Mean natives/site:	0.14			
Trophic Status:	Meso	# of native species:	5	Species diversity:	0.63			
Littoral Sites:	24	Maximum species/site:	2	Native diversity:	0.59			
Depth: 10 to 15 ft		Frequency of Occurrence		Rake score frequency per s				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		44.4	55.6	18.5	14.8	11.1	23.7	
Sago pondweed		25.9	74.1	25.9	0.0	0.0	5.2	
Slender Naiad		18.5	81.5	14.8	3.7	0.0	5.2	
Chara		14.8	85.2	14.8	0.0	0.0	3.0	
Eel grass		11.1	88.9	7.4	3.7	0.0	3.7	
Richardson's pondweed		11.1	88.9	0.0	11.1	0.0	6.7	
Curly-leaf pondweed		3.7	96.3	3.7	0.0	0.0	0.7	
Starry stonewort		3.7	96.3	0.0	0.0	3.7	3.7	
Filamentous Algae		66.7						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	0.20			
Date:	6.3.15	Sites with plants:	2	SE Mean species/site:	0.13			
Secchi (ft):	19.5	Sites with native plants:	2	Mean native species/site:	0.20			
Max Plant Depth (ft):	17.0	Number of species:	1	SE Mean natives/site:	0.13			
Trophic Status:	Meso	# of native species:	1	Species diversity:	0.00			
Littoral Sites:	7	Maximum species/site:	1	Native diversity:	0.00			
Depth: 15 to 20 ft		Frequency of Occurrence		Rake score frequency per s				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		20.0	80.0	10.0	0.0	10.0	12.0	
Filamentous Algae		20.0						

**James Lake**

Sixty sites were sampled on James Lake on June 3<sup>rd</sup>. Eight species were collected and plants were present at 50 sites. Coontail was the most frequently occurring species and was found at 58.3% of sample sites. Curly-leaf pondweed and Eurasian watermilfoil were the only invasive species collected and were found at 8.3% and 3.3% of sample sites (Figures 13 & 14). The results of the survey are located in Table 6.



Figure 13. Curly-leaf pondweed location on James Lake, June 3, 2015.



Figure 14. Eurasian watermilfoil location on James Lake, June 3, 2015.

**Table 6. Tier 2 Survey Results, James Lake, June 3, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (all depths).</b>								
County:	Kos	Total Sites:	60	Mean species/site:	1.10			
Date:	6.3.15	Sites with plants:	50	SE Mean species/site:	0.10			
Secchi (ft):	16.0	Sites with native plants:	49	Mean native species/site:	0.98			
Max Plant Depth (ft):	20.0	Number of species:	8	SE Mean natives/site:	0.09			
Trophic Status:	Meso	# of native species:	6	Species diversity:	0.63			
Littoral Sites:	59	Maximum species/site:	4	Native species diversity:	0.55			
All Depths (0 to 20 ft)		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		58.3	41.7	13.3	18.3	26.7	40.3	
Chara		30.0	70.0	8.3	10.0	11.7	19.3	
Curly-leaf pondweed		8.3	91.7	5.0	3.3	0.0	3.0	
Sago pondweed		5.0	95.0	5.0	0.0	0.0	1.0	
Eurasian watermilfoil		3.3	96.7	1.7	0.0	1.7	2.0	
Eel grass		1.7	98.3	1.7	0.0	0.0	0.3	
Flat-stemmed pondweed		1.7	98.3	0.0	1.7	0.0	1.0	
Slender naiad		1.7	98.3	0.0	1.7	0.0	1.0	
Filamentous Algae		25.0						
Other species observed: Spatterdock, button bush, cattail, sw ap loosestrife, w hite w ater lily, arrow head, arrow arum, and bladderwort								
<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (0-5 ft).</b>								
County:	Kos	Total Sites:	18	Mean species/site:	1.28			
Date:	6.3.15	Sites with plants:	17	SE Mean species/site:	0.16			
Secchi (ft):	16.0	Sites with native plants:	17	Mean native species/site:	1.22			
Max Plant Depth (ft):	20.0	Number of species:	6	SE Mean natives/site:	0.13			
Trophic Status:	Meso	# of native species:	5	Species diversity:	0.62			
Littoral Sites:	18	Maximum species/site:	3	Native diversity:	0.59			
Depth: 0 to 5 ft		Frequency of Occurrence		Rake score freq per sp.				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Chara		72.2	27.8	16.7	27.8	27.8	47.8	
Coontail		27.8	72.2	16.7	5.6	5.6	12.2	
Sago pondweed		11.1	88.9	11.1	0.0	0.0	2.2	
Eel grass		5.6	94.4	5.6	0.0	0.0	1.1	
Eurasian watermilfoil		5.6	94.4	5.6	0.0	0.0	1.1	
Slender naiad		5.6	94.4	0.0	5.6	0.0	3.3	
Filamentous Algae		61.1						
<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (5-10 ft).</b>								
County:	Kos	Total Sites:	16	Mean species/site:	1.19			
Date:	6.3.15	Sites with plants:	14	SE Mean species/site:	0.23			
Secchi (ft):	16.0	Sites with native plants:	13	Mean native species/site:	1.06			
Max Plant Depth (ft):	20.0	Number of species:	6	SE Mean natives/site:	0.23			
Trophic Status:	Meso	# of native species:	4	Species diversity:	0.57			
Littoral Sites:	16	Maximum species/site:	4	Native diversity:	0.46			
Depth: 5 to 10 ft		Frequency of Occurrence		Rake score freq per sp.				Plant Dominance
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		75.0	25.0	12.5	12.5	50.0	60.0	
Chara		18.8	81.3	6.3	6.3	6.3	11.3	
Curly-leaf pondweed		6.3	93.8	0.0	6.3	0.0	3.8	
Eurasian watermilfoil		6.3	93.8	0.0	0.0	6.3	6.3	
Flat-stemmed pondweed		6.3	93.8	0.0	6.3	0.0	3.8	
Sago pondweed		6.3	93.8	6.3	0.0	0.0	1.3	
Filamentous Algae		12.5						

**Table 6 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (10-15 ft).</b>								
County: Kos	Total Sites: 16	Mean species/site:						1.19
Date: 6.3.15	Sites with plants: 15	SE Mean species/site:						0.16
Secchi (ft): 16.0	Sites with native plants: 15	Mean native species/site:						1.00
Max Plant Depth (ft): 20.0	Number of species: 3	SE Mean natives/site:						0.09
Trophic Status: Meso	# of native species: 2	Species diversity:						0.42
Littoral Sites: 16	Maximum species/site: 3	Native diversity:						0.22
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score freq per specie				Plant Dominance		
<b>Species</b>		<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>			
Coontail	87.5	12.5	18.8	31.3	37.5	60.0		
Curly-leaf pondweed	18.8	81.3	12.5	6.3	0.0	6.3		
Chara	12.5	87.5	6.3	0.0	6.3	7.5		
Filamentous Algae	6.3							
<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (15-20 ft).</b>								
County: Kos	Total Sites: 10	Mean species/site:						0.50
Date: 6.3.15	Sites with plants: 4	SE Mean species/site:						0.22
Secchi (ft): 16.0	Sites with native plants: 4	Mean native species/site:						0.40
Max Plant Depth (ft): 20.0	Number of species: 2	SE Mean natives/site:						0.16
Trophic Status: Meso	# of native species: 1	Species diversity:						0.32
Littoral Sites: 9	Maximum species/site: 2	Native diversity:						0.00
Depth: 15 to 20 ft	Frequency of Occurrence	Rake score freq per specie				Plant Dominance		
<b>Species</b>		<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>			
Coontail	40.0	60.0	0.0	30.0	10.0	28.0		
Curly-leaf pondweed	10.0	90.0	10.0	0.0	0.0	2.0		
Filamentous Algae	10.0							

2.1.3 August 4, 2015 Survey

**Oswego Lake**

On August 4, 2015, forty sites were sampled on Oswego Lake. Ten species were collected and native vegetation was collected at 17 sites. Eel grass was the most frequently occurring species (37.5%). Spiny naiad (*Najas marina*) was the only non-native species collected. Results of the survey are summarized in Table 7.

**Table 7. Tier 2 Survey Results, Oswego Lake, August 4, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (all depths).</b>								
County:	Kos	Total Sites:	40	Mean species/site:	1.05			
Date:	8/4/15	Sites with plants:	17	SE Mean species/site:	0.22			
Secchi (ft):	8.5	Sites with native plants:	17	Mean native species/site:	1.03			
Max Plant Depth (ft):	16.0	Number of species:	10	SE Mean natives/site:	0.21			
Trophic Status:	Meso	# of native species:	9	Species diversity:	0.81			
Littoral Sites:	33	Maximum species/site:	4	Native species diversity:	0.80			
All Depths (0 to 20 ft)		Frequency of Occurrence		Rake score freq per sp.				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Eel grass		37.5		62.5	7.5	15.0	15.0	25.5
Chara		15.0		85.0	0.0	7.5	7.5	12.0
Illinois pondweed		15.0		85.0	12.5	2.5	0.0	4.0
Coontail		12.5		87.5	5.0	2.5	5.0	7.5
Sago pondweed		7.5		92.5	5.0	0.0	2.5	3.5
Richardson's pondweed		5.0		95.0	5.0	0.0	0.0	1.0
Southern naiad		5.0		95.0	5.0	0.0	0.0	1.0
Spiny naiad		2.5		97.5	2.5	0.0	0.0	0.5
Nittela		2.5		97.5	2.5	0.0	0.0	0.5
Slender naiad		2.5		97.5	2.5	0.0	0.0	0.5
Filamentous Algae		32.5						
Other species observed: Sacred lotus, white water lily, purple loosestrife, spatterdock, swamp loosestrife, and rose mallow								
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (0-5 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	2.20			
Date:	8/4/15	Sites with plants:	8	SE Mean species/site:	0.42			
Secchi (ft):	8.5	Sites with native plants:	8	Mean native species/site:	2.10			
Max Plant Depth (ft):	16.0	Number of species:	8	SE Mean natives/site:	0.41			
Trophic Status:	Meso	# of native species:	7	Species diversity:	0.76			
Littoral Sites:	10	Maximum species/site:	4	Native diversity:	0.74			
Depth: 0 to 5 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Eel grass		80.0		20.0	10.0	40.0	30.0	56.0
Chara		60.0		40.0	0.0	30.0	30.0	48.0
Sago pondweed		30.0		70.0	20.0	0.0	10.0	14.0
Coontail		10.0		90.0	0.0	10.0	0.0	6.0
Illinois pondweed		10.0		90.0	0.0	10.0	0.0	6.0
Spiny naiad		10.0		90.0	10.0	0.0	0.0	2.0
Nittela		10.0		90.0	10.0	0.0	0.0	2.0
Southern naiad		10.0		90.0	10.0	0.0	0.0	2.0
Filamentous Algae		20.0						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (5-10 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	1.50			
Date:	8/4/15	Sites with plants:	7	SE Mean species/site:	0.40			
Secchi (ft):	8.5	Sites with native plants:	7	Mean native species/site:	1.50			
Max Plant Depth (ft):	16.0	Number of species:	6	SE Mean natives/site:	0.40			
Trophic Status:	Meso	# of native species:	6	Species diversity:	0.74			
Littoral Sites:	10	Maximum species/site:	3	Native diversity:	0.74			
Depth: 5 to 10 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Eel grass		60.0		40.0	10.0	20.0	30.0	44.0
Illinois pondweed		40.0		60.0	40.0	0.0	0.0	8.0
Coontail		20.0		80.0	10.0	0.0	10.0	12.0
Richardson's pondweed		10.0		90.0	10.0	0.0	0.0	2.0
Slender naiad		10.0		90.0	10.0	0.0	0.0	2.0
Southern naiad		10.0		90.0	10.0	0.0	0.0	2.0
Filamentous Algae		40.0						

**Table 7 Continued.**

Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (10-15 ft).								
County:	Kos	Total Sites:	10	Mean species/site:	0.40			
Date:	8/4/15	Sites with plants:	1	SE Mean species/site:	0.40			
Secchi (ft):	8.5	Sites with native plants:	1	Mean native species/site:	0.40			
Max Plant Depth (ft):	16.0	Number of species:	4	SE Mean natives/site:	0.40			
Trophic Status:	Meso	# of native species:	4	Species diversity:	0.75			
Littoral Sites:	10	Maximum species/site:	4	Native diversity:	0.75			
Depth: 10 to 15 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		10.0	90.0	0.0	0.0	10.0	10.0	
Eel grass		10.0	90.0	10.0	0.0	0.0	2.0	
Illinois pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Richardson's pondweed		10.0	90.0	10.0	0.0	0.0	2.0	
Filamentous Algae		50.0						
Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (15-20 ft).								
County:	Kos	Total Sites:	10	Mean species/site:	0.10			
Date:	8/4/15	Sites with plants:	1	SE Mean species/site:	0.10			
Secchi (ft):	8.5	Sites with native plants:	1	Mean native species/site:	0.10			
Max Plant Depth (ft):	16.0	Number of species:	1	SE Mean natives/site:	0.10			
Trophic Status:	Meso	# of native species:	1	Species diversity:	0.00			
Littoral Sites:	3	Maximum species/site:	1	Native diversity:	0.00			
Depth: 15 to 20 ft		Frequency of Occurrence		Rake score frequency per				Plant Dominance
<b>Species</b>				<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		10.0	90.0	10.0	0.0	0.0	2.0	
Filamentous Algae		20.0						

**Tippecanoe Lake**

Ninety sites were sampled on Tippecanoe Lake on August 4, 2015. Eleven species were collected and plants were present at 69 of the 90 sites. Eel grass was the most frequently occurring species and was found at 55.6% of the sites. Starry stonewort was found at 3 sites, and Eurasian watermilfoil was only found in a single location (Figure 15 & 16). The results of the survey are located in Table 8.

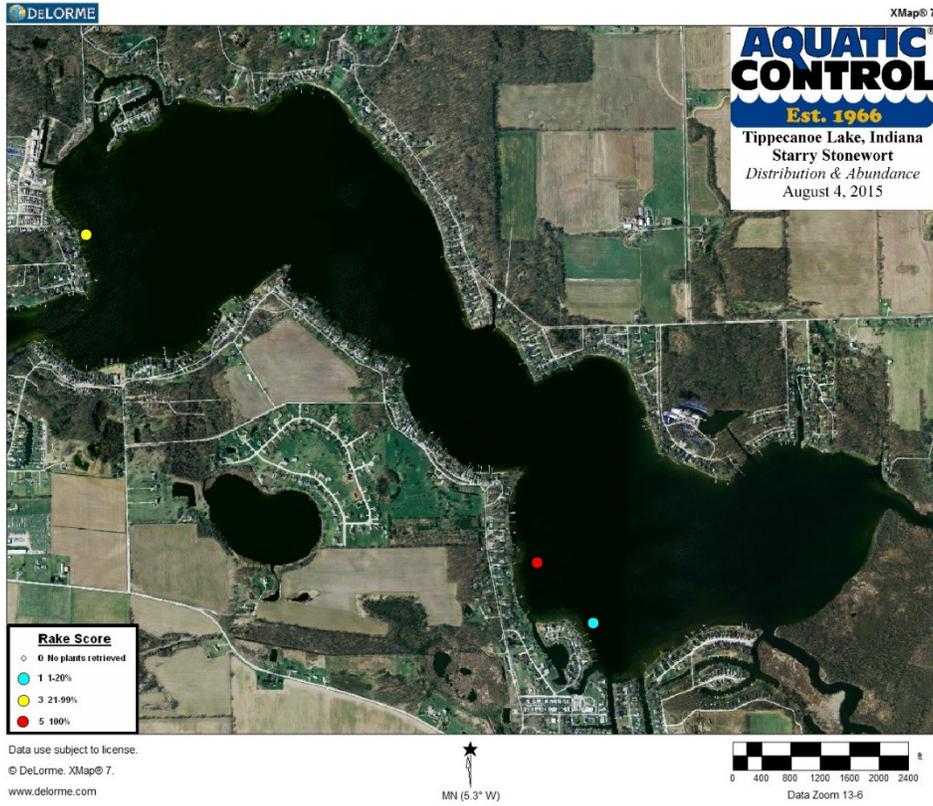


Figure 15. Starry stonewort location on Tippecanoe Lake, August 4, 2015.

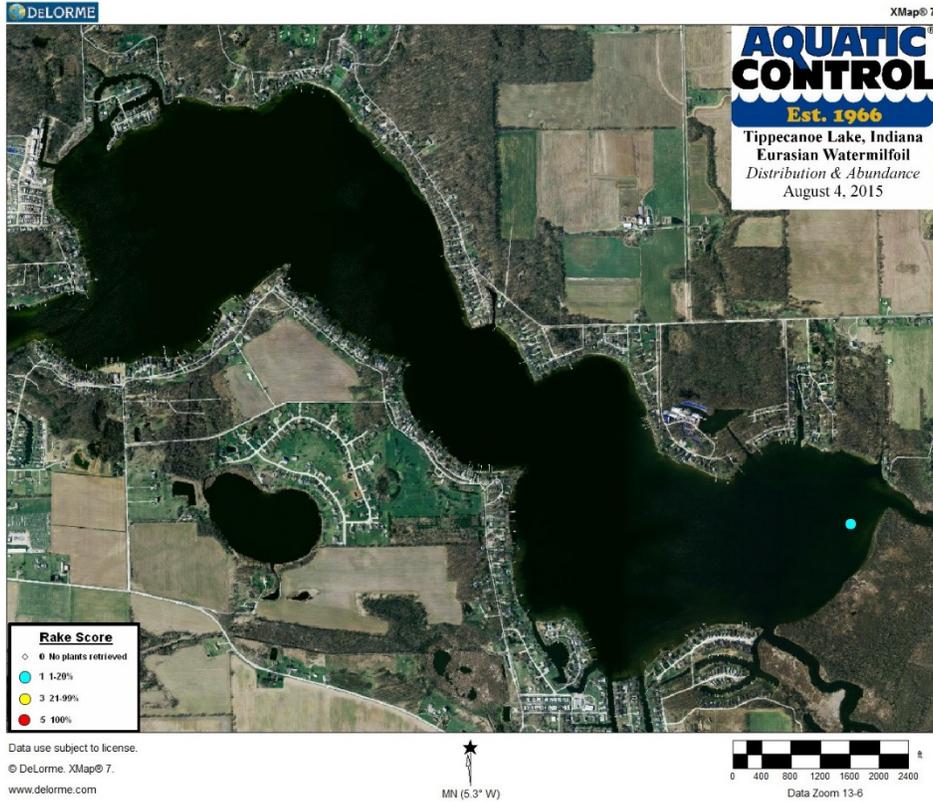


Figure 16. Eurasian watermilfoil location on Tippecanoe Lake, August 4, 2015.

**Table 8. Tier 2 Survey Results, Tippecanoe Lake, August 4, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (all depths).</b>						
County: Kos	Total Sites: 90	Mean species/site:	1.47			
Date: 8/4/15	Sites with plants: 69	SE Mean species/site:	0.12			
Secchi (ft): 6.0	Sites with native plants: 68	Mean native species/site:	1.42			
Max Plant Depth (ft): 17.0	Number of species: 11	SE Mean natives/site:	0.12			
Trophic Status: Meso	# of native species: 9	Species diversity:	0.78			
Littoral Sites: 86	Maximum species/site: 5	Native species diversity:	0.77			
All Depths	Frequency of Occurrence	Rake score freq per sp.				Plant Dominance
Species		0	1	3	5	
Eel grass	55.6	44.4	18.9	11.1	25.6	36.0
Coontail	32.2	67.8	16.7	4.4	11.1	17.1
Chara	16.7	83.3	7.8	1.1	7.8	10.0
Richardson's pondweed	11.1	88.9	4.4	6.7	0.0	4.9
Sago pondweed	11.1	88.9	2.2	3.3	5.6	8.0
Southern naiad	7.8	92.2	4.4	2.2	1.1	3.3
Slender Naiad	5.6	94.4	4.4	0.0	1.1	2.0
Starry stonewort	3.3	96.7	1.1	1.1	1.1	2.0
Eurasian watermilfoil	1.1	98.9	1.1	0.0	0.0	0.2
Flat-stemmed pondweed	1.1	98.9	1.1	0.0	0.0	0.2
Illinois pondweed	1.1	98.9	0.0	0.0	1.1	1.1
Filamentous Algae	21.1					
Species Observed: Spatterdock, water stargrass, bladderwort, and white water lily						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (0-5 ft).</b>						
County: Kos	Total Sites: 29	Mean species/site:	1.93			
Date: 8/4/15	Sites with plants: 25	SE Mean species/site:	0.25			
Secchi (ft): 6	Sites with native plants: 25	Mean native species/site:	1.86			
Max Plant Depth (ft): 17.0	Number of species: 11	SE Mean natives/site:	0.23			
Trophic Status: Meso	# of native species: 9	Species diversity:	0.80			
Littoral Sites: 29	Maximum species/site: 5	Native diversity:	0.78			
Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per s				Plant Dominance
Species		0	1	3	5	
Eel grass	72.4	27.6	24.1	17.2	31.0	46.2
Chara	31.0	69.0	13.8	0.0	17.2	20.0
Richardson's pondweed	24.1	75.9	6.9	17.2	0.0	11.7
Sago pondweed	20.7	79.3	6.9	6.9	6.9	12.4
Coontail	13.8	86.2	10.3	0.0	3.4	5.5
Southern naiad	10.3	89.7	6.9	3.4	0.0	3.4
Slender Naiad	6.9	93.1	3.4	0.0	3.4	4.1
Eurasian watermilfoil	3.4	96.6	3.4	0.0	0.0	0.7
Flat-stemmed pondweed	3.4	96.6	3.4	0.0	0.0	0.7
Illinois pondweed	3.4	96.6	0.0	0.0	3.4	3.4
Starry stonewort	3.4	96.6	3.4	0.0	0.0	0.7
Filamentous Algae	31.0					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).</b>						
County: Kos	Total Sites: 27	Mean species/site:	1.81			
Date: 8/4/15	Sites with plants: 25	SE Mean species/site:	0.19			
Secchi (ft): 6	Sites with native plants: 24	Mean native species/site:	1.74			
Max Plant Depth (ft): 17.0	Number of species: 8	SE Mean natives/site:	0.20			
Trophic Status: Meso	# of native species: 7	Species diversity:	0.75			
Littoral Sites: 27	Maximum species/site: 4	Native diversity:	0.73			
Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per s				Plant Dominance
Species		0	1	3	5	
Eel grass	77.8	22.2	22.2	11.1	44.4	55.6
Coontail	37.0	63.0	18.5	3.7	14.8	20.7
Chara	18.5	81.5	11.1	0.0	7.4	9.6
Richardson's pondweed	11.1	88.9	7.4	3.7	0.0	3.7
Sago pondweed	11.1	88.9	0.0	3.7	7.4	9.6
Southern naiad	11.1	88.9	3.7	3.7	3.7	6.7
Slender Naiad	7.4	92.6	7.4	0.0	0.0	1.5
Starry stonewort	7.4	92.6	0.0	3.7	3.7	5.9
Filamentous Algae	18.5					

**Table 8 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft).</b>								
County:	Kos	Total Sites:	24	Mean species/site:	1.00			
Date:	8/4/15	Sites with plants:	17	SE Mean species/site:	0.17			
Secchi (ft):	6	Sites with native plants:	17	Mean native species/site:	1.00			
Max Plant Depth (ft):	17.0	Number of species:	4	SE Mean natives/site:	0.17			
Trophic Status:	Meso	# of native species:	4	Species diversity:	0.52			
Littoral Sites:	24	Maximum species/site:	3	Native diversity:	0.52			
Depth: 10 to 15 ft		Frequency of Occurrence	Rake score frequency per s				Plant Dominance	
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail		62.5	37.5	29.2	12.5	20.8	34.2	
Eel grass		29.2	70.8	12.5	8.3	8.3	15.8	
Sago pondweed		4.2	95.8	0.0	0.0	4.2	4.2	
Slender Naiad		4.2	95.8	4.2	0.0	0.0	0.8	
Filamentous Algae		16.7						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).</b>								
County:	Kos	Total Sites:	10	Mean species/site:	0.30			
Date:	8/4/15	Sites with plants:	2	SE Mean species/site:	0.21			
Secchi (ft):	6	Sites with native plants:	2	Mean native species/site:	0.30			
Max Plant Depth (ft):	17.0	Number of species:	3	SE Mean natives/site:	0.21			
Trophic Status:	Meso	# of native species:	3	Species diversity:	0.67			
Littoral Sites:	6	Maximum species/site:	2	Native diversity:	0.67			
Depth: 15 to 20 ft		Frequency of Occurrence	Rake score frequency per s				Plant Dominance	
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Chara		10.0	90.0	0.0	10.0	0.0	6.0	
Eel grass		10.0	90.0	10.0	0.0	0.0	2.0	
Southern naiad		10.0	90.0	10.0	0.0	0.0	2.0	
Filamentous Algae		10.0						

**James Lake**

Sixty sites were sampled on James Lake on August 4, 2015. Ten species were collected and native species were collected at 43 of the sites. Coontail was the most frequently occurring species and had an abundance of 60.0%. Eurasian watermilfoil was collected at 2 sites, while curly-leaf pondweed was found at a single site (Figures 17 & 18). The results of the survey are located in Table 9.

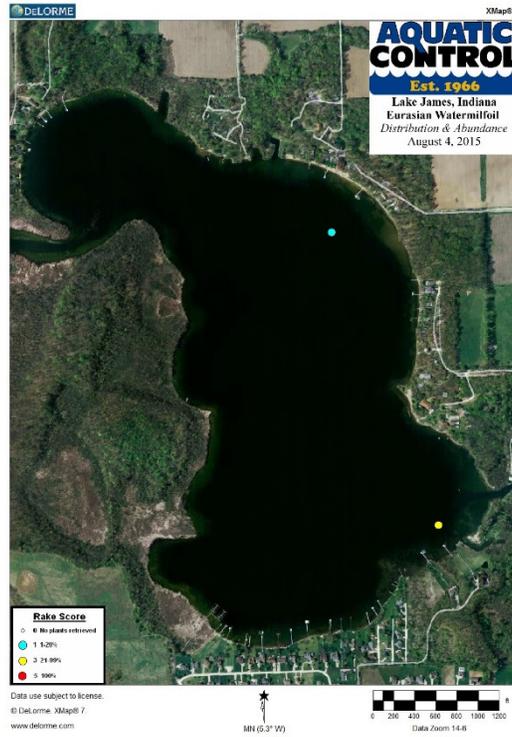


Figure 17. Eurasian watermilfoil location on James Lake, August 4, 2015.



Figure 18. Curly-leaf pondweed location on James Lake, August 4, 2015.

**Table 10. Tier 2 Survey Results, James Lake, August 4, 2015.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (all depths).</b>							
County:	Kos	Total Sites:	60	Mean species/site:	1.08		
Date:	8/4/2015	Sites with plants:	43	SE Mean species/site:	0.14		
Secchi (ft):	4.5	Sites with native plants:	43	Mean native species/site:	1.03		
Max Plant Depth (ft):	17.0	Number of species:	10	SE Mean natives/site:	0.13		
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.66		
Littoral Sites:	52	Maximum species/site:	5	Native species diversity:	0.63		
All Depths (0 to 20 ft)		Frequency of Occurrence		Rake score frequency per sp.		Plant Dominance	
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		60.0	40.0	10.0	8.3	41.7	48.7
Eel grass		11.7	88.3	5.0	1.7	5.0	7.0
Chara		10.0	90.0	5.0	1.7	3.3	5.3
Sago pondweed		6.7	93.3	3.3	3.3	0.0	2.7
Slender naiad		6.7	93.3	0.0	3.3	3.3	5.3
Southern naiad		5.0	95.0	3.3	1.7	0.0	1.7
Eurasian watermilfoil		3.3	96.7	1.7	1.7	0.0	1.3
Canada waterweed		1.7	98.3	1.7	0.0	0.0	0.3
Curly-leaf pondweed		1.7	98.3	0.0	0.0	1.7	1.7
Illinois pondweed		1.7	98.3	1.7	0.0	0.0	0.3
Filamentous Algae		8.3					
Other species observed: Arrow arum, button bush, swamp mallow, spatterdock, white water lily, bladderwort, water stargrass, purple loosestrife, and bulrush							
<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (0-5 ft).</b>							
County:	Kos	Total Sites:	18	Mean species/site:	1.83		
Date:	8/4/15	Sites with plants:	15	SE Mean species/site:	0.35		
Secchi (ft):	4.5	Sites with native plants:	15	Mean native species/site:	1.72		
Max Plant Depth (ft):	17.0	Number of species:	10	SE Mean natives/site:	0.34		
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.84		
Littoral Sites:	18	Maximum species/site:	5	Native diversity:	0.82		
Depth: 0 to 5 ft		Frequency of Occurrence		Rake score freq per sp.		Plant Dominance	
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		50.0	50.0	22.2	0.0	27.8	32.2
Eel grass		33.3	66.7	16.7	0.0	16.7	20.0
Chara		22.2	77.8	5.6	5.6	11.1	15.6
Sago pondweed		22.2	77.8	11.1	11.1	0.0	8.9
Slender naiad		16.7	83.3	0.0	11.1	5.6	12.2
Southern naiad		16.7	83.3	11.1	5.6	0.0	5.6
Canada waterweed		5.6	94.4	5.6	0.0	0.0	1.1
Curly-leaf pondweed		5.6	94.4	0.0	0.0	5.6	5.6
Eurasian watermilfoil		5.6	94.4	0.0	5.6	0.0	3.3
Illinois pondweed		5.6	94.4	5.6	0.0	0.0	1.1
Filamentous Algae		11.1					
<b>Occurrence and Abundance of Submersed Aquatic Plants in James Lake (5-10 ft).</b>							
County:	Kos	Total Sites:	16	Mean species/site:	1.19		
Date:	8/4/15	Sites with plants:	16	SE Mean species/site:	0.10		
Secchi (ft):	4.5	Sites with native plants:	16	Mean native species/site:	1.13		
Max Plant Depth (ft):	17.0	Number of species:	4	SE Mean natives/site:	0.09		
Trophic Status:	Meso	# of native species:	3	Species diversity:	0.36		
Littoral Sites:	16	Maximum species/site:	2	Native diversity:	0.29		
Depth: 5 to 10 ft		Frequency of Occurrence		Rake score freq per sp.		Plant Dominance	
<b>Species</b>			<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	
Coontail		93.8	6.3	6.3	12.5	75.0	83.8
Chara		12.5	87.5	12.5	0.0	0.0	2.5
Eurasian watermilfoil		6.3	93.8	6.3	0.0	0.0	1.3
Slender naiad		6.3	93.8	0.0	0.0	6.3	6.3
Filamentous Algae		18.8					

**Table 10 Continued.**

Occurrence and Abundance of Submersed Aquatic Plants in James Lake (10-15 ft).							
County: Kos	Total Sites:	16	Mean species/site:		0.75		
Date: 8/4/15	Sites with plants:	11	SE Mean species/site:		0.14		
Secchi (ft): 4.5	Sites with native plants:	11	Mean native species/site:		0.75		
Max Plant Depth (ft): 17.0	Number of species:	2	SE Mean natives/site:		0.14		
Trophic Status: Meso	# of native species:	2	Species diversity:		0.15		
Littoral Sites: 16	Maximum species/site:	2	Native diversity:		0.15		
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score freq per specie				Plant Dominance	
<b>Species</b>		<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail	68.8	31.3	6.3	18.8	43.8	56.3	
Eel grass	6.3	93.8	0.0	6.3	0.0	3.8	
Occurrence and Abundance of Submersed Aquatic Plants in James Lake (15-20 ft).							
County: Kos	Total Sites:	10	Mean species/site:		0.10		
Date: 8/4/15	Sites with plants:	1	SE Mean species/site:		0.10		
Secchi (ft): 4.5	Sites with native plants:	1	Mean native species/site:		0.10		
Max Plant Depth (ft): 17.0	Number of species:	1	SE Mean natives/site:		0.10		
Trophic Status: Meso	# of native species:	1	Species diversity:		0.00		
Littoral Sites: 2	Maximum species/site:	1	Native diversity:		0.00		
Depth: 15 to 20 ft	Frequency of Occurrence	Rake score freq per specie				Plant Dominance	
<b>Species</b>		<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>		
Coontail	10.0	90.0	0.0	0.0	10.0	10.0	

**2.2 Plant Sampling Discussion**

The objective of maintaining invasive species percent occurrence below 10% in late summer Tier 2 surveys was met on all three lakes. Late summer Tier 2 surveys only found Eurasian watermilfoil at a single site on Lake Tippecanoe, two sites in James Lake, and none was collected in Oswego Lake. Similar low levels of Eurasian watermilfoil have been observed over the last five years on all three lakes. Curly-leaf pondweed, which is typically most abundant in late spring, was only collected at a single site in all three basins combined during the summer survey. In 2015, a late spring survey was also conducted and levels were still found to be well below 10% occurrence. Starry stonewort has yet to be collected in James or Oswego. Starry stonewort was discovered in Lake Tippecanoe in 2013, but only showed up in Tier 2 surveys beginning in late summer of 2014 when it was collected at a single site. Starry stonewort was collected at two sites in the spring 2015 survey and then three sites in the late summer 2015 survey.

Eel grass is considered to be an ecologically beneficial native species, but has created some problems for residents and boaters on Lake Tippecanoe. No large scale treatments of eel grass were completed in 2015 due to permit restrictions and lack of complaints from the Association. Eel grass percent occurrence in Lake Tippecanoe increased from 34.4% in 2014 to 55.6% in 2015. This plant historically has occurred at 50-60% of sites.

Overall, diversity was down slightly and below the stated objectives in all 3 lakes. Lake Tippecanoe (76%) and James Lake (72%) were slightly below the overall native coverage objective of 80%, while Oswego Lake fell well short of the 70% native coverage objective. The decline in coontail occurrence appears to be leading to an overall coverage decline in Oswego Lake. The reason for the reduction in coontail abundance is not clear, especially since it has remained relatively stable or increased in the other two

connected lakes. Tables 10-12, on the following pages, compare Tier 2 surveys completed from 2004 through 2015. Additional comparison data broken down by 5-ft depth contours can be found in the Appendix.

**Table 10. Tier 2 Survey Comparison, Oswego Lake, 2004-2015.**

Survey or	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/25/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	33	40	40	40	40	40	40	40	40	40	40	40
Littoral Sites	33	39	35	37	40	37	33	32	26	30	35	33
Sites with Plants	31	38	30	36	33	29	25	26	17	21	21	17
Sites with Native Plants	29	38	28	36	33	29	25	26	17	21	21	17
Percent Littoral Coverage	94%	97%	86%	97%	83%	78%	76%	81%	65%	70%	60%	43%
Maximum Plant Depth	24	17	12	19	20	19	18	15	10	15	16	16
Secchi (ft)	NA	6	12	5.5	7.5	6	7	9	7	10	17.5	8.5
Number of Species	8	12	7	16	14	9	10	10	12	11	9	10
Number of Native Species	6	9	5	13	11	8	8	8	10	9	8	9
Species Diversity	0.79	0.84	0.83	0.85	0.82	0.80	0.86	0.81	0.84	0.84	0.77	0.81
Native Species Diversity	0.66	0.80	0.76	0.82	0.79	0.80	0.83	0.79	0.82	0.81	0.76	0.80
Mean Native Species/Site	1.09	1.65	0.93	1.95	1.74	1.37	1.38	1.33	1.25	1.08	0.80	1.05
Species Frequency of Occurrence - Depth: 0 to 20 ft												
Eurasian watermilfoil	51.5	10.0	10.0	5.0	7.5	0.0	5.0	0.0	2.5	0.0	2.5	0.0
Curly-leaf pondweed	27.3	7.5	22.5	2.5	5.0	0.0	0.0	2.5	0.0	7.5	0.0	0.0
Brittle naiad	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	5.0	0.0	12.5	2.5	2.5	0.0	7.5	2.5	5.0	0.0	2.5
Coontail	57.6	50.0	25.0	35.0	45.0	40.0	25.0	30.0	7.5	17.5	22.5	12.5
Sago pondweed	0.0	17.5	0.0	12.5	5.0	20.0	12.5	7.5	5.0	10.0	5.0	7.5
Chara sp.	21.2	35.0	27.5	47.5	30.0	15.0	15.0	25.0	17.5	27.5	27.5	15.0
Nitella	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	2.5
Eel grass	12.1	37.5	0.0	55.0	55.0	37.5	40.0	40.0	40.0	30.0	2.5	37.5
Richardson's pondweed	0.0	5.0	5.0	7.5	7.5	7.5	12.5	2.5	0.0	2.5	2.5	5.0
Illinois pondweed	0.0	5.0	0.0	0.0	2.5	10.0	0.0	2.5	10.0	5.0	15.0	15.0
Leafy pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	2.5	0.0	0.0
Small pondweed	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slender naiad	0.0	7.5	0.0	5.0	12.5	0.0	15.0	2.5	5.0	0.0	2.5	2.5
Canada waterweed	0.7	2.5	0.0	0.0	5.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	2.5	0.0	0.0	0.0	22.5	22.5	10.0	0.0	5.0
Large-leaved pondweed	0.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	16.4	0.0	0.0	0.0	7.5	2.5	12.5	0.0	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	19.3	5.0	22.5	7.5	2.5	5.0	0.0	0.0	2.5	2.5	2.5	0.0
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common bladderwort	0.7	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	12.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	33.3	12.5	0.0	0.0	0.0	0.0	20.0	40.0	25.0	50.0	60.0	32.5

**Table 11. Tier 2 Survey Comparison, Tippecanoe Lake, 2004-2015.**

Surveyor	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/25/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	140	119	119	119	90	89	89	90	90	90	90	90
Littoral Sites	134	119	113	115	87	89	83	89	82	78	87	86
Sites with Plants	119	106	81	95	78	81	67	69	50	48	62	69
Sites with Native Plants	99	103	68	95	76	81	67	68	50	48	60	68
Percent Littoral Coverage	89%	89%	72%	83%	90%	91%	81%	78%	61%	62%	69%	80%
Maximum Plant Depth	17	19	16	17	17	22	18	21	16	14	17	17
Secchi (ft)	-	6	13	6	7	6	7	8	6	9	19.5	6
Number of Species	12	12	10	15	16	13	11	14	12	10	11	11
Number of Native Species	10	10	8	13	14	12	10	12	11	8	8	9
Species Diversity	0.83	0.82	0.83	0.83	0.84	0.81	0.75	0.84	0.81	0.80	0.82	0.78
Native Species Diversity	0.79	0.78	0.79	0.82	0.82	0.80	0.73	0.82	0.80	0.79	0.81	0.77
Mean Native Species/Site	0.97	1.54	0.77	1.70	1.75	1.79	1.31	1.79	1.17	1.01	1.03	1.47
Species Frequency of Occurrence - Depth: 0 to 25 ft												
Eurasian watermilfoil	22.9	19.3	5.0	3.4	10.0	9.0	4.5	12.2	1.1	1.1	1.1	1.1
Curly-leaf pondweed	45.7	3.4	30.3	0.8	4.4	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.2	3.3
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Coontail	13.6	26.1	16.8	26.9	35.6	36.0	23.6	22.2	11.1	21.1	30.0	32.2
Spiny coontail	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sago pondweed	0.0	10.9	0.0	10.1	5.6	13.5	6.7	28.9	21.1	15.6	21.1	11.1
Chara sp.	30.7	23.5	19.3	18.5	25.6	37.1	11.2	26.7	14.4	10.0	14.4	16.7
Eel grass	12.9	61.3	3.4	58.0	55.6	58.4	60.7	53.3	41.1	34.4	14.4	55.6
Slender naiad	0.0	5.9	0.0	1.7	4.4	1.1	4.5	3.3	4.4	2.2	7.8	5.6
Richardson's pondweed	0.0	9.2	4.2	7.6	10.0	4.5	14.6	5.6	0.0	5.6	8.9	11.1
Canada waterweed	0.7	0.0	0.8	0.8	3.3	2.2		2.2	0.0	0.0	0.0	0.0
Variable pondweed	16.4	3.4	0.0	0.0	2.2	4.5	6.7	3.3	3.3	0.0	1.1	0.0
Flat-stemmed pondweed	19.3	6.7	21.8	11.8	0.0	12.4	1.1	1.1	1.1	0.0	0.0	1.1
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Common Bladderwort	0.7	0.0	0.0	16.0	0.0	0.0	1.1	0.0	2.2	0.0	0.0	0.0
Water stargrass	0.7	5.0	2.5	11.8	11.1	6.7	0.0	2.2	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	3.4	0.0	1.1	0.0	26.7	13.3	8.9	0.0	7.8
Small pondweed	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	11.8	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	1.7	0.0	2.5	0.0	1.1	1.1	3.3	3.3	3.3	1.1	1.1
Leafy pondweed	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	8.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	48.6	13.4	0.0	0.0	0.0	0.0	0.0	12.2	17.8	24.4	58.9	21.1

**Table 12. Tier 2 Survey Comparison, James Lake, 2004-2015.**

Survey or	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/26/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	74	64	64	64	60	60	60	60	60	60	60	60
Littoral Sites	65	64	60	63	53	56	57	57	50	60	59	52
Sites with Plants	62	61	54	56	50	46	52	47	32	37	50	43
Sites with Native Plants	56	61	53	56	50	46	52	46	32	37	49	43
Percent Littoral Coverage	95%	95%	90%	89%	94%	82%	91%	82%	64%	62%	85%	83%
Maximum Plant Depth	11	20	15	23	16	20	18	18	15	20	20	17
Secchi (ft)	-	6	16	9	4.5	7	5.5	5.5	4	8	16	4.5
Number of Species	11	14	9	13	14	10	12	12	7	8	8	10
Number of Native Species	9	11	7	12	13	7	10	10	7	8	6	8
Species Diversity	0.80	0.85	0.83	0.79	0.78	0.76	0.80	0.76	0.77	0.76	0.63	0.66
Native Species Diversity	0.71	0.81	0.74	0.78	0.77	0.73	0.79	0.71	0.77	0.76	0.55	0.63
Mean Native Species/Site	1.11	1.89	1.19	1.58	1.43	1.33	1.53	1.20	1.02	0.95	0.98	1.08
Species Frequency of Occurrence - Depth: 0 to 25 ft												
Eurasian watermilfoil	12.2	23.4	32.8	1.6	1.7	6.7	0.0	10.0	0.0	0.0	3.3	3.3
Curly-leaf pondweed	43.2	9.4	43.8	0.0	0.0	1.7	1.7	0.0	0.0	0.0	8.3	1.7
Brittle naiad	0.0	0.0	32.8	0.0	10.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	1.6	0.0	0.0	0.0	1.7	0.0	3.3	0.0	0.0	0.0	0.0
Coontail	43.2	57.8	43.8	54.7	61.7	56.7	51.7	58.3	35.0	35.0	58.3	60.0
Sago pondweed	0.0	6.3	0.0	0.0	6.7	3.3	13.3	11.7	18.3	3.3	5.0	6.7
Chara sp.	36.5	35.9	0.0	28.1	15.0	26.7	26.7	21.7	18.3	25.0	30.0	10.0
Eel grass	1.4	42.2	1.6	37.5	18.3	26.7	31.7	13.3	21.7	16.7	1.7	11.7
Slender naiad	0.0	15.6	0.0	12.5	8.3	10.0	16.7	1.7	3.3	6.7	1.7	6.7
Canada waterweed	0.7	4.7	15.6	6.3	6.7	5.0	3.3	1.7	0.0	3.3	0.0	1.7
Leafy pondweed	0.0	3.1	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Richardson's pondweed	0.0	0.0	0.0	1.6	1.7	0.0	1.7	1.7	0.0	0.0	0.0	0.0
Large-leaved pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	16.4	6.3	0.0	0.0	0.0	0.0	3.3	0.0	3.3	0.0	0.0	0.0
Flat-stemmed pondweed	19.3	9.4	18.8	4.7	6.7	5.0	0.0	1.7	1.7	0.0	1.7	0.0
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common bladderwort	0.7	1.6	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.7	6.3	1.6	3.1	3.3	0.0	3.3	5.0	0.0	0.0	0.0	0.0
Small pondweed	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.3	0.0	3.3	0.0	5.0
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7
Northern watermilfoil	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spiny coontail	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water crowfoot	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	4.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	47.3	4.7	0.0	0.0	0.0	0.0	6.7	11.7	13.3	16.7	25.0	8.3

### 3.0 PLANT MANAGEMENT DISCUSSION & ACTION PLAN

If left unmanaged, Eurasian watermilfoil, curly-leaf pondweed, and starry stonewort could potentially become severe problems on the Tippecanoe Chain of Lakes by impeding boating, fishing, swimming, and property values. In addition, these species may also have negative impacts on the native submersed plant community and overall ecology of the lake. Controls have successfully limited the abundance of invasive Eurasian watermilfoil and curly-leaf pondweed to the point that it has become difficult to find these species during spring surveys. It is recommended that selective herbicide treatments be continued next season, and if funds permit, treatments should again include channel areas. Treatments for curly-leaf pondweed and Eurasian watermilfoil in channels and other isolated areas should be completed with 1.0 ppm 2,4-D and 1.0 ppm Aquathol

K. Main lake treatments should be completed with 2.0 ppm 2,4-D and 1.0 ppm of Aquathol. These treatments should be completed in late April or early May when water temperatures approach 50° F (warming trend) and are not higher than 60° F. It is estimated that up to 30 acres of each species may need treatment next season in main lake areas and 30 acres in channels. With the exception of starry stonewort, IDNR is likely to limit all main lake treatments to just 30 acres regardless if the vegetation is invasive or native. The cost of treatment of curly-leaf pondweed and Eurasian watermilfoil would be approximately \$30,000.00.

Control of invasive starry stonewort is one of the primary plant management concerns in Tippecanoe Lake. It was first found in 2013 and aggressively treated with IDNR funds. All of the areas that were discovered during plant surveys were treated in 2013 and 2014. Starry stonewort is not a rooted macrophyte, but is a type of algae called a charophyte. It does not respond to traditional herbicide treatments the way rooted macrophytes respond. One can go in and completely kill a Eurasian watermilfoil or curly-leaf pondweed plant with a systemic herbicide and the plant is gone. The only way the macrophyte will return is through reproductive structures like turions, seeds, or fragments. At this time it appears that herbicide treatments for starry stonewort have to be repeated multiple times during the growing season in order to just slow down the spread of this plant. In addition, these treatments usually require high rates of aquatic herbicides/algacides. In 2013 and 2014, IDNR used a combination of chelated copper at a concentration of 0.8 ppm (trade name: Cutrine Ultra) and endothall at a concentration of 0.17 ppm (trade name: Hydrothol 191). These treatments ‘burnt’ back the starry stonewort, but it typically would return to pretreatment levels within 30-60 days and has continued to spread across the Tippecanoe Lake (Figure 19).

In 2015, flumioxazin (trade name: Clipper) was applied at a rate of 0.4 ppm in two channel areas in early June and appeared to give longer control than treatments completed in previous years. Unfortunately, flumioxazin at these rates is not selective and controls virtually all rooted macrophytes within the treated area, so treatments with this herbicide were limited to just channel areas. The July treatment on Tippecanoe Lake used the chelated copper/endothall combination. A survey completed in early August found that starry stonewort had expanded from June areas. These areas were reported to IDNR, but no treatment was completed due to a lack of funds. At the October permit meeting, IDNR reported that funding was lacking as starry stonewort was spreading to more lakes and treatments had to be prioritized to high use or boat ramp areas in an effort to prevent/slow the spread to additional water bodies.

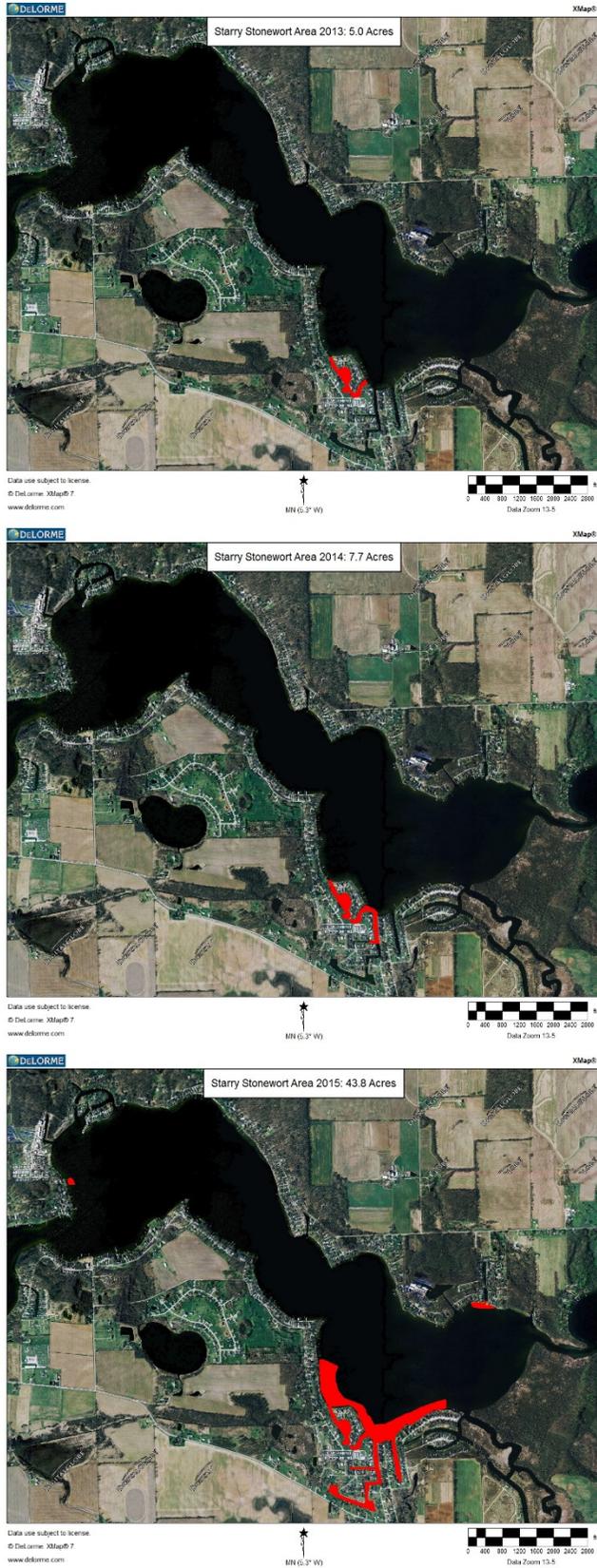


Figure 19. Starry stonewort areas, 2013-2015.

Unfortunately, there is very little published literature or research on starry stonewort control or biology, and most controls are based on anecdotal observations from applicators and lake managers. In addition, LARE guidelines do not permit the use of funds for control of algae, which, despite its appearance, starry stonewort is a type of algae. These issues, combined with the lack of IDNR funding, will make slowing the spread of this plant on Tippecanoe Lake extremely difficult. Ideally, we would attempt to control all areas of starry stonewort, but, with the lack of funding, it is important to prioritize areas based on the goal of reducing spread and reducing negative ecological impacts to sensitive areas. These priority areas would include boat ramps, high boat traffic areas, and new small infestations away from the initial infestation. In addition, it is important to keep this invasive out of the ecozone area as it appears that this invasive can displace native plants. Figure 20 is an attempt to prioritize areas that should receive treatment.

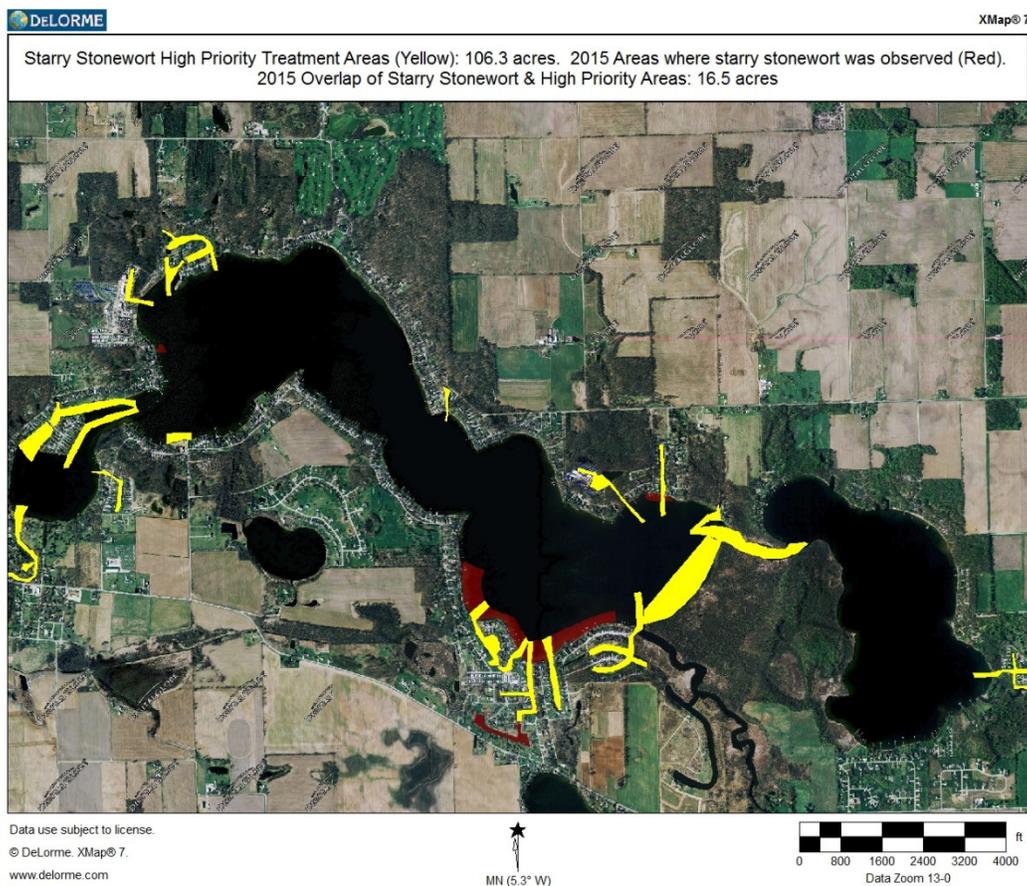


Figure 20. Starry stonewort high priority treatment areas.

It appears that flumioxazin has been the most effective control technique and should be used in all areas at 0.4 ppm rate (this may be adjusted lower if lower rates are found to be effective); however, this herbicide will impact native vegetation and may be limited in main lake areas. If IDNR determines that main lake areas cannot be treated at this rate then a copper combination treatment would be used in the main basin. The cost of the 0.4 ppm flumioxazin treatment can range from \$500-\$1000 per acre and the cost of the

copper/endothall treatments can range from \$250-\$750 per acre depending on water depth. The cost of a single treatment to all the areas marked in the 2015 surveys with the copper combination would be approximately \$17,000, while treating the same area with flumioxazin would be approximately \$34,000 (2015 map in Figure 19). This treatment may need to be repeated 2-4 times per season and there will likely be more areas containing this invasive in 2016. A single treatment of just the high priority areas that contained starry stonewort in 2015 would cost approximately \$6,500 with the copper formulation and \$13,000 with flumioxazin (Figure 20). Ideally, IDNR would be able cover some of this expense with GLRI funds, but that is dependent on where, and how much, starry stonewort is found in 2016 and how much, if any, GLRI funding is provided to IDNR. It is important that IDNR communicates with the Association as to where and how much is being treated. Areas that are left untreated could potentially be treated with private funds, if available.

Another major concern of LTPOA members is the abundance of eel grass in the lakes. Eel grass is considered a beneficial species for fish and wildlife, so control will be closely monitored by IDNR. Additionally, due to the decline in native diversity and coverage observed in 2013 and 2014 native control will be a concern for IDNR in 2016. It is advised that eel grass control should be a three pronged approach that involves herbicide treatment in approved areas, physical removal of washed up plant material, and education and/or restrictions on near shore boating which is likely helping to create the floating mats. IDNR approved 11 acres for treatment in 2014, but treatment of this acreage in 2015 would have exceeded the 30 acres maximum placed upon the basin. If the 30 acre treatment limit is not reached and eel grass requires treatment, the cost of this treatment in 2016 would be approximately \$5,000.00. LTPOA contracted with local businesses to remove washed up plant material in previous years. It is recommended that they plan on that budgetary expense in 2016 as treatments will not be enough to keep this plant in check.

In order to locate and control invasive species and monitor the changes in native vegetation, surveys are an important component of the plan. Vegetation sampling should consist of an invasive species mapping survey in mid-April, early to mid-June, and late summer. Tier 2 surveys should be completed in June and late summer. The cost of the plant survey along with the plan update would be approximately \$8,000.00.

In addition, the ecozone should continue to be monitored in order to assess its effectiveness at reestablishing native plant beds. Tier 2 and emergent vegetation surveys were completed in 2008 and 2012 and should be completed in 2016. Data comparisons would give the Association and IDNR an objective assessment of the effectiveness of the ecozone.

Listed below are recommendations for meeting the goals of the aquatic vegetation management plan:

1. Complete invasive species surveys in the late April/early May, June, and late summer of 2016 in order to locate any areas of invasive species. The increased numbers of surveys is needed in order to locate areas of starry stonewort. Tier 2

surveys should be completed in June and August in order to help locate invasive areas and document changes in the native plant community. Data should be used to update the Aquatic Vegetation Management Plan.

2. Complete treatment to all areas of starry stonewort with a combination of 0.4 ppm of flumioxazin in channel areas and main lake areas where allowed by IDNR. A combination of 0.8 ppm of chelated copper (Cutrine Ultra) and 0.17 ppm of endothall (Hydrothol 191) may be needed in main lake areas.
3. Complete treatment of invasive milfoil and curly-leaf pondweed with 2,4-D liquid and Aquathol K. Treatment should be completed in late April or early May of 2016 when water temperatures approach 50° F (warming trend) and are not higher than 60° F.
4. Work at limiting the impact of eel grass through herbicide treatments, manual removal of washed up fragments, and education of boaters on the impact of near shore boating.
5. Continue to monitor the ecozone area with Tier 2 and emergent vegetation surveys.

<u>2016 Budget</u>	<u>Cost Estimate</u>
Pretreatment visual surveys (3), Tier 2 Surveys (2), and AVMP Update:	\$8,000.00
Treatment of 50 acres of starry stonewort. Estimate for 3 applications per year:	\$95,000.00
Treatment of 30 acres of Eurasian watermilfoil on the main lake:	\$9,000.00
Treatment of 30 acres of curly-leaf pondweed on the main lake:	\$9,000.00
Treatment of 30 acres of channels for control of both Eurasian watermilfoil and curly-leaf pondweed with a combination of 1.0 ppm Aquathol K and 1.0 ppm 2,4-D:	\$12,000.00
Complete Tier 2 and emergent plant bed mapping of ecozone:	\$2,500.00
Total cost estimate <u>with</u> starry stonewort:	\$135,500.00
Total cost estimate <u>without</u> starry stonewort:	\$40,500.00
LARE Share (\$35,000 max for treatment, 80% of sampling & plan expenses):	\$41,400.00
Association Cost Share if Grant Awarded and Starry Stonewort Included:	\$92,100.00

#### 4.0 PUBLIC INVOLVEMENT

Aquatic Control Inc. attended a meeting of the LTPOA on September 29, 2015, to present the results of the herbicide treatment and discuss the 2016 strategy. Thirteen individuals attended the meeting and completed the lake use survey (Table 13). Several attendants at the meeting expressed their concerns about the spread of starry stonewort and the abundance of eel grass this summer.

**Table 13. Lake User Survey, September 29, 2015.**

Lake and Date	Tippe	9/29/2015
Are you a lake property owner?	Yes 92.9%	No 7.1%
Are you currently a member of your lake association?	Yes 92.9%	No 7.1%
How many years have you been at the lake?	2 or Less: 7.1%	5 to 10: 14.3%
	2 to 5: 0%	Over 10: 78.6%
How do you use the lake (mark all that apply)	Swimming 100%	Irrigation 21.4%
	Boating 100%	Drinking water 7.1%
	Fishing 50%	Other? _____
Do you have aquatic plants at your shoreline in nuisance quantities?	Yes:78.6% No:21.4%	
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes:78.6% No:21.4%	
Does the level of vegetation in the lake affect your property values?	Yes:64.3% No:21.4%	
Are you in favor of continuing efforts to control vegetation on the lake?	Yes:100% 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:71.4% No:14.3%	
Were you satisfied with the results of the LARE funded invasive treatments this season?	Yes:42.9% No:35.7%	
Mark any of these you think are problems on your lake:		
28.6% Too many boats access the lake		
28.6% Use of jet skis on the lake		
0 % Too much fishing		
0 % Fish population problem		
64.3% Dredging needed		
7.1 % Overuse by nonresidents		
78.6% Too many aquatic plants		
0 % Not enough aquatic plants		
7.1 % Poor water quality		
14.3% Pier/funneling problem		
1. Eel Grass is a serious problem.		
2. Invasion of weeds in the past few years has been a nuisance-makes swimming not so enjoyable		
3. Eel Grass is a particular problem on the lake.		
4. Large Bass tournaments that carry in other vegetation from many Indiana lakes.		
5. Biggest concerns are lyngbya and Starry Stonewort!		
6. Further education is needed for use of large-wake boats so as to not degrade shorelines.		
7. Better education of fishing contest participants of keeping other peoples invasive out of lake.		
8. Starry Stonewort a problem.		
9. Starry Stonewort is major problem in our channel. (T14A)		
10. Im on the north side. I've spent \$300 for weed removal this summer. We need help!		
11. Boats & Pontoons not obeying "no wake" areas.		

## 5.0 REFERENCES CITED

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- Aquatic Control Inc. 2013. Lake Tippecanoe Aquatic Vegetation Management Plan 2012 Update Report to Lake Tippecanoe Property Owners Association. Syracuse, Indiana.
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## 6.0 APPENDICES

### 6.1 Data Sheets

#### 6.1.1 Oswego Lake

##### Oswego Spring Survey

WPT	Lat	Long	Depth	Eurasian watermilfoil	Fil. Algae	Chara	Illinois pondweed	Sago pondweed	Slender naiad	Coontail	Eel grass	Flat-stemmed pondweed	Richardson's pondweed
141	41.329775	-85.782915	3		P	3	1						
142	41.329647	-85.783899	6			5							
143	41.329411	-85.785196	4		P	1							
144	41.329092	-85.78401	4			1	1	1	1				
145	41.328427	-85.783947	4		P	1	1						
146	41.327774	-85.784631	6		P			1					
147	41.327084	-85.784789	4		P								
148	41.326647	-85.784664	7		P	1							
149	41.326238	-85.784699	12		P								
150	41.326913	-85.785582	6		P								
151	41.326409	-85.785756	16		P								
152	41.326373	-85.786368	13		P								
153	41.326313	-85.786356	12										
154	41.326235	-85.787014	12		P		1						
155	41.32627	-85.787475	17										
156	41.32699	-85.787461	5							1			
157	41.327913	-85.787409	6		P	1	1			5			
158	41.326397	-85.788236	6	1	P					1			
159	41.326128	-85.787942	16		P					1			
160	41.32584	-85.788232	17		P								
161	41.325445	-85.788554	16		P					3			
162	41.325056	-85.788471	18										
163	41.324637	-85.788667	7							5			
164	41.324006	-85.788714	4		P	3	1						
165	41.324372	-85.787952	14										
166	41.324301	-85.78712	19										
167	41.323945	-85.786198	14										
168	41.324006	-85.785377	11							5			
169	41.324373	-85.784686	5		P	1					1	1	1
170	41.325016	-85.784228	16		P								
171	41.325385	-85.783582	4		P	1							
172	41.325709	-85.784274	11		P								
173	41.326049	-85.784891	17										
174	41.326254	-85.785211	16										
175	41.326123	-85.78382	6		P								
176	41.324531	-85.784173	3			5							
177	41.323996	-85.787066	12							1			
178	41.324112	-85.788063	11							5			
179	41.327624	-85.783909	6		P								
180	41.328574	-85.783051	6		P								

***Oswego Summer Survey***

WPT	Lat	Long	Depth	Spiny naiad	Fil. Algae	Chara	Illinois pondweed	Sago pondweed	Slender naiad	Coontail	Eel grass	Richardson's pondweed	Southern naiad	Nittella
141	41.329775	-85.782915	2			3					5			
142	41.329647	-85.783899	5			5					5			
143	41.329411	-85.785196	5			5					5		1	
144	41.329092	-85.78401	3			5					3			
145	41.328427	-85.783947	5			3		1			3			
146	41.327774	-85.784631	6		P									
147	41.327084	-85.784789	6		P									
148	41.326647	-85.784664	6		P								1	
149	41.326238	-85.784699	13		P									
150	41.326913	-85.785582	5		P									
151	41.326409	-85.785756	11		P									
152	41.326373	-85.786368	11											
153	41.326313	-85.786356	11		P									
154	41.326235	-85.787014	11											
155	41.326653	-85.787508	11		P									
156	41.32699	-85.787461	4		P									
157	41.327913	-85.787409	6							1	5			
158	41.326397	-85.788236	6								3			
159	41.326128	-85.787942	17											
160	41.32584	-85.788232	18											
161	41.325445	-85.788554	16							1				
162	41.325056	-85.788471	19											
163	41.324637	-85.788667	15											
164	41.324006	-85.788714	3			3	3				1			
165	41.324372	-85.787952	17											
166	41.324301	-85.78712	18											
167	41.323945	-85.786198	16											
168	41.324006	-85.785377	11				1			5	1	1		
169	41.324373	-85.784686	7				1			5	3			
170	41.325016	-85.784228	16											
171	41.325198	-85.784108	11											
172	41.325709	-85.784274	18		P									
173	41.326049	-85.784891	20		P									
174	41.32634	-85.784683	6		P		1				5			
175	41.326136	-85.784423	11		P									
176	41.324928	-85.7842	9											
177	41.323996	-85.787066	7				1		1		1			
178	41.324112	-85.788063	8				1				5	1		
179	41.327624	-85.783909	4					1		3	3			1
180	41.328574	-85.783051	3	1				5			3			

### Oswego Comparison

Survey or	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/25/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	33	40	40	40	40	40	40	40	40	40	40	40
Littoral Sites	33	39	35	37	40	37	33	32	26	30	35	33
Sites with Plants	31	38	30	36	33	29	25	26	17	21	21	17
Sites with Native Plants	29	38	28	36	33	29	25	26	17	21	21	17
Percent Littoral Coverage	94%	97%	86%	97%	83%	78%	76%	81%	65%	70%	60%	43%
Maximum Plant Depth	24	17	12	19	20	19	18	15	10	15	16	16
Secchi (ft)	NA	6	12	5.5	7.5	6	7	9	7	10	17.5	8.5
Number of Species	8	12	7	16	14	9	10	10	12	11	9	10
Number of Native Species	6	9	5	13	11	8	8	8	10	9	8	9
Species Diversity	0.79	0.84	0.83	0.85	0.82	0.80	0.86	0.81	0.84	0.84	0.77	0.81
Native Species Diversity	0.66	0.80	0.76	0.82	0.79	0.80	0.83	0.79	0.82	0.81	0.76	0.80
Mean Native Species/Site	1.09	1.65	0.93	1.95	1.74	1.37	1.38	1.33	1.25	1.08	0.80	1.05
Species Frequency of Occurrence - Depth: 0 to 20 ft												
Eurasian watermilfoil	51.5	10.0	10.0	5.0	7.5	0.0	5.0	0.0	2.5	0.0	2.5	0.0
Curly-leaf pondweed	27.3	7.5	22.5	2.5	5.0	0.0	0.0	2.5	0.0	7.5	0.0	0.0
Brittle naiad	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	5.0	0.0	12.5	2.5	2.5	0.0	7.5	2.5	5.0	0.0	2.5
Coontail	57.6	50.0	25.0	35.0	45.0	40.0	25.0	30.0	7.5	17.5	22.5	12.5
Sago pondweed	0.0	17.5	0.0	12.5	5.0	20.0	12.5	7.5	5.0	10.0	5.0	7.5
Chara sp.	21.2	35.0	27.5	47.5	30.0	15.0	15.0	25.0	17.5	27.5	27.5	15.0
Nitella	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	2.5
Eel grass	12.1	37.5	0.0	55.0	55.0	37.5	40.0	40.0	40.0	30.0	2.5	37.5
Richardson's pondweed	0.0	5.0	5.0	7.5	7.5	7.5	12.5	2.5	0.0	2.5	2.5	5.0
Illinois pondweed	0.0	5.0	0.0	0.0	2.5	10.0	0.0	2.5	10.0	5.0	15.0	15.0
Leafy pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	2.5	0.0	0.0
Small pondweed	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slender naiad	0.0	7.5	0.0	5.0	12.5	0.0	15.0	2.5	5.0	0.0	2.5	2.5
Canada waterweed	0.7	2.5	0.0	0.0	5.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	2.5	0.0	0.0	0.0	22.5	22.5	10.0	0.0	5.0
Large-leaved pondweed	0.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	16.4	0.0	0.0	0.0	7.5	2.5	12.5	0.0	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	19.3	5.0	22.5	7.5	2.5	5.0	0.0	0.0	2.5	2.5	2.5	0.0
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common bladderwort	0.7	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	12.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	33.3	12.5	0.0	0.0	0.0	0.0	20.0	40.0	25.0	50.0	60.0	32.5
Species Frequency of Occurrence - Depth: 0 to 5 ft												
Eurasian watermilfoil	52.4	5.3	0.0	9.5	0.0	0.0	0.0	0.0	5.6	0.0	5.6	0.0
Curly-leaf pondweed	23.8	0.0	21.7	4.8	10.0	0.0	0.0	5.3	0.0	0.0	53.6	0.0
Spiny naiad	0.0	5.3	0.0	14.3	10.0	6.7	0.0	15.8	5.6	20.0	0.0	10.0
Coontail	42.9	21.1	21.7	14.3	20.0	26.7	14.3	21.1	5.6	20.0	50.0	10.0
Sago pondweed	0.0	26.3	0.0	23.8	10.0	46.7	42.9	15.8	5.6	40.0	0.0	30.0
Chara sp.	28.6	63.2	43.5	76.2	60.0	33.3	57.1	47.4	27.8	60.0	22.2	50.0
Nitella	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	10.0
Eel grass	19.0	57.9	0.0	61.9	80.0	53.3	100.0	57.9	72.2	60.0	0.0	80.0
Richardson's pondweed	0.0	5.3	4.3	4.8	10.0	13.3	28.6	5.3	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	10.5	0.0	0.0	0.0	20.0	0.0	5.3	16.7	20.0	5.6	10.0
Small pondweed	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	10.0	0.0	0.0
Slender naiad	0.0	5.3	0.0	4.8	10.0	0.0	14.3	5.3	5.6	0.0	16.7	0.0
Canada waterweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0
Southern naiad	0.0	0.0	0.0	4.8	0.0	0.0	0.0	36.8	38.9	20.0	16.7	10.0
Large-leaved pondweed	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	14.3	0.0	0.0	0.0	10.0	6.4	28.6	0.0	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	4.8	10.5	30.4	4.8	10.0	6.7	0.0	0.0	0.0	10.0	0.0	0.0
Horned pondweed	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	47.6	15.8	0.0	0.0	0.0	0.0	0.0	52.6	44.4	50.0	11.1	20.0

***Oswego Comparison Continued***

Species Frequency of Occurrence - Depth: 5 to 10 ft												
Eurasian watermilfoil	71.4	25.0	40.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0
Curly-leaf pondweed	57.1	25.0	40.0	7.1	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0
Coontail	85.7	66.7	40.0	64.3	50.0	55.6	60.0	25.0	25.0	30.0	93.8	20.0
Sago pondweed	0.0	16.7	0.0	0.0	10.0	11.1	0.0	0.0	12.5	0.0	0.0	0.0
Chara sp.	14.3	16.7	10.0	21.4	50.0	11.1	0.0	25.0	25.0	30.0	12.5	0.0
Nitella	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
Eel grass	0.0	33.3	0.0	64.3	80.0	66.7	0.0	50.0	37.5	60.0	0.0	60.0
Richardson's pondweed	0.0	8.3	10.0	14.3	10.0	11.1	0.0	0.0	0.0	10.0	0.0	10.0
Illinois pondweed	0.0	0.0	0.0	0.0	10.0	11.1	0.0	0.0	12.5	0.0	0.0	40.0
Slender naiad	0.0	16.7	0.0	7.1	20.0	0.0	0.0	0.0	12.5	0.0	6.3	10.0
Spiny naiad	0.0	8.3	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada waterweed	0.0	8.3	0.0	7.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	10.0	0.0	10.0
Large-leaved pondweed	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	14.3	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	0.0	0.0	20.0	14.3	0.0	11.1	0.0	0.0	12.5	0.0	0.0	0.0
Whorled watermilfoil	0.0	0.0	10.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	0.0	8.3	0.0	0.0	0.0	0.0	0.0	75.0	25.0	50.0	18.8	40.0
Species Frequency of Occurrence - Depth: 10 to 15 ft												
Eurasian watermilfoil	25.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Curly-leaf pondweed	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0
Coontail	75.0	100.0	0.0	100.0	50.0	50.0	18.2	77.8	0.0	30.0	68.8	10.0
Chara sp.	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0
Eel grass	0.0	0.0	0.0	0.0	60.0	0.0	0.0	33.3	0.0	60.0	6.3	10.0
Richardson's pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	10.0
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
Slender naiad	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada waterweed	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	10.0	0.0	0.0
Filamentous algae	25.0	20.0	0.0	0.0	0.0	0.0	0.0	44.0	0.0	50.0	0.0	50.0
Species Frequency of Occurrence - Depth: 15 to 20 ft												
Coontail	0.0	75.0	NA	100.0	60.0	50.0	0.0	0.0	0.0	0.0	10.0	10.0
Eel grass	0.0	0.0	NA	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0
Richardson's pondweed	0.0	0.0	NA	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0

### 6.1.2 Tippecanoe Lake Tippecanoe Spring Survey

WPT	Lat	Long	Depth	Eurasian watermilfoil	Starry stonewort	Curly-leaf pondweed	Fil. Algae	Eel grass	Coontail	Sago pondweed	Slender Naiad	Chara	Richardson's pondweed	Illinois pondweed	Variable pondweed
181	41.328204	-85.777431	13	1											
182	41.328712	-85.775322	16												
183	41.329643	-85.773605	4				P								
184	41.330895	-85.771664	17												
185	41.33147	-85.769914	3				P	1							
186	41.330896	-85.768256	11					1	5						
187	41.330218	-85.766825	4				P			1					
188	41.329269	-85.765498	16						5						
189	41.328611	-85.764031	7				P				1				
190	41.328144	-85.762773	11						1						
191	41.327052	-85.762321	6				P	1		1		1			
192	41.326123	-85.76214	5				P	1		1					
193	41.325777	-85.761345	13												
194	41.324935	-85.760697	3					1					3		
195	41.324916	-85.759228	6				P			1		1	3		
196	41.324233	-85.758057	3				P			1		1			
197	41.324364	-85.756407	14												
198	41.323357	-85.756982	4				P			1	1	1	3		
199	41.322541	-85.756801	13						3						
200	41.321564	-85.757022	6				P			1					
201	41.320453	-85.756391	6						5						
202	41.319665	-85.755803	16				P								
203	41.318829	-85.755404	6				P					1			
204	41.319147	-85.753859	6						3	1	3		3		
205	41.318192	-85.753599	4				P	1							
206	41.317091	-85.753037	7		5				1			1			
207	41.316462	-85.751712	3									3			
208	41.318097	-85.750765	6				P			1					
209	41.317995	-85.748948	2		5										
210	41.319323	-85.748181	4				P								
211	41.319605	-85.746716	6				P		1						
212	41.31874	-85.745822	3				P		1						
213	41.319017	-85.743988	3				P								
214	41.320199	-85.744685	7				P		1						
215	41.320647	-85.742727	6												
216	41.321847	-85.740786	4				P		1	3					
217	41.323165	-85.74061	4				P								
218	41.323922	-85.742285	4				P								
219	41.32299	-85.743691	7				P		5						
220	41.323501	-85.745302	6				P		3	1					
221	41.323234	-85.746704	11						1						
222	41.322735	-85.747984	6			1	P	1		1					
223	41.323402	-85.74928	12						1						
224	41.324056	-85.750354	18												
225	41.324681	-85.751587	6				P						3		
226	41.326352	-85.752094	6						1						
227	41.327405	-85.753172	8						5						
228	41.327247	-85.754867	18												
229	41.326891	-85.756155	11				P								
230	41.327524	-85.757309	4				P	1							
231	41.328492	-85.75848	8				P		3						
232	41.329071	-85.759699	18												
233	41.330139	-85.760535	5				P	1							
234	41.331405	-85.761159	16												
235	41.332729	-85.761634	17						1						
236	41.333843	-85.762297	11				P								
237	41.335093	-85.76355	13							3					
238	41.336051	-85.764806	11				P	1	1						
239	41.336982	-85.765942	13												
240	41.337768	-85.767387	14					5							
241	41.337833	-85.768485	4				P			1					
242	41.337164	-85.76911	6								1				
243	41.336971	-85.770222	12				P								
244	41.336582	-85.770951	6					3							
245	41.336912	-85.77221	14				P	3							
246	41.337313	-85.773449	4				P		3	1					
247	41.336731	-85.773796	9				P								
248	41.336419	-85.775075	4				P								
249	41.33581	-85.774817	8												
250	41.335506	-85.775789	11				P								
251	41.335448	-85.776939	7				P		1						
252	41.33601	-85.778217	4				P								
253	41.335332	-85.779154	3							3		1			
254	41.334693	-85.77832	16				P								
255	41.334122	-85.779603	13						5						
256	41.333718	-85.778437	11				P		1						
257	41.332739	-85.778804	6						3						
258	41.332138	-85.778065	11												
259	41.33144	-85.77817	4				P								
260	41.330687	-85.77821	6				P				1				
261	41.329843	-85.77831	11												
262	41.330266	-85.779611	6				P				1				
263	41.329785	-85.780509	14						5						
264	41.328625	-85.780055	4				P					5			
265	41.328168	-85.77868	11						1				3		
266	41.328303	-85.776432	4				P			1		3	1		
267	41.328593	-85.773884	3							1		1	1	1	
268	41.330159	-85.772536	3				P					1			
269	41.330761	-85.770773	4				P			1		3			1
270	41.33171	-85.76904	11								1				

**Tippecanoe Summer Survey**

WPT	Lat	Long	Depth	Eurasian watermilfoil	Starry stonewort	Curly-leaf pondweed	Fil. Algae	Eel grass	Coontail	Sago pondweed	Slender Naiad	Chara	Richardson's pondweed	Illinois pondweed	Variable pondweed	Southern naiad	Flat-stemmed pondweed
181	41.328204	-85.777431	4						5				3				
182	41.328712	-85.775322	7					1	5								
183	41.329643	-85.773605	6				P					1					
184	41.330895	-85.771664	12						1								
185	41.33147	-85.769914	3					1				1					
186	41.330896	-85.768256	11				P	3	5		1					1	
187	41.330218	-85.766825	11						1								
188	41.329269	-85.765498	7					5	1								
189	41.328611	-85.764031	14					5	3								
190	41.328144	-85.762773	3					1									
191	41.327052	-85.762321	14						1								
192	41.326123	-85.76214	6					1				5					
193	41.325777	-85.761345	11						3								
194	41.324935	-85.760697	3					5		5			3				
195	41.324916	-85.759228	6					1									
196	41.324233	-85.758057	3					5					3				
197	41.324364	-85.756407	6					3			1						
198	41.323357	-85.756982	7					5	5	5							
199	41.322541	-85.756801	18				P										
200	41.321564	-85.757022	4					5	1	3							
201	41.320453	-85.756391	7		5												
202	41.319665	-85.755803	16														
203	41.318829	-85.755404	4					3		5		1					1
204	41.319147	-85.753859	6						1		1						
205	41.318192	-85.753599	4		1			5		1							
206	41.317091	-85.753037	4					3									
207	41.316462	-85.751712	3									5					
208	41.318097	-85.750765	13				P		1								
209	41.317995	-85.748948	3											5			
210	41.319323	-85.748181	4				P										
211	41.319605	-85.746716	8				P										
212	41.31874	-85.745822	3				P										
213	41.319017	-85.743988	2				P	1	1				1			1	
214	41.320199	-85.744685	16														
215	41.32081	-85.743896	7						3								
216	41.321847	-85.740786	3	1				1	1	3		1					
217	41.323165	-85.74061	6				P	1									
218	41.323922	-85.742285	3				P	1									
219	41.32299	-85.743691	11					1	1								
220	41.323501	-85.745302	9					5									
221	41.323234	-85.746704	6					5									
222	41.322735	-85.747984	5				P	1					3				
223	41.323402	-85.74928	16					1									
224	41.323699	-85.750848	11														
225	41.324681	-85.751587	4					3					3				
226	41.326352	-85.752094	6					5	5		1						
227	41.327405	-85.753172	13						5								
228	41.327247	-85.754867	19														
229	41.326891	-85.756155	12														
230	41.327524	-85.757309	3				P	3									
231	41.328492	-85.75848	13				P		5								
232	41.329071	-85.759699	19									3				1	
233	41.330139	-85.760535	3					5									
234	41.331405	-85.761159	11						1								
235	41.332729	-85.761634	20														
236	41.333843	-85.762297	20														
237	41.335093	-85.76355	6					5	1				1				
238	41.336051	-85.764806	11					3	1								
239	41.336982	-85.765942	15														
240	41.337768	-85.767387	9					1	1								
241	41.337469	-85.768412	7				P	5	1								
242	41.337164	-85.76911	11						5								
243	41.336971	-85.770222	12					5	5								
244	41.336582	-85.770951	4					3			5		1				
245	41.336912	-85.77221	7					5								3	
246	41.337313	-85.773449	6					5									
247	41.336731	-85.773796	12				P	1									
248	41.336419	-85.775075	3				P					1					
249	41.33581	-85.774817	20														
250	41.335506	-85.775789	20														
251	41.335448	-85.776939	4				P										
252	41.33601	-85.778217	2					1									
253	41.335332	-85.779154	6					3				5					
254	41.334693	-85.77832	14														
255	41.334122	-85.779603	9					3				1					
256	41.333718	-85.778437	13						3							5	
257	41.332739	-85.778804	7		3			5		3							
258	41.332138	-85.778065	12														
259	41.33144	-85.77817	3					5				5					
260	41.330687	-85.77821	14														
261	41.329843	-85.77831	6				P										
262	41.330266	-85.779611	6					5	5	5			1				
263	41.329785	-85.780509	13					1		5							
264	41.328625	-85.780055	4					5				5					
265	41.328168	-85.77868	11														
266	41.328303	-85.776432	6					5				1				1	
267	41.328593	-85.773884	3					5				5				3	
268	41.330159	-85.772536	3				P										
269	41.330761	-85.770773	3					5		1		5					
270	41.331725	-85.769011	8					1					3				

### Tippecanoe Comparison

Surveyor	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/25/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	140	119	119	119	90	89	89	90	90	90	90	90
Littoral Sites	134	119	113	115	87	89	83	89	82	78	87	86
Sites with Plants	119	106	81	95	78	81	67	69	50	48	62	69
Sites with Native Plants	99	103	68	95	76	81	67	68	50	48	60	68
Percent Littoral Coverage	89%	89%	72%	83%	90%	91%	81%	78%	61%	62%	69%	80%
Maximum Plant Depth	17	19	16	17	17	22	18	21	16	14	17	17
Secchi (ft)	-	6	13	6	7	6	7	8	6	9	19.5	6
Number of Species	12	12	10	15	16	13	11	14	12	10	11	11
Number of Native Species	10	10	8	13	14	12	10	12	11	8	8	9
Species Diversity	0.83	0.82	0.83	0.83	0.84	0.81	0.75	0.84	0.81	0.80	0.82	0.78
Native Species Diversity	0.79	0.78	0.79	0.82	0.82	0.80	0.73	0.82	0.80	0.79	0.81	0.77
Mean Native Species/Site	0.97	1.54	0.77	1.70	1.75	1.79	1.31	1.79	1.17	1.01	1.03	1.47
Species Frequency of Occurrence - Depth: 0 to 25 ft												
Eurasian watermilfoil	22.9	19.3	5.0	3.4	10.0	9.0	4.5	12.2	1.1	1.1	1.1	1.1
Curly-leaf pondweed	45.7	3.4	30.3	0.8	4.4	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.2	3.3
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Coontail	13.6	26.1	16.8	26.9	35.6	36.0	23.6	22.2	11.1	21.1	30.0	32.2
Spiny coontail	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sago pondweed	0.0	10.9	0.0	10.1	5.6	13.5	6.7	28.9	21.1	15.6	21.1	11.1
Chara sp.	30.7	23.5	19.3	18.5	25.6	37.1	11.2	26.7	14.4	10.0	14.4	16.7
Eel grass	12.9	61.3	3.4	58.0	55.6	58.4	60.7	53.3	41.1	34.4	14.4	55.6
Slender naiad	0.0	5.9	0.0	1.7	4.4	1.1	4.5	3.3	4.4	2.2	7.8	5.6
Richardson's pondweed	0.0	9.2	4.2	7.6	10.0	4.5	14.6	5.6	0.0	5.6	8.9	11.1
Canada waterweed	0.7	0.0	0.8	0.8	3.3	2.2		2.2	0.0	0.0	0.0	0.0
Variable pondweed	16.4	3.4	0.0	0.0	2.2	4.5	6.7	3.3	3.3	0.0	1.1	0.0
Flat-stemmed pondweed	19.3	6.7	21.8	11.8	0.0	12.4	1.1	1.1	1.1	0.0	0.0	1.1
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Common Bladderwort	0.7	0.0	0.0	16.0	0.0	0.0	1.1	0.0	2.2	0.0	0.0	0.0
Water stargrass	0.7	5.0	2.5	11.8	11.1	6.7	0.0	2.2	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	3.4	0.0	1.1	0.0	26.7	13.3	8.9	0.0	7.8
Small pondweed	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	11.8	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	1.7	0.0	2.5	0.0	1.1	1.1	3.3	3.3	3.3	1.1	1.1
Leafy pondweed	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	8.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	48.6	13.4	0.0	0.0	0.0	0.0	0.0	12.2	17.8	24.4	58.9	21.1
Species Frequency of Occurrence - Depth: 0 to 5 ft												
Eurasian watermilfoil	29.5	13.2	6.3	0.0	3.1	4.5	8.0	11.6	2.2	0.0	0.0	3.4
Curly-leaf pondweed	42.3	3.8	39.7	0.0	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4	3.4
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0
Coontail	9.0	13.2	4.8	7.9	3.1	2.3	12.0	9.3	8.9	31.0	10.3	13.8
Sago pondweed	0.0	11.3	0.0	6.3	6.3	22.7	4.0	39.5	33.3	20.7	37.9	20.7
Chara sp.	38.5	34.0	22.2	17.5	65.6	68.2	32.0	41.9	28.9	13.8	31.0	31.0
Eel grass	12.8	67.9	3.2	65.1	59.4	72.7	60.0	67.4	55.6	58.6	20.7	72.4
Slender naiad	0.0	11.3	0.0	3.2	9.4	2.3	4.0	0.0	6.7	3.4	3.4	6.9
Richardson's pondweed	0.0	17.0	3.2	9.5	6.3	9.1	16.0	7.0	0.0	3.4	13.8	24.1
Canada waterweed	0.0	0.0	0.0	0.0	6.3	0.0	0.0	2.3	0.0	0.0	0.0	0.0
Variable pondweed	19.2	5.7	0.0	0.0	6.3	9.1	0.0	7.0	4.4	0.0	3.4	0.0
Flat-stemmed pondweed	25.6	9.4	31.7	11.1	0.0	18.2	4.0	0.0	2.2	0.0	0.0	3.4
Horned pondweed	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common Bladderwort	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0
Water stargrass	1.3	5.7	1.6	27.0	6.3	4.5	0.0	4.7	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	3.2	0.0	2.3	0.0	34.9	20.0	13.8	0.0	10.3
Small pondweed	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	11.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	1.9	0.0	4.8	0.0	0.0	4.0	4.7	6.7	3.4	3.4	3.4
Leafy pondweed	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	1.3	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	55.1	18.9	0.0	0.0	0.0	0.0	0.0	20.9	28.9	44.8	66.2	31.0

**Tippecanoe Comparison Continued**

Species Frequency of Occurrence - Depth: 5 to 10 ft												
Eurasian watermilfoil	15.4	41.9	9.1	13.6	8.3	21.1	2.7	13.6	0.0	3.7	0.0	0.0
Curly-leaf pondweed	61.5	6.5	31.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	7.4
Coontail	23.1	22.6	40.9	63.6	37.5	57.9	16.2	40.9	13.6	22.2	44.4	37.0
Sago pondweed	0.0	22.6	0.0	18.2	4.2	5.3	13.5	31.8	13.6	25.9	25.9	11.1
Chara sp.	15.4	6.5	4.5	4.5	8.3	15.8	5.4	22.7	0.0	11.1	14.8	18.5
Eel grass	15.4	71.0	4.5	72.7	83.3	84.2	83.8	59.1	45.5	40.7	11.1	77.8
Slender naiad	0.0	0.0	0.0	0.0	4.2	0.0	3.0	4.5	0.0	3.7	18.5	7.4
Richardson's pondweed	0.0	6.5	9.1	9.1	12.5	0.0	21.6	4.5	0.0	14.8	11.1	11.1
Canada waterweed	0.0	0.0	0.0	4.5	4.2	10.5	0.0	4.5	0.0	0.0	0.0	0.0
Variable pondweed	15.4	15.4	15.4	0.0	0.0	0.0	8.1	0.0	4.5	0.0	0.0	0.0
Flat-stemmed pondweed	23.1	6.5	22.7	22.7	0.0	15.8	0.0	4.5	0.0	0.0	0.0	0.0
Horned pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0
Common Bladderwort	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	6.5	9.1	4.5	25.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	9.1	0.0	0.0	0.0	31.8	13.6	7.4	0.0	11.1
Northern watermilfoil	0.0	0.0	0.0	13.6	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	3.2	0.0	0.0	0.0	5.3	0.0	4.5	0.0	3.7	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable watermilfoil	0.0	0.0	0.0	15.4	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.0	0.0	22.7	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	61.5	16.1	0.0	0.0	0.0	0.0	0.0	9.1	13.6	22.2	66.7	18.5
Species Frequency of Occurrence - Depth: 10 to 15 ft												
Eurasian watermilfoil	0.0	0.0	0.0	14.3	20.8	16.7	6.7	15.4	0.0	0.0	0.0	0.0
Curly-leaf pondweed	66.7	0.0	28.6	0.0	4.2	0.0	0.0	0.0	0.0	0.0	3.7	0.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0
Coontail	66.7	70.0	57.1	57.1	58.3	66.7	73.3	30.8	15.4	16.7	44.4	62.5
Spiny coontail	0.0	0.0	0.0	0.0	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sago pondweed	0.0	0.0	0.0	14.3	8.3	8.3	0.0	7.7	0.0	4.2	25.9	4.2
Chara sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	8.3	14.8	0.0
Eel grass	33.3	40.0	0.0	42.9	45.8	25.0	53.3	30.8	7.4	12.5	11.1	29.2
Slender naiad	0.0	0.0	0.0	0.0	0.0	0.0	13.3	7.7	7.7	0.0	18.5	4.2
Richardson's pondweed	0.0	0.0	0.0	0.0	16.7	0.0	6.7	7.7	0.0	0.0	11.1	0.0
Flat-stemmed pondweed	16.7	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	10.0	0.0	14.3	8.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	8.3	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	14.3	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae		0.0		0.0	0.0	0.0	0.0	0.0	0.0	8.3	66.7	16.7
Species Frequency of Occurrence - Depth: 15 to 20 ft												
Eurasian watermilfoil	0.0	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Curly-leaf pondweed	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coontail	33.3	50.0	0.0	50.0	80.0	90.9	8.3	30.0	0.0	0.0	20.0	0.0
Sago pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	12.5	0.0	0.0	0.0
Chara sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
Eel grass	0.0	16.7	0.0	0.0	0.0	9.1	0.0	10.0	0.0	0.0	0.0	10.0
Slender naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Filamentous algae	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0
Species Frequency of Occurrence - Depth: 20 to 25 ft												
Coontail	0.0	NA	0.0	0.0	0.0	66.7	0.0	50.0	0.0	NA	NA	NA
Spiny coontail	0.0	NA	0.0	0.0	10.0	0.0	0.0	0.0	0.0	NA	NA	NA
Sago pondweed	0.0	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	NA	NA

**6.1.3 James Lake**  
**James Spring Survey**

WPT	Lat	Long	Depth	Eurasian watermilfoil	Curly-leaf pondweed	Fil. Algae	Chara	Coontail	Sago pondweed	Flat-stemmed pondweed	Eel grass	Slender naiad
271	41.322327	-85.733135	4				5					
272	41.322978	-85.732155	8				5	1				
273	41.322295	-85.731323	3			P	3					
274	41.321508	-85.730298	16					3				
275	41.320924	-85.730016	16									
276	41.320177	-85.730186	3				5		1			
277	41.3193	-85.730257	19									
278	41.3183	-85.730305	15									
279	41.317778	-85.729503	3			P	5					
280	41.317156	-85.729125	4			P	3					
281	41.316232	-85.72927	6					3				
282	41.315013	-85.729715	11				5					
283	41.314229	-85.729243	13					1				
284	41.31412	-85.73025	8					5				
285	41.313629	-85.731376	2				5	5				
286	41.313478	-85.730753	17			P						
287	41.313006	-85.729947	7					5				
288	41.312493	-85.729281	16					3				
289	41.312106	-85.729032	8					5				
290	41.31222	-85.728127	6				1	5	1	3		
291	41.312248	-85.727204	11					1				
292	41.312069	-85.726177	3			P	1				1	
293	41.312546	-85.725604	11					3				
294	41.31233	-85.724789	3			P	3					
295	41.312905	-85.724127	4	1			3		1			
296	41.313828	-85.724225	4			P	1					
297	41.31433	-85.723216	14					3				
298	41.314029	-85.722491	4					3				
299	41.314578	-85.721796	3									3
300	41.315673	-85.721836	4			P		1				
301	41.316092	-85.722587	6					5				
302	41.317151	-85.723301	16		1			3				
303	41.317857	-85.723613	3			P	1	1				
304	41.318806	-85.72372	16									
305	41.31942	-85.722986	3			P	3					
306	41.319849	-85.723424	9				3					
307	41.320541	-85.723288	11					3				
308	41.321441	-85.723627	11					5				
309	41.322284	-85.724072	3			P						
310	41.322216	-85.725501	6			P						
311	41.323166	-85.725248	14					3				
312	41.323242	-85.726217	17									
313	41.323803	-85.727433	4			P		1				
314	41.323858	-85.728576	4				5					
315	41.323629	-85.729573	7		3			5				
316	41.3242	-85.730225	17					5				
317	41.324785	-85.731044	9					5				
318	41.324941	-85.731848	16									
319	41.325306	-85.732276	13		3			5				
320	41.325573	-85.733056	7					1				
321	41.32557	-85.733927	14					5				
322	41.325263	-85.734786	7									
323	41.325006	-85.735329	12					5				
324	41.324288	-85.735676	12					5				
325	41.32384	-85.736047	6			P		5				
326	41.32337	-85.735817	8					3				
327	41.322955	-85.73535	11		1			5				
328	41.322734	-85.734554	12					3				
329	41.322519	-85.73417	11		1	P	1	1				
330	41.322913	-85.732784	8	5								

**James Summer Survey**

WPT	Lat	Long	Depth	Eurasian watermilfoil	Curly-leaf pondweed	Fil. Algae	Chara	Coontail	Sago pondweed	Flat-stemmed pondweed	Eel grass	Slender naiad	Southern naiad	Illinois pondweed	Common elodea
271	41.322327	-85.733135	3			P					1				
272	41.322978	-85.732155	10				1	3							
273	41.322295	-85.731323	3												
274	41.321508	-85.730298	20												
275	41.320924	-85.730016	20												
276	41.320177	-85.730186	3												
277	41.3193	-85.730257	19												
278	41.3183	-85.730305	15					5							
279	41.317778	-85.729503	3									5			
280	41.317156	-85.729125	4					1							
281	41.316232	-85.72927	4					5							
282	41.315013	-85.729715	20												
283	41.314229	-85.729243	15					5							
284	41.31412	-85.73025	5					5	1						
285	41.313629	-85.731376	3				3	5	3						
286	41.313478	-85.730753	15												
287	41.313006	-85.729947	10					5							
288	41.312493	-85.729281	13					5							
289	41.312106	-85.729032	4					5			5		3		
290	41.31222	-85.728127	9					5							
291	41.312248	-85.727204	9					5							
292	41.312069	-85.726177	2				5	1	1		5		1		
293	41.312546	-85.725604	15												
294	41.31233	-85.724789	2				5	1			1				
295	41.312905	-85.724127	3												
296	41.313828	-85.724225	4			P	1								
297	41.31433	-85.723216	10					5							
298	41.314029	-85.722491	3											1	
299	41.314578	-85.721796	3	3				5				3			1
300	41.315673	-85.721836	6			P		5							
301	41.316092	-85.722587	9					5							
302	41.317151	-85.723301	10					5							
303	41.317857	-85.723613	3									3			
304	41.318806	-85.72372	20												
305	41.31942	-85.722986	3		5						1				
306	41.319849	-85.723424	14												
307	41.320541	-85.723288	15					3							
308	41.321441	-85.723627	17					5							
309	41.322284	-85.724072	6					5							
310	41.322216	-85.725501	6	1		P	1								
311	41.323166	-85.725248	4					1	3		5		1		
312	41.323242	-85.726217	14					5							
313	41.323473	-85.72751	19												
314	41.32339	-85.728878	6					5							
315	41.323629	-85.729573	6					5							
316	41.3242	-85.730225	14					3							
317	41.324785	-85.731044	11					1							
318	41.324543	-85.731356	16												
319	41.324888	-85.732042	19												
320	41.325573	-85.733056	15												
321	41.325404	-85.733892	13					5							
322	41.325263	-85.734786	19												
323	41.325006	-85.735329	15					3							
324	41.324288	-85.735676	6					3							
325	41.323708	-85.735769	15												
326	41.32337	-85.735817	15					5			3				
327	41.322955	-85.73535	9					5							
328	41.322734	-85.734554	9			P		1							
329	41.322519	-85.73417	11					5							
330	41.322913	-85.732784	6					5				5			

**James Comparison**

Surveyor	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
Date	5/24/04	8/26/04	5/17/05	8/8/05	8/2/06	7/23/07	8/20/09	8/29/12	8/28/13	8/12/14	6/3/15	8/4/15
Total Sites	74	64	64	64	60	60	60	60	60	60	60	60
Littoral Sites	65	64	60	63	53	56	57	57	50	60	59	52
Sites with Plants	62	61	54	56	50	46	52	47	32	37	50	43
Sites with Native Plants	56	61	53	56	50	46	52	46	32	37	49	43
Percent Littoral Coverage	95%	95%	90%	89%	94%	82%	91%	82%	64%	62%	85%	83%
Maximum Plant Depth	11	20	15	23	16	20	18	18	15	20	20	17
Secchi (ft)	-	6	16	9	4.5	7	5.5	5.5	4	8	16	4.5
Number of Species	11	14	9	13	14	10	12	12	7	8	8	10
Number of Native Species	9	11	7	12	13	7	10	10	7	8	6	8
Species Diversity	0.80	0.85	0.83	0.79	0.78	0.76	0.80	0.76	0.77	0.76	0.63	0.66
Native Species Diversity	0.71	0.81	0.74	0.78	0.77	0.73	0.79	0.71	0.77	0.76	0.55	0.63
Mean Native Species/Site	1.11	1.89	1.19	1.58	1.43	1.33	1.53	1.20	1.02	0.95	0.98	1.08
Species Frequency of Occurrence - Depth: 0 to 25 ft												
Eurasian watermilfoil	12.2	23.4	32.8	1.6	1.7	6.7	0.0	10.0	0.0	0.0	3.3	3.3
Curly-leaf pondweed	43.2	9.4	43.8	0.0	0.0	1.7	1.7	0.0	0.0	0.0	8.3	1.7
Brittle naiad	0.0	0.0	32.8	0.0	10.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	1.6	0.0	0.0	0.0	1.7	0.0	3.3	0.0	0.0	0.0	0.0
Coontail	43.2	57.8	43.8	54.7	61.7	56.7	51.7	58.3	35.0	35.0	58.3	60.0
Sago pondweed	0.0	6.3	0.0	0.0	6.7	3.3	13.3	11.7	18.3	3.3	5.0	6.7
Chara sp.	36.5	35.9	0.0	28.1	15.0	26.7	26.7	21.7	18.3	25.0	30.0	10.0
Eel grass	1.4	42.2	1.6	37.5	18.3	26.7	31.7	13.3	21.7	16.7	1.7	11.7
Slender naiad	0.0	15.6	0.0	12.5	8.3	10.0	16.7	1.7	3.3	6.7	1.7	6.7
Canada waterweed	0.7	4.7	15.6	6.3	6.7	5.0	3.3	1.7	0.0	3.3	0.0	1.7
Leafy pondweed	0.0	3.1	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Richardson's pondweed	0.0	0.0	0.0	1.6	1.7	0.0	1.7	1.7	0.0	0.0	0.0	0.0
Large-leaved pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	16.4	6.3	0.0	0.0	0.0	0.0	3.3	0.0	3.3	0.0	0.0	0.0
Flat-stemmed pondweed	19.3	9.4	18.8	4.7	6.7	5.0	0.0	1.7	1.7	0.0	1.7	0.0
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common bladderwort	0.7	1.6	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.7	6.3	1.6	3.1	3.3	0.0	3.3	5.0	0.0	0.0	0.0	0.0
Small pondweed	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.3	0.0	3.3	0.0	5.0
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7
Northern watermilfoil	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spiny coontail	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water crowfoot	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.7	0.0	4.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	47.3	4.7	0.0	0.0	0.0	0.0	6.7	11.7	13.3	16.7	25.0	8.3
Species Frequency of Occurrence - Depth: 0 to 5 ft												
Eurasian watermilfoil	17.3	31.6	42.5	2.3	5.3	18.2	0.0	13.3	0.0	0.0	5.6	5.6
Curly-leaf pondweed	46.2	7.9	52.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	5.6
Brittle naiad	0.0	0.0	0.0	0.0	31.6	0.0	5.6	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	2.6	0.0	0.0	0.0	4.5	0.0	3.3	0.0	0.0	0.0	0.0
Coontail	40.4	42.1	37.5	45.5	26.3	31.8	16.7	53.3	38.7	22.2	27.8	50.0
Sago pondweed	0.0	0.0	0.0	0.0	21.1	4.5	38.9	16.7	32.3	11.1	11.1	22.2
Chara sp.	51.9	57.9	52.5	40.9	47.4	63.6	72.2	40.0	35.5	77.8	72.2	22.2
Eel grass	1.9	57.9	2.5	50.0	47.4	50.0	50.0	23.3	32.3	27.8	5.6	33.3
Slender naiad	0.0	0.0	0.0	18.2	26.3	27.3	33.3	3.3	6.5	22.2	5.6	16.7
Canada waterweed	1.9	7.9	22.5	9.1	10.5	9.1	11.1	3.3	0.0	5.6	0.0	5.6
Leafy pondweed	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Richardson's pondweed	0.0	0.0	0.0	2.3	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Large-leaved pondweed	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	3.8	0.0	0.0	0.0	0.0	0.0	11.1	0.0	3.2	0.0	0.0	0.0
Flat-stemmed pondweed	23.1	7.9	22.5	4.5	21.1	13.6	0.0	3.3	3.2	0.0	0.0	0.0
Horned pondweed	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	5.3	2.5	4.5	5.3	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Small pondweed	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	4.5	0.0	0.0	0.0	6.7	0.0	11.1	0.0	16.7
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	5.6
Northern watermilfoil	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water crowfoot	1.9	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.0	0.0	5.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	65.4	7.9	0.0	0.0	0.0	0.0	0.0	23.3	22.6	16.7	61.1	11.1

**James Comparison Continued**

Species Frequency of Occurrence - Depth: 5 to 10 ft												
Eurasian watermilfoil	0.0	23.1	30.8	0.0	0.0	0.0	0.0	16.7	0.0	0.0	6.3	6.3
Curly-leaf pondweed	66.7	23.1	53.8	0.0	0.0	0.0	5.6	0.0	0.0	0.0	6.3	0.0
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0
Coontail	75.0	76.9	92.3	100.0	93.3	93.8	55.6	75.0	62.5	56.3	75.0	93.8
Sago pondweed	0.0	0.0	0.0	0.0	0.0	6.3	5.6	8.3	12.5	0.0	6.3	0.0
Chara sp.	0.0	7.7	0.0	0.0	0.0	12.5	16.7	8.3	0.0	6.3	18.8	12.5
Eel grass	0.0	38.5	0.0	25.0	6.7	18.8	50.0	8.3	12.5	18.8	0.0	0.0
Slender naiad	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	0.0	0.0	6.3
Canada waterweed	0.0	0.0	7.7	0.0	0.0	6.3	0.0	0.0	0.0	6.3	0.0	0.0
Leafy pondweed	0.0	7.7	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Richardson's pondweed	0.0	0.0	0.0	0.0	0.0	0.0	5.6	8.3	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	16.7	23.1	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0
Common bladderwort	0.0	7.7	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	15.4	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filamentous algae	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	37.5	12.5	18.8
Species Frequency of Occurrence - Depth: 10 to 15 ft												
Curly-leaf pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	0.0
Coontail	66.7	83.3	14.3	100.0	93.8	100.0	90.9	71.4	36.4	31.3	87.5	68.8
Sago pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0
Chara sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0
Eel grass	0.0	0.0	0.0	16.7	6.3	14.3	0.0	0.0	18.2	6.3	0.0	6.3
Canada waterweed	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	0.0
Flat-stemmed pondweed	0.0	0.0	14.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	0.0	0.0	0.0	6.3	0.0	9.1	0.0	0.0	0.0	0.0	0.0
Spiny coontail	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	6.3	6.3	0.0
Species Frequency of Occurrence - Depth: 15 to 20 ft												
Curly-leaf pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0
Coontail	0.0	0.0	0.0	80.0	30.0	45.5	61.5	45.5	0.0	30.0	40.0	10.0
Eel grass	0.0	0.0	0.0	0.0	0.0	9.1	7.7	0.0	0.0	10.0	0.0	0.0
Filamentous algae	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0
Species Frequency of Occurrence - Depth: 20 to 25 ft												
Coontail	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## 6.2 IDNR VEGETATION PERMIT APPLICATIONS

### 6.2.1 2015 Oswego Lake Permit



#### APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (RS / 9-13)  
Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND WILDLIFE  
ATTN: COMMERCIAL LICENSE CLERK  
402 W. Washington Street, Rm W273  
Indianapolis, IN 46204  
Telephone Number: (317) 232-4102  
Fax Number: (317) 232-6150

Check type of permit:

**FEE \$5.00**

Whole Lake     Multiple Treatment Areas

INSTRUCTIONS: 1. Please print or type information.  
2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

Applicant Name Holly LaSalle		Lake Association Name Lake Tippecanoe Property Owners Association	
Street or Rural Route PO Box 224		Telephone Number 574-275-1286	
City and State Leesburg, IN		ZIP Code 46538	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body) Oswego	Nearest Town North Webster	County Kosciusko	
Is the body of water a water supply or does it 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 number: 1	Latitude / Longitude or Universal Transverse Mercator (UTM): Areas to be determined following spring survey	Total acres to be controlled: <10	Proposed shoreline treatment length (ft): 720	Perpendicular distance from shoreline (ft): 100	
Maximum depth of treatment (ft): 8	Expected date(s) of treatment(s): April/early May	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.    2,4-D 1-2 ppm and Aquathol K 1 ppm. Clipper, Cutrine Ultra, Hydrothol for starry if needed					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify)					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input type="checkbox"/>	10		<input type="checkbox"/>	
Common naiad	<input type="checkbox"/>	5		<input type="checkbox"/>	
Chara	<input type="checkbox"/>	30		<input type="checkbox"/>	
Illinois pondweed	<input type="checkbox"/>	15		<input type="checkbox"/>	
Sago pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	25		<input type="checkbox"/>	
Eurasian watermilfoil	<input checked="" type="checkbox"/>	5		<input type="checkbox"/>	
Curlyleaf pondweed	<input checked="" type="checkbox"/>	5		<input type="checkbox"/>	
Starry stonewort	<input checked="" type="checkbox"/>	0		<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	



### Page 3 of 3 Oswego Lake Permit Map



**6.2.2 2015 Tippecanoe Lake Permit**



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**  
State Form 26727 (RS / 9-13)  
Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND WILDLIFE  
ATTN: COMMERCIAL LICENSE CLERK  
402 W. Washington Street, Rm W273  
Indianapolis, IN 46204  
Telephone Number: (317) 232-4102  
Fax Number: (317) 232-8150

Check type of permit:

Whole Lake     Multiple Treatment Areas

**FEE \$5.00**

**INSTRUCTIONS:** 1. Please print or type information.  
2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

Applicant Name Holly LaSalle		Lake Association Name Lake Tippecanoe POA	
Street or Rural Route 67 EMS T49A Lane		Telephone Number 574-834-2185	
City and State Syracuse, IN		ZIP Code 46567	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body) Lake Tippecanoe		Nearest Town North Webster	County Kosciusko
Is the body of water a water supply or does it 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 number: 1	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.32692W85.76237 to N41.32640W85.76247	Total acres to be controlled: 0.5	Proposed shoreline treatment length (ft): 440	Perpendicular distance from shoreline (ft): 100	
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): Late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50		<input type="checkbox"/>	
Sago pondweed	<input type="checkbox"/>	20		<input type="checkbox"/>	
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
Southern naiad	<input type="checkbox"/>	5		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	5		<input type="checkbox"/>	
Illinois pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
Variable pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	

Treatment area number: 2	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.32207W85.75742 to N41.31859W85.75639		Total acres to be controlled: 3.6	Proposed shoreline treatment length (ft): 1880	Perpendicular distance from shoreline (ft): 100
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50	Illinois pondweed	<input type="checkbox"/>	5
sago pondweed	<input type="checkbox"/>	10	Variable pondweed	<input type="checkbox"/>	5
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
nalad	<input type="checkbox"/>	10		<input type="checkbox"/>	
coontail	<input type="checkbox"/>	10		<input type="checkbox"/>	
Treatment area number: 3	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.31739W85.75036 to N41.31831W85.74830		Total acres to be controlled: 2.3	Proposed shoreline treatment length (ft): 650	Perpendicular distance from shoreline (ft): 100
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50	Illinois pondweed	<input type="checkbox"/>	5
Sago pondweed	<input type="checkbox"/>	20	Variable pondweed	<input type="checkbox"/>	5
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
Naiad	<input type="checkbox"/>	5		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	5		<input type="checkbox"/>	
<b>AGREEMENT</b>					
I have read and understand the Indiana Aquatic Vegetation Control Permit Laws and agree to abide by them. Under the penalties of perjury (IC 35-44-2-1), I affirm the information supplied by me is true and correct to the best of my knowledge.					
Signature of Applicant _____			Date (month, day, year) _____		
Signature of Certified Applicator _____			Date (month, day, year) _____		
<b>Make check or money order payable to DNR - Division of Fish and Wildlife in the amount of \$5.00 Return completed application with the \$5.00 permit fee to the address shown on page 1.</b>					
<b>OFFICE USE ONLY</b>					
Permit Number		Check Number		Other	
<input type="checkbox"/> Denied		<input type="checkbox"/> Approved		<input type="checkbox"/> Approved w/Conditions	
				Fisheries Section Approval	



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**

State Form 26727 (RS / 9-13)  
Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND WILDLIFE  
ATTN: COMMERCIAL LICENSE CLERK  
402 W. Washington Street, Rm W273  
Indianapolis, IN 46204  
Telephone Number: (317) 232-4102  
Fax Number: (317) 232-8150

Check type of permit:

Whole Lake     Multiple Treatment Areas

**FEE \$5.00**

**INSTRUCTIONS:** 1. Please print or type information.  
2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

Applicant Name Holly LaSalle		Lake Association Name Lake Tippecanoe POA	
Street or Rural Route 67 EMS T49A Lane		Telephone Number 574-275-1286	
City and State Syracuse, IN		ZIP Code 46567	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body)	Nearest Town	County	
Is the body of water a water supply or does it 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 number: 4	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.32417W85.74185 to N41.32417W85.74536	Total acres to be controlled: 2.7	Proposed shoreline treatment length (ft): 1080	Perpendicular distance from shoreline (ft): 100	
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): Late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50		<input type="checkbox"/>	
Sago pondweed	<input type="checkbox"/>	20		<input type="checkbox"/>	
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
Southern naiad	<input type="checkbox"/>	5		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	5		<input type="checkbox"/>	
Illinois pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
Variable pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	

Treatment area number: 5	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.32773W85.75230 to N41.32795W85.75353		Total acres to be controlled: 1.6	Proposed shoreline treatment length (ft): 500	Perpendicular distance from shoreline (ft): 100
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50	Illinois pondweed	<input type="checkbox"/>	5
sago pondweed	<input type="checkbox"/>	10	Variable pondweed	<input type="checkbox"/>	5
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
naiad	<input type="checkbox"/>	10		<input type="checkbox"/>	
coontail	<input type="checkbox"/>	10		<input type="checkbox"/>	
Treatment area number: 6	Latitude / Longitude or Universal Transverse Mercator (UTM): N41.32919W85.75867 to N41.32898W85.75947		Total acres to be controlled: 0.3	Proposed shoreline treatment length (ft): 280	Perpendicular distance from shoreline (ft): 100
Maximum depth of treatment (ft): 6	Expected date(s) of treatment(s): late June/July	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique, Hydrothol, Komeen Crystal</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input checked="" type="checkbox"/>	50	Illinois pondweed	<input type="checkbox"/>	5
Sago pondweed	<input type="checkbox"/>	20	Variable pondweed	<input type="checkbox"/>	5
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
Naiad	<input type="checkbox"/>	5		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	5		<input type="checkbox"/>	
<b>AGREEMENT</b>					
I have read and understand the Indiana Aquatic Vegetation Control Permit Laws and agree to abide by them. Under the penalties of perjury (IC 35-44-2-1), I affirm the information supplied by me is true and correct to the best of my knowledge.					
Signature of Applicant _____				Date (month, day, year) _____	
Signature of Certified Applicator _____				Date (month, day, year) _____	
<b>Make check or money order payable to DNR - Division of Fish and Wildlife in the amount of \$5.00 Return completed application with the \$5.00 permit fee to the address shown on page 1.</b>					
<b>OFFICE USE ONLY</b>					
Permit Number _____		Check Number _____		Other _____	
<input type="checkbox"/> Denied		<input type="checkbox"/> Approved		<input type="checkbox"/> Approved w/Conditions	
				Fisheries Section Approval _____	



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**

State Form 26727 (R5 / 9-13)  
Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND WILDLIFE  
ATTN: COMMERCIAL LICENSE CLERK  
402 W. Washington Street, Rm W273  
Indianapolis, IN 46204  
Telephone Number: (317) 232-4102  
Fax Number: (317) 232-6150

Check type of permit:

Whole Lake     Multiple Treatment Areas

**FEE \$5.00**

- INSTRUCTIONS:** 1. Please print or type information.  
2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

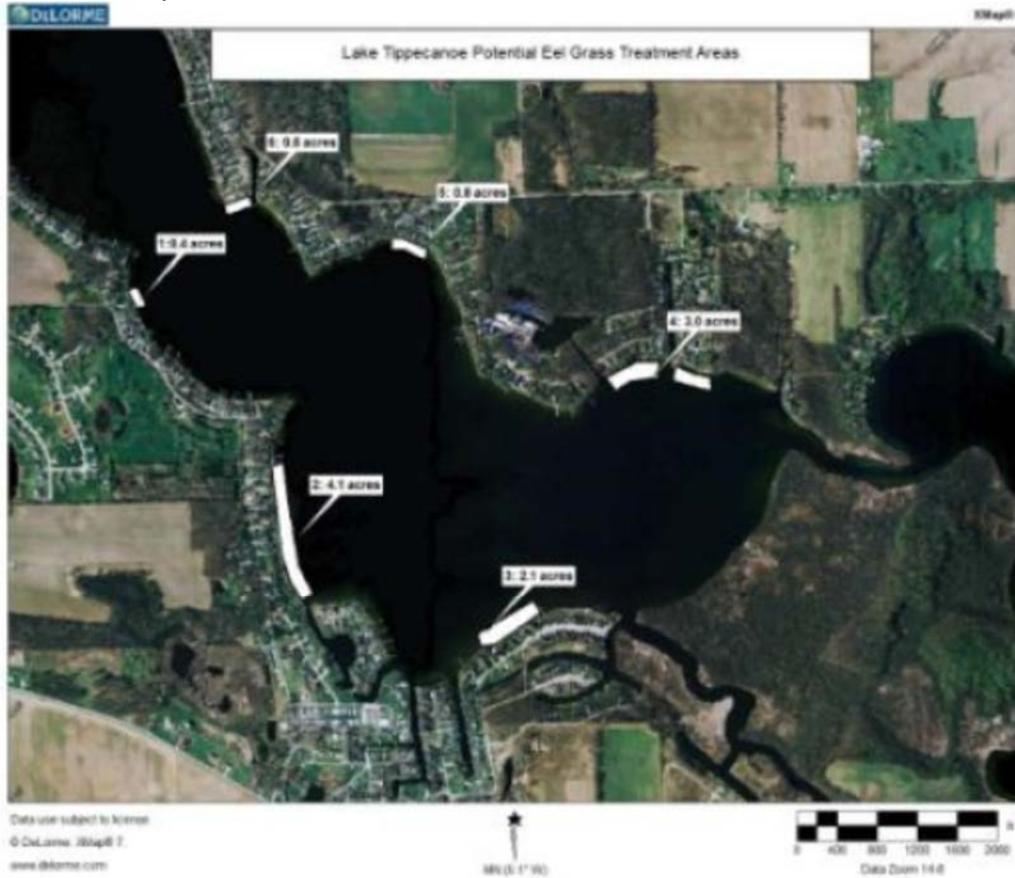
Applicant Name		Lake Association Name	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body)	Nearest Town	County	
Is the body of water a water supply or does it 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.

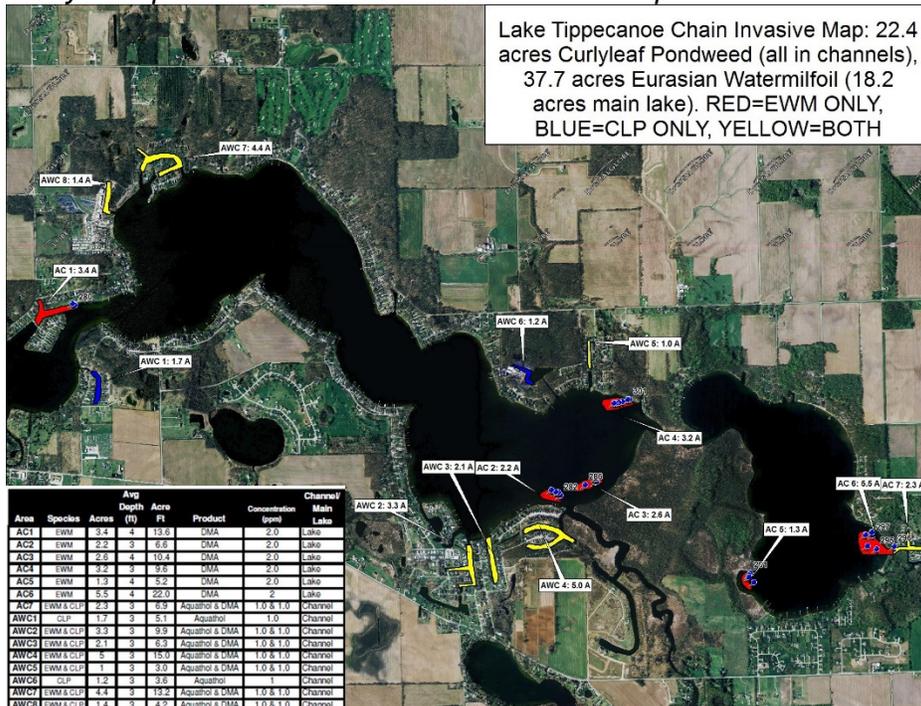
Treatment area number: 7	Latitude / Longitude or Universal Transverse Mercator (UTM): Treatment of EWM and CLP following invasive mapping		Total acres to be controlled:	Proposed shoreline treatment length (ft): na	Perpendicular distance from shoreline (ft): na
Maximum depth of treatment (ft): na	Expected date(s) of treatment(s): April/early May	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>2,4-D 1-2ppm Aquathol 1 ppm.</u>					
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input type="checkbox"/>	20	Richardsons pondweed	<input type="checkbox"/>	5
Sago pondweed	<input type="checkbox"/>	10	Curlyleaf pondweed	<input checked="" type="checkbox"/>	2
Chara	<input type="checkbox"/>	20		<input type="checkbox"/>	
Common naiad	<input type="checkbox"/>	10		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	20		<input type="checkbox"/>	
Illinois pondweed	<input type="checkbox"/>	1		<input type="checkbox"/>	
Variable pondweed	<input type="checkbox"/>	1		<input type="checkbox"/>	
Starry stonewort	<input type="checkbox"/>	5		<input type="checkbox"/>	
Eurasian watermilfoil	<input checked="" type="checkbox"/>	5		<input type="checkbox"/>	
Flatstem pondweed	<input type="checkbox"/>	1		<input type="checkbox"/>	



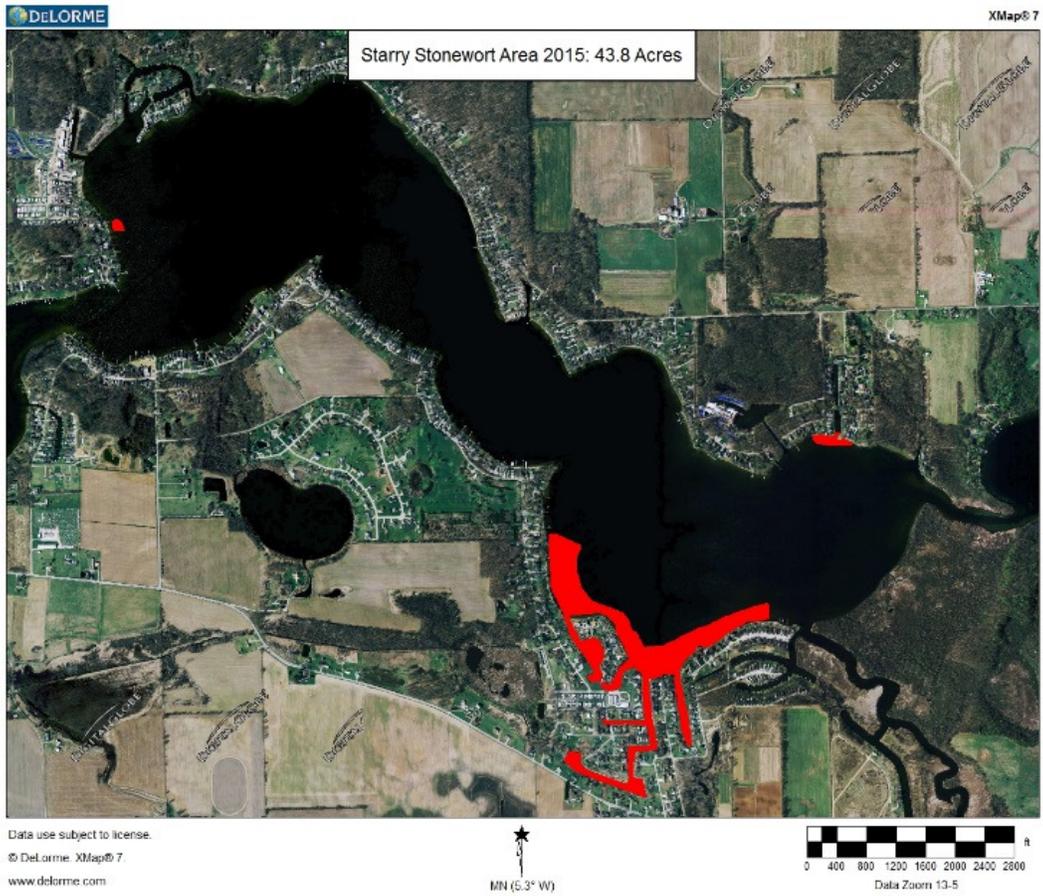
Eel Grass Map Areas 1-6



Curly-leaf pondweed/Eurasian watermilfoil Map Area 7



### Starry Stonewort Map Area 8



**6.2.3 James Lake Permit**



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**  
State Form 26727 (RS / 9-13)  
Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND WILDLIFE  
ATTN: COMMERCIAL LICENSE CLERK  
402 W. Washington Street, Rm W273  
Indianapolis, IN 46204  
Telephone Number: (317) 232-4102  
Fax Number: (317) 232-8150

Check type of permit:

Whole Lake     Multiple Treatment Areas

**FEE \$5.00**

**INSTRUCTIONS:** 1. Please print or type information.  
2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

Applicant Name Holly LaSalle		Lake Association Name Lake Tippecanoe POA	
Street or Rural Route 67 EMS T49A Lane		Telephone Number 574-834-2185	
City and State Syracuse, IN		ZIP Code 46567	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body) James/Little tippe	Nearest Town	County	
Is the body of water a water supply or does it flow into a water supply? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

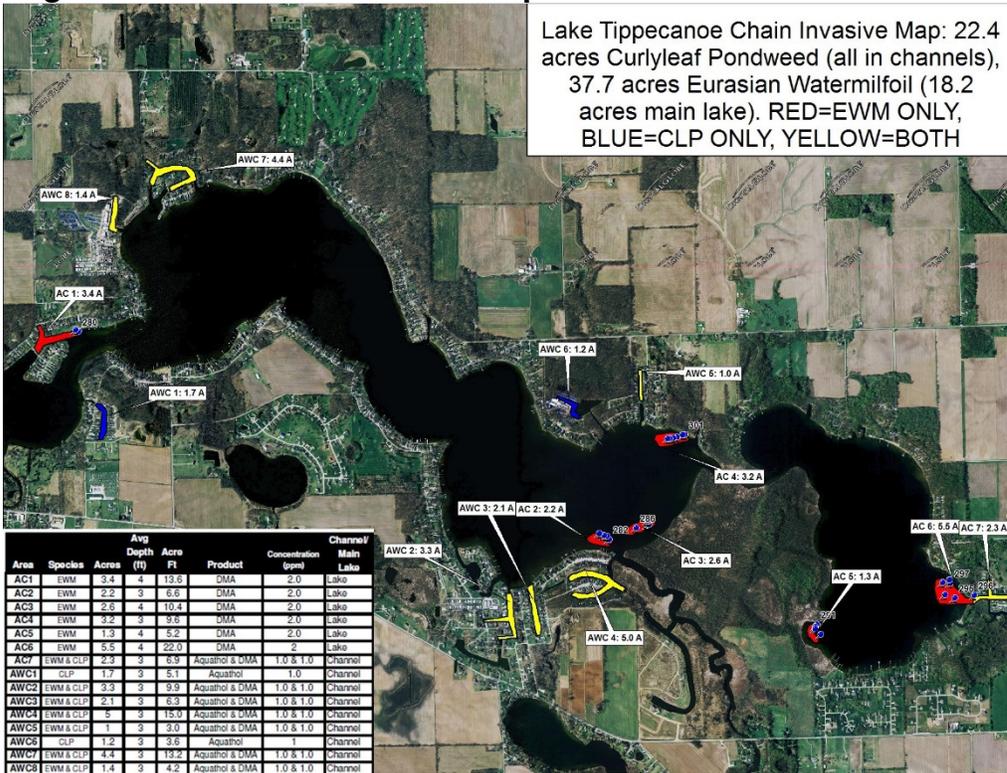
Please complete one section for EACH treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment area number: 1	Latitude / Longitude or Universal Transverse Mercator (UTM): Areas to be determined following spring survey	Total acres to be controlled: <20	Proposed shoreline treatment length (ft): na	Perpendicular distance from shoreline (ft): na	
Maximum depth of treatment (ft): 8	Expected date(s) of treatment(s): April or early May	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 to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.    2,4-D 1-2 ppm Aquathol K 1 ppm. Clipper, Cutrine Ultra, Hydrothol of Starry Stonewort					
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eel grass	<input type="checkbox"/>	30		<input type="checkbox"/>	
Sago pondweed	<input type="checkbox"/>	10		<input type="checkbox"/>	
Chara	<input type="checkbox"/>	10		<input type="checkbox"/>	
Common naiad	<input type="checkbox"/>	10		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	20		<input type="checkbox"/>	
Flatstem pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
Variable pondweed	<input type="checkbox"/>	5		<input type="checkbox"/>	
Eurasian watermilfoil	<input checked="" type="checkbox"/>	5		<input type="checkbox"/>	
Curlyleaf pondweed	<input checked="" type="checkbox"/>	5		<input type="checkbox"/>	
Starry stonewort	<input checked="" type="checkbox"/>	0		<input type="checkbox"/>	



Page 3 of 3 James Lake Permit Map

Lake Tippecanoe Chain Invasive Map: 22.4 acres Curlyleaf Pondweed (all in channels), 37.7 acres Eurasian Watermilfoil (18.2 acres main lake). RED=EWM ONLY, BLUE=CLP ONLY, YELLOW=BOTH



**6.3 Grant Application (Sponsor needs to sign & date )**



**AQUATIC VEGETATION MANAGEMENT PROJECT APPLICATION  
LAKE AND RIVER ENHANCEMENT (LARE) PROGRAM**  
State Form 54522 (R2 / 10-13)  
INDIANA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH & WILDLIFE

**Application deadline is January 31st of the year for which grant is applied.**

ACTIVITIES RELATED TO AQUATIC VEGETATION MANAGEMENT FOR LAKES	
I. APPLICANT INFORMATION	
<b>A. Project sponsor (applicant):</b>	
Name: Lake Tippecanoe Property Owners, Inc.	
Address (number and street): PO Box 224	
City, State, and ZIP Code: Leesburg, IN 46538	
Is the project sponsor already listed as a vendor with the state of Indiana? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>If the answer is no, a Vendor Information Form (State Form 53788) must be submitted to the Indiana State Auditor before the sponsor can receive funds from the State of Indiana.</i>	
<b>B. Contact person for the sponsor organization</b>	
Name: Holly LaSalle	Title:
Address (number and street): 67 EMS T49A Lane	
City, State, and ZIP Code: Syracuse, IN 46567	
Telephone number (Day): 574-834-2185	Telephone number (Evening): 574-275-1286
FAX number: none	E-mail address: hal@kconline.com
<b>C. Briefly describe the past and present activities of the sponsor organization.</b> The Lake Tippecanoe Property Owners (LTPO) was formed in 1944 as the Lake Tippecanoe Protective Association. It was founded largely for the purpose of preserving the beauty and health of the lake. The LTPO have continued to update and expand the original goals and has developed a strategic plan to reach those goals. The LTPO has been active in LARE programs since 1997.	
<b>D. Describe the legal status of the sponsor organization, i.e., indicate what the sponsor has done to acquire official standing. State when the organization was established. List current officers' / officials' names.</b> The Lake Tippecanoe Property Owners was formed in 1944. President, Jon Tyler; Vice President, Jeff Thornburgh; Secretary, Angela Drook; Treasurer, Becky Hartman.	
<b>E. If the sponsor organization is a property owners or lake association, what percentage of the affected lake's residents are members of the group?</b> Membership in the LTPO is voluntary with 700 members, approximately 60% of the lake homeowners are members of the association.	
<b>F. Are there other organizations also representing residents of the affected lake? What relationship do those organizations have with the sponsor/applicant on matters related to this proposed project?</b> LTPO is an active and supporting affiliate of the Tippecanoe Watershed Foundation.	
<b>G. Briefly describe the financial resources available to the sponsor organization (e.g. dues, contributions, fund drives, taxes, etc.).</b> Membership dues, contributions to dedicated funds and fund raisers.	
II. LAKE/WATERSHED INFORMATION	
<b>A. Lake(s) or River name(s):</b> James, Tippecanoe, & Oswego	<b>B. County(ies):</b> Kosciusko

C. Lake size (acres): Tippe (763), James (272), Oswego (75)	D. Watershed (drainage basin) size (acres), (if known): 72,320
E. 12 digit Hydrologic Unit Code (HUC)	

F. Describe how the general public can gain access to the lake(s) (i.e., the number and types of access sites, their location, ownership, and any fees charged).  
 Public access at Grassy Creek and several pay access sites around lakes.

**III. PROJECT INFORMATION**

A. For what specific purpose or need is funding being sought?  
 Funding is being sought to assist the control Eurasian watermilfoil and curlyleaf pondweed on all 3 lakes and to complete plan updates

Development of a new or updated aquatic vegetation management plan?  
 Yes, update

Management of aquatic vegetation?  
 Yes, curlyleaf pondweed and Eurasian watermilfoil control

Other? (Explain)  
 Will be treating Eel grass also

B. Describe any studies or restoration measures that have been completed for the lake/watershed.  
 Design Summary - Lake Tippecanoe Hanna B. Walker Drain Sediment Trap 2000  
 Design Summary - Lake Tippecanoe Henwood Creek Restoration Project 2000  
 Design Summary - Lake Tippecanoe Indian Creek Detention Basins 2000  
 Ecozone Feasibility - Lake Tippecanoe 2007  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2005  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2005 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2006 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2007 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2009 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2012 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2013 Update  
 Lake Tippecanoe Aquatic Vegetation Management Plan 2014 Update  
 Lake Tippecanoe Diagnostic Study 1997  
 Lake Diagnostic Study  
 Lake Tippecanoe Feasibility Study 1998  
 Lake Tippecanoe Langohr Sediment Trap Design/Build Report 2004  
 Lake Tippecanoe Palmer Design/Build Report 2003  
 Lake Tippecanoe Palmer Design/Build Report 2003  
 Lake Tippecanoe Storm Drain Project 2006  
 Littoral Zone Restoration Research Project 2007-2009 Year 1  
 Littoral Zone Restoration Research Project 2007-2009 Year 1  
 Littoral Zone Restoration Research Project 2007-2009 Year 2  
 Littoral Zone Restoration Research Project 2007-2009 Year 2  
 Littoral Zone Restoration Research Project 2007-2009 Year 3  
 Littoral Zone Restoration Research Project 2007-2009  
 Tippecanoe Chain 2008 Ecozone Survey Report  
 Lake Tippecanoe, James Lake & Oswego sediment study for dredging 2013  
 Lake Tippecanoe dredging removal 2014

C. Complete the table below as well as describe here or on an attached sheet the activities for which funding is requested (include maps of treatment areas, include average depth of treatment areas, indicate whole-lake or spot treatment, indicate priority species if only one can be funded; as well as other support materials, as applicable).

Species	Total Acreage Including Channels	Channel Only Acreage	Chemical Name	Treatment Cost
Eurasian watermilfoil & Curlyleaf Pondweed Main Lake	30 for each species		2,4-d (2.0 ppm) and Aquathol (1.0ppm)	\$18,000
Eurasian watermilfoil & Curlyleaf pondweed in channels	30	30	2,4-D (1.0 ppm) & Aquathol K (1.0 ppm)	\$12,000
Starry Stonewort	50 (figuring 3 treatments per year)		Flumioxazin (0.2ppm) in channels Chelated Copper (0.8ppm) and Endothal (0.17 ppm) in main lake	\$95,000

D. What is the total estimated cost of the project? \$ 135,500

Itemized by specific expenses:
Planning and Surveys (AVMP or update): \$ 8,000 (3 invasive surveys and 2 Tier 2 surveys),
Herbicide treatment costs: \$ 125,000
Other (revegetation, ecozones, etc): \$ 2,500 for ecozone survey
Anticipated cost-share to be contributed by sponsor (\$ or %): 20

What was the basis for the estimate (e.g., diagnostic or feasibility study, preliminary estimate by consultant, formal bidding, etc.)? 2015 AVMP update & Consultant (Aquatic Control)
E. If a LARE grant were awarded for herbicide treatment, when would the effort realistically be expected to begin (e.g., early-season treatment, prior to June 1st, etc.)? April/May
F. Indicate how the sponsor will oversee the contractor's work and participate in the effort. Sponsor will assist in notifying residents of restrictions, setting up public meeting facility, and checking on treatment results.
This application for Lake and River Enhancement program assistance is hereby submitted as authorized by the sponsoring organization.
Sponsor organization: Lake Tippecanoe Property Owners
Printed name of representative:
Signature of representative: <i>(Note: Please insert the initials of the representative in this box to constitute the electronic signature on your organization's application.)</i>
Date (month, day, year):

**INSTRUCTIONS:** This application can be completed electronically, but to submit it, you must save a copy of the completed form, assign it a file name, and e-mail it to: [lare@dnr.IN.gov](mailto:lare@dnr.IN.gov) or print the completed form and mail to:

Lake and River Enhancement Program  
Division of Fish and Wildlife  
Indiana Department of Natural Resources  
402 W. Washington Street, Room W273  
Indianapolis, IN 46204  
Telephone 317-233-1484

**Application deadline is January 31st**

## 6.4 Species List

<i>Scientific Name</i>	<i>Common name</i>
<i>Any algae</i>	Algae
<i>Ceratophyllum demersum</i>	coontail
<i>Ceratophyllum echinatum</i>	spiny coontail
<i>Chara sp.</i>	Chara
<i>Elodea canadensis</i>	Canada waterweed
<i>Myriophyllum heterophyllum</i>	variable watermilfoil
<i>Myriophyllum sibiricum</i>	northern watermilfoil
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil
<i>Myriophyllum verticillatum</i>	whorled watermilfoil
<i>Najas flexilis</i>	slender naiad
<i>Najas guadalupensis</i>	southern naiad
<i>Najas marina</i>	spiny naiad
<i>Najas minor</i>	brittle naiad
<i>Nitella obtusa</i>	starry stonewort
<i>Nitella sp.</i>	Nitella
<i>Potamogeton amplifolius</i>	large-leaved pondweed
<i>Potamogeton crispus</i>	curly-leaf pondweed
<i>Potamogeton foliosus</i>	leafy pondweed
<i>Potamogeton gramineus</i>	variable pondweed
<i>Potamogeton illinoensis</i>	Illinois pondweed
<i>Stuckenia pectinata</i>	sago pondweed
<i>Potamogeton pusillus</i>	small pondweed
<i>Potamogeton richardsonii</i>	Richardson's pondweed
<i>Potamogeton zosteriformis</i>	flat-stemmed pondweed
<i>Ranunculus aquatilis</i>	white water crowfoot
<i>Utricularia macrorhiza</i>	bladderwort
<i>Vallisneria americana</i>	eel grass
<i>Zannichellia palustris</i>	horned pondweed
<i>Heteranthera dubia</i>	water stargrass