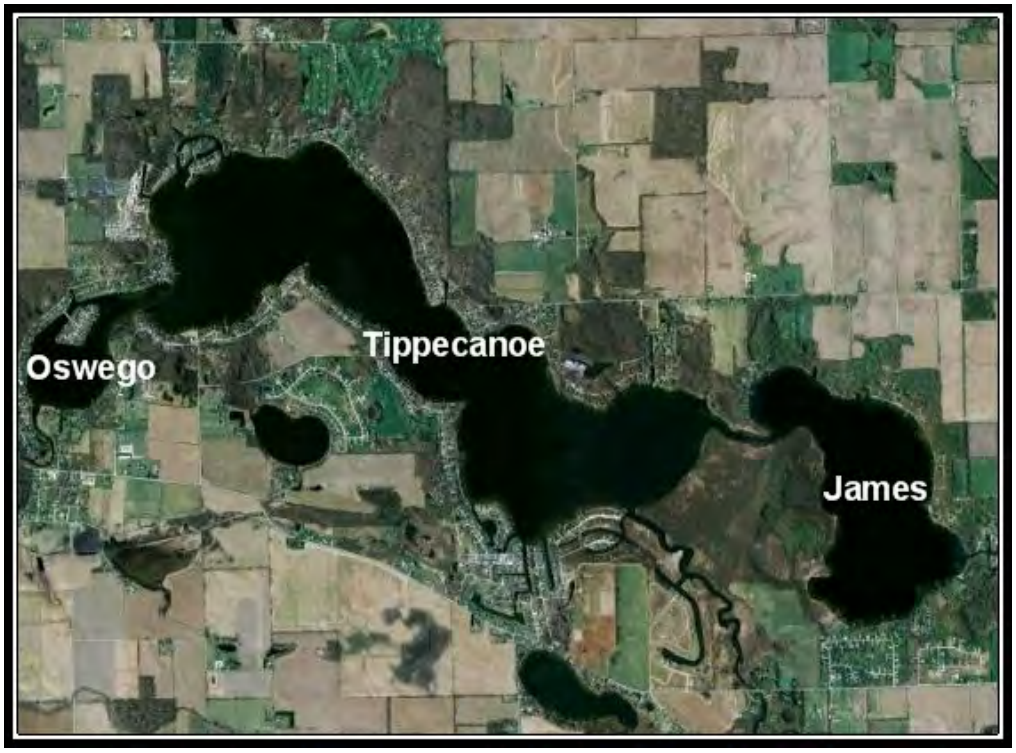
# *Lake Tippecanoe*
# *Aquatic Vegetation Management Plan*
# *2012 Update*
## *Kosciusko County, Indiana*

February 11, 2013

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# 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 $28,400 for creation of a plan update, an ecozone survey, and early season spot treatment of curlyleaf pondweed and Eurasian watermilfoil. Historically, LTPOA just managed vegetation in the main lake areas. In 2012, LTPOA and LARE decided to expand management to include all of the channel areas of the lake. An invasive species survey was completed and found 96.9 acres of milfoil and 98.6 acres of curlyleaf pondweed. Treatment of these areas was completed on April 30$^{th}$ with a combination of 2,4-D and endothal (brand name: Aquathol K). On June 22$^{nd}$, 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$^{th}$ with a copper based herbicide called Nautique. An ecozone survey was completed on August 13$^{th}$. 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 tuberose*) and pickerel week (*Pontedaria cordata*).

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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[1] | Milfoil & Curlyleaf | Tippe & Oswego | 35.0 | Renovate & Aquathol | 1.5 & 0.5 |
| 2004[1] | Milfoil & Curlyleaf | Tippe & Oswego | 32.0 | Renovate & Aquathol | 1.5 & 0.5 |
| 2005[1] | Milfoil & Curlyleaf | Tippe, James, & Oswego | 21.5 | Renovate & Aquathol | 1.5 & 0.5 |
| 2006* | Milfoil | Tippe, James, & Oswego | 37.0 | Renovate | 1.5 |
| 2007*[2] | Milfoil & Curlyleaf | Tippe, James, & Oswego | CLP-104 & EWM-34.0 | Renovate & Aquathol | 1.5 & 1.0 |
| 2008*[2] | Milfoil & Curlyleaf | Tippe, James, & Oswego | CLP-104 & EWM-32.5 | Renovate & Aquathol | 1.5 & 1.0 |
| 2009*[2] | 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*[3] | 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

[1] Only areas of milfoil treated, added 0.5 ppm Aquathol to knock down curlyleaf which was also present in those areas

[2] All main lake areas of curlyleaf pondweed were treated in early season in an attempt to reduce turion bank

[3] 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 17th 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 30th 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 |

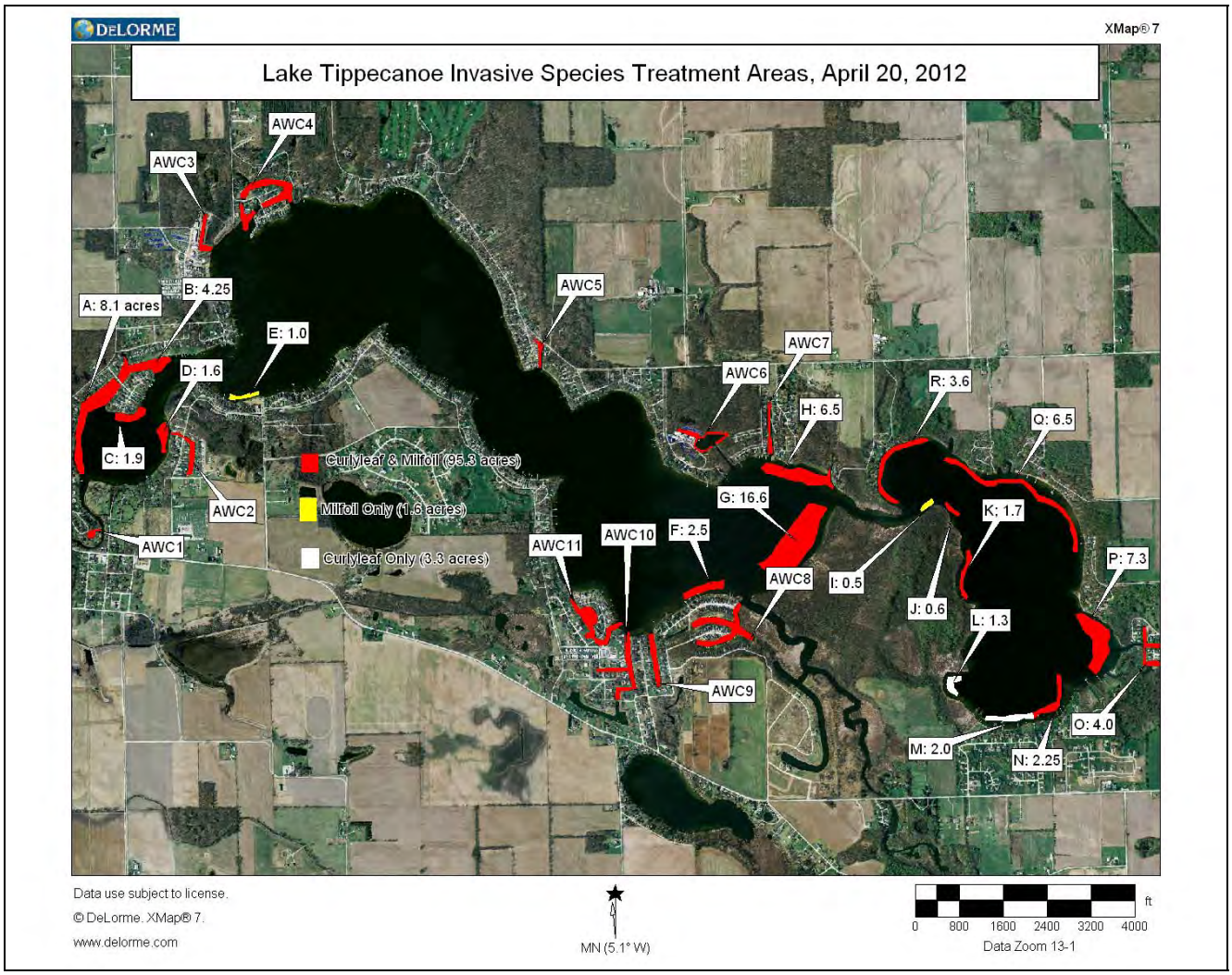


**Figure 2. Lake Tippecanoe Eurasian watermilfoil and curlyleaf pondweed treatment areas, April 30, 2012** (Yellow=EWM only, Red=CLP & EWM, White=CLP only).

A follow-up treatment was completed on June 22nd. 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.

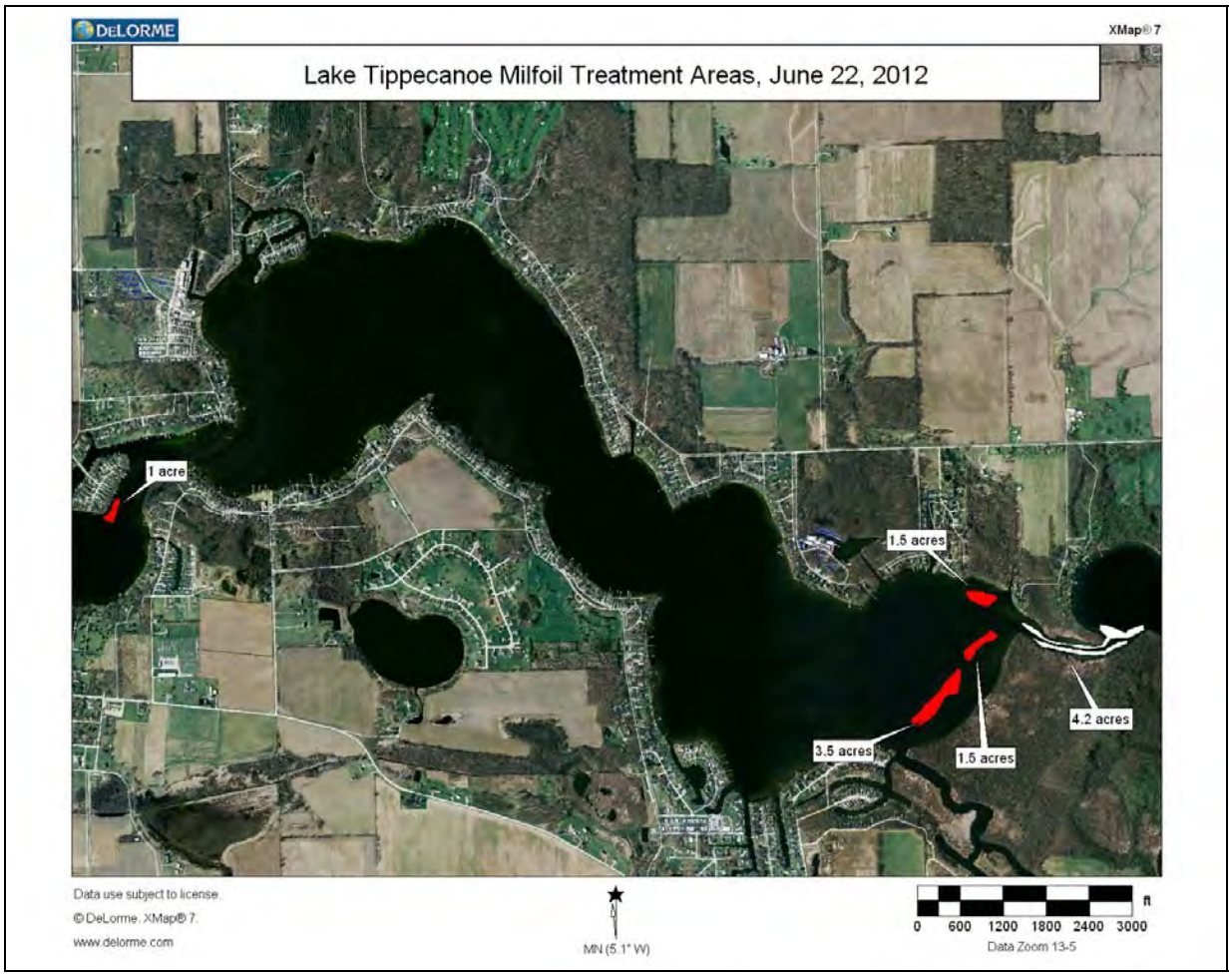


**Figure 3. Lake Tippecanoe Eurasian watermilfoil treatment areas, June 22, 2012** (Red=retreatment & white=new area).

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 19th (Figure 4).

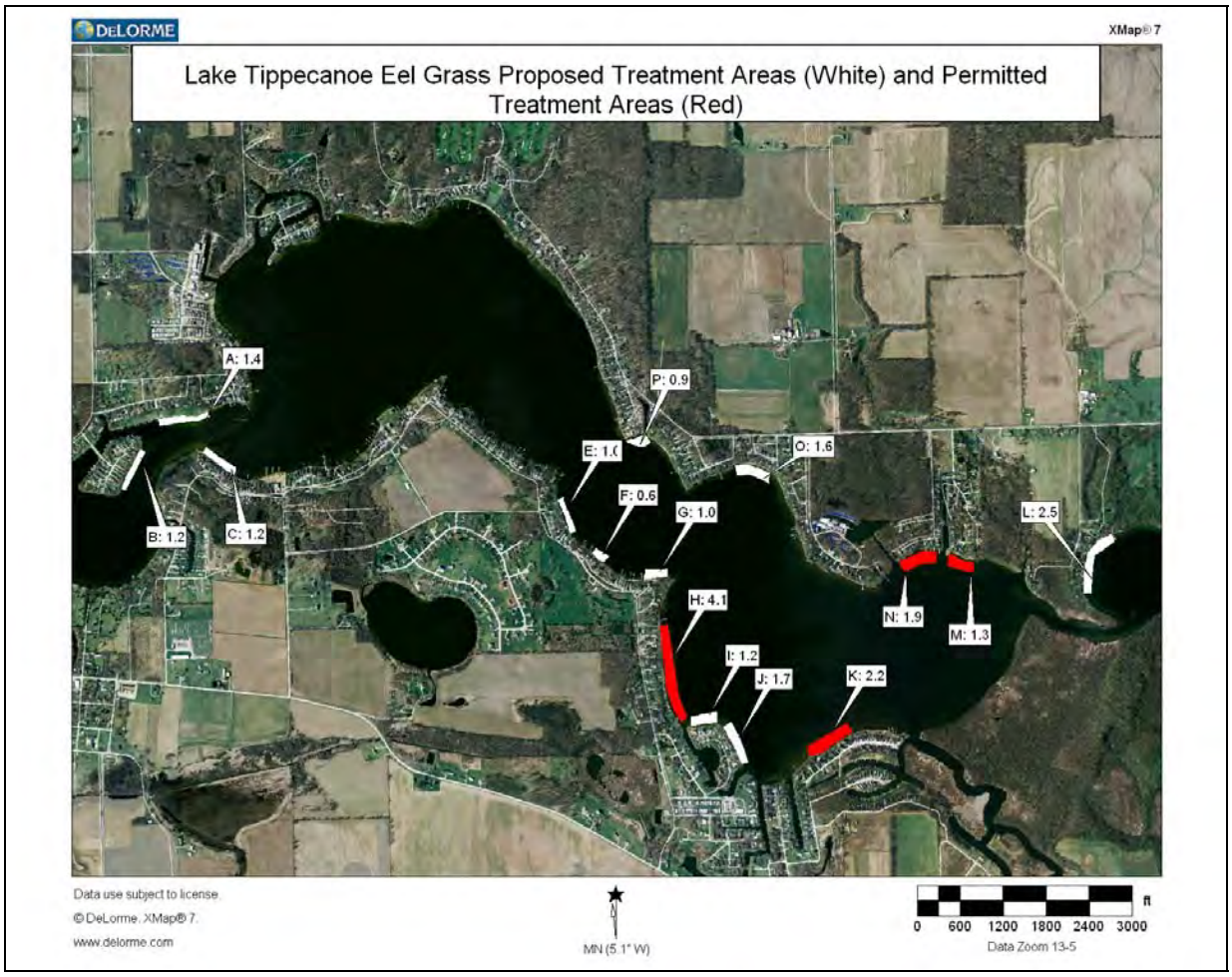


**Figure 4. Lake Tippecanoe eel grass treatment areas, July 19, 2012** (Red=actual treatment areas & white=proposed treatment areas).

## 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).

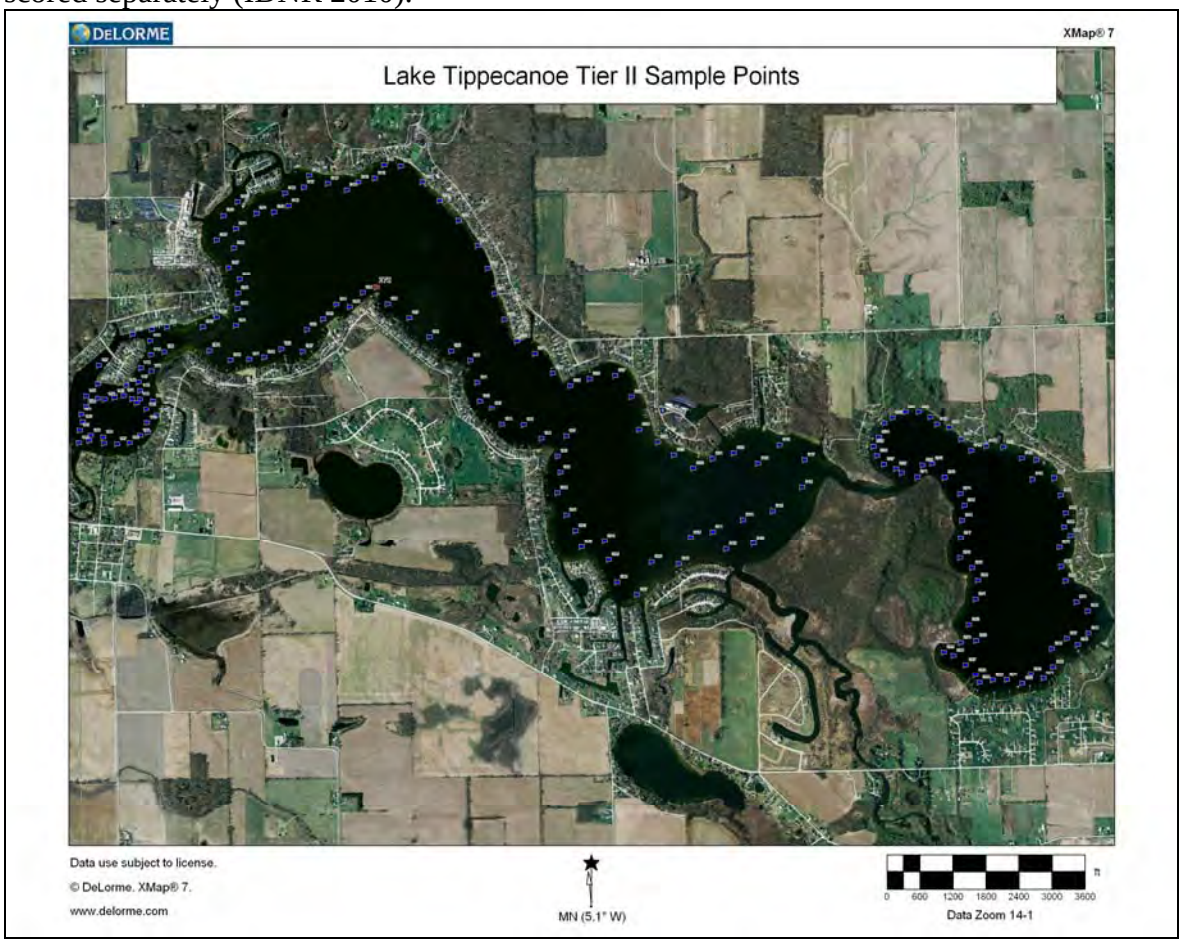


**Figure 5. Tier II Sample Sites.**

### *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.

**Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (all depths).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 |
| Illinios 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

**Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (0-5 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 |
| Illinios 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 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (5-10 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake (10-15 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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.

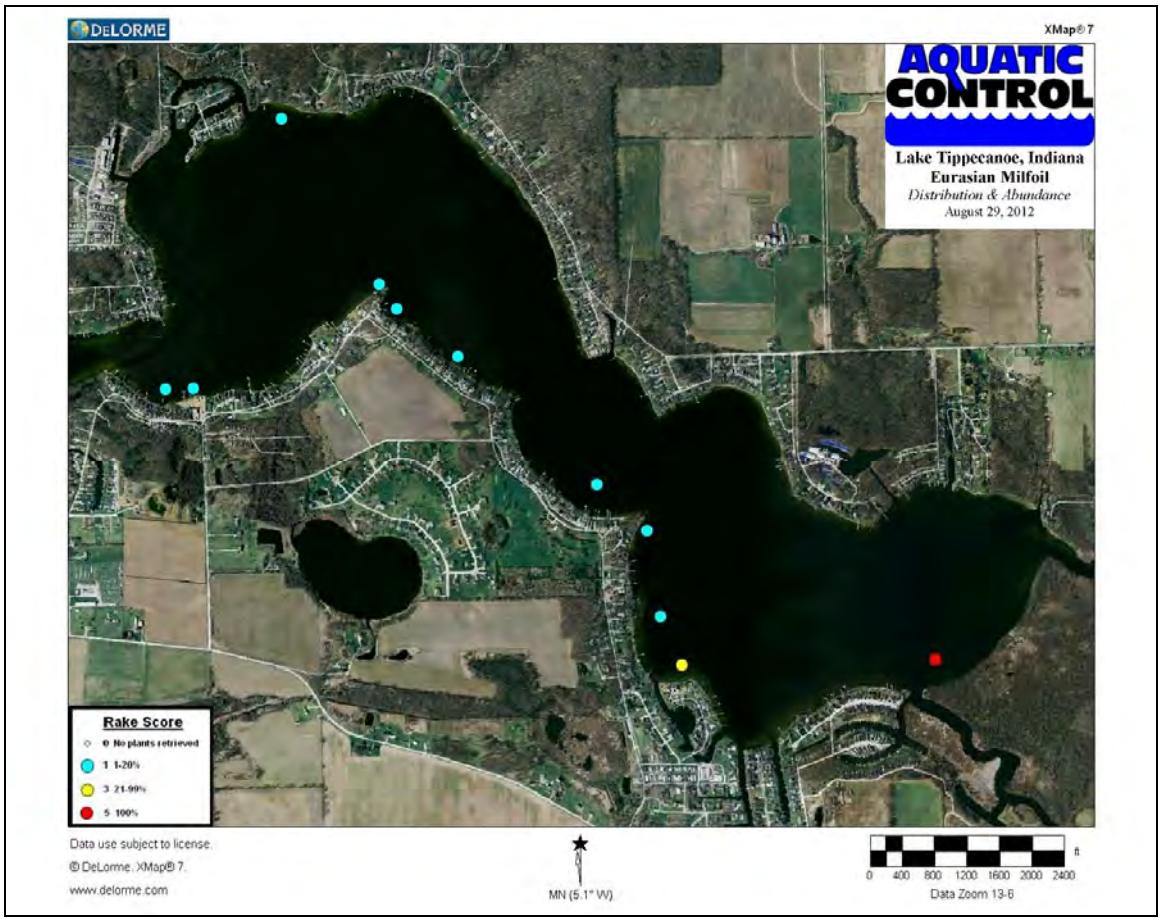


**Figure 8. Eurasian watermilfoil locations on Tippecanoe Lake, August 29, 2012**

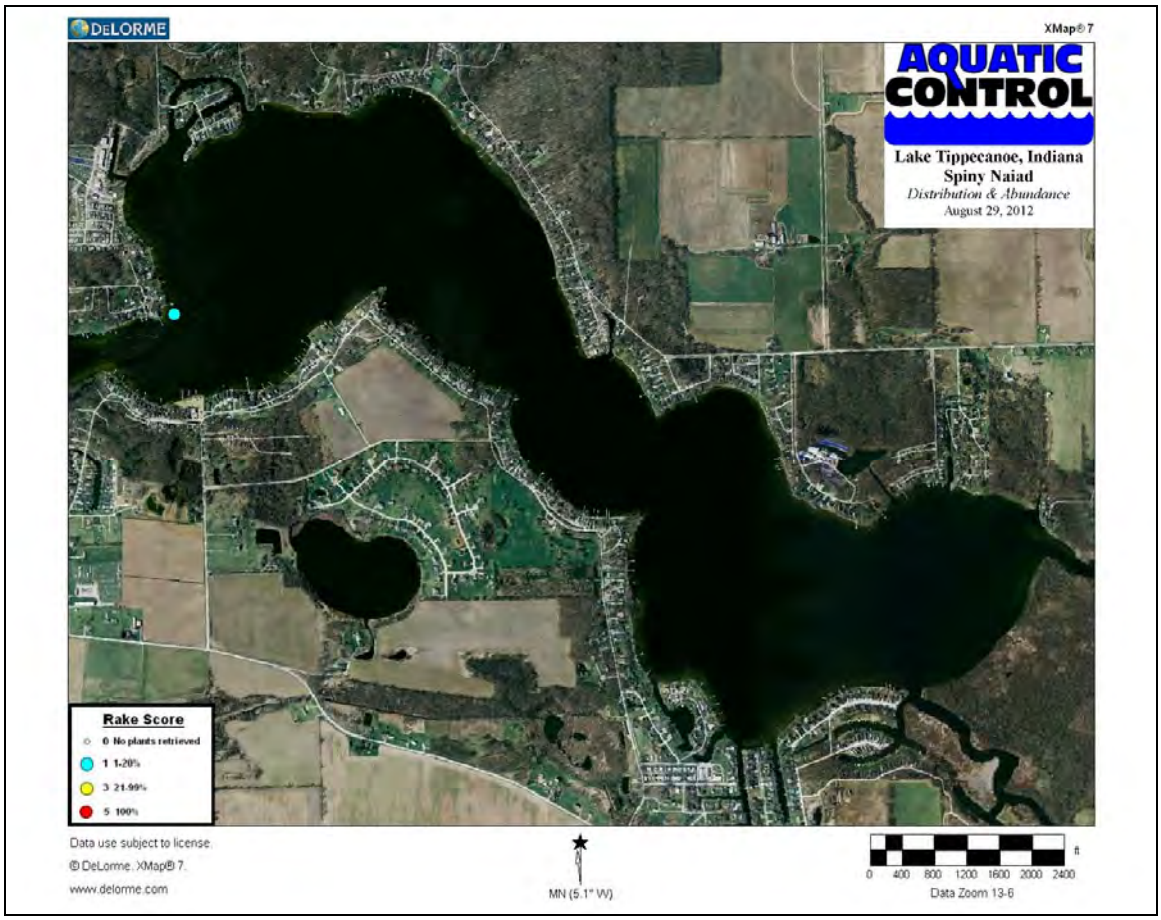


**Figure 9. Spiny naiad location on Tippecanoe Lake, August 29, 2012.**

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

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (all depths).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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.

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (0-5 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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**.

| Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft). | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 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 | |
| **Species** | | | **0** | **1** | **3** | **5** | | |
| 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 | |
| **Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).** | | | | | | | | |
| 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 | |
| **Species** | | | **0** | **1** | **3** | **5** | | |
| 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 | |
| **Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (20-25 ft).** | | | | | | | | |
| 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 | |
| **Species** | | | **0** | **1** | **3** | **5** | | |
| 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.

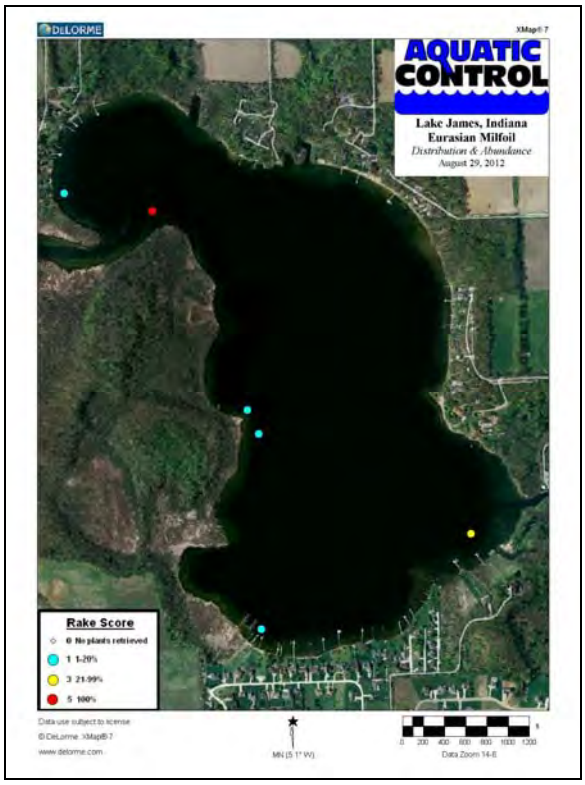


**Figure 10. Eurasian watermilfoil locations on James Lake, August 29, 2012.**

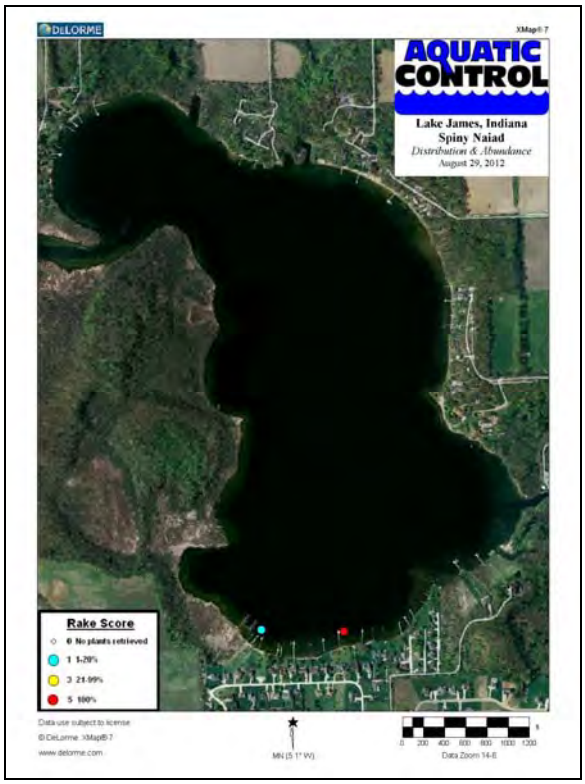


**Figure 11. Spiny naiad locations on James Lake, August 29, 2012.**

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

**Occurrence and Abundance of Submersed Aquatic Plants in Lake James (all depths).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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

**Occurrence and Abundance of Submersed Aquatic Plants in Lake James (0-5 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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.

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (5-10 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (10-15 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 |

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (15-20 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 |

**Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe (20-25 ft).**

| | | | | | |
|---|---|---|---|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **Species** | | **0** | **1** | **3** | **5** | |
| 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 variegate*) 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.

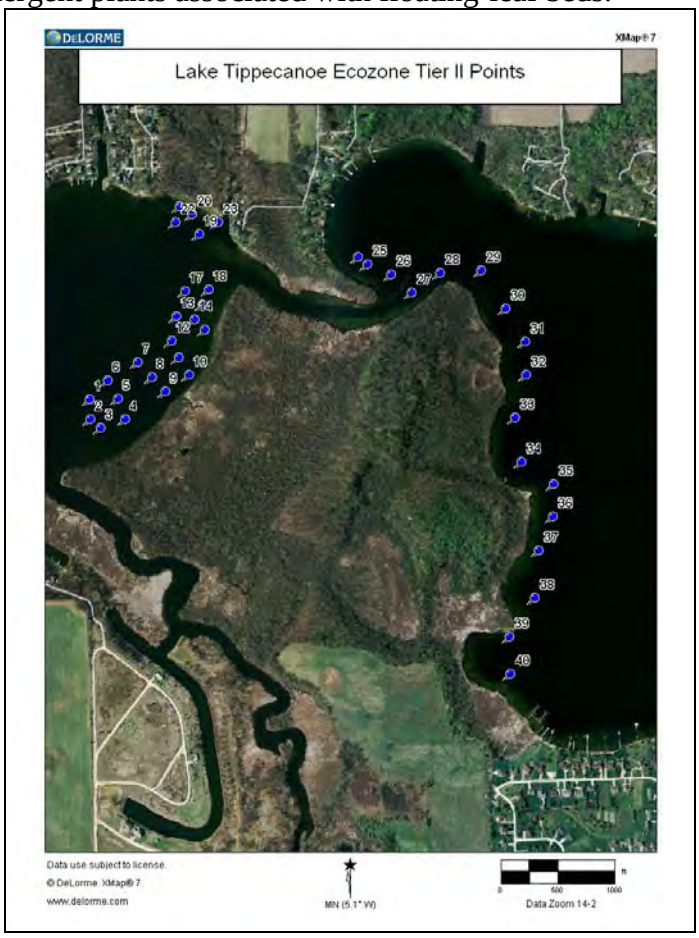


**Figure 12. Ecozone Tier II Survey Points.**

### *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) | Frequency of Occurrence | Rake score frequency per sp. | | | | Plant Dominance |
|---|---|---|---|---|---|---|
| **Species** | | **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 | Frequency of Occurrence | Rake score frequency per sp. | | | | Plant Dominance |
|---|---|---|---|---|---|---|
| **Species** | | **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 | Frequency of Occurrence | Rake score frequency per sp. | | | | Plant Dominance |
|---|---|---|---|---|---|---|
| **Species** | | **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.**

| | | | | | Species Frequency of Occurrence | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bed | # of Sites | Mean Latitude | Mean Longitude | Mean Width (ft) | SPA | WAL | ARA | SWL | CAT | PIK | PRL | BUR | BUB | HIB | # of Species | #/Site | Acres | Shoreline Length (ft) |
| 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 | 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

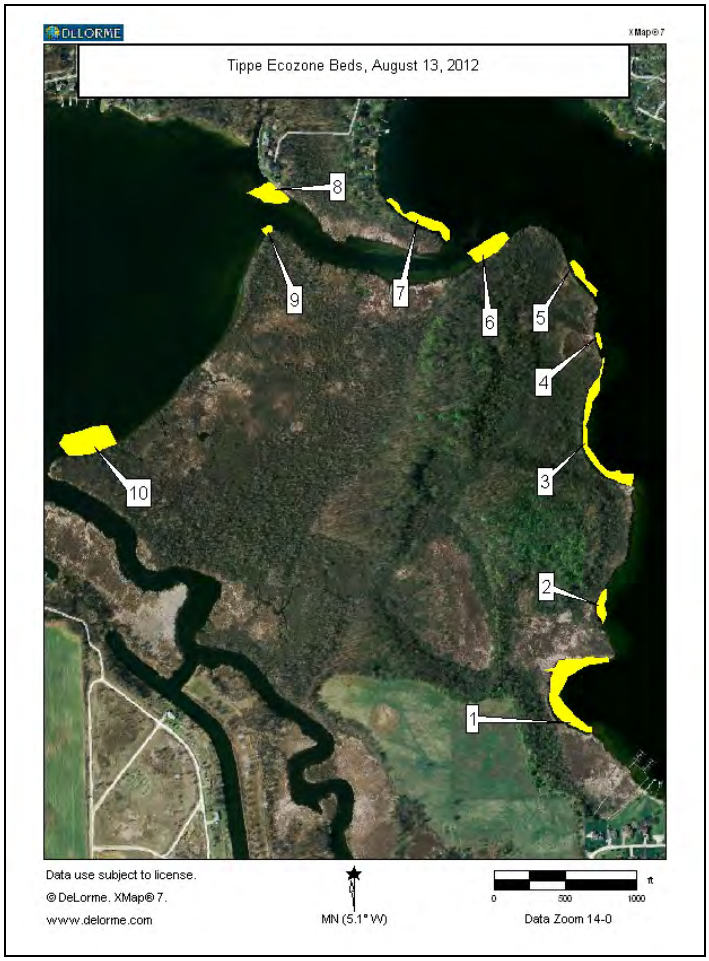


**Figure 13. Ecozone floating leaf plant bed location.**

### *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.

| 2013 Budget | Cost Estimate |
|---|---|
| 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.

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# 6.0 APPENDICIES

## 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 | Illinios 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 | Eel grass | Richardson's pondweed | Chara | Slender naiad | Sago pondweed | Illinois pondweed | Flatstem pondweed | Southern 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 | | 1 | | | | | 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 | | | | | | | | | | | |
| 23 | 41.318829 | -85.755404 | 5 | 5 | 3 | | | 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 | | P | | | | | | | | | 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 | | | | 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 | | | 3 | | 3 | | 1 | | | | | | |

## *6.1.3 James Lake*

| WPT | Lat | Long | Number of Species | Number of Natives | Depth | Rake score | Eurasian milfoil | Curlyleaf pondweed | Fil. Algae | Eel Grass | Sago pondweed | Chara | Water stargrass | Coontail | Slender naiad | Richardson's pondweed | Elodea | Spiny naiad | Southern naiad | 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 | Eel grass | 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 | | | | 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 | 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 | 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 | 9 | 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 [X] Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:* 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: Holly LaSalle | Lake Assoc. Name: Lake Tippecanoe POA | |
| Rural Route or Street: 67 ENS T49A | | Phone Number: 812-497-2410 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |
| 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): Oswego Lake | Nearest Town: North Webster | County: Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

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

| | | | | | |
|---|---|---|---|---|---|
| Treatment Area # | 1 | LAT/LONG or UTM's | see map | | |
| Total acres to be controlled | 1.9 | Proposed shoreline treatment length (ft) | 720 | Perpendicular distance from shoreline (ft) | 100 |
| Maximum Depth of Treatment (ft) | 4 | Expected date(s) of treatment(s) | Late June/July | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

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

Plant survey method: [X] Rake [X] 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 |
| | | |
| | | |
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| | | |
| | | |
| | | |

Page 2 of 4

| | | | |
|---|---|---|---|
| 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: [X] Chemical [ ] Physical | [ ] Biological Control | [ ] Mechanical | |

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

Plant survey method: [x] Rake [X] 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 # 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: [X] Chemical [ ] Physical | [ ] Biological Control | [ ] Mechanical | |

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D for selective control of EWM and low dose Aquathol K for selective control of CLP

Plant survey method: [X] Rake [X] Visual [ ] 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 3 of 4

| | | |
|---|---|---|
| Treatment Area # | LAT/LONG or UTM's | |
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s) mid to late summer depending on plant growth | |

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| | | |
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| | |
|---|---|
| Applicant Signature | Date |
| Certified Applicant's Signature | Date |

**FOR OFFICE ONLY**

| | |
|---|---|
| ☐ Approved ☐ Disapproved | Fisheries Staff Specialist |
| ☐ Approved ☐ Disapproved | Environmental Staff Specialist |

Mail check or money order in the amount of $5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

## 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 [X] Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:* 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: Holly LaSalle | Lake Assoc. Name: Lake Tippecanoe POA | |
| Rural Route or Street: 67 EMS T49A | | Phone Number: 812-497-2410 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |
| 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): Lake Tippecanoe | Nearest Town: North Webster | County: Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

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

| | | | |
|---|---|---|---|
| Treatment Area # 1 | LAT/LONG or UTM's See Map | | |
| Total acres to be controlled 0.5 | Proposed shoreline treatment length (ft) 440 | Perpendicular distance from shoreline (ft) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) late June/July | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

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

Plant survey method: [X] Rake [X] Visual [ ] 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 |
| | | |
| | | |
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|---|---|---|---|---|---|
| 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) | 100 |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | late June/July | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

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

Plant survey method: [x] Rake [X] Visual [ ] 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 |
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|---|---|---|---|---|---|
| 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) | 100 |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | late June/July | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

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

Plant survey method: [x] Rake [X] Visual [ ] 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 |
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|---|---|---|---|
| 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: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique or Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] 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 |
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|---|---|---|---|
| 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: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique, Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] 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 |
| | | |
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|---|---|---|---|
| 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) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | | |
| Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique/Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Summer Survey | | | |

| 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 |
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|---|---|---|---|
| Treatment Area # 7 | LAT/LONG or UTM's Control EWM and CLP in areas TBD in Spring Survey | | |
| Total acres to be controlled <70 | Proposed shoreline treatment length (ft) n.a. | Perpendicular distance from shoreline (ft) n.a. | |
| Maximum Depth of Treatment (ft) n.a. | Expected date(s) of treatment(s) late April/early May | | |
| Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D, Renovate, and Aquathol for early season selective control. Areas TBD following spring survey | | | |
| Plant survey method: [ ] Rake [X] Visual [ ] Other (specify) 2012 Permit Report Data | | | |

| 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 |
| | | |
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|---|---|---|
| Treatment Area # | LAT/LONG or UTM's | |
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s) mid to late summer | |

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| | |
|---|---|
| Applicant Signature | Date |
| Certified Applicant's Signature | Date |

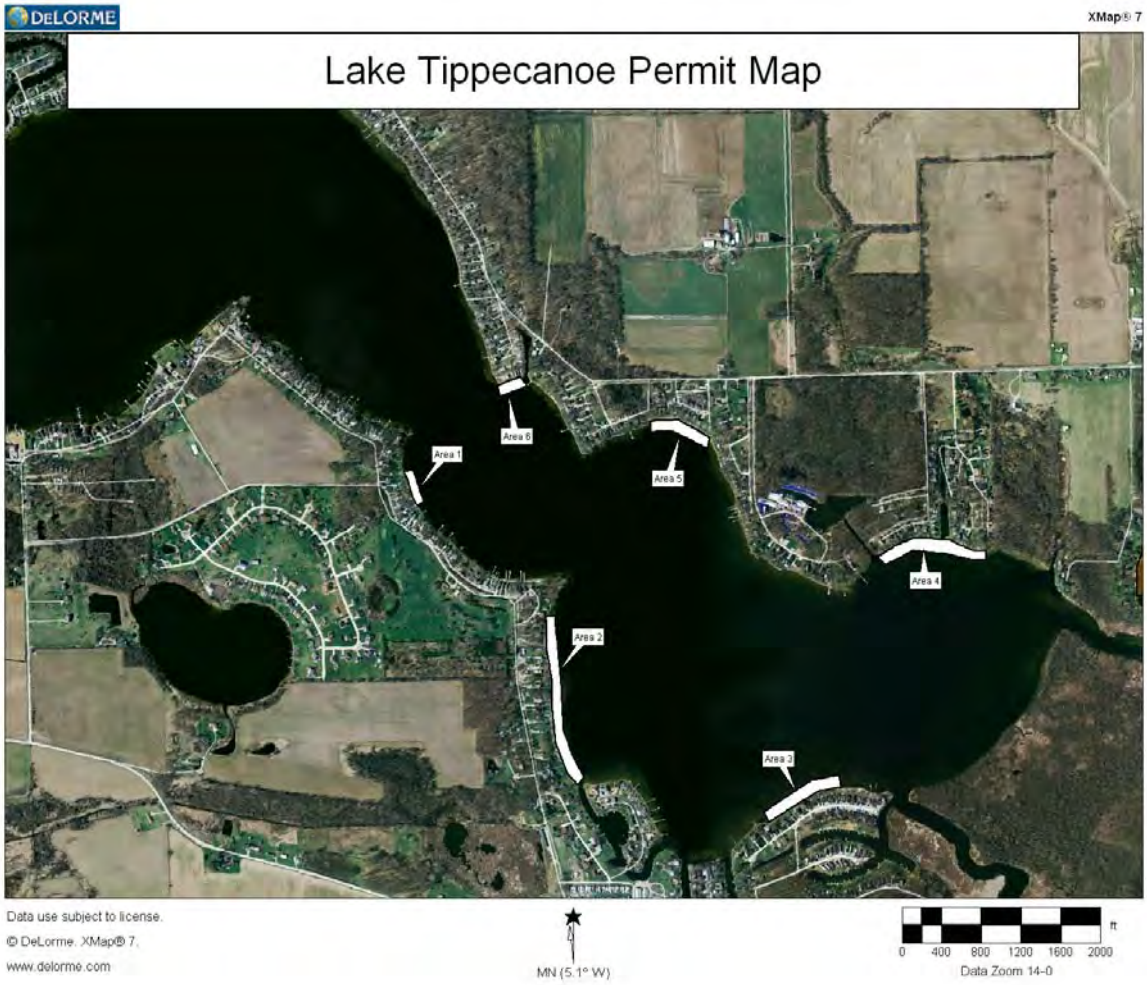
**FOR OFFICE ONLY**

| | |
|---|---|
| ☐ Approved ☐ Disapproved | Fisheries Staff Specialist |
| ☐ Approved ☐ Disapproved | Environmental Staff Specialist |

Mail check or money order in the amount of $5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

## 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 [X] Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:* 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

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

| | | |
|---|---|---|
| Lake (One application per lake): Lake James | Nearest Town: North Webster | County: Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

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

| | | |
|---|---|---|
| Treatment Area # 1 | LAT/LONG or UTM's See Map | |
| Total acres to be controlled 1.75 | Proposed shoreline treatment length (ft) 1000 | Perpendicular distance from shoreline (ft) 100 |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

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

Plant survey method: [x] Rake [X] Visual [ ] 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 |
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Page 2 of 5

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|---|---|---|---|
| Treatment Area # 2 | LAT/LONG or UTM's See Map | | |
| Total acres to be controlled 1.9 | Proposed shoreline treatment length (ft) 1140 | Perpendicular distance from shoreline (ft) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | | |
| Treatment method: [X] Chemical [ ] Physical | [ ] Biological Control | [ ] Mechanical | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique/Hydrothol | | | |
| Plant survey method: [x] Rake [X] Visual [ ] 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 |
| | | |
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|---|---|---|---|
| Treatment Area # 3 | LAT/LONG or UTM's See Map | | |
| Total acres to be controlled 2.25 | Proposed shoreline treatment length (ft) 850 | Perpendicular distance from shoreline (ft) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | | |
| Treatment method: [X] Chemical [ ] Physical | [ ] Biological Control | [ ] Mechanical | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique/Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] 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 |
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|---|---|---|---|
| Treatment Area # 4 | LAT/LONG or UTM's See Map | | |
| Total acres to be controlled 2 | Proposed shoreline treatment length (ft) 700 | Perpendicular distance from shoreline (ft) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | | |
| Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique/Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] 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 |
| | | |
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|---|---|---|---|
| Treatment Area # 5 | LAT/LONG or UTM's See Map | | |
| Total acres to be controlled 5.1 | Proposed shoreline treatment length (ft) 2000 | Perpendicular distance from shoreline (ft) 100 | |
| Maximum Depth of Treatment (ft) 6 | Expected date(s) of treatment(s) Late June/July | | |
| Treatment method: [ ] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical | | | |
| Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique/Hydrothol | | | |
| Plant survey method: [X] Rake [X] Visual [ ] 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 |
| | | |
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|---|---|---|---|
| Treatment Area # 6 | LAT/LONG or UTM's Areas TBD following early spring survey | | |
| Total acres to be controlled <30 | Proposed shoreline treatment length (ft) n.a. | Perpendicular distance from shoreline (ft) n.a. | |
| Maximum Depth of Treatment (ft) n.a. | Expected date(s) of treatment(s) late April early May | | |
| Treatment method: [x] Chemical | [ ] Physical | [ ] Biological Control | [ ] Mechanical |

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D, Renovate, and Aquathol K for control of invasive species

Plant survey method: [ ] Rake [x] Visual [ ] Other (specify) 2012 Permit report data

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Coontail | | 20 |
| Eurasian watermilfoil | x | 20 |
| Curlyleaf pondweed | x | 40 |
| Chara | | 10 |
| Filamentous algae | | 5 |
| Elodea | | 5 |
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| | |
|---|---|
| Applicant Signature | Date |
| Certified Applicant's Signature | Date |

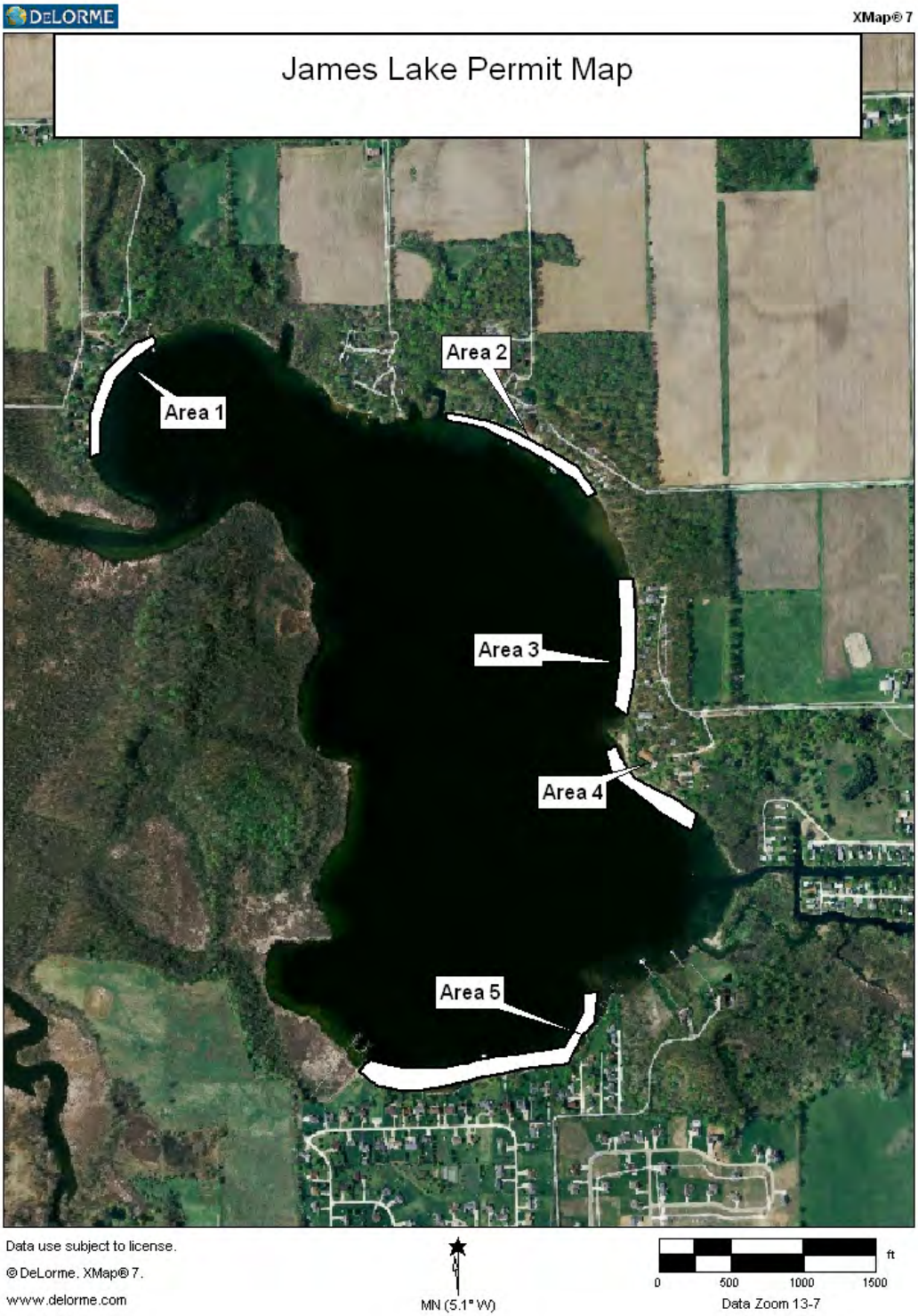
**FOR OFFICE ONLY**

| | |
|---|---|
| [ ] Approved [ ] Disapproved | Fisheries Staff Specialist |
| [ ] Approved [ ] Disapproved | Environmental Staff Specialist |

Mail check or money order in the amount of $5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

## Page 5 of 5 James Lake Permit Map



## 6.3 Species List

| ***Scientific Name*** | ***Common Name*** |
|---|---|
| *Any algae* | Algae |
| *Cephalanthus occidentalis* | button bush |
| *Ceratophyllum demersum* | common coontail |
| *Chara sp.* | Chara sp. |
| *Decodon verticillatus* | swamp loosestrife |
| *Elodea canadensis* | American elodea |
| *Elodea nuttali* | western elodea |
| *Hibiscus palustris* | swamp rose mallow |
| *Lythrum salicaria* | purple loosestrife |
| *Myriophyllum heterophyllum* | variable watermilfoil |
| *Myriophyllum sibiricum* | northern watermilfoil |
| *Myriophyllum spicatum* | Eurasian watermilfoil |
| *Myriophyllum verticillatum* | whorled watermilfoil |
| *Najas flexilis* | slender naiad |
| *Naja guadalupensis* | southern naiad |
| *Najas marina* | spiny naiad |
| *Najas minor* | brittle naiad |
| *Nelumbo nucifera* | sacred lotus |
| *Nuphar variegetum* | spatterdock |
| *Nymphaea tuberosa* | white water lily |
| *Peltandra virginica* | arrow arum |
| *Polygonum hydropiper* | water smartweed |
| *Pontederia cordata* | pickerel weed |
| *Potamogeton amplifoilus* | large leaf pondweed |
| *Potamogeton crispus* | curlyleaf pondweed |
| *Potamogeton foliosus* | leafy pondweed |
| *Potamogeton gramineus* | variable pondweed |
| *Potamogeton illinoensis* | Illinois pondweed |
| *Potamogeton pectinatus* | sago pondweed |
| *Potamogeton pusillus* | small pondweed |
| *Potamogeton richardsonii* | Richardson's pondweed |
| *Potamogeton zosteriformis* | flatstemmed pondweed |
| *Sagittaria spp.* | arrowhead |
| *Scirpus sp.* | bulrush |
| *Typha latifolia* | common cattail |
| *Utricularia vulgaris* | common bladderwort |
| *Vallisneria americana* | eel grass |
| *Zannichellia palustris* | horned pondweed |
| *Zosterella dubia* | water stargrass |