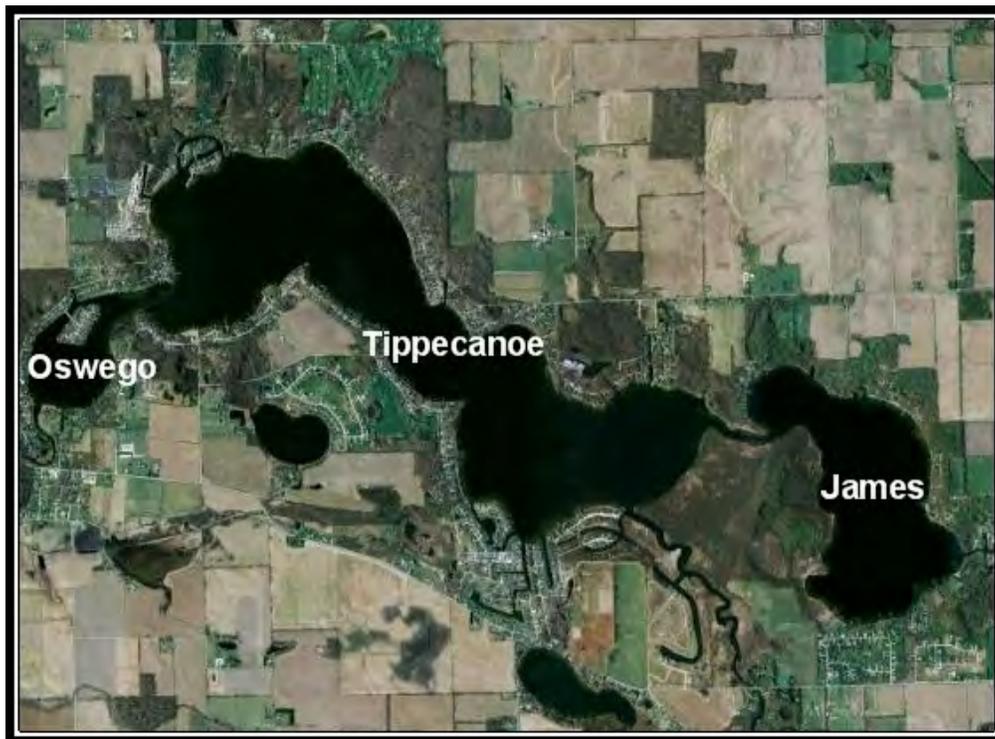


*Lake Tippecanoe  
Aquatic Vegetation Management Plan  
2012 Update  
Kosciusko County, Indiana*

February 11, 2013



**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 (individually Oswego covers 75 acres, Tippecanoe 763 acres, and James 272 acres). The primary invasive species within the chain are Eurasian watermilfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*). Eel grass (*Vallisneria americana*) and filamentous bluegreen algae are also abundant in Lake Tippecanoe and can reach nuisance levels. Lake Tippecanoe Property Owners Association (LTPOA) has actively managed Eurasian watermilfoil and curlyleaf pondweed for many years. Herbicide treatments were initiated in 2003 and continued through present day.

In 2012, LTPOA was awarded a Lake and River Enhancement (LARE) grant of \$28,400 for creation of a plan update, an ecozone survey, and early season spot treatment of curlyleaf pondweed and Eurasian watermilfoil. Historically, LTPOA just managed vegetation in the main lake areas. In 2012, LTPOA and LARE decided to expand management to include all of the channel areas of the lake. An invasive species survey was completed and found 96.9 acres of milfoil and 98.6 acres of curlyleaf pondweed. Treatment of these areas was completed on April 30<sup>th</sup> with a combination of 2,4-D and endothal (brand name: Aquathol K). On June 22<sup>nd</sup>, a map was presented to LTPOA and Indiana Department of Natural Resources (IDNR) biologists requesting treatment of 23.8 acres of eel grass. IDNR approved treatment of 9.5 acres. This area was treated on July 19<sup>th</sup> with a copper based herbicide called Nautique. An ecozone survey was completed on August 13<sup>th</sup>. The survey found that abundance and diversity of submersed vegetation had increased substantially. In addition, coverage of rooted floating vegetation increased 15% since 2008. A Tier II survey of all three lakes was completed two weeks later. The survey found invasive curlyleaf pondweed and Eurasian watermilfoil to be at or below the 10% frequency of occurrence objective in all lakes except Tippecanoe where milfoil was collected at 12.5% of sites. In addition, native diversity metric were improved or near the same when compared to past surveys.

It is important to continue with the current strategy of maintaining invasive species at low levels with early season selective herbicide treatments. In addition, summer Tier II surveys should be continued in order to document changes in the plant community. Control of eel grass and filamentous algae appears to now be one of the primary concerns of residents and LTPOA members. Eel grass is considered a beneficial species for fish and wildlife, so control will be closely monitored. 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 creating the floating mats. In addition, the ecozone should continue to be monitored. It appears that the ecozone is having positive effects on the submersed plant community within that area, but LTPOA should consider working with plant restoration specialists to come up with a plan for revegetating areas that are still void of beneficial species like spatterdock (*Nuphar sp.*), white water lily (*Nymphaea tuberosa*) and pickerel weed (*Pontedaria cordata*).

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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 Jed Pearson, Fisheries Biologists for the Indiana Department of Natural Resources-Division of Fish and Wildlife, for his assistance and review of this plan. Special thanks are also given to Rod Edgell and Ashlee Haviland, Aquatic Biologist from the Lake and River Enhancement Program (LARE) for their review and assistance on this plan. Author of this report is Nathan Long of Aquatic Control. The author would like to acknowledge the valuable input from Patrick Whitson, Brendan Hastie, Joey Leach, and Barbie Huber of Aquatic Control for their field assistance, map generation, review, and editing of this report.

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## 1.0 Problem Statement and Management History

### 1.1 Problem Statement

The primary invasive species within the Tippecanoe chain are Eurasian watermilfoil and curlyleaf pondweed (Figure 1). These invasive species can create dense surface mats that impact navigation, swimming, fishing, native vegetation, and property values. Eel grass and filamentous bluegreen algae are also abundant in Lake Tippecanoe and can reach nuisance levels.



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

### 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 and fish and wildlife resources.

The primary objective of the initial plan was to maintain Eurasian watermilfoil and curlyleaf pondweed below 10% frequency of occurrence in all three lakes. In addition, another objective is to maintain at least 11, 10, and 12 native plants collected each year in the summer tier II survey at James, Oswego, and Tippecanoe Lakes, respectively. The final objective is to maintain a native species diversity of 0.77, 0.81, and 0.79 each year in the summer tier II 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. These treatments are summarized in Table 1. In addition, LTPOA has funded treatment of eel grass. These treatments have been limited to areas approved by IDNR. These treatments are outlined in Table 2. 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 3 is that attempt. The information in Table 3 was obtained from IDNR permit reports.

**Table 1. LTPOA funded invasive plant controls since 2003.**

Year	Species Targeted	Lakes Treated	Acres Treated	Chemical	Conc. (ppm)
2003 <sup>1</sup>	Milfoil & Curlyleaf	Tippe & Oswego	35.0	Renovate & Aquathol	1.5 & 0.5
2004 <sup>1</sup>	Milfoil & Curlyleaf	Tippe & Oswego	32.0	Renovate & Aquathol	1.5 & 0.5
2005 <sup>1</sup>	Milfoil & Curlyleaf	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>	Milfoil & Curlyleaf	Tippe, James, & Oswego	CLP-104 & EWM-34.0	Renovate & Aquathol	1.5 & 1.0
2008* <sup>2</sup>	Milfoil & Curlyleaf	Tippe, James, & Oswego	CLP-104 & EWM-32.5	Renovate & Aquathol	1.5 & 1.0
2009* <sup>2</sup>	Milfoil & Curlyleaf	Tippe, James, & Oswego	CLP-104 & EWM-51.8	Renovate & Aquathol	1.5 & 1.0
2010	Milfoil	Tippe, James, & Oswego	EWM-34.8	Renovate	1.5
2011	Milfoil & Curlyleaf	Tippe, James, & Oswego	EWM-16.5 & CLP-46	2,4-D & Aquathol	1.0-2.0 & 1.0
2012* <sup>3</sup>	Milfoil & Curlyleaf	Tippe, James, & Oswego	EWM-101.1 & CLP-98.6	2,4-D & Aquathol	1.0-2.0 & 1.0

\*LARE funds used to cover portion of treatment

<sup>1</sup> Only areas of milfoil treated, added 0.5 ppm Aquathol to knock down curlyleaf which was also present in those areas

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

<sup>3</sup> Included all areas of milfoil

**Table 2. LTPOA funded eel grass treatments.**

Year	Species Targeted	Lakes Treated	Acres	Herbicide	Herbicide Concentration (ppm)
2004	Eel grass	Tippe, James, Oswego	8	Nautique	1
2005	Eel grass	Tippe & James	4	Nautique	1
2006	Eel grass	Tippe	7.5	Nautique	1
2011	Eel grass	Tippe	11.1	Nautique	1
2012	Eel grass	Tippe	9.5	Nautique	1

**Table 3. Summary of lot and channel treatments not funded by LTPOA, according to IDNR permit reports.**

**Oswego Lake**

Year	Species Listed on Permit Report	Acres
2009	Coontail & algae	4.91
2010	Milfoil, curlyleaf pondweed, sago pondweed	0.68
2011	Milfoil, curlyleaf pondweed, algae, chara	8.80
2012	Coontail, algae, milfoil, curlyleaf pondweed, eel grass, naiad	9.61

**Lake Tippecanoe**

Year	Species Listed on Permit Report	Acres
2009	Eurasian milfoil, eel grass, northern milfoil, naiad, curlyleaf, sago pondweed, and coontail	19.03
2010	Eel grass, coontail, northern milfoil, curlyleaf, Eurasian milfoil, algae	11.25
2011	Eurasian milfoil, curlyleaf pondweed, algae coontail	48.35
2012	Coontail, algae, milfoil, curlyleaf pondweed, sago pondweed, naiad	15.77

**James Lake**

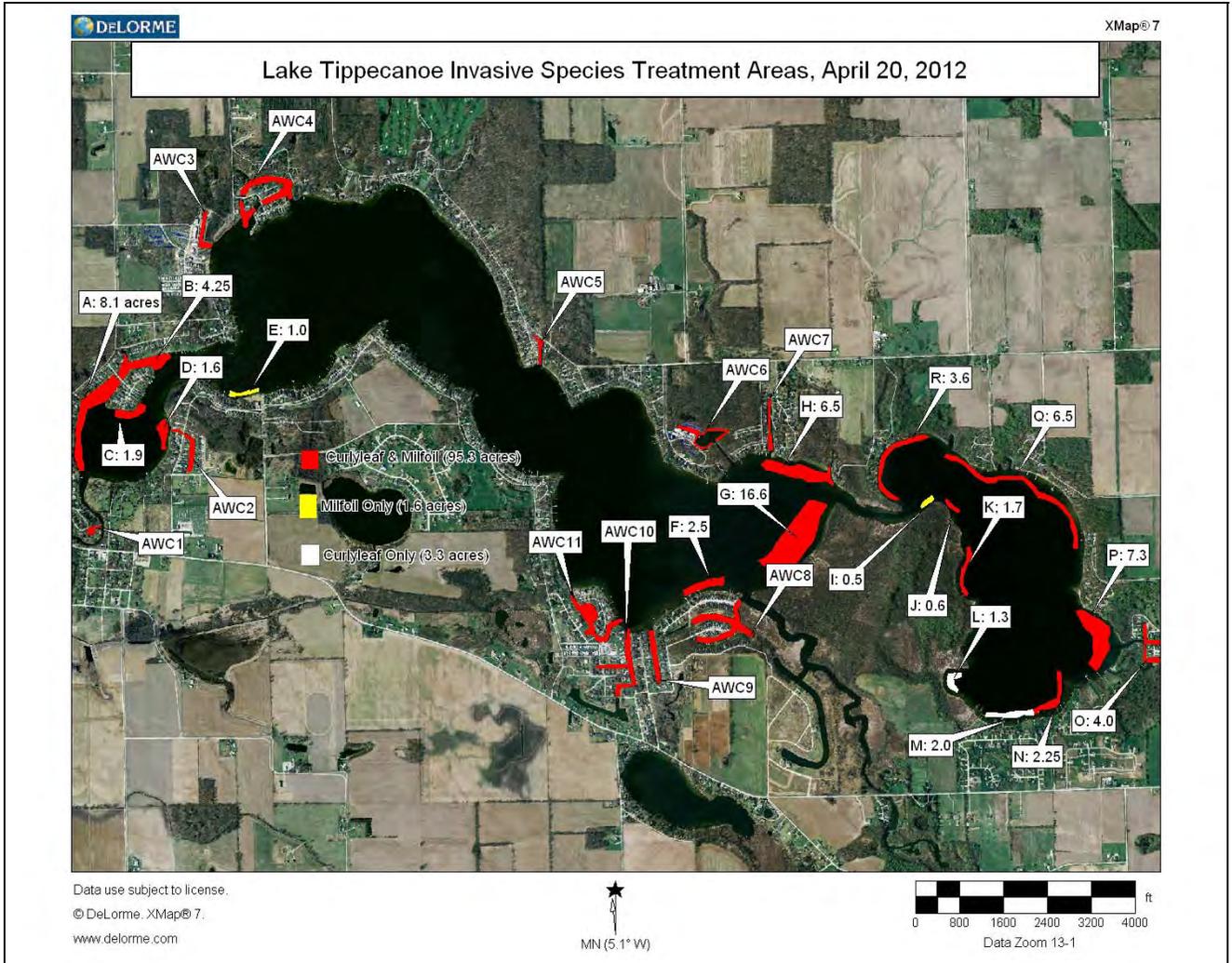
Year	Species Listed on Permit Report	Acres
2009	Coontail and algae	4.91
2010	Milfoil, curlyleaf pondweed, & algae	0.68
2011	Milfoil, curlyleaf, algae, eel grass, & naiad	8.80
2012	Curlyleaf, milfoil, coontail, algae, sago, naiad, elodea	8.54

An invasive survey completed on April 17<sup>th</sup> found 96.9 acres of Eurasian watermilfoil and 98.6 acres of curlyleaf pondweed. With a few exceptions, these species were typically growing together in the same areas. There was a significant increase in coverage of invasive species in 2012 compared to past surveys. One reason for the increase was the inclusion of channels in the 2012 mapping, but even without the channel acreage

there was still a significant increase in invasive coverage (main lake contained 65.2 acres of Eurasian watermilfoil and 68.0 acres of curlyleaf pondweed in 2012 vs. 16.5 acres of milfoil and 46 acres of curlyleaf in 2011). The largest increase was seen in James Lake and along the northeast shore of Lake Tippecanoe. An initial treatment was completed on April 30<sup>th</sup> with a combination of 1.0 ppm liquid 2,4-D and Aquathol in areas that contained both species, 1.0 ppm of Aquathol in areas containing only curlyleaf pondweed, and 2.0 ppm of liquid 2,4-D in areas that contained only milfoil. Aquatic Control completed treatment on the main lake areas and Aquatic Weed Control completed treatment in the channel areas (Aquatic Weed Control had prior contracts to treat the channel areas which were not included in the 2011 treatment). This treatment is summarized in Table 4 and illustrated in Figure 2.

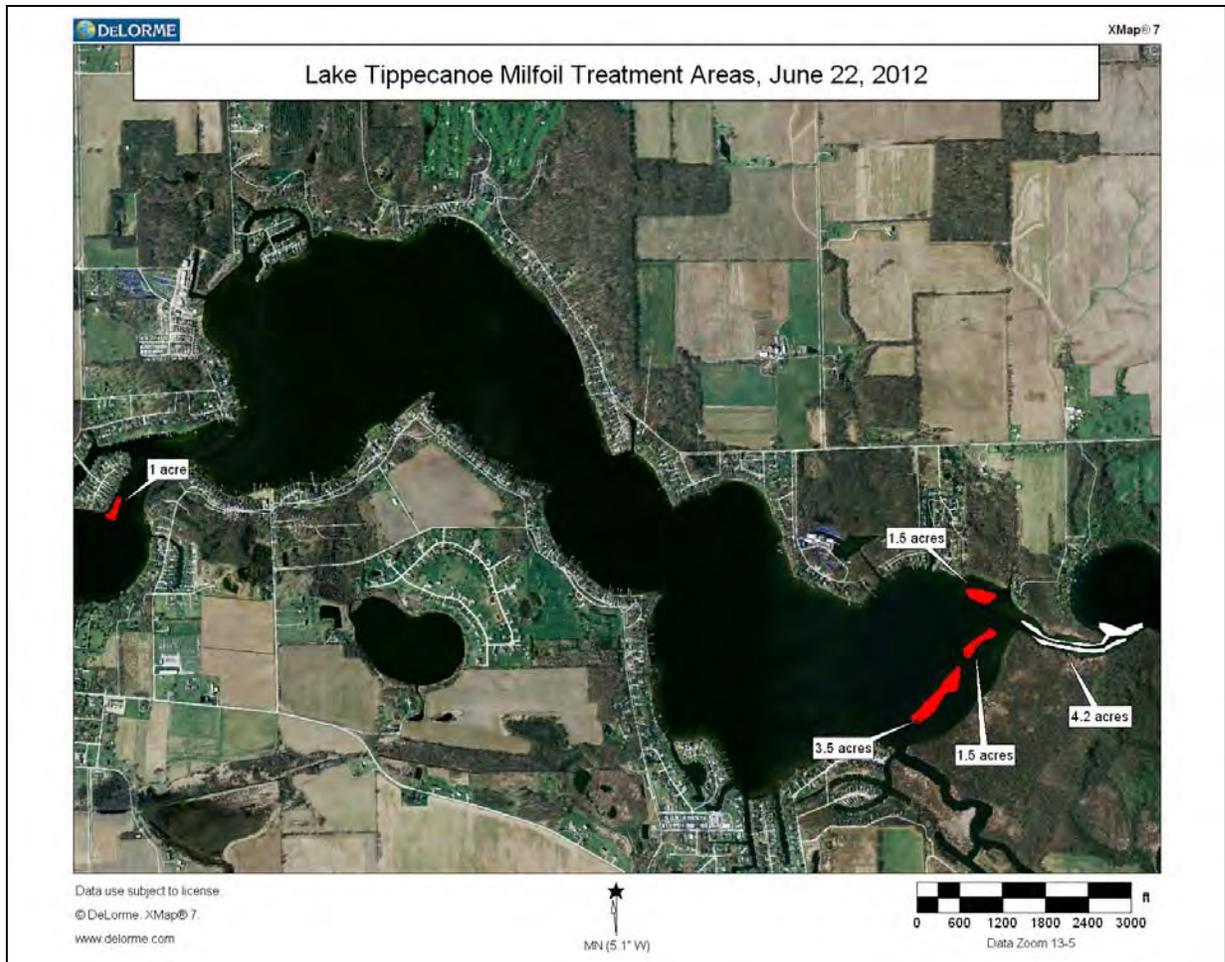
**Table 4. Oswego, Tippecanoe, & James Lakes April 30, 2012 Invasive Species Treatment.**

Area	Species	Acres	Avg Depth (ft)	Acre Ft	Product	Concentration (ppm)
A	EWM & CLP	8.1	3	24.3	Aquathol & DMA	1.0 & 1.0
B	EWM & CLP	4.3	3	12.9	Aquathol & DMA	1.0 & 1.0
C	EWM & CLP	1.9	4	7.6	Aquathol & DMA	1.0 & 1.0
D	EWM & CLP	1.6	4	6.4	Aquathol & DMA	1.0 & 1.0
E	EWM & CLP	1	4	4.0	Aquathol & DMA	1.0 & 1.0
F	EWM & CLP	2.5	4	10.0	Aquathol & DMA	1.0 & 1.0
G	EWM & CLP	16.6	3	49.8	Aquathol & DMA	1.0 & 1.0
H	EWM & CLP	6.5	3	19.5	Aquathol & DMA	1.0 & 1.0
I	EWM	0.5	5	2.5	DMA	2.0
J	EWM & CLP	0.6	5	3.0	Aquathol & DMA	1.0 & 1.0
K	EWM & CLP	1.7	5	8.5	Aquathol & DMA	1.0 & 1.0
L	CLP	1.3	3	3.9	Aquathol	1.0
M	CLP	2	5	10.0	Aquathol	1.0
N	EWM & CLP	2.25	5	11.3	Aquathol & DMA	1.0 & 1.0
O	EWM & CLP	4	3	12.0	Aquathol & DMA	1.0 & 1.0
P	EWM & CLP	7.3	4	29.2	Aquathol & DMA	1.0 & 1.0
Q	EWM & CLP	6.5	5	32.5	Aquathol & DMA	1.0 & 1.0
R	EWM & CLP	3.6	4	14.4	Aquathol & DMA	1.0 & 1.0
AWC1	EWM & CLP	0.45	3	1.4	Aquathol & DMA	1.0 & 1.0
AWC2	EWM & CLP	1.6	4	6.4	Aquathol & DMA	1.0 & 1.0
AWC3	EWM & CLP	1.4	3	4.2	Aquathol & DMA	1.0 & 1.0
AWC4	EWM & CLP	5.5	4	22.0	Aquathol & DMA	1.0 & 1.0
AWC5	EWM & CLP	0.8	3	2.4	Aquathol & DMA	1.0 & 1.0
AWC6	EWM & CLP	1.7	4	6.8	Aquathol & DMA	1.0 & 1.0
AWC7	EWM & CLP	1.3	3	3.9	Aquathol & DMA	1.0 & 1.0
AWC8	EWM & CLP	5.3	3	15.9	Aquathol & DMA	1.0 & 1.0
AWC9	EWM & CLP	2.1	3	6.3	Aquathol & DMA	1.0 & 1.0
AWC10	EWM & CLP	3.4	3	10.2	Aquathol & DMA	1.0 & 1.0
AWC11	EWM & CLP	4.4	3	13.2	Aquathol & DMA	1.0 & 1.0



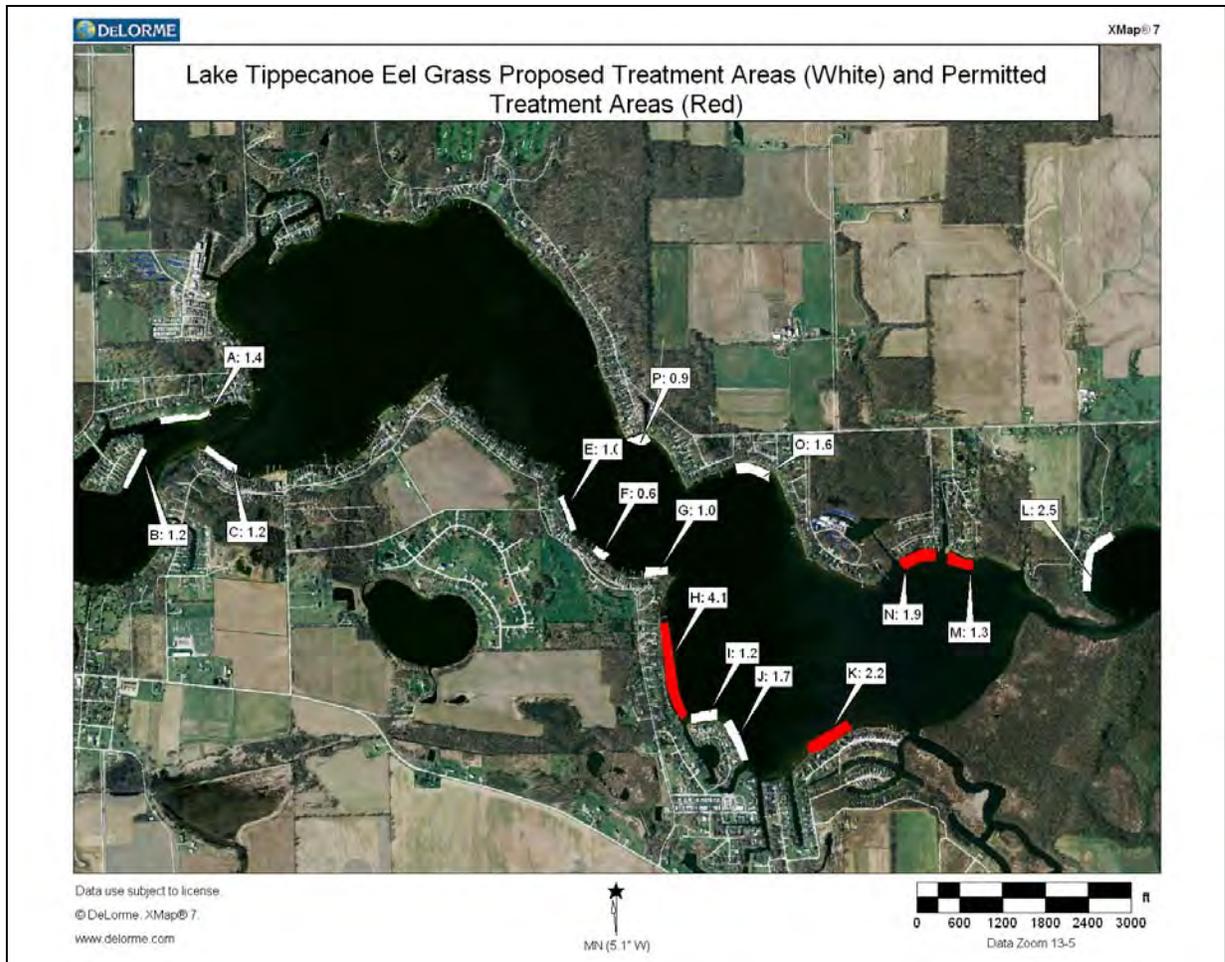
**Figure 2. Lake Tippecanoe Eurasian watermilfoil and curlyleaf pondweed treatment areas, April 30, 2012 (Yellow=EWM only, Red=CLP & EWM, White=CLP only).**

A follow-up treatment was completed on June 22<sup>nd</sup>. This treatment included touching up 8.0 acres of Eurasian watermilfoil on the main lake and treatment of an additional 4.2 acres of Eurasian watermilfoil in the channel between James and Tippecanoe Lake (Figure 3). Eurasian watermilfoil was treated with 2.0 ppm of liquid 2,4-D.



**Figure 3. Lake Tippecanoe Eurasian watermilfoil treatment areas, June 22, 2012 (Red=retreatment & white=new area).**

In addition to the invasive treatments, LTPOA also funded treatment of eel grass. In late June, areas deemed to have potentially nuisance levels of eel grass were mapped out by Aquatic Control. This map was sent to IDNR and LTPOA for approval following inspection. IDNR approved treatment of 9.5 acres. These areas were treated with 1.0 ppm Nautique herbicide on July 19<sup>th</sup> (Figure 4).



**Figure 4. Lake Tippecanoe eel grass treatment areas, July 19, 2012 (Red=actual treatment areas & white=proposed treatment areas).**

## 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 2012, LARE and the LTPOA funded an invasive species mapping survey, a Tier II survey, and an ecozone survey that included a tier II survey and an emergent vegetation survey within the ecozone area. The invasive mapping survey was covered in Section 1.3.

### 2.1 Tier II Sampling Results

#### 2.1.1 Methods

The tier II survey helps meet the following objectives:

1. to document the distribution and abundance of submersed and floating-leaved aquatic vegetation

2. to compare present distribution and abundance with past distribution and abundance within select areas

The same sites used in past tier II surveys were used again in the 2012 survey (Figure 5). 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 is retrieved the overall plant abundance on the rake is 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) and then individual species are placed back on the rake and scored separately (IDNR 2010).

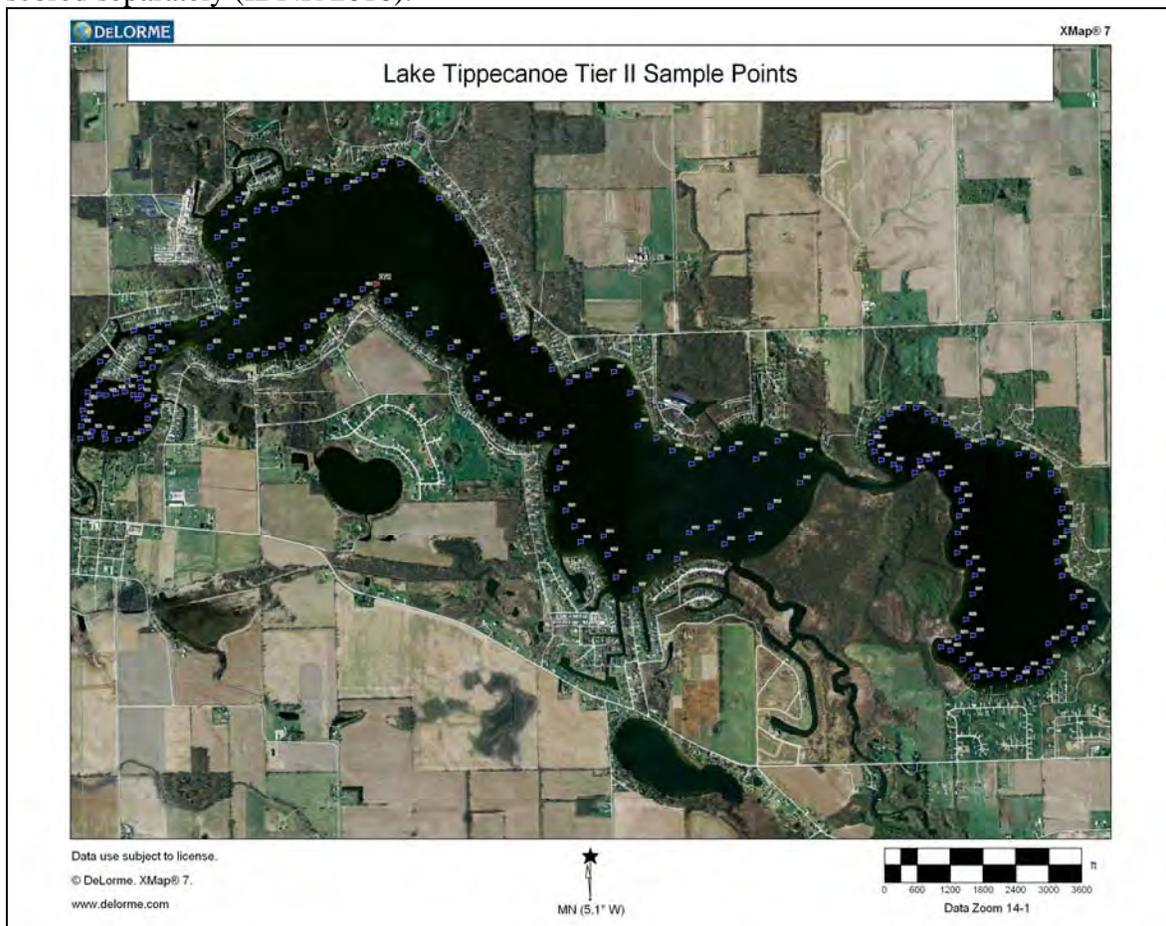


Figure 5. Tier II Sample Sites.

### 2.1.2 Oswego Lake

On August 29, 2012, forty sites were sampled on Oswego Lake. Eleven species were collected and plants were present at 26 sites. Eel grass was the most frequently occurring species. Curlyleaf pondweed and spiny naiad (*Najas marina*) were the only exotic species collected. (Figure 6 & 7). Results of the survey are summarized in Table 5.

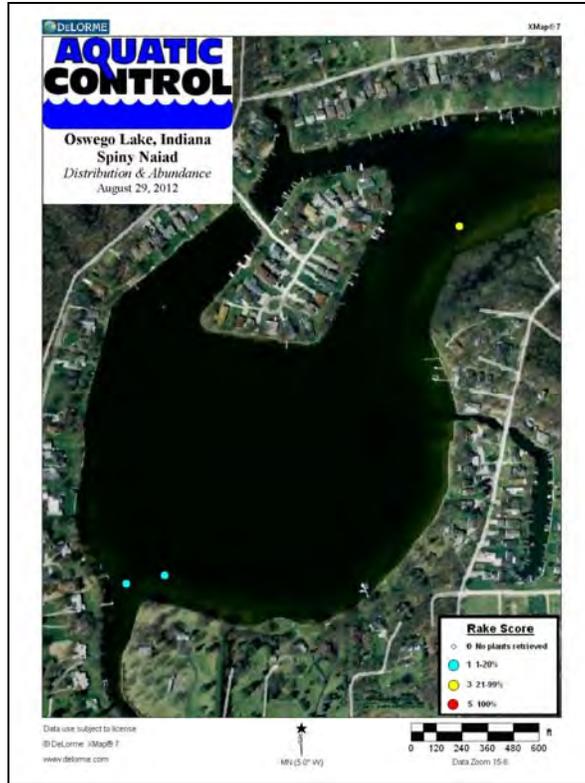


Figure 6. Spiny naiad locations on Oswego Lake, August 29, 2012

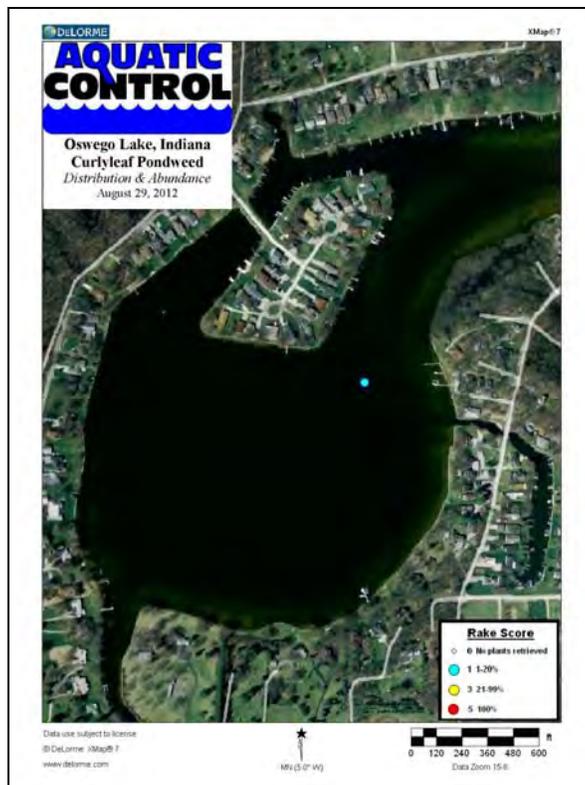


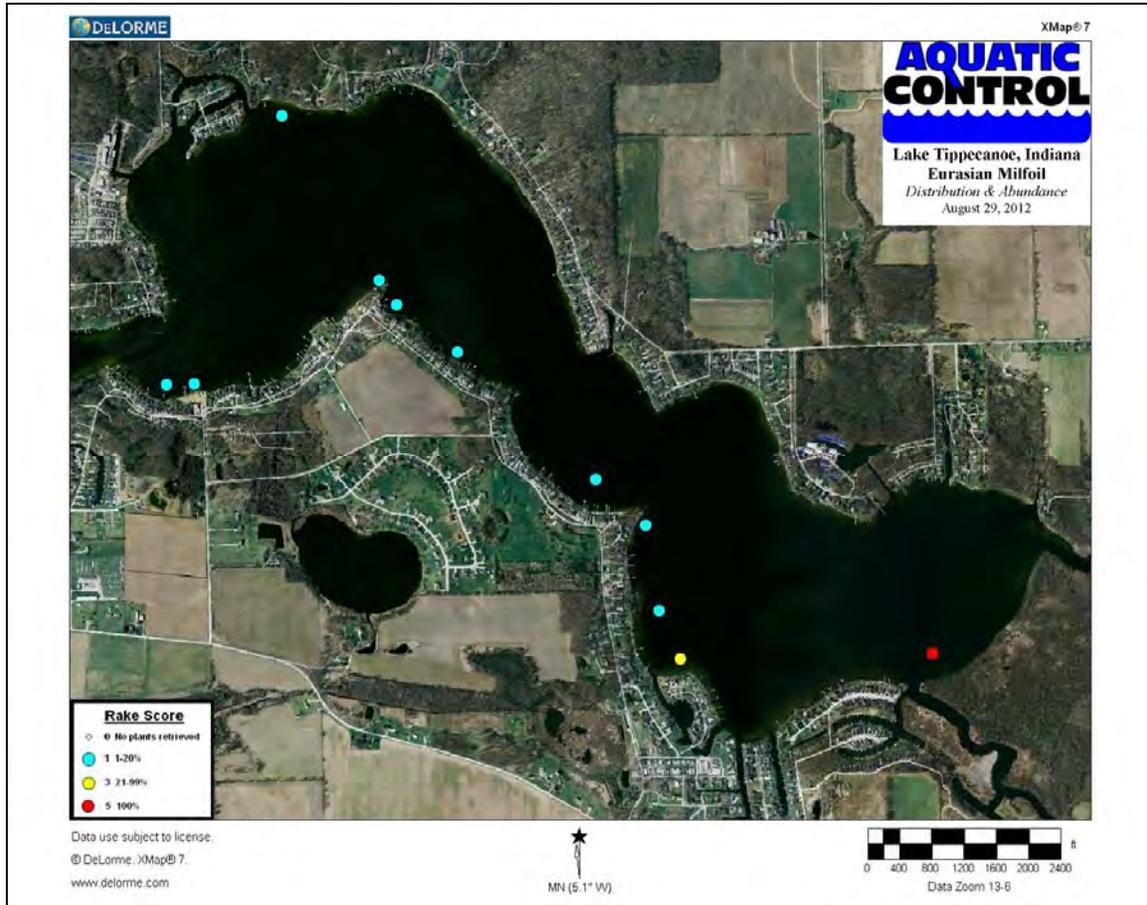
Figure 7. Curlyleaf pondweed location on Oswego Lake, August 29, 2012

**Table 5. Occurrence and abundance of submersed aquatic plants in Oswego Lake, August 29, 2012.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (all depths).</b>						
County:	Kos	Total Sites:	40	Mean species/site:	1.43	
Date:	8.29.12	Sites with plants:	26	SE Mean species/site:	0.22	
Secchi (ft):	9	Sites with native plants:	26	Mean native species/site:	1.33	
Max Plant Depth (ft):	15	Number of species:	10	SE Mean natives/site:	0.20	
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.81	
		Maximum species/site:	5	Native species diversity:	0.79	
All Depths (0 to 15 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	40.0	60.0	10.0	7.5	22.5	29.0
coontail	30.0	70.0	12.5	7.5	10.0	17.0
Chara	25.0	75.0	17.5	2.5	5.0	10.0
Southern naiad	22.5	77.5	17.5	5.0	0.0	6.5
Sago pondweed	7.5	92.5	5.0	0.0	2.5	3.5
Spiny naiad	7.5	92.5	5.0	2.5	0.0	2.5
Curlyleaf pondweed	2.5	97.5	2.5	0.0	0.0	0.5
Illinois 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	45.0					
Other species observed: White water lily, watermeal, spatterdock, sacred lotus, duckweed						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (0-5 ft).</b>						
County:	Kos	Total Sites:	19	Mean species/site:	2.16	
Date:	8.29.12	Sites with plants:	16	SE Mean species/site:	0.34	
Secchi (ft):	9	Sites with native plants:	16	Mean native species/site:	1.95	
Max Plant Depth (ft):	15	Number of species:	10	SE Mean natives/site:	0.30	
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.83	
		Maximum species/site:	5	Native diversity:	0.80	
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>	
Eel grass	57.9	42.1	15.8	5.3	36.8	43.2
Chara	47.4	52.6	31.6	5.3	10.5	20.0
Southern naiad	36.8	63.2	26.3	10.5	0.0	11.6
coontail	21.1	78.9	5.3	10.5	5.3	12.6
Sago pondweed	15.8	84.2	10.5	0.0	5.3	7.4
Spiny naiad	15.8	84.2	10.5	5.3	0.0	5.3
Curlyleaf pondweed	5.3	94.7	5.3	0.0	0.0	1.1
Illinois pondweed	5.3	94.7	5.3	0.0	0.0	1.1
Richardson's pondweed	5.3	94.7	5.3	0.0	0.0	1.1
Slender naiad	5.3	94.7	5.3	0.0	0.0	1.1
Filamentous Algae	52.6					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (5-10 ft).</b>						
County:	Kos	Total Sites:	4	Mean species/site:	1.25	
Date:	8.29.12	Sites with plants:	2	SE Mean species/site:	0.75	
Secchi (ft):	9	Sites with native plants:	2	Mean native species/site:	1.25	
Max Plant Depth (ft):	15	Number of species:	4	SE Mean natives/site:	0.75	
Trophic Status:	Meso	# of native species:	4	Species diversity:	0.72	
		Maximum species/site:	3	Native diversity:	0.72	
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>	
Eel grass	50.0	50.0	25.0	0.0	25.0	30.0
Chara	25.0	75.0	25.0	0.0	0.0	5.0
coontail	25.0	75.0	25.0	0.0	0.0	5.0
Southern naiad	25.0	75.0	25.0	0.0	0.0	5.0
Filamentous Algae	75					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (10-15 ft).</b>						
County:	Kos	Total Sites:	9	Mean species/site:	1.22	
Date:	8.29.12	Sites with plants:	8	SE Mean species/site:	0.28	
Secchi (ft):	9	Sites with native plants:	8	Mean native species/site:	1.22	
Max Plant Depth (ft):	15	Number of species:	3	SE Mean natives/site:	0.28	
Trophic Status:	Meso	# of native species:	3	Species diversity:	0.51	
		Maximum species/site:	3	Native diversity:	0.51	
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	77.8	22.2	33.3	11.1	33.3	46.7
Eel grass	33.3	66.7	0.0	22.2	11.1	24.4
Southern naiad	11.1	88.9	11.1	0.0	0.0	2.2
Filamentous Algae	44.4					

### 2.1.3 Tippecanoe Lake

Ninety sites were sampled on Tippecanoe Lake in 2012. Fourteen species were collected and plants were present at 69 sites. Eel grass was the most frequently occurring species. Eurasian watermilfoil and spiny naiad were the only exotic species collected (Figure 8 & 9). The results of the survey are located in Table 6.



**Figure 8. Eurasian watermilfoil locations on Tippecanoe Lake, August 29, 2012**

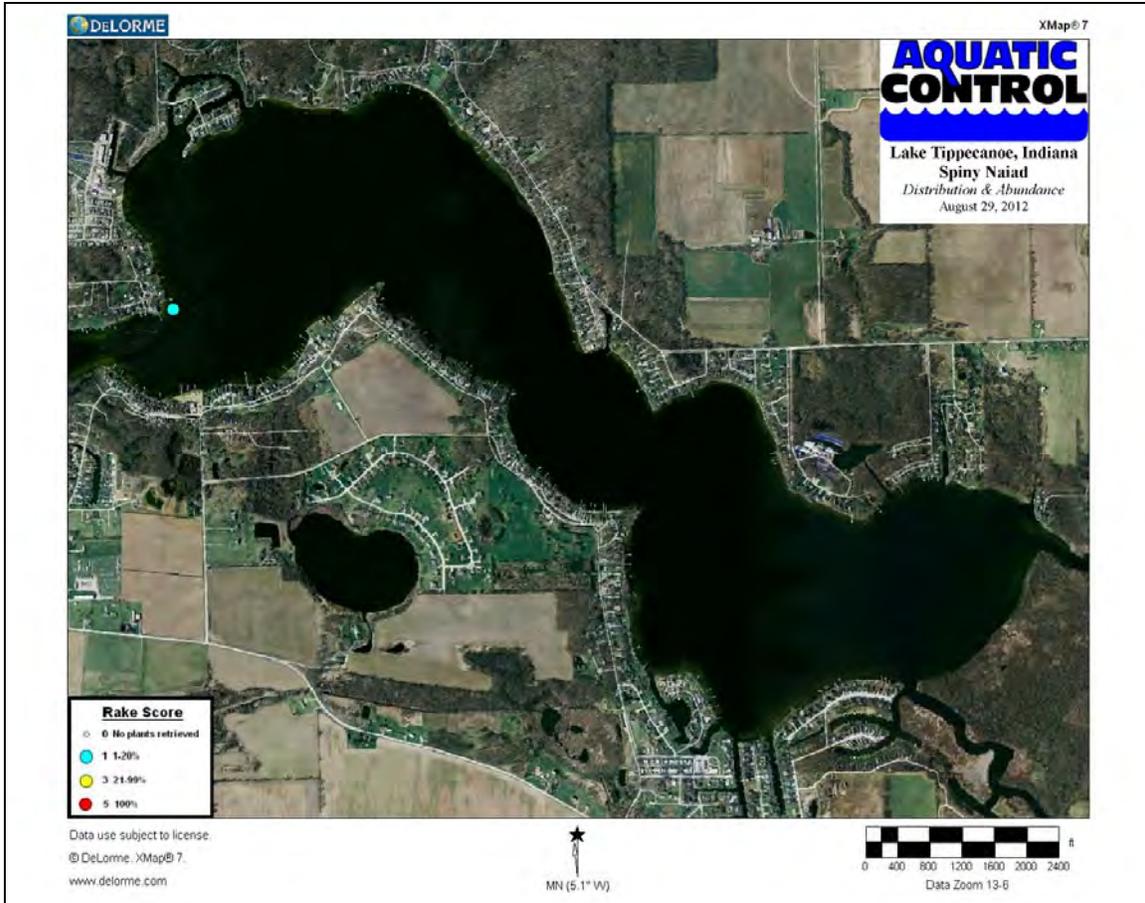


Figure 9. Spiny naiad location on Tippecanoe Lake, August 29, 2012.

**Table 6. Occurrence and abundance of submersed aquatic plants in Lake Tippecanoe, August 29, 2012.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (all depths).</b>						
County: Kos	Total Sites:	90	Mean species/site:	1.92		
Date: 8.29.12	Sites with plants:	69	SE Mean species/site:	0.17		
Secchi (ft): 8.0	Sites with native plants:	68	Mean native species/site:	1.79		
Max Plant Depth (ft): 21	Number of species:	14	SE Mean natives/site:	0.15		
Trophic Status: Meso	# of native species:	12	Species diversity:	0.84		
	Maximum species/site:	5	Native species diversity:	0.82		
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>	
Eel grass	53.3	46.7	15.6	20.0	17.8	32.9
Sago pondweed	28.9	71.1	10.0	11.1	7.8	16.4
Chara	26.7	73.3	10.0	8.9	7.8	15.1
Southern naiad	26.7	73.3	22.2	0.0	4.4	8.9
Coontail	22.2	77.8	8.9	5.6	7.8	12.9
Eurasian watermilfoil	12.2	87.8	10.0	1.1	1.1	3.8
Richardson's pondweed	5.6	94.4	5.6	0.0	0.0	1.1
Illinois pondweed	3.3	96.7	1.1	2.2	0.0	1.6
Slender naiad	3.3	96.7	3.3	0.0	0.0	0.7
Variable pondweed	3.3	96.7	2.2	1.1	0.0	1.1
Common elodea	2.2	97.8	2.2	0.0	0.0	0.4
Water stargrass	2.2	97.8	2.2	0.0	0.0	0.4
Flatstem pondweed	1.1	98.9	1.1	0.0	0.0	0.2
Spiny naiad	1.1	98.9	1.1	0.0	0.0	0.2
Filamentous Algae	12.2					
Species Observed: Common cattail, spatterdock, bulrush, and white water lily.						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (0-5 ft).</b>						
County: Kos	Total Sites:	43	Mean species/site:	2.33		
Date: 8.29.12	Sites with plants:	37	SE Mean species/site:	0.23		
Secchi (ft): 8	Sites with native plants:	36	Mean native species/site:	2.19		
Max Plant Depth (ft): 21	Number of species:	12	SE Mean natives/site:	0.22		
Trophic Status: Meso	# of native species:	10	Species diversity:	0.83		
	Maximum species/site:	5	Native diversity:	0.81		
Depth: 0 to 5 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>	
Eel grass	67.4	32.6	18.6	32.6	16.3	39.5
Chara	41.9	58.1	14.0	11.6	16.3	26.0
Sago pondweed	39.5	60.5	11.6	18.6	9.3	22.8
Southern naiad	34.9	65.1	27.9	0.0	7.0	12.6
Eurasian watermilfoil	11.6	88.4	7.0	2.3	2.3	5.1
Coontail	9.3	90.7	4.7	0.0	4.7	5.6
Richardson's pondweed	7.0	93.0	7.0	0.0	0.0	1.4
Variable pondweed	7.0	93.0	4.7	2.3	0.0	2.3
Illinois pondweed	4.7	95.3	0.0	4.7	0.0	2.8
Water stargrass	4.7	95.3	4.7	0.0	0.0	0.9
Common elodea	2.3	97.7	2.3	0.0	0.0	0.5
Spiny naiad	2.3	97.7	2.3	0.0	0.0	0.5
Filamentous Algae	20.9					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).</b>						
County: Kos	Total Sites:	22	Mean species/site:	2.23		
Date: 8.29.12	Sites with plants:	20	SE Mean species/site:	0.34		
Secchi (ft): 8	Sites with native plants:	20	Mean native species/site:	2.09		
Max Plant Depth (ft): 21	Number of species:	11	SE Mean natives/site:	0.29		
Trophic Status: Meso	# of native species:	10	Species diversity:	0.84		
	Maximum species/site:	5	Native diversity:	0.82		
Depth: 5 to 10 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>	
Eel grass	59.1	40.9	13.6	18.2	27.3	40.9
Coontail	40.9	59.1	9.1	13.6	18.2	28.2
Sago pondweed	31.8	68.2	13.6	4.5	13.6	19.1
Southern naiad	31.8	68.2	31.8	0.0	0.0	6.4
Chara	22.7	77.3	9.1	13.6	0.0	10.0
Eurasian watermilfoil	13.6	86.4	13.6	0.0	0.0	2.7
Common elodea	4.5	95.5	4.5	0.0	0.0	0.9
Flatstem pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Illinois pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Richardson's pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Slender naiad	4.5	95.5	4.5	0.0	0.0	0.9
Filamentous Algae	9.1					

**Table 6 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft).</b>						
County:	Kos	Total Sites:	13	Mean species/site:	1.15	
Date:	8.29.12	Sites with plants:	7	SE Mean species/site:	0.39	
Secchi (ft):	8	Sites with native plants:	7	Mean native species/site:	1.00	
Max Plant Depth (ft):	21	Number of species:	8	SE Mean natives/site:	0.32	
Trophic Status:	Meso	# of native species:	7	Species diversity:	0.82	
		Maximum species/site:	4	Native diversity:	0.78	
Depth: 10 to 15 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	30.8	69.2	23.1	0.0	7.7	12.3
Eel grass	30.8	69.2	15.4	0.0	15.4	18.5
Eurasian watermilfoil	15.4	84.6	15.4	0.0	0.0	3.1
Chara	7.7	92.3	7.7	0.0	0.0	1.5
Richardson's pondweed	7.7	92.3	7.7	0.0	0.0	1.5
Sago pondweed	7.7	92.3	7.7	0.0	0.0	1.5
Slender naiad	7.7	92.3	7.7	0.0	0.0	1.5
Southern naiad	7.7	92.3	0.0	0.0	7.7	7.7
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).</b>						
County:	Kos	Total Sites:	10	Mean species/site:	0.80	
Date:	8.29.12	Sites with plants:	4	SE Mean species/site:	0.49	
Secchi (ft):	8	Sites with native plants:	4	Mean native species/site:	0.70	
Max Plant Depth (ft):	21	Number of species:	6	SE Mean natives/site:	0.40	
Trophic Status:	Meso	# of native species:	5	Species diversity:	0.78	
		Maximum species/site:	5	Native diversity:	0.73	
Depth: 15 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	30.0	70.0	10.0	20.0	0.0	14.0
Eel grass	10.0	90.0	0.0	0.0	10.0	10.0
Eurasian watermilfoil	10.0	90.0	10.0	0.0	0.0	2.0
Sago pondweed	10.0	90.0	0.0	10.0	0.0	6.0
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
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (20-25 ft).</b>						
County:	Kos	Total Sites:	2	Mean species/site:	0.50	
Date:	8.29.12	Sites with plants:	1	SE Mean species/site:	0.50	
Secchi (ft):	8	Sites with native plants:	1	Mean native species/site:	0.50	
Max Plant Depth (ft):	21	Number of species:	1	SE Mean natives/site:	0.50	
Trophic Status:	Meso	# of native species:	1	Species diversity:	0.00	
		Maximum species/site:	1	Native diversity:	0.00	
Depth: 20 to 25 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>	
Eel grass	50.0	50.0	50.0	0.0	0.0	10.0

**2.1.4 James Lake**

Sixty sites were sampled on James Lake in 2012. Twelve species were collected and plants were present at 47 sites. Coontail was the most frequently occurring species. Eurasian watermilfoil and spiny naiad were the only exotic species collected (Figure 10 & 11). The results of the survey are located in Table 7.

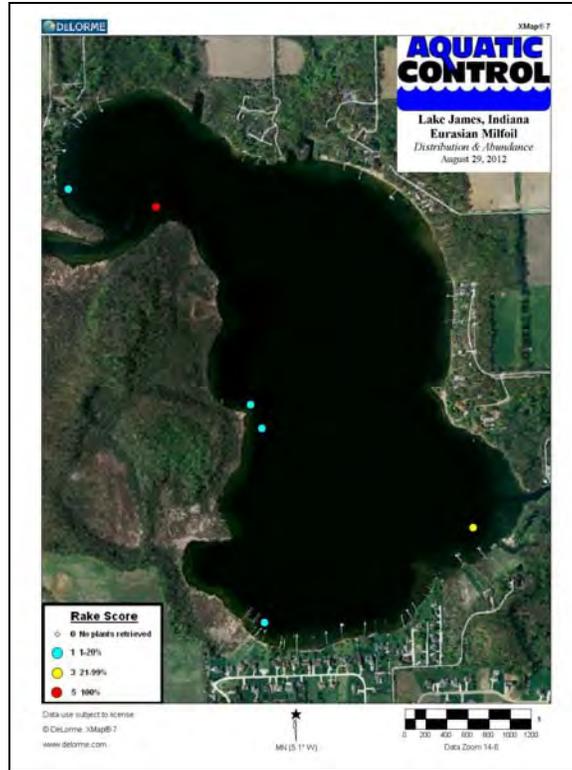


Figure 10. Eurasian watermilfoil locations on James Lake, August 29, 2012.

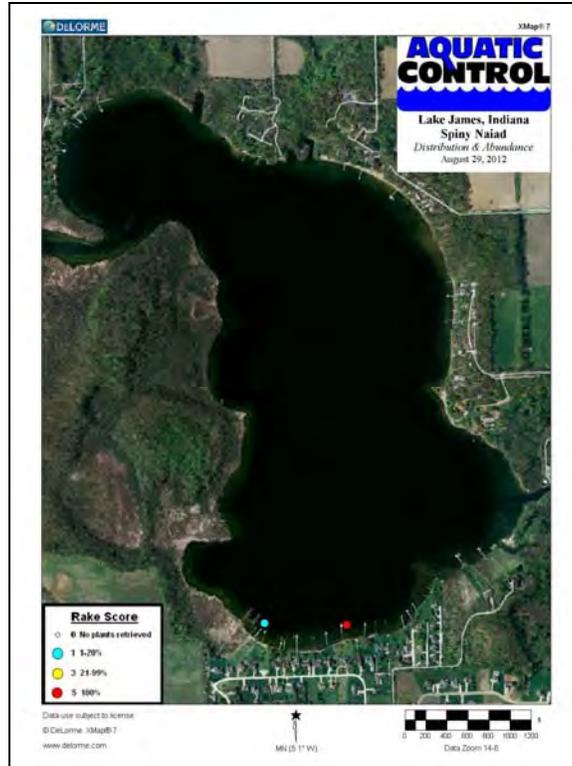


Figure 11. Spiny naiad locations on James Lake, August 29, 2012.

**Table 7. Occurrence and abundance of submersed aquatic plants in James Lake, August 29, 2012.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake James (all depths).</b>						
County:	Kos	Total Sites:	60	Mean species/site:	1.33	
Date:	8.29.12	Sites with plants:	47	SE Mean species/site:	0.13	
Secchi (ft):	5.5	Sites with native plants:	46	Mean native species/site:	1.20	
Max Plant Depth (ft):	18	Number of species:	12	SE Mean natives/site:	0.12	
Trophic Status:	Meso	# of native species:	10	Species diversity:	0.76	
		Maximum species/site:	4	Native species diversity:	0.71	
All Depths (0 to 18 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	58.3	41.7	15.0	6.7	36.7	43.7
Chara	21.7	78.3	10.0	6.7	5.0	11.0
Eel Grass	13.3	86.7	6.7	3.3	3.3	6.7
Sago pondweed	11.7	88.3	1.7	5.0	5.0	8.3
Eurasian milfoil	10.0	90.0	6.7	1.7	1.7	4.0
Water stargrass	5.0	95.0	1.7	1.7	1.7	3.0
Southern naiad	3.3	96.7	1.7	1.7	0.0	1.3
Spiny naiad	3.3	96.7	1.7	0.0	1.7	2.0
Elodea	1.7	98.3	1.7	0.0	0.0	0.3
Flatstem pondweed	1.7	98.3	1.7	0.0	0.0	0.3
Richardson's pondweed	1.7	98.3	1.7	0.0	0.0	0.3
Slender naiad	1.7	98.3	0.0	0.0	1.7	1.7
Filamentous Algae	11.7					
Other species observed: Spatterdock, button bush, white water lily, cattail, cardinal flower, swamp loosestrife						
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake James (0-5 ft).</b>						
County:	Kos	Total Sites:	30	Mean species/site:	1.77	
Date:	8.29.12	Sites with plants:	27	SE Mean species/site:	0.18	
Secchi (ft):	5.5	Sites with native plants:	26	Mean native species/site:	1.60	
Max Plant Depth (ft):	18	Number of species:	11	SE Mean natives/site:	0.17	
Trophic Status:	Meso	# of native species:	9	Species diversity:	0.82	
		Maximum species/site:	4	Native diversity:	0.79	
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	53.3	46.7	26.7	3.3	23.3	30.7
Chara	40.0	60.0	20.0	13.3	6.7	18.7
Eel Grass	23.3	76.7	13.3	6.7	3.3	10.0
Sago pondweed	16.7	83.3	3.3	6.7	6.7	11.3
Eurasian milfoil	13.3	86.7	10.0	3.3	0.0	4.0
Water stargrass	10.0	90.0	3.3	3.3	3.3	6.0
Southern naiad	6.7	93.3	3.3	3.3	0.0	2.7
Elodea	3.3	96.7	3.3	0.0	0.0	0.7
Flatstem pondweed	3.3	96.7	3.3	0.0	0.0	0.7
Slender naiad	3.3	96.7	0.0	0.0	3.3	3.3
Spiny naiad	3.3	96.7	0.0	0.0	3.3	3.3
Filamentous Algae	23.3					

**Table 7 Continued.**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).</b>						
County:	Kos	Total Sites:	22	Mean species/site:	2.23	
Date:	8.29.12	Sites with plants:	20	SE Mean species/site:	0.34	
Secchi (ft):	8	Sites with native plants:	20	Mean native species/site:	2.09	
Max Plant Depth (ft):	21	Number of species:	11	SE Mean natives/site:	0.29	
Trophic Status:	Meso	# of native species:	10	Species diversity:	0.84	
		Maximum species/site:	5	Native diversity:	0.82	
Depth: 5 to 10 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>	
Eel grass	59.1	40.9	13.6	18.2	27.3	40.9
Coontail	40.9	59.1	9.1	13.6	18.2	28.2
Sago pondweed	31.8	68.2	13.6	4.5	13.6	19.1
Southern naiad	31.8	68.2	31.8	0.0	0.0	6.4
Chara	22.7	77.3	9.1	13.6	0.0	10.0
Eurasian watermilfoil	13.6	86.4	13.6	0.0	0.0	2.7
Common elodea	4.5	95.5	4.5	0.0	0.0	0.9
Flatstem pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Illinois pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Richardson's pondweed	4.5	95.5	4.5	0.0	0.0	0.9
Slender naiad	4.5	95.5	4.5	0.0	0.0	0.9
Filamentous Algae	9.1					
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft).</b>						
County:	Kos	Total Sites:	13	Mean species/site:	1.15	
Date:	8.29.12	Sites with plants:	7	SE Mean species/site:	0.39	
Secchi (ft):	8	Sites with native plants:	7	Mean native species/site:	1.00	
Max Plant Depth (ft):	21	Number of species:	8	SE Mean natives/site:	0.32	
Trophic Status:	Meso	# of native species:	7	Species diversity:	0.82	
		Maximum species/site:	4	Native diversity:	0.78	
Depth: 10 to 15 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	30.8	69.2	23.1	0.0	7.7	12.3
Eel grass	30.8	69.2	15.4	0.0	15.4	18.5
Eurasian watermilfoil	15.4	84.6	15.4	0.0	0.0	3.1
Chara	7.7	92.3	7.7	0.0	0.0	1.5
Richardson's pondweed	7.7	92.3	7.7	0.0	0.0	1.5
Sago pondweed	7.7	92.3	7.7	0.0	0.0	1.5
Slender naiad	7.7	92.3	7.7	0.0	0.0	1.5
Southern naiad	7.7	92.3	0.0	0.0	7.7	7.7
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).</b>						
County:	Kos	Total Sites:	10	Mean species/site:	0.80	
Date:	8.29.12	Sites with plants:	4	SE Mean species/site:	0.49	
Secchi (ft):	8	Sites with native plants:	4	Mean native species/site:	0.70	
Max Plant Depth (ft):	21	Number of species:	6	SE Mean natives/site:	0.40	
Trophic Status:	Meso	# of native species:	5	Species diversity:	0.78	
		Maximum species/site:	5	Native diversity:	0.73	
Depth: 15 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	30.0	70.0	10.0	20.0	0.0	14.0
Eel grass	10.0	90.0	0.0	0.0	10.0	10.0
Eurasian watermilfoil	10.0	90.0	10.0	0.0	0.0	2.0
Sago pondweed	10.0	90.0	0.0	10.0	0.0	6.0
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
<b>Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (20-25 ft).</b>						
County:	Kos	Total Sites:	2	Mean species/site:	0.50	
Date:	8.29.12	Sites with plants:	1	SE Mean species/site:	0.50	
Secchi (ft):	8	Sites with native plants:	1	Mean native species/site:	0.50	
Max Plant Depth (ft):	21	Number of species:	1	SE Mean natives/site:	0.50	
Trophic Status:	Meso	# of native species:	1	Species diversity:	0.00	
		Maximum species/site:	1	Native diversity:	0.00	
Depth: 20 to 25 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>	
Eel grass	50.0	50.0	50.0	0.0	0.0	10.0

## 2.2 Ecozone Survey

### 2.2.1 Methods

Two surveys were completed in the ecozone area on August 13, 2012. A Tier II survey was completed using the same points that were used in the original 2008 survey (Aquatic Control 2009). These points are illustrated in Figure 12. The same methods described in 2.1.1 were used in this Tier II survey. In addition, a floating leaf emergent vegetation survey was also completed on the same day. The sampling method is described in *Emergent Vegetation Survey Protocol* (IDNR 2012). This method was designed to delineate and characterize the species composition of floating-leaf and emergent plant beds, primarily spatterdock (*Nuphar variegata*) and white water lily (*Nymphaea odorata*). Beds were delineated with a handheld Global Positioning System (GPS) unit and range finder, while beds were characterized based on the dominance of floating-leaf species along transects within the beds. Supplemental data was also obtained on the presence of shallow-water emergent plants associated with floating-leaf beds.

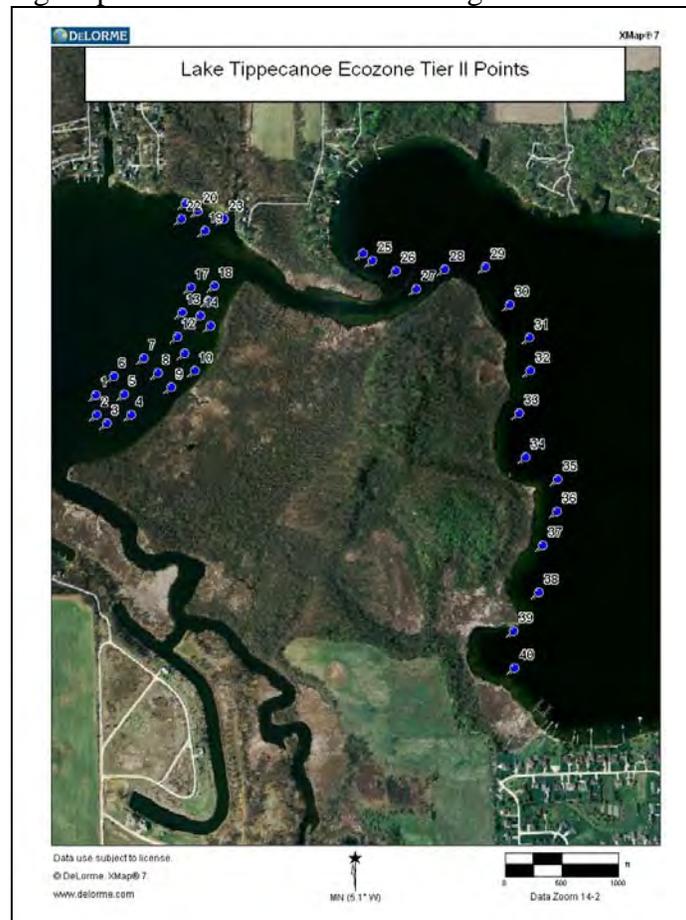


Figure 12. Ecozone Tier II Survey Points.

### 2.2.2 Tier II Results

Forty sites were sampled within the Ecozone on August 13, 2012. Nine species were collected and plants were present at 38 sites. Coontail was the most frequently occurring species. Eurasian watermilfoil was the only invasive species collected and it was found at a single site on James Lake (this area was targeted for Eurasian watermilfoil control in the spring of 2012 prior to this survey). The results of the survey are located in Table 8.

**Table 8. Occurrence and abundance of submersed aquatic plants in the Lake Tippecanoe ecozone, August 13, 2012.**

Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe and Lake James Ecozone (all depths).						
County:	KOS	Total Sites:	40	Mean species/site:	2.03	
Date:	8.13.12	Sites with plants:	38	SE Mean sp/site:	0.21	
Secchi (ft):	6.5	Sites with native plants:	38	Mean native sp/site:	2.00	
Max Plant Depth (ft):	9	Number of species:	9	SE Mean natives/site:	0.21	
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.81	
		Maximum species/site:	6	Native species diversity:	0.81	
All Depths (0 to 10 ft)						
Species	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
		0	1	3	5	
Coontail	50.0	50.0	17.5	12.5	20.0	31.0
Chara	47.5	52.5	17.5	12.5	17.5	28.5
Slender naiad	40.0	60.0	27.5	2.5	10.0	17.0
Eel grass	30.0	70.0	20.0	10.0	0.0	10.0
Sago pondweed	17.5	82.5	15.0	2.5	0.0	4.5
Flatstem pondweed	5.0	95.0	5.0	0.0	0.0	1.0
leafy pondweed	5.0	95.0	2.5	2.5	0.0	2.0
Water stargrass	5.0	95.0	5.0	0.0	0.0	1.0
Eurasian milfoil	2.5	97.5	2.5	0.0	0.0	0.5
Filamentous Algae	35.0					
Other species observed: Richardson's pondweed, spatterdock, cattail, hibiscus, water lily, swamp loosestrife, purple loosestrife, arrow arum						
Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe and Lake James Ecozone (0-5 ft).						
County:	KOS	Total Sites:	33	Mean species/site:	2.15	
Date:	8.13.12	Sites with plants:	31	SE Mean species/site:	0.23	
Secchi (ft):	6.5	Sites with native plants:	31	Mean native species/site:	2.15	
Max Plant Depth (ft):	9	Number of species:	8	SE Mean natives/site:	0.23	
Trophic Status:	Meso	# of native species:	8	Species diversity:	0.82	
		Maximum species/site:	6	Native diversity:	0.82	
Depth: 0 to 5 ft						
Species	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
		0	1	3	5	
Chara	54.5	45.5	21.2	12.1	21.2	32.7
Slender naiad	48.5	51.5	33.3	3.0	12.1	20.6
Coontail	39.4	60.6	18.2	12.1	9.1	20.0
Eel grass	33.3	66.7	21.2	12.1	0.0	11.5
Sago pondweed	21.2	78.8	18.2	3.0	0.0	5.5
Flatstem pondweed	6.1	93.9	6.1	0.0	0.0	1.2
leafy pondweed	6.1	93.9	3.0	3.0	0.0	2.4
Water stargrass	6.1	93.9	6.1	0.0	0.0	1.2
Filamentous Algae	42.4					
Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe and Lake James Ecozone (5-10 ft).						
County:	KOS	Total Sites:	7	Mean species/site:	1.43	
Date:	8.13.12	Sites with plants:	7	SE Mean species/site:	0.43	
Secchi (ft):	6.5	Sites with native plants:	7	Mean native species/site:	1.29	
Max Plant Depth (ft):	9	Number of species:	4	SE Mean natives/site:	0.29	
Trophic Status:	Meso	# of native species:	3	Species diversity:	0.48	
		Maximum species/site:	4	Native diversity:	0.37	
Depth: 5 to 10 ft						
Species	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
		0	1	3	5	
Coontail	100.0	0.0	14.3	14.3	71.4	82.9
Chara	14.3	85.7	0.0	14.3	0.0	8.6
Eel grass	14.3	85.7	14.3	0.0	0.0	2.9
Eurasian milfoil	14.3	85.7	14.3	0.0	0.0	2.9

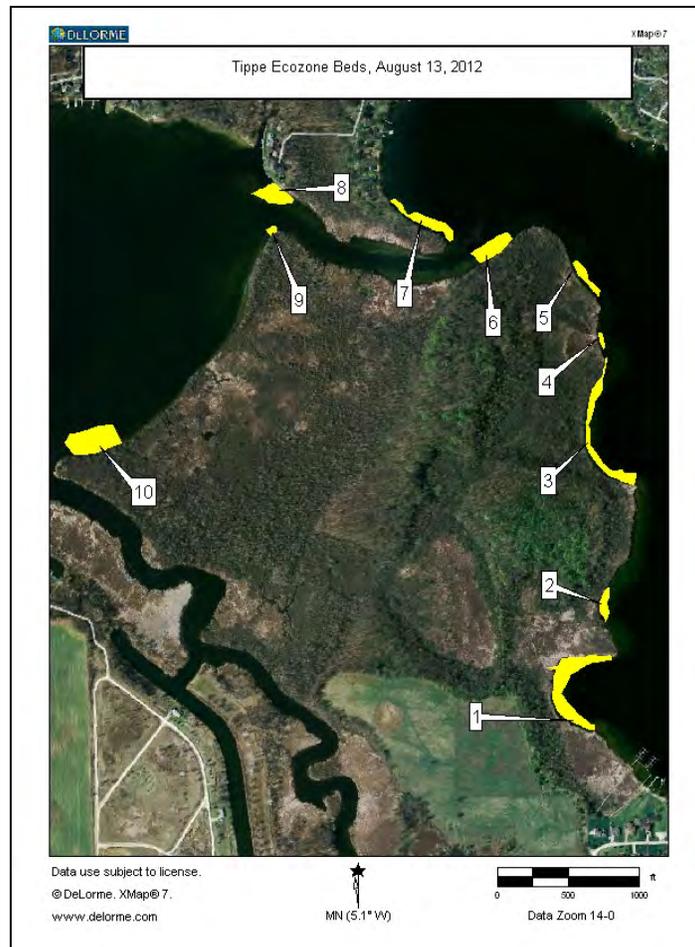
**2.2.3 Floating Leaf and Emergent Vegetation Survey Results**

Ten beds totaling 6.95 acres were defined within the ecozone area. A total of ten species were observed. Spatterdock and cattail were present in all of the beds (Table 9). The bed location is illustrated in Figure 13.

**Table 9. Floating Leaf and Emergent Vegetation Survey Results, August 13, 2012.**

Bed	# of Sites	Mean Latitude	Mean Longitude	Mean Width (ft)	Species Frequency of Occurrence										# of Species	#/Site	Acres	Shoreline Length (ft)
					SPA	WAL	ARA	SWL	CAT	PIK	PRL	BUR	BUB	HIB				
1	8	41.31368	-85.73107	73.9	87.5	100.0	0.0	0.0	100.0	0.0	12.5	0.0	0.0	87.5	4	3.88	1.440	798
2	5	41.315293	-85.7304	46.8	60.0	20.0	40.0	0.0	100.0	80.0	0.0	0.0	0.0	5	3.00	0.290	238	
3	13	41.318639	-85.73049	55.4	76.9	0.0	76.9	0.0	38.5	46.2	23.1	7.7	7.7	61.5	7	3.38	1.360	1094
4	3	41.320404	-85.73054	40.0	100.0	0.0	66.7	0.0	100.0	0.0	0.0	0.0	66.7	66.7	4	4.00	0.100	107
5	4	41.321648	-85.73094	52.5	100.0	25.0	25.0	0.0	50.0	25.0	0.0	75.0	75.0	50.0	7	4.25	0.370	285
6	4	41.3223	-85.73342	77.3	100.0	0.0	0.0	50.0	100.0	0.0	0.0	0.0	25.0	25.0	4	3.00	0.550	299
7	8	41.322741	-85.7351	61.5	75.0	25.0	75.0	0.0	12.5	0.0	0.0	0.0	25.0	0.0	5	2.13	0.260	144
8	4	41.323038	-85.73904	126.8	100.0	100.0	0.0	100.0	100.0	0.0	25.0	0.0	0.0	25.0	5	4.50	0.920	301
9	3	41.322641	-85.7391	49.0	100.0	0.0	0.0	33.3	66.7	0.0	100.0	0.0	0.0	0.0	4	3.00	0.250	207
10	5	41.318621	-85.74381	151.8	20.0	100.0	20.0	20.0	20.0	0.0	0.0	0.0	20.0	40.0	6	2.40	1.410	382

SPA=Spatterdock, WAL=Water Lily, ARA=Arrow Arum, SWL=Swamp Loosestrife, CAT=Cattail  
PIK=Pickeral Weed, PRL=Purple Loosestrife, ARH= Arrowhead, BUB=Button, STB= Soft-stem Bullrush, and HIB=Hibiscus



**Figure 13. Ecozone floating leaf plant bed location.**

### ***2.3 Plant Sampling Discussion***

The objective of maintaining Eurasian watermilfoil percent occurrence below 10% occurrence was met on Oswego Lake where no milfoil was collected in 2012, but Eurasian watermilfoil was present at 10% of sites on James and 12.2% of sites on Lake Tippecanoe. There were no noticeable topped out beds on either lake, but Eurasian watermilfoil was scattered throughout some native beds. Many of the locations where Eurasian watermilfoil was detected in the summer surveys were not included in the 2012 treatment. The reason for these areas not being treated could be that this plant was not present during the spring survey or was at such a low level during the spring survey that it was not easily detected.

Overall, there continues to be a relatively abundant and diverse native plant population in all three lakes. This season, Lake Tippecanoe exceeded the native diversity objectives, Oswego was just under the native diversity objective, while James was slightly under the both native objectives. The reason for these changes is not clear, but may be due to a limited data set that can produce high variability. It is important to continue monitoring native vegetation on these lakes in order to deduce whether this is just sampling variability or an actual decline. Eel grass continued to be present at above 50% of sites on Lake Tippecanoe.

**Table 10. Occurrence and abundance of submersed aquatic plants in Oswego Lake, 2004-2012.**

Oswego Lake								
Surveyor	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
Total Sites	33	40	40	40	40	40	40	40
Sites with Plants	31	38	30	36	34	29	25	26
Sites with Native Plants	29	38	28	36	34	29	25	26
Secchi (ft)		6	12	5.5	7.5	6	7	9
Number of Species	8	12	7	16	14	9	10	10
Number of Native Species	6	10	5	14	12	9	8	8
Species Diversity	0.79	0.84	0.83	0.85	0.82	0.80	0.86	0.81
Native Species Diversity	0.66	0.81	0.76	0.84	0.80	0.80	0.83	0.79
Mean Native Species/Site	1.09	1.70	0.93	2.08	1.78	1.40	1.38	1.33
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
Curlyleaf pondweed	27.3	7.5	22.5	2.5	5.0	0.0	0.0	2.5
Brittle naiad	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0
Coontail	57.6	50.0	25.0	35.0	45.0	40.0	25.0	30.0
Sago pondweed	0.0	17.5	0.0	12.5	5.0	20.0	12.5	7.5
Chara sp.	21.2	35.0	27.5	47.5	30.0	15.0	15.0	25.0
Eel grass	12.1	37.5	0.0	55.0	55.0	37.5	40.0	40.0
Richardson's pondweed	0.0	5.0	5.0	7.5	7.5	7.5	12.5	2.5
Illinois pondweed	0.0	5.0	0.0	0.0	2.5	10.0	0.0	2.5
Small pondweed	0.0	0.0	0.0	7.5	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
Spiny naiad	0.0	5.0	0.0	12.5	2.5	2.5	0.0	7.5
Elodea	0.7	2.5	0.0	0.0	5.0	0.0	2.5	0.0
Southern naiad	0.0	0.0	0.0	2.5	0.0	0.0	0.0	22.5
Large-leaf pondweed	0.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Northern milfoil	0.0	0.0	0.0	5.0	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
Flatstem pondweed	19.3	5.0	22.5	7.5	2.5	5.0	0.0	0.0
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common bladder wort	0.7	0.0	0.0	2.5	0.0	0.0	0.0	0.0
Variable milfoil	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0
Common elodea	0.7	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
Whorled milfoil	0.7	0.0	12.5	5.0	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
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
Curlyleaf pondweed	23.8	0.0	21.7	4.8	10.0	0.0	0.0	5.3
Coontail	42.9	21.1	21.7	14.3	20.0	26.7	14.3	21.1
Sago pondweed	0.0	26.3	0.0	23.8	10.0	46.7	42.9	15.8
Chara sp.	28.6	63.2	43.5	76.2	60.0	33.3	57.1	47.4
Eel grass	19.0	57.9	0.0	61.9	80.0	53.3	100.0	57.9
Richardson's pondweed	0.0	5.3	4.3	4.8	10.0	13.3	28.6	5.3
Illinois pondweed	0.0	10.5	0.0	0.0	0.0	20.0	0.0	5.3
Small pondweed	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0
Slender naiad	0.0	5.3	0.0	4.8	10.0	0.0	14.3	5.3
Spiny naiad	0.0	5.3	0.0	14.3	10.0	6.7	0.0	15.8
Southern naiad	0.0	0.0	0.0	4.8	0.0	0.0	0.0	36.8
Large-leaf pondweed	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0
Northern milfoil	0.0	0.0	0.0	4.8	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
Flatstem pondweed	4.8	10.5	30.4	4.8	10.0	6.7	0.0	0.0
Horned pondweed	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled milfoil	0.0	0.0	13.0	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

**Table 10 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
Curlyleaf pondweed	57.1	25.0	40.0	7.1	0.0	0.0	0.0	0.0
Coontail	85.7	66.7	40.0	64.3	50.0	55.6	60.0	25.0
Sago pondweed	0.0	16.7	0.0	0.0	10.0	11.1	0.0	0.0
Chara sp.	14.3	16.7	10.0	21.4	50.0	11.1	0.0	25.0
Eel grass	0.0	33.3	0.0	64.3	80.0	66.7	0.0	50.0
Richardson's pondweed	0.0	8.3	10.0	14.3	10.0	11.1	0.0	0.0
Illinois pondweed	0.0	0.0	0.0	0.0	10.0	11.1	0.0	0.0
Slender naiad	0.0	16.7	0.0	7.1	20.0	0.0	0.0	0.0
Spiny naiad	0.0	8.3	0.0	14.3	0.0	0.0	0.0	0.0
Elodea	0.0	8.3	0.0	0.0	10.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
Large-leaf pondweed	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
Northern milfoil	0.0	0.0	0.0	7.1	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
Flatstem pondweed	0.0	0.0	20.0	14.3	0.0	11.1	0.0	0.0
Common bladder wort	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0
Whorled milfoil	0.0	0.0	10.0	14.3	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
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
Curlyleaf pondweed	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Coontail	75.0	100.0	0.0	100.0	50.0	50.0	18.2	77.8
Chara sp.	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Eel grass	0.0	0.0	0.0	0.0	60.0	0.0	0.0	33.3
Slender naiad	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0
Elodea	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1
Variable pondweed	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Variable milfoil	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Filamentous algae	25.0	20.0	0.0	0.0	0.0	0.0	0.0	44.0
Species Frequency of Occurrence - Depth: 15 to 20 ft								
Coontail		75.0		100.0	60.0	50.0		
Eel grass	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0
Richardson's pondweed	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0

**Table 11. Occurrence and abundance of submersed aquatic plants in Tippecanoe Lake, 2004-2012.**

Surveyor	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
Total Sites	140	119	119	119	90	89	89	90
Sites with Plants	119	106	81	95	78	81	67	69
Sites with Native Plants	99	103	68	95	76	81	67	68
Secchi (ft)	-	6	13	6	7	6	7	8
Number of Species	12	12	10	15	16	13	11	14
Number of Native Species	10	10	8	13	14	12	10	12
Species Diversity	0.83	0.82	0.83	0.83	0.84	0.81	0.75	0.84
Native Species Diversity	0.79	0.78	0.79	0.82	0.82	0.80	0.73	0.82
Mean Native Species/Site	0.97	1.54	0.77	1.70	1.72	1.79	1.31	1.79
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
Curlyleaf pondweed	45.7	3.4	30.3	0.8	4.4	0.0	0.0	0.0
Coontail	13.6	26.1	16.8	26.9	35.6	36.0	23.6	22.2
Sago pondweed	0.0	10.9	0.0	10.1	5.6	13.5	6.7	28.9
Chara sp.	30.7	23.5	19.3	18.5	25.6	37.1	11.2	26.7
Eel grass	12.9	61.3	3.4	58.0	55.6	58.4	60.7	53.3
Slender naiad	0.0	5.9	0.0	1.7	4.4	1.1	4.5	3.3
Richardson's pondweed	0.0	9.2	4.2	7.6	10.0	4.5	14.6	5.6
Elodea	0.7	0.0	0.8	0.8	3.3	2.2	0.0	2.2
Variable pondweed	16.4	3.4	0.0	0.0	2.2	4.5	6.7	3.3
Flatstem pondweed	19.3	6.7	21.8	11.8	0.0	12.4	1.1	1.1
Horned pondweed	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bladderwort	0.7	0.0	0.0	16.0	0.0	0.0	1.1	0.0
Water stargrass	0.7	5.0	2.5	11.8	11.1	6.7	0.0	2.2
Southern naiad	0.0	0.0	0.0	3.4	0.0	1.1	0.0	26.7
Small pondweed	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0
Northern milfoil	0.0	0.0	0.0	11.8	4.4	0.0	0.0	0.0
Illinois pondweed	0.0	1.7	0.0	2.5	0.0	1.1	1.1	3.3
Leafy pondweed	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0
Variable milfoil	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Spiny naiad	0.0	0.0	0.0	0.0	6.7	0.0	0.0	1.1
Whorled milfoil	0.7	0.0	8.4	0.0	1.1	0.0	0.0	0.0
Filamentous algae	48.6	13.4	0.0	0.0	0.0	0.0	0.0	12.2
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
Curlyleaf pondweed	42.3	3.8	39.7	0.0	9.4	0.0	0.0	0.0
Coontail	9.0	13.2	4.8	7.9	3.1	2.3	12.0	9.3
Sago pondweed	0.0	11.3	0.0	6.3	6.3	22.7	4.0	39.5
Chara sp.	38.5	34.0	22.2	17.5	65.6	68.2	32.0	41.9
Eel grass	12.8	67.9	3.2	65.1	59.4	72.7	60.0	67.4
Slender naiad	0.0	11.3	0.0	3.2	9.4	2.3	4.0	0.0
Richardson's pondweed	0.0	17.0	3.2	9.5	6.3	9.1	16.0	7.0
Elodea	0.0	0.0	0.0	0.0	6.3	0.0	0.0	2.3
Variable pondweed	19.2	5.7	0.0	0.0	6.3	9.1	0.0	7.0
Flatstem pondweed	25.6	9.4	31.7	11.1	0.0	18.2	4.0	0.0
Horned pondweed	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bladderwort	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	1.3	5.7	1.6	27.0	6.3	4.5	0.0	4.7
Southern naiad	0.0	0.0	0.0	3.2	0.0	2.3	0.0	34.9
Small pondweed	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0
Northern milfoil	0.0	0.0	0.0	11.1	3.1	0.0	0.0	0.0
Illinois pondweed	0.0	1.9	0.0	4.8	0.0	0.0	4.0	4.7
Leafy pondweed	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0
Variable milfoil	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Whorled milfoil	1.3	0.0	7.9	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

**Table 11 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
Curlyleaf pondweed	61.5	6.5	31.8	0.0	0.0	0.0	0.0	0.0
Coontail	23.1	22.6	40.9	63.6	37.5	57.9	16.2	40.9
Sago pondweed	0.0	22.6	0.0	18.2	4.2	5.3	13.5	31.8
Chara sp.	15.4	6.5	4.5	4.5	8.3	15.8	5.4	22.7
Eel grass	15.4	71.0	4.5	72.7	83.3	84.2	83.8	59.1
Slender naiad	0.0	0.0	0.0	0.0	4.2	0.0	3.0	4.5
Richardson's pondweed	0.0	6.5	9.1	9.1	12.5	0.0	21.6	4.5
Elodea	0.0	0.0	0.0	4.5	4.2	10.5	0.0	4.5
Variable pondweed	15.4	15.4	15.4	0.0	0.0	0.0	8.1	0.0
Flatstem pondweed	23.1	6.5	22.7	22.7	0.0	15.8	0.0	4.5
Bladderwort	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0
Water stargrass	0.0	6.5	9.1	4.5	25.0	10.5	0.0	0.0
Southern naiad	0.0	0.0	0.0	9.1	0.0	0.0	0.0	31.8
Northern milfoil	0.0	0.0	0.0	13.6	4.2	0.0	0.0	0.0
Illinois pondweed	0.0	3.2	0.0	0.0	0.0	5.3	0.0	4.5
Leafy pondweed	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0
Variable milfoil	0.0	0.0	0.0	15.4	4.2	0.0	0.0	0.0
Whorled milfoil	0.0	0.0	22.7	0.0	4.2	0.0	0.0	0.0
Filamentous algae	61.5	16.1	0.0	0.0	0.0	0.0	0.0	9.1
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
Curlyleaf pondweed	66.7	0.0	28.6	0.0	4.2	0.0	0.0	0.0
Coontail	66.7	70.0	57.1	57.1	58.3	66.7	73.3	30.8
Sago pondweed	0.0	0.0	0.0	14.3	8.3	8.3	0.0	7.7
Chara sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7
Eel grass	33.3	40.0	0.0	42.9	45.8	25.0	53.3	30.8
Slender naiad	0.0	0.0	0.0	0.0	0.0	0.0	13.3	7.7
Richardson's pondweed	0.0	0.0	0.0	0.0	16.7	0.0	6.7	7.7
Flatstem pondweed	16.7	0.0	14.3	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
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7
Northern milfoil	0.0	0.0	0.0	14.3	8.3	0.0	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0
Spiny naiad	0.0	0.0	0.0	0.0	20.8	0.0	0.0	0.0
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
Curlyleaf pondweed	0.0	0.0	14.3	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
Sago pondweed	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
Slender naiad	0.0	0.0	0.0	0.0	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
Spiny naiad	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Species Frequency of Occurrence - Depth: 20 to 25 ft								
Coontail	0.0	0.0	0.0	0.0	0.0	66.7	0.0	50.0
Spiny naiad	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0

**Table 12. Occurrence and abundance of submersed aquatic plants in James Lake, 2004-2012.**

Surveyor	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
Total Sites	74	64	64	64	60	60	60	60
Sites with Plants	62	61	54	56	50	47	52	47
Sites with Native Plants	56	61	53	56	50	47	52	47
Secchi (ft)	-	6	16	9	4.5	7	5.5	5.5
Number of Species	11	14	9	13	14	10	12	12
Number of Native Species	9	12	7	12	13	8	10	10
Species Diversity	0.80	0.85	0.83	0.79	0.78	0.76	0.80	0.76
Native Species Diversity	0.71	0.81	0.74	0.78	0.77	0.74	0.79	0.72
Mean Native Species/Site	1.11	1.91	1.19	1.58	1.43	1.35	1.53	1.23
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
Curlyleaf pondweed	43.2	9.4	43.8	0.0	0.0	1.7	1.7	0.0
Brittle naiad	0.0	0.0	32.8	0.0	10.0	0.0	1.7	0.0
Coontail	43.2	57.8	43.8	54.7	61.7	56.7	51.7	58.3
Sago pondweed	0.0	6.3	0.0	0.0	6.7	3.3	13.3	11.7
Chara sp.	36.5	35.9	0.0	28.1	15.0	26.7	26.7	21.7
Eel grass	1.4	42.2	1.6	37.5	18.3	26.7	31.7	13.3
Slender naiad	0.0	15.6	0.0	12.5	8.3	10.0	16.7	1.7
Elodea	0.7	4.7	15.6	6.3	6.7	5.0	3.3	1.7
Leafy pondweed	0.0	3.1	0.0	0.0	1.7	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
Large-leaf pondweed	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
Flatstem pondweed	19.3	9.4	18.8	4.7	6.7	5.0	0.0	1.7
Horned pondweed	1.4	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
Common elodea	0.7	0.0	0.0	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
Small pondweed	0.0	0.0	0.0	1.6	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
Northern milofil	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Prickly coontail	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0
White water buttercup	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0
Spiny naiad	0.0	1.6	0.0	0.0	0.0	1.7	0.0	3.3
Whorled milfoil	0.7	0.0	4.7	1.6	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

**Table 12 Continued:**

Species Frequency of Occurrence - Depth: 0 to 5 ft								
Eurasian Watermilfoil	17.3	31.6	42.5	2.3	5.3	18.2		13.3
Curlyleaf pondweed	46.2	7.9	52.5			4.5		
Brittle naiad					31.6		5.6	
Coontail	40.4	42.1	37.5	45.5	26.3	31.8	16.7	53.3
Sago pondweed					21.1	4.5	38.9	16.7
Chara sp.	51.9	57.9	52.5	40.9	47.4	63.6	72.2	40.0
Eel grass	1.9	57.9	2.5	50.0	47.4	50.0	50.0	23.3
Slender naiad				18.2	26.3	27.3	33.3	3.3
Elodea	1.9	7.9	22.5	9.1	10.5	9.1	11.1	3.3
Leafy pondweed		2.6						
Richardson's pondweed				2.3	5.3			
Large-leaf pondweed	1.9							
Variable pondweed	3.8						11.1	
Flatstem pondweed	23.1	7.9	22.5	4.5	21.1	13.6		3.3
Horned pondweed	5.8							
Water stargrass		5.3	2.5	4.5	5.3			10.0
Small pondweed				2.3				
Southern naiad				4.5				6.7
Northern milofil				4.5				
White water buttercup	1.9				5.3			
Spiny naiad		2.6				4.5		3.3
Whorled milfoil			5.0	2.3				
Filamentous algae	65.4	7.9						23.3
Species Frequency of Occurrence - Depth: 5 to 10 ft								
Eurasian Watermilfoil		23.1	30.8					16.7
Curlyleaf pondweed	66.7	23.1	53.8				5.6	
Coontail	75.0	76.9	92.3	100.0	93.3	93.8	55.6	75.0
Sago pondweed						6.3	5.6	8.3
Chara sp.		7.7				12.5	16.7	8.3
Eel grass		38.5		25.0	6.7	18.8	50.0	8.3
Slender naiad							22.2	
Elodea			7.7			6.3		
Leafy pondweed		7.7			6.7			
Richardson's pondweed							5.6	8.3
Flatstem pondweed	16.7	23.1	15.4					
Common bladderwort		7.7					5.6	
Water stargrass		15.4					5.6	
Spiny naiad								8.3
Whorled milfoil			7.7					
Filamentous algae	8.3							
Species Frequency of Occurrence - Depth: 10 to 15 ft								
Coontail	66.7	83.3	14.3	100.0	93.8	100.0	90.9	71.4
Sago pondweed								14.3
Eel grass				16.7	6.3	14.3		
Elodea					12.5			
Flatstem pondweed			14.3	16.7				
Water stargrass					6.3		9.1	
Prickly coontail					6.3			
Species Frequency of Occurrence - Depth: 15 to 20 ft								
Coontail				80.0	30.0	45.5	61.5	45.5
Eel grass						9.1	7.7	
Species Frequency of Occurrence - Depth: 20 to 25 ft								
Coontail				20.0				

Table 13 compares the two Tier II surveys completed on the Lake Tippecanoe Ecozone. It appears that submersed vegetation abundance and diversity has increased since the inception of the ecozone. This is illustrated by the increases in the number of sites with plants, mean species collected per site and the native diversity index. Coontail, sago pondweed, slender naiad, and chara all increased in frequency. Leafy pondweed and water stargrass were collected in 2012 but not in 2008. Eel grass decreased in frequency of occurrence, while Illinois pondweed and Richardson's pondweed were collected in 2008 but not in 2012. Invasive species were at low levels or not detected during both surveys, but this area received significant treatment in the spring of both years prior to the summer survey. There also appears to be an increase in the area covered by rooted floating and emergent vegetation (Table 14). The largest increases were seen in bed width in James Lake, and the large bed near grassy creek appears to have expanded northward. However, there were no new beds growing in a large area of Lake Tippecanoe along the Ball Wetland.

**Table 13. Occurrence and Abundance of Submersed Aquatic Plants in the Lake Tippecanoe Ecozone, 2008 & 2012.**

Tippecanoe Lake Ecozone		
Surveyor	AC	AC
Date	8/28/2008	8/13/2012
Total Sites	40	40
Sites with Plants	27	38
Number of Species	8	9
Number of Native Species	8	8
Species Diversity	0.78	0.81
Native Species Diversity	0.78	0.81
Mean Native Species/Site	1.45	2.00
Species Frequency of Occurrence - Depth: 0 to 9 ft		
Eurasian Watermilfoil	0.0	2.5
Coontail	35.0	50
Sago pondweed	15	17.5
Chara sp.	25.0	47.5
Slender naiad	12.5	48.5
Eel grass	47.5	30
Flatstem pondweed	5.0	5.0
Leafy pondweed	0.0	5.0
Water stargrass	0.0	5.0
Richardsons pondweed	2.5	0.0
Illinois pondweed	2.5	0.0
Filamentous algae	*	35.0
Species Frequency of Occurrence - Depth: 0 to 5 ft		
Coontail	32.4	39.4
Sago pondweed	16.2	21.2
Chara sp.	27.0	54.5
Slender naiad	10.8	48.5
Eel grass	48.6	33.3
Flatstem pondweed	5.4	6.1
Leafy pondweed	0.0	6.1
Water stargrass	0.0	6.1
Richardsons pondweed	2.7	0.0
Illinois pondweed	2.7	0.0
Filamentous algae	*	42.4
Species Frequency of Occurrence - Depth: 5 to 10 ft		
Eurasian Watermilfoil	0.0	14.3
Coontail	66.7	100.0
Chara sp.	0.0	14.3
Slender naiad	33.3	0.0
Eel grass	33.3	14.3

**Table 14. Comparison of Rooted Floating and Emergent Plant Beds 2008, 2009, and 2012.**

	2008	2009	2012
Total Number of Beds	10	12	10
Total Number of Species	9	11	10
Most Frequently Occurring Species	Spatterdock	Spatterdock	Spatterdock
Total Bed Acres	5.808	6.054	6.950

### 3.0 PLANT MANAGEMENT DISCUSSION & ACTION PLAN

If left unmanaged, Eurasian watermilfoil and curlyleaf pondweed can quickly 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 species. It is recommended that selective herbicide treatments be continued next season, and, if funds permit, these treatments should again include channel areas. Treatments in channels and other isolated areas (approx. 30 acres) should be completed with 1.0 ppm 2,4-D and 1.0 ppm Aquathol K. Main lake treatments (approx. 70 acres) should be completed with 2.0 ppm 2,4-D and 1.0 ppm of Aquathol (1 ppm 2,4-D didn't provide adequate control in 2012 to a few main lake areas). It is estimated that up to 100 acres may need treatment next season. This treatment should be completed in late April or early May. The cost of this treatment would be approximately \$54,000.00. Vegetation sampling should consist of an invasive species mapping survey in mid April and a Tier II survey in late summer. The cost of the plant survey along with the plan update would be approximately \$6,000.00.

One of the primary concerns of lake users is the abundance of eel grass in the lake. Eel grass is considered a beneficial species for fish and wildlife, so control will be closely monitored by IDNR. 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. It is also advised that the LTPOA limit treatment of natives including eel grass in areas that overlap with Eurasian watermilfoil treatment areas when possible. Reducing impacts to native species may help reduce the abundance of invasive species by allowing the natives to compete and become established following selective herbicide treatments designed to control invasive species. IDNR approved 9.5 acres for treatment in 2012. The cost this treatment in 2013 would be approximately \$5,000.00. There are new herbicides being developed for better control of eel grass. These herbicides may work better, but they will also likely cost more on a per acre basis. LTPOA contracted with local businesses to remove washed up plant material in 2011. It is recommended that they plan on that budgetary expense in 2013 as treatments will not be enough to keep this plant in check.

In addition, the ecozone should continue to be monitored and may need intervention to establish vegetation in several areas. Tier II and emergent vegetation surveys should be completed every other year in order to monitor changes in the plant community. The

ecozone is having positive effects on the plant community within that area, but LTPOA should consider working with plant restoration specialists to come up with a plan for revegetating areas that are still void of rooted floating vegetation. Part of the revegetation may require control of dense bluegreen algae mats that appear to be hindering submersed and rooted floating plant growth. It is also likely that the lack of emergent plant beds along the eastern shoreline of Lake Tippecanoe is related more to substrate and the lake's lengthy fetch. Control of algae can be costly, but can be achieved with combinations of EPA approved algaecides. These treatments will need to be repeated throughout the growing season. The cost of such algaecide applications would be \$500-\$700/acre/treatment depending on depth of the algae and depth of the water column. This will reduce the surface and bottom coverage of filamentous bluegreen algae, but will have no impact on controlling algae that will float into a treated area. Similar to treatment of nuisance native vegetation, no LARE funds are available for the control of algae. There is concern by some that the ecozone has led to increased bluegreen algae growth in this area. No surveys or bluegreen algae mats have been completed in this area to prove or disprove this theory, however, prior to the formation of the ecozone, dense bluegreen algae mats were observed in this area.

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

1. Complete Invasive Species Sampling in the spring of 2013 in order to map out invasive species treatment areas. This survey should be completed around mid-April depending on water temperature.
2. Complete treatment of invasive milfoil and curlyleaf pondweed with 2,4-D liquid and Aquathol K. Treatment should be completed in late April or early May of 2013. Estimate that there may be 100 acres of milfoil and curlyleaf pondweed.
3. Continue summer Tier II surveys on all lakes, in order to monitor the changes in the native plant population and assess the effectiveness of vegetation controls.
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 II and emergent vegetation surveys and work with revegetation specialist on the feasibility of establishing native rooted floating plant beds in this area.

	<u>Cost</u> <u>Estimate</u>
<u>2013 Budget</u>	
Pretreatment visual survey, Tier II Survey, and AVMP Update	\$6,000.00
Treatment of 70 acres of Eurasian watermilfoil on the main lake with 2.0 ppm of 2,4-D	\$21,000.00
Treatment of 70 acres of curlyleaf pondweed on the main lake with 1.0 ppm of Aquathol K	\$21,000.00
Treatment of 30 acres of channels for control of both Eurasian watermilfoil and curlyleaf pondweed with a combination of 1.0 ppm Aquathol K and 1.0 ppm 2,4-D	\$12,000.00
Control of 10 acres of eel grass with EPA approved herbicides	\$5,000.00
Total Cost Estimate:	\$65,000.00
LARE Grant Request:	\$60,000.00
Association Cost Share if Grant Awarded (20%):	\$12,000.00

#### **4.0 PUBLIC INVOLVEMENT**

Aquatic Control attended a meeting of the LTPOA on September 7, 2012 to present the results of the herbicide treatment and to discuss the 2013 strategy. Approximately twenty individuals attended the meeting of which thirteen completed the Lake Use Survey (Table 15). Many in attendance expressed frustration over the amount of eel grass present along their shoreline. It was explained that there are IDNR limits to native species control, especially for eel grass. Several left the meeting in frustration. In addition, several expressed aggravation over abundant filamentous bluegreen algae in and around the ecozone. Aquatic Control stated that we did not believe that the Ecozone caused an increase in the bluegreen algae growth and that there was significant bluegreen algae there prior to the ecozone being created. In addition, there was very little bluegreen algae growth in the areas where native vegetation was taking hold leading us to believe that more native submersed and emergent vegetation will equal less bluegreen algae. This has been the case in multiple lakes that we manage. Several ideas that were previously discussed in this plan were also brought up at this meeting including manual removal of eel grass and revegetation of the ecozone area.

**Table 15. Lake User Survey, September 7, 2012.**

Lake Tippecanoe 9/17/12			
Are you a lake property owner?	Yes: 93%	No: 7%	
Are you currently a member of your lake association?	Yes: 86%	No:14%	
How many years have you been at the lake?	2 or Less: 0%	5 to 10: 7%	
	2 to 5: 14%	Over 10: 79%	
How do you use the lake (mark all that apply)	Swimming 93%	Irrigation 50%	
	Boating 100%	Drinking water 0%	
	Fishing 50%	Other? 0%	
Do you have aquatic plants at your shoreline in nuisance	Yes: 71% No: 29%		
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes: 79% No: 27%		
Does the level of vegetation in the lake affect your property values?	Yes: 50% No: .29%		
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: 86% No:14%		
Were you satisfied with the results of the LARE funded invasive treatments this season?	Yes: 71% No: 21%		
Mark any of these you think are problems on your lake:			
7% Too many boats access the lake			
14% Use of jet skis on the lake			
0% Too much fishing			
7% Fish population problem			
64% Dredging needed			
7% Overuse by nonresidents			
76% Too many aquatic plants			
21% Not enough aquatic plants			
50% Poor water quality			
14% Pier/funneling problem			

Comments:

We have 30 ft. of muck, for 2 mos. Grandchildren couldn't swim.  
 Never seen so many weeds. Kept up until Labor Day but the N. side is worse than ever.  
 Need to treat our excess of Eel grass  
 Find a solution to Eco Zone plant growth to revegitate the shoreline.  
 The rate of increase in algae is a real health risk.  
 Wakeboarding boats cause erosion.  
 Need to eliminate invasives, dredge & replant native species.  
 Need further treatment in areas like Blacks Landing & elsewhere.

## 5.0 REFERENCES CITED

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- IDNR 2010. A Sampling Method to Assess Occurrence, Abundance and Distribution of Submersed Aquatic Plants in Indiana Lakes. IN Department of Natural Resources. Division of Fish & Wildlife, Indianapolis, Indiana.
- IDNR 2012. Emergent Vegetation Survey Protocol. IN Department of Natural Resources. Division of Fish & Wildlife. Indianapolis, IN.

## 6.0 APPENDICES

### 6.1 Data Sheets

#### 6.1.1 Oswego Lake

WPT	Lat	Long	Depth	Rake score	Eurasian watermilfoil	Curlyleaf pondweed	Fil. Algae	Chara	Eel grass	Slender naiad	Richardson's pondweed	coontail	Sago pondweed	Southern naiad	Spiny naiad	Illinois pondweed
1	41.329775	-85.782915	2	5				1	5							
2	41.329647	-85.783899	3	5					5	1		3				
3	41.329411	-85.785196	4	5				5	1					1		
4	41.329092	-85.78401	5	5			P		5					3		
5	41.328427	-85.783947	3	1			P							1		
6	41.327774	-85.784631	4	5					5			1		1		
7	41.327084	-85.784789	3	0			P									
8	41.326647	-85.784664	3	1		1	P	1								
9	41.326238	-85.784699	10	0			P									
10	41.326913	-85.785582	5	5			P					5				
11	41.326409	-85.785756	11	5			P		5							
12	41.326373	-85.786368	7	1			P	1	1							
13	41.326313	-85.786356	14	0												
14	41.326235	-85.787014	7	0			P									
15	41.32627	-85.787475	17	0												
16	41.32699	-85.787461	4	0			P									
17	41.327913	-85.787409	5	5			P	3			1	3		3		
18	41.326397	-85.788236	5	5					5							
19	41.326128	-85.787942	17	0												
20	41.32584	-85.788232	15	1			P					1				
21	41.325445	-85.788554	15	1			P					1				
22	41.325056	-85.788471	19	0												
23	41.324637	-85.788667	14	5								5				
24	41.324006	-85.788714	3	5				1	5					1	1	1
25	41.324372	-85.787952	16	0												
26	41.324301	-85.78712	20	0												
27	41.323945	-85.786198	13	5					3			5				
28	41.324006	-85.785377	11	3								3				
29	41.324373	-85.784686	6	5					5			1		1		
30	41.325016	-85.784228	16	0												
31	41.325385	-85.783582	4	5				1	5					1		
32	41.325709	-85.784274	17	0												
33	41.326049	-85.784891	18	0			P									
34	41.326254	-85.785211	15	1			P					1				
35	41.326123	-85.78382	5	1			P		1							
36	41.324531	-85.784173	5	5				1	1			5				
37	41.323996	-85.787066	11	5					3			5		1		
38	41.324112	-85.788063	5	1			P	1					1		1	
39	41.327624	-85.783909	3	0			P									
40	41.328574	-85.783051	2	5				5	3				1		3	

6.1.2 Tippecanoe Lake

WPT	Lat	Long	Depth	Rake score	Eurasian watermilfoil	Fil. Algae	Coontail	Eelgrass	Richardson's pondweed	Chara	Slender naiad	Sago pondweed	Illinois pondweed	Flatstem pondweed	Southem naiad	Water stargrass	Common elodea	Spiny naiad
1	41.328204	-85.777431	9	3	1		3	1	1						1			
2	41.328712	-85.775322	12	5			5											
3	41.329643	-85.773605	4	1						1								
4	41.330895	-85.771664	13	0														
5	41.33147	-85.769914	3	3				1		3					1			
6	41.330896	-85.768256	16	5	1		1	5		1					1			
7	41.330218	-85.766825	5	5				3							5	1		
8	41.329269	-85.765498	12	3	1			1		1								
9	41.328611	-85.764031	10	3				3					1		1		1	
10	41.328144	-85.762773	12	5				1		1					5			
11	41.327052	-85.762321	6	1				1							1			
12	41.326123	-85.76214	4	5				3				3						
13	41.325777	-85.761345	9	5			5											
14	41.324935	-85.760697	3	5				3		5		3			1			
15	41.324916	-85.759228	14	5	1		1	5	1									
16	41.324233	-85.758057	3	5				1		5		1			1			
17	41.324364	-85.756407	10	1		P					1							
18	41.323357	-85.756982	3	5	1			5	1			3						1
19	41.322541	-85.756801	18	3			3											
20	41.321564	-85.757022	12	5			1	5										
21	41.320453	-85.756391	5	5	1		1	3				5				1		
22	41.319665	-85.755803	16	3			3	3										
23	41.318829	-85.755404	5	5	3				1			5			1			
24	41.319147	-85.753859	5	5				5				5			1			
25	41.318192	-85.753599	3	1											1			
26	41.317091	-85.753037	5	3		P		3										
27	41.316462	-85.751712	2	5				5		3			3					
28	41.318097	-85.750765	15	0														
29	41.317995	-85.748948	2	5			5	3										
30	41.319323	-85.748181	4	0		P												
31	41.319605	-85.746716	5	1				1							1			
32	41.31874	-85.745822	3	1											1			
33	41.319017	-85.743988	3	5	5	P		1							1			
34	41.320199	-85.744685	12	0														
35	41.320647	-85.742727	5	0		P												
36	41.321847	-85.740786	3	5		P				5					5			
37	41.323165	-85.74061	5	0		P												
38	41.323922	-85.742285	4	0		P												
39	41.32299	-85.743691	9	5			5											
40	41.323501	-85.745302	6	5			5	5				3						
41	41.323234	-85.746704	6	5		P		5										
42	41.322735	-85.747984	7	1				1										
43	41.323402	-85.74928	16	0														
44	41.324056	-85.750354	3	1				1										
45	41.324681	-85.751587	5	3				3										
46	41.326352	-85.752094	7	5			3	5				1			1			
47	41.327405	-85.753172	12	1								1						
48	41.327247	-85.754867	11	1			1											
49	41.326891	-85.756155	9	1			1											
50	41.327524	-85.757309	4	3				3		1		1						
51	41.328492	-85.75848	16	0														
52	41.329071	-85.759699	24	0														
53	41.330139	-85.760535	5	5				5										
54	41.331405	-85.761159	11	0														
55	41.332729	-85.761634	21	1				1										
56	41.333843	-85.762297	16	0														
57	41.335093	-85.76355	6	5				5							1			
58	41.336051	-85.764806	9	5				3		3		5						
59	41.336982	-85.765942	16	3								3						
60	41.337768	-85.767387	10	5				5		3		5			1			
61	41.337833	-85.768485	2	5			5	3				5						
62	41.337164	-85.76911	8	3			3											
63	41.336971	-85.770222	6	5				5		1								
64	41.336582	-85.770951	10	0														
65	41.336912	-85.77221	7	3						1		1						
66	41.337313	-85.773449	3	5	1													
67	41.336731	-85.773796	17	0														
68	41.336419	-85.775075	4	0														
69	41.33581	-85.774817	19	0														
70	41.335506	-85.775789	16	0														
71	41.335448	-85.776939	4	0		P												
72	41.33601	-85.778217	2	5				5		3								
73	41.335332	-85.779154	4	5				3		5								
74	41.334693	-85.77832	14	0														
75	41.334122	-85.779603	3	5								3			5			
76	41.333718	-85.778437	3	5				3	1			1	3					
77	41.332739	-85.778804	3	5					1	3		3						
78	41.332138	-85.778065	13	0														
79	41.33144	-85.77817	3	3				1		1		1			1			
80	41.330687	-85.77821	4	3				1		1					1			1
81	41.329843	-85.77831	7	0														
82	41.330266	-85.779611	5	3			1	3										
83	41.329785	-85.780509	9	5			5											
84	41.328625	-85.780055	4	5				3		5		3						
85	41.328168	-85.77868	8	3	1		1	3					1		1			
86	41.328303	-85.776432	4	5						3		3						
87	41.328593	-85.773884	2	5				5		5		3			1			
88	41.330159	-85.772536	3	1				1				1						
89	41.330761	-85.770773	4	5				5		5								
90	41.33171	-85.76904	8	5	1		90	3		3		1						



6.1.3 James Lake

WPT	Lat	Long	Number of Species	Number of Natives	Depth	Rake score	Eurasian milfoil	Curly leaf pondweed	Fil. Algae	Eel Grass	Sago pondweed	Chara	Water stargrass	Coon tail	Slender naiad	Richardson's pondweed	Elodea	Spiny naiad	South ern pondweed	Flatstem pondweed
1	41.322327	-85.733135	2	2	3	1			P	1				1						
2	41.322978	-85.732155	1	1	4	1						1								
3	41.322295	-85.731323	2	2	2	1						1		1						
4	41.321508	-85.730298	0	0	20	0														
5	41.320924	-85.730016	0	0	18	0														
6	41.320177	-85.730186	1	1	2	5								5						
7	41.3193	-85.730257	1	1	16	3								3						
8	41.3183	-85.730305	1	1	14	5								5						
9	41.317778	-85.729503	4	3	2	3	1			1	3	1								
10	41.317156	-85.729125	2	1	3	3	1					3								
11	41.316232	-85.72927	1	1	7	5						5								
12	41.315013	-85.729715	1	1	16	5								5						
13	41.314229	-85.729243	0	0	6	0														
14	41.31412	-85.73025	1	1	8	5								5						
15	41.313629	-85.731376	2	2	3	5						5		5						
16	41.313478	-85.730753	0	0	16	0														
17	41.313006	-85.729947	1	1	5	5								5						
18	41.312493	-85.729281	2	2	6	5								5		1				
19	41.312106	-85.729032	4	3	6	5	1			5				3				1		
20	41.31222	-85.728127	1	1	7	5								5						
21	41.312248	-85.727204	2	2	5	5				3				5						
22	41.312069	-85.726177	1	1	2	5												5		
23	41.312546	-85.725604	1	1	6	5								5						
24	41.31233	-85.724789	2	2	2	5								1	5					
25	41.312905	-85.724127	2	2	4	3						3		1						
26	41.313828	-85.724225	0	0	3	0			P											
27	41.31433	-85.723216	0	0	18	0														
28	41.314029	-85.722491	2	2	3	5				3				5						
29	41.314578	-85.721796	3	2	3	5	3		P				3						3	
30	41.315673	-85.721836	0	0	4	0			P											
31	41.316092	-85.722587	0	0	10	0														
32	41.317151	-85.723301	1	1	18	5								5						
33	41.317857	-85.723613	2	2	3	5						5		1						
34	41.318806	-85.72372	1	1	14	5								5						
35	41.31942	-85.722986	2	2	3	1				1		1								
36	41.319849	-85.723424	0	0	20	0														
37	41.320541	-85.723288	1	1	7	5								5						
38	41.321441	-85.723627	1	1	16	1								1						
39	41.322284	-85.724072	1	1	3	1			P	1										
40	41.322216	-85.725501	0	0	4	0			P											
41	41.323166	-85.725248	3	3	3	5				5	3	3								
42	41.323242	-85.726217	2	2	6	5					3			5						
43	41.323803	-85.727433	2	2	3	5					5	1								
44	41.323858	-85.728576	1	1	3	1			P					1						
45	41.323629	-85.729573	1	1	6	5								5						
46	41.3242	-85.730225	2	2	12	5					5			3						
47	41.324785	-85.731044	1	1	3	1								1						
48	41.324941	-85.731848	0	0	12	0														
49	41.325306	-85.732276	0	0	19	0														
50	41.325573	-85.733056	1	1	16	5								5						
51	41.32557	-85.733927	2	2	3	5							5				1			
52	41.325263	-85.734786	0	0	15	0														
53	41.325006	-85.735329	1	1	11	5								5						
54	41.324288	-85.735676	1	1	12	5								5						
55	41.32384	-85.736047	2	2	4	1						1								1
56	41.32337	-85.735817	3	2	3	5	1				3			5						
57	41.322955	-85.73535	4	4	5	5				1		1		5						1
58	41.322734	-85.734554	2	2	4	5					5			3						
59	41.322519	-85.73417	1	1	3	1								1						
60	41.322913	-85.732784	2	1	6	5	5							5						



**6.1.4 Ecozone Tier II**

WPT	Lat	Long	Depth	Rake score	Eurasian milfoil	Fil. Algae	Slender naiad	Coontail	Chara	Sago pondweed	Water stargrass	Eelgrass	leafy pondweed	Flatstem pondweed
1	41.319616	-85.743941	4	0										
2	41.319148	-85.743923	2	1		P		1						
3	41.318932	-85.7436	1	1		P		1						
4	41.319137	-85.742826	2	5			5						1	
5	41.319623	-85.743046	4	5		P	5		1					
6	41.320055	-85.743366	5	0		P								
7	41.320503	-85.742414	4	5		P	1		5					
8	41.320144	-85.741952	3	5			5		3	1		3		1
9	41.319809	-85.741545	2	5					5					
10	41.320202	-85.740792	2	5				1	5					
11	41.320607	-85.741107	2	5			1		5			3		
12	41.321004	-85.741344	3	5			5		3			3		
13	41.321588	-85.741178	4	1		P	1							
14	41.321511	-85.7406	3	5			3		3			1		
15	41.321267	-85.74029	2	5			1		5	1				
16	41.321863	-85.740352	2	5					5			1		
17	41.322178	-85.740924	4	1		P		1						
18	41.322222	-85.740154	2	5		P	1	1		3		1	3	1
19	41.323539	-85.74047	3	1		P			1		1			
20	41.32401	-85.740678	3	3		P	1	3						
21	41.324206	-85.741089	2	5		P	1	5						
22	41.323828	-85.741214	4	5		P	1	3		1	1	3		
23	41.323826	-85.739849	4	5		P		3				1		
24	41.322157	-85.733716	9	5				5						
25	41.322576	-85.734369	5	5				5				1		
26	41.322831	-85.735119	5	5				5						
27	41.322991	-85.735437	7	5				5						
28	41.322624	-85.73282	3	1		P	1		1	1				
29	41.322673	-85.731518	4	1					1					
30	41.32177	-85.730751	9	3				3						
31	41.320977	-85.730112	7	5				5						
32	41.320189	-85.730102	3	3			1		3			1		
33	41.319182	-85.730454	6	3	1			1	3			1		
34	41.318128	-85.730238	9	5				5						
35	41.31761	-85.72922	4	1			1		1	1				
36	41.316827	-85.729252	3	1					1					
37	41.316023	-85.729697	2	1				1	1					
38	41.314896	-85.729822	4	3				3		1		1		
39	41.313982	-85.730635	6	5				5						
40	41.31309	-85.730591	1	5					5					

### 6.1.5 Ecozone Rooted Floating & Emergent

Date	Site	Point	Latitude	Longitude	Wid_ft	SPA	WAL	ARA	SWL	CAT	PIK	PRL	BUL	BUB	HIB	Spe	Bed	Area	Segment length
8/13/12	1	S	41.312958	-85.730745	30	9	1			9					9	4	1		
8/13/12	2		41.313171	-85.731149	75	9	1			9		9			9	5	1	0.164	136
8/13/12	3		41.313374	-85.73142	102	9	1			9					9	4	1	0.214	105
8/13/12	4		41.313565	-85.731624	120	9	1			9						3	1	0.229	90
8/13/12	5		41.313924	-85.731389	90	9	1			9					9	4	1	0.354	147
8/13/12	6		41.314068	-85.7311	69	9	1			9					9	4	1	0.174	95
8/13/12	7		41.314154	-85.730835	69	9	1			9					9	4	1	0.126	79
8/13/12	8	E	41.314228	-85.730316	36		1			9					9	3	1	0.175	145
8/13/12	9	S	41.314971	-85.730451	24					9	1					2	2	0.190	276
8/13/12	10		41.315143	-85.730385	57	1				9	9					3	2	0.061	66
8/13/12	11		41.315292	-85.730445	66	1				9	9					3	2	0.081	57
8/13/12	12		41.315463	-85.730373	66	1		9		9	9					4	2	0.100	66
8/13/12	13	E	41.315597	-85.730363	21		1	9		9						3	2	0.049	49
8/13/12	14	S	41.317817	-85.729677	69	1				9		9			9	4	3	0.865	837
8/13/12	15		41.317815	-85.730001	60	1		9		9					9	4	3	0.132	89
8/13/12	16		41.317898	-85.730047	93	1		9		9	9	9			9	6	3	0.058	33
8/13/12	17		41.317865	-85.730302	36			1			9			9		3	3	0.105	71
8/13/12	18		41.318009	-85.730536	54	1		9		9					9	4	3	0.086	83
8/13/12	19		41.318359	-85.730861	69	1		9				9			9	4	3	0.221	157
8/13/12	20		41.318609	-85.730859	69	1		9			9				9	4	3	0.146	92
8/13/12	21		41.318746	-85.730921	36	1					9				9	3	3	0.064	53
8/13/12	22		41.318879	-85.730847	39	1		9								2	3	0.046	53
8/13/12	23		41.319204	-85.730745	57	9		1								2	3	0.135	123
8/13/12	24		41.319436	-85.730537	66	1		9			9					3	3	0.145	103
8/13/12	25		41.319591	-85.730553	42			1								1	3	0.071	57
8/13/12	26	E	41.320075	-85.730443	30					9	1		9		9	4	3	0.149	180
8/13/12	27	S	41.320244	-85.730484	51	1		9		9						4	4	0.059	63
8/13/12	28		41.320444	-85.730547	39	1		9		9					9	4	4	0.078	76
8/13/12	29	E	41.320525	-85.730582	30	1				9					9	4	4	0.025	31
8/13/12	30	S	41.321337	-85.730602	30	1				9				9	9	4	5	0.206	299
8/13/12	31		41.321555	-85.73092	57	1	9	9							9	5	5	0.118	118
8/13/12	32		41.321773	-85.731009	78	1				9	9				9	4	5	0.130	84
8/13/12	33	E	41.321928	-85.73123	45	1									9	4	5	0.117	83
8/13/12	34	S	41.322463	-85.733012	60	1				9					9	3	6	0.635	527
8/13/12	35		41.322392	-85.733239	69	1				9						2	6	0.100	68
8/13/12	36		41.322286	-85.733471	75	1			9	9					9	4	6	0.123	75
8/13/12	37	E	41.322059	-85.733953	105	1			9	9						3	6	0.323	156
8/13/12	38	S	41.322304	-85.734368	45	1				9						2	7	0.250	145
8/13/12	39		41.322488	-85.734382	87	1		9						9		3	7	0.103	68
8/13/12	40		41.322637	-85.734573	90	1		9								2	7	0.154	76
8/13/12	41		41.322724	-85.734934	84	1		9						9		3	7	0.208	104
8/13/12	42		41.322858	-85.735344	72	1		9								2	7	0.220	123
8/13/12	43		41.322798	-85.735576	21			1								1	7	0.072	67
8/13/12	44		41.323012	-85.735695	57	1	9	9								3	7	0.076	85
8/13/12	45	E	41.323109	-85.735904	36		1									1	7	0.072	68
8/13/12	46	S	41.322862	-85.738646	90	9	1		9	9						4	8	1.096	758
8/13/12	47		41.322989	-85.738732	126	9	1		9	9		9				5	8	0.130	52
8/13/12	48		41.323088	-85.739208	141	1	9		9	9					9	5	8	0.416	136
8/13/12	49	E	41.323213	-85.739586	150	1	9		9	9						4	8	0.379	113
8/13/12	50	S	41.322601	-85.738982	42	1			9	9		9				4	9	0.616	279
8/13/12	51		41.322819	-85.739137	60	1				9		9				3	9	0.106	91
8/13/12	52	E	41.322504	-85.739191	45	1					9					2	9	0.141	117
8/13/12	53	S	41.31876	-85.743126	153		1									1	10	3.976	1749
8/13/12	54		41.318728	-85.743487	186		1							9	9	3	10	0.388	100
8/13/12	55		41.318647	-85.743825	168		1								9	2	10	0.396	97
8/13/12	56		41.318564	-85.744226	150		1		9							2	10	0.417	114
8/13/12	57	E	41.318405	-85.744373	102	9	1	9		9						4	10	0.205	71

## 6.2 IDNR VEGETATION PERMIT APPLICATIONS

### 6.2.1 2013 Oswego Lake Permit



**APPLICATION FOR AQUATIC  
VEGETATION CONTROL PERMIT**

State Form 26727 (R / 11-03)  
Approved State Board of Accounts 1987  
 Whole Lake       Multiple Treatment Areas  
 Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY	
License No.	
Date Issued	
Lake County	

Return to: Page 1 of 4  
 DEPARTMENT OF NATURAL RESOURCES  
 Division of Fish and Wildlife  
 Commercial License Clerk  
 402 West Washington Street, Room W273  
 Indianapolis, IN 46204

FEE: \$5.00
-------------

Applicant's Name <b>Holly LaSalle</b>		Lake Assoc. Name <b>Lake Tippecanoe POA</b>	
Rural Route or Street <b>67 ENS T49A</b>		Phone Number <b>812-497-2410</b>	
City and State <b>Syracuse, IN</b>		ZIP Code <b>46567</b>	
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake) <b>Oswego Lake</b>	Nearest Town <b>North Webster</b>	County <b>Kosciusko</b>
Does water flow into a water supply <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

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

Treatment Area # <b>1</b>	LAT/LONG or UTM's    see map		
Total acres to be controlled <b>1.9</b>	Proposed shoreline treatment length (ft) <b>720</b>	Perpendicular distance from shoreline (ft) <b>100</b>	
Maximum Depth of Treatment (ft) <b>4</b>	Expected date(s) of treatment(s) <b>Late June/July</b>		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.    **Nautique, Hydrothol, or combination for control of eel grass**

Plant survey method:     Rake     Visual     Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	x	40
Chara		20
Coontail		10
Common naiad		5
Sago Pondweed		5
Illinois pondweed		5
Filamentous algae		15



Treatment Area #	2	LAT/LONG or UTM's		See Map	
Total acres to be controlled	3	Proposed shoreline treatment length (ft)	1420	Perpendicular distance from shoreline (ft)	100
Maximum Depth of Treatment (ft)	5	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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique and Hydrothol herbicide will be used for control of eel grass</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	
Eel grass		x		40	
Chara				20	
Coontail				10	
Common naiad				5	
Sago Pondweed				5	
Illinois pondweed				5	
Filamentous algae				15	
Treatment Area #	3	LAT/LONG or UTM's			Treatment of EWM and CLP throughout lake (areas tbd following survey)
Total acres to be controlled	<20	Proposed shoreline treatment length (ft)	n.a.	Perpendicular distance from shoreline (ft)	n.a.
Maximum Depth of Treatment (ft)	10	Expected date(s) of treatment(s)			late 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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>2,4-D for selective control of EWM and low dose Aquathol K for selective control of CLP</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	
Chara				5	
Coontail				20	
Curlyleaf Pondweed		X		20	
American elodea				10	
Filamentous algae				5	
Eurasian Watermilfoil		X		15	



Page 4 of 4 Oswego Lake Permit Map



**6.2.2 2013 Tippecanoe Lake Permit**



**APPLICATION FOR AQUATIC  
VEGETATION CONTROL PERMIT**

State Form 26727 (R / 11-03)  
Approved State Board of Accounts 1987  
 Whole Lake  Multiple Treatment Areas  
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY	
License No.	
Date Issued	
Lake County	

Return to: Page 1 of 6  
DEPARTMENT OF NATURAL RESOURCES  
Division of Fish and Wildlife  
Commercial License Clerk  
402 West Washington Street, Room W273  
Indianapolis, IN 46204

FEE: \$5.00

Applicant's Name <b>Holly LaSalle</b>		Lake Assoc. Name <b>Lake Tippecanoe POA</b>	
Rural Route or Street <b>67 EMS T49A</b>		Phone Number <b>812-497-2410</b>	
City and State <b>Syracuse, IN</b>		ZIP Code <b>46567</b>	
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

Lake (One application per lake) <b>Lake Tippecanoe</b>	Nearest Town <b>North Webster</b>	County <b>Kosciusko</b>
Does water flow into a water supply		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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

Treatment Area # <b>1</b>	LAT/LONG or UTM's <b>See Map</b>		
Total acres to be controlled <b>0.5</b>	Proposed shoreline treatment length (ft) <b>440</b>	Perpendicular distance from shoreline (ft) <b>100</b>	
Maximum Depth of Treatment (ft) <b>6</b>	Expected date(s) of treatment(s) <b>late June/July</b>		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <b>Nautique or Hydrothol/Nautique Combination</b>			
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
Eel Grass	x	40
Chara		20
Common naiad		10
Sago pondweed		10
Coontail		10
Illinois Pondweed		5
Eurasian watermilfoil		5



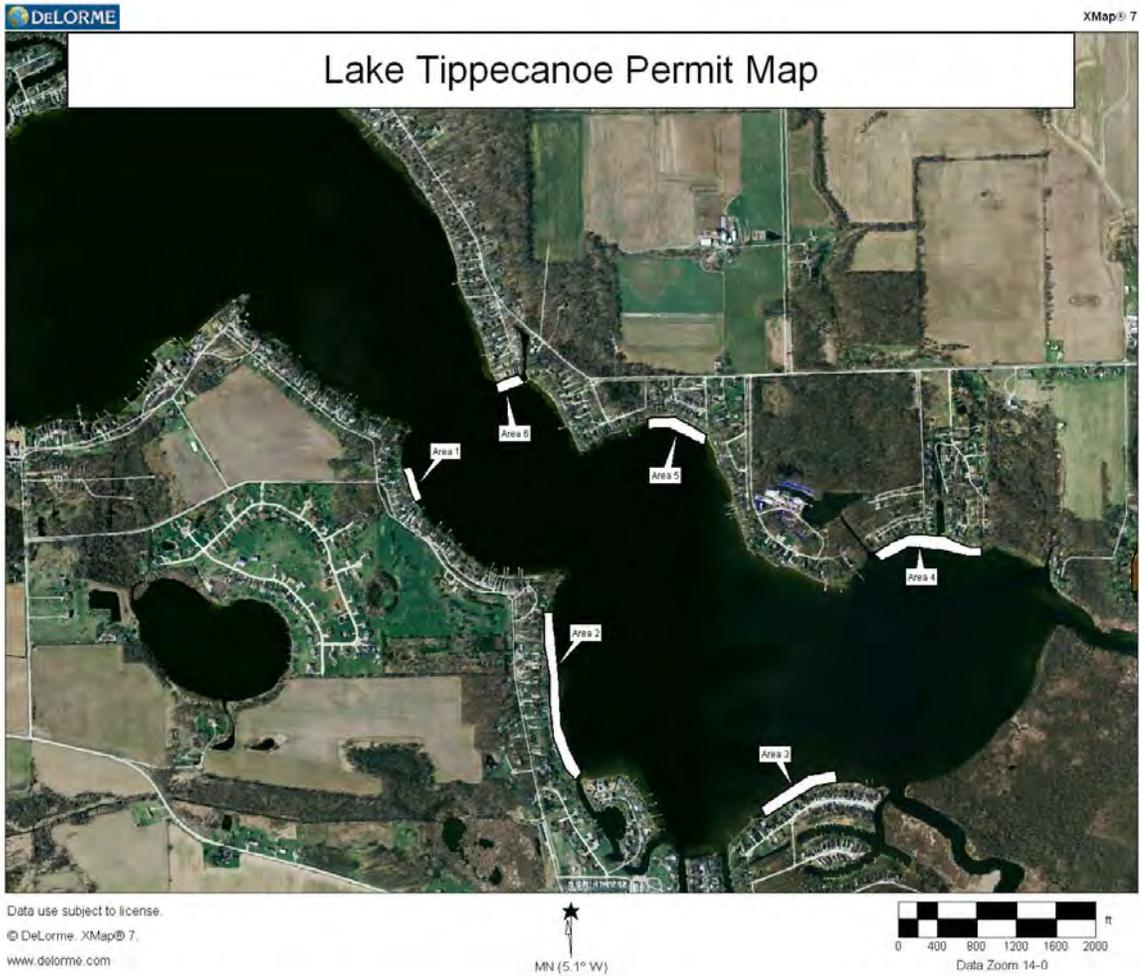
Treatment Area #	2	LAT/LONG or UTM's		See map
Total acres to be controlled	3.6	Proposed shoreline treatment length (ft)	1880	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s) late June/July		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical				
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique or Hydrothol/Nautique Combination				
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Summer Data				
Aquatic Plant Name		Check if Target Species	Relative Abundance % of Community	
Eel Grass		x	40	
Chara			20	
Common naiad			10	
Sago pondweed			10	
Coontail			10	
Illinois Pondweed			5	
Eurasian watermilfoil			5	
Treatment Area #	3	LAT/LONG or UTM's see map		
Total acres to be controlled	2.3	Proposed shoreline treatment length (ft)	650	Perpendicular distance from shoreline (ft)
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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique or Hydrothol/Nautique Combination				
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Summer data				
Aquatic Plant Name		Check if Target Species	Relative Abundance % of Community	
Eel Grass		x	40	
Chara			20	
Common naiad			10	
Sago pondweed			10	
Coontail			10	
Illinois Pondweed			5	
Eurasian watermilfoil			5	

Treatment Area #	4	LAT/LONG or UTM's		See Map	
Total acres to be controlled	2.75	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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique or Hydrothol					
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Summer data					
Aquatic Plant Name		Check if Target Species		Relative Abundance % of Community	
Eel Grass		x		40	
Chara				20	
Common naiad				10	
Sago pondweed				10	
Coontail				10	
Illinois Pondweed				5	
Eurasian watermilfoil				5	
Treatment Area #	5	LAT/LONG or UTM's		See Map	
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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique, Hydrothol					
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) Summer data					
Aquatic Plant Name		Check if Target Species		Relative Abundance % of Community	
Eel Grass		x		40	
Chara				20	
Common naiad				10	
Sago pondweed				10	
Coontail				10	
Illinois Pondweed				5	
Eurasian watermilfoil				5	

Treatment Area #	6	LAT/LONG or UTM's		See Map
Total acres to be controlled	0.25	Proposed shoreline treatment length (ft)	280	Perpendicular distance from shoreline (ft)
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 used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Nautique/Hydrothol</u>				
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) <u>Summer Survey</u>				
Aquatic Plant Name		Check if Target Species	Relative Abundance % of Community	
Eel Grass		x	40	
Chara			20	
Common naiad			10	
Sago pondweed			10	
Coontail			10	
Illinois Pondweed			5	
Eurasian watermilfoil			5	
Treatment Area #	7	LAT/LONG or UTM's <u>Control EWM and CLP in areas TBD in Spring Survey</u>		
Total acres to be controlled	<70	Proposed shoreline treatment length (ft)	n.a.	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	n.a.	Expected date(s) of treatment(s) <u>late April/early May</u>		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical				
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>2,4-D, Renovate, and Aquathol for early season selective control. Areas TBD following spring survey</u>				
Plant survey method: <input type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) <u>2012 Permit Report Data</u>				
Aquatic Plant Name		Check if Target Species	Relative Abundance % of Community	
Curlyleaf Pondweed		x	30	
Eurasian watermilfoil		x	30	
Chara			20	
Coontail			5	
Elodea			5	
Filamentous algae			10	



### Page 6 of 6 Tippecanoe Lake Permit Map



### 6.2.3 James Lake Permit



#### APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)  
Approved State Board of Accounts 1987  
 Whole Lake       Multiple Treatment Areas  
 Check type of permit

FOR OFFICE USE ONLY	
License No.	
Date Issued	
Lake County	

Return to: Page 1 of 5  
 DEPARTMENT OF NATURAL RESOURCES  
 Division of Fish and Wildlife  
 Commercial License Clerk  
 402 West Washington Street, Room W273  
 Indianapolis, IN 46204

FEE: \$5.00

INSTRUCTIONS: Please print or type information

Applicant's Name <b>Holly LaSalle</b>		Lake Assoc. Name <b>Lake Tippecanoe POA</b>	
Rural Route or Street <b>67 EMS T49 A</b>		Phone Number <b>574-834-2185</b>	
City and State <b>Syracuse, IN</b>		ZIP Code <b>46567</b>	
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number	
Rural Route or Street			
City and State		ZIP Code	

Lake (One application per lake) <b>Lake James</b>	Nearest Town <b>North Webster</b>	County <b>Kosciusko</b>
Does water flow into a water supply <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

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

Treatment Area # <b>1</b>	LAT/LONG or UTM's <b>See Map</b>		
Total acres to be controlled <b>1.75</b>	Proposed shoreline treatment length (ft) <b>1000</b>	Perpendicular distance from shoreline (ft) <b>100</b>	
Maximum Depth of Treatment (ft) <b>6</b>	Expected date(s) of treatment(s) <b>Late June/July</b>		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <b>Nautique/Hydrothol</b>			
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
Coontail		40
Eel Grass	x	30
Sago Pondweed		10
Eurasian watermilfoil		10
Chara		10

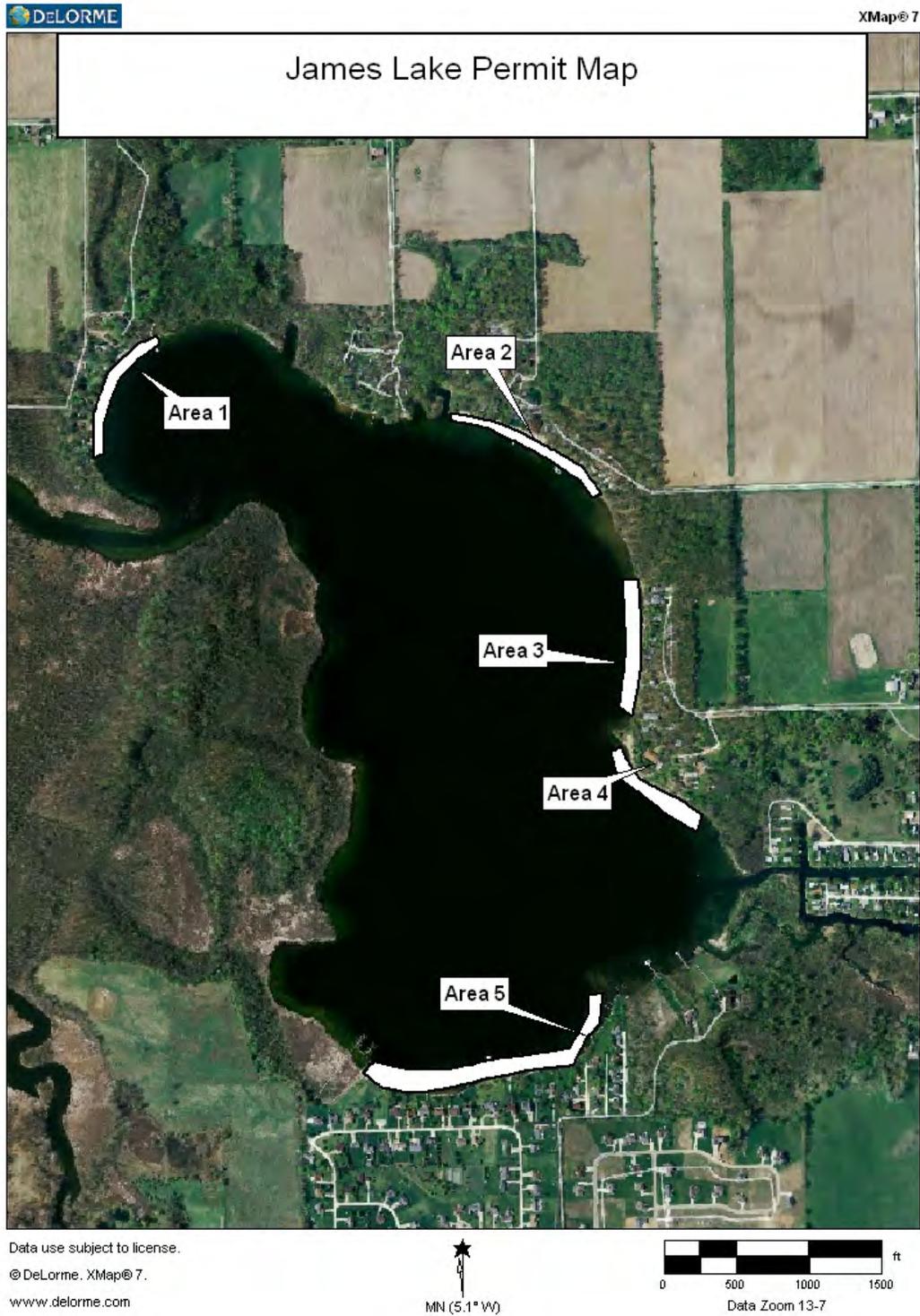








### Page 5 of 5 James Lake Permit Map



### 6.3 Species List

<b>Scientific Name</b>	<b>Common Name</b>
<i>Any algae</i>	Algae
<i>Cephalanthus occidentalis</i>	button bush
<i>Ceratophyllum demersum</i>	common coontail
<i>Chara sp.</i>	Chara sp.
<i>Decodon verticillatus</i>	swamp loosestrife
<i>Elodea canadensis</i>	American elodea
<i>Elodea nuttali</i>	western elodea
<i>Hibiscus palustris</i>	swamp rose mallow
<i>Lythrum salicaria</i>	purple loosestrife
<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>Nelumbo nucifera</i>	sacred lotus
<i>Nuphar variegatum</i>	spatterdock
<i>Nymphaea tuberosa</i>	white water lily
<i>Peltandra virginica</i>	arrow arum
<i>Polygonum hydropiper</i>	water smartweed
<i>Pontederia cordata</i>	pickerel weed
<i>Potamogeton amplifolius</i>	large leaf pondweed
<i>Potamogeton crispus</i>	curlyleaf pondweed
<i>Potamogeton foliosus</i>	leafy pondweed
<i>Potamogeton gramineus</i>	variable pondweed
<i>Potamogeton illinoensis</i>	Illinois pondweed
<i>Potamogeton pectinatus</i>	sago pondweed
<i>Potamogeton pusillus</i>	small pondweed
<i>Potamogeton richardsonii</i>	Richardson's pondweed
<i>Potamogeton zosteriformis</i>	flatstemmed pondweed
<i>Sagittaria spp.</i>	arrowhead
<i>Scirpus sp.</i>	bulrush
<i>Typha latifolia</i>	common cattail
<i>Utricularia vulgaris</i>	common bladderwort
<i>Vallisneria americana</i>	eel grass
<i>Zannichellia palustris</i>	horned pondweed
<i>Zosterella dubia</i>	water stargrass