Aquatic Vegetation Management Plan

For Big and Little Chapman Lakes

Kosciusko County, IN

Update 2013

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EXECUTIVE SUMMARY

The Chapman Lakes Conservation Association was awarded funding for an Aquatic Vegetation Management Plan (AVMP) Update by the IDNR Lake and River Enhancement Program (LARE) in the spring of 2013. The aquatic plant management plan for Chapman Lakes should meet the following goals as specified by the LARE program: 1) develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality, and is resistant to minor habitat disturbances and invasive species 2) direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species 3) provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

A mapping of invasive species was carried out on June 10th, 2013. Ten beds of Eurasian water-milfoil were initially mapped in the two lakes totaling 12.1 acres as well as 22.5 acres of channels. Based on EWM mapping performed by All Things Water just prior to herbicide application an additional 8.0 acres was identified to bring the total acreage to 42.6, On July 2 2013, 13.8 acres of EWM were treated in Big Chapman and Little Chapman, using Navigate® and DMA® 4. An additional 22.5 acres of EWM was treated in channels. On July 18, 2013, two acres of additional beds were treated with Navigate on Big Chapman Lake and on September 17, 2013 eight acres were treated with Navigate® on both lakes.

A post-treatment Tier II survey was carried out on August 12th, 2013. Six native submerged aquatic plant species were found in Little Chapman Lake and nine native submerged aquatic plant species were found in Big Chapman Lake. Sixty-seven percent of the littoral zone was vegetated for Little Chapman Lake and 73% was vegetated for Big Chapman Lake. Twelve submerged aquatic plant species (three non-natives) were found in Big Chapman Lake compared to nine (three non-natives) in Little Chapman Lake. Spiny naiad (*Najas marina*) was the most abundant species on Big Chapman Lake with a frequency of 40.0% in 2013 compared to 13.3% in 2012. This species only had a frequency of 2.0% on Little Chapman Lake in both 2013 and 2012. IDNR Division of Nature Preserves considers spiny naiad (*Najas marina*) to be a non-native species in Indiana and it is listed in this report as such. AQRS has conceded this for consistency regarding LARE funded reports, however this species is widely considered to be native throughout North America (Stuckey 1985, Flora of North America Editorial Committee 2000). Sago pondweed (33.3%), Chara spp. (24.4%), and common naiad (22.2%) were the most abundant species on Big Chapman Lake after spiny naiad. Coontail (36.7%), eel-grass (34.7%), and sago pondweed (28.6%) were the most common native species on Little Chapman Lake. EWM had a frequency of 11.1% and 6.1% respectively for Big and Little Chapman Lakes. Brittle naiad (*Najas minor*) which is a non-native species had a frequency of 6.1% on Little Chapman Lake.

Four specific quantifiable objectives for the Chapman Lakes which can be evaluated were to 1) reduce the frequency of occurrence at or below 10% for Eurasian water-milfoil in the post-treatment Tier II survey, and 2) To increase the frequency of the five most common native submerged aquatic plant species to at least 20% through the management of Eurasian water-milfoil and curly-leaf pondweed, and 3) To maintain a minimum of 11 native submerged species and a minimum native species diversity index of 0.82 or greater for Big Chapman Lake, and 4) To maintain a minimum of 8 native submerged species and a minimum native species diversity index of 0.78 for Little Chapman Lake. Post-treatment Tier II survey results for Big Chapman Lake indicate a frequency of 11.1% for EWM which is slightly higher than the threshold frequency of 10% required to meet objective one and is marginally lower than the post-treatment value for

EWM in 2012 of 13%. The five most common native aquatic plant species had a frequency >20% which does meet the second objective. Post-treatment Tier II survey results for Little Chapman Lake indicate a frequency of only 4.0% for EWM which meets the first objective. Only three of the most common native submerged aquatic species on Little Chapman Lake had a frequency ≥20% which is a similar result to 2012. Continued herbicide treatment should contribute to an increase in native species over the next few years and allow attainment of objective two. Objectives three and four were set in 2012 based on data from that year and previous years. In 2013 species diversity declined slightly to six native species on Big Chapman Lake but native species diversity increased from 2012 from 0.82 to 0.86. This is a reflection of the fact that although species number declined the frequency of native species was higher than in previous years. Therefore half of objective three was met. On Little Chapman Lake both number of native species as well as native species diversity was down in 2013. Thus objective four was not met for 2013. It is likely that the late season start for aquatic plants in 2013 as well as the prevalence of algae blooms probably contributed to the reductions in numbers and the frequency of occurrence of these species.

A strategy for control of EWM was discussed at the IDNR permit meeting held on October 3rd, 2013 at the IDNR offices in Columbia City. In attendance were Robin Scribailo (AQRS), Rod Edgell (IDNR) and Bill Magurany and Derek Finch (Chapman Lakes Conservation Association). It was felt that the best strategy for 2013 was to continue with the same herbicide strategy and acreage as was used in 2013. The proposed budget for 2014 is to herbicide 39.1 acres of EWM with DMA4 and 13.5 acres with Navigate.

ACKNOWLEDGEMENTS

Funding for this project has been provided by a grant obtained from the Indiana Department of Natural Resources, Lake and River Enhancement (LARE) Program and cost-share assistance from the Chapman Lakes Conservation Association. We acknowledge Rod Edgell and Greg Biberdorf of the Indiana Department of Natural Resources, Division of Fish and Wildlife, for their assistance during the course of this project. Special thanks are also given to Charlie Hawkins of All Things Water (Elkhart, IN) for his insight on herbicide options and assistance with permit applications. We also thank Bill Magurany and Derek Finch of the Chapman Lakes Conservation Association for their support on this project.

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1.0. INTRODUCTION

The Chapman Lakes Conservation Association received a grant in April, 2013 from the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement Program (LARE) to prepare an aquatic vegetation management plan (AVMP) update for 2013. Aquatic Restoration Systems, LLC was awarded the contract to prepare the AVMP update with a 20% match from the Chapman Lakes Conservation Association. Funding for herbicide application was awarded to All Things Water (Elkhart, Indiana). This AVMP update for Chapman Lakes summarizes data collected in 2013 and represents a continuation of LARE funding from 2012 (with a six year hiatus) following an initial AVMP (Aquatic Weed Patrol (2004) and an update for 2005 and 2006 (JFNew 2007) .

The overall purpose of the LARE program as stated in the LARE brochure (INDR 2005):

> "… is to ensure the continued viability of Indiana's publicly accessible lakes, streams, and reservoirs. Program goals include (a) controlling inflows of eroded soil and associated nutrients to lakes, streams, and reservoirs and (b) where appropriate, forestalling or reversing degradation from these inflows through remedial actions. To accomplish these goals, the LARE Section of the IDNR Division of Fish and Wildlife provides technical and financial assistance to qualified projects. These include: (a) studies, management plans, sediment removal and design and construction activities involving specific lakes or streams; (b) land treatment practices or management plans for designated watersheds and (c) management plans and control of exotic plants and animals in targeted lakes. Funding for the LARE program is provided by an annual fee charged to boat owners."

1.1. Problem Statement

Big Chapman and Little Chapman Lakes are considered to be mesotrophic and eutrophic, respectively. They have had management issues in the past with Eurasian water-milfoil (EWM) and to a lesser extent with curly-leaf pondweed. Although difficult to document, heavy growths of EWM are well known to frustrate the ability of anglers to fish without incessant line-snagging and reductions in the quality and size of fish catches, and snarl boat propellers reducing boat-related activities, such as water skiing. Reductions in the extent of EWM are correlated with overall increases in aquatic plant diversity (Carpenter 1980; Nichols and Lathrop 1994) as well as the diversity, abundance, and size of certain cohorts of game fish (e.g., Unmuth et al. 1999).

The aquatic plant management plan for Chapman Lake should meet the following goals as specified by the LARE program:

1. to develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality, and is resistant to minor habitat disturbances and invasive species;

2. to direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species;

3. to provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

1.2. Specific Objectives

No specific quantifiable objectives were articulated in the initial AVMP from (Aquatic Weed Patrol 2004). In addition to the more general LARE goals previously discussed, the following four objectives are quantifiable benchmarks that are realistic and attainable for this plan and were set down in the AVMP Update for 2012. The same objectives are reiterated in this report.

1. To reduce the frequency of occurrence at or below 10% for Eurasian water-milfoil in the post-treatment Tier II survey;

2. To increase the frequency of the five most common native submerged aquatic plant species over 20% through the management of Eurasian water-milfoil and curly-leaf pondweed;

3. To maintain at least a minimum of 11 native submerged species and at least a minimum native species diversity index of 0.82 for Big Chapman Lake in a post-treatment tier II survey;

4. To maintain at least a minimum of 8 native submerged species and at least a minimum native species diversity index of 0.78 for Little Chapman Lake in a post-treatment tier II survey.

1.3. Management History

Chapman Lakes have a long history of LARE funding for lake management issues. The herbicide application history of these lakes has been summarized in Tables 1.0 and 2.0, which includes information from the initial AVMP from 2004 (Aquatic Weed Patrol 2005) as well as information from updates for 2005 and 2006 (JFNew 2007). In the absence of LARE funding from 2007-2011, lake association funds were used to treat about 10 acres on the east shoreline of Big Chapman Lake and 10 acres at the northeast end of Little Chapman Lake for EWM each year (Bill Magurany, pers. comm.). In 2012 additional LARE funding was awarded for control of EWM.

1.4. Watershed and Water Body Characteristics

Excellent detailed information on this subject is available from the Lake Diagnostic Study carried out by JFNew and the School of Public and Environmental Affairs of Indiana University (SPEA) in 2001 as well as the more recent Chapman Lakes Strategic Lakes Management Plan (JFNew & DJ Case 2007). The most recent report available summarizes efforts to remove sediment from various inflow sites on Big Chapman Lake (JFNew 2009). All of these reports as well as the AVMP Update for 2012 are available online at the Lake and River Enhancement website of IDNR. The lakes are used heavily for boating, water skiing (particularly on Big Chapman Lake), and sport fishing in the summer and winter.

2.0. METHODS

To ensure some consistency among the surveys of the aquatic plant community in the Chapman Lakes, the coordinates from the August Tier II survey performed by JFNew (2006) were used as sampling points in 2012 and again in 2013 (Figure 3.0). Aquatic plant sampling methods used in this survey are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR 2010a). The number of random sample points required for the various community metrics is based on lake surface area and the trophic state of the lake (Table 4.0). The

sampling site locations for non-native species were mapped with a Trimble GeoXT™ global positioning system (GPS) real-time differential corrected receiver to determine the extent of their coverage and to locate beds for herbicide application.

Taxonomy and nomenclature of vascular aquatic macrophytes follows the familial treatments of the Flora of North America Editorial Committee (1997, 2000, 2002a, 2002b, 2002c) with the following exceptions: Haloragaceae (Scribailo and Alix, unpubl. data), and Lentibulariaceae (Taylor 1989). Taxonomic treatment of the Characeae follows Daily (1953) and Wood (1965), with nomenclatural revisions where necessary (e.g., see Scribailo and Alix 2010).

3.0. RESULTS

3.1. Mapping Non-native Species

An initial mapping of invasive species was carried out on June 10th, 2013. Although the lakes were visited several times in May to attempt mapping a very cool, wet spring contributed to a late development of aquatic plant beds. Ten beds of Eurasian water-milfoil (EWM) were mapped on the two lakes totaling 12.1 acres as well as 22.5 acres of channel. The ten beds are labeled 1-10 in Table 3.0 and are shown in Figure 1.0 as blue polygons for Big Chapman Lake and yellow polygons for Little Chapman Lake. The channel acreage is identified as such in Table 3.0 and in Figure 1.0 is shown as green polygons on Big Chapman Lake and as red polygons on Little Chapman Lake.

3.2. Non-native Species Treatment

All of the acreage of EWM initially identified during mapping was treated on 07/02/13 as well as several additional beds of EWM identified at this time (orange beds in Figure 1.0). On 08/18/13, two acres of additional beds of EWM were treated with Navigate on Big Chapman Lake and on 09/17/13 eight acres were treated with Navigate on both lakes (Table 3.0). Dosage rates were adjusted for average depth so that a concentration of 2.00 ppm was maintained for both Navigate and DMA4. This concentration was found to be effective while doing less damage to associated species.

3.3. Tier II Post-treatment Survey

A post-treatment Tier II survey was done on August 12th, 2013. Six native submerged aquatic plant species were found in Little Chapman Lake (Table 5.0) and nine native submerged aquatic plant species were found in Big Chapman Lake (Table 6.0). Sixty-seven percent of the littoral zone was vegetated for Little Chapman Lake and 73% was vegetated for Big Chapman Lake. Twelve submerged aquatic plant species (three non-natives) were found in Big Chapman Lake compared to nine (three non-natives) in Little Chapman Lake. Spiny naiad (*Najas marina*) was the most abundant species on Big Chapman Lake with a frequency of 40.0% in 2013 compared to 13.3% in 2012. This species only had a frequency of 2.0% on Little Chapman Lake in both 2013 and 2012. IDNR Division of Nature Preserves considers spiny naiad (*Najas marina*) to be a non-native species in Indiana and it is listed in this report as such. AQRS has conceded this for consistency regarding LARE funded reports, however this species is widely considered to be native throughout North America (Stuckey 1985, Flora of North America Editorial Committee 2000). Spiny naiad was also very prevalent at Lower Fish Lake in La Porte County in 2013 where, like Big Chapman Lake, it was at low frequency the previous year. The sudden increase of this annual species indicates the extent of the seed bank that must be present in the sediments of these two lakes to bring about such a large increase in frequency. Sago pondweed (33.3%), Chara spp. (24.4%), and common naiad (22.2%) were the most abundant species on Big Chapman Lake after spiny naiad (Table 12.0). Coontail (36.7%), eel-grass (34.7%), and sago pondweed (28.6%) were the most common native species on Little Chapman Lake. EWM had a frequency of 11.1%

and 6.1% respectively for Big and Little Chapman Lakes. Since no pre-treatment tier II was performed it is not possible to quantify the effectiveness of the herbicide treatment. In 2012 the frequency of EWM dropped from the pre-treatment levels of 31% and 55% for Big and Little Chapman Lakes respectively, to 6.9% and 0.0%, respectively, in the second survey (Tables 7.0-10.0). Nevertheless, the re-growth by September from some of the original treated beds warranted a second application as noted previously. Curly-leaf pondweed only had a frequency of 3.3% on Big Chapman and was absent from Little Chapman in the Tier II survey, which is expected since it is an early season species that often dies back by July. Mapping for this species in May indicated almost a complete absence of this species from both lakes. Secchi disc transparency was only 6.5 ft. in Big Chapman Lake and 5.0 ft. in Little Chapman Lake. Brittle naiad (*Najas minor*) which is a non-native species had a frequency of 6.1% on Little Chapman Lake. The latter is considered to be a non-native, but is not expected to interfere with recreational activity on the lake since it is at low frequency.

3.4. Threatened and Endangered Species

Fries' pondweed (*Potamogeton friesii*) was found in both Big and Little Chapman Lakes in the early season survey Tier 2 from 2012 with a frequency of 35%. Fries' pondweed is an early summer species and dies back to turions by July, much like curly-leaf pondweed, and was thus absent from the post-treatment Tier II survey in 2013. The former species is state threatened in Indiana (IDNR 2010b), though it is likely more common in the state than currently documented. It has been noted in the lake since the initial AVMP by Aquatic Weed Patrol (2004).

3.5. Discussion

Four specific quantifiable objectives for the Chapman Lakes which can be evaluated were to 1) reduce the frequency of occurrence at or below 10% for Eurasian water-milfoil in the post-treatment Tier II survey, and 2) To increase the frequency of the five most common native submerged aquatic plant species to at least 20% through the management of Eurasian water-milfoil and curly-leaf pondweed, and 3) To maintain a minimum of 11 native submerged species and a minimum native species diversity index of 0.82 or greater for Big Chapman Lake, and 4) To maintain a minimum of 8 native submerged species and a minimum native species diversity index of 0.78 for Little Chapman Lake. Post-treatment Tier II survey results for Big Chapman Lake indicate a frequency of 11.1% for EWM which is slightly higher than the threshold frequency of 10% required to meet objective one and is marginally lower than the post-treatment value for EWM in 2012 of 13%. It is encouraging to see that the five most common native species had a frequency >20% which does meet the second objective (Table 12.0). Post-treatment Tier II survey results for Little Chapman Lake indicate a frequency of EWM of only 4.0% which certainly meets the first objective. Only three of the most common native submerged aquatic species had a frequency ≥20% which is a similar result to 2012. Continued herbicide treatment should contribute to an increase in native species over the next few years and allow attainment of objective two. Objectives three and four were set in 2012 based on data from that year and previous years (Table 5.0 and 6.0). In 2013 species diversity declined slightly to six native species on Big Chapman Lake but native species diversity increased from 2012 from 0.82 to 0.86. This is a reflection of the fact that although species number declined the frequency of native species was higher than in previous years. Therefore half of objective three was met. On Little Chapman Lake both number of native species as well as native species diversity was down in 2013 (Table 6.0). Thus objective four was not met for 2013. It is likely that the late season start for aquatic plants in 2013 as well as the prevalence of algae blooms probably contributed to the reductions in numbers and the frequency of occurrence of these species. Continued monitoring in subsequent years will provide benchmarks for an assessment of the health of the submerged aquatic plant community over time. If the number of native submerged aquatic plant species and native species diversity index substantially declines, strategies for managing non-native species may have to be reassessed.

The average number of species for Big Chapman Lake in particular, is well above the average number of eight submerged aquatic plant species found for a set of 21 northern Indiana lakes (Pearson 2004). An examination of aquatic plant data for the Chapman Lakes indicates that little has changed over the last decade. Most of the species present have maintained similar frequencies over this time period (Table 7.0 and 8.0). Eurasian water-milfoil continues to be the main problem invasive species on the lake and appeared to increase in frequency (2007-2011) in the absence of an aggressive control program. Curly-leaf pondweed is only a minor problem and the low nutrient status of Big Chapman Lake in particular tends to keep it as an infrequent species. Current dredging and construction projects to limit or remove nutrient inputs into the lakes, and a continued invasive aquatic plant management effort, should reduce the problem with EWM over the long-term and increase the frequency of native aquatic plant species. These efforts should bring about a continued improvement in lake quality and make attainment of the specific objectives possible in the coming years.

4.0. ACTION PLAN and BUDGET

A strategy for control of EWM was discussed at the IDNR permit meeting held on October 3rd, 2013 at the IDNR offices in Columbia City. In attendance were Robin Scribailo (AQRS), Rod Edgell, Neil Ledet, Larry Koza (IDNR), and Bill Magurany and Derek Finch (Chapman Lakes Conservation Association). It was felt that the best strategy for 2013 was to continue with the same herbicide strategy and acreage as was used in 2013. EWM will be initially treated in late May or early June with a second application in September depending upon the effectiveness of the first application. Navigate is used on Big Chapman Lake because the aquatic plants extend to greater depths than on Little Chapman lake. DMA® 4 is used on Little Chapman Lake and in the channels of both lakes. Treatment areas are shown in Table 3.0. All dosage rates for navigate and DMA4 will be adjusted by depth to maintain a concentration of 2, 4-D of 2.00 ppm. Average depths shown are based on acre ft calculations from Table 3.0. Although the projected budget has funding for more EWM than was present in 2013 particularly for Little Chapman Lake it is expected that 2014 will likely be a more typical year with more extensive beds of EWM at the southeast end of the lake.

4.1. Budget (all treatments are for EWM)

Projected Budget 2014

13.5 acres Big Chapman with Navigate® @ $448.00/acre (6.0 ft)	$6048
20.0 acres Big Chapman Lake (channels) with DMA® 4 @ $260.00/acre (4.0 ft)	$5200
19.1 acres Little Chapman with DMA® 4 @ $260/acre (4.0 ft)	$4966
Herbicide Total	**$16214**
Aquatic vegetation management plan update	$5500
Total Funds Requested	**$21714**
Chapman Lakes Association 20% Cost Share (if funded)	**$4343**

5.0. PUBLIC INVOLVEMENT

Robin Scribailo presented results from the AVMP to about 20 lake residents on November 3rd, 2013 at the Chapman Lakes clubhouse in Warsaw. The presentation gave a brief background on lake ecology, summarized the requirements of an aquatic plant management plant, discussed results of the surveys of the lakes, and presented management strategies for 2013. Several residents commented that they had never really thought much about the interconnectedness between different biological levels in lakes and how important these are to lake health. Questions about the lake quality of the Chapman Lakes compared to other Indiana lakes were discussed in the context of future strategies for lake management. Results of a public survey will be incorporated into the report when available.

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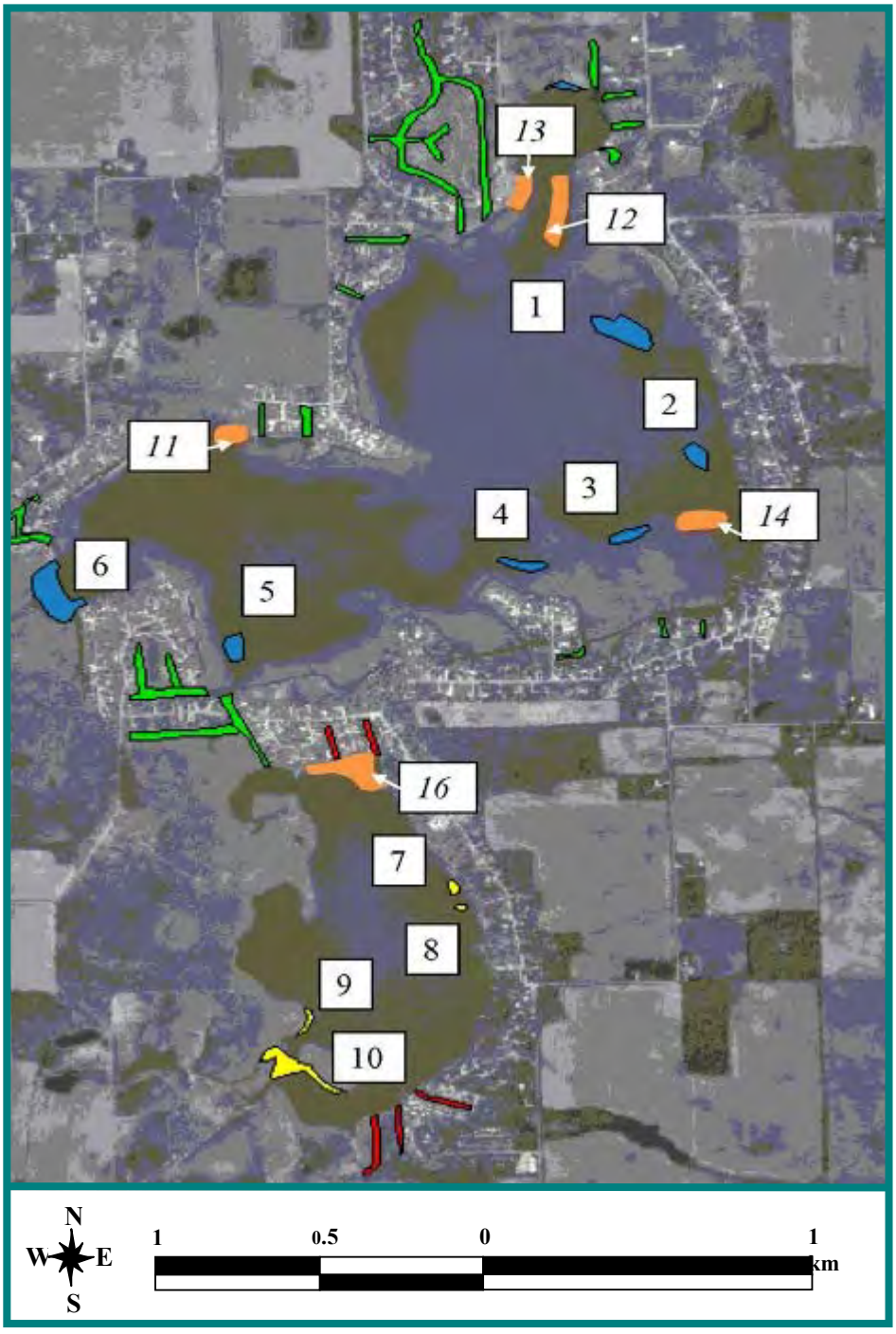

Figure 1.0. Coverage of *Myriophyllum spicatum* (Eurasian water-milfoil) on June 10th, 2013 (blue and yellow polygons). Additional beds (orange polygons) were mapped at various times later in the summer. Green and red polygons indicate the extent of EWM in channels of Big and Little Chapman Lakes, respectively. (Orthophotograph courtesy of the United States Geological Survey)

Table 1.0. Treatment History of Eurasian water-milfoil, curly-leaf pondweed, sago pondweed, and other aquatic plants at Little Chapman Lake.

		Acres Treated			
Year	Company	Eurasian water-milfoil	Curly-leaf pondweed	Sago pondweed	Other
2005*	Aquatic Control	13	—	—	—
2006*	Aquatic Control	2	10	—	—
2007	Chapman Lake Assoc.	~10	—	—	—
2007	Weed Patrol	7	—	—	—
2008	Chapman Lake Assoc.	~10	—	—	—
2009	Chapman Lake Assoc.	~10	—	—	—
2010	Chapman Lake Assoc	~10	—	—	—
2010	Aquatic Weed Control	1.03	—	—	—
2011	Chapman Lake Assoc.	~10	—	—	—
2011	Aquatic Weed Control	1.58	—	—	—
2011	Clarke Aquatic Services	1.70	—	—	—
2012	Aquatic Weed Control	1.58	—	—	—
2012*	All Things Water	19	—	—	—
2013*	All Things Water	7.5	—	—	—

*Treatment funded by the LARE Program

Table 2.0. Treatment History of Eurasian water-milfoil, curly-leaf pondweed, sago pondweed, and other aquatic plants at Big Chapman Lake.

		Acres Treated			
Year	Company	Eurasian water-milfoil	Curly-leaf pondweed	Sago pondweed	Other
2005*	Aquatic Control	7.5	—	—	—
2006*	Aquatic Control	12	10	—	—
2006	Weed Patrol	7	—	—	—
2007	Chapman Lake Assoc.	~10	—	—	—
2007	Weed Patrol	11.5	—	—	—
2008	Chapman Lake Assoc.	~10	—	—	—
2009	Chapman Lake Assoc.	~10	—	—	—
2010	Chapman Lake Assoc	~10	—	—	—
2010	Aquatic Weed Control	4.53	—	—	—
2010	Clarke Aquatic Services	0.5	—	4	—
2011	Chapman Lake Assoc.	~10	—	—	—
2011	Aquatic Weed Control	0.5	—	—	—
2011	Clarke Aquatic Services	—	—	—	6.1
2012	Aquatic Weed Control	9.45	—	—	—
2012*	All Things Water	38	—	—	—
2013*	All Things Water	35.1	—	—	—

*Treatment funded by the LARE Program

Table 3.0. Summary of herbicide treatment at Big and Little Chapman Lakes in 2013. Dosage rates for DMA® 4, and Navigate® were 2.00 ppm.

Lake	ID	Acreage	Average Depth (ft)	Acre feet	Chemical	Date Treated
Big Chapman	1	2.5	6.0	15.0	Navigate®	07/02/13
Big Chapman	2	0.82	4.0	3.28	DMA® 4	07/02/13
						07/22/13
						09/17/13
Big Chapman	3	0.78	2.0	1.56	DMA® 4	07/02/13
Big Chapman	4	0.80	3.0	2.4	Navigate®	07/02/13
Big Chapman	5	1.00	5.0	5.0	Navigate®	07/02/13
Big Chapman	6	3.2	6.0	19.2	Navigate®	07/02/13
						09/07/13
Big Chapman	11	1.0	8.0	8.0	Navigate®	07/22/13
Big Chapman	12	2.0	8.0	16.0	Navigate®	08/18/13
Big Chapman	13	1.0	8.0	4.0	Navigate®	07/22/13
Big Chapman	14	2.0	7.0	14.0	Navigate®	09/17/13
Total		**15.1**		**88.4 Average depth 6.0 ft**		
Big Chapman Channels		20.0	4.0	80.0	DMA® 4	07/02/13
Total Big Chapman		**35.1**		**168.4**		
Little Chapman	7	0.31	6.0	1.86	DMA® 4`	07/02/13
Little Chapman	8	0.19	7.0	1.33	DMA® 4	07/02/13
Little Chapman	9	0.2	6.0	1.2	DMA® 4	07/02/13
Little Chapman	10	2.3	4.0	9.2	DMA® 4	07/02/13
Little Chapman	16	2.0	3.0	6.0	Navigate®	09/17/13
Total		**5.0**		**19.59 Average Depth 4.0 ft**		
Little Chapman Channels		2.5	4.0	10.0	DMA® 4	07/02/13
Total Little Chapman		**7.5**		**65.6**		
Total both lakes		**42.6**				

Figure 2.0. Distribution of sample locations. (Orthophotograph courtesy of the United States Geological Survey)

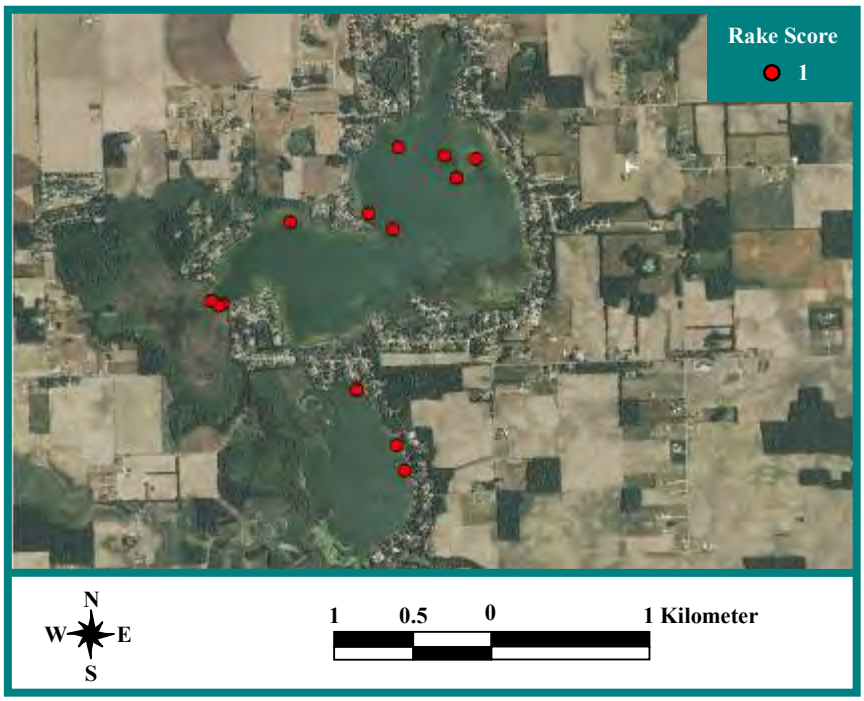

Figure 3.0. Distribution and abundance of *Myriophyllum spicatum* (Eurasian water-milfoil). (Orthophotograph courtesy of the United States Geological Survey)

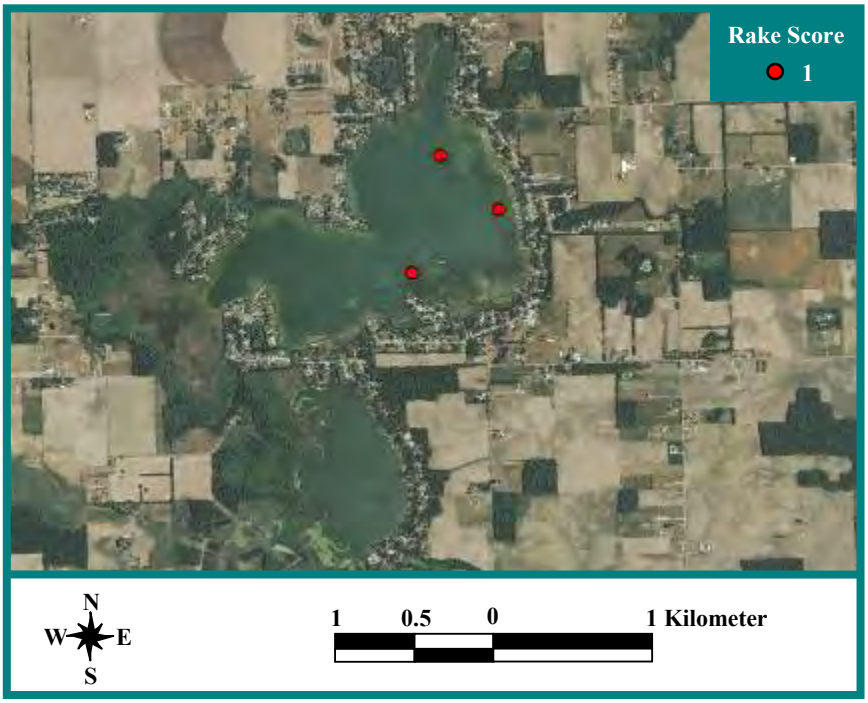

Figure 4.0. Distribution and abundance of *Potamogeton crispus* (curly-leaf pondweed). (Orthophotograph courtesy of the United States Geological Survey)

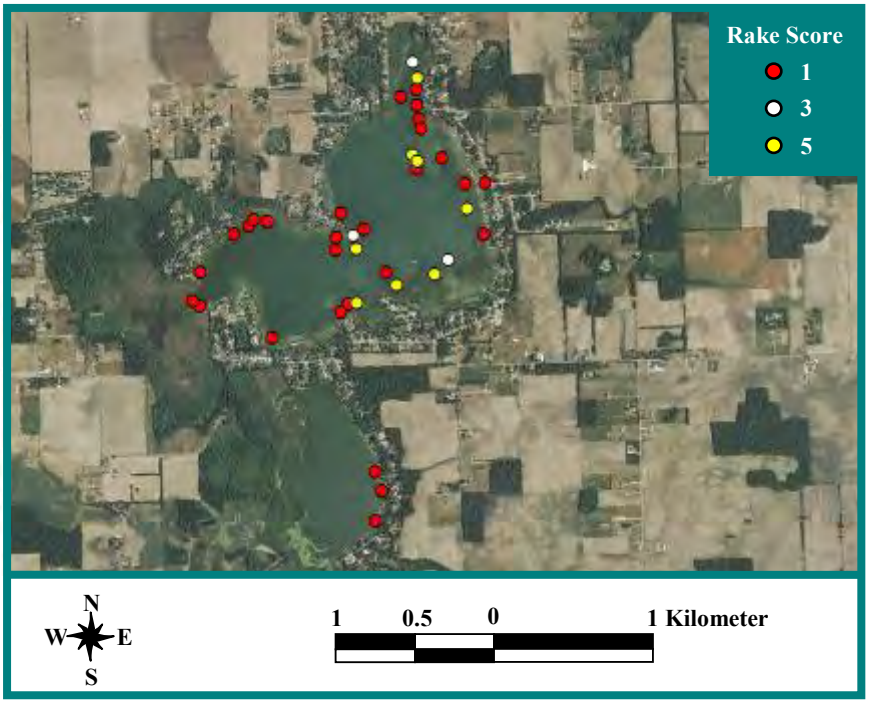

Figure 5.0. Distribution and abundance of *Najas minor* (brittle naiad). (Orthophotograph courtesy of the United States Geological Survey)

Figure 6.0. Distribution and abundance of *Najas marina* (spiny naiad). (Orthophotograph courtesy of the United States Geological Survey)

Table 4.0. Protocol for the number of random samples required for the determination of aquatic vegetation abundance. The number of samples is based on lake surface area and trophic state, in which samples are distributed by depth class (modified from IDNR 2010). Values in boldface type correspond to sampling regime for Little Chapman and Big Chapman Lakes, respectively.

	Number of Random Samples														
		Hypereutrophic Contours		Eutrophic Contours			Mesotrophic Contours				Oligotrophic Contours				
Lake Surface Area (Acres)	Total	0-5	5-10	0-5	5-10	10-15	0-5	5-10	10-15	15-20	0-5	5-10	10-15	15-20	20-25
<10	20	10	10	10	7	3	10	5	3	2	10	4	3	2	1
10-49	30	20	10	10	10	10	10	10	7	3	10	10	5	3	2
50-99	40	30	10	17	13	10	10	10	10	10	10	10	10	7	3
100-199	**50**	40	10	**23**	**17**	**10**	14	14	12	10	10	10	10	10	10
200-299	60	50	10	30	20	10	18	16	16	10	14	12	12	12	10
300-399	70	60	10	37	23	10	22	20	18	10	17	15	14	14	10
400-499	80	70	10	43	27	10	25	25	22	10	19	18	17	16	10
500-799	**90**	80	10	50	30	10	**29**	**27**	**24**	**10**	22	21	19	18	10
≥800	100	90	10	57	33	10	33	31	26	10	25	23	22	20	10

Table 5.0. Summary of aquatic plant community metrics for Little Chapman Lake.

	Spring Surveys					Summer Surveys							
Metric	2005[b]	2006[b]	2006[c]	2007	2012	2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2012	2013
% littoral sites with plants	86	80	80	74	92	92	74	90	65	80	70	80	67
Total number of species	6	7	10	7	8	11	7	9	8	10	6	9	8
Total number of native species	4	5	8	5	6	9	5	5	7	8	5	8	6
$\bar{}$ species richness /site	1.41	1.06	1.35	1.36	2.08	1.98	1.02	1.97	0.98	1.56	1.12	1.51	1.24
$\bar{}$ native species richness/site	0.57	0.56	0.61	0.94	1.43	1.50	0.77	1.72	0.70	1.34	0.72	1.51	1.10
Species diversity	0.71	0.77	0.84	0.76	0.76	0.82	0.75	0.83	0.77	0.80	0.76	0.78	0.77
Native species diversity	0.41	0.67	0.76	0.68	0.65	0.78	0.66	0.59	0.71	0.74	0.74	0.78	0.72

[a]Surveys conducted by Aquatic Weed Patrol.
[b]Surveys conducted by Indiana Department of Natural Resources
[c]Surveys conducted by JFNew and Associates

Table 6.0. Summary of aquatic plant community metrics for Big Chapman Lake.

	Spring Surveys					Summer Surveys								
Metric	2005[b]	2006[b]	2006[c]	2007[b]	2012	2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
% littoral sites with plants	93	95	86	95	89	99	98	100	95	92	93	93	84	73
Total number of species	13	13	13	15	16	16	17	19	13	17	10	13	13	12
Total number of native species	11	10	11	12	13	14	14	15	10	15	7	10	11	9
$\bar{}$ species richness/site	1.63	2.32	1.50	2.07	1.83	2.54	2.44	3.39	2.32	2.83	1.84	2.22	1.70	2.12
$\bar{}$ native species richness/site	1.03	1.79	1.06	1.58	1.44	2.26	1.91	2.70	1.79	2.72	1.17	1.69	1.56	1.58
Species diversity	0.82	0.86	0.84	0.86	0.86	0.88	0.88	0.89	0.86	0.88	0.85	0.88	0.84	0.88
Native species diversity	0.72	0.81	0.77	0.80	0.82	0.86	0.85	0.86	0.81	0.86	0.79	0.84	0.82	0.86

[a]Surveys conducted by Aquatic Weed Patrol.
[b]Surveys conducted by Indiana Department of Natural Resources
[c]Surveys conducted by JFNew and Associates.

Table 7.0. Summary of frequency of occurrence data, apportioned by depth class, collected from spring surveys conducted on Little Chapman Lake. Synonyms provided in parentheses. Horizontal bar (—) = not recorded.

		Survey Year				
Taxon	Common Name	2005[a]	2006[a]	2006[b]	2007[a]	2012
0-15 FT CONTOUR						
Ceratophyllum demersum	Coontail	42.9	28.0	36.0	46.0	75.5
Chara spp.	Stonewort	7.1	12.0	10.0	18.0	18.4
Elodea sp.	Waterweed	1.8	——	——	——	——
Heteranthera dubia	Water star-grass	——	——	——	——	2.0
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	26.0	——	——
Myriophyllum spicatum	Eurasian water-milfoil	53.6	36.0	24.0	40.0	55.1
Najas flexilis	Common naiad	——	——	——	——	2.0
Najas guadalupensis	Southern Naiad	——	——	4.0	——	——
Najas marina	Spiny naiad	——	——	——	——	——
Najas minor	Brittle naiad	——	——	——	——	——
Nitella sp.	Stonewort	——	——	——	2.0	——
Potamogeton crispus	Curly-leaf pondweed	30.4	14.0	16.0	2.0	10.2
Potamogeton friesii	Fries' pondweed	——	——	——	——	18.4
Potamogeton foliosus	Leafy pondweed	——	——	——	——	——
Potamogeton gramineus	Variable-leaved pondweed	——	——	6.0	——	——
Potamogeton illinoensis	Illinois pondweed	——	2.0	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	2.0	——	——
Potamogeton zosteriformis	Flat-stem pondweed	5.4	4.0	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	12.0	12.0	——
Vallisneria americana	Eel-grass	17.9	10.0	2.0	16.0	26.5
0-5 FT CONTOUR						
Ceratophyllum demersum	Coontail	59.1	43.5	48.0	56.5	77.3
Chara spp.	Stonewort	13.6	17.4	22.0	30.4	18.2
Elodea sp.	Waterweed	4.5	——	——	——	——
Heteranthera dubia	Water star-grass	——	——	——	——	4.5
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	43.0	——	——
Myriophyllum spicatum	Eurasian water-milfoil	59.1	52.2	26.0	56.5	59.1
Najas guadalupensis	Southern Naiad	——	——	9.0	——	——
Potamogeton amplifolius	Broad-leaved pondweed	——	4.3	——	——	——
Potamogeton crispus	Curly-leaf pondweed	22.7	17.4	9.0	——	22.7
Potamogeton friesii	Fries' pondweed	——	——	——	——	13.6
Potamogeton gramineus	Variable-leaved pondweed	——	——	13.0	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	4.0	——	——
Potamogeton zosteriformis	Flat-stem pondweed	9.1	4.3	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	17.0	26.1	——
Vallisneria americana	Eel-grass	——	21.7	——	21.7	9.1

Table 7.0.—Continued

Taxon	Common Name	Survey Year 2005[a]	2006[a]	2006[b]	2007[a]	2012
5-10 FT CONTOUR						
Ceratophyllum demersum	Coontail	47.8	23.5	41.0	41.2	64.7
Chara spp.	Stonewort	4.3	11.8	——	11.8	23.5
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	12.0	——	——
Myriophyllum spicatum	Eurasian water-milfoil	65.2	35.3	41.0	35.3	58.8
Najas flexilis	Common naiad	——	——	——	——	5.9
Nitella sp.	Stonewort	——	——	——	5.9	——
Potamogeton crispus	Curly-leaf pondweed	52.2	17.6	35.0	5.9	——
Potamogeton friesii	Fries' pondweed	——	——	——	——	35.3
Potamogeton zosteriformis	Flat-stem pondweed	——	5.9	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	12.0	——	——
Vallisneria americana	Eel-grass	——	——	6.0	11.8	64.7
10-15 FT CONTOUR						
Ceratophyllum demersum	Coontail	——	——	——	30.0	90.0
Chara spp.	Stonewort	——	——	——	——	10.0
Myriophyllum spicatum	Eurasian water-milfoil	22.2	——	——	10.0	40.0
Potamogeton amplifolius	Broad-leaved pondweed	——	——	——	——	——
Potamogeton zosteriformis	Flat-stem pondweed	11.1	——	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	——	——	——
Vallisneria americana	Eel-grass	——	——	——	10.0	——

[a]Surveys conducted by Indiana Department of Natural Resources
[b]Surveys conducted by JFNew and Associates.

Table 8.0. Summary of frequency of occurrence data, apportioned by depth class, collected from summer surveys conducted on Little Chapman Lake. Synonyms provided in parentheses. Horizontal bar (—) = not recorded.

Taxon	Common Name	Survey Year							
		2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2012	2013
0-15 FT CONTOUR									
Ceratophyllum demersum	Coontail	55.0	39.3	51.7	32.0	42.0	28.0	57.1	36.7
Chara spp.	Stonewort	22.5	10.7	21.7	8.0	16.0	14.0	26.5	4.1
Heteranthera dubia	Water star-grass	——	1.8	——	——	2.0	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	10.0	——	——	——	20.0	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	50.5	23.2	20.0	28.0	18.0	40.0	——	6.1
Najas sp.	Naiad	——	——	——	4.0	——	4.0	——	——
Najas flexilis	Common naiad	——	——	——	——	2.0	——	12.2	2.0
Najas guadalupensis	Southern Naiad	——	——	10.0	——	4.0	——	——	——
Najas marina	Spiny naiad	5.0	——	——	——	——	——	2.0	2.0
Najas minor	Brittle naiad	7.5	——	16.7	——	——	——	8.2	6.1
Potamogeton amplifolius	Broad-leaved pondweed	——	——	——	——	2.0	——	4.1	——
Potamogeton crispus	Curly-leaf pondweed	——	1.8	5.0	——	4.0	——	——	——
Potamogeton diversifolius	Water-thread pondweed	——	——	——	2.0	——	——	——	——
Potamogeton friesii	Fries' pondweed	——	——	——	——	2.0	——	——	——
Potamogeton foliosus	Leafy pondweed	——	——	1.7	——	——	——	——	——
Potamogeton gramineus	Variable-leaved pondweed	5.0	——	——	——	6.0	——	——	——
Potamogeton illinoensis	Illinois pondweed	——	——	——	2.0	——	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	——	——	6.1	4.1
Potamogeton zosteriformis	Flat-stem pondweed	5.0	——	——	——	——	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	5.0	7.1	36.7	6.0	18.0	10.0	8.2	28.6
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	2.0	——	——	——
Vallisneria americana	Eel-grass	52.5	17.9	33.3	16.0	18.0	16.0	26.5	34.7

Table 8.0.—Continued

Taxon	Common Name	Survey Year 2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2012	2013
0-5 FT CONTOUR									
Ceratophyllum demersum	Coontail	——	47.6	——	52.2	48.0	34.8	68.2	54.5
Chara spp.	Stonewort	——	28.6	——	17.4	26.0	26.1	22.7	9.1
Heteranthera dubia	Water star-grass	——	——	——	——	4.0	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	——	——	35.0	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	——	38.1	——	52.2	30.0	56.5	——	——
Najas sp.	Naiad	——	——	——	8.7	——	8.7	——	——
Najas flexilis	Common naiad	——	——	——	——	4.0	——	9.1	——
Najas guadalupensis	Southern Naiad	——	——	——	——	4.0	——	——	——
Najas marina	Spiny naiad	——	——	——	——	——	——	4.5	4.5
Najas minor	Brittle naiad	——	——	——	——	——	——	——	4.5
Potamogeton amplifolius	Broad-leaved pondweed	——	——	——	——	4.0	——	4.5	——
Potamogeton crispus	Curly-leaf pondweed	——	4.8	——	——	9.0	——	——	——
Potamogeton diversifolius	Water-thread pondweed	——	——	——	4.3	——	——	——	——
Potamogeton friesii	Fries' pondweed	——	——	——	——	4.0	——	——	——
Potamogeton foliosus	Leafy pondweed	——	——	——	——	——	——	——	——
Potamogeton gramineus	Variable-leaved pondweed	——	——	——	——	13.0	——	——	——
Potamogeton illinoensis	Illinois pondweed	——	——	——	——	——	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	——	——	4.5	——
Potamogeton zosteriformis	Flat-stem pondweed	——	——	——	——	——	——	——	
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	14.3	——	13.0	35.0	21.7	——	22.7
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	4.0	——	——	——
Vallisneria americana	Eel-grass	——	38.1	——	30.4	35.0	30.4	13.6	18.2

Table 8.0.—Continued

Taxon	Common Name	Survey Year 2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2012	2013
5-10 FT CONTOUR									
Ceratophyllum demersum	Coontail	——	54.5	——	17.6	41.0	35.3	47.1	54.5
Chara spp.	Stonewort	——	——	——	——	6.0	5.9	41.2	——
Heteranthera dubia	Water star-grass	——	4.5	——	——	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	——	——	12.0	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	——	22.7	——	11.8	6.0	41.2	——	17.6
Najas flexilis	Common naiad	——	——	——	——	——	——	23.5	5.9
Najas guadalupensis	Southern Naiad	——	——	——	——	6.0	——	——	——
Najas marina	Spiny naiad	——	——	——	——	——	——	——	——
Najas minor	Brittle naiad	——	——	——	——	——	——	23.5	17.6
Potamogeton illinoensis	Illinois pondweed	——	——	——	5.9	——	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	——	——	11.8	11.8
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	4.5	——	——	——	——	23.5	47.1
Vallisneria americana	Eel-grass	——	9.1	——	5.9	6.0	5.9	58.8	76.5
10-15 FT CONTOUR									
Ceratophyllum demersum	Coontail	——	——	——	30.0	10.0	——	50.0	23.5
Chara spp.	Stonewort	——	——	——	10.0	——	——	10.0	——
Myriophyllum spicatum	Eurasian water-milfoil	——	——	——	20.0	——	——	——	——
Potamogeton amplifolius	Broad-leaved pondweed	——	——	——	——	——	——	10.0	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	——	20.0	——	——	——	10.0

[a]Surveys conducted by Aquatic Weed Patrol.
[b]Surveys conducted by Indiana Department of Natural Resources
[c]Surveys conducted by JFNew and Associates.

Table 9.0. Summary of frequency of occurrence data, apportioned by depth class, collected from spring surveys conducted on Big Chapman Lake. Synonyms provided in parentheses. Horizontal bar (—) = not recorded.

		Survey Year				
Taxon	Common Name	2005[a]	2006[a]	2006[b]	2007[a]	2012
0-20 FT CONTOUR						
Ceratophyllum demersum	Coontail	23.0	20.0	32.0	27.8	33.3
Chara spp.	Stonewort	48.0	42.2	50.0	51.1	43.3
Elodea sp.	Water-weed	1.0	1.1	——	1.1	——
Elodea canadensis	Canadian water-weed	——	——	7.0	——	1.1
Elodea nuttallii	Slender water-weed	——	——	1.0	——	——
Heteranthera dubia	Water star-grass	7.0	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	2.0	4.4	3.3
Myriophyllum spicatum	Eurasian water-milfoil	39.0	23.3	19.0	32.2	30.0
Najas sp.	Naiad	——	3.3	——	3.3	——
Najas flexilis	Common naiad	——	——	1.0	——	1.1
Najas guadalupensis	Southern Naiad	——	——	3.0	——	——
Najas marina	Spiny naiad	——	——	9.0	6.7	——
Najas minor	Brittle naiad	——	——	3.0	——	——
Nitella sp.	Stonewort	6.0	1.1	12.0	1.1	15.6
Potamogeton amplifolius	Broad-leaved pondweed	1.0	3.3	3.0	——	1.1
Potamogeton crispus	Curly-leaf pondweed	22.0	21.1	26.0	10.0	8.9
Potamogeton friesii	Fries' pondweed	——	——	——	——	7.8
Potamogeton gramineus	Variable-leaved pondweed	7.0	10.0	6.0	3.3	2.2
Potamogeton illinoensis	Illinois pondweed	1.0	——	3.0	4.4	11.1
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	1.0	——	——
Potamogeton richarsonii	Richardson's pondweed	1.0	——	——	——	——
Potamogeton zosteriformis	Flat-stem pondweed	4.0	13.3	——	1.1	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	18.0	33.3	14.4
Utricularia sp.	Bladderwort	5.0	3.3	——	8.9	——
Utricularia geminiscapa	Mixed bladderwort	——	——	2.0	——	——
Utricularia gibba	Creeping bladderwort	——	——	1.0	——	——
Utricularia intermedia	Northern bladderwort	——	——	——	——	6.7
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	6.0	——	1.1
Vallisneria americana	Eel-grass	——	4.4	1.0	17.8	2.2
Zannichelliaceae palustris	Horned-pondweed	——	3.3	——	——	——
0-5 FT CONTOUR						
Ceratophyllum demersum	Coontail	2.9	3.4	7.0	6.7	34.5
Chara spp.	Stonewort	91.2	86.2	97.0	90.0	44.8
Elodea canadensis	Canadian water-weed	——	——	——	——	3.4
Heteranthera dubia	Water star-grass	8.8	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	——	3.3	——
Myriophyllum spicatum	Eurasian water-milfoil	14.7	3.4	10.0	20.0	31.0
Najas sp.	Naiad	——	6.9	——	——	——

Table 9.0.—Continued

Taxon	Common Name	Survey Year 2005[a]	2006[a]	2006[b]	2007[a]	2012
Najas marina	Spiny naiad	——	——	13.0	6.7	——
Nitella sp.	Stonewort	——	——	——	2.0	20.7
Potamogeton amplifolius	Broad-leaved pondweed	2.9	3.4	——	——	——
Potamogeton crispus	Curly-leaf pondweed	——	6.9	3.0	——	20.7
Potamogeton gramineus	Variable-leaved pondweed	14.7	17.2	3.0	6.7	——
Potamogeton illinoensis	Illinois pondweed	——	——	——	6.7	6.9
Potamogeton zosteriformis	Flat-stem pondweed	2.9	6.9	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	21.0	30.0	13.8
Utricularia sp.	Bladderwort	8.8	6.9	——	——	——
Utricularia geminiscapa	Mixed bladderwort	——	——	3.0	——	——
Utricularia gibba	Creeping bladderwort	——	——	3.0	——	——
Utricularia intermedia	Northern bladderwort	——	——	——	——	3.4
Utricularia macrorhiza	Common bladderwort	——	——	17.0	——	——
Vallisneria americana	Eel-grass	——	10.3	——	——	——
Zannichelliaceae palustris	Horned-pondweed	——	3.4	——	——	——
5-10 FT CONTOUR						
Ceratophyllum demersum	Coontail	27.8	14.8	22.0	33.3	18.5
Chara spp.	Stonewort	41.7	40.7	48.0	48.1	55.6
Elodea sp.	Water-weed	——	——	——	3.7	——
Elodea canadensis	Canadian water-weed	——	——	11.0	——	——
Heteranthera dubia	Water star-grass	5.6	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	4.0	3.7	——
Myriophyllum spicatum	Eurasian water-milfoil	47.2	40.7	26.0	44.4	37.0
Najas sp.	Naiad	——	——	——	3.7	——
Najas flexilis	Common naiad	——		4.0	——	——
Najas marina	Spiny naiad	——	——	15.0	7.4	——
Najas minor	Brittle naiad	——	——	4.0	——	——
Nitella sp.	Stonewort	——	——	——	——	14.8
Potamogeton amplifolius	Broad-leaved pondweed	——	7.4	4.0	——	——
Potamogeton crispus	Curly-leaf pondweed	16.7	14.8	11.0	11.1	——
Potamogeton friesii	Fries' pondweed	——	——	——	——	18.5
Potamogeton gramineus	Variable-leaved pondweed	2.8	14.8	7.0	3.7	——
Potamogeton illinoensis	Illinois pondweed	——	——	7.0	3.7	7.4
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	4.0	——	——
Potamogeton zosteriformis	Flat-stem pondweed	5.6	25.9	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	12.0	51.9	3.7
Utricularia sp.	Bladderwort	5.6	3.7	——	3.7	——
Utricularia geminiscapa	Mixed bladderwort	——	——	4.0	——	——
Utricularia intermedia	Northern bladderwort	——	——	——	——	11.1
Vallisneria americana	Eel-grass	——	3.7	4.0	29.6	3.7
Zannichelliaceae palustris	Horned-pondweed	——	3.7	——	——	——

Table 9.0.—Continued

Taxon	Common Name	Survey Year 2005[a]	2006[a]	2006[b]	2007[a]	2012
10-15 FT CONTOUR						
Ceratophyllum demersum	Coontail	20.0	41.7	75.0	43.5	50.0
Chara spp.	Stonewort	13.3	4.2	13.0	17.4	41.7
Elodea canadensis	Canadian water-weed	——	——	4.0	——	——
Elodea nuttallii	Slender water-weed	——	——	4.0	——	——
Heteranthera dubia	Water star-grass	6.7	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	4.0	8.7	12.5
Myriophyllum spicatum	Eurasian water-milfoil	80.0	37.5	30.0	43.5	25.0
Najas flexilis	Common naiad	——	——	——	——	4.2
Najas guadalupensis	Southern Naiad	——	——	8.0	——	——
Najas marina	Spiny naiad	——	——	——	8.7	——
Nitella sp.	Stonewort	6.7	4.2	21.0	4.3	12.5
Potamogeton amplifolius	Broad-leaved pondweed	——	——	——	——	4.2
Potamogeton crispus	Curly-leaf pondweed	60.0	41.7	67.0	21.7	8.3
Potamogeton friesii	Fries' pondweed	——	——	——	——	4.2
Potamogeton gramineus	Variable-leaved pondweed	——	——	13.0	——	4.2
Potamogeton illinoensis	Illinois pondweed	6.7	——	——	4.3	20.8
Potamogeton zosteriformis	Flat-stem pondweed	——	8.3	——	4.3	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	——	30.4	29.2
Utricularia intermedia	Northern bladderwort	——	——	——	——	8.3
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	4.2
Vallisneria americana	Eel-grass	——	——	——	26.1	4.2
Zannichelliaceae palustris	Horned-pondweed	——	4.2	——	——	——
15-20 FT CONTOUR						
Ceratophyllum demersum	Coontail	81.8	30.0	30.0	40.0	30.0
Chara spp.	Stonewort	——	10.0	20.0	20.0	10.0
Elodea sp.	Water-weed	9.1	10.0	——	——	——
Heteranthera dubia	Water star-grass	9.1	——	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	36.4	——	——	10.0	20.0
Najas sp.	Naiad	——	10.0	——	20.0	——
Najas guadalupensis	Southern Naiad	——	——	20.0	——	——
Nitella sp.	Stonewort	27.3	——	50.0	——	10.0
Potamogeton crispus	Curly-leaf pondweed	54.5	30.0	20.0	10.0	——
Potamogeton friesii	Fries' pondweed	——	——	——	——	10.0
Potamogeton gramineus	Variable-leaved pondweed	9.1	——	13.0	——	10.0
Potamogeton illinoensis	Illinois pondweed	——	——	——	——	10.0
Potamogeton richarsonii	Richardson's pondweed	9.1	——	——	——	——
Potamogeton zosteriformis	Flat-stem pondweed	9.1	10.0	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	——	40.0	——	10.0
Vallisneria americana	Eel-grass	——	——	——	20.0	——

[a]Surveys conducted by Indiana Department of Natural Resources
[b]Surveys conducted by JFNew and Associates.

Table 10.0. Summary of frequency of occurrence data, apportioned by depth class, collected from summer surveys conducted on Big Chapman Lake. Synonyms provided in parentheses. Horizontal bar (—) = not recorded.

Taxon	Common Name	Survey Year								
		2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
0-25 FT CONTOUR										
Ceratophyllum demersum	Coontail	26.9	25.0	25.5	30.0	40.0	13.3	24.4	27.8	20.0
Chara spp.	Stonewort	70.5	52.0	77.1	47.8	46.0	38.9	42.2	51.1	24.4
Elodea sp.	Water-weed	3.8	4.0	——	3.3	——	——	——	——	——
Elodea canadensis	Canadian water-weed	——	——	8.4	——	7.0	——	——	——	——
Heteranthera dubia	Water star-grass	9.0	2.0	——	——	——	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	12.8	——	8.4	5.6	9.0	——	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	23.1	15.0	19.3	13.3	11.0	33.3	25.6	13.3	11.1
Najas sp.	Naiad	7.7	11.0	——	5.6	——	——	2.2	——	——
Najas flexilis	Common naiad	——	——	——	——	——	——	——	8.9	22.2
Najas guadalupensis	Southern Naiad	——	——	12.1	——	2.0	——	——	——	
Najas marina	Spiny naiad	17.9	35.0	48.2	36.7	20.0	32.2	24.4	13.3	40.0
Najas minor	Brittle naiad	——	——	3.6	——	——	——	——	——	——
Nitella sp.	Stonewort	——	8.0	2.4	6.7	13.0	2.2	3.3	8.9	3.3
Potamogeton amplifolius	Broad-leaved pondweed	6.4	1.0	2.4	——	1.0	——	——	——	——
Potamogeton crispus	Curly-leaf pondweed	7.7	3.0	4.8	3.3	4.0	2.2	3.3	1.1	3.3
Potamogeton foliosus	Leafy pondweed	——	——	2.4	——	——	——	4.4	——	——
Potamogeton gramineus	Variable-leaved pondweed	12.8	8.0	9.6	45.6	6.0	11.1	20.0	——	——
Potamogeton illinoensis	Illinois pondweed	5.1	5.0	9.6	——	1.0	——	——	17.8	21.1
Potamogeton natans	Floating-leaved pondweed	2.6	——	——	——	——	——	——	——	——
Potamogeton nodosus	Long-leaved pondweed	——	2.0	6.0	——	1.0	——	——	——	——
Potamogeton praelongus	White-stemmed pondweed	3.8	——	——	——	——	——	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	1.0	——	——	1.1	10.0
Potamogeton zosteriformis	Flat-stem pondweed	5.0	3.0	7.2	2.2	——	——	1.1	——	
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	25.6	34.0	56.6	25.6	26.0	20.0	16.7	17.8	33.3

Table 10.0.–Continued

Taxon	Common Name	Survey Year 2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
Utricularia sp.	Bladderwort	——	8.0	——	6.7	——	7.8	20.0	——	——
Utricularia intermedia	Northern bladderwort	——	——	——	——	——	——	——	5.6	——
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	12.8	——	30.1	——	7.0	——	——	2.2	14.4
Vallisneria americana	Eel-grass	25.6	29.0	26.5	——	16.0	23.3	34.4	1.1	8.9
0-5 FT CONTOUR										
Ceratophyllum demersum	Coontail	——	6.3	——	3.6	31.0	6.5	10.3	34.5	24.9
Chara spp.	Stonewort	——	93.8	——	78.6	93.0	87.1	82.8	41.4	——
Elodea sp.	Water-weed	——	3.1	——	3.6	——	——	——	——	——
Elodea canadensis	Canadian water-weed	——	——	——	——	7.0	——	——	——	——
Heteranthera dubia	Water star-grass	——	3.1	——	——	——	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	——	7.1	3.0	——	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	——	3.1	——	3.6	14.0	9.7	3.4	6.9	3.5
Najas sp.	Naiad	——	12.5	——	——	——	——	3.4	——	——
Najas flexilis	Common naiad	——	——	——	——	——	——	——	10.3	34.5
Najas guadalupensis	Southern Naiad	——	——	——	——	3.0	——	——	——	——
Najas marina	Spiny naiad	——	43.8	——	46.4	31.0	12.9	24.1	13.8	41.4
Nitella sp.	Stonewort	——	——	——	——	——	——	——	20.7	——
Potamogeton amplifolius	Broad-leaved pondweed	——	3.1	——	——	3.0	——	——	——	——
Potamogeton crispus	Curly-leaf pondweed	——	——	——	3.6	——	——	——	3.4	3.5
Potamogeton gramineus	Variable-leaved pondweed	——	12.5	——	57.1	14.0	13.0	41.4	——	——
Potamogeton illinoensis	Illinois pondweed	——	9.4	——	——	——	——	——	17.2	17.2
Potamogeton nodosus	Long-leaved pondweed	——	6.3	——	——	——	——	——	——	——
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	——	——	——	——	17.2
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	31.3	——	28.6	21.0	16.1	10.3	20.7	34.5

Table 10.0.—Continued

Taxon	Common Name	Survey Year								
		2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
Utricularia sp.	Bladderwort	——	9.4	——	7.1	——	6.5	31.0	——	——
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	14.0	——	——	——	3.5
Vallisneria americana	Eel-grass	——	25.0	——	——	24.0	——	6.9	3.4	——
5-10 FT CONTOUR										
Ceratophyllum demersum	Coontail	——	23.3	——	25.0	37.0	18.5	22.2	25.9	7.4
Chara spp.	Stonewort	——	63.3	——	57.1	44.0	22.2	37.0	63.0	33.3
Elodea sp.	Water-weed	——	6.7	——	3.6	——	——	——	——	——
Elodea canadensis	Canadian water-weed	——	——	——	——	4.0	——	——	——	——
Heteranthera dubia	Water star-grass	——	3.3	——	——	——	——	——	——	——
Myriophyllum sibiricum (*Myriophyllum exalbescens*)	Northern water-milfoil	——	——	——	10.7	26.0	——	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	——	26.7	——	17.9	19.0	44.4	33.3	18.5	22.2
Najas sp.	Naiad		16.7	——	7.1	——	——	3.7	——	——
Najas flexilis	Common naiad	——	——	——	——	——	——	——	14.8	29.6
Najas marina	Spiny naiad	——	46.7	——	57.1	30.0	63.0	48.1	22.2	44.4
Nitella sp.	Stonewort	——	——	——	10.7	4.0	——	——	3.7	11.1
Potamogeton crispus	Curly-leaf pondweed	——	3.3	——	7.1	4.0	——	3.7	——	——
Potamogeton foliosus	Leafy pondweed	——	——	——	——	——	——	3.7	——	——
Potamogeton gramineus	Variable-leaved pondweed		10.0	——	60.7	4.0	25.9	22.2	——	——
Potamogeton illinoensis	Illinois pondweed	——	6.7	——	——	4.0	——	——	18.5	29.6
Potamogeton nodosus	Long-leaved pondweed	——	——	——	——	4.0	——	——	——	——
Potamogeton zosteriformis	Flat-stem pondweed	——	——	——	3.6	——	——	3.7	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	36.7	——	46.4	56.0	29.6	33.3	18.5	25.9
Utricularia sp.	Bladderwort	——	13.3	——	14.3	——	11.1	33.3	——	——

Table 10.0.—Continued

Taxon	Common Name	Survey Year 2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
Utricularia intermedia	Northern bladderwort	——	——	——	——	——	——	——	11.1	——
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	7.0	——	——	——	14.8
Vallisneria americana	Eel-grass	——	46.7	——	——	26.0	44.4	66.7	——	22.2
10-15 FT CONTOUR										
Ceratophyllum demersum	Coontail	——	40.0	——	63.6	65.0	8.7	41.7	20.8	29.2
Chara spp.	Stonewort	——	15.0	——	22.7	9.0	8.7	16.7	62.5	41,7
Elodea sp.	Water-weed	——	——	——	4.5	——	——	——	——	
Elodea canadensis	Canadian water-weed	——	——	——	——	13.0	——	——	——	
Myriophyllum spicatum	Eurasian water-milfoil	——	25.0	——	27.3	——	56.5	54.2	16.7	12.5
Najas sp.	Naiad	——	5.0	——	13.6	——	——	——	——	
Najas flexilis	Common naiad	——	——	——	——	——	——	——	4.2	8.3
Najas guadalupensis	Southern Naiad	——	——	——	——	4.0	——	——	——	
Najas marina	Spiny naiad	——	30.0	——	18.2	4.0	34.8	8.3	8.3	41.7
Nitella sp.	Stonewort	——	5.0	5.0	13.6	35.0	4.3	4.2	4.2	4.2
Potamogeton crispus	Curly-leaf pondweed	——	10.0	——	——	13.0	8.7	8.3	——	4.2
Potamogeton foliosus	Leafy pondweed	——	——	——	——	——	——	8.3	——	
Potamogeton gramineus	Variable-leaved pondweed	——	5.0	——	36.4	——	——	——	——	
Potamogeton illinoensis	Illinois pondweed	——	——	——	——	——	——	——	20.8	20.8
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	4.0	——	——	——	4.2
Potamogeton zosteriformis	Flat-stem pondweed	——	5.0	——	——	——	——	——	——	
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	50.0	——	9.1	9.0	21.7	12.5	20.8	50.0
Utricularia sp.	Bladderwort	——	5.0	——	——	——	8.7	——	——	
Utricularia intermedia	Northern bladderwort	——	——	——	——	——	——	——	8.3	
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	——	——	——	——	——	——	——	8.3	33.3
Vallisneria americana	Eel-grass	——	25.0	——	——	——	39.1	45.8	——	8.3

Table 10.0.—Continued

Taxon	Common Name	Survey Year 2004[a]	2005[b]	2005[c]	2006[b]	2006[c]	2007[b]	2011[b]	2012	2013
15-20 FT CONTOUR										
Ceratophyllum demersum	Coontail	——	50.0	——	41.7	20.0	33.3	30.0	30.0	20.0
Chara spp.	Stonewort	——			——	——	——	——	20.0	20.0
Elodea sp.	Water-weed	——			——	——	——	——	——	——
Myriophyllum spicatum	Eurasian water-milfoil	——			——	10.0	22.2	——	10.0	——
Najas sp.	Naiad	——			——	——	——	——	——	——
Najas marina	Spiny naiad	——	7.1	——	——	——	——	——	——	20.0
Nitella sp.	Stonewort	——	28.6	——	——	30.0	11.1	20.0	——	——
Potamogeton foliosus	Leafy pondweed	——	——	——	——	——	——	10.0	——	10.0
Potamogeton illinoensis	Illinois pondweed	——	——	——	——	——	——	——	20.8	10.0
Potamogeton pusillus subsp. *tenuissimus*	Small pondweed	——	——	——	——	——	——	——	10.0	10.0
Potamogeton zosteriformis	Flat-stem pondweed	——	14.3		8.3	——	——	——	——	——
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	——	21.4	——	——	——	——	——	——	10.0
Vallisneria americana	Eel-grass	——	14.3	——	——	——	——	——	——	——
20-25 FT CONTOUR										
Nitella sp.	Stonewort	——	75.0	——	——	——	——	——	——	——

[a]Surveys conducted by Aquatic Weed Patrol.
[b]Surveys conducted by Indiana Department of Natural Resources
[c]Surveys conducted by JFNew and Associates.

Table 11.0. Summary of aquatic macrophyte surveys conducted on the Chapman Lakes. Synonyms provided in parentheses. X = present; – = not recorded.

Taxon	Common Name	Survey Year								
		Historical*	2000	2004	2005	2006	2007	2011	2012	2013
SUBMERGENT										
Ceratophyllum demersum	Coontail	X	X	–	X	X	X	X	X	X
Chara sp.	Stonewort	X	X	–	–	–	X	X	X	X
Chara contraria	Opposite stonewort	–	–	–	–	–	–	–	X	X
Chara globularis	Fragile stonewort	–	–	–	–	–	–	–	X	X
Chara haitensis	Haitian stonewort	–	–	–	–	–	–	–	X	X
Elodea sp.	Waterweed	–	–	–	–	–	X	–	–	–
Elodea canadensis	Common water-weed	X	X	–	X	X	–	–	X	X
Elodea nutallii	Slender water-weed	–	–	–	X	X	–	–	–	–
Heteranthera dubia	Water star-grass	–	–	X	X	X	X	–	–	–
Myriophyllum heterophyllum	Variable-leaved water-milfoil	–	–	X	–	–	–	–	–	X
Myriophyllum sibiricum	Northern water-milfoil	–	–	X	X	X	X	–	X	–
Myriophyllum spicatum	Eurasian water-milfoil	X	X	X	X	X	X	X	X	X
Najas sp.	Naiad	–	–	–	–	–	X	X	X	X
Najas flexilis	Common naiad	–	X	X	X	X	–	–	X	X
Najas gracillima	Thread-like naiad	–	–	–	X	X	–	–	–	–
Najas guadalupensis	Southern Naiad	X	X	X	X	X	–	–	–	–
Najas marina	Spiny naiad	–	–	X	–	–	X	X	X	X
Najas minor	Brittle naiad	X	–	–	X	X	–	–	X	X
Nitella sp.	Stonewort	–	–	X	–	–	X	X	–	X
Nitella flexilis	Flexible Stonewort	–	–	–	–	–	–	–	X	X
Polygonum lapathifolium	Heartsease	–	–	–	X	X	–	–	–	–
Potamogeton amplifolius	Broad-leaved pondweed	X	–	X	X	X	–	–	X	X
Potamogeton crispus	Curly-leaf pondweed	X	X	X	X	X	X	X	X	X
Potamogeton foliosus	Leafy pondweed	–	–	X	X	X	X	X	–	–
Potamogeton friesii	Fries' pondweed	–	–	–	X	X	–	–	X	–
Potamogeton gramineus	Variable-leaved pondweed	–	X	X	–	–	X	X	–	–
Potamogeton illinoensis	Illinois pondweed	–	–	X	–	–	X	–	X	X
Potamogeton nodosus	Long-leaf pondweed	–	–	X	X	X	–	–	–	X

Table 11.0.—Continued

Taxon	Common Name	Survey Year							
		Historical*	2000	2004	2005	2006	2007	2011	2012	2013
Potamogeton praelongus	White-stemmed pondweed	–	–	X	X	X	–	–	–	–
Potamogeton pusillus subsp. *tenuissimus*	Broad-leaved small pondweed	–	–	X	–	–	–	–	X	X
Potamogeton zosteriformis	Flat-stem pondweed	–	X	X	X	X	X	–	–	–
Stuckenia pectinata (*Potamogeton pectinatus*)	Sago pondweed	X	X	X	X	X	X	X	X	X
Utricularia sp.	Bladderwort	–	–	–	–	X	X	–	–	–
Utricularia gibba	Humped bladderwort	–	–	X	–	X	X	–	–	–
Utricularia intermedia	Northern bladderwort	–	–	–	–	–	–	–	X	X
Utricularia macrorhiza (*Utricularia vulgaris*)	Common bladderwort	–	–	X	X	X	–	–	X	X
Vallisneria americana	Eel-grass	X	X	X	X	X	X	X	X	X
EMERGENT										
Asclepias incarnata	Swamp milkweed	–	X	–	X	–	–	–	–	–
Cephalanthus occidentalis	Buttonbush	–	X	–	–	–	–	–	–	X
Cladium mariscoides	Twig-rush	–	–	–	X	X	–	–	X	X
Decodon verticillatus	Swamp loosestrife	–	X	–	–	–	–	–	X	X
Dryopteris thelypteris	Marsh shield fern	–	–	–	X	X	–	–	X	X
Hibiscus palustris	Rose mallow	–	X	–	X	X	–	–	X	X
Impatiens capensis	jewelweed	–	X	–	X	X	–	–	X	X
Juncus effusus	Soft rush	X	–	–	–	–	–	–	–	X
Justicia americana	Water-willow	X	–	–	X	X	–	–	X	X
Leersia oryzoides	Rice cut-grass	–	–	–	–	X	–	–	X	–
Lythrum salicaria	Purple loosestrife	–	X	–	X	X	–	–	X	X
Phalaris arundinacaea	Reed canary grass	–	–	–	X	X	–	–	X	X
Pontederia cordata	Pickerel weed	X	X	–	X	X	–	–	X	X
Sagittaria latifolia	Common arrowhead	X	–	–	X	X	–	–	X	X
Schoenoplectus pungens (*Scirpus americanus*)	Three-square bulrush	–	–	–	X	X	–	–	X	X

Table11.0.—Continued

Taxon	Common Name	Survey Year							
		Historical*	2000	2004	2005	2006	2007	2011	2012	2013
Schoenoplectus tabernaemontani (Scirpus validus)	Softstem bulrush	X	–	–	X	X	–	–	X	X
Typha angustifolia	Narrow-leaved cat-tail	X	X	–	X	X	–	–	–	–
Typha latifolia	Broad-leaved cattail	–	–	–	X	X	–	–	X	X
Utricularia cornuta	Horned bladderwort	–	–	–	X	X	–	–	–	–
Utricularia gemniscapa	Bog bladderwort	–	X	–	X	–	–	–	–	–
FLOATING-LEAVED										
Lemna minor	Small duckweed	X	X	–	X	X	–	–	X	X
Lemna trisulca	Forked duckweed	–	X	–	X	–	–	–	–	–
Nuphar advena (*N. luteum*)	Common Spatterdock	X	X	–	X	X	–	–	X	X
Nuphar microphylla	Small-leaved pond lily	–	–	–	X	X	–	–	–	–
Nuphar variegata	Bull-head pond lily	–	–	–	X	X	X	–	X	X
Nymphaea odorata subsp. *tuberosa* (*N. tuberosa*)	Fragrant water-lily	–	X	–	X	X	–	–	X	X
Spirodela polyrrhiza	Great duckweed	–	–	–	X	X	–	–	X	X
Wolffia brasiliensis	Brazilian watermeal	–	–	–	–	–	X	–	–	–
Wolffia columbiana	Columbian watermeal	–	–	–	X	X	–	–	–	–

*From IDNR Fisheries Reports

Table 12.0. Big Chapman Lake summary of frequency and dominance values of aquatic macrophytes partitioned by depth and calculated from data collected during the pre-treatment survey (Aug 2013).

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake.

County:	Kosciusko	Total Sites:	90	Mean species/site:	2.12
Date:	8/12/2013	Sites with plants:	66	SE Mean species/site:	0.18
Secchi (ft):	2.0	Sites with native plants:	66	Mean native species/site:	1.58
Maximum Plant Depth (ft):	20.0	Number of species:	12	SE Mean natives/site:	0.14
Trophic Status:	Mesotrophic	Number of native species:	9	Species diversity:	0.88
		Maximum species/site:	6	Native species diversity:	0.86

All Depths (0 to 20 ft)		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Spiny naiad	NAJMAR	40.0	60.0	27.8	8.9	3.3	14.2
Sago pondweed	STUPEC	33.3	66.7	30.0	1.1	2.2	8.9
Chara spp.	——	24.4	75.6	24.4	0.0	0.0	4.9
Common naiad	NAJFLE	22.2	77.8	22.2	0.0	0.0	4.4
Illinois pondweed	POTILL	21.1	78.9	21.1	0.0	0.0	4.2
Coontail	CERDEM	20.0	80.0	20.0	0.0	0.0	4.0
Common bladderwort	UTRMAC	14.4	85.6	14.4	0.0	0.0	2.9
Eurasian water-milfoil	MYRSPI	11.1	88.9	11.1	0.0	0.0	2.2
Small pondweed	POTPUS	10.0	90.0	8.9	0.0	1.1	2.9
Eel-grass	VALAME	8.9	91.1	7.8	1.1	0.0	2.2
Curly-leaved pondweed	POTCRI	3.3	96.7	3.3	0.0	0.0	0.7
Nitella sp.	——	3.3	96.7	3.3	0.0	0.0	0.7

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake.

County:	Kosciusko	Total Sites:	29	Mean species/site:	1.79
Date:	8/12/2013	Sites with plants:	21	SE Mean species/site:	0.29
Secchi (ft):	2.0	Sites with native plants:	21	Mean native species/site:	1.31
Maximum Plant Depth (ft):	20.0	Number of species:	9	SE Mean natives/site:	0.22
Trophic Status:	Mesotrophic	Number of native species:	7	Species diversity:	0.84
		Maximum species/site:	5	Native diversity:	0.79

Depth: 0 to 5 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Spiny naiad	NAJMAR	41.4	58.6	20.7	13.8	6.9	19.3
Common naiad	NAJFLE	34.5	65.5	34.5	0.0	0.0	6.9
Sago pondweed	STUPEC	34.5	65.5	27.6	0.0	6.9	12.4
Coontail	CERDEM	24.1	75.9	24.1	0.0	0.0	4.8
Illinois pondweed	POTILL	17.2	82.8	17.2	0.0	0.0	3.4
Small pondweed	POTPUS	17.2	82.8	13.8	0.0	3.4	6.2
Common bladderwort	UTRMAC	3.4	96.6	3.4	0.0	0.0	0.7
Curly-leaved pondweed	POTCRI	3.4	96.6	3.4	0.0	0.0	0.7
Eurasian water-milfoil	MYRSPI	3.4	96.6	3.4	0.0	0.0	0.7

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake.

County:	Kosciusko	Total Sites:	27	Mean species/site:	2.48
Date:	8/12/2013	Sites with plants:	23	SE Mean species/site:	0.29
Secchi (ft):	2.0	Sites with native plants:	23	Mean native species/site:	1.81
Maximum Plant Depth (ft):	20.0	Number of species:	11	SE Mean natives/site:	0.21
Trophic Status:	Mesotrophic	Number of native species:	9	Species diversity:	0.89
		Maximum species/site:	6	Native diversity:	0.86

Depth: 5 to 10 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Spiny naiad	NAJMAR	44.4	55.6	37.0	3.7	3.7	13.3
Chara spp.	——	33.3	66.7	33.3	0.0	0.0	6.7
Common naiad	NAJFLE	29.6	70.4	29.6	0.0	0.0	5.9
Illinois pondweed	POTILL	29.6	70.4	29.6	0.0	0.0	5.9
Sago pondweed	STUPEC	25.9	74.1	25.9	0.0	0.0	5.2
Eel-grass	VALAME	22.2	77.8	18.5	3.7	0.0	5.9
Eurasian water-milfoil	MYRSPI	22.2	77.8	22.2	0.0	0.0	4.4
Common bladderwort	UTRMAC	14.8	85.2	14.8	0.0	0.0	3.0
Nitella sp.	——	11.1	88.9	11.1	0.0	0.0	2.2
Coontail	CERDEM	7.4	92.6	7.4	0.0	0.0	1.5
Small pondweed	POTPUS	7.4	92.6	7.4	0.0	0.0	1.5

Table 12.0.—Continued

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake.

County:	Kosciusko	Total Sites:	24	Mean species/site:	2.54
Date:	8/12/2013	Sites with plants:	18	SE Mean species/site:	0.39
Secchi (ft):	2.0	Sites with native plants:	18	Mean native species/site:	1.96
Maximum Plant Depth (ft):	20.0	Number of species:	11	SE Mean natives/site:	0.32
Trophic Status:	Mesotrophic	Number of native species:	8	Species diversity:	0.87
		Maximum species/site:	6	Native diversity:	0.82

Depth: 10 to 15 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Sago pondweed	STUPEC	50.0	50.0	45.8	4.2	0.0	11.7
Chara spp.	——	41.7	58.3	41.7	0.0	0.0	8.3
Spiny naiad	NAJMAR	41.7	58.3	33.3	8.3	0.0	11.7
Common bladderwort	UTRMAC	33.3	66.7	33.3	0.0	0.0	6.7
Coontail	CERDEM	29.2	70.8	29.2	0.0	0.0	5.8
Illinois pondweed	POTILL	20.8	79.2	20.8	0.0	0.0	4.2
Eurasian water-milfoil	MYRSPI	12.5	87.5	12.5	0.0	0.0	2.5
Common naiad	NAJFLE	8.3	91.7	8.3	0.0	0.0	1.7
Eel-grass	VALAME	8.3	91.7	8.3	0.0	0.0	1.7
Curly-leaved pondweed	POTCRI	4.2	95.8	4.2	0.0	0.0	0.8
Small pondweed	POTPUS	4.2	95.8	4.2	0.0	0.0	0.8

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake.

County:	Kosciusko	Total Sites:	10	Mean species/site:	1.10
Date:	8/12/2013	Sites with plants:	4	SE Mean species/site:	0.50
Secchi (ft):	2.0	Sites with native plants:	4	Mean native species/site:	0.80
Maximum Plant Depth (ft):	20.0	Number of species:	7	SE Mean natives/site:	0.39
Trophic Status:	Mesotrophic	Number of native species:	5	Species diversity:	0.83
		Maximum species/site:	4	Native diversity:	0.75

Depth: 15 to 20 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Chara spp.	——	30.0	70.0	30.0	0.0	0.0	6.0
Coontail	CERDEM	20.0	80.0	20.0	0.0	0.0	4.0
Spiny naiad	NAJMAR	20.0	80.0	10.0	10.0	0.0	8.0
Curly-leaved pondweed	POTCRI	10.0	90.0	10.0	0.0	0.0	2.0
Illinois pondweed	POTILL	10.0	90.0	10.0	0.0	0.0	2.0
Sago pondweed	STUPEC	10.0	90.0	10.0	0.0	0.0	2.0
Small pondweed	POTPUS	10.0	90.0	10.0	0.0	0.0	2.0

Table 13.0. Little Chapman Lake summary of frequency and dominance values of aquatic macrophytes partitioned by depth and calculated from data collected during the pre-treatment survey (Aug 2013).

Occurrence and Abundance of Submersed Aquatic Plants in Little Chapman Lake.

County:	Kosciusko	Total Sites:	49	Mean species/site:	1.24
Date:	8/12/2013	Sites with plants:	33	SE Mean species/site:	0.18
Secchi (ft):	5.0	Sites with native plants:	33	Mean native species/site:	1.10
Maximum Plant Depth (ft):	14.0	Number of species:	8	SE Mean natives/site:	0.15
Trophic Status:	Eutrophic	Number of native species:	6	Species diversity:	0.77
		Maximum species/site:	5	Native species diversity:	0.72

All Depths (0 to 15 ft)		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Coontail	CERDEM	36.7	63.3	26.5	4.1	6.1	13.9
Eel-grass	VALAME	34.7	65.3	34.7	0.0	0.0	6.9
Sago pondweed	STUPEC	28.6	71.4	28.6	0.0	0.0	5.7
Spiny naiad	NAJMAR	8.2	91.8	8.2	0.0	0.0	1.6
Eurasian water-milfoil	MYRSPI	6.1	93.9	6.1	0.0	0.0	1.2
Chara spp.	——	4.1	95.9	4.1	0.0	0.0	0.8
Small pondweed	POTPUS	4.1	95.9	4.1	0.0	0.0	0.8
Common naiad	NAJFLE	2.0	98.0	2.0	0.0	0.0	0.4

Occurrence and Abundance of Submersed Aquatic Plants in Little Chapman Lake.

County:		Total Sites:	22	Mean species/site:	1.09
Date:	8/12/2013	Sites with plants:	16	SE Mean species/site:	0.21
Secchi (ft):	5.0	Sites with native plants:	16	Mean native species/site:	1.05
Maximum Plant Depth (ft):	14.0	Number of species:	5	SE Mean natives/site:	0.19
Trophic Status:	Eutrophic	Number of native species:	4	Species diversity:	0.67
		Maximum species/site:	3	Native diversity:	0.64

Depth: 0 to 5 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Coontail	CERDEM	54.5	45.5	40.9	4.5	9.1	20.0
Sago pondweed	STUPEC	22.7	77.3	22.7	0.0	0.0	4.5
Eel-grass	VALAME	18.2	81.8	18.2	0.0	0.0	3.6
Chara spp.	——	9.1	90.9	9.1	0.0	0.0	1.8
Spiny naiad	NAJMAR	4.5	95.5	4.5	0.0	0.0	0.9

Occurrence and Abundance of Submersed Aquatic Plants in Little Chapman Lake.

County:		Total Sites:	17	Mean species/site:	2.00
Date:	8/12/2013	Sites with plants:	14	SE Mean species/site:	0.35
Secchi (ft):	5.0	Sites with native plants:	14	Mean native species/site:	1.65
Maximum Plant Depth (ft):	14.0	Number of species:	7	SE Mean natives/site:	0.27
Trophic Status:	Eutrophic	Number of native species:	5	Species diversity:	0.76
		Maximum species/site:	5	Native diversity:	0.68

Depth: 5 to 10 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Eel-grass	VALAME	76.5	23.5	76.5	0.0	0.0	15.3
Sago pondweed	STUPEC	47.1	52.9	47.1	0.0	0.0	9.4
Coontail	CERDEM	23.5	76.5	23.5	0.0	0.0	4.7
Eurasian water-milfoil	MYRSPI	17.6	82.4	17.6	0.0	0.0	3.5
Spiny naiad	NAJMAR	17.6	82.4	17.6	0.0	0.0	3.5
Small pondweed	POTPUS	11.8	88.2	11.8	0.0	0.0	2.4
Common naiad	NAJFLE	5.9	94.1	5.9	0.0	0.0	1.2

Occurrence and Abundance of Submersed Aquatic Plants in Little Chapman Lake.

County:		Total Sites:	10	Mean species/site:	0.30
Date:	8/12/2013	Sites with plants:	3	SE Mean species/site:	0.15
Secchi (ft):	5.0	Sites with native plants:	3	Mean native species/site:	0.30
Maximum Plant Depth (ft):	14.0	Number of species:	2	SE Mean natives/site:	0.15
Trophic Status:	Eutrophic	Number of native species:	2	Species diversity:	0.44
		Maximum species/site:	1	Native diversity:	0.44

Depth: 10 to 15 ft		Frequency of	Rake score frequency per species				Plant
Species	ID	Occurrence	0	1	3	5	Dominance
Coontail	CERDEM	20.0	80.0	0.0	10.0	10.0	16.0
Sago pondweed	STUPEC	10.0	90.0	10.0	0.0	0.0	2.0

7.0. APPENDICES

7.1. Chapman Lakes Tier II Data Sheets—Summer Survey

WATERBODY NAME: Chapman Lake	DATE: 08/12/2013
COUNTY: Kosciusko	SECCHI DEPTH (ft):5.0
SITE ID:	MAXIMUM PLANT DEPTH (ft): 20
SURVEYING ORGANIZATION: Aquatic Restoration	WEATHER: Clear
CREW LEADER: Robin W. Scribailo	COMMENTS (Include voucher codes – V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake
RECORDER: M. S. Alix: malix@pnc.edu	
CONTACT INFO: rscribailo@pnc.edu	*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	CERDEM	VALAME	POTCRI	CHACOM	STUPEC	CHAHAI	HABMAR	NUMODT	NUPADV	NOTES
1	T	41.27937	-85.79535	2.0				1	1				9	
2	T	41.27810	-85.79444	2.0		1	1	1		1	1			
3	T	41.27701	-85.79410	2.0	1									
4	T	41.27657	-85.79483	2.0	5							9	9	
5	T	41.27683	-85.79383	2.5	3									
6	T	41.27682	-85.79337	2.5	1									
7	T	41.27645	-85.79245	3.0										
8	T	41.27609	-85.79235	3.0	1									
9	T	41.27591	-85.79233	3.0	5									
10	T	41.27483	-85.79245	3.0										
11	T	41.27384	-85.79238	3.0	1								9	
12	T	41.27312	-85.79242	3.5	1	1			1					
13	T	41.27304	-85.79344	4.0										I
14	T	41.27261	-85.79486	4.0					1					
15	T	41.27188	-85.79466	4.0	1									
16	T	41.27125	-85.79434	5.0	1									
17	T	41.27088	-85.79376	5.0	1				1					
18	T	41.27142	-85.79375	5.0										
19	T	41.27051	-85.79277	5.0										
20	T	41.27727	-85.79251	5.0	1	1			1			9		

Other plant species observed at lake:

Chapman Lakes Tier II Data Sheets—Continued.

WATERBODY NAME: Chapman Lake	DATE: 08/12/2013	Aquatic Restoration Systems AQRS, LLC
COUNTY: Kosciusko	SECCHI DEPTH (ft): 5.0	
SITE ID:	MAXIMUM PLANT DEPTH (ft): 20	
SURVEYING ORGANIZATION: Aquatic Restoration	WEATHER: Clear	
CREW LEADER: Robin W. Scribailo	COMMENTS (Include voucher codes – V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake	
RECORDER: M. S. Alix: malix@pnc.edu		
CONTACT INFO: rscribailo@pnc.edu	*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*	

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	MYRSPI	CERDEM	VALAME	NAJFLE	STUPEC	NAJMIN	POTPUS	NOTES
21	T	41.27744	-85.79147	5.0			1		1			
22	T	41.27654	-85.79185	5.0								
23	T	41.27707	-85.79073	5.5	1	1	1		1			
24	T	41.27625	-85.78969	5.5			1		1		1	
25	T	41.27588	-85.78947	6.0			1					
26	T	41.27608	-85.79146	6.0								
27	T	41.27525	-85.78945	6.0								
28	T	41.27507	-85.78896	6.0		1	1		1			
29	T	41.27388	-85.78775	7.0	1		1					
30	T	41.27316	-85.78727	7.5			1		1			
31	T	41.27244	-85.78714	7.5	1	1	1			1	1	
32	T	41.27135	-85.78665	8.0			1		1	1		
33	T	41.27027	-85.78697	8.0			1		1			
34	T	41.27037	-85.78741	9.0								
35	T	41.26964	-85.78721	9.0				1	1	1		
36	T	41.26947	-85.78759	9.5		1	1		1			
37	T	41.26893	-85.78817	9.5			1					
38	T	41.26876	-85.78856	10.0			1					
39	T	41.26849	-85.78886	10.0			1					
40	T	41.26814	-85.78987	10.5								

Other plant species observed at lake:

Chapman Lakes Tier II Data Sheets—Continued.

WATERBODY NAME: Chapman Lake	DATE: 08/12/2013
COUNTY: Kosciusko	SECCHI DEPTH (ft): 5.0
SITE ID:	MAXIMUM PLANT DEPTH (ft): 20
SURVEYING ORGANIZATION: Aquatic Restoration	WEATHER: Clear
CREW LEADER: Robin W. Scribailo	COMMENTS (Include voucher codes – V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake
RECORDER: M. S. Alix; malix@pnc.edu	
CONTACT INFO: rscribailo@pnc.edu	*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	CERDEM	CHACOM	STUPEC	POTCRI	POTPUS	NAJMAR	NYMODT	SCHTAB	NOTES
41	T	41.26824	-85.79056	11.0									
42	T	41.26788	-85.79034	12.0	3								
43	T	41.26789	-85.79136	13.0									
44	T	41.26771	-85.79143	13.0									
45	T	41.26790	-85.79237	13.0							9		
46	T	41.26808	-85.79273	13.0							9		
47	T	41.26870	-85.79140	14.0			1				9		
48	T	41.26961	-85.79281	14.0	5								
49	T	41.27024	-85.79256	15.0									
50	T	41.28506	-85.78027	2.0									
51	T	41.28452	-85.78006	2.0	1		5						
52	T	41.28406	-85.77918	2.0									
53	T	41.28435	-85.78109	2.0	1		1			5		9	
54	T	41.28309	-85.78126	2.0		1							
55	T	41.28355	-85.78218	2.0			5			3			
56	T	41.28445	-85.78233	3.0									
57	T	41.28420	-85.78355	3.0									
58	T	41.28366	-85.78421	3.0									
59	T	41.28295	-85.78523	3.0			1		5	3			
60	T	41.28368	-85.78609	3.0	1		1	1	1	1			

Other plant species observed at lake:

WATERBODY NAME: Chapman Lake	DATE: 08/12/2013
COUNTY: Kosciusko	SECCHI DEPTH (ft): 5.0
SITE ID:	MAXIMUM PLANT DEPTH (ft):20
SURVEYING ORGANIZATION: Aquatic restoration	WEATHER: Clear
CREW LEADER: Robin W. Scribailo	COMMENTS (Include voucher codes – V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake
RECORDER: M. S. Alix: malix@pnc.edu	
CONTACT INFO: rscribailo@pnc.edu	*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*

Aquatic Restoration Systems AQRS, LLC

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	CERDEM	CHACOM	POTILL	RARSPI	RAMAR	STUPEC	POTPUS	VALAME	CHAGLO	UTRMAC	CHAHAI	NUPADV	NOTES
61	T	41.28423	-85.78692	3.0													
62	T	41.28439	-85.78503	3.0	1	1	1			1	1				1		
63	T	41.28189	-85.78693	3.0		1							1				
64	T	41.28200	-85.78847	3.0					3				1	1			
65	T	41.28192	-85.78919	4.0		1			1	1							
66	T	41.28147	-85.78976	4.0		1	1		1		1						
67	T	41.28568	-85.78765	4.0	1												
68	T	41.28613	-85.78780	5.0	1			1	1	1							
69	T	41.28578	-85.78867	5.0					5	1							
70	T	41.28506	-85.78846	5.0					3		1						
71	T	41.28499	-85.79011	5.0		1	1		1								
72	T	41.28509	-85.79099	5.0													
73	T	41.28519	-85.79198	5.0													
74	T	41.28060	-85.79287	5.0			1										
75	T	41.28045	-85.79510	5.0	1												
76	T	41.28009	-85.79528	5.0		1			1	1						9	
77	T	41.28190	-85.79597	5.0		1	1										
78	T	41.28335	-85.79733	5.0		1											
79	T	41.28266	-85.79991	6.0													
80	T	41.28204	-85.80072	6.0				1				1					

Other plant species observed at lake:

Chapman Lakes Tier II Data Sheets—Continued.

WATERBODY NAME: Chapman Lake	DATE: 08/12/2012
COUNTY: Kosciusko	SECCHI DEPTH (ft): 5.0
SITE ID:	MAXIMUM PLANT DEPTH (ft):20
SURVEYING ORGANIZATION: Aquatic Restoration	WEATHER: Clear
CREW LEADER: Robin W. Scribailo	COMMENTS (Include voucher codes – V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake
RECORDER: M. S. Alix: malix@pnc.edu	
CONTACT INFO: rscribailo@pnc.edu	*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*

Aquatic Restoration Systems AQRS, LLC

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	MYRSPI	CHACOM	POTILL	CERDEM	STUPEC	CHAHAI	NAJMAR	VALAME	UTRMAC	POTPUS	NUPODT	NOTES
81	T	41.28195	-85.80106	6.0	1	1				1	1					
82	T	41.28223	-85.80165	6.0	1	1		1			1		1	1	9	
83	T	41.28384	-85.80100	6.0		1	1				1					
84	T	41.28464	-85.80015	6.0		1	1									
85	T	41.28447	-85.80076	7.0		1										
86	T	41.28597	-85.79824	7.0							1	1				
87	T	41.28641	-85.79705	7.0		1			1		1		1			
88	T	41.28677	-85.79663	7.0		1	1			1	1					
89	T	41.28667	-85.79556	8.0					1		1	1				
90	T	41.28648	-85.79460	8.0		1	1									
91	T	41.28592	-85.79315	9.0		1										
92	T	41.28572	-85.79118	8.0		1			1	1						
93	T	41.28571	-85.79005	9.0		1	1				1					
94	T	41.28705	-85.78963	9.0	1				1		1	1				
95	T	41.28795	-85.78929	9.0												
96	T	41.28841	-85.78967	9.0												
97	T	41.28805	-85.79052	10.0		1										
98	T	41.28950	-85.79056	9.0		1	1			1						
99	T	41.29081	-85.78733	9.0	1			1	3							
100	T	41.29145	-85.78801	8.0												

Other plant species observed at lake:

Chapman Lakes Tier II Data Sheets—Continued.

WATERBODY NAME: Chapman Lake					DATE: 08/12/2013																																
COUNTY: Kosciusko					SECCHI DEPTH (ft):5.0																																
SITE ID:					MAXIMUM PLANT DEPTH (ft): 20																																
SURVEYING ORGANIZATION: Aquatic Restoration					WEATHER: Clear																																
CREW LEADER: Robin W. Scribailo					COMMENTS (Include voucher codes - V1, V2…): POINTS 1-2 = sites in channel between Big and Little Chapman Lakes POINTS 3-49 = Sites in Little Chapman Lake POINTS 50-139 = Sites in Big Chapman Lake																																
RECORDER: M. S. Alix: malix@pnc.edu																																			
CONTACT INFO: rscribailo@pnc.edu					*Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.*																																
					Species Codes:																																
Point ID	R/T	Latitude	Longitude	Depth (ft)	MARSPI	CHACOM	STUPEC	POTILL	CERDEM	MYRTLE	POTCRI	MYAMAR	POTPUS	UTRMAC	CHAHAI	MAJELE	VALAME	CHAGLO	CHAVUL																	NOTES
101	T	41.29143	-85.78582	9.0		1	1	1						1																					
102	T	41.29251	-85.78577	9.0		1		1																											
103	T	41.29358	-85.78472	9.0		1	1					1					1																			
104	T	41.29555	-85.78372	10.0			1					5		1					1																	
105	T	41.29464	-85.78334	10.0			1					3						1																		
106	T	41.29402	-85.78348	11.0		1	1					1		1																						
107	T	41.29311	-85.78345	11.0		1						1																								
108	T	41.29230	-85.78325	11.0		1		1				1		1		1																				
109	T	41.29176	-85.78312	11.0		1		1				1		1																						
110	T	41.29231	-85.78411	11.0			1		1	1																										
111	T	41.29168	-85.78442	12.0																																
112	T	41.29123	-85.78406	13.0		1		1							1	1																				
113	T	41.29103	-85.78257	13.0		1								1																						
114	T	41.29033	-85.78381	13.0	1		1			1	1	3	1																							
115	T	41.28996	-85.78346	13.0			1		1			3																								
116	T	41.28988	-85.78423	13.0																																
117	T	41.28906	-85.78293	13.0	1		3		1																											
118	T	41.28869	-85.78272	14.0			1		1																											
119	T	41.28852	-85.78324	14.0																																
120	T	41.28876	-85.78088	15.0	1		1		1			1																								
Other plant species observed at lake:																																			

WATERBODY NAME: Chapman Lake
COUNTY: Kosciusko
SITE ID:
SURVEYING ORGANIZATION: Aquatic Restoration
CREW LEADER: Robin W. Scribailo
RECORDER: M. S. Alix: malix@pnc.edu
CONTACT INFO: rscribailo@pnc.edu

DATE:08/12/2013
SECCHI DEPTH (ft):5.0
MAXIMUM PLANT DEPTH (ft):20
WEATHER: Clear

COMMENTS (Include voucher codes – V1, V2…):
POINTS 1-2 = sites in channel between Big and Little Chapman Lakes
POINTS 3-49 = Sites in Little Chapman Lake
POINTS 50-139 = Sites in Big Chapman Lake

Rake score (1, 3, or 5). 9 = algae, emergent, or species observed but not sampled.

Species Codes:

Point ID	R/T	Latitude	Longitude	Depth (ft)	CERDEM	POTCRI	POTILL	STUPEC	CHACON	UTRMAC	NAJFLE	VALAME	NAJMAR	POTPUS	CHAHAI	CHAGLO	NOTES
121	T	41.28787	-85.78169	15.0													
122	T	41.29012	-85.78150	15.0				1	1	1		1	1		1		
123	T	41.28939	-85.78057	15.0	1		1	1	1	1		1			1		
124	T	41.28866	-85.77965	15.0				1	1	1	1		1				
125	T	41.28687	-85.78047	15.0													
126	T	41.28722	-85.77950	15.0	1												
127	T	41.28730	-85.77856	15.0			1	1	1								
128	T	41.28576	-85.77821	15.0													
129	T	41.28786	-85.78062	15.0				1		1			1				
130	T	41.28865	-85.77804	17.0					1								
131	T	41.28607	-85.78045	17.0													
132	T	41.28784	-85.78337	19.0													
133	T	41.29011	-85.78479	19.0													
134	T	41.28875	-85.78384	19.0													
135	T	41.28694	-85.78348	20.0													
136	T	41.28951	-85.78357	20.0			1	1	1				1				
137	T	41.29005	-85.78351	20.0	1	1							3				
138	T	41.28870	-85.78332	20.0	1									1		1	
139	T	41.28627	-85.78322	20.0													

Other plant species observed at lake:

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