Lake Wawasee and Syracuse Lake

Aquatic Vegetation Management Plan

2015 Update

Kosciusko County, Indiana

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Executive Summary

This report was funded by the Indiana Department of Natural Resources (IDNR) through a grant from the Great Lakes Restoration Initiative (GLRI). It summarizes exotic plant management efforts on Lake Wawasee and Syracuse Lake. These lakes are located in Kosciusko County, Indiana near the town of Syracuse. Lake Wawasee has 3,060 surface acres with a maximum depth of 77 feet and an average depth of 22 feet. Syracuse Lake has 414 surface acres with a maximum depth of 34 feet and an average depth of 13 feet. Eurasian watermilfoil (*Myriophyllum spicatum*) and starry stonewort (*Nitellopsis obtusa*) are exotic plant species that are now present in both lakes. The following report summarizes Eurasian watermilfoil (EWM) and starry stonewort (SSW) control practices implemented on Lake Wawasee and Syracuse Lake. It also outlines a plan for future management of these exotic species.

Two tier II vegetation surveys were performed on Lake Wawasee and Syracuse Lake in 2015. The most recent survey data from August of 2015 showed that EWM site frequency was 11.2 percent in Lake Wawasee and 22.0 percent in Syracuse Lake. The Syracuse Lake survey took place prior to the 2015 EWM Treatments. EWM populations in both lakes exceed the established objective of a 10 percent maximum EWM frequency each summer. However, allowable EWM treatment acreages for both lakes are not expected to reduce EWM frequency to the 10 percent threshold on an annual basis.

In August of 2015, starry stonewort (SSW) frequency was 36.7 percent in Lake Wawasee and 18.0 percent in Syracuse Lake. Both these SSW frequencies are up significantly from August of 2014. Total coverage of SSW in the both lakes has increased since 2014.

Despite large scale efforts to control SSW, its acreage has increased steadily each year since 2009. In August of 2009, total SSW acreage in Lake Wawasee was estimated at 15 acres. In the fall of 2015, an estimated at 230.69 acres of dense SSW beds were mapped. Along with this acreage there are other open water sites where SSW was collected in the tier II surveys. Forty-eight acres of dense SSW has been mapped in Syracuse Lake along with numerous open water locations where it has been collected in tier II surveys. Chemical applications temporarily control SSW, but no long term control of the plant has been observed. Multiple applications are needed in the same treatment area throughout the course of the season to keep SSW suppressed.

Starry stonewort may be considered the highest treatment priority based on the large amount of perceived available habitat into which it could still expand in both of these lakes. It appears to be very aggressive and severely inhibits lake use in shallow water. While EWM can be very problematic, it has been present in the lakes for decades and is likely already present in most areas of suitable habitat. Currently, total EWM acreage in Lake Wawasee is estimated at 579 acres based on a 2012 total estimated EWM distribution map. Any treatment of EWM must also be balanced against the possibility that SSW could expand into areas where EWM is controlled.

Realistically, it will be difficult to fund multiple treatments of all areas that have nuisance levels of SSW in these lakes in 2016. If the decision is made not to treat all areas of nuisance SSW infestation, then treatment areas should be prioritized based on lake use. Funding to treat some areas of SSW in these lakes will be available from the IDNR through a grant from the Great Lakes Restoration Initiative (GLRI). It is important to note that GLRI funding is divided between a growing number of Indiana lakes that are infested with SSW, and there will not be enough GLRI funding to treat all areas of SSW infestation on these lakes in 2016.

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Problem Statement

Starry stonewort (SSW) and Eurasian watermilfoil (EWM) are impacting the use of Lake Wawasee and Syracuse Lake in many areas. Both SSW and EWM form dense mats in many areas, which can inhibit fishing, swimming, and boating. Observations from Lake Wawasee and Syracuse Lake over the past 5 years indicate that SSW is extremely aggressive and even appears to be out-competing EWM in many areas. These invasive plants beds may also prevent the growth of beneficial native species which often provide less recreational interference and better quality fish habitat. Starry stonewort is currently present in over 230 surface acres on Lake Wawasee and over 48.2 acres in Syracuse Lake.

Objectives:

The following specific, quantifiable objectives are recommended to evaluate the success of EWM and SSW management activities at Lake Wawasee and Syracuse Lake:

1. Limit the frequency of occurrence of EWM in summer tier II sampling to 10 percent or less in both lakes (IDNR, 2013).

2. Limit starry stonewort biomass to the point that it does not interfere significantly with lake use.

3. Maintain a minimum of 11 native species collected each year in tier II surveys in Syracuse Lake.

4. Maintain a minimum of 13 native species collected each year in tier II surveys in Lake Wawasee.

Treating SSW and EWM will not eradicate them from Lake Wawasee and Syracuse Lake. In fact, SSW acreage in Lake Wawasee and Syracuse Lake may increase in coming years based on the perceived amount of suitable habitat available for its expansion. However, if these objectives could be met each year, the indication would be that SSW and EWM are being managed effectively on a seasonal basis without causing significant damage to the native plant community.

Starry stonewort frequency objectives are not being met and are not likely to be met in future years because of the aggressiveness of the plant and the lack of long term control options. Also, the allowable treatment acreage for EWM in these lakes is not likely to reduce EWM to the point where the management objectives are met.

Aquatic Vegetation Management History

The first aquatic vegetation management plan developed for Syracuse Lake was completed in 2005, and the first plan developed for Lake Wawasee was completed in 2006. These plans focused on annual control of EWM in areas of high recreational use. At that time, SSW had not yet been discovered in either lake (Aquatic Weed Control, 2005 and 2006). Large scale EWM treatments (35-50 acres) were conducted on Syracuse Lake in 2005, 2006, 2008, and 2009. Permitted EWM treatment acreage for Syracuse Lake has been reduced in recent years. In 2015, 20 acres in Syracuse Lake were permitted to be treated for selective EWM control with DMA-4 herbicide at a rate of 2.0 parts per million.

Areas of high use in Lake Wawasee (25 -50 acres) were treated in 2007, 2008, 2009, and 2013 through 2015. All EWM treatments on Lake Wawasee have used liquid DMA-4 herbicide at a rate of 2 parts per million to selectively control EWM without damaging native vegetation. In 2015, 32.5 acres in Lake Wawasee were treated for selective EWM control with DMA-4 herbicide at a rate of 2.0 parts per million.

SSW was first observed in summer of 2008 on Lake Wawasee in the channels on the west side of Johnson's Bay. In August of 2009, 15 acres in Johnson's Bay were treated with Nautique herbicide for the control of SSW. Since 2008, SSW distribution has steadily increased in Lake Wawasee. Treatments for SSW on Lake Wawasee have been frequent and aggressive, especially in areas of high use and areas of dense SSW infestation. Detailed SSW treatment information is outlined in Table 1.

In 2011, SSW was first discovered in Syracuse Lake in the 4.5 acre access channel adjacent to Syracuse Park. Also in 2011, the IDNR received a grant through the Great Lakes Restoration Initiative for the control of SSW species. Since 2011, the IDNR has fully funded numerous SSW treatments on both Lake Wawasee and Syracuse Lake. These treatments have used a combination of Cutrine Ultra herbicide at a rate of 2.4 gallons per acre foot with Hydrothol 191 herbicide at variable rates to control SSW.

Despite large scale efforts to control SSW, its acreage has increased steadily each year since 2009. In August of 2009, total SSW acreage in Lake Wawasee was estimated at 15 acres. In August of 2015, over 230 acres of SSW infestation were identified in the tier II survey. Total SSW acreage in Syracuse Lake was over 48 acres in August of 2015. Chemical applications temporarily control SSW, but no long term control of the plant has been observed. Multiple applications are needed in the same treatment area throughout the course of the season to keep SSW suppressed.

Table 1 and Table 2 summarize the treatment history of Lake Wawasee and Syracuse Lake from the beginning of their involvement with the LARE program. The two main target species have been EWM and SSW. SSW treatments have been funded 100% by the IDNR through the Great Lakes Restoration Initiative Funding, while Eurasian watermilfoil treatments were funded by the Wawasee Area Conservancy Foundation (WACF), the Syracuse Lake Association, and the LARE program.

Table 1: Lake Wawasee Treatment History

Year	Target species	Month	Acres	Areas	Herbicide	Rate
2006	EWM**	July	5 ac		DMA-4	2.0 ppm
2007	EWM	July	25 ac		DMA-4	2.0 ppm
2008	EWM**	July	50 ac		DMA-4	2.0 ppm
2009	EWM**	July	25 ac		DMA-4	2.0 ppm
	EWM**	August	25 ac		DMA-4	2.0 ppm
	SSW	August	15 ac	Johnsons Bay	Nautique	1.0 ppm
2010	SSW	June 7	20 ac	Johnsons Bay	Nautique	0.8 ppm
	SSW	July 14	20 ac	Johnsons Bay	Nautique	0.8 ppm
	SSW	August 10	1.0 ac	A – Johnson's Bay	Cutrine ultra + Hydrothol	2.4 gal/acre foot +1qt/surface acre Hydrothol
	SSW	August 10	1.0 ac	D1 – Johnson's Bay	Cutrine ultra + Hydrothol	2.4 gal/acre foot + 1 qt/acre-foot Hydrothol
		August 10	0.6 ac	B3-Johnson's Bay	Granular Hydrothol	82 lbs/ac-foot (0.8 ppm)
2011	SSW	June 29	30.76 ac		Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol
	SSW	July 26	56.56 ac		Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 15	20.26 ac	1,2,3,10,11*	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 22	11.29 ac	Johnson's Bay	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 22	30.72 ac	Johnson's Bay	Captain XTR + Hydrothol	2.4 gal/acre foot +Hydrothol***
2012	SSW	May 8	20.26 ac	1,2,3,10,11*	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	June 21	67.39 ac	1,2,3,10,11*+ Johnsons Bay channels	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	July 24	22.69 ac	1,2,3,10,11*	Captain XTR + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	October 2	23.57 ac	1,2,3,10,11*	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
2013	SSW	June 28	100.5 ac	1-8, 10,12-24	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 12 & 15	54.18 ac	1-3, 15-24	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 18-19	59.6 ac	1,2,3, thirty acres of 9, five acres of 11, 15,20,22	Cutrine ultra + Hydrothol (5 acres in area 11 were treated with Komeen Crystal at 20lbs	2.4 gal/acre foot +Hydrothol***

					per acre)	
	EWM**	July 1	40 ac		DMA-4	2.0 ppm
2014	SSW	July 9-11	113.4 ac	1-8, 12-13, 15-20, 22-26,30-31	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 5-6	113.4 ac	1-8, 12-13, 15-20, 22-26,30-31	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	EWM**	June 26	40 ac		DMA-4	2.0 ppm
2015	SSW	July 7	108.6 ac	1-8, 10, 12-13, 15-19, 22, 23, 24, 26, 31	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 4	59.32 ac	1-3, 15-19, 22, 23, 24, 26, 31	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 2	4.6 ac	4.6 acres in area 21	Clearigate	2.2 gal/acre foot
	EWM**	June 25	32.5 ac		DMA-4	2.0 ppm

*Areas in Table 1 refer to Figure 11.
**LARE funded
***Hydrothol rates vary depending on treatment location. In general, Hydrothol was used at a rate of 1 quart per surface acre in all channels and confined water areas. Along open shoreline and main lake areas, Hydrothol was used at a rate of 1 quart per acre foot. These differing rates were used to avoid fish toxicity issues.
All SSW Treatments since 2011 have been funded through the Great Lakes Restoration Initiative.

Table 2: Syracuse Lake Treatment History

Year	Target species	Month	Acres	Areas	Herbicide	Rate
2005	EWM**	July	35 ac		DMA-4	2.0 ppm
2006	EWM**	July	50 ac		DMA-4	2.0 ppm
2007	none	--	--		--	--
2008	EWM**	July	50 ac		DMA-4	2.0 ppm
2009	EWM**	July	50 ac		DMA-4	2.0 ppm
2010	No treatment					
2011	SSW	September 6	4.5 ac	1	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 22	4.5 ac	1	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
2012	SSW	May 8	4.5 ac	1	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	June 21	6.5	1,2,3	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	July 24	6.5 ac	1,2,3	Captain XTR	2.4 gal/acre foot +Hydrothol***
	SSW	October 2	7.5 ac	1,2,3,4	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
2013	SSW	July 11	10	1,2,3,4,5	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 15	10	1,2,3,4,5	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	September 18	9.5	1,2,4,5(expanded)	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	EWM**	July 1	21 ac		DMA-4	2.0 ppm
2014	SSW	July 10	17.5	1,2,4,5,6*	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 5	17.5	1,2,4,5,6*	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	EWM**	September 3	16.5		DMA-4	2.0 ppm
2015	SSW	July 1	17.98	1,2,5,6,7	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	SSW	August 4	8.58	1,5,7	Cutrine ultra + Hydrothol	2.4 gal/acre foot +Hydrothol***
	EWM**	June 5	20		DMA-4	2.0 ppm

*Areas in Table 2 refer to Figure 10.
**LARE Funded
***Hydrothol rates vary depending on treatment location. In general, Hydrothol was used at a rate of 1 quart per surface acre in all channels and confined water areas. Along open shoreline and main lake areas, Hydrothol was used at a rate of 1 quart per acre foot. These differing rates were used to avoid fish toxicity issues.
All SSW Treatments since 2011 have been funded through the Great Lakes Restoration Initiative.

2015 Vegetation Treatments

Syracuse Lake 2015 EWM Treatments

In 2015, EWM was not abundant or problematic in spring, which is not uncommon in Syracuse Lake. Following the summer tier II survey on July 20, 2015, four dense EWM beds totaling 35.04 acres were mapped. Following approval from the IDNR, 20 acres of these dense beds were then treated on July 28, 2015 for selective EWM control with liquid 2, 4-D at a rate of 2.0 parts per million. These treatment areas are shaded purple in Figure 1.

Permitted EWM treatment acreage has been reduced in Syracuse Lake due to its recent classification as important northern pike habitat which reduces treatment acreage to no more than 5 percent of the lake's surface acreage.

Figure 1: Syracuse Summer 2015 EWM Distribution and Treatment Areas

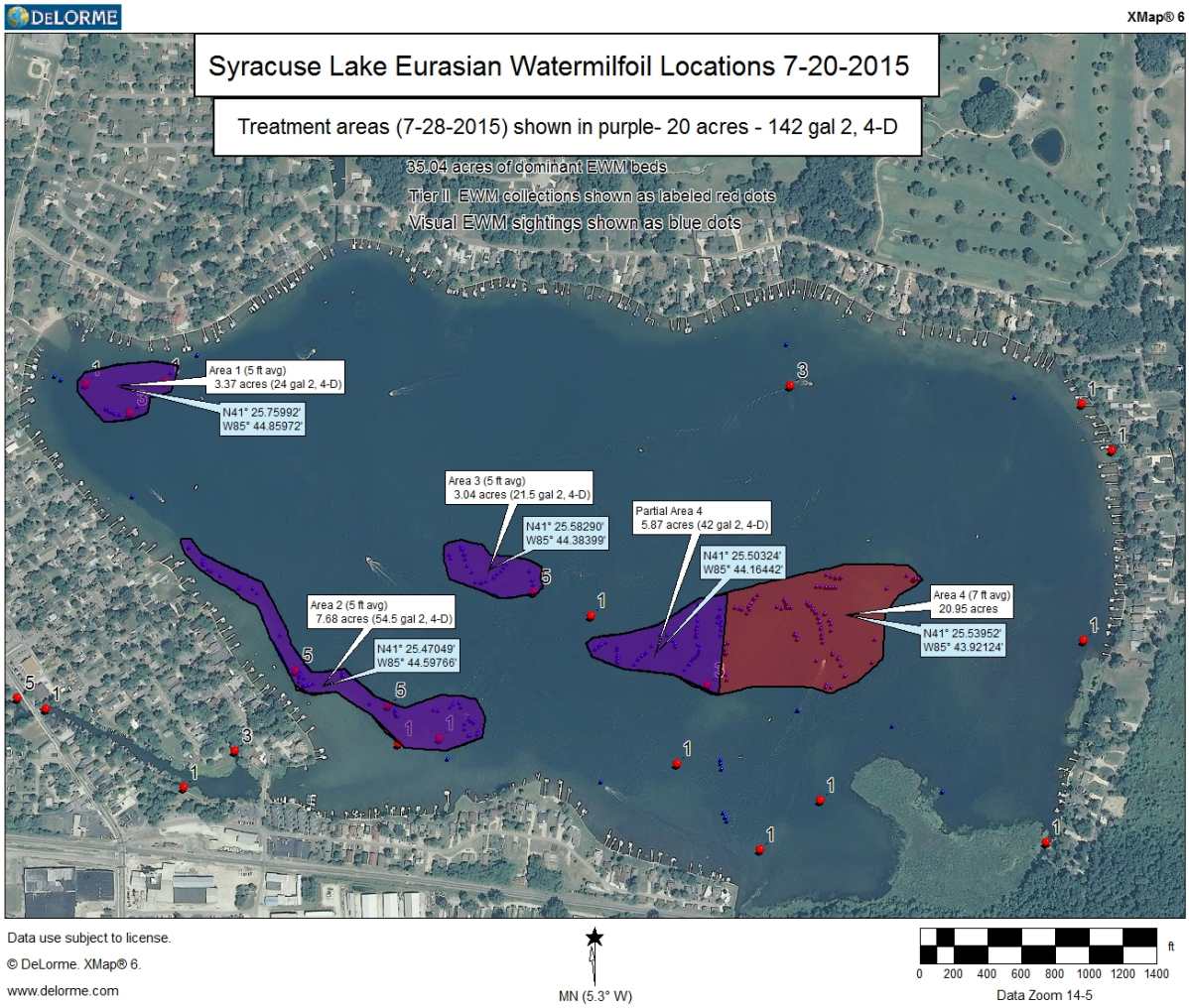


Table 3 summarizes treatment details from the 2015 EWM treatments on Syracuse Lake.

Table 3: Syracuse Lake 2015 EWM Treatment Information

Area	Acres	AVG depth	Herbicide	Rate
1	3.37	5	DMA-4	2.0 ppm
2	7.68	5	DMA-4	2.0 ppm
3	3.04	5	DMA-4	2.0 ppm
4	5.87	5	DMA-4	2.0 ppm

Syracuse Lake 2015 SSW Treatments

There were two starry stonewort (SSW) treatments on Syracuse Lake in 2015.

The first treatment was on July 1, 2015. A total of 17.98 acres of SSW infestation were treated with Cutrine ultra at a rate of 2.4 gallons/acre-foot in combination with Hydrothol herbicide. The 2015 treatment areas are described in Figure 2.

The second SSW treatment took place on August 4, 2015. A total of 8.58 acres of SSW infestation were treated with Cutrine Ultra at a rate of 2.4 gallons/acre-foot in combination with Hydrothol herbicide. This treatment comprised of areas 1, 5, and 7 in Figure 2. All SSW treatments in 2015 were funded through the Great Lakes Restoration Initiative (GLRI). There are 48.22 acres of mapped dense SSW beds in Syracuse lake although it is now common to most of the littoral zone of the lake.

Figure 2: Syracuse Lake 2015 SSW Treatment Areas

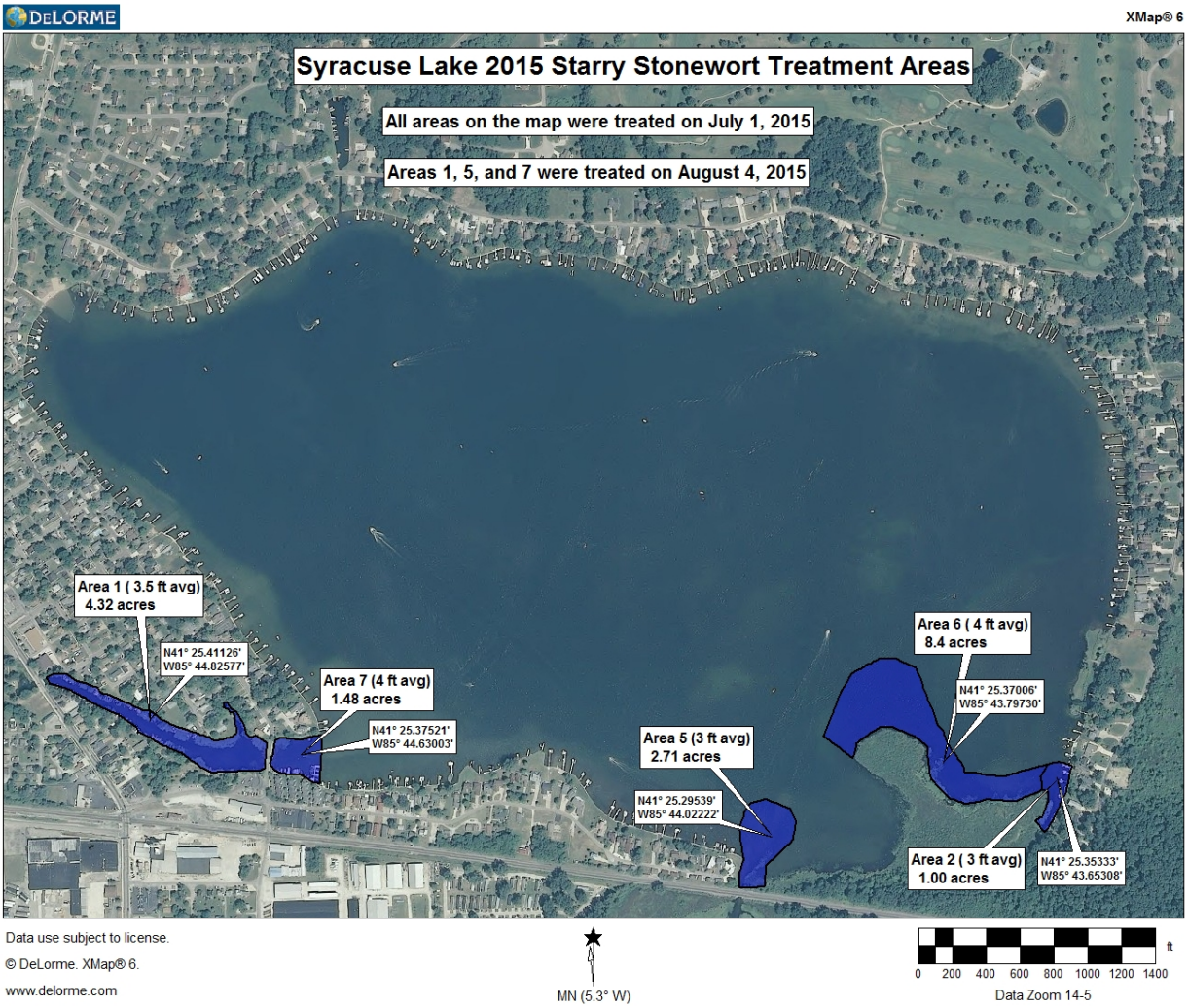


Table 4 gives details of the 2015 Syracuse Lake SSW treatment areas. These areas correspond to Figure 2.

Table 4: Syracuse Lake 2015 SSW Treatment Areas

Area	Dates Treated	Target	Acres	Avg. Depth	Herbicide
Area 1	July 7 & August 4	SSW	4.32	3.5	Cutrine at 2.4 gal/acre foot + Hydrothol
Area 2	July 7	SSW	1.0	3	Cutrine at 2.4 gal/acre foot + Hydrothol
Area 5	July 7 & August 4	SSW	2.71	3	Cutrine at 2.4 gal/acre foot + Hydrothol
Area 6	July 7	SSW	8.4	4	Cutrine at 2.4 gal/acre foot + Hydrothol
Area 7	July 7 & August 4	SSW	1.48	4	Cutrine at 2.4 gal/acre foot + Hydrothol
Totals			17.91		

2015 Lake Wawasee EWM Treatments

On June 25, 2015, 32.5 acres of EWM were treated with liquid 2, 4-D at 2.0 ppm. This area is shaded red in Figure 3. This area represents only a small portion of the total EWM acreage of Wawasee, which is estimated at around 579 acres.

Figure 3: Lake Wawasee 2015 EWM Treatment Area

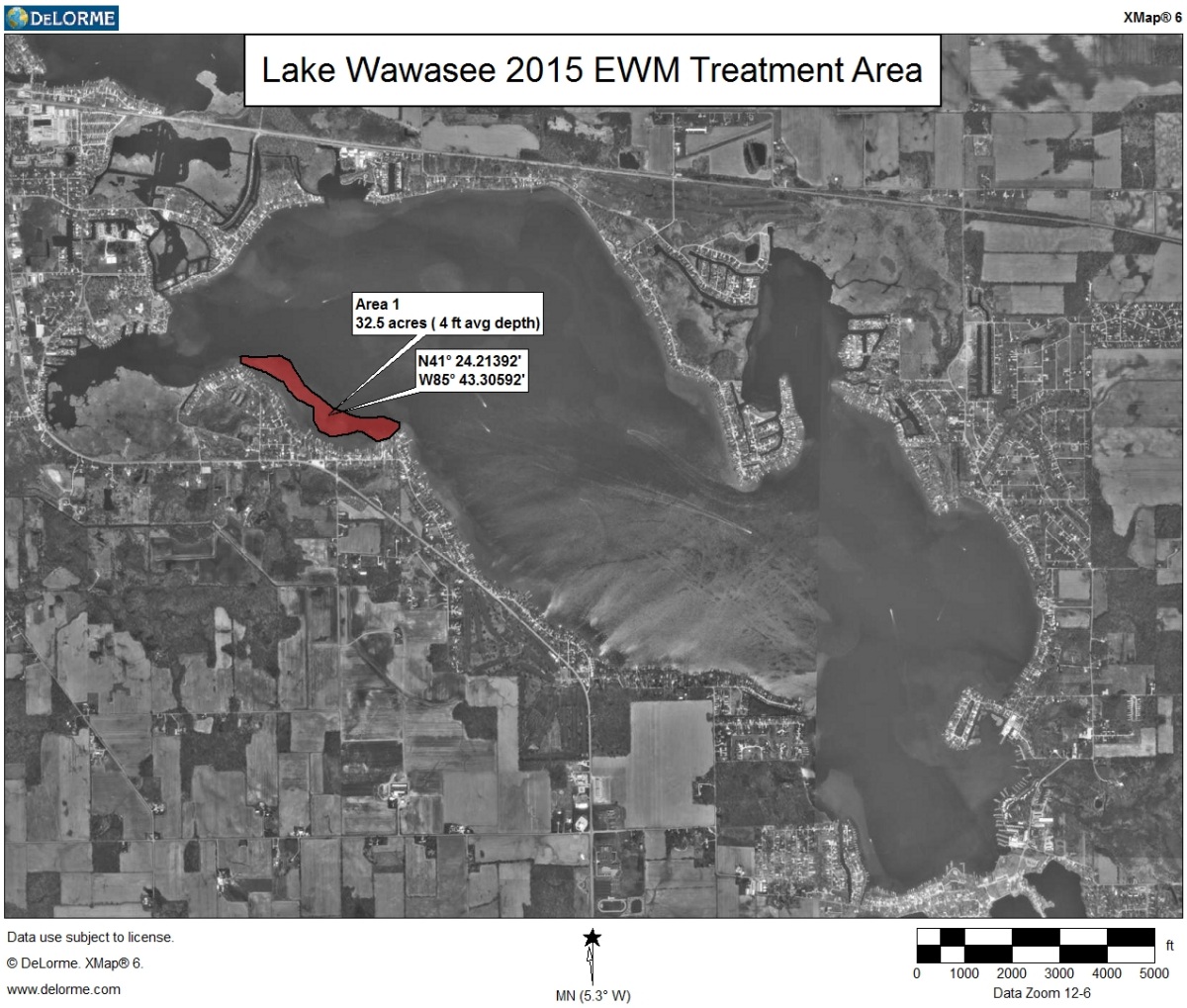


Table 5 shows detailed information about the 2015 EWM treatment areas on Lake Wawasee. The areas in Table 5 correspond to the labeled treatment areas in Figure 3.

Table 5: Lake Wawasee 2015 EWM Treatment Information

Area	Acres	AVG depth	Herbicide	Rate
1	32.5	4	DMA-4	2.0 ppm

2015 Lake Wawasee SSW Treatments

There were two starry stonewort (SSW) treatments on Lake Wawasee in 2015. The first treatment was on July 7, 2015. A total of 108.6 acres of SSW infestation were treated with Cutrine ultra at a rate of 2.4 gallons/acre-foot in combination with hydrothol herbicide.

The second SSW treatment took place on August 4, 2015. A total of 59.32 surface acres of SSW infestation were treated with Cutrine ultra at a rate of 2.4 gallons/acre-foot in combination with hydrothol herbicide.

All SSW treatments in 2015 were funded through the Great Lakes Restoration Initiative (GLRI). There are an estimated 230.69 acres of dense SSW beds in Lake Wawasee as well as many new open water tier II collections of SSW as of August 2015.

The specific 2015 SSW treatment areas are listed in Table 1, Table 6, and described in Figure 4.

Figure 4: Lake Wawasee 2015 SSW Treatment Areas

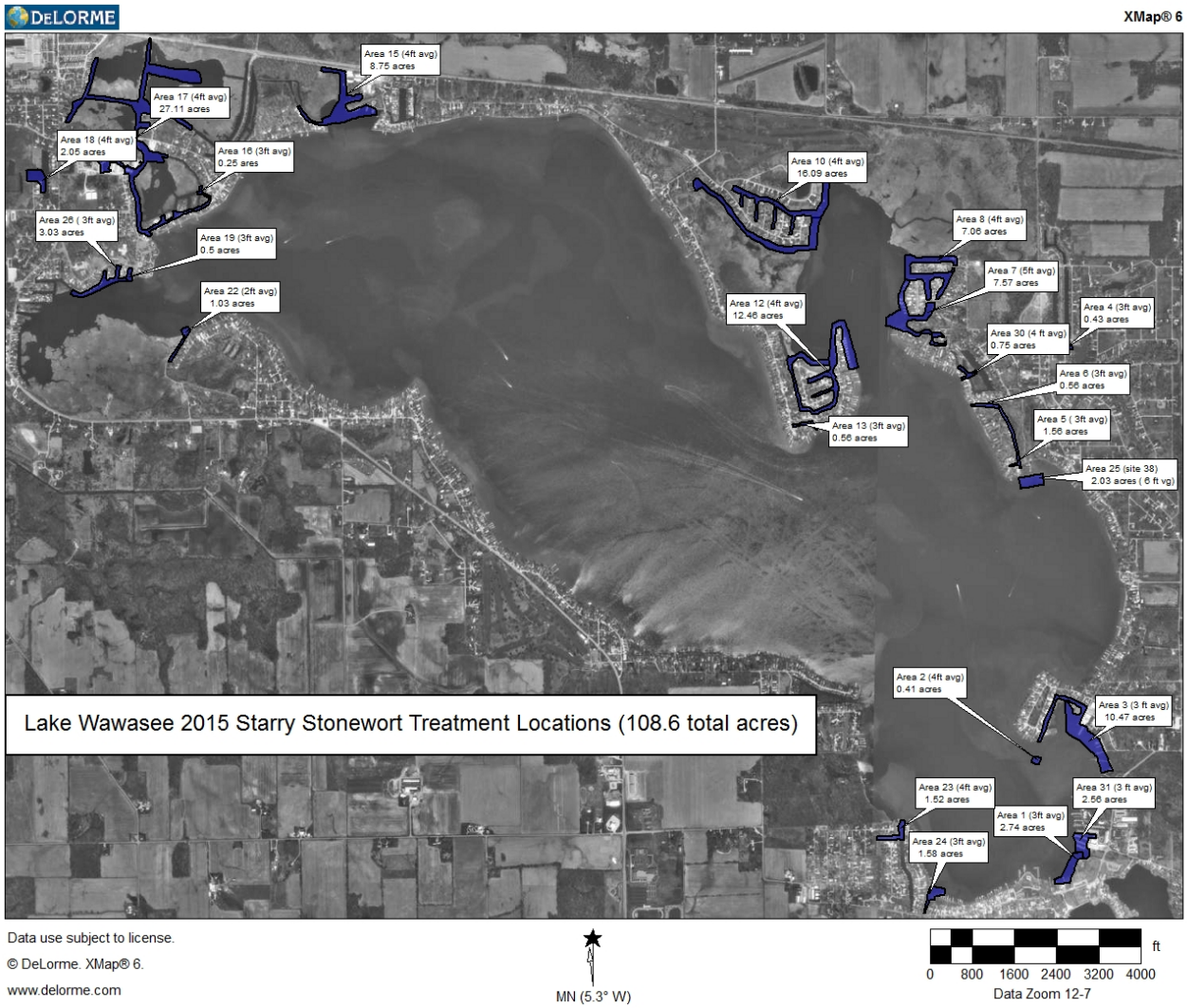


Table 6 shows information on the Lake Wawasee 2014 SSW treatments. The areas referred to in this table correspond to the labeled areas in Figure 4.

Table 6: Lake Wawasee 2014 SSW Treatment Information

Target species	Date Treated	Acres	Areas	Herbicide/Rate
SSW	July 7, 2015	108.6 ac	1-8, 10, 12-13, 15-19, 22, 23, 24, 26, 31	Cutrine ultra at 2.4 gal/acre foot+ Hydrothol
SSW	August 4, 2015	59.32 ac	1-3, 15-19, 22, 23, 24, 26, 31	Cutrine ultra at 2.4 gal/acre foot+ Hydrothol
SSW	September 2, 2015	4.6 ac	4.6 ac of area 21	Clearigate 2.2 gal/acre foot

In addition to all the areas treated with Cutrine Ultra and Hydrothol, a 4.6 acre area was treated on September 2, 2015 with a different copper based herbicide called Clearigate at a rate of 2.2 gal/acre ft. This was a trial treatment to explore the efficacy of this new herbicide on SSW. At the time of writing this plan, it was still too early to evaluate the results of this treatment. Figure 5 was provided by the IDNR and outlines the Clearigate herbicide trial area. This area is located in Conklin bay on Lake Wawasee.

Figure 5: Clearigate Trial Area (outlined in white) - September 2, 2015

Tier II Survey Results

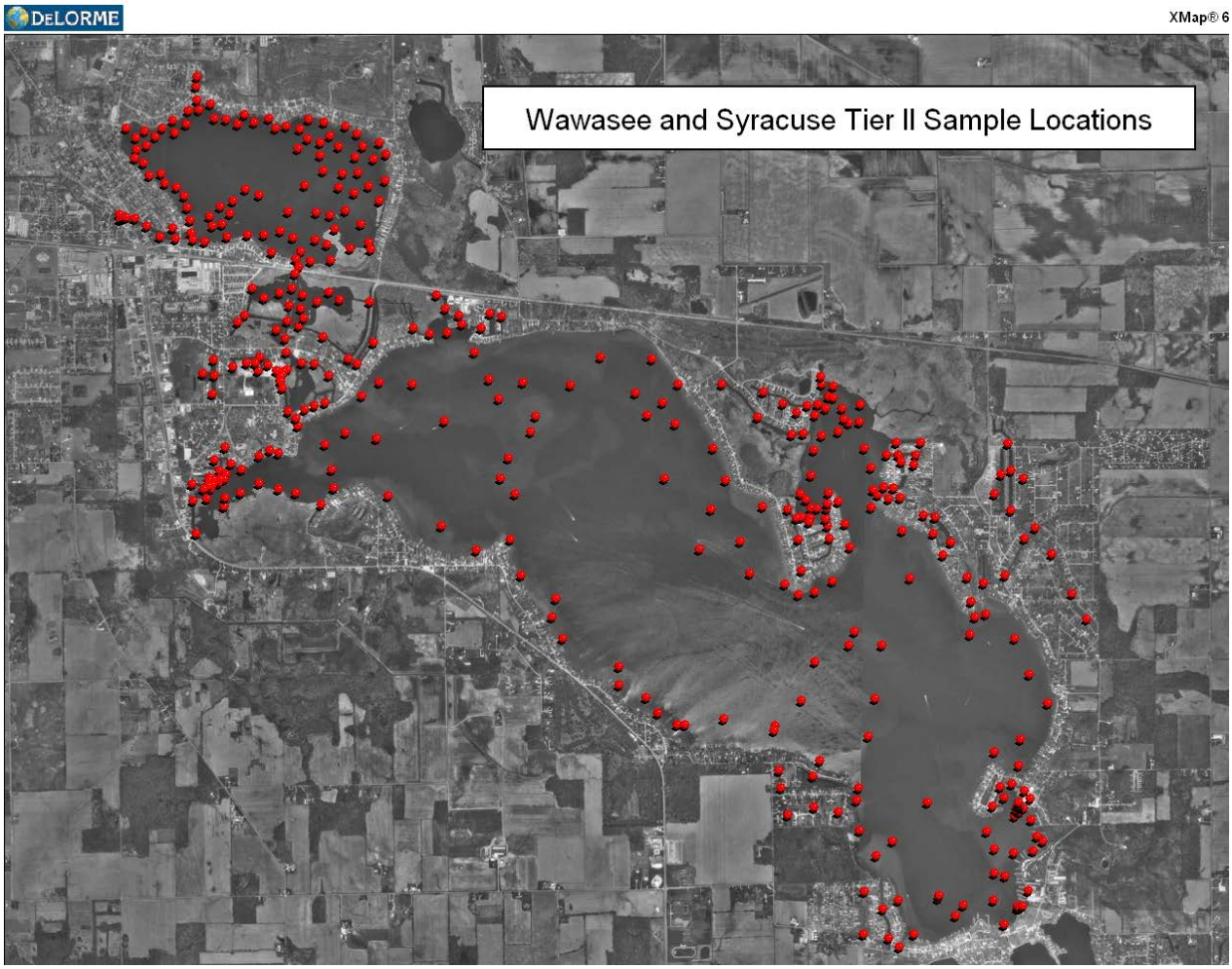
Two tier II vegetation surveys were performed on Lake Wawasee and Syracuse Lake in 2015. The spring survey on Lake Wawasee was conducted on June 9th and June 11th, while the summer survey on Lake Wawasee took place on August 21st and 26th.

The spring survey on Syracuse Lake took place on June 5th, while the summer survey took place on July 20th.

Aquatic plant sampling methods used for surveys on Lake Wawasee and Syracuse Lake are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR, 2014). In Syracuse Lake, 100 sample sites are distributed randomly throughout the littoral zone. In Lake Wawasee, 300 sample sites are distributed throughout the littoral zone. Channels are typically excluded from vegetation surveys; however, channels were included in 2011 through 2015 in an effort to locate starry stonewort.

Data presented below for EWM and SSW excludes any sampling locations within channels and only describes the "main lake" samples. Common and scientific names for aquatic plants are consistent with those listed in the original AVMPs for these lakes and are listed in the appendix to this report. Figure 6 shows the tier II sample locations on Lake Wawasee and Syracuse Lake. These site locations have not changed since 2011.

Figure 6: Wawasee and Syracuse Lakes Tier II Sample Locations

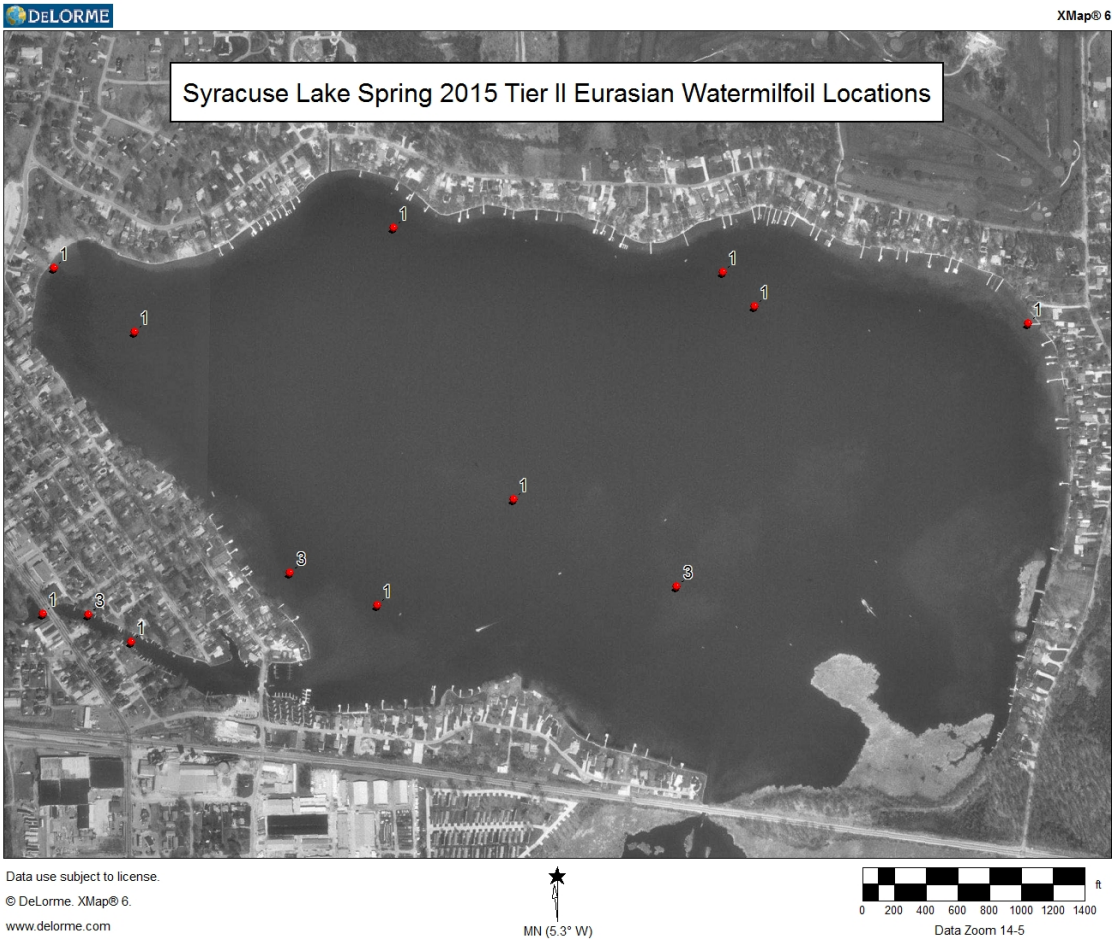


Invasive species

Eurasian Watermilfoil (EWM)

In Syracuse Lake, spring 2015 EWM frequency was 13.0 percent and summer frequency was 22.0 percent. Figure 7 shows the locations where EWM was collected in spring of 2015.

Figure 7: Syracuse Lake Spring 2015 Eurasian watermilfoil Locations



Summer EWM frequency in 2015 was very similar to the summer of 2014 (21.0 percent). Total 2015 EWM distribution in Syracuse Lake is described in Figure 1. It should be noted that EWM frequency can vary greatly each year depending upon weather conditions.

In Lake Wawasee, EWM site frequency was 18.3 percent in the spring of 2015 and 11.2 percent in the summer of 2015. Data from 2013 and 2014 indicates that EWM abundance seems stable in Lake Wawasee from year to year. Tier II data from multiple tier II surveys, as well as depth contour information was used to estimate total EWM acreage at 579 acres in Lake Wawasee in 2012. Although EWM acreage is high (Aquatic Weed Control, 2012), the population has remained somewhat constant in recent years. Figure 8 and Figure 9 describe EWM distribution in the 2015 tier II surveys.

Figure 8: Lake Wawasee Spring 2015 Tier II EWM Locations

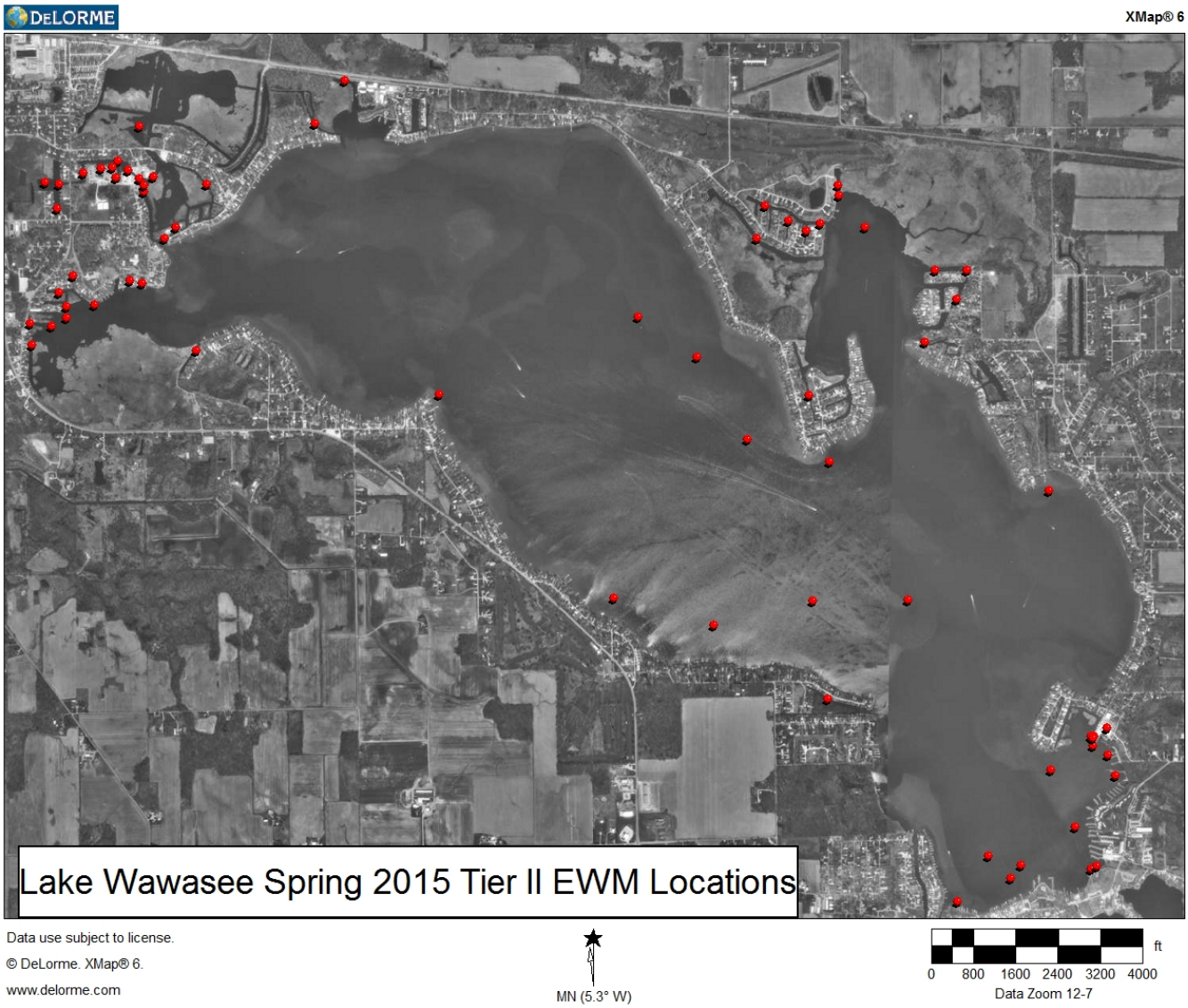
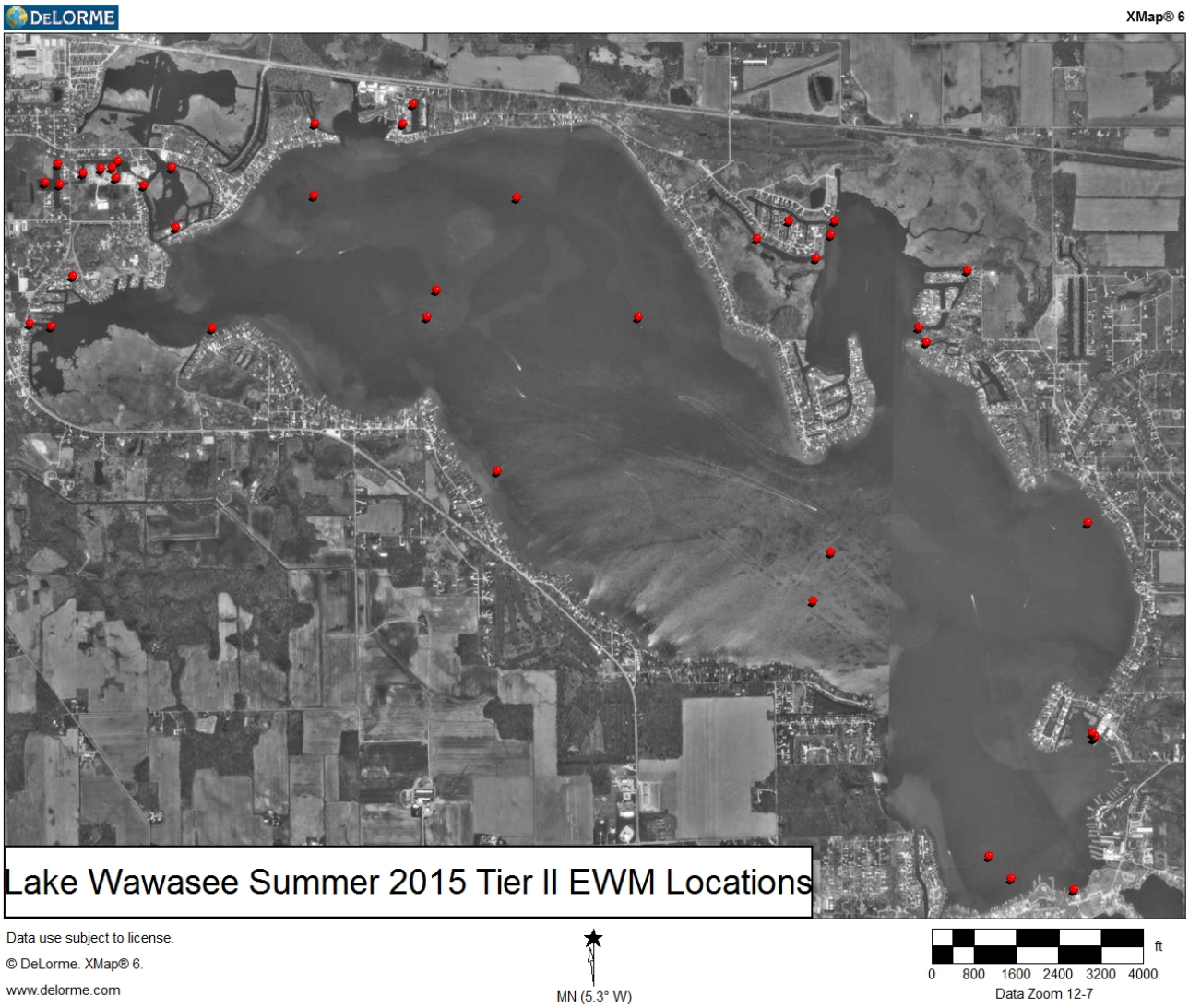


Figure 9: Lake Wawasee Summer 2015 Tier II EWM Location



Starry Stonewort (SSW)

In Syracuse Lake, SSW frequency was 14.0 percent in the spring and 18.0 percent in the summer of 2015. SSW appears to be spreading, and the large amount of suitable habitat in Syracuse Lake is of concern. Total SSW distribution in Syracuse Lake is described in Figure 10.

In Lake Wawasee, spring 2015 SSW frequency was 34.3 percent and summer frequency was 36.7 percent. SSW frequency did not increase from 2012 although the amount of identified SSW acreage did increase by about 18 acres. Total SSW acreage in Lake Wawasee is described in Figure 11.

Despite large scale efforts to control SSW, its acreage has increased steadily each year since 2009. In August of 2009, total SSW acreage in Lake Wawasee was estimated at 15 acres. In fall of 2014, total SSW acreage in Wawasee was estimated at 230.69 acres.

SSW in Syracuse Lake is spreading as well. Total SSW acreage in Syracuse Lake was estimated at 7.5 acres in the fall of 2012. In the fall of 2014 that acreage had increased to 48.2 acres and in 2015, SSW was so widely distributed that it is considered common to the entire littoral zone.

Figure 10: Syracuse Lake 2015 Total SSW Distribution

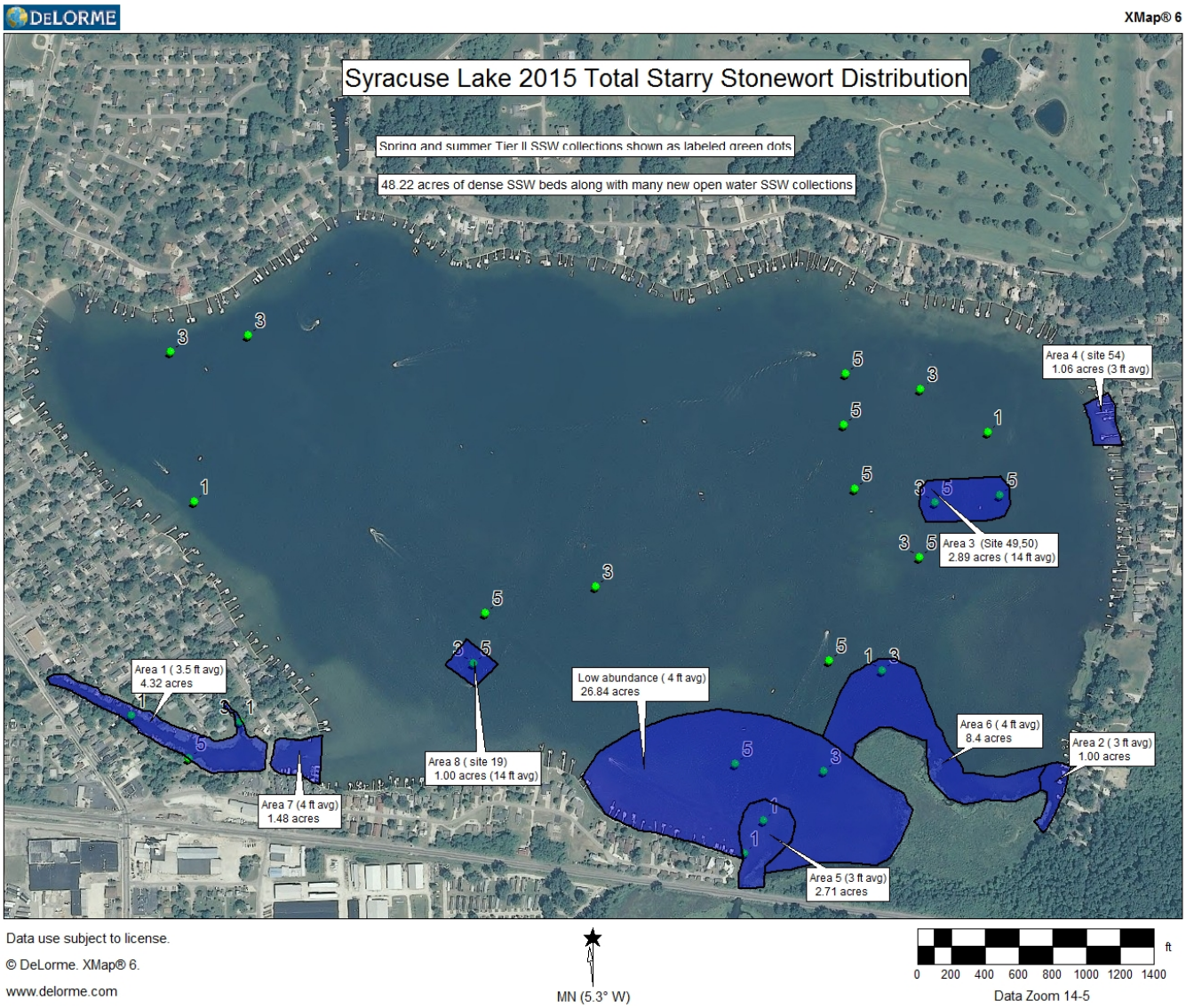
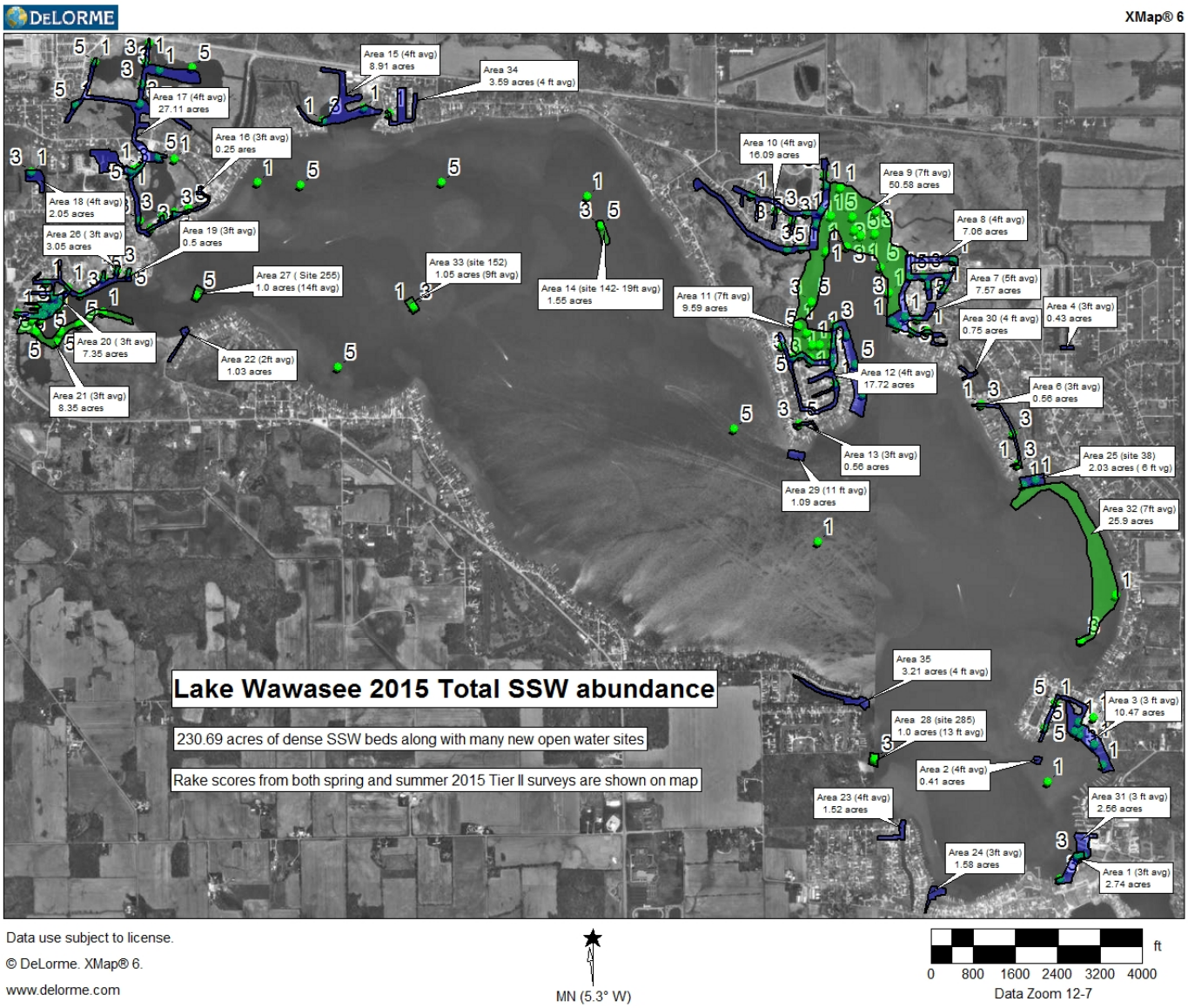


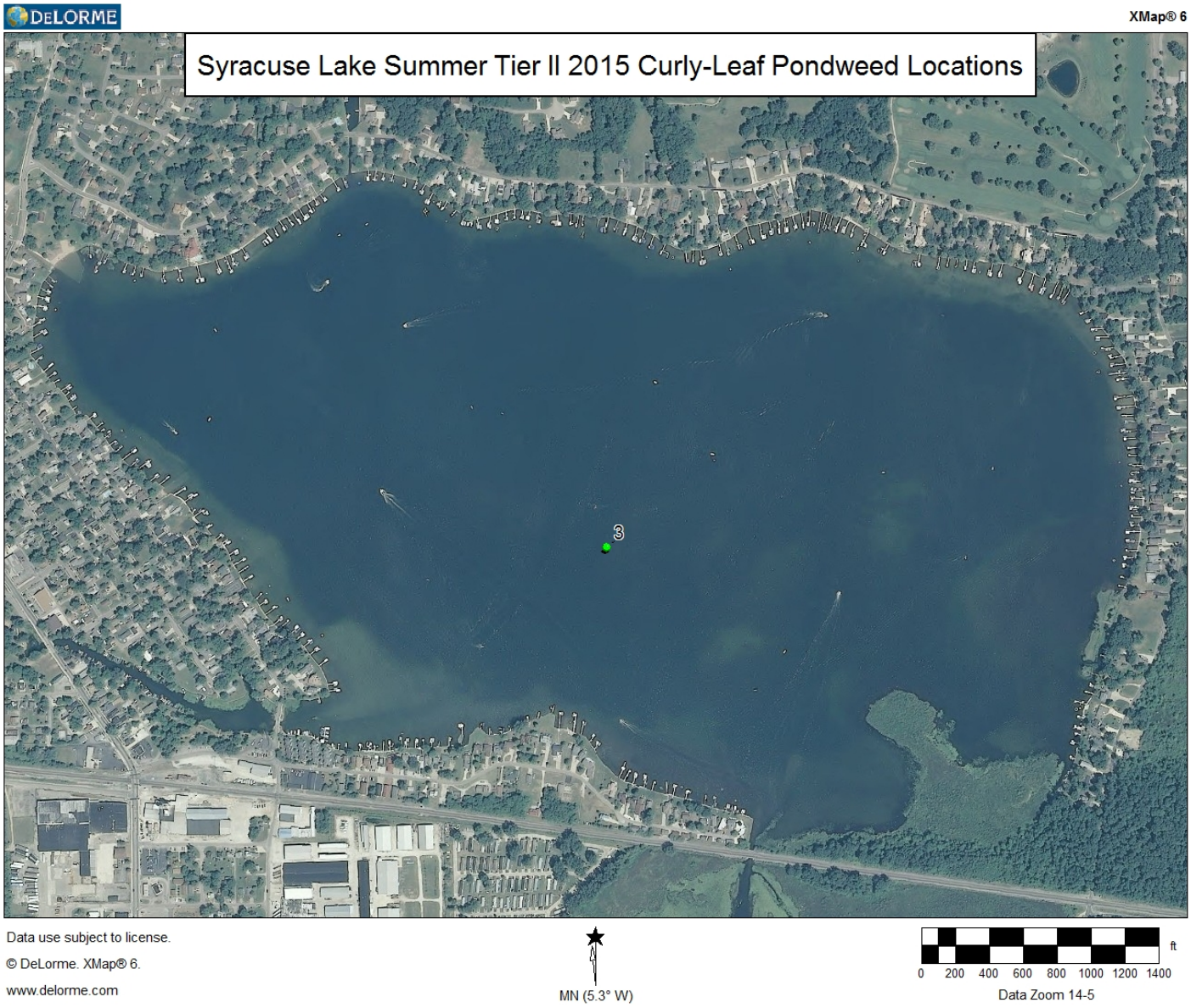
Figure 11: Lake Wawasee 2015 Total SSW Distribution



Curly-leaf Pondweed (CLP)

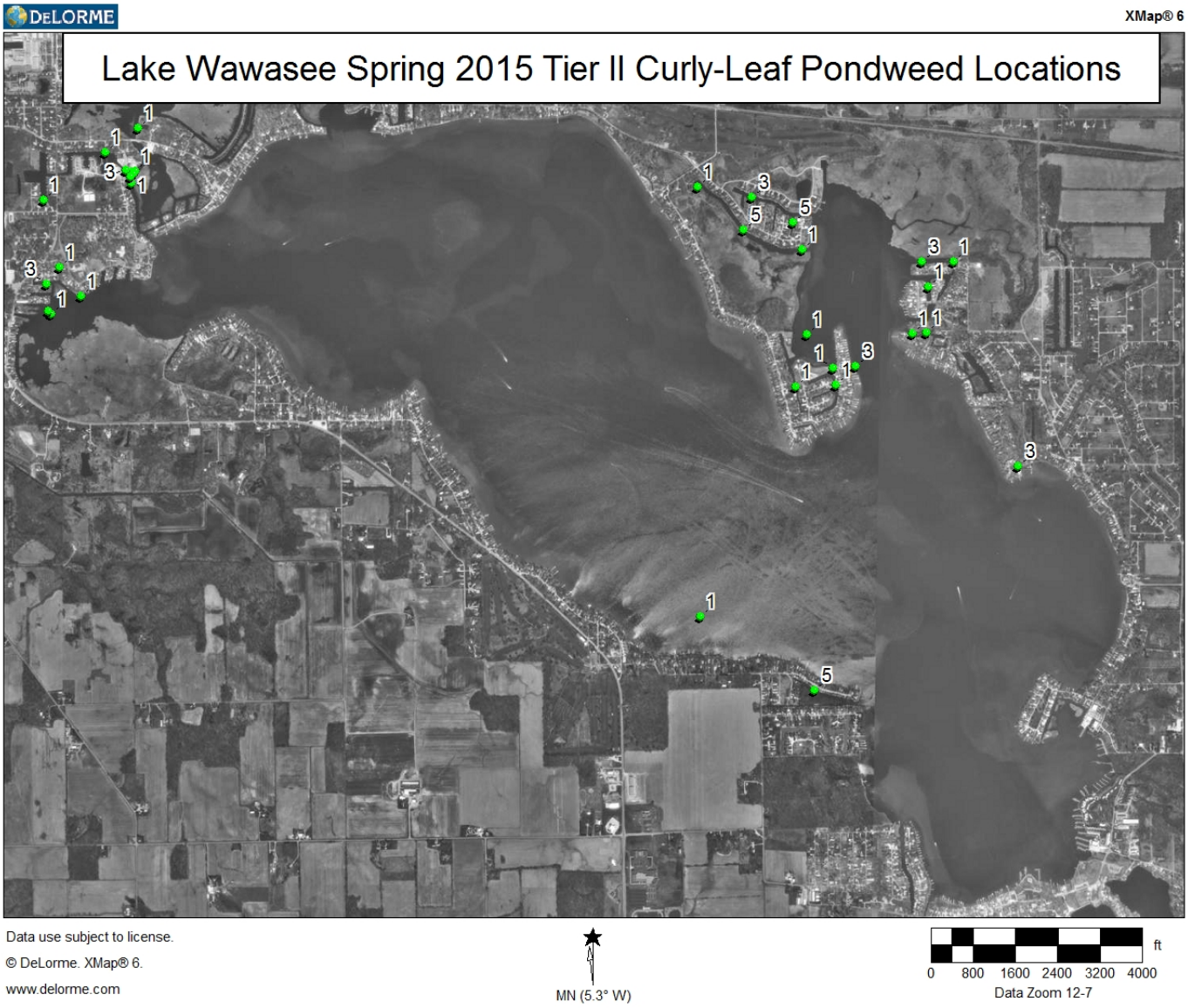
In Syracuse Lake, CLP does not appear to be problematic. It was not collected in the spring 2015 survey and was collected at only one site in the summer 2015 tier II survey. This site is described in Figure 12.

Figure 12: Syracuse Lake Summer 2015 Curly-Leaf Pondweed Locations



In Lake Wawasee, CLP is somewhat more abundant although it is generally not present in nuisance levels on the main lake. CLP frequency was 5.9 percent in the spring of 2015 and 0.6 percent in the summer of 2015.

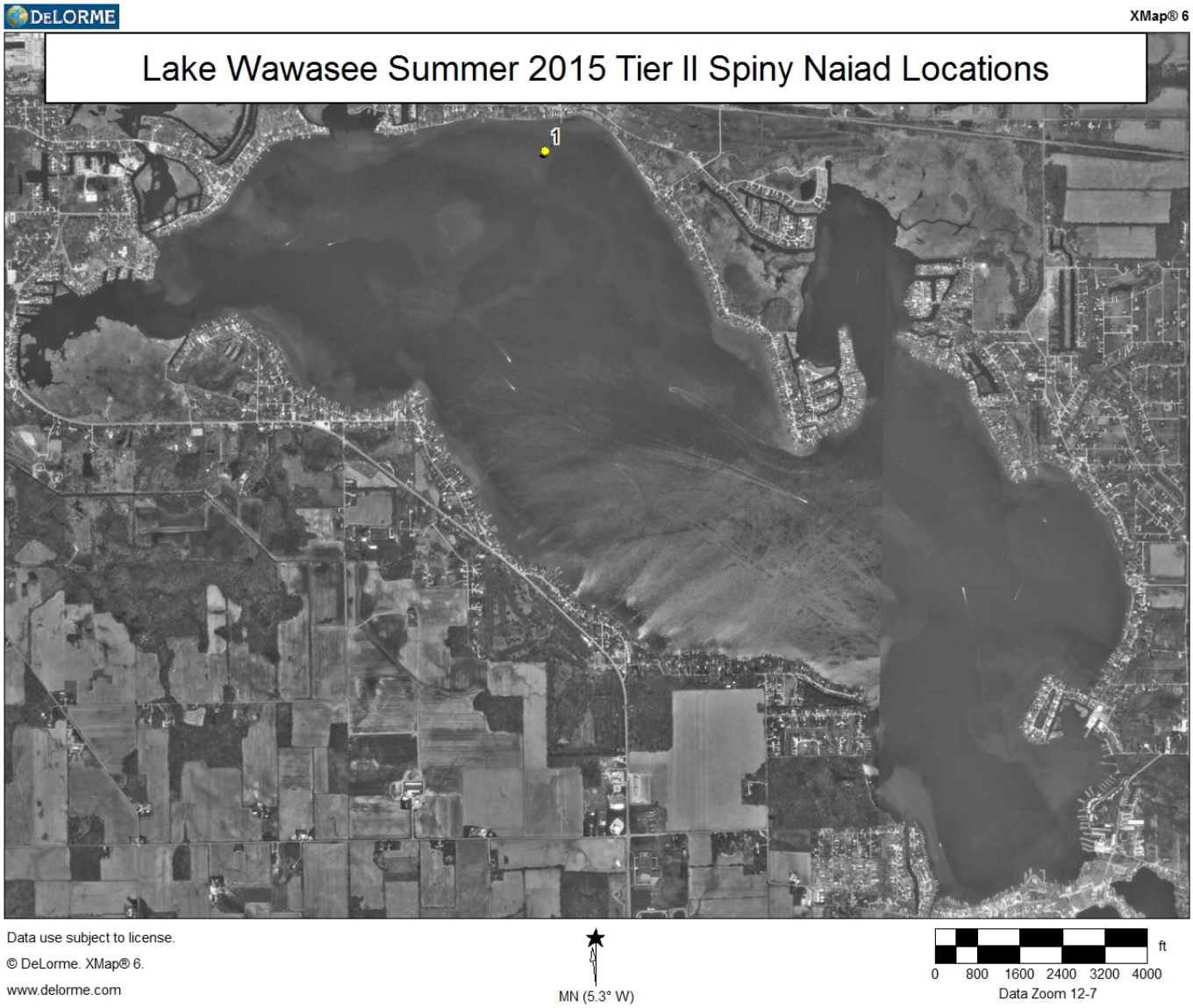
Figure 13: Lake Wawasee Spring 2015 Curly-Leaf Pondweed Locations



Spiny Naiad

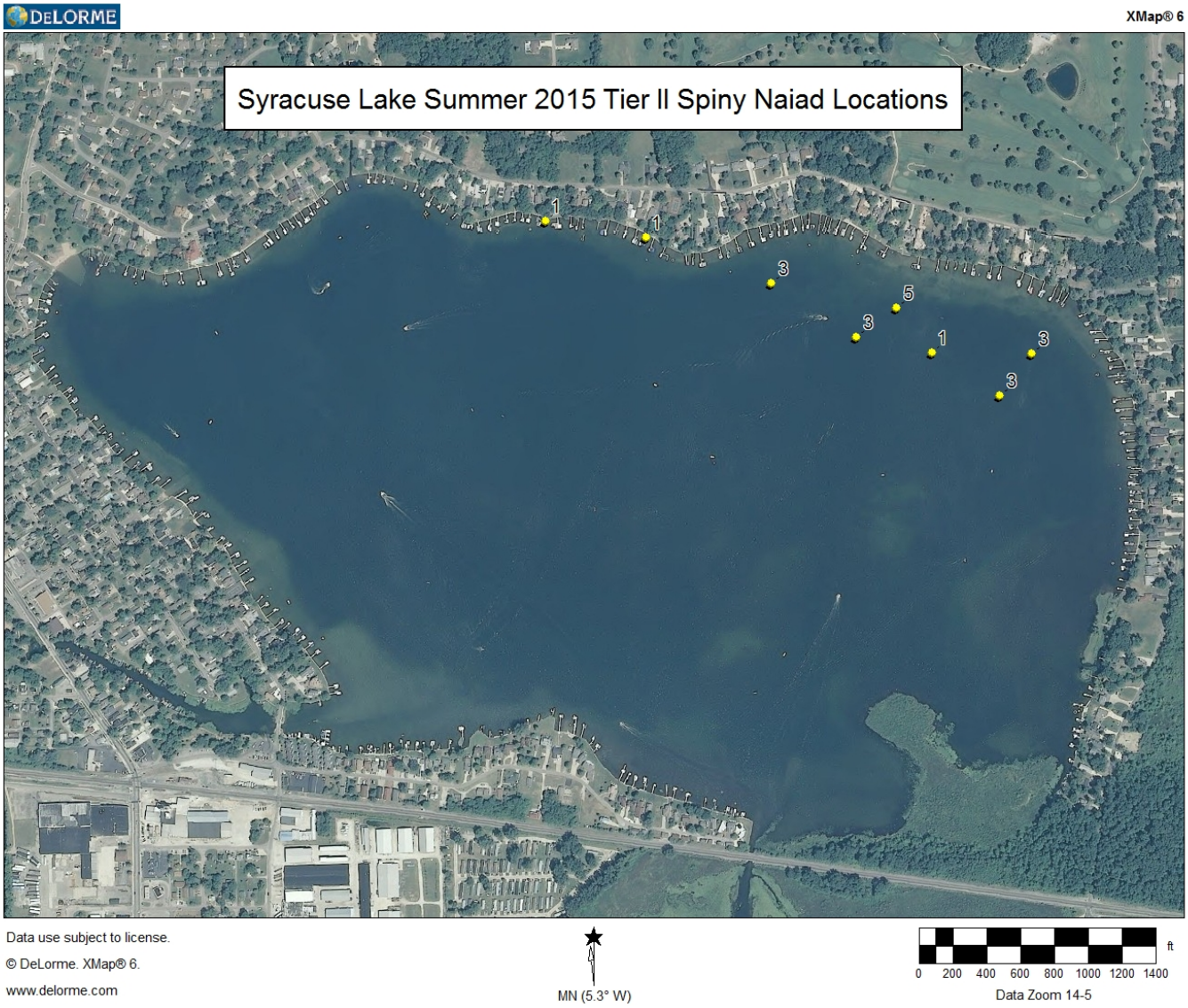
Spiny naiad is another exotic species that is present in these lakes. Spiny naiad is present in low abundance in Lake Wawasee and does not seem to be increasing or causing any problems. Spiny naiad frequency in Lake Wawasee was just 0.6 percent in summer of 2015. This one location is shown in Figure 14.

Figure 14: Lake Wawasee Summer 2015 Spiny Naiad Locations



In Syracuse Lake, spiny naiad frequency was 8.0 percent in summer of 2015 which is down from 13.0 percent in summer of 2014. The sites where it was collected in 2015 are described in Figure 15.

Figure 15: Syracuse Lake Summer 2015 Spiny Naiad Locations



2015 Tier II Data

***All tier II data tables are for "main lake" sites only in Lake Wawasee, including the multi-year data presentation. Channel sites are excluded from this data.

Results from the spring and summer 2015 tier II surveys are included in the following tables. Table 7 and Table 8 describe data collected in the spring and summer tier II surveys conducted on Syracuse Lake. Site frequency, dominance, diversity, and other metrics are shown for the entire survey (overall) and also for each 5 foot depth contour where plants were present.

Table 9 and Table 10 describe spring and summer 2015 tier II data from Lake Wawasee. Site frequency, dominance, diversity, and other metrics are shown for the entire survey (overall) and also for each 5 foot depth contour where plants were present.

Table 11 and Table 12 are summaries of tier II data collected on these lakes since the beginning of their involvement in the LARE program. Sampling methods changed in 2006 and again in 2010 and should be taken into account when evaluating this data. Every species collected in every survey on these lakes is included in these tables.

Table 7: Syracuse Lake Spring 2015 Tier II Data Analysis

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	16'	Mean species/site:	1.61
Date:	6/5/2015	Sites with plants:	87	SE Mean species/site:	0.11
Littoral Depth (ft):	20.0	Sites with native plants:	78	Mean native species/site:	1.34
Littoral Sites:	100	Number of species:	14	SE Mean natives/site:	0.10
Total Sites:	100	Number of native species:	12	Species diversity:	0.83
		Maximum species/site:	6	Native species diversity:	0.78

All Depths	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	55.0	45.0	22.0	27.0	6.0	26.6
Illinois pondweed	19.0	81.0	17.0	2.0	0.0	4.6
Bladderwort	16.0	84.0	4.0	12.0	0.0	8.0
Sago pondweed	14.0	86.0	7.0	6.0	1.0	6.0
Starry stonewort	14.0	86.0	4.0	7.0	3.0	8.0
Eurasian watermilfoil	13.0	87.0	10.0	3.0	0.0	3.8
Nitella	10.0	90.0	2.0	6.0	2.0	6.0
Eelgrass	6.0	94.0	3.0	3.0	0.0	2.4
Coontail	4.0	96.0	1.0	3.0	0.0	2.0
Flat-stemmed pondweed	3.0	97.0	2.0	1.0	0.0	1.0
Richardson's pondweed	3.0	97.0	0.0	3.0	0.0	1.8
Naiad sp.	2.0	98.0	1.0	1.0	0.0	0.8
Large-leaved pondweed	1.0	99.0	1.0	0.0	0.0	0.2
Whorled watermilfoil	1.0	99.0	1.0	0.0	0.0	0.2
Filamentous Algae	2.0					

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	16'	Mean species/site:	1.68
Date:	6/5/2015	Sites with plants:	38	SE Mean species/site:	0.18
Littoral Depth (ft):	20.0	Sites with native plants:	38	Mean native species/site:	1.50
Littoral Sites:	44	Number of species:	11	SE Mean natives/site:	0.15
Total Sites:	44	Number of native species:	9	Species diversity:	0.74
		Maximum species/site:	6	Native species diversity:	0.68

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	77.3	22.7	29.5	34.1	13.6	40.0
Bladderwort	27.3	72.7	6.8	20.5	0.0	13.6
Illinois pondweed	20.5	79.5	18.2	2.3	0.0	5.0
Eurasian watermilfoil	11.4	88.6	9.1	2.3	0.0	3.2
Sago pondweed	9.1	90.9	4.5	2.3	2.3	4.5
Eelgrass	6.8	93.2	4.5	2.3	0.0	2.3
Starry stonewort	6.8	93.2	2.3	2.3	2.3	4.1
Coontail	2.3	97.7	2.3	0.0	0.0	0.5
Flat-stemmed pondweed	2.3	97.7	2.3	0.0	0.0	0.5
Large-leaved pondweed	2.3	97.7	2.3	0.0	0.0	0.5
Whorled watermilfoil	2.3	97.7	2.3	0.0	0.0	0.5
Filamentous Algae	2.3					

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	16'	Mean species/site:	1.96
Date:	6/5/2015	Sites with plants:	23	SE Mean species/site:	0.19
Littoral Depth (ft):	20.0	Sites with native plants:	22	Mean native species/site:	1.72
Littoral Sites:	25	Number of species:	12	SE Mean natives/site:	0.19
Total Sites:	25	Number of native species:	10	Species diversity:	0.83
		Maximum species/site:	4	Native species diversity:	0.79

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	56.0	44.0	20.0	36.0	0.0	25.6
Illinois pondweed	40.0	60.0	36.0	4.0	0.0	9.6
Sago pondweed	32.0	68.0	16.0	16.0	0.0	12.8
Eurasian watermilfoil	20.0	80.0	12.0	8.0	0.0	7.2
Bladderwort	12.0	88.0	4.0	8.0	0.0	5.6
Eelgrass	8.0	92.0	4.0	4.0	0.0	3.2
Flat-stemmed pondweed	8.0	92.0	4.0	4.0	0.0	3.2
Naiad sp.	4.0	96.0	0.0	4.0	0.0	2.4
Coontail	4.0	96.0	0.0	4.0	0.0	2.4
Nitella	4.0	96.0	4.0	0.0	0.0	0.8
Richardson's pondweed	4.0	96.0	0.0	4.0	0.0	2.4
Starry stonewort	4.0	96.0	0.0	4.0	0.0	2.4
Filamentous Algae	4.0					

Table 7 continued

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	16'	Mean species/site:	1.29
Date:	6/5/2015	Sites with plants:	18	SE Mean species/site:	0.18
Littoral Depth (ft):	20.0	Sites with native plants:	11	Mean native species/site:	0.71
Littoral Sites:	21	Number of species:	9	SE Mean natives/site:	0.17
Total Sites:	21	Number of native species:	7	Species diversity:	0.82
		Maximum species/site:	3	Native species diversity:	0.81

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	42.9	57.1	14.3	23.8	4.8	21.9
Chara	23.8	76.2	9.5	14.3	0.0	10.5
Eurasian watermilfoil	14.3	85.7	14.3	0.0	0.0	2.9
Coontail	9.5	90.5	0.0	9.5	0.0	5.7
Nitella	9.5	90.5	0.0	4.8	4.8	7.6
Richardson's pondweed	9.5	90.5	0.0	9.5	0.0	5.7
Sago pondweed	9.5	90.5	4.8	4.8	0.0	3.8
Naiad sp.	4.8	95.2	4.8	0.0	0.0	1.0
Eelgrass	4.8	95.2	0.0	4.8	0.0	2.9

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	16'	Mean species/site:	1.10
Date:	6/5/2015	Sites with plants:	8	SE Mean species/site:	0.28
Littoral Depth (ft):	20.0	Sites with native plants:	7	Mean native species/site:	1.00
Littoral Sites:	10	Number of species:	4	SE Mean natives/site:	0.30
Total Sites:	10	Number of native species:	3	Species diversity:	0.55
		Maximum species/site:	3	Native species diversity:	0.46

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Nitella	70.0	30.0	10.0	50.0	10.0	42.0
Chara	20.0	80.0	20.0	0.0	0.0	4.0
Bladderwort	10.0	90.0	0.0	10.0	0.0	6.0
Starry stonewort	10.0	90.0	0.0	0.0	10.0	10.0

Table 8: Syracuse Lake Summer 2015 Tier II Data Analysis

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	14.9	Mean species/site:	2.14
Date:	7/20/2015	Sites with plants:	92	SE Mean species/site:	0.12
Littoral Depth (ft):	20.0	Sites with native plants:	79	Mean native species/site:	1.65
Littoral Sites:	100	Number of species:	16	SE Mean natives/site:	0.13
Total Sites:	100	Number of native species:	12	Species diversity:	0.88
		Maximum species/site:	5	Native species diversity:	0.83

All Depths	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	50.0	50.0	21.0	24.0	5.0	23.6
Sago pondweed	27.0	73.0	10.0	14.0	3.0	13.4
Eelgrass	23.0	77.0	11.0	12.0	0.0	9.4
Eurasian watermilfoil	22.0	78.0	14.0	4.0	4.0	9.2
Bladderwort	19.0	81.0	10.0	8.0	1.0	7.8
Starry stonewort	18.0	82.0	4.0	4.0	10.0	13.2
Slender naiad	16.0	84.0	10.0	6.0	0.0	5.6
Coontail	8.0	92.0	2.0	6.0	0.0	4.0
Spiny naiad	8.0	92.0	3.0	4.0	1.0	4.0
Illinois pondweed	6.0	94.0	6.0	0.0	0.0	1.2
Nitella	6.0	94.0	3.0	2.0	1.0	2.8
Flat-stemmed pondweed	4.0	96.0	4.0	0.0	0.0	0.8
Richardson's pondweed	3.0	97.0	2.0	1.0	0.0	1.0
Southern naiad	2.0	98.0	2.0	0.0	0.0	0.4
American pondweed	1.0	99.0	1.0	0.0	0.0	0.2
Curly-leaf pondweed	1.0	99.0	0.0	1.0	0.0	0.6
Filamentous Algae	0.0					

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	14.9	Mean species/site:	1.98
Date:	7/20/2015	Sites with plants:	38	SE Mean species/site:	0.18
Littoral Depth (ft):	20.0	Sites with native plants:	38	Mean native species/site:	1.68
Littoral Sites:	44	Number of species:	14	SE Mean natives/site:	0.18
Total Sites:	44	Number of native species:	11	Species diversity:	0.83
		Maximum species/site:	5	Native species diversity:	0.78

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	63.6	36.4	22.7	34.1	6.8	31.8
Bladderwort	29.5	70.5	20.5	6.8	2.3	10.5
Sago pondweed	22.7	77.3	9.1	13.6	0.0	10.0
Eelgrass	20.5	79.5	4.5	15.9	0.0	10.5
Eurasian watermilfoil	20.5	79.5	15.9	2.3	2.3	6.8
Slender naiad	13.6	86.4	6.8	6.8	0.0	5.5
Flat-stemmed 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
Spiny naiad	4.5	95.5	4.5	0.0	0.0	0.9
Starry stonewort	4.5	95.5	4.5	0.0	0.0	0.9
American pondweed	2.3	97.7	2.3	0.0	0.0	0.5
Nitella	2.3	97.7	2.3	0.0	0.0	0.5
Richardson's pondweed	2.3	97.7	2.3	0.0	0.0	0.5
Southern naiad	2.3	97.7	2.3	0.0	0.0	0.5

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	14.9	Mean species/site:	2.92
Date:	7/20/2015	Sites with plants:	25	SE Mean species/site:	0.21
Littoral Depth (ft):	20.0	Sites with native plants:	22	Mean native species/site:	2.32
Littoral Sites:	25	Number of species:	14	SE Mean natives/site:	0.24
Total Sites:	25	Number of native species:	11	Species diversity:	0.88
		Maximum species/site:	4	Native species diversity:	0.85

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	60.0	40.0	24.0	28.0	8.0	29.6
Eelgrass	40.0	60.0	24.0	16.0	0.0	14.4
Sago pondweed	40.0	60.0	16.0	20.0	4.0	19.2
Eurasian watermilfoil	36.0	64.0	16.0	12.0	8.0	18.4
Bladderwort	24.0	76.0	4.0	20.0	0.0	12.8
Slender naiad	20.0	80.0	16.0	4.0	0.0	5.6
Illinois pondweed	16.0	84.0	16.0	0.0	0.0	3.2
Coontail	12.0	88.0	0.0	12.0	0.0	7.2
Spiny naiad	12.0	88.0	0.0	8.0	4.0	8.8
Starry stonewort	12.0	88.0	4.0	0.0	8.0	8.8
Richardson's pondweed	8.0	92.0	4.0	4.0	0.0	3.2
Flat-stemmed pondweed	4.0	96.0	4.0	0.0	0.0	0.8
Nitella	4.0	96.0	0.0	4.0	0.0	2.4
Southern naiad	4.0	96.0	4.0	0.0	0.0	0.8

Table 8 Continued

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	14.9	Mean species/site:	2.05
Date:	7/20/2015	Sites with plants:	20	SE Mean species/site:	0.26
Littoral Depth (ft):	20.0	Sites with native plants:	13	Mean native species/site:	1.24
Littoral Sites:	21	Number of species:	11	SE Mean natives/site:	0.27
Total Sites:	21	Number of native species:	7	Species diversity:	0.88
		Maximum species/site:	5	Native species diversity:	0.82

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	42.9	57.1	4.8	14.3	23.8	33.3
Chara	28.6	71.4	19.0	9.5	0.0	9.5
Sago pondweed	28.6	71.4	4.8	14.3	9.5	19.0
Slender naiad	23.8	76.2	14.3	9.5	0.0	8.6
Eelgrass	19.0	81.0	14.3	4.8	0.0	5.7
Eurasian watermilfoil	19.0	81.0	14.3	0.0	4.8	7.6
Coontail	14.3	85.7	4.8	9.5	0.0	6.7
Spiny naiad	14.3	85.7	4.8	9.5	0.0	6.7
Curly-leaf pondweed	4.8	95.2	0.0	4.8	0.0	2.9
Flat-stemmed pondweed	4.8	95.2	4.8	0.0	0.0	1.0
Nitella	4.8	95.2	4.8	0.0	0.0	1.0

Occurrence and Abundance of Submersed Aquatic Plants in Syracuse Lake

County:	Kosciusko	Secchi (ft):	14.9	Mean species/site:	1.10
Date:	7/20/2015	Sites with plants:	9	SE Mean species/site:	0.18
Littoral Depth (ft):	20.0	Sites with native plants:	6	Mean native species/site:	0.70
Littoral Sites:	10	Number of species:	5	SE Mean natives/site:	0.21
Total Sites:	10	Number of native species:	4	Species diversity:	0.74
		Maximum species/site:	2	Native species diversity:	0.69

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	40.0	60.0	0.0	10.0	30.0	36.0
Nitella	30.0	70.0	10.0	10.0	10.0	18.0
Coontail	20.0	80.0	10.0	10.0	0.0	8.0
Chara	10.0	90.0	10.0	0.0	0.0	2.0
Sago pondweed	10.0	90.0	10.0	0.0	0.0	2.0

Table 9: Lake Wawasee Spring 2015 Tier II Data Analysis

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	1.63
Date:	6/11/2015	Sites with plants:	139	SE Mean species/site:	0.10
Littoral Depth (ft):	21.0	Sites with native plants:	111	Mean native species/site:	1.04
Littoral Sites:	165	Number of species:	16	SE Mean natives/site:	0.08
Total Sites:	169	Number of native species:	13	Species diversity:	0.86
		Maximum species/site:	8	Native species diversity:	0.81

All Depths	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	37.9	62.1	20.1	16.0	1.8	15.4
Starry stonewort	34.3	65.7	14.8	10.1	9.5	18.5
Eurasian watermilfoil	18.3	81.7	11.2	4.7	2.4	7.5
Coontail	13.0	87.0	4.1	7.7	1.2	6.6
Sago pondweed	13.0	87.0	5.9	7.1	0.0	5.4
Illinois pondweed	11.2	88.8	10.1	1.2	0.0	2.7
Bladderwort	7.1	92.9	5.9	1.2	0.0	1.9
Curly-leaf pondweed	5.9	94.1	4.7	1.2	0.0	1.7
Whorled watermilfoil	4.7	95.3	4.7	0.0	0.0	0.9
Eelgrass	4.1	95.9	2.4	1.8	0.0	1.5
Flat-stemmed pondweed	4.1	95.9	4.1	0.0	0.0	0.8
Richardson's pondweed	3.6	96.4	0.0	3.6	0.0	2.1
Canada waterweed	1.8	98.2	1.2	0.6	0.0	0.6
American pondweed	1.2	98.8	1.2	0.0	0.0	0.2
Naiad sp.	1.2	98.8	1.2	0.0	0.0	0.2
Nitella	1.2	98.8	0.0	1.2	0.0	0.7
Filamentous Algae	2.4					

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	2.19
Date:	6/11/2015	Sites with plants:	58	SE Mean species/site:	0.17
Littoral Depth (ft):	21.0	Sites with native plants:	53	Mean native species/site:	1.53
Littoral Sites:	62	Number of species:	15	SE Mean natives/site:	0.14
Total Sites:	62	Number of native species:	12	Species diversity:	0.87
		Maximum species/site:	5	Native species diversity:	0.83

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	53.2	46.8	29.0	21.0	3.2	21.6
Starry stonewort	38.7	61.3	19.4	9.7	9.7	19.4
Eurasian watermilfoil	24.2	75.8	19.4	4.8	0.0	6.8
Illinois pondweed	16.1	83.9	14.5	1.6	0.0	3.9
Coontail	14.5	85.5	1.6	9.7	3.2	9.4
Bladderwort	12.9	87.1	9.7	3.2	0.0	3.9
Eelgrass	11.3	88.7	6.5	4.8	0.0	4.2
Sago pondweed	11.3	88.7	6.5	4.8	0.0	4.2
Flat-stemmed pondweed	9.7	90.3	9.7	0.0	0.0	1.9
Richardson's pondweed	8.1	91.9	0.0	8.1	0.0	4.8
Whorled watermilfoil	8.1	91.9	8.1	0.0	0.0	1.6
American pondweed	3.2	96.8	3.2	0.0	0.0	0.6
Canada waterweed	3.2	96.8	1.6	1.6	0.0	1.3
Curly-leaf pondweed	3.2	96.8	3.2	0.0	0.0	0.6
Naiad sp.	1.6	98.4	1.6	0.0	0.0	0.3
Filamentous Algae	4.8					

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	1.74
Date:	6/11/2015	Sites with plants:	42	SE Mean species/site:	0.26
Littoral Depth (ft):	21.0	Sites with native plants:	31	Mean native species/site:	1.04
Littoral Sites:	47	Number of species:	11	SE Mean natives/site:	0.21
Total Sites:	47	Number of native species:	8	Species diversity:	0.82
		Maximum species/site:	8	Native species diversity:	0.71

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	48.9	51.1	29.8	17.0	2.1	18.3
Starry stonewort	44.7	55.3	21.3	10.6	12.8	23.4
Sago pondweed	21.3	78.7	10.6	10.6	0.0	8.5
Illinois pondweed	17.0	83.0	14.9	2.1	0.0	4.3
Eurasian watermilfoil	14.9	85.1	2.1	8.5	4.3	9.8
Curly-leaf pondweed	10.6	89.4	8.5	2.1	0.0	3.0
Bladderwort	4.3	95.7	4.3	0.0	0.0	0.9
Coontail	4.3	95.7	4.3	0.0	0.0	0.9
Whorled watermilfoil	4.3	95.7	4.3	0.0	0.0	0.9
Canada waterweed	2.1	97.9	2.1	0.0	0.0	0.4
Naiad sp.	2.1	97.9	2.1	0.0	0.0	0.4

Table 9 continued

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	1.36
Date:	6/11/2015	Sites with plants:	24	SE Mean species/site:	0.17
Littoral Depth (ft):	21.0	Sites with native plants:	21	Mean native species/site:	0.86
Littoral Sites:	28	Number of species:	11	SE Mean natives/site:	0.12
Total Sites:	28	Number of native species:	8	Species diversity:	0.84
		Maximum species/site:	4	Native species diversity:	0.77

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Coontail	28.6	71.4	10.7	17.9	0.0	12.9
Eurasian watermilfoil	28.6	71.4	17.9	3.6	7.1	12.9
Chara	25.0	75.0	7.1	17.9	0.0	12.1
Starry stonewort	17.9	82.1	3.6	3.6	10.7	13.6
Sago pondweed	14.3	85.7	3.6	10.7	0.0	7.1
Bladderwort	3.6	96.4	3.6	0.0	0.0	0.7
Curly-leaf pondweed	3.6	96.4	0.0	3.6	0.0	2.1
Flat-stemmed pondweed	3.6	96.4	3.6	0.0	0.0	0.7
Illinois pondweed	3.6	96.4	3.6	0.0	0.0	0.7
Richardson's pondweed	3.6	96.4	0.0	3.6	0.0	2.1
Whorled watermilfoil	3.6	96.4	3.6	0.0	0.0	0.7
Filamentous Algae	3.6					

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	0.82
Date:	6/11/2015	Sites with plants:	14	SE Mean species/site:	0.16
Littoral Depth (ft):	21.0	Sites with native plants:	5	Mean native species/site:	0.32
Littoral Sites:	22	Number of species:	8	SE Mean natives/site:	0.14
Total Sites:	22	Number of native species:	5	Species diversity:	0.75
		Maximum species/site:	2	Native species diversity:	0.78

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	36.4	63.6	9.1	22.7	4.5	20.0
Coontail	9.1	90.9	4.5	4.5	0.0	3.6
Curly-leaf pondweed	9.1	90.9	9.1	0.0	0.0	1.8
Nitella	9.1	90.9	0.0	9.1	0.0	5.5
Bladderwort	4.5	95.5	4.5	0.0	0.0	0.9
Chara	4.5	95.5	0.0	4.5	0.0	2.7
Eurasian watermilfoil	4.5	95.5	4.5	0.0	0.0	0.9
Sago pondweed	4.5	95.5	0.0	4.5	0.0	2.7

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	12'	Mean species/site:	0.10
Date:	6/11/2015	Sites with plants:	1	SE Mean species/site:	0.10
Littoral Depth (ft):	21.0	Sites with native plants:	1	Mean native species/site:	0.10
Littoral Sites:	6	Number of species:	1	SE Mean natives/site:	0.10
Total Sites:	10	Number of native species:	1	Species diversity:	0.00
		Maximum species/site:	1	Native species diversity:	0.00

Depths: 20 to 25 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Coontail	10.0	90.0	0.0	10.0	0.0	6.0

Table 10: Lake Wawasee Summer 2015 Tier II Data Analysis

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	1.64
Date:	8/26/2015	Sites with plants:	134	SE Mean species/site:	0.11
Littoral Depth (ft):	22.0	Sites with native plants:	105	Mean native species/site:	1.15
Littoral Sites:	166	Number of species:	19	SE Mean natives/site:	0.10
Total Sites:	169	Number of native species:	15	Species diversity:	0.87
		Maximum species/site:	6	Native species diversity:	0.85

All Depths	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	36.7	63.3	12.4	8.3	16.0	23.4
Chara	32.5	67.5	18.3	13.6	0.6	12.4
Eel grass	16.0	84.0	8.9	3.6	3.6	7.5
Coontail	14.2	85.8	4.7	7.1	2.4	7.6
Eurasian watermilfoil	11.2	88.8	8.3	1.8	1.2	3.9
Illinois pondweed	11.2	88.8	9.5	1.8	0.0	3.0
Bladderwort	9.5	90.5	5.9	3.6	0.0	3.3
Sago pondweed	8.9	91.1	6.5	1.8	0.6	3.0
Slender naiad	8.9	91.1	8.3	0.6	0.0	2.0
Richardson's pondweed	3.0	97.0	2.4	0.6	0.0	0.8
Whorled watermilfoil	3.0	97.0	2.4	0.6	0.0	0.8
American pondweed	1.8	98.2	0.6	1.2	0.0	0.8
Southern naiad	1.8	98.2	1.2	0.6	0.0	0.6
Canada waterweed	1.2	98.8	0.6	0.6	0.0	0.5
Nitella	1.2	98.8	1.2	0.0	0.0	0.2
Small pondweed	1.2	98.8	0.0	1.2	0.0	0.7
Curly-leaf pondweed	0.6	99.4	0.6	0.0	0.0	0.1
Flat-stemmed pondweed	0.6	99.4	0.6	0.0	0.0	0.1
Spiny naiad	0.6	99.4	0.6	0.0	0.0	0.1
Filamentous Algae	1.2					

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	2.11
Date:	8/26/2015	Sites with plants:	53	SE Mean species/site:	0.20
Littoral Depth (ft):	22.0	Sites with native plants:	49	Mean native species/site:	1.65
Littoral Sites:	62	Number of species:	16	SE Mean natives/site:	0.18
Total Sites:	62	Number of native species:	13	Species diversity:	0.88
		Maximum species/site:	5	Native species diversity:	0.86

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	41.9	58.1	19.4	21.0	1.6	18.1
Starry stonewort	33.9	66.1	17.7	11.3	4.8	15.2
Eel grass	29.0	71.0	12.9	8.1	8.1	15.5
Illinois pondweed	22.6	77.4	19.4	3.2	0.0	5.8
Bladderwort	16.1	83.9	8.1	8.1	0.0	6.5
Slender naiad	16.1	83.9	16.1	0.0	0.0	3.2
Eurasian watermilfoil	11.3	88.7	11.3	0.0	0.0	2.3
Sago pondweed	11.3	88.7	8.1	3.2	0.0	3.5
Coontail	9.7	90.3	4.8	1.6	3.2	5.2
Whorled watermilfoil	6.5	93.5	4.8	1.6	0.0	1.9
Canada waterweed	3.2	96.8	1.6	1.6	0.0	1.3
Richardson's pondweed	3.2	96.8	3.2	0.0	0.0	0.6
American pondweed	1.6	98.4	0.0	1.6	0.0	1.0
Curly-leaf pondweed	1.6	98.4	1.6	0.0	0.0	0.3
Flat-stemmed pondweed	1.6	98.4	1.6	0.0	0.0	0.3
Southern naiad	1.6	98.4	0.0	1.6	0.0	1.0
Filamentous Algae	3.2					

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	1.62
Date:	8/26/2015	Sites with plants:	39	SE Mean species/site:	0.25
Littoral Depth (ft):	22.0	Sites with native plants:	31	Mean native species/site:	1.11
Littoral Sites:	47	Number of species:	14	SE Mean natives/site:	0.16
Total Sites:	47	Number of native species:	11	Species diversity:	0.84
		Maximum species/site:	6	Native species diversity:	0.80

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	42.6	57.4	27.7	14.9	0.0	14.5
Starry stonewort	40.4	59.6	17.0	6.4	17.0	24.3
Bladderwort	10.6	89.4	8.5	2.1	0.0	3.0
Coontail	10.6	89.4	4.3	4.3	2.1	5.5
Eel grass	10.6	89.4	8.5	2.1	0.0	3.0
Illinois pondweed	10.6	89.4	8.5	2.1	0.0	3.0
Sago pondweed	10.6	89.4	10.6	0.0	0.0	2.1
Eurasian watermilfoil	8.5	91.5	4.3	4.3	0.0	3.4
American pondweed	4.3	95.7	2.1	2.1	0.0	1.7
Slender naiad	4.3	95.7	2.1	2.1	0.0	1.7
Richardson's pondweed	2.1	97.9	2.1	0.0	0.0	0.4
Southern naiad	2.1	97.9	2.1	0.0	0.0	0.4
Spiny naiad	2.1	97.9	2.1	0.0	0.0	0.4
Whorled watermilfoil	2.1	97.9	2.1	0.0	0.0	0.4

Table 10 Continued

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	1.75
Date:	8/26/2015	Sites with plants:	25	SE Mean species/site:	0.26
Littoral Depth (ft):	22.0	Sites with native plants:	17	Mean native species/site:	1.11
Littoral Sites:	28	Number of species:	11	SE Mean natives/site:	0.21
Total Sites:	28	Number of native species:	9	Species diversity:	0.86
		Maximum species/site:	5	Native species diversity:	0.83

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	39.3	60.7	3.6	7.1	28.6	33.6
Chara	32.1	67.9	21.4	10.7	0.0	10.7
Eurasian watermilfoil	25.0	75.0	17.9	3.6	3.6	9.3
Coontail	21.4	78.6	7.1	10.7	3.6	11.4
Eel grass	14.3	85.7	10.7	0.0	3.6	5.7
Sago pondweed	10.7	89.3	3.6	3.6	3.6	6.4
Slender naiad	10.7	89.3	10.7	0.0	0.0	2.1
Richardson's pondweed	7.1	92.9	3.6	3.6	0.0	2.9
Small pondweed	7.1	92.9	0.0	7.1	0.0	4.3
Nitella	3.6	96.4	3.6	0.0	0.0	0.7
Southern naiad	3.6	96.4	3.6	0.0	0.0	0.7

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	0.82
Date:	8/26/2015	Sites with plants:	14	SE Mean species/site:	0.16
Littoral Depth (ft):	22.0	Sites with native plants:	6	Mean native species/site:	0.32
Littoral Sites:	22	Number of species:	5	SE Mean natives/site:	0.12
Total Sites:	22	Number of native species:	3	Species diversity:	0.60
		Maximum species/site:	2	Native species diversity:	0.45

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Starry stonewort	45.5	54.5	4.5	4.5	36.4	40.0
Coontail	22.7	77.3	4.5	18.2	0.0	11.8
Bladderwort	4.5	95.5	4.5	0.0	0.0	0.9
Eurasian watermilfoil	4.5	95.5	0.0	0.0	4.5	4.5
Nitella	4.5	95.5	4.5	0.0	0.0	0.9

Occurrence and Abundance of Submersed Aquatic Plants in Lake Wawasee

County:	Kosciusko	Secchi (ft):	9	Mean species/site:	0.40
Date:	8/26/2015	Sites with plants:	4	SE Mean species/site:	0.16
Littoral Depth (ft):	22.0	Sites with native plants:	3	Mean native species/site:	0.30
Littoral Sites:	7	Number of species:	3	SE Mean natives/site:	0.15
Total Sites:	10	Number of native species:	2	Species diversity:	0.63
		Maximum species/site:	1	Native species diversity:	0.44

Depths: 20 to 25 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Coontail	20.0	80.0	0.0	20.0	0.0	12.0
Starry stonewort	10.0	90.0	0.0	10.0	0.0	6.0

Table 11: Lake Wawasee Multi-Year Tier II Data Presentation

Lake Wawasee Multi-year Data Presentation														
Date:	5/26/2005	8/10/2005	7/26/2006	8/12/2009	6/22/2011	9/8/2011	5/30/2012	8/22/2012	6/7/2013	8/16/2013	6/5/2014	8/26/2014	6/11/2015	8/26/2015
Total Sites:	360	360	100.0	100	169	169	169	169	169	169	169	169	169	169
Secchi (ft):	10.0	10.0	8.0	8.5	8.0	7.8	15.5	11.2	17.0	16	9.5	10.7	12.0	9.0
Number of Species:	16	20	18	16	19	18	18	17	16	17	17	17	16	19
Number of Native Species:	14	18	16	14	16	16	15	14	13	15	14	14	13	15
Sites with plants	323	323	90	78	136	129	142	142	138	143	140	125	139	135
Sites with Native Plants	322	320	88	71	116	113	113	116	102	121	110	106	111	106
Maximum Plant Depth (ft)	22	23	19	24	23	22	23	23	23	23	23	23	21	22
Species Diversity:	0.81	0.88	1.00	0.85	0.90	0.90	0.89	0.90	0.87	0.87	0.87	0.87	0.86	0.87
Native Species Diversity:	0.75	0.86	0.99	0.83	0.88	0.88	0.88	0.87	0.83	0.84	0.82	0.82	0.81	0.85
Mean Native Species/Site:	1.33	1.93	2	1.15	1.18	1.33	0.89	1.36	0.85	1.19	0.96	1.03	1.04	1.15
Surveying organization	AWC	AWC	V3	V3	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC
Species Frequency of Occurrence - All Depths														
Eurasian watermilfoil	12.8	11.1	28.0	33.0	29.6	23.7	33.7	23.7	26.6	11.2	21.9	14.2	18.3	11.2
Coontail	10.6	15.3	31.0	18.0	23.1	21.3	16.0	17.8	15.4	17.2	16.6	8.9	13.0	14.2
Chara	59.7	55.3	49.0	39.0	23.1	24.3	18.3	29.6	26.0	34.9	32.0	34.9	37.9	32.5
Starry stonewort	0.0	0.0	0.0	0.0	17.8	14.2	17.2	23.1	23.7	27.2	27.2	18.9	34.3	36.7
Eel grass	2.5	14.7	12.0	14.0	13.6	16.0	4.1	19.5	3.6	16.0	2.4	14.2	4.1	16.0
Illinois pondweed	0.0	2.2	7.0	3.0	11.2	17.8	11.8	17.8	12.4	18.9	10.7	13.6	11.2	11.2
Curly-leaf pondweed	10.3	0.6	2.0	1.0	8.9	0.0	10.7	0.6	4.7	0.0	5.3	0.0	5.9	0.6
Bladderwort	4.7	18.3	9.0	4.0	7.7	7.7	5.3	4.7	1.8	2.4	5.3	5.3	7.1	9.5
Sago pondweed	1.9	9.7	8.0	6.0	6.5	16.0	8.9	15.4	8.3	8.9	11.8	10.1	13.0	8.9
Flat-stemmed pondweed	5.0	2.5	4.0	0.0	6.5	0.0	0.6	0.0	1.8	1.2	1.2	1.2	4.1	0.6
Richardson's pondweed	10.3	4.7	2.0	7.0	5.9	7.1	3.0	4.1	3.6	4.7	3.6	1.2	3.6	3.0
Whorled watermilfoil	3.9	7.2	4.0	4.0	5.3	1.8	8.9	5.3	3.0	5.3	1.8	0.6	4.7	3.0
Small pondweed	0.0	0.0	2.0	1.0	4.1	1.2	3.6	1.8	0.0	1.2	0.6	1.2	0.0	1.2
Nitella	1.7	0.3	8.0	5.0	4.1	1.2	2.4	1.8	4.1	0.6	4.1	0.6	0.6	1.2
Saggitaria sp.	0.0	2.5	0.0	0.0	3.0	1.8	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
American pondweed	0.0	0.0	0.0	1.0	2.4	0.6	1.2	1.2	1.8	0.6	1.8	0.0	1.8	1.8
Canada waterweed	0.8	0.6	2.0	0.0	0.6	0.0	2.4	1.2	1.2	1.2	0.6	1.2	1.8	1.2
Large-leaved pondweed	2.2	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Slender naiad	3.3	18.9	10.0	7.0	0.6	11.8	2.4	15.4	1.8	5.3	3.6	9.5	1.2	8.9
Southern naiad	0.0	2.5	2.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Spiny naiad	0.0	0.8	0.0	1.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.6
Variable pondweed	0.0	18.6	9.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
Northern watermilfoil	22.2	0.0	37.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horned pondweed	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White-stemmed pondweed	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Species Frequency of Occurrence - 0 to 5 ft														
Eel grass	NA	NA	NA	6.9	30.6	27.0	9.7	37.1	9.7	24.2	4.8	24.2	11.3	29.0
Coontail	NA	NA	NA	3.4	25.8	20.6	19.4	16.1	12.9	12.9	17.7	4.8	14.5	9.7
Eurasian watermilfoil	NA	NA	NA	3.4	24.2	20.6	21.0	21.0	24.2	9.7	22.6	14.5	24.2	11.3
Chara	NA	NA	NA	62.1	22.6	22.2	17.7	32.3	27.4	41.9	37.1	37.1	53.2	41.9
Starry stonewort	NA	NA	NA	0.0	19.4	17.5	21.0	19.4	29.0	32.3	30.6	14.5	38.7	33.9
Illinois pondweed	NA	NA	NA	10.3	16.1	19.0	16.1	25.8	14.5	27.4	17.7	22.6	16.1	22.6
Bladderwort	NA	NA	NA	0.0	12.9	7.9	8.1	11.3	1.6	1.6	8.1	4.8	12.9	16.1
Flat-stemmed pondweed	NA	NA	NA	0.0	11.3	1.6	0.0	0.0	1.6	3.2	3.2	3.2	9.7	1.6
Sago pondweed	NA	NA	NA	0.0	9.7	15.9	8.1	17.7	9.7	9.7	11.3	3.2	11.3	11.3
Small pondweed	NA	NA	NA	3.4	9.7	0.0	1.6	0.0	0.0	1.6	0.0	1.6	0.0	0.0
Whorled watermilfoil	NA	NA	NA	0.0	9.7	3.2	11.3	4.8	4.8	8.1	3.2	1.6	8.1	6.5
Richardson's pondweed	NA	NA	NA	10.3	8.1	9.5	4.8	6.5	6.5	6.5	3.2	0.0	8.1	3.2
Saggitaria sp.	NA	NA	NA	0.0	6.5	4.8	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
American pondweed	NA	NA	NA	3.4	4.8	1.6	3.2	1.6	4.8	1.6	3.2	0.0	3.2	1.6
Curly-leaf pondweed	NA	NA	NA	0.0	4.8	0.0	8.1	0.0	4.8	0.0	3.2	0.0	3.2	1.6
Canada waterweed	NA	NA	NA	0.0	1.6	0.0	4.8	3.2	3.2	0.0	1.6	3.2	3.2	3.2
Large-leaved pondweed	NA	NA	NA	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slender naiad	NA	NA	NA	10.3	0.0	19.0	4.8	21.0	3.2	8.1	6.5	21.0	1.6	16.1
Southern naiad	NA	NA	NA	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
Water stargrass	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0
Spiny naiad	NA	NA	NA	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitella	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0
Species Frequency of Occurrence - 5 to 10 ft														
Chara	NA	NA	NA	59.1	35.6	37.8	25.5	31.1	36.2	44.7	48.9	46.8	48.9	42.6
Eurasian watermilfoil	NA	NA	NA	27.3	33.3	20.0	44.7	26.7	27.7	12.8	17.0	17.0	14.9	8.5
Starry stonewort	NA	NA	NA	0.0	26.7	11.1	21.3	35.6	29.8	27.7	31.9	19.1	44.7	40.4
Illinois pondweed	NA	NA	NA	0.0	13.3	22.2	17.0	24.4	21.3	21.3	10.6	14.9	17.0	10.6
Bladderwort	NA	NA	NA	18.2	8.9	13.3	6.4	2.2	2.1	4.3	4.3	6.4	4.3	10.6
Curly-leaf pondweed	NA	NA	NA	0.0	8.9	0.0	12.8	0.0	6.4	0.0	8.5	0.0	10.6	0.0
Eel grass	NA	NA	NA	31.8	8.9	13.3	2.1	13.3	0.0	14.9	2.1	10.6	0.0	10.6
Coontail	NA	NA	NA	0.0	6.7	11.1	4.3	15.6	8.5	6.4	6.4	8.5	4.3	10.6
Richardson's pondweed	NA	NA	NA	18.2	6.7	4.4	2.1	6.7	4.3	2.1	2.1	2.1	0.0	2.1
Sago pondweed	NA	NA	NA	13.6	6.7	11.1	17.0	20.0	8.5	10.6	14.9	14.9	21.3	10.6
Flat-stemmed pondweed	NA	NA	NA	0.0	6.7	0.0	2.1	0.0	2.1	0.0	0.0	0.0	0.0	0.0
Nitella	NA	NA	NA	0.0	4.4	0.0	0.0	0.0	4.3	0.0	2.1	0.0	0.0	0.0
American pondweed	NA	NA	NA	0.0	2.2	0.0	0.0	2.2	0.0	0.0	2.1	0.0	0.0	4.3
Saggitaria sp.	NA	NA	NA	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	NA	NA	NA	9.1	2.2	2.2	12.8	8.9	2.1	8.5	0.0	0.0	4.3	2.1
Slender naiad	NA	NA	NA	0.0	0.0	13.3	2.1	20.0	2.1	8.5	0.0	0.0	2.1	4.3
Small pondweed	NA	NA	NA	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	NA	NA	NA	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada waterweed	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	2.1	0.0
Large-leaved pondweed	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
White-stemmed pondweed	NA	NA	NA	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Spiny naiad	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1

Table 11 Continued

Species Frequency of Occurrence - 10 to 15 ft													
Eurasian watermilfoil	NA	NA	NA	60.0	50.0	40.7	57.1	35.7	42.9	14.3	42.9	14.3	28.6	25.0
Coontail	NA	NA	NA	24.0	35.7	22.2	32.1	25.0	17.9	14.3	21.4	3.6	28.6	21.4
Chara	NA	NA	NA	28.0	25.0	29.6	25.0	53.6	35.7	35.7	21.4	50.0	25.0	32.1
Curly-leaf pondweed	NA	NA	NA	0.0	21.4	0.0	21.4	0.0	3.6	0.0	7.1	0.0	3.6	0.0
Starry stonewort	NA	NA	NA	0.0	7.1	7.4	3.6	10.7	7.1	21.4	21.4	17.9	17.9	39.3
Whorled watermilfoil	NA	NA	NA	4.0	7.1	0.0	7.1	0.0	3.6	0.0	3.6	0.0	3.6	0.0
Richardson's pondweed	NA	NA	NA	4.0	7.1	7.4	3.6	0.0	0.0	7.1	10.7	3.6	3.6	7.1
Sago pondweed	NA	NA	NA	12.0	7.1	18.5	7.1	17.9	3.6	10.7	21.4	17.9	14.3	10.7
Small pondweed	NA	NA	NA	0.0	3.6	0.0	14.3	3.6	0.0	0.0	3.6	0.0	0.0	7.1
Bladderwort	NA	NA	NA	0.0	3.6	3.7	3.6	0.0	3.6	3.6	7.1	7.1	3.6	0.0
Flat-stemmed pondweed	NA	NA	NA	0.0	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.6	0.0
Illinois pondweed	NA	NA	NA	0.0	3.6	18.5	7.1	7.1	7.1	17.9	3.6	7.1	3.6	0.0
Slender naiad	NA	NA	NA	12.0	3.6	3.7	0.0	10.7	0.0	0.0	3.6	10.7	0.0	10.7
Eel grass	NA	NA	NA	20.0	0.0	14.8	0.0	10.7	0.0	14.3	0.0	14.3	0.0	14.3
Southern naiad	NA	NA	NA	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6
Nitella	NA	NA	NA	4.0	0.0	0.0	7.1	0.0	3.6	0.0	7.1	0.0	0.0	3.6
White-stemmed pondweed	NA	NA	NA	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spiny naiad	NA	NA	NA	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Species Frequency of Occurrence - 15 to 20 ft													
Coontail	NA	NA	NA	43.8	37.5	33.3	13.6	25.0	31.8	45.5	22.7	31.8	9.1	22.7
Eurasian watermilfoil	NA	NA	NA	50.0	25.0	20.8	31.8	16.7	13.6	9.1	13.6	13.6	4.5	4.5
Starry stonewort	NA	NA	NA	0.0	16.7	20.8	22.7	33.3	22.7	27.3	27.3	31.8	36.4	45.5
Nitella	NA	NA	NA	18.8	12.5	8.3	4.5	8.3	13.6	4.5	9.1	4.5	4.5	4.5
Chara	NA	NA	NA	6.3	8.3	8.3	4.5	4.2	0.0	9.1	9.1	0.0	0.0	0.0
Illinois pondweed	NA	NA	NA	0.0	8.3	12.5	0.0	4.2	0.0	0.0	4.5	0.0	0.0	0.0
Curly-leaf pondweed	NA	NA	NA	6.3	4.2	0.0	0.0	4.2	4.5	0.0	4.5	0.0	9.1	0.0
Sago pondweed	NA	NA	NA	0.0	0.0	29.2	0.0	4.2	13.6	4.5	0.0	0.0	4.5	0.0
Richardson's pondweed	NA	NA	NA	0.0	0.0	8.3	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0
Chara	NA	NA	NA	0.0	0.0	8.3	0.0	4.2	0.0	0.0	0.0	0.0	4.5	0.0
Bladderwort	NA	NA	NA	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	4.5	4.5
Slender naiad	NA	NA	NA	0.0	0.0	4.2	0.0	4.2	0.0	0.0	4.5	0.0	0.0	0.0
Spiny naiad	NA	NA	NA	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
Canada waterweed	NA	NA	NA	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Small pondweed	NA	NA	NA	0.0	0.0	0.0	4.5	4.2	0.0	0.0	0.0	0.0	0.0	0.0
Whorled watermilfoil	NA	NA	NA	6.3	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Eelgrass	NA	NA	NA	0.0	0.0	0.0	0.0	4.2	0.0	4.5	0.0	0.0	0.0	0.0
Species Frequency of Occurrence 20 to 25 ft													
Nitella	NA	NA	NA	12.5	20.0	40.0	10.0	10.0	10.0	0.0	10.0	0.0	0.0	0.0
Coontail	NA	NA	NA	50.0	10.0	0.0	10.0	0.0	20.0	40.0	30.0	0.0	10.0	20.0
Curly-leaf pondweed	NA	NA	NA	0.0	10.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eurasian watermilfoil	NA	NA	NA	37.5	0.0	20.0	0.0	10.0	20.0	10.0	0.0	0.0	0.0	0.0
Starry stonewort	NA	NA	NA	0.0	0.0	10.0	0.0	0.0	10.0	10.0	0.0	20.0	0.0	10.0
Small pondweed	NA	NA	NA	0.0	0.0	0.0	0.0	10.0	0.0	10.0	0.0	10.0	0.0	0.0
Bladderwort	NA	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0

Table 12: Syracuse Lake Multi-Year Tier II Data Presentation

Syracuse Lake Multi-Year Data Presentation														
Date:	8/19/2004	8/5/2005	8/9/2006	8/12/2009	6/29/2011	8/25/2011	6/1/2012	8/16/2012	6/11/2013	8/9/2013	6/4/2014	8/15/2014	6/5/2015	7/20/2015
Total Sites:	80	80	80	80	100	100	100	100	100	100	100	100	100	100
Secchi (ft):	10.0	12.0	9.0	15.3	13.0	9.5	14.0	13.7	16.5	12	9.3	17.5	16.0	14.9
Number of Species:	11	14	16	17	13	17	15	18	16	13	15	16	14	16
Number of Native Species:	10	12	14	15	12	16	12	16	13	10	13	13	12	12
Sites with Plants	NA	75	66	75	96	92	87	96	90	88	89	90	87	92
Sites with Native Plants	NA	73	63	74	92	89	78	92	85	82	82	85	78	79
Maximum Plant Depth (ft)	NA	17	17	20	20	18	20	20	18	20	20	20	20	20
Species Diversity:	0.84	0.84	0.89	0.86	0.86	0.84	0.84	0.87	0.83	0.85	0.86	0.88	0.83	0.88
Native Species Diversity:	0.76	0.82	0.88	0.84	0.83	0.82	0.79	0.85	0.77	0.8	0.83	0.83	0.78	0.83
Mean Native Species/Site:	1.92	2.16	1.83	2.36	1.82	1.58	1.32	2.09	1.36	1.42	1.33	1.38	1.34	1.65
Surveying Organization	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC	AWC
Species Frequency of Occurrence - All Depths														
Chara	77.3	66.3	43.8	66.3	59.0	58.0	53.0	59.0	57.0	51.0	44.0	36.0	55.0	50.0
Eurasian watermilfoil	33.3	12.5	21.3	25.0	31.0	26.0	30.0	46.0	26.0	21.0	11.0	18.0	13.0	22.0
Illinois pondweed	30.7	23.8	18.8	12.5	25.0	15.0	9.0	30.0	21.0	25.0	9.0	10.0	19.0	6.0
Sago pondweed	12.0	17.5	20.0	16.3	14.0	10.0	18.0	27.0	15.0	16.0	22.0	33.0	14.0	27.0
Eel grass	9.3	10.0	15.0	27.5	16.0	21.0	5.0	22.0	5.0	8.0	3.0	13.0	6.0	23.0
Coontail	5.3	22.5	16.3	28.8	18.0	15.0	14.0	17.0	12.0	19.0	13.0	7.0	4.0	8.0
Slender naiad	9.3	3.8	13.8	8.8	4.0	6.0	3.0	17.0	1.0	6.0	3.0	7.0	2.0	16.0
Nitella	0.0	0.0	0.0	10.0	15.0	7.0	12.0	10.0	8.0	5.0	14.0	3.0	10.0	6.0
Bladderwort	0.0	48.8	22.5	17.5	17.0	12.0	7.0	6.0	6.0	6.0	13.0	19.0	16.0	19.0
Spiny naiad	0.0	0.0	5.0	1.3	0.0	2.0	0.0	5.0	0.0	1.0	0.0	13.0	0.0	8.0
American pondweed	14.7	6.3	1.3	1.3	0.0	4.0	2.0	4.0	5.0	4.0	3.0	1.0	0.0	1.0
Richardson's pondweed	0.0	0.0	12.5	2.5	5.0	2.0	2.0	3.0	1.0	0.0	2.0	2.0	3.0	3.0
Whorled watermilfoil	0.0	0.0	3.8	6.3	2.0	1.0	2.0	3.0	2.0	2.0	2.0	1.0	1.0	0.0
Flat-stemmed pondweed	0.0	11.3	1.3	1.3	3.0	1.0	3.0	3.0	1.0	0.0	4.0	2.0	3.0	4.0
Starry stonewort	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.0	3.0	7.0	10.0	4.0	14.0	18.0
Small pondweed	0.0	0.0	6.3	3.8	4.0	1.0	2.0	1.0	2.0	0.0	1.0	4.0	0.0	0.0
Canada waterweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Curly-leaf pondweed	42.7	3.8	1.3	0.0	0.0	0.0	2.0	0.0	3.0	0.0	0.0	0.0	0.0	1.0
Southern naiad	0.0	0.0	0.0	6.3	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Northern watermilfoil	13.3	3.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	9.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Large-leaved pondweed	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Species Frequency of Occurrence - 0 to 5 ft														
Chara	NA	NA	84.0	92.0	84.1	70.5	54.5	61.4	65.9	63.6	63.6	61.4	77.3	63.6
Illinois pondweed	NA	NA	36.0	24.0	38.6	25.0	15.9	43.2	34.1	31.8	9.1	11.4	20.5	4.5
Eurasian watermilfoil	NA	NA	0.0	8.0	18.2	9.1	18.2	38.6	13.6	11.4	4.5	11.4	11.4	20.5
Sago pondweed	NA	NA	12.0	24.0	11.4	11.4	20.5	29.5	11.4	9.1	22.7	27.3	9.1	22.7
Slender naiad	NA	NA	16.0	16.0	6.8	6.8	4.5	22.7	0.0	11.4	2.3	4.5	0.0	13.6
Eel grass	NA	NA	8.0	24.0	18.2	9.1	4.5	22.7	6.8	4.5	4.5	9.1	6.8	20.5
Bladderwort	NA	NA	36.0	12.0	20.5	11.4	13.6	9.1	11.4	9.1	18.2	34.1	27.3	29.5
American pondweed	NA	NA	4.0	4.0	0	9.1	4.5	6.8	6.8	9.1	6.8	2.3	0.0	2.3
Whorled watermilfoil	NA	NA	4.0	12.0	2.3	2.3	4.5	6.8	4.5	4.5	4.5	0.0	2.3	0.0
Flat-stemmed pondweed	NA	NA	0.0	0.0	2.3	0.0	2.3	4.5	0.0	0.0	2.3	2.3	2.3	4.5
Spiny naiad	NA	NA	0.0	0.0	0	0.0	0.0	2.3	0.0	2.3	0.0	2.3	0.0	4.5
Richardson's pondweed	NA	NA	0.0	8.0	2.3	2.3	0.0	2.3	0.0	0.0	2.3	0.0	0.0	2.3
Starry stonewort	NA	NA	0.0	0.0	0	0.0	4.5	2.3	2.3	9.1	9.1	2.3	6.8	4.5
Coontail	NA	NA	4.0	8.0	4.5	6.8	6.8	2.3	6.8	11.4	6.8	2.3	2.3	0.0
Canada waterweed	NA	NA	0.0	0.0	0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Curly-leaf pondweed	NA	NA	0.0	0.0	0	0.0	4.5	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Small pondweed	NA	NA	4.0	0.0	6.8	0.0	2.3	0.0	4.5	0.0	0.0	4.5	0.0	0.0
Southern naiad	NA	NA	0.0	8.0	0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Northern watermilfoil	NA	NA	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitella	NA	NA	0.0	0.0	0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	2.3
Large-leaved pondweed	NA	NA	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0
Species Frequency of Occurrence - 5 to 10 ft														
Chara	NA	NA	52.2	70.8	52.0	80.0	56.0	68.0	64.0	52.0	48.0	28.0	56.0	60.0
Eurasian watermilfoil	NA	NA	26.1	33.3	52.0	36.0	40.0	56.0	40.0	44.0	20.0	20.0	20.0	36.0
Sago pondweed	NA	NA	30.4	16.7	16.0	12.0	20.0	40.0	28.0	32.0	32.0	60.0	32.0	40.0
Eel grass	NA	NA	26.1	41.7	16.0	40.0	8.0	32.0	4.0	16.0	4.0	20.0	8.0	40.0
Illinois pondweed	NA	NA	17.4	16.7	16.0	16.0	8.0	32.0	24.0	24.0	20.0	16.0	40.0	16.0
Coontail	NA	NA	21.7	33.3	20.0	8.0	8.0	20.0	16.0	16.0	16.0	4.0	4.0	12.0
Slender naiad	NA	NA	8.7	4.2	4.0	8.0	4.0	12.0	0.0	0.0	8.0	4.0	4.0	20.0
Richardson's pondweed	NA	NA	13.0	0.0	8.0	0.0	0.0	4.0	0.0	0.0	4.0	4.0	4.0	8.0
Small pondweed	NA	NA	8.7	8.3	4.0	0.0	4.0	4.0	0.0	0.0	0.0	4.0	0.0	0.0
Bladderwort	NA	NA	30.4	12.5	20.0	12.0	4.0	4.0	4.0	4.0	8.0	16.0	12.0	24.0
Spiny naiad	NA	NA	13.0	4.2	0.0	0.0	0.0	4.0	0.0	0.0	0.0	24.0	0.0	12.0
Flat-stemmed pondweed	NA	NA	4.3	4.2	8.0	4.0	4.0	4.0	0.0	0.0	8.0	4.0	8.0	4.0
Nitella	NA	NA	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	8.0	0.0	4.0	4.0
Southern naiad	NA	NA	0.0	12.5	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
Whorled watermilfoil	NA	NA	4.3	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0
Curly-leaf pondweed	NA	NA	4.3	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Starry stonewort	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	4.0	0.0	4.0	12.0

Table 12 Continued

Species Frequency of Occurrence - 10 to 15 ft														
Eurasian watermilfoil	NA	NA	45.5	47.6	47.6	57.1	52.4	71.4	38.1	23.8	14.3	33.3	14.3	19.0
Chara	NA	NA	9.1	52.4	38.1	33.3	66.7	66.7	47.6	42.9	19.0	4.8	23.8	28.6
Coontail	NA	NA	27.3	42.9	38.1	38.1	19.0	42.9	19.0	47.6	28.6	14.3	9.5	14.3
Eel grass	NA	NA	18.2	28.6	14.3	28.6	4.8	19.0	4.8	9.5	0.0	19.0	4.8	19.0
Sago pondweed	NA	NA	22.7	14.3	23.8	9.5	14.3	19.0	14.3	19.0	19.0	28.6	9.5	28.6
Spiny naiad	NA	NA	4.5	0.0	0.0	9.5	0.0	14.3	0.0	0.0	0.0	28.6	0.0	14.3
Illinois pondweed	NA	NA	9.1	0.0	19.0	0.0	0.0	14.3	0.0	23.8	0.0	4.8	0.0	0.0
Slender naiad	NA	NA	22.7	9.5	0.0	4.8	0.0	14.3	0.0	4.8	0.0	14.3	4.8	23.8
Nitella	NA	NA	0.0	9.5	33.3	19.0	19.0	9.5	4.8	4.8	33.3	4.8	9.5	4.8
Bladderwort	NA	NA	9.1	0.0	9.5	19.0	0.0	4.8	0.0	4.8	14.3	0.0	0.0	0.0
Richardson's pondweed	NA	NA	9.1	0.0	9.5	4.8	9.5	4.8	4.8	0.0	0.0	4.8	9.5	0.0
Starry stonewort	NA	NA	0.0	0.0	0.0	0.0	4.8	4.8	4.8	9.5	19.0	9.5	42.9	42.9
American pondweed	NA	NA	0.0	0.0	0.0	0.0	0.0	4.8	9.5	0.0	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	NA	NA	0.0	0.0	0.0	0.0	4.8	0.0	4.8	0.0	4.8	0.0	0.0	4.8
Small pondweed	NA	NA	9.1	4.8	0.0	4.8	0.0	0.0	0.0	0.0	4.8	4.8	0.0	0.0
Curly-leaf pondweed	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	4.8
Whorled watermilfoil	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Species Frequency of Occurrence - 15 to 20 ft														
Nitella	NA	NA	0.0	60.0	80.0	30.0	70.0	80.0	60.0	40.0	50.0	20.0	70.0	30.0
Coontail	NA	NA	10.0	40.0	30.0	20.0	50.0	20.0	10.0	0.0	0.0	20.0	0.0	20.0
Chara	NA	NA	0.0	20.0	10.0	0.0	10.0	10.0	20.0	10.0	0.0	10.0	20.0	10.0
Slender naiad	NA	NA	0.0	0.0	0.0	0.0	0.0	10.0	10.0	0.0	0.0	10.0	0.0	0.0
Sago pondweed	NA	NA	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
Eurasian watermilfoil	NA	NA	10.0	0.0	0.0	10.0	0.0	0.0	20.0	0.0	10.0	10.0	0.0	0.0
Eel grass	NA	NA	10.0	0.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bladderwort	NA	NA	10.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0
Whorled watermilfoil	NA	NA	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Starry stonewort	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	100.0	10.0	40.0

Secchi depth and water quality history

Water clarity was good in the summer of 2015 in both Lake Wawasee and Syracuse Lake. Secchi depth (a measure of water clarity) in Syracuse Lake was 16.0 feet in June and 14.9 feet in July. In Lake Wawasee, Secchi depth was 12.0 feet in June and 9.0 feet in August.

Water quality in both of these lakes has historically been good, and the Syracuse Lake Association and the Wawasee Area Conservancy Foundation have been proactive in improving the watershed of these lakes through establishing protected wetland areas as well as purchasing tracts of land that are important to the ecology of these lakes (V3 Companies, 2010). Data from the past 10 years indicates that water clarity in these lakes has remained stable or has even risen slightly over this time period. Secchi depths for each survey on these lakes can be found in Table 11 and Table 12.

Dissolved oxygen and temperature profiles for 2015 on Lake Wawasee and Syracuse Lake are described in Figure 16 through Figure 19. Adequate dissolved oxygen to support fish life was present down past 20 feet deep in both lakes in summer of 2015. Both lakes showed only very weak thermal stratification in 2015 which is very similar to the summer of 2014.

Figure 16: Syracuse Lake 2015 Dissolved Oxygen Profile

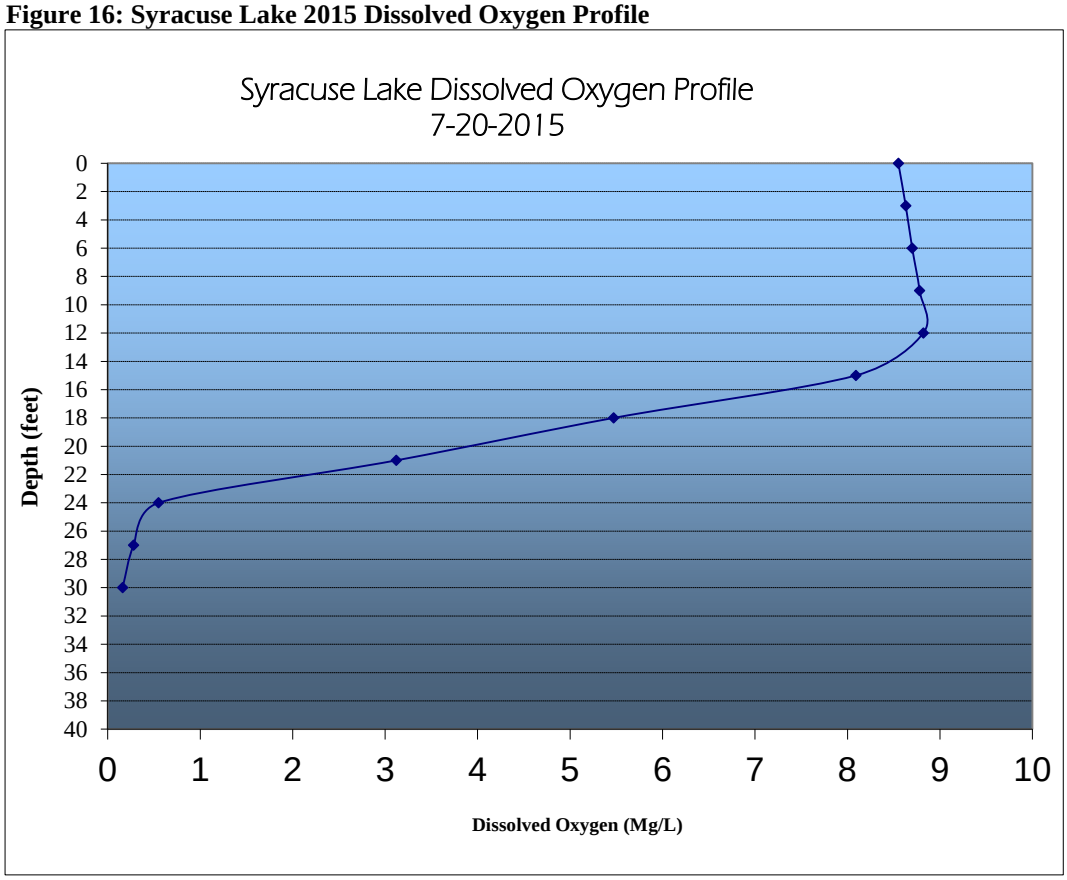


Figure 17: Syracuse Lake 2015 Temperature Profile

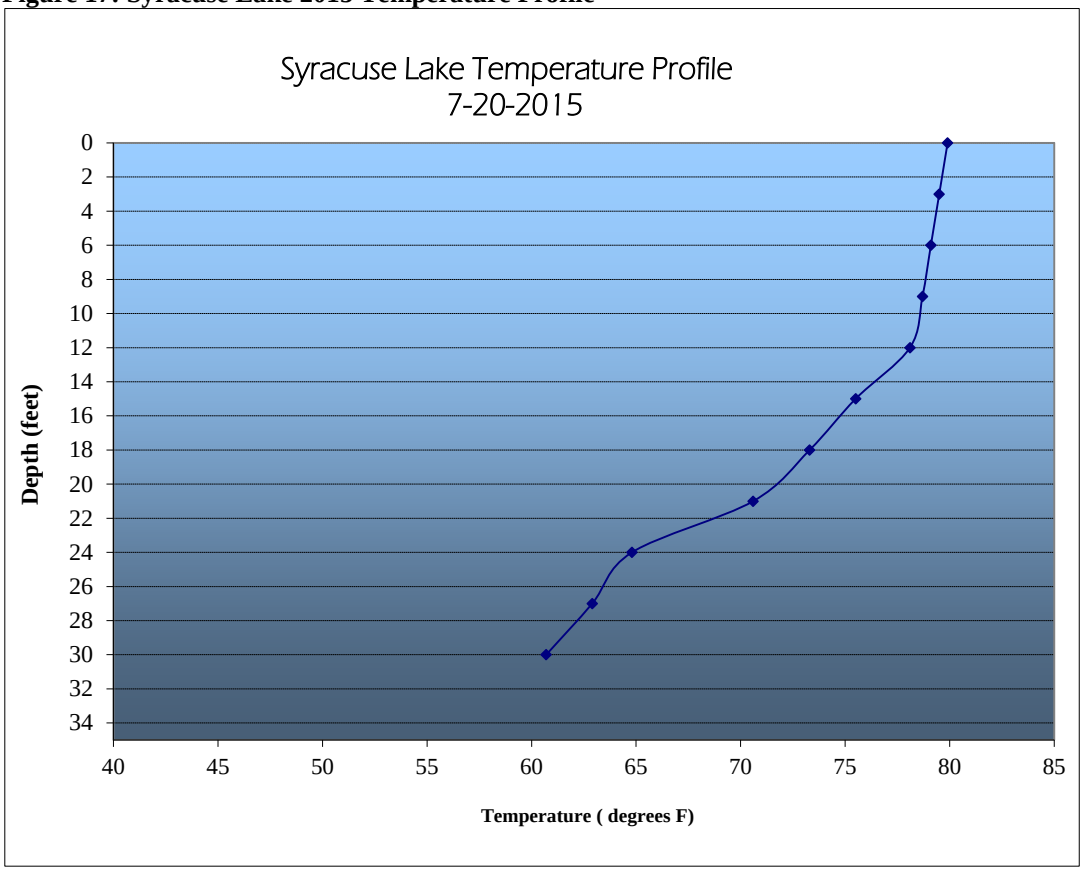


Figure 18: Lake Wawasee 2015 Dissolved Oxygen Profile

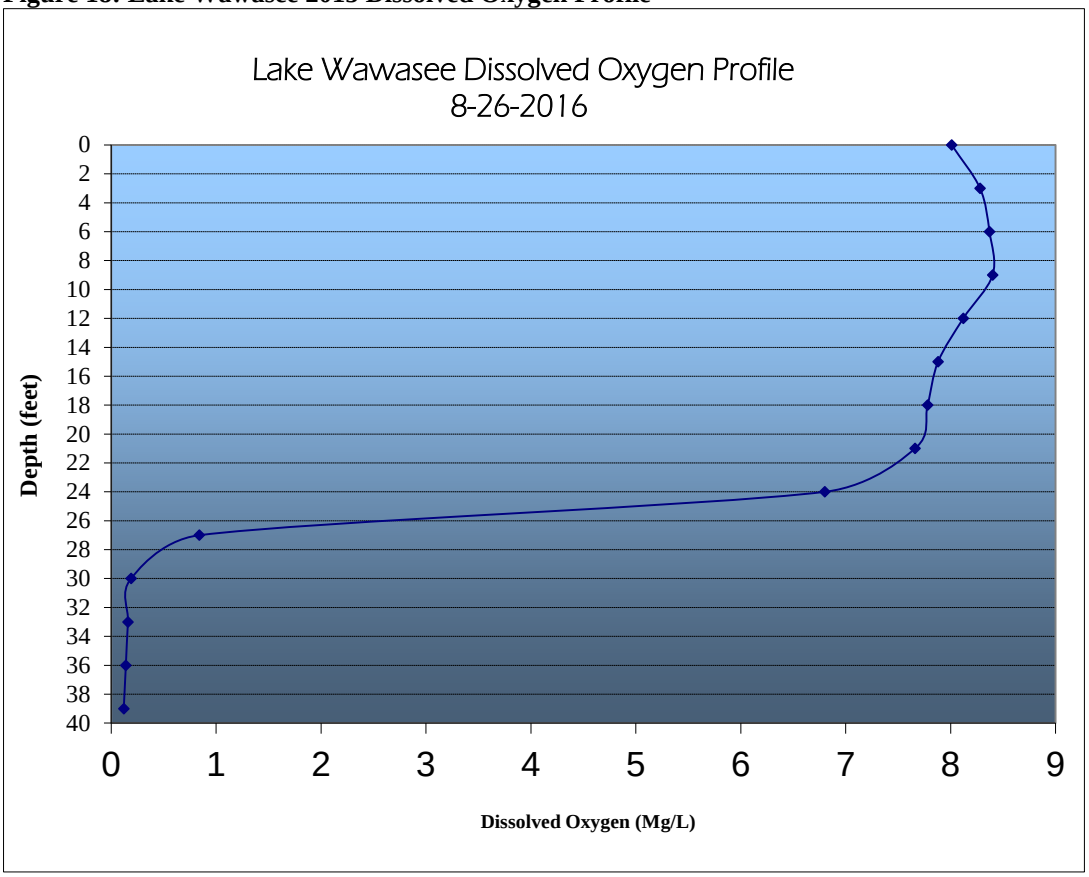
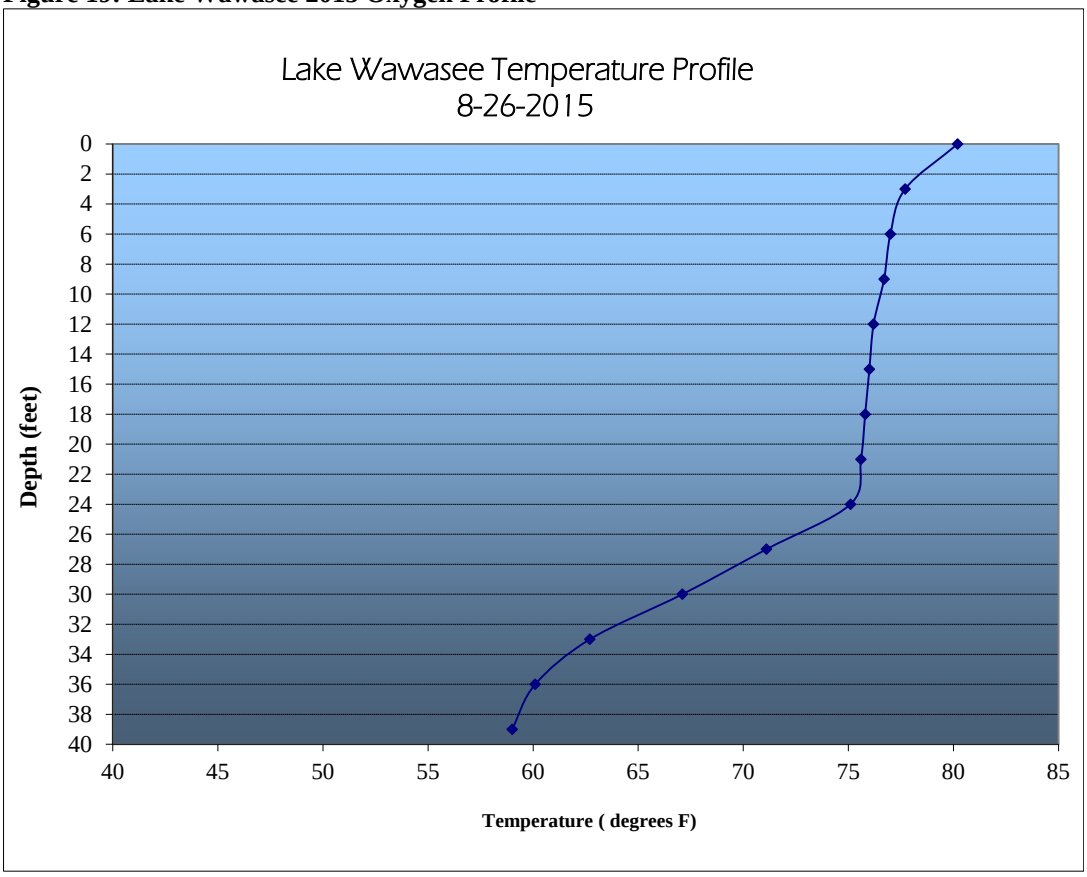


Figure 19: Lake Wawasee 2015 Oxygen Profile



Tier II Discussion

Overall plant diversity and species richness in Lake Wawasee and Syracuse Lakes are greater than those seen in many area lakes. In the summer of 2015 surveys, 12 native plant species were collected in Syracuse Lake and 15 native plant species were collected in Lake Wawasee. Native species richness in Syracuse Lake and Lake Wawasee each met the native species richness objectives of 11 and 13 species respectively.

Native species diversity in Lake Wawasee and Syracuse Lake was good in 2015. Native species diversity in Lake Wawasee was 0.85 in the summer of 2015, and the native species diversity in Syracuse Lake was 0.83. While native plant populations appear healthy, exotic plant species (mainly SSW) have been expanding in these lakes and should be monitored closely.

The continued increase in SSW site frequency is still likely the biggest cause for concern in Lake Wawasee and Syracuse Lake. Despite large scale efforts to control SSW, its acreage has increased steadily each year since 2009. In August of 2009, total SSW acreage in Lake Wawasee was estimated at 15 acres. In the summer of 2015, total SSW acreage in Wawasee was estimated at over 230.3 acres. Total SSW acreage in Syracuse Lake was estimated at 7.5 acres in the summer of 2012 and had risen to well over 48.2 acres in the summer of 2015. Chemical applications temporarily control SSW, but no long term control of the plant has been observed. Multiple applications are needed in the same treatment area throughout the course of the season to keep SSW suppressed.

EWM is present throughout the littoral zone in both Lake Wawasee and Syracuse Lake. In Lake Wawasee, EWM total acreage was estimated at 579 acres in 2012. The EWM population appears to be stable in Lake Wawasee. EWM has been in the lake for decades and may currently be growing in most if not all areas of suitable habitat. Its total acreage would not be expected to increase dramatically although its overall percentage of the plant community could become greater, especially if a decrease in water quality would occur.

EWM frequency on Syracuse Lake seems highly variable. EWM frequency on Syracuse Lake in the summer of 2015 was 22.0 percent (this was prior to treatment). EWM populations should continue to be monitored closely in future years.

Based on the recent classification of Syracuse Lake as important northern pike habitat by the IDNR, no more than 5 percent of the lake's total surface area is likely to be permitted for EWM treatment. This would represent maximum treatment acreage of 25 acres for EWM in 2015 on Syracuse Lake. In 2015, 20 acres of EWM were permitted to be treated.

In Lake Wawasee, approximately 40 acres are likely to be permitted for EWM treatment in 2016, based on conversations with the IDNR. These 40 acres may be prioritized based on lake use and EWM severity in 2016. LARE treatment funding for both of these lakes will likely be considered "maintenance funding." In this case, there is a 50/50 cost share between LARE and the lake association for all treatment costs with LARE supplying a maximum of $5,000 towards treatments.

Permitting restrictions on treatment acreage for EWM in both of these lakes make it unlikely that the frequency goals for EWM set forth in this plan will be met. However, treatments should eliminate nuisance conditions in some areas of the lakes, which is the goal of maintenance treatments.

SSW treatment funding is becoming increasingly limited as more lakes are requiring SSW treatment. This may further reduce the acreage and frequency of SSW treatments on these lakes. Thus far,

treatments have provided good short term control in treatment areas, but they have certainly not stopped the spread of SSW.

Action Plan

SSW Treatments

The treatment of starry stonewort (SSW) should be the highest management priority for Lake Wawasee and Syracuse Lake in 2016. SSW treatments help to reduce biomass, although control is not usually complete, and multiple applications must be made to the same area each year to keep it in check. At this point, herbicide options for the control of SSW are very limited. Cutrine Ultra applied at a rate of 2.4 gallons per acre-foot in combination with Hydrothol 191 herbicide at varying rates is currently being used to provide temporary control of SSW. It is recommended that this treatment strategy be continued. Some funding for SSW treatments will again be available from the IDNR in 2016 through a grant from the Great Lakes Restoration Initiative. All available funding in 2016 will need to be prioritized between a rising number of lakes with increasing populations of SSW. This means that fewer state sponsored treatments may be conducted on these lakes. Private homeowners should be making preparations to privately fund SSW treatments in areas where it impairs lake use.

Developing SSW treatment priorities and tracking SSW treatments on these lakes is challenging due to the high number of SSW beds and their ever-changing acreages as SSW continues to spread. Current SSW abundance in these lakes is shown in Figure 10 and Figure 11. These maps will be updated in spring of 2016 and submitted to the IDNR and used as the basis for decisions on SSW treatment.

2016 EWM treatments

It is recommended that funding be set aside to treat 25 acres of EWM infestation in Syracuse Lake and 40 acres of EWM infestation in Lake Wawasee in 2015. These acreages do not represent total EWM abundance in these lakes and are not expected to reduce EWM frequency significantly in these lakes. These acreages are based upon permitting guidelines from fisheries staff. The goal of any EWM treatments in 2016 would primarily be to improve lake use and access in areas of dense EWM growth. Any EWM treatment recommendations must be balanced with the fact that many EWM treatment areas are also likely to be suitable habitats for SSW infestation.

Exact EWM treatment areas in these lakes in 2016 will depend upon the results of the spring surveys. However, the most likely potential treatment area would be the area treated in 2015. This area is described in Figure 3.

EWM Treatment Specifications

In the past, all areas of EWM infestation in Syracuse Lake and Lake Wawasee have been treated with DMA-4 herbicide at 2.0 ppm. Treatments have been successful in the past at reducing EWM on a yearly basis in treatment areas, and this strategy is recommended for 2016. Average depth of past EWM treatment areas on these lakes has been 4 to 7 feet.

Surveys and Planning

Two tier II surveys for each lake are proposed for 2016. These surveys are likely to be fully funded by the IDNR through either the LARE Program or a grant from the Great Lakes Restoration Initiative (GLRI).

2016 Project Budget

The following budget estimates are based on a 50/50 cost share between the IDNR and the lake associations for EWM treatments and 100% state funding for AVMP plans and surveys in 2016.

EWM treatments on these lakes may be funded as "maintenance treatments" by the LARE program, in which case a 50/50 cost share would take place for EWM treatments with the DNR paying a maximum of $5,000 per lake.

2016 Budget

Treat up to 40 acres of EWM on Lake Wawasee with DMA-4 herbicide at 2ppm. (4 foot avg. depth)		$ 14,000
Treat up to 25 acres of EWM on Syracuse Lake with DMA-4 herbicide at 2ppm. (up to 6 foot avg. depth)		$ 8,750
Spring and Summer Tier II Surveys, and AVMP Update Combined with Syracuse AVMP		$ 12,000
Total Cost Estimate		**$ 34,750**
LARE share (100% of AVMPs, 50% for EWM treatments with 5,000 max per lake.)		$ 21,375
WACF share (Wawasee EWM treatment cost minus 5000 max LARE match)	up to	$ 9,000
Syracuse Lake Association Share (50% of Syracuse EWM treatment)	up to	$ 4,375

Starry Stonewort Budget

At this time it is believed that continued funding from the Great Lakes Restoration Initiative will be available to treat SSW in 2016 as it has in the past. Cutrine Ultra was used in combination with Hydrothol 191 to control SSW in 2014. The cost for SSW treatments at Lake Wawasee and Syracuse Lake in 2015 was $751.32 per 10 acre-feet treated with Cutrine Ultra.

Priority Starry Stonewort Areas

If all areas of SSW infestation in Lake Wawasee cannot be treated in 2016 the highest priority SSW treatment areas are listed below. All of these areas correspond to Figure 11 which is recommended as the basis for future SSW Treatments on Lake Wawasee. These are all areas of high use or with very dense SSW infestations.

1. Area 1: 2.74 acres (Wawasee)
2. Area 1: 4.32 acres (Syracuse)
3. Area 3: 10.47 acres (Wawasee)
4. Area 15: 8.91 acres (Wawasee)
5. Area 17: 27.11 acres(Wawasee)

Public Involvement

Parties interested in the improvement of Lake Wawasee and Syracuse Lake include members of the WACF and the Syracuse Lake Association as well as others who access the lake at the IDNR public access sites. The most common and most effective methods for keeping the public informed about aquatic vegetation management practices are lake association meetings as well as periodical newsletters sent out by the associations. It is recommended that association members encourage neighbors and other lake users to attend lake association meetings so that interested parties are well informed about the LARE program. Making sure that meetings are well advertised and planned well in advance of the meeting dates are ways to help ensure good attendance. Carry-in dinners, door prizes, contests, guest speakers, and discussion panels are all excellent ways to boost attendance, encourage involvement, and keep association members informed about lake management activities.

The WACF held a public meeting on August 1, 2015 to discuss issues related to the LARE program and SSW control. Jim Donahoe of Aquatic Weed Control attended this meeting to summarize activities on the lake. Attendance was average with 14 public surveys being returned. The lake residents continue to be in favor of controlling invasive species in these lakes and were supportive of continued involvement in the LARE program. Figure 20 summarizes responses to the 2015 public questionnaire.

Figure 20: Lake Wawasee and Syracuse Lakes 2015 Public Questionnaire

Lake Use Survey — Lake name Lake Wawasee

Are you a lake property owner? Yes 12 No 1

Are you currently a member of your lake association? Yes 12 No 1

How many years have you been at the lake? 2 or less 0
2 – 5 years 0
5-10 years 1
Over 10 years 12

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

13 Swimming
13 Boating
4 Fishing
6 Irrigation
0 Drinking water
1 Other sailing

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 4 No 9

Do you currently participate in a weed control project on the lake? Yes 5 No 8

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 4 No 9

Does the level of vegetation in the lake affect your property values? Yes 6 No 6

Are you in favor of continuing efforts to control vegetation on the lake? Yes 13 No 0

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 13 No 1

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

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

Please add any comments:
Dredging neede-channel issue.
Dredging needed- Enchanted Hills Channel.
Deep Draft Boats-Huge waves, shorelines degraded.

References Cited

Aquatic Weed Control. 2012. Lake Wawasee and Syracuse Lake Aquatic Vegetation Management Plan Update. P.O. Box 325 Syracuse, IN 46567.

Aquatic Weed Control. 2006. Lake Wawasee Aquatic Vegetation Management Plan. P.O. Box 325 Syracuse, IN 46567.

Aquatic Weed Control. 2005. Syracuse Lake Aquatic Vegetation Management Plan P.O. Box 325 Syracuse, IN 46567.

IDNR. 2014. Procedure Manual for Surveying Aquatic Vegetation: Tier II Reconnaissance Surveys. IN Department of Natural Resources. Indianapolis, Indiana.

V3 Companies. 2010. Lake Wawasee Aquatic Vegetation Management Plan Update – 2009 and Vegetation Surveys in Eco-zone Areas of Conklin. 7325 Janes Avenue, Woodbridge, Illinois 60517

Appendix

Common and Scientific Plant Names of Species in Lake Wawasee and Syracuse Lake

Common Name	Scientific Name
American pondweed	*Potamogeton nodosus*
bladderwort	*Utricularia sp.*
spiny naiad	*Najas marina*
chara	*Chara sp.*
coontail	*Ceratophyllum demersum*
curly-leaf pondweed	*Potamogeton crispus*
eel grass	*Vallisneria americana*
Canada waterweed	*Elodea canadensis*
Eurasian watermilfoil	*Myriophyllum spicatum*
flat -stemmed pondweed	*Potamogeton zosteriformis*
floating-leaf pondweed	*Potamogeton natans*
Illinois pondweed	*Potamogeton illinoensis*
large-leaved pondweed	*Potamogeton amplifolius*
leafy pondweed	*Potamogeton foliosus*
nitella	*Nitella sp.*
northern watermilfoil	*Myriophyllum sibiricum*
Richardson's pondweed	*Potamogeton richardsonii*
sago pondweed	*Stuckenia pectinata*
slender naiad	*Najas flexilis*
small pondweed	*Potamogeton pusillus*
variable pondweed	*Potamogeton gramineus*
starry stonewort	*Nitellopsis obtusa*
water stargrass	*Heteranthera dubia*
white-stemmed pondweed	*Potamogeton praelongus*
whorled watermilfoil	*Myriophyllum verticillatum*

Data Sheets and GPS Coordinates- Syracuse Lake

Syracuse Lake 6-5-2015 Secch: 16ft H_2O Temp 74.7°

Latitude	Longitude	Depth	Site	EWM	CLP	Starry	Chara	Sago	Richardsons	Naiad	Bladderwort	small	Illinois	Eel grass	Coontail	whorled	Flatstem	American	Nitella	LARG
41.428135	-85.729013	11	51			1														
41.426583	-85.726387	5	52				1													
41.427992	-85.727427	11	53	—																
41.428326	-85.726260	2	54				1						3							
41.429079	-85.726910	3	55	1		5							1		1					
41.428815	-85.728316	9	56				3						1							
41.429654	-85.728899	6	57				3													
41.428832	-85.730474	12	58					3												
41.428267	-85.732135	14	59			5														
41.428687	-85.734089	18	60	—																
41.429375	-85.733202	8	61	1																
41.429088	-85.732100	9	62				3								3		3			
41.429562	-85.731234	8	63				3			3										
41.430207	-85.729913	3	64				1													
41.430450	-85.731786	3	65				3						1							
41.430639	-85.733168	6	66				1				3		1							
41.429962	-85.733941	11	67	1																
41.430197	-85.735139	6	68					3					1							
41.430026	-85.736043	17	69																3	
41.430698	-85.736633	2	70				3													
41.430447	-85.737930	11	71	—																
41.430966	-85.738797	2	72				1				3									
41.430317	-85.739433	20	73				1				3								3	
41.430631	-85.740412	6	74				1						1							
41.430729	-85.741506	12	75	1			3												5	
41.431645	-85.741790	1	76				1													
41.431306	-85.742828	9	77				1	3												
41.431946	-85.742978	2	78											1						
41.432827	-85.743068	5	79	—																
41.433501	-85.742999	3	80	—																
41.431188	-85.743824	2	81				3				3		1							
41.430283	-85.743964	12	82				3													
41.429715	-85.745008	17	83																3	
41.430581	-85.745194	1	84	—																
41.430060	-85.746096	2	85				3				3		1							
41.429449	-85.746682	15	86			3														
41.429878	-85.747684	6	87				3	3												
41.430028	-85.749299	3	88	1			3						1	1			1			1
41.429399	-85.748397	10	89				1						1	1						
41.428927	-85.747459	8	90	1															1	
41.428623	-85.748328	11	91					1		1										
41.428055	-85.748533	6	92				1	1												
41.427750	-85.747697	13	93	—																
41.426880	-85.747227	3	94				3				3		1							
41.427020	-85.746157	13	95			1														
41.426367	-85.745817	7	96				3				3		1							
41.426102	-85.744781	8	97	—																
41.425570	-85.744096	18	98	3				1											3	
41.424753	-85.743881	6	99	3				1												
41.423957	-85.743585	2	100				1				3									

Syracuse Lake Date 6-5-2015 Secchi: 16 ft

Latitude	Longitude	Depth	Site	EWM	CLP	Starry	Chara	Sago	Richardsons	Naiad	Bladderwort	small	Illinois	Eel grass	Coontail	whorled	Flatstem	American	Nitella	
41.424312	-85.749884	5	1				5													
41.423983	-85.749814	5	2				5													
41.424055	-85.749567	5	3	1			1									1				
41.424136	-85.749270	3	4				3						1							
41.424041	-85.748523	3	5	3			5													
41.423561	-85.747522	3	6	1			5													
41.422871	-85.746280	2	7			5	3													
41.423453	-85.745186	2	8			3	1				1									
41.422700	-85.744881	4	9	—																
41.423098	-85.743490	5	10				1									1				
41.422679	-85.743364	3	11				1						1							
41.422531	-85.742336	3	12				3													
41.423581	-85.741657	6	13					3			1									
41.424191	-85.741880	6	14	1			3	1					3							
41.424870	-85.740935	18	15				1												5	
41.425221	-85.739882	14	16				1												3	
41.426022	-85.738747	13	17	1			1		3											
41.425643	-85.737497	12	18			3									3					
41.424400	-85.740133	14	19			3														
41.423672	-85.740768	5	20				3	3												
41.422841	-85.740373	3	21				5				1									
41.422957	-85.738561	3	22				3	1					1							
41.422959	-85.737112	6	23				3						1							
41.421829	-85.736451	3	24				3				1									
41.423250	-85.735642	11	25						3											
41.424518	-85.734990	8	26	3				1									1			
41.422785	-85.734484	16	27			5														
41.421867	-85.733861	6	28	—																
41.421334	-85.734269	3	29			1	1				3									
41.420849	-85.734031	2	30	—																
41.421208	-85.732989	2	31				3													
41.421289	-85.731209	3	32				1				3									
41.422322	-85.731502	3	33				3				3									
41.422658	-85.732557	8	34			3								3						
41.424445	-85.732452	9	35						3											
41.424283	-85.731297	11	36			1								3						
41.423350	-85.730825	2	37	—																
41.422081	-85.729424	3	38					5												
41.422489	-85.727798	2	39					1												
41.421986	-85.727684	3	40											3						
41.423689	-85.728488	4	41				1				3									
41.424564	-85.729873	8	42				3						1							
41.425248	-85.726876	3	43				3													
41.426169	-85.727798	11	44				3													
41.425740	-85.729138	6	45										1							
41.426125	-85.730501	11	46			3									3					
41.426268	-85.733509	17	47																1	
41.427232	-85.731884	16	48																3	
41.427004	-85.730169	14	49			3														
41.427124	-85.728758	17	50	—																

Syracuse Lake Date 7-20-15 Secchi: 14.9 slender

Latitude	Longitude	Depth	Site	EWM	CLP	Starry	Chara	Sago	Richardsons	Naiad	Bladderwort	small	Illinois	Eel grass	Coontail	whorled	Flatstem	American	Nitella	~~FWD~~ southern
41.424312	-85.749884	5	1	5						3										
41.423983	-85.749814	5	2				3			1			1							
41.424055	-85.749567	5	3				3			3										
41.424136	-85.749270	3	4	1			5													
41.424041	-85.748523	3	5				3													
41.423561	-85.747522	3	6			1	3													
41.422871	-85.746280	2	7	1			5													
41.423453	-85.745186	2	8	3		1	1													
41.422700	-85.744881	4	9																	
41.423098	-85.743490	5	10				3	1			3									
41.422679	-85.743364	3	11				3			1	3		1	3.						
41.422531	-85.742336	3	12				3				1									
41.423581	-85.741657	6	13	1			3			1			1							
41.424191	-85.741880	6	14	5				1	3					1						
41.424870	-85.740935	18	15																	
41.425221	-85.739882	14	16			5														
41.426022	-85.738747	13	17	5						1					3				1	
41.425643	-85.737497	12	18	1	3										3					
41.424400	-85.740133	14	19			5														
41.423672	-85.740768	5	20	1				3		3				3						
41.422841	-85.740373	3	21				3	3						3						
41.422957	-85.738561	3	22				3	1												
41.422959	-85.737112	6	23				3							3						
41.421829	-85.736451	3	24								1									
41.423250	-85.735642	11	25	1				3									1			~~P~~ 1
41.424518	-85.734990	8	26	3			1	3		3										1
41.422785	-85.734484	16	27			5														
41.421867	-85.733861	6	28	1		1	3							1						
41.421334	-85.734269	3	29				1	1												
41.420849	-85.734031	2	30					3						3						
41.421208	-85.732989	2	31				1				1									
41.421289	-85.731209	3	32						1		1			3			1	1		
41.422322	-85.731502	3	33				3				1									
41.422658	-85.732557	8	34	1																
41.424445	-85.732452	9	35			5														
41.424283	-85.731297	11	36			3														
41.423350	-85.730825	2	37																	
41.422081	-85.729424	3	38					3						3						
41.422489	-85.727798	2	39					3			1									
41.421986	-85.727684	3	40	1										3						
41.423689	-85.728488	4	41				3													
41.424564	-85.729873	8	42				1	3			3						1			
41.425248	-85.726876	3	43	1						1										
41.426169	-85.727798	11	44				3	1						1						
41.425740	-85.729138	6	45				3	1												1
41.426125	-85.730501	11	46			5														
41.426268	-85.733509	17	47					1											5	
41.427232	-85.731884	16	48			5														
41.427004	-85.730169	14	49			5														
41.427124	-85.728758	17	50			5														

Latitude	Longitude	Depth	Site	EWM	CLP	Starry	Chara	Sago	Richardsons	Naiad	Bladderwort	small	Illinois	Eel grass	Coontail	whorled	Flatstem	American	Nitella	Spiny	
41.428135	-85.729013	11	51			1		3												3	
41.426583	-85.726387	5	52				1														
41.427992	-85.727427	11	53																		
41.428326	-85.726260	2	54	1			1														
41.429079	-85.726910	3	55	1			1														
41.428815	-85.728316	9	56				1	3						1						3	
41.429654	-85.728899	6	57				1						1								
41.428832	-85.730474	12	58			3														1	
41.428267	-85.732135	14	59			5															
41.428687	-85.734089	18	60												3						
41.429375	-85.733202	8	61	3				1		1				3							
41.429088	-85.732100	9	62			5														3	
41.429562	-85.731234	8	63				1							1						5	
41.430207	-85.729913	3	64				1														
41.430450	-85.731786	3	65																		
41.430639	-85.733168	6	66				3				3										
41.429962	-85.733941	11	67				1	5		3				3						3	
41.430197	-85.735139	6	68				3	1					1	3							
41.430026	-85.736043	17	69												1						
41.430698	-85.736633	2	70				1				1									1	
41.430447	-85.737930	11	71							1					1						
41.430966	-85.738797	2	72				3													1	
41.430317	-85.739433	20	73																3		
41.430631	-85.740412	6	74				1				3		1	1							
41.430729	-85.741506	12	75				1							1							
41.431645	-85.741790	1	76				1	1			1										
41.431306	-85.742828	9	77											1	3						
41.431946	-85.742978	2	78											1							
41.432827	-85.743068	5	79																		
41.433501	-85.742999	3	80																		
41.431188	-85.743824	2	81				1				5										
41.430283	-85.743964	12	82				1	5													
41.429715	-85.745008	17	83			3	1														
41.430581	-85.745194	1	84																		
41.430060	-85.746096	2	85				5				1										
41.429449	-85.746682	15	86	1		3				1											
41.429878	-85.747684	6	87				3	5			3										
41.430028	-85.749299	3	88				3										1				
41.429399	-85.748397	10	89	1					1												
41.428927	-85.747459	8	90	3											3						
41.428623	-85.748328	11	91					3						1							
41.428055	-85.748533	6	92				5	3			3										
41.427750	-85.747697	13	93				1			3											
41.426880	-85.747227	3	94				3				3										
41.427020	-85.746157	13	95				3														
41.426367	-85.745817	7	96				5				1										
41.426102	-85.744781	8	97					3		1				3					3		
41.425570	-85.744096	18	98																1		
41.424753	-85.743881	6	99	5						1					3						
41.423957	-85.743585	2	100				3	3						1							southern naiad - 1

Data Sheets and GPS Coordinates- Lake Wawasee

Lake Wawasee 6-9-2015 Secchi: 12.0 ft water temp: Mid-70's

Latitude	Longitude	Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.378244	-85.670398	3	1			1	1	1							1								
41.378406	-85.670429	5.5	2	3	1			3	3	1		1	1				1						
41.378298	-85.670236	4.5	3	1						1		1											
41.378382	-85.670004	4.5	4	1	3	1	3						1										
41.379442	-85.669505	4	5		1		3	3				1	1										
41.380413	-85.671503	5	6		1	1		3	1														
41.380593	-85.672478	13	7	—																			
41.382187	-85.672468	5	8		3																		
41.381943	-85.670770	21	9	—																			
41.382100	-85.669081	3 A	10				3				3			3	1								
41.382717	-85.668187	2 A	11				3								1								
41.383054	-85.668690	5	12			1	3				1						3						
41.384130	-85.669240	5	13	1		1			1		3			3									
41.384387	-85.670710	20	14				3																
41.384624	-85.670267	5	15	3	1	1			1					3									
41.384892	-85.669910	4.5	16				3				3												
41.385545	-85.669304	5 A	17			3	3				1		3										
41.384833	-85.670601	5	18	5											1		1						
41.385006	-85.670282	4	19	1		3			1		1												
41.385095	-85.670164	4	20			1					1			3	1								
41.385085	-85.670382	4.5	21			1								3	1								
41.385307	-85.670346	3	22	1										3									
41.386042	-85.669835	3 A	23				1																
41.386511	-85.670899	5 A	24	—																			
41.386311	-85.671959	4 A	25	5																			
41.385613	-85.671613	11	26				3																
41.385020	-85.672677	5	27		1																		
41.383348	-85.673173	7	28		1	3			1														
41.385291	-85.678414	21	29				3																
41.388653	-85.672492	5	30	—																			
41.387743	-85.670301	5	31		1				3														
41.389484	-85.670151	11	32				3																
41.391861	-85.667768	10	33	1	3																		
41.393770	-85.669432	17	34																3				
41.396157	-85.670668	11	35					3															
41.396427	-85.674653	21	36	—																			
41.397578	-85.674155	6	37	1	1																		
41.397796	-85.673289	6	38	1	1	1		1															
41.399875	-85.673448	3 A	39				3																
41.400344	-85.671559	4	40	—																			
41.402782	-85.669801	2 A	41	—																			
41.401806	-85.667412	4	42	—																			
41.399129	-85.665619	2	43	—																			
41.397469	-85.664362	4	44	—																			
41.403520	-85.668864	5	45	—																			
41.406778	-85.669891	6	46	—																			
41.404652	-85.670991	5	47		1			1															
41.407320	-85.671016	3 A	48	—																			
41.409112	-85.671317	4	49	—																			
41.405797	-85.672475	4 A	50		3																		

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.407040	-85.671872	6	51																				
41.398630	-85.674507	5	52	1			1															3	
41.400234	-85.674842	4	53				1																
41.401697	-85.677024	5	54	1	3																		
41.400152	-85.679922	6	55		1																		
41.403146	-85.677922	5	56		1						1												
41.402525	-85.676327	6	57				3	3															
41.404209	-85.677721	4	58				5																
41.404334	-85.678748	9	59				1																
41.403312	-85.680673	5	60		1																		
41.404896	-85.683363	20	61																				
41.406007	-85.683182	16.5	62	1																			
41.405727	-85.682816	4	63	1	3				3					3									
41.405485	-85.681813	4.5	64	3		1																1	
41.405503	-85.680802	6.5	65																			1	
41.406245	-85.682297	5.5	66	5	1																		
41.406135	-85.681409	10	67	5																			
41.407492	-85.683396	7	68					1															
41.408327	-85.682013	5.5	69	3																			
41.408349	-85.681009	6.5	70	1																			
41.407899	-85.680700	8	71	3																		1	
41.408361	-85.679456	5	72	3	3																		
41.407717	-85.679628	7	73		1	1													3				
41.409179	-85.681151	5	74			1																3	
41.409207	-85.678969	4	75	1		3		3														1	
41.408821	-85.684002	17	76	3																			
41.409868	-85.686290	20	77	1																			
41.410450	-85.685316	18.5	78	3																			
41.410565	-85.684392	8	79	1								1											
41.410748	-85.685803	16	80	5																			
41.411418	-85.685939	10.5	81	1		1																	
41.411697	-85.684317	4.5	82	1	3			1															
41.412924	-85.686747	5.5	83	3	3																		
41.413055	-85.687764	4.5	84	1		1																	
41.413563	-85.687846	8	85	5		3		3															
41.412238	-85.687187	5.5	86		3																		
41.412182	-85.686727	5	87		3																		
41.411728	-85.688081	3.5	88	3	3																		
41.411442	-85.687409	5.5	89	1	3																		
41.411613	-85.689080	11.5	90	3		5		3															
41.411197	-85.690022	5	91	5		3		1														5	
41.411746	-85.691221	5	92	3		3		1															
41.412519	-85.692872	7	93	1		3		1														3	
41.411021	-85.688374	4	94		3																		
41.409797	-85.689400	4	95	3																		1	
41.409716	-85.690402	5	96	5																			
41.410850	-85.693418	6	97			3																5	
41.413060	-85.696565	6	98																			1	
41.409617	-85.687753	6.5	99	1																			
41.408686	-85.688441	6	100																				

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.406999	-85.688732	17	101	3																			
41.405778	-85.689676	4	102	1					1			1								1			
41.405410	-85.689098	15.5	103	3																		1	
41.404804	-85.688693	8	104	3	1																		
41.404803	-85.688198	10	105	1																			
41.404138	-85.688797	3.5	106	3	3							1											
41.403920	-85.688839	1.5	107	3	5			1					1										
41.404256	-85.689547	3.5	108		1																		
41.404177	-85.689985	4.5	109	3																			
41.404765	-85.690732	5.5	110	5																			
41.402718	-85.689817	6.5	111		3	1									1				3			1	
41.402805	-85.687075	8.5	112	1	5																	1	
41.403677	-85.687258	3	113	1																		1	
41.404114	-85.687414	3.5	114		1																		
41.404781	-85.687345	5	115	5	1																		
41.405114	-85.687267	5	116	3	1																		
41.405823	-85.687130	21	117	—																			
41.405289	-85.686276	6	118	1	1			1	1				1										
41.403772	-85.685728	15	119	5			3															3	
41.402234	-85.685243	5	120	1	1															1			
41.399980	-85.686783	19	121	—																			
41.396623	-85.684857	10	122		3																		
41.395727	-85.685384	21	123	—																			
41.395749	-85.682462	17	124	—																			
41.392172	-85.683025	11	125			5	1	1							1								
41.389694	-85.683622	5	126		3							1											
41.392081	-85.689568	12	127		3	1																	
41.394628	-85.688329	12	128		3																		
41.399273	-85.688387	10	129			5		3															
41.400687	-85.689565	11	130	3			1																
41.399068	-85.689817	11	131					3															
41.399773	-85.691022	5	132	—																			
41.400476	-85.694067	15	133			1																	
41.402086	-85.698529	21	134	—																			
41.402639	-85.694984	8	135		3				1														
41.404949	-85.692977	4	136	—																			
41.404725	-85.697527	12	137		3	1																	
41.406676	-85.696283	8	138	—																			
41.406798	-85.701615	13	139			5	3																
41.408801	-85.697334	6	140	—																			
41.410425	-85.700719	8	141	—																			
41.410990	-85.703201	19	142	3																			
41.411811	-85.701816	11	143		3				1														
41.412452	-85.704212	18	144		3							1											
41.413082	-85.700442	6	145		1																		
41.414702	-85.702782	7	146		3		1		1														
41.414881	-85.707302	7	147		3																		
41.412966	-85.709979	14	148					3															
41.410931	-85.713027	17	149		1				1														
41.409910	-85.713513	8	150		3				1														

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.408191	-85.715511	16	151																				
41.406792	-85.716151	16	152	1	1			3															
41.405784	-85.714883	23	153																				
41.410590	-85.721112	11	154																				
41.412107	-85.716289	11	155		1																		
41.413190	-85.714227	18	156																3				
41.413370	-85.717185	23	157																				
41.415187	-85.718464	4	158		1																		
41.416446	-85.720861	6	159																				
41.417051	-85.719575	4	160	1	1			1	1		1												
41.416773	-85.717838	4	161				3																
41.417770	-85.717082	8	162				1																
41.417536	-85.716055	3	163				3																
41.417617	-85.719869	3	164										5										
41.418054	-85.721022	10	165									1						3	5				
41.418993	-85.721816	5	166			1	1																
41.416373	-85.722418	5	167	1	1									1									
41.416787	-85.723894	4	168		1	3																	
41.415841	-85.727439	3	169				5																
41.414382	-85.728835	3	170				5					3											
41.413029	-85.723943	14	171		3																		
41.413195	-85.726925	7	172		1																		
41.412269	-85.728458	5	173																				
41.410315	-85.734066	4	174																				
41.410829	-85.734233	6	175	3	3	1					1			3									
41.411397	-85.733456	5	176			5		1															
41.411633	-85.732645	7	177	5				1															
41.411835	-85.731653	6	178	3	5			1	1														
41.413649	-85.731328	5	179			1	3										5						
41.414421	-85.732649	5	180				3	1									1						
41.414480	-85.733735	5	181	5																			
41.415193	-85.735141	6	182					3															
41.416113	-85.735173	5	183		1			5				1										1	
41.416892	-85.734027	7	184	5																			
41.416203	-85.731863	6	185				1					3											
41.414759	-85.729608	4	186				5																
41.418524	-85.727757	4	187									1											
41.417458	-85.733588	3	188				5																
41.418093	-85.733827	3	189																				
41.418522	-85.732342	3	190																				
41.418670	-85.730407	3	191									3											
41.419143	-85.731389	4	192																				
41.418990	-85.733678	3	193	3																			
41.419418	-85.734580	4	194	5																			
41.420370	-85.734383	4	195	1				1															
41.419104	-85.735726	0	196																				
41.418809	-85.737111	0	197																				
41.419416	-85.738102	4	198	5																			
41.417648	-85.738833	5	199									1						3					
41.417192	-85.739453	4	200	5																			

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.418244	-85.734836	6	201	3				1			1												
41.417241	-85.735021	6	202	3																			
41.416642	-85.735990	2	203		1	1			1														
41.414029	-85.735011	4.5	204	1		1	1		1														
41.413870	-85.735362	5.5	205	1	1																	1	
41.413843	-85.735624	5.5	206	5	1																	1	
41.413924	-85.735991	4.5	207			3	3															3	
41.414340	-85.736760	6	208			1																	
41.414846	-85.737418	6	209			3																1	
41.413963	-85.737601	6	210			5							1										
41.414501	-85.737858	5	211			5							3										
41.414473	-85.738628	7	212			5																	
41.414200	-85.739817	8	213			5	1											1					
41.413647	-85.741467	5	214			3		1										1					
41.414692	-85.741563	6	215				1																
41.413736	-85.742474	4	216	3		3			1														
41.412400	-85.741652	10	217			1		1														1	
41.413710	-85.735455	5	218		3																	3	
41.413592	-85.735647	5	219	1	1	3							3				3					3	
41.413240	-85.735623	4.5	220			1	1											1				1	
41.412772	-85.735443	5.5	221		3			1			3		1										
41.411231	-85.734994	4	222		3						3	1	3										
41.408497	-85.735779	4	223	5		1					1		3										
41.408676	-85.736586	5	224	1	5	1												1					
41.408275	-85.737539	5 A	225	3	1																		
41.407418	-85.739079	4	226	3		1					1											1	
41.407762	-85.739978	4	227	1			3					1											
41.408894	-85.740529	4	228			3	3															1	
41.408037	-85.741482	5	229			5													1			3	
41.407329	-85.741009	4.5	230	1	1	1																	
41.407053	-85.740414	7	231	1	5																		
41.406720	-85.740624	9	232	1																			
41.406713	-85.740981	9.5	233	3		3		1														1	
41.406467	-85.741134	9	234	3																		1	
41.406609	-85.741318	8.5	235	5																			
41.406738	-85.741551	6	236	5					1														
41.406894	-85.741874	5.5	237	3	3																		
41.406652	-85.742018	4.5	238	5	3																		
41.406329	-85.741631	11	239	5																			
41.406116	-85.741834	12	240	5								1											
41.406295	-85.742016	8	241	5		3																	
41.406448	-85.743469	3.5	242		5	1																	
41.406091	-85.742402	7.5	243	5																			
41.405330	-85.743386	4 A	244			1	3																
41.403135	-85.743126	5	245				5																
41.405455	-85.742176	5	246	5								1											
41.404937	-85.740657	7	247	5																			
41.405498	-85.740507	8	248	5																			
41.405871	-85.739197	4	249	5																			
41.406494	-85.737519	2	250	1																			

Sec 12.0ft

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.406106	-85.735771	5	251		1																		
41.405869	-85.734271	4	252		1															1			
41.405061	-85.732016	3	253			1							1										
41.406192	-85.730957	7	254		1				1														
41.407360	-85.731107	14	255	—			1																
41.409058	-85.731721	10	256		1																		
41.409865	-85.729886	22	257	—																			
41.409458	-85.727177	20	258	—																			
41.405674	-85.726078	4	259		3																		
41.403627	-85.721371	7	260		1			3															
41.402014	-85.718272	5	261		3			1															
41.402769	-85.715325	6	262			1		1															
41.400351	-85.714315	4	263		1																		
41.398792	-85.711303	12	264	—																			
41.397606	-85.711650	5	265		1																		
41.396156	-85.710643	5	266		1																		
41.394307	-85.705694	9	267		1																		
41.393081	-85.705719	5	268		1				1														
41.392250	-85.703256	15	269			3								3									
41.391209	-85.702295	5	270		1																		
41.390478	-85.700517	23	271	—																			
41.390450	-85.699861	16	272	—																			
41.390846	-85.696390	17	273			1																1	
41.390357	-85.691885	19	274	—																			
41.390059	-85.691925	12	275		1																		
41.388074	-85.687901	5	276		3				1														
41.386286	-85.684490	18	277																3				
41.387047	-85.688552	4	278			1						1										5	
41.386232	-85.691375	5	279								3		5										
41.387408	-85.691570	5	280										1										
41.385404	-85.684681	3	281		1																		
41.384673	-85.686297	5	282										1										
41.385004	-85.688423	5	283					1															
41.384425	-85.690769	4	284																				
41.383416	-85.684403	13	285				1																
41.382728	-85.681466	16	286	—																			
41.381776	-85.682912	4	287		3																		
41.379340	-85.684019	5	288																				
41.376556	-85.684076	5	289																				
41.378226	-85.682390	13	290																				
41.376293	-85.681846	11	291																				
41.378818	-85.680989	4	292		1				1														
41.375713	-85.680887	11	293										1										
41.376558	-85.679577	3	294		3	1			1		1												
41.378901	-85.677495	10	295			5																	
41.379088	-85.677331	19	296				1																
41.377778	-85.675930	5	297			3		3															
41.378458	-85.675243	11	298			1	3																
41.378779	-85.672526	5	299						1														
41.377188	-85.671629	4	300	3								3											

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Lake Wawasee 8-21 and 8-26, 2015 Secchi: 9.0 ft

Latitude	Longitude	Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.378244	-85.670398	3	1						1														
41.378406	-85.670429	5.5	2	1							3												
41.378298	-85.670236	4.5	3								1												
41.378382	-85.670004	4.5	4				1	3			3						1						
41.379442	-85.669505	4	5		3				3	1	1		1										
41.380413	-85.671503	5	6						3	1													
41.380593	-85.672478	13	7																				
41.382187	-85.672468	5	A8	1	3				1														
41.381943	-85.670770	21	9																				
41.382100	-85.669081	3	A10		1					1	3			1									
41.382717	-85.668187	2	11				5	1			3	1											
41.383054	-85.668690	5	12	1					1		1						3					1	
41.384130	-85.669240	5	13		1						3		1	1									
41.384387	-85.670710	20	14																				
41.384624	-85.670267	5	15	3							5												
41.384892	-85.669910	4.5	16								5												
41.385545	-85.669304	5	17	1						3	5												
41.384833	-85.670601	5	18	3							1												
41.385006	-85.670282	4	19	3		1					3	1											
41.385095	-85.670164	4	20			1				1	5												
41.385085	-85.670382	4.5	21	3							1												
41.385307	-85.670346	3	A22	1		1	1																
41.386042	-85.669835	3	23								1												
41.386511	-85.670899	5	24				3			3	1	3											
41.386311	-85.671959	4	25	1									1										
41.385613	-85.671613	11	26																				
41.385020	-85.672677	5	27	5																			
41.383348	-85.673173	7	28		1						1												
41.385291	-85.678414	21	29				South No 3																
41.388653	-85.672492	5	30																				
41.387743	-85.670301	5	31		3			1	1	1													
41.389484	-85.670151	11	32	3			1							3									
41.391861	-85.667768	10	33		1																		
41.393770	-85.669432	17	34																				
41.396157	-85.670668	11	35			1	3				1												
41.396427	-85.674653	21	36																				
41.397578	-85.674155	6	37																				
41.397796	-85.673289	6	A38	1	1																		
41.399875	-85.673448	3	39																				
41.400344	-85.671559	4	A40					1															
41.402782	-85.669801	2	A41										1										
41.401806	-85.667412	4	42										1										
41.399129	-85.665619	2	43																				
41.397469	-85.664362	4	44										1										
41.403520	-85.668864	5	45										1										
41.406778	-85.669891	6	A46		1			3															
41.404652	-85.670991	5	A47																				
41.407320	-85.671016	3	A48																				
41.409112	-85.671317	4	49																				
41.405797	-85.672475	4	50		5																		

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Lake Wawasee

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.407040	-85.671872	6	51		5																		
41.398630	-85.674507	5	52	3							3	(South Naiad)											
41.400234	-85.674842	4	53	3						1	3												
41.401697	-85.677024	5	54	3																			
41.400152	-85.679922	6	55		1																		
41.403146	-85.677922	5	A 56																				
41.402525	-85.676327	6	57																				
41.404209	-85.677721	4	58				1				1												
41.404334	-85.678748	9	59																				
41.403312	-85.680673	5	60		1																		
41.404896	-85.683363	20	61																				
41.406007	-85.683182	16.5	62	5																			
41.405727	-85.682816	4	63																				
41.405485	-85.681813	4.5	64	3	1	1				1													
41.405503	-85.680802	6.5	65	1																			
41.406245	-85.682297	5.5	66	1	1	1				1	1			1									
41.406135	-85.681409	10	67	1																			
41.407492	-85.683396	7	68	1	1			1	1														
41.408327	-85.682013	5.5	69	5	1																		
41.408349	-85.681009	6.5	70	3																			
41.407899	-85.680700	8	71	5																			
41.408361	-85.679456	5	72																				
41.407717	-85.679628	7	73	1																			
41.409179	-85.681151	5	A 74																				
41.409207	-85.678969	4	75	1		1	3																
41.408821	-85.684002	17	76	5																			
41.409868	-85.686290	20	77	3																			
41.410450	-85.685316	18.5	78	5																			
41.410565	-85.684392	8	79	3	1																		
41.410748	-85.685803	16	80	5																			
41.411418	-85.685939	10.5	81	5	1																		
41.411697	-85.684317	4.5	82	1	3				1			3											
41.412924	-85.686747	5.5	83	1	3							3											
41.413055	-85.687764	4.5	84	1																			
41.413563	-85.687846	8	85	5																			
41.412238	-85.687187	5.5	86		3																		
41.412182	-85.686727	5	87		1							3											
41.411728	-85.688081	3.5	88	5	3	1			1														
41.411442	-85.687409	5.5	89		3																		
41.411613	-85.689080	11.5	90																				
41.411197	-85.690022	5	91	3									1										
41.411746	-85.691221	5	92			3							1										
41.412519	-85.692872	7	93		1																		
41.411021	-85.688374	4	94	1	3	1			1		1	1	1										
41.409797	-85.689400	4	95	1		1		1															
41.409716	-85.690402	5	96	5																			
41.410850	-85.693418	6	97			3																	
41.413060	-85.696565	6	98										1										
41.409617	-85.687753	6.5	99		3																		
41.408686	-85.688441	6	100																				

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Lake Wawasee

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.406999	-85.688732	17	101	5																			
41.405778	-85.689676	4	102						1														
41.405410	-85.689098	15.5	103	5																			
41.404804	-85.688693	8	104	1	3																		
41.404803	-85.688198	10	105		3																		
41.404138	-85.688797	3.5	106	1	1																		
41.403920	-85.688839	1.5	107	3	1			1			1	3											
41.404256	-85.689547	3.5	108	1	5																		
41.404177	-85.689985	4.5	109	1								1											
41.404765	-85.690732	5.5	110							3	1												
41.402718	-85.689817	6.5	111	—																			
41.402805	-85.687075	8.5	112	—																			
41.403677	-85.687258	3	113				1																
41.404114	-85.687414	3.5	114	1	3					1		1											
41.404781	-85.687345	5	115	1	3																		
41.405114	-85.687267	5	116	1	5			1		1	1												
41.405823	-85.687130	21	117	3																			
41.405289	-85.686276	6	118	—	1																		
41.403772	-85.685728	15	119	5																			
41.402234	-85.685243	5	120		1			1	1											3			
41.399980	-85.686783	19	121	—																			
41.396623	-85.684857	10	122		3																		
41.395727	-85.685384	21	123	—																			
41.395749	-85.682462	17	124	—																			
41.392172	-85.683025	11	125															3					
41.389694	-85.683622	5	126									1											
41.392081	-85.689568	12	127		1	1		3			5												
41.394628	-85.688329	12	128	1		3	3	5			1												
41.399273	-85.688387	10	129		1			1															Sowll 1
41.400687	-85.689565	11	130	5						1													Swidem. 1
41.399068	-85.689817	11	131	—	—																		
41.399773	-85.691022	5	132	—	—																		
41.400476	-85.694067	15	133	5																			
41.402086	-85.698529	21	134				3																
41.402639	-85.694984	8	135	—	—																		
41.404949	-85.692977	4	136	—	—																		
41.404725	-85.697527	12	137		3																		
41.406676	-85.696283	8	138	—	—																		
41.406798	-85.701615	13	139			5																	
41.408801	-85.697334	6	140	—	—																		
41.410425	-85.700719	8	141		1																		
41.410990	-85.703201	19	142	5																			
41.411811	-85.701816	11	143		1																		
41.412452	-85.704212	18	144	1			3																
41.413082	-85.700442	6	145		1		1		1														
41.414702	-85.702782	7	146	—	—																		
41.414881	-85.707302	7	147		3							1											Spiny -1
41.412966	-85.709979	14	148			1	3	1											1				
41.410931	-85.713027	17	149		1							1											
41.409910	-85.713513	8	150		1																		

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Lake Wawasee

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.408191	-85.715511	16	151			5	3																
41.406792	-85.716151	16	152	3		3	1					1											
41.405784	-85.714883	23	153	—	—																		
41.410590	-85.721112	11	154		1																		
41.412107	-85.716289	11	155		1																		
41.413190	-85.714227	18	156	5								1											
41.413370	-85.717185	23	157	—	—																		
41.415187	-85.718464	4	158	—	—	—	—	—															
41.416446	-85.720861	6	159					1				1											
41.417051	-85.719575	4	160		1			3				1											
41.416773	-85.717838	4	161	1		1		1			1												
41.417770	-85.717082	8	162			5	3																
41.417536	-85.716055	3 A	163				3																
41.417617	-85.719869	3	164									1	5										
41.418054	-85.721022	10 A	165	—	—	—	—	—															
41.418993	-85.721816	5	166				1																
41.416373	-85.722418	5	167	3	3						3												
41.416787	-85.723894	4	168			5		3						1									
41.415841	-85.727439	3	169				3					3											
41.414382	-85.728835	3	170				5																
41.413029	-85.723943	14	171	5		1																	
41.413195	-85.726925	7	172	1																			
41.412269	-85.728458	5	173	—	—	—	—	—															
41.410315	-85.734066	4	174	—	—	—	—	—	—														
41.410829	-85.734233	6	175	3	1							1											
41.411397	-85.733456	5	176	3		1		1			1												
41.411633	-85.732645	7	177	3					3														
41.411835	-85.731653	6	178	5	1																		
41.413649	-85.731328	5 A	179	—	—	—	—	—															
41.414421	-85.732649	5 A	180	1			5																
41.414480	-85.733735	5	181		1	3	1					1											
41.415193	-85.735141	6	182	—	—	—	—	—															
41.416113	-85.735173	5	183								5												
41.416892	-85.734027	7	184				1																
41.416203	-85.731863	6 A	185				3					1											
41.414759	-85.729608	4	186				5																
41.418524	-85.727757	4	187				1																
41.417458	-85.733588	3	188	—	—	—	—	—															
41.418093	-85.733827	3	189	—	—	—	—	—															
41.418522	-85.732342	3	190									3											
41.418670	-85.730407	3	191	—	—	—	—	—	—														
41.419143	-85.731389	4	192	5																			
41.418990	-85.733678	3	193	1																			
41.419418	-85.734580	4	194	3																			
41.420370	-85.734383	4	195	—	—	—	—	—	—	—	—												
41.419104	-85.735726	0	196	—	—	—	—	—															
41.418809	-85.737111	0	197	—	—	—	—	—	—														
41.419416	-85.738102	4	198	1																			
41.417648	-85.738833	5	199	—	—	—	—	—															
41.417192	-85.739453	4	200	1																			

5

Lake Wawaset

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.418244	-85.734836	6	201								1												
41.417241	-85.735021	6	202	3							1												
41.416642	-85.735990	2	203																				
41.414029	-85.735011	4.5	204								1												
41.413870	-85.735362	5.5	205								1												
41.413843	-85.735624	5.5	206	3									1										
41.413924	-85.735991	4.5	207							3			1										
41.414340	-85.736760	6	208								1		1										
41.414846	-85.737418	6	209			1	1		1		1												
41.413963	-85.737601	6	210			5																	
41.414501	-85.737858	5	211			5																	
41.414473	-85.738628	7	212			5						1											
41.414200	-85.739817	8	213			5																	
41.413647	-85.741467	5	214			5																	
41.414692	-85.741563	6	215			5																	
41.413736	-85.742474	4	216	1		1																	
41.412400	-85.741652	10	217																				
41.413710	-85.735455	5	218								1												
41.413592	-85.735647	5	219			1			1			3					3						
41.413240	-85.735623	4.5	220																				
41.412772	-85.735443	5.5	221							1													
41.411231	-85.734994	4	222	3	1						3												
41.408497	-85.735779	4	223	5							1												
41.408676	-85.736586	5	224	3							1												
41.408275	-85.737539	5	225	5							3												
41.407418	-85.739079	4	226		3				1		1												
41.407762	-85.739978	4	227																				
41.408894	-85.740529	4	228			1	3																
41.408037	-85.741482	5	229	1						3													
41.407329	-85.741009	4.5	230	1	1																		
41.407053	-85.740414	7	231	5																			
41.406720	-85.740624	9	232	3							1												
41.406713	-85.740981	9.5	233	5					3														
41.406467	-85.741134	9	234	5					1														
41.406609	-85.741318	8.5	235	5																			
41.406738	-85.741551	6	236	5																			
41.406894	-85.741874	5.5	237	3	5																		
41.406652	-85.742018	4.5	238	3	1				1														
41.406329	-85.741631	11	239	5																			
41.406116	-85.741834	12	240	5																			
41.406295	-85.742016	8	241	5		1																	
41.406448	-85.743469	3.5	242	1	3	1																	
41.406091	-85.742402	7.5	243	5																			
41.405330	-85.743386	4	244									3											
41.403135	-85.743126	5	245				1																
41.405455	-85.742176	5	246	5																			
41.404937	-85.740657	7	247	5			3																
41.405498	-85.740507	8	248	5																			
41.405871	-85.739197	4	249	5																			
41.406494	-85.737519	2	250								5	3											

6

Secchi: 9.0 ft Lake Wawasee

		Depth	Site	Starry	Chara	EWM	Coontail	Sago	Illinois	Slender	Eel	Bladder	Whorled	Richardson's	Flat-stem	Saggitaria s	Elodea	Small	Nitella	American P	Variable	CLP	Largeleaf
41.406106	-85.735771	5	251																				
41.405869	-85.734271	4	252		1																		
41.405061	-85.732016	3	253							1													
41.406192	-85.730957	7	254		1	1		1												1			
41.407360	-85.731107	14	255	5																			
41.409058	-85.731721	10	256				5																
41.409865	-85.729886	22	257				3																
41.409458	-85.727177	20	258				3												1				
41.405674	-85.726078	4	259		1																		
41.403627	-85.721371	7	260	5																			
41.402014	-85.718272	5	261		3																		
41.402769	-85.715325	6	262					1	1	3	1									3			
41.400351	-85.714315	4	263		3				1			1											
41.398792	-85.711303	12	264		3	1				1	1												
41.397606	-85.711650	5	265																				
41.396156	-85.710643	5	266		1																		
41.394307	-85.705694	9	267																				
41.393081	-85.705719	5	268																				
41.392250	-85.703256	15	269		3																		
41.391209	-85.702295	5	270		3																		
41.390478	-85.700517	23	271																				
41.390450	-85.699861	16	272				1																
41.390846	-85.696390	17	273				3																
41.390357	-85.691885	19	274																				
41.390059	-85.691925	12	275		1																		
41.388074	-85.687901	5	276		3				1														
41.386286	-85.684490	18	277																1				
41.387047	-85.688552	4 P	278				3				1												
41.386232	-85.691375	5 P	279								1		3										
41.387408	-85.691570	5	280										3										
41.385404	-85.684681	3	281		3				1			1											
41.384673	-85.686297	5	282																				
41.385004	-85.688423	5 P	283																				
41.384425	-85.690769	4	284																				
41.383416	-85.684403	13	285	3																			
41.382728	-85.681466	16	286																				
41.381776	-85.682912	4	287		3		1																
41.379340	-85.684019	5	288										1										
41.376556	-85.684076	5	289																				
41.378226	-85.682390	13	290																				
41.376293	-85.681846	11	291																				
41.378818	-85.680989	4	292		3				1		1												
41.375713	-85.680887	11	293				1											3					
41.376558	-85.679577	3	294		1				1	1	1												
41.378901	-85.677495	10	295			3	3																
41.379088	-85.677331	19	296																				
41.377778	-85.675930	5	297			1		3			5				1								
41.378458	-85.675243	11	298				5			1				1									
41.378779	-85.672526	5	299																				
41.377188	-85.671629	4	300		1	1				1		3											

0 8.01 80.2
1 8.28 77.7
2 8.37 77.0
3 8.40 76.7
4 8.12 76.2
5 7.88 76.0
6 7.78 75.8
7 7.66 75.6
8 6.80 75.1
9 0.84 71.1
10 0.19 67.1
11 0.16 62.7
12 0.14 60.1
13 0.12 59.0

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Aquatic Vegetation Control Permits

Lake Wawasee EWM LARE Permit

Page 1 of ____

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R5 / 9-13)
Approved by State Board of Accounts, 2013

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

FEE $5.00

Check type of permit:
☐ Whole Lake ☒ Multiple Treatment Areas

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

Applicant Name Wawasee Area Conservancy Foundation	Lake Association Name Wawasee Area Conservancy Foundation	
Street or Rural Route		Telephone Number
City and State		ZIP Code
Certified Applicator Name	Company or Corporation Name	Certification Number
Street or Rural Route		Telephone Number
City and State		ZIP Code
Water Body Name (One application per water body)	Nearest Town	County
Is the body of water a water supply or does it flow into a water supply?		☐ Yes ☒ No

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

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
1	on map	32.5	4347	100

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
12	Mid-June	☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

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

Plant survey method: ☐ Rake ☒ Visual ☐ Other (*specify*) ____

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50			
curly-leaf pondweed		20			
sago pondweed		10			
coontail		20			

Page 2 of ____

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
2	on map	7.5	2025	250

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ■ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical
12	Mid June	

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

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50		☐	
curly-leaf pondweed	☐	20		☐	
sago	☐	10		☐	
coontail	☐	20		☐	
	☐			☐	

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
3	on map	52.4	3938	1497

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ■ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical
12	Mid June	

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

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50		☐	
curly-leaf pondweed	☐	20		☐	
sago pondweed	☐	10		☐	
coontail	☐	20		☐	
	☐			☐	

AGREEMENT

I have read and understand the Indiana Aquatic Vegetation Control Permit Laws and agree to abide by them. Under the penalties of perjury (IC 35-44-2-1), I affirm the information supplied by me is true and correct to the best of my knowledge.

Signature of Applicant _____ Date (*month, day, year*) _____

Signature of Certified Applicator _____ Date (*month, day, year*) _____

Make check or money order payable to DNR - Division of Fish and Wildlife in the amount of $5.00
Return completed application with the $5.00 permit fee to the address shown on page 1.

OFFICE USE ONLY

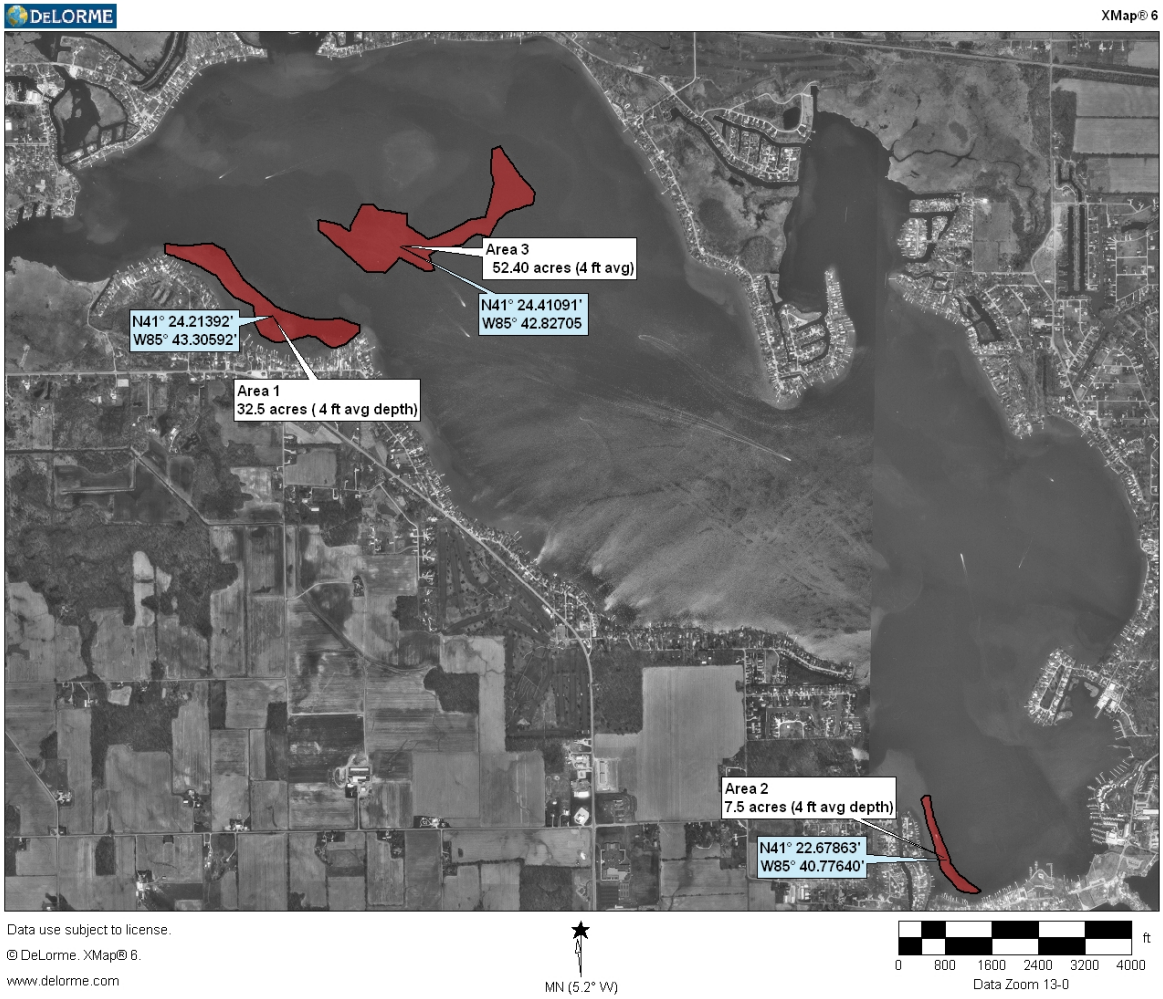
Permit Number	Check Number	Other

☐ Denied ☐ Approved ☐ Approved w/Conditions

Fisheries Section Approval

*****Wawasee EWM LARE Permit Map

These areas will not all be treated for EWM. They are simply high priority areas that could potentially be treated. Area 1 will be the highest priority, with the other two areas prioritized based on EWM severity in spring of 2016.



Syracuse Lake EWM LARE Permit

AWC was instructed to apply for up to 20 acres of EWM treatment on Syracuse Lake for the 2016 IDNR permit. The treatment areas on the following permit are potential areas based on 2015 EWM density. However, a final map will submitted prior to treatments in 2016.

Page 1 of ____

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT
State Form 26727 (R5 / 9-13)
Approved by State Board of Accounts, 2013

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

FEE $5.00

Check type of permit: ☐ Whole Lake ☒ Multiple Treatment Areas

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

Applicant Name: Syracuse Lake Association	Lake Association Name: Syracuse Lake Association	
Street or Rural Route		Telephone Number
City and State		ZIP Code
Certified Applicator Name	Company or Corporation Name	Certification Number
Street or Rural Route		Telephone Number
City and State		ZIP Code
Water Body Name (One application per water body)	Nearest Town	County
Is the body of water a water supply or does it flow into a water supply?		☐ Yes ☒ No

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

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
1	on map	3.85 ac	open water	open

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
12	Mid-June	☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

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

Plant survey method: ☐ Rake ☒ Visual ☐ Other (*specify*) ____

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50			
curly-leaf pondweed		20			
sago pondweed		10			
coontail		20			

Page 2 of ____

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
2	on map	7.68	open water	open water

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ■ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical
12	Mid June	

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

Plant survey method: ☐ Rake ■ Visual ☐ Other (*specify*) ____

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50		☐	
curly-leaf pondweed	☐	20		☐	
sago	☐	10		☐	
coontail	☐	20		☐	
	☐			☐	

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
3	on map	3.04	open water	open water

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ■ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical
12	Mid June	

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

Plant survey method: ☐ Rake ■ Visual ☐ Other (*specify*) ____

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	✓	50		☐	
curly-leaf pondweed	☐	20		☐	
sago pondweed	☐	10		☐	
coontail	☐	20		☐	
	☐			☐	

AGREEMENT

I have read and understand the Indiana Aquatic Vegetation Control Permit Laws and agree to abide by them. Under the penalties of perjury (IC 35-44-2-1), I affirm the information supplied by me is true and correct to the best of my knowledge.

Signature of Applicant ____ Date (*month, day, year*) ____

Signature of Certified Applicator ____ Date (*month, day, year*) ____

Make check or money order payable to DNR - Division of Fish and Wildlife in the amount of $5.00
Return completed application with the $5.00 permit fee to the address shown on page 1.

OFFICE USE ONLY

Permit Number	Check Number	Other

☐ Denied ☐ Approved ☐ Approved w/Conditions

Fisheries Section Approval

#

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
4-partial	on map	5.87	open water	open water

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ☑ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical
12	Early July	

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

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian watermilfoil	☑	50		☐	
sago pondweed	☐	25		☐	
coontail	☐	25		☐	
	☐			☐	
	☐			☐	

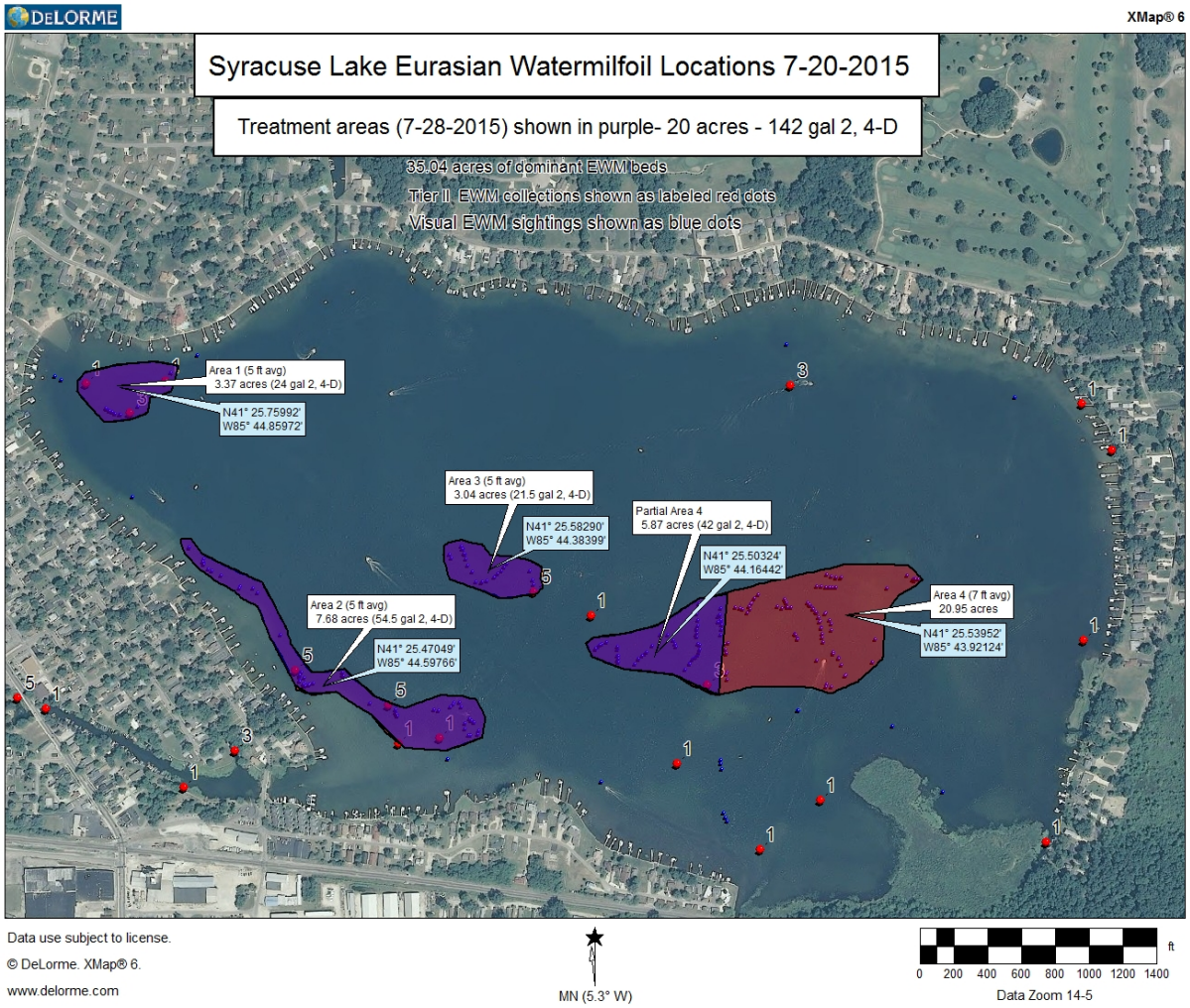
Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: ☑ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

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

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
	☐			☐	
	☐			☐	
	☐			☐	
	☐			☐	



*****Starry stonewort treatments have not needed a vegetation control permit in the past since they have been funded and controlled by the IDNR. It is likely that they will not need a permit in 2016.