Chapman Lakes
Aquatic Vegetation Management Plan
2015 Update
Kosciusko County, Indiana

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Executive Summary

Chapman Lakes, including Little Chapman and Big Chapman, are located 5 miles northeast of Warsaw, Indiana in the southern portion of Kosciusko County. Together the lakes have an area of 638 acres. The primary invasive species within the chain is Eurasian watermilfoil (*Myriophyllum spicatum*). Invasive curly-leaf pondweed (*Potamogeton crispus*) and spiny naiad (*Najas marina*) have also been documented, but rarely reach the level of Eurasian watermilfoil. Native eel grass (*Vallisneria americana*) is also abundant in Chapman Lakes and can reach nuisance levels. Chapman Lakes Conservation Association (CLCA) has been attempting to manage Eurasian watermilfoil on a lake-wide level for many years.

In 2015, CLCA was awarded a Lake and River Enhancement (LARE) grant of $22,112 for creation of a plan update and treatment of up to 59 acres of Eurasian watermilfoil. An invasive species survey completed on May 27th found 53.1 acres of Eurasian watermilfoil in Big Chapman and 16.8 acres in Little Chapman. This was a substantial increase from the amount documented in 2014. Treatment of these areas was completed on June 3rd with a combination of 2,4-D liquid and granular herbicides (trade names: DMA 4 IVM and SculpinG). A Tier 2 survey of both lakes was completed on August 12th. The survey found Eurasian watermilfoil to be well below the 10% frequency of occurrence objective on Big Chapman and no Eurasian watermilfoil was collected in Little Chapman. Native plant coverage increased on both lakes but overall diversity declined.

In 2015, treatments effectively controlled Eurasian watermilfoil throughout the lakes while maintaining and increasing overall native plant coverage. Historically, there has not been an annual decline in Eurasian watermilfoil coverage in years following large-scale treatments; however, Eurasian watermilfoil occurrence was at a historically low level by late summer in 2015. Due to the lack of Eurasian watermilfoil in late summer it is possible that there will be less Eurasian watermilfoil in 2016. It is important to continue monitoring and treating Eurasian watermilfoil with selective herbicides in order to reduce nuisance conditions and prevent it from returning to pre-management levels. In addition, summer Tier 2 surveys should be continued in order to document changes in the plant community and treatment effectiveness. Eel grass density was also a concern along the east side of Big Chapman. If native vegetation abundance is sufficient, IDNR may approve some limited native controls following inspection. These controls should focus on creating boating lanes out to the main lake and will have to be solely funded by CLCA as LARE funds cannot be used to control native vegetation.

Acknowledgements

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1.0 Problem Statement and Management History

1.1 Problem Statement

The primary invasive species within the Chapman Lakes is Eurasian watermilfoil. Curly-leaf pondweed is also found in several areas of the lake but abundance is typically lower than Eurasian watermilfoil and curly-leaf typically drops out of the water column in early summer (Figure 1). These invasive species can create dense surface mats that impact navigation, swimming, fishing, native vegetation, and property values. Eel grass is also abundant in Big Chapman Lake, especially along the shallow east shore. This plant can reach potentially nuisance levels in late summer. Non-native spiny naiad has also been documented in surveys but rarely becomes a nuisance species in this region.

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

1.2 Goals and Objectives

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

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

The objectives of the plan update are the following:

- Maintain Eurasian watermilfoil at or below 10% frequency of occurrence in both lakes.
- Maintain at least 11 native plants collected each year in the summer Tier 2 survey in Big Chapman Lake.

- Maintain at least 6 native plants collected each year in the summer Tier 2 surveys in Little Chapman Lake.
- Maintain native coverage of 85% of all sites each year in the summer Tier 2 surveys at Big Chapman Lake.
- Maintain native coverage of 65% of all sites each year in the summer Tier 2 surveys at Little Chapman Lakes.

1.3 Plant Management History

CLCA has been funding nuisance vegetation treatments on Chapman Lakes since 2005. Up until 2012 treatments just focused on main lake vegetation control. In 2012, channels were included in the CLCA funded treatments. Eurasian watermilfoil has been the primary focus of plant controls. LARE funding was utilized in 2005, 2006, and 2012-2015. The following tables and figures summarize treatments completed from 2005-2015 (Tables 1 & 2) (Figures 2 & 3).

Table 1. CLCA funded invasive plant controls since 2005 in Big Chapman Lake.

Year	Funding Source	EWM (acres)	Channels EWM (acres)	Total EWM (acres)	Retreatment (acres)	Curly-leaf (acres)	Natives (acres)
2005	LARE	7.5	-	7.5	-	-	-
2006	LARE	19.0	-	19.0	-	10	-
2007	Private	21.5	-	21.5	-	-	-
2008	Private	10.0	-	10.0	-	-	-
2009	Private	10.0	-	10.0	-	-	-
2010	Private	15.3	-	15.3	-	-	-
2011	Private	10.5	-	10.5	-	-	4
2012	LARE	30.0	17.5	47.5	4.5	-	6.1
2013	LARE	17.6	17.5	35.1	4.0	-	-
2014	LARE	20.0	15.5	35.5	5.0	-	-
2015	LARE	27.7	25.4	53.1	-	-	-

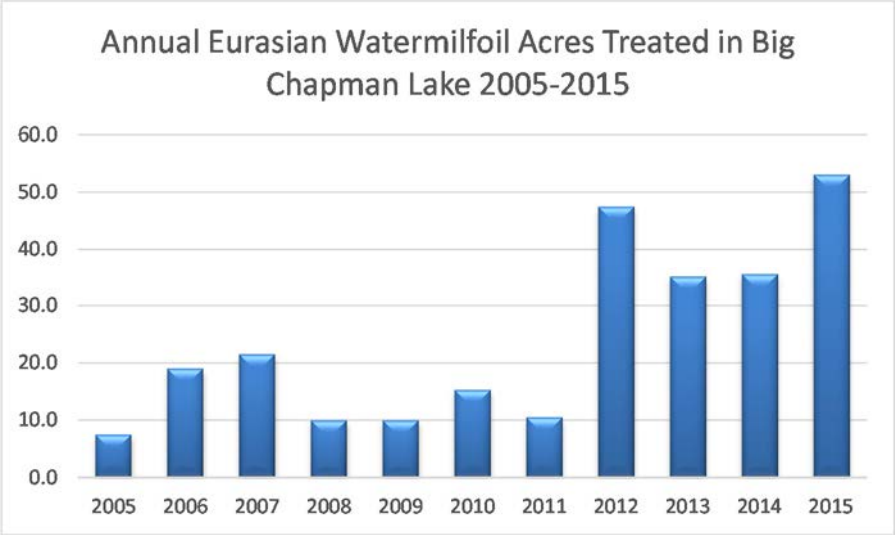

Figure 2. Annual Eurasian watermilfoil acres treated in Big Chapman Lake 2005-2015 (channel treatment began in 2012).

Table 2. CLCA funded invasive plant controls since 2005 in Little Chapman Lake.

Year	Funding Source	EWM (acres)	Channels EWM (acres)	Total EWM (acres)	Retreatment (acres)	Curly-leaf (acres)
2005	LARE	13.0	-	13.0	-	-
2006	LARE	2.0	-	2.0	-	10
2007	Private	17.0	-	17.0	-	-
2008	Private	10.0	-	10.0	-	-
2009	Private	10.0	-	10.0	-	-
2010	Private	11.0	-	11.0	-	-
2011	Private	13.3	-	13.3	-	-
2012	LARE	20.6	2.5	23.1	-	-
2013	LARE	5.0	2.5	7.5	2.0	-
2014	LARE	18.5	2.5	21.0	5.0	-
2015	LARE	13.4	1.7	15.1	-	-

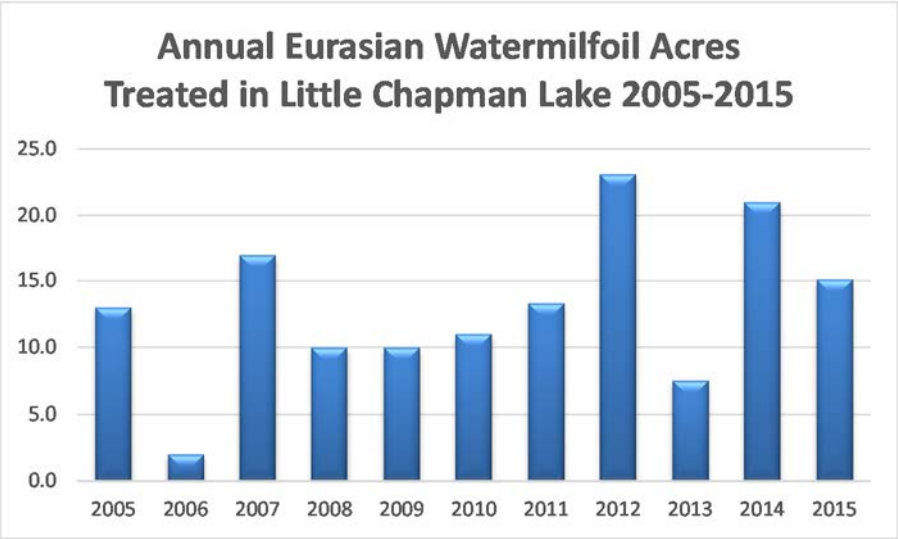

Figure 3. Annual Eurasian watermilfoil acres treated in Little Chapman Lake 2005-2015 (channel treatments began in 2012).

In 2015, the spring invasive survey was completed on May 27th. The survey of Big Chapman found 53.1 acres of Eurasian watermilfoil, of which 25.4 was located in channels (Figure 4). Big Chapman also contained approximately 35.0 acres of curly-leaf pondweed (Figure 5). On Little Chapman, there was 15.1 acres of Eurasian watermilfoil, of which 1.7 acres was located in channels (Figure 6). In addition, 5.8 acres of curly-leaf pondweed was also mapped (Figure 7). The IDNR vegetation control permit limited main lake treatments on Big Chapman to 24.0 acres. IDNR was notified and allowed for treatment of the additional 3.7 acres so that all Eurasian watermilfoil could be treated. Treatment was completed on June 3rd. Liquid 2,4-D (Trade Name DMA4-IVM) was used in the channels and eastern shore of Little Chapman at a rate of 2.0 ppm. Granular 2,4-D (trade name SculpinG) was applied at the same rate in Big Chapman main lake

areas and smaller narrow patches in Little Chapman. Treatment zones and rates are summarized in Table 3 and 4.

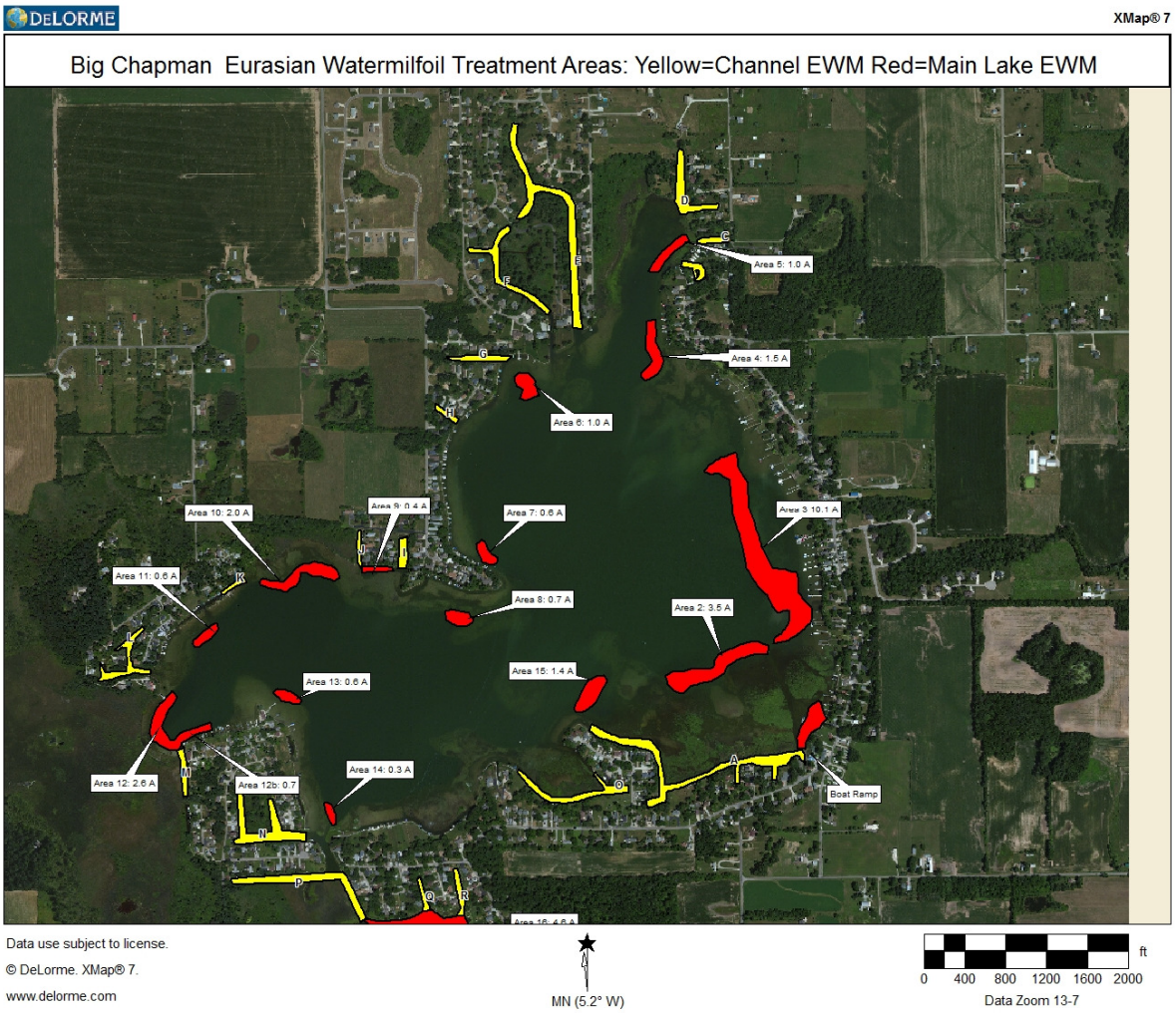

Figure 4. Big Chapman Lake Eurasian watermilfoil areas, May 27, 2015 (Red=Main Lake Yellow=Channel).

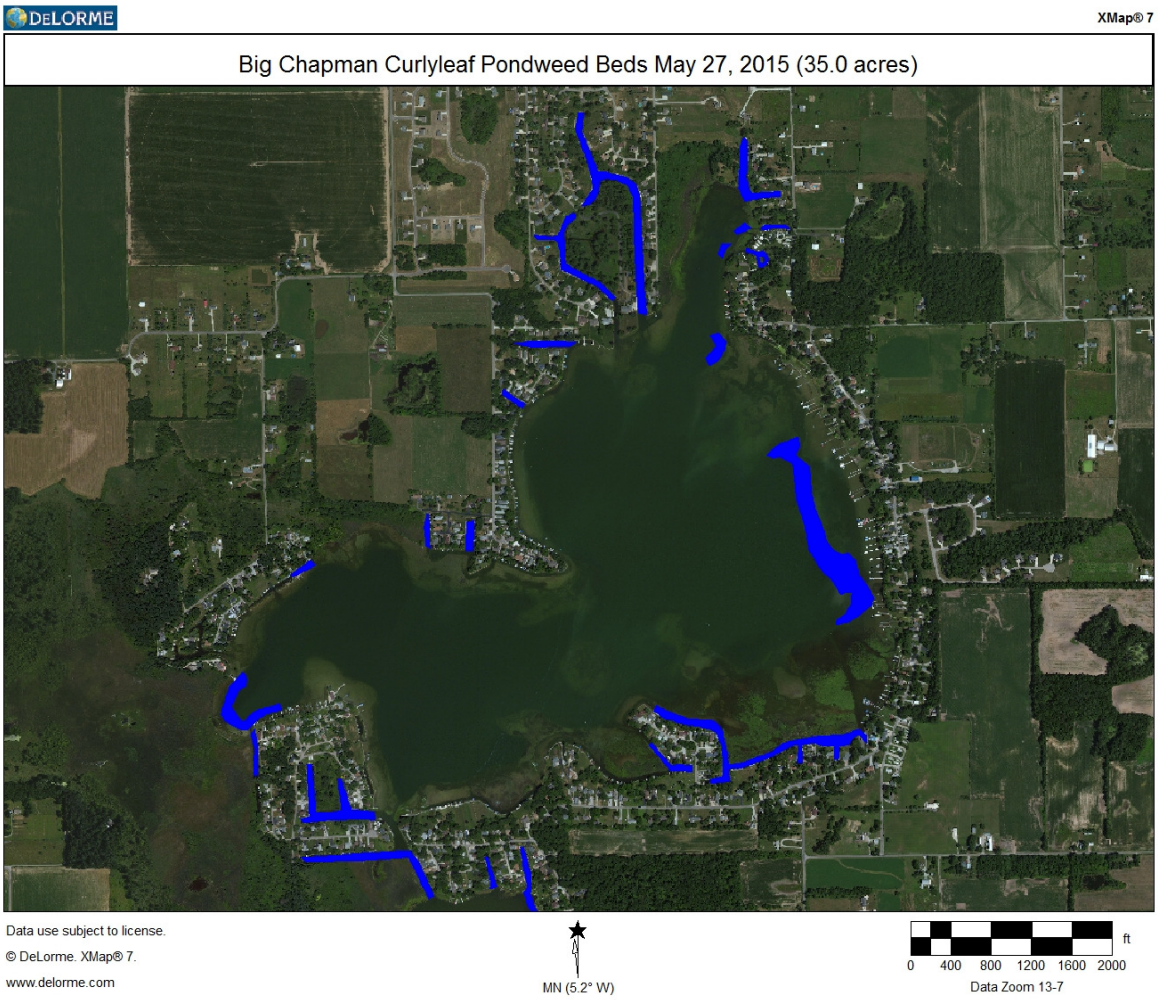

Figure 5. Big Chapman Lake curly-leaf pondweed areas, May 27, 2015.

Table 3. Big Chapman Lake, May 27, 2015 Eurasian Watermilfoil Treatment.

Area	Acres	Avg. Depth	Acre Feet	Herbicide	Herbicide Concentration (ppm)
BIG CHAPMAN MAIN LAKE					
1	1.4	3	4.2	DMA 4	2.0
2	3.5	6	21	SculpinG	2.0
3	10.1	6	60.6	SculpinG	2.0
4	1.5	6	9	SculpinG	2.0
5	1	6	6	SculpinG	2.0
6	1	6	6	SculpinG	2.0
7	0.6	6	3.6	SculpinG	2.0
8	0.7	6	4.2	SculpinG	2.0
9	0.4	3	1.2	SculpinG	2.0
10	2	6	12	SculpinG	2.0
11	0.6	6	3.6	SculpinG	2.0
12	2.6	6	15.6	SculpinG	2.0
13	0.6	6	3.6	SculpinG	2.0
14	0.3	6	1.8	SculpinG	2.0
15	1.4	6	8.4	SculpinG	2.0
Main LakeTotal:	**27.7**				
Channel A	4.7	3	14.1	DMA 4	2.0
Channel **B**	0.6	3	1.8	DMA 4	2.0
Channel C	0.5	3	1.5	DMA 4	2.0
Channel D	1.6	3	4.8	DMA 4	2.0
Channel E	4.4	3	13.2	DMA 4	2.0
Channel F	1.8	3	5.4	DMA 4	2.0
Channel G	0.7	3	2.1	DMA 4	2.0
Channel H	0.3	3	0.9	DMA 4	2.0
Channel I	0.6	3	1.8	DMA 4	2.0
Channel J	0.3	3	0.9	DMA 4	2.0
Channel K	0.3	3	0.9	DMA 4	2.0
Channel L	1.3	3	3.9	DMA 4	2.0
Channel M	1.2	3	3.6	DMA 4	2.0
Channel N	2.7	3	8.1	DMA 4	2.0
Channel O	1.8	3	5.4	DMA 4	2.0
Channel P	2.6	3	7.8	DMA 4	2.0
Channel Total:	**25.4**				
Big Chap Total:	**53.1**				

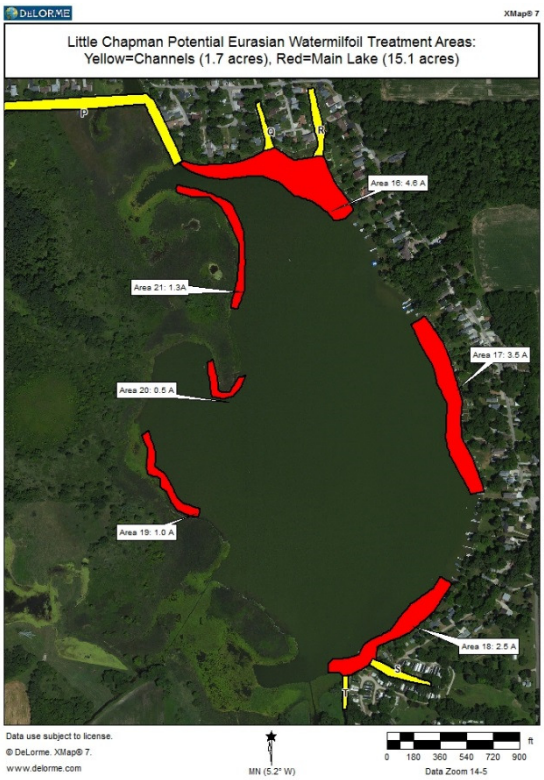

Figure 6. Little Chapman Lake Eurasian watermilfoil areas, May 27, 2015.

Figure 7. Little Chapman Lake curly-leaf pondweed areas, May 27, 2015.

Table 4. Little Chapman Lake, May 27, 2015 Eurasian watermilfoil treatment.

Area	Acres	Avg. Depth	Acre Feet	Herbicide	Herbicide Concentration (ppm)
LITTLE CHAPMAN MAIN LAKE					
16	4.6	6	27.6	DMA 4	2.0
17	3.5	6	21	DMA 4	2.0
18	2.5	6	15	DMA 4	2.0
19	1	6	6	SculpinG	2.0
20	0.5	6	3	SculpinG	2.0
21	1.3	6	7.8	SculpinG	2.0
Main LakeTotal:	**13.4**				
Channel Q	0.3	3	0.9	DMA 4	2.0
Channel **R**	0.7	3	2.1	DMA 4	2.0
Channel S	0.5	3	1.5	DMA 4	2.0
Channel T	0.2	3	0.6	DMA 4	2.0
Channel Total:	**1.7**				
Little Chap Total:	**15.1**				

2.0 AQUATIC PLANT COMMUNITY CHARACTERIZATION

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

2.1 Tier 2 Sampling Results

2.1.1 Methods

The Tier 2 survey helps meet the following objectives:

1. To document the distribution and abundance of submersed aquatic vegetation within selected areas and at a lake-wide scale.
2. To compare present distribution and abundance with past distribution and abundance within select areas and at a lake-wide scale.

The same sites used in past IDNR Tier 2 surveys were used in the 2015 survey (Figure 8). Once a site was reached the boat was slowed to a stop and the coordinates were recorded on a hand-held GPS unit and later downloaded into a mapping program. A depth measurement was taken by dropping a two-headed standard sampling rake that was attached to a rope marked off in 1-foot increments. An additional ten feet of rope was released and the boat was reversed at minimum operating speed for a distance of ten feet. Once the rake was retrieved individual species abundance on the rake was scored with either a 0 (no plants retrieved), 1 (1-19% of rake teeth filled), 3 (20-99% of rake teeth filled), or 5 (100% of rake teeth filled) (IDNR 2014).

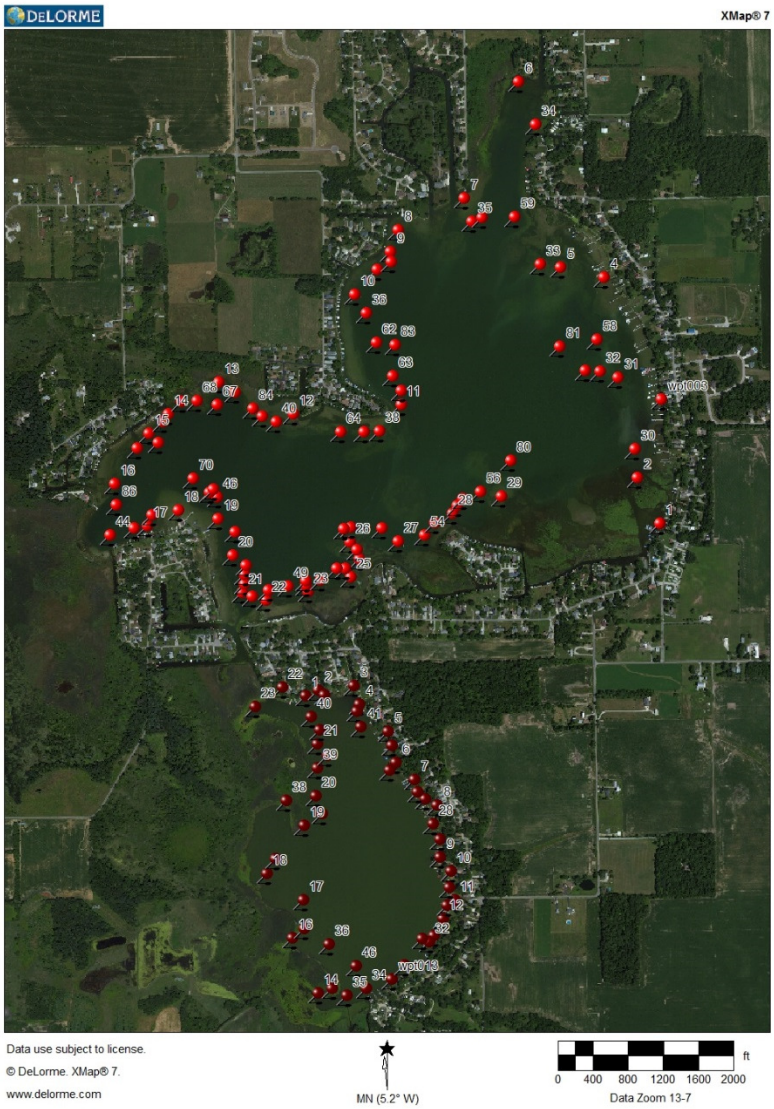

Figure 8. Tier 2 Sample Sites.

2.1.2 Big Chapman Lake

On August 12, 2015, ninety sites were sampled on Big Chapman Lake. Twelve species were collected and plants were present at 83 of the 90 littoral sites yielding 92% littoral coverage. Chara was the most frequently occurring species (40%). Spiny naiad and Eurasian watermilfoil were the only invasive species collected and were found at 18.9% and 5.6% of sites (Figure 9 & 10). Results of the survey are summarized in Table 5. An invasive plant survey was also completed on the same day. Five areas of Eurasian watermilfoil totaling 0.91 surface acres were documented on Big Chapman Lake (Figure 11).

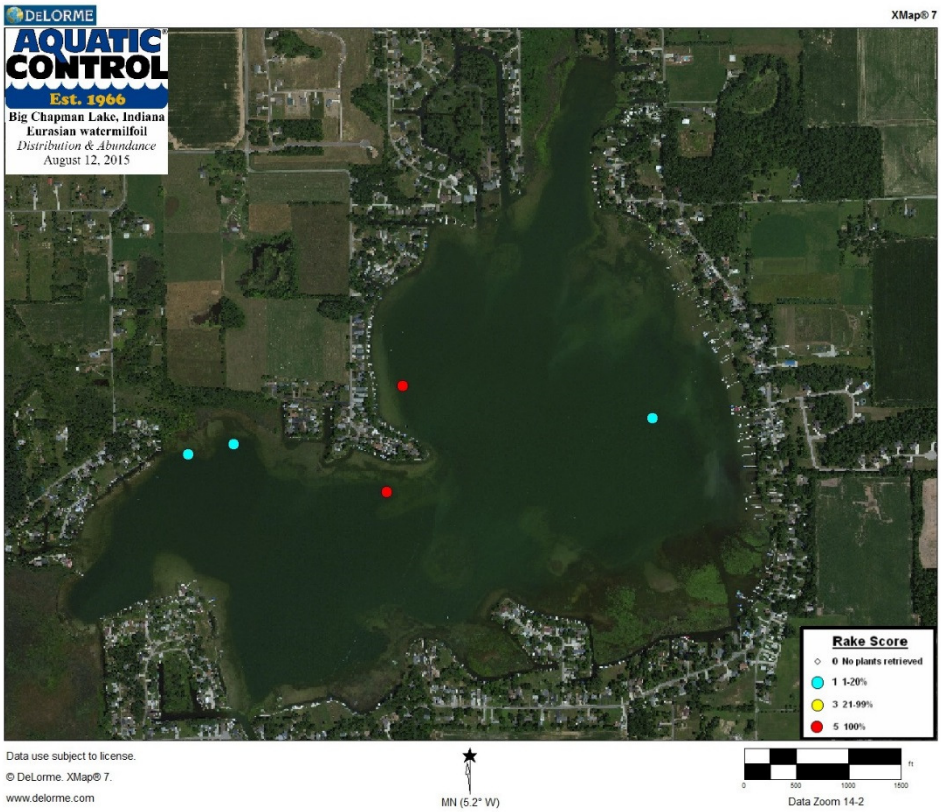

Figure 9. Eurasian watermilfoil location on Big Chapman Lake, August 12, 2015.

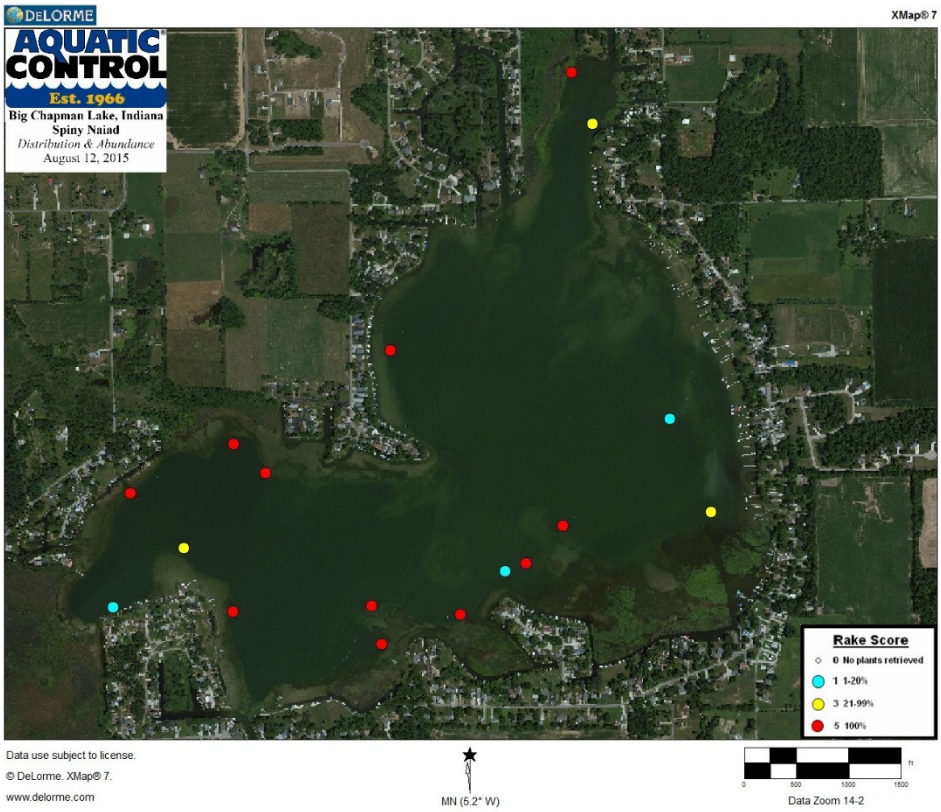

Figure 10. Spiny naiad location on Big Chapman Lake, August 12, 2015.

Table 5. Tier 2 Survey Results, Big Chapman Lake, August 12, 2015.

Occurrence and Abundance of Submersed Aquatic Plants in Big Chapman Lake (all depths).

County:	Kos	Total Sites:	90	Mean species/site:	1.90
Date:	8/12/15	Sites with plants:	83	SE Mean sp/site:	0.12
Secchi (ft):	7.5	Sites with native plants:	83	Mean native sp/site:	1.66
Max Plant Depth (ft):	20.0	Number of species:	12	SE Mean natives/site:	0.10
Trophic Status:	Olig	# of native species:	10	Species diversity:	0.88
Littoral Sites:	90	Maximum species/site:	5	Native species diversity:	0.85

All Depths (0 to 20 ft)	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Chara	40.0	60.0	4.4	3.3	32.2	35.1
Eel grass	25.6	74.4	8.9	6.7	10.0	15.8
Coontail	23.3	76.7	7.8	3.3	12.2	15.8
Nitella	23.3	76.7	13.3	5.6	4.4	10.4
Common bladderwort	22.2	77.8	10.0	5.6	6.7	12.0
Spiny naiad	18.9	81.1	3.3	3.3	12.2	14.9
Sago pondweed	13.3	86.7	6.7	3.3	3.3	6.7
Illinois pondweed	8.9	91.1	7.8	1.1	0.0	2.2
Eurasian watermilfoil	5.6	94.4	3.3	0.0	2.2	2.9
Slender Naiad	3.3	96.7	3.3	0.0	0.0	0.7
Small pondweed	3.3	96.7	3.3	0.0	0.0	0.7
Variable pondweed	2.2	97.8	2.2	0.0	0.0	0.4
Filamentous Algae	3.3					

Other species observed: Cattails, white water lily, spatterdock, swamp loosestrife, swamp rose mallow, pickerelweed, large-leaved pondweed, purple loosestrife, and bulrush.

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

County:	Kos	Total Sites:	29	Mean species/site:	1.90
Date:	8/12/15	Sites with plants:	29	SE Mean species/site:	0.14
Secchi (ft):	7.5	Sites with native plants:	29	Mean native species/site	1.83
Max Plant Depth (ft):	20.0	Number of species:	9	SE Mean natives/site:	0.13
Trophic Status:	Olig	# of native species:	8	Species diversity:	0.71
Littoral Sites:	29	Maximum species/site:	3	Native diversity:	0.69

Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Chara	89.7	10.3	3.4	3.4	82.8	85.5
Common bladderwort	37.9	62.1	10.3	13.8	13.8	24.1
Illinois pondweed	24.1	75.9	24.1	0.0	0.0	4.8
Eel grass	10.3	89.7	10.3	0.0	0.0	2.1
Coontail	6.9	93.1	3.4	3.4	0.0	2.8
Spiny naiad	6.9	93.1	0.0	0.0	6.9	6.9
Variable pondweed	6.9	93.1	6.9	0.0	0.0	1.4
Sago pondweed	3.4	96.6	0.0	3.4	0.0	2.1
Slender Naiad	3.4	96.6	3.4	0.0	0.0	0.7
Filamentous Algae	6.9					

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

County:	Kos	Total Sites:	27	Mean species/site:	2.26
Date:	8/12/15	Sites with plants:	26	SE Mean species/site:	0.24
Secchi (ft):	7.5	Sites with native plants:	26	Mean native species/site	1.85
Max Plant Depth (ft):	20.0	Number of species:	11	SE Mean natives/site:	0.20
Trophic Status:	Olig	# of native species:	9	Species diversity:	0.87
Littoral Sites:	27	Maximum species/site:	5	Native diversity:	0.85

Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Eel grass	40.7	59.3	3.7	11.1	25.9	33.3
Chara	37.0	63.0	11.1	7.4	18.5	25.2
Spiny naiad	37.0	63.0	7.4	7.4	22.2	28.1
Sago pondweed	29.6	70.4	18.5	3.7	7.4	13.3
Common bladderwort	22.2	77.8	11.1	3.7	7.4	11.9
Coontail	18.5	81.5	7.4	0.0	11.1	12.6
Nitella	18.5	81.5	11.1	7.4	0.0	6.7
Slender Naiad	7.4	92.6	7.4	0.0	0.0	1.5
Small pondweed	7.4	92.6	7.4	0.0	0.0	1.5
Eurasian watermilfoil	3.7	96.3	0.0	0.0	3.7	3.7
Illinois pondweed	3.7	96.3	0.0	3.7	0.0	2.2
Filamentous Algae	3.7					

Table 5 continued

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

County:	Kos	Total Sites:	24	Mean species/site:	2.04
Date:	8/12/15	Sites with plants:	22	SE Mean species/site:	0.27
Secchi (ft):	7.5	Sites with native plants:	22	Mean native species/site	1.67
Max Plant Depth (ft):	20.0	Number of species:	8	SE Mean natives/site:	0.20
Trophic Status:	Olig	# of native species:	6	Species diversity:	0.82
Littoral Sites:	24	Maximum species/site:	5	Native diversity:	0.75

Depth: 10 to 15 ft		Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance	
Species			**0**	**1**	**3**	**5**		
Coontail		54.2	45.8	16.7	8.3	29.2	37.5	
Nitella		50.0	50.0	33.3	12.5	4.2	18.3	
Eel grass		33.3	66.7	16.7	8.3	8.3	16.7	
Spiny naiad		20.8	79.2	4.2	4.2	12.5	15.8	
Eurasian watermilfoil		16.7	83.3	12.5	0.0	4.2	6.7	
Common bladderwort		12.5	87.5	12.5	0.0	0.0	2.5	
Sago pondweed		12.5	87.5	4.2	4.2	4.2	7.5	
Small pondweed		4.2	95.8	4.2	0.0	0.0	0.8	

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

County:	Kos	Total Sites:	10	Mean species/site:	0.60
Date:	8/12/15	Sites with plants:	6	SE Mean species/site:	0.16
Secchi (ft):	7.5	Sites with native plants:	6	Mean native species/site	0.60
Max Plant Depth (ft):	20.0	Number of species:	3	SE Mean natives/site:	0.16
Trophic Status:	Olig	# of native species:	3	Species diversity:	0.50
Littoral Sites:	10	Maximum species/site:	1	Native diversity:	0.50

Depth: 15 to 20 ft		Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance	
Species			**0**	**1**	**3**	**5**		
Nitella		40.0	60.0	10.0	0.0	30.0	32.0	
Coontail		10.0	90.0	0.0	0.0	10.0	10.0	
Eel grass		10.0	90.0	0.0	10.0	0.0	6.0	

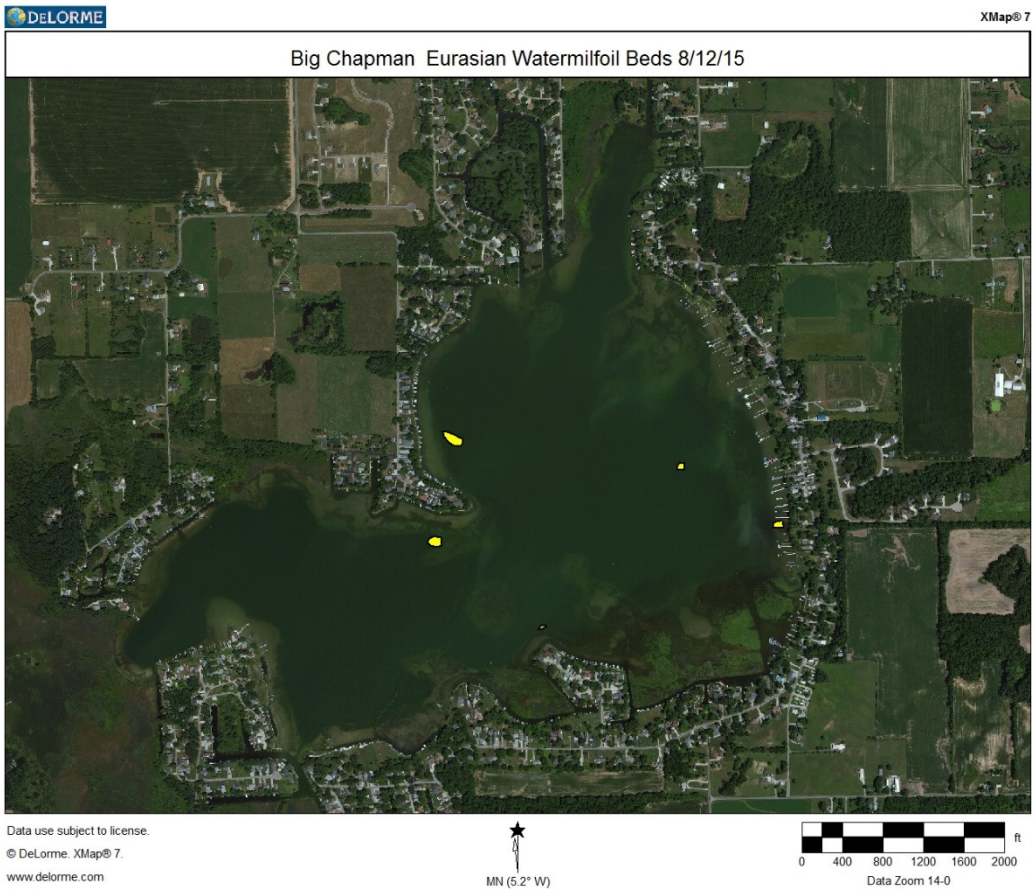

Figure 11. Eurasian watermilfoil beds on Big Chapman Lake, August 12, 2015.

2.1.3 Little Chapman Lake

Fifty sites were sampled on Little Chapman Lake in 2015. Four species were collected and plants were present at 29 of the 40 littoral sites yielding 73% littoral coverage. Coontail (*Ceratophyllum demersum*) was the most frequently occurring species and was found at 50.0% of the sites. No invasive species were collected, but 0.3 acres of Eurasian watermilfoil was documented in a shallow bay on the south side of the lake (Figure 12). No plants were collected within the 10-15 foot contour. The results of the survey are located in Table 6.

Figure 12. Eurasian watermilfoil bed on Little Chapman Lake, August 12, 2015.

Table 6. Tier 2 Survey Results in Little Chapman Lake, August 12, 2015.

Occurrence and Abundance of Submersed Aquatic Plants in Little Chapman Lake (all depths).

County:	Kos	Total Sites:	50	Mean species/site:	1.00
Date:	8.12.15	Sites with plants:	29	SE Mean sp/site:	0.14
Secchi (ft):	3.5	Sites with native plants:	29	Mean native sp/site:	1.00
Max Plant Depth (ft):	10.0	Number of species:	4	SE Mean natives/site:	0.14
Trophic Status:	Eutro	# of native species:	4	Species diversity:	0.62
Littoral Sites:	40	Maximum species/site:	3	Native species diversity:	0.62

All Depths (0 to 10 ft)	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Coontail	50.0	50.0	18.0	14.0	18.0	30.0
Eel grass	32.0	68.0	6.0	8.0	18.0	24.0
Chara	16.0	84.0	14.0	2.0	0.0	4.0
Sago pondweed	2.0	98.0	2.0	0.0	0.0	0.4
Filamentous Algae	26.0					

Other species observed: White water lily, cattail, Hibiscus, spatterdock, and purple loosestrife

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

County:	Kos	Total Sites:	23	Mean species/site:	1.61
Date:	8.12.15	Sites with plants:	21	SE Mean species/site:	0.17
Secchi (ft):	3.5	Sites with native plants:	21	Mean native species/site	1.61
Max Plant Depth (ft):	10.0	Number of species:	4	SE Mean natives/site:	0.17
Trophic Status:	Eutro	# of native species:	4	Species diversity:	0.63
Littoral Sites:	23	Maximum species/site:	3	Native diversity:	0.63

Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Coontail	78.3	21.7	26.1	21.7	30.4	48.7
Eel grass	52.2	47.8	4.3	13.0	34.8	43.5
Chara	26.1	73.9	26.1	0.0	0.0	5.2
Sago pondweed	4.3	95.7	4.3	0.0	0.0	0.9
Filamentous Algae	34.8					

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

County:	Kos	Total Sites:	17	Mean species/site:	0.76
Date:	8.12.15	Sites with plants:	8	SE Mean species/site:	0.24
Secchi (ft):	3.5	Sites with native plants:	8	Mean native species/site	0.76
Max Plant Depth (ft):	10.0	Number of species:	3	SE Mean natives/site:	0.24
Trophic Status:	Eutro	# of native species:	3	Species diversity:	0.59
Littoral Sites:	17	Maximum species/site:	3	Native diversity:	0.59

Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		**0**	**1**	**3**	**5**	
Coontail	41.2	58.8	17.6	11.8	11.8	22.4
Eel grass	23.5	76.5	11.8	5.9	5.9	11.8
Chara	11.8	88.2	5.9	5.9	0.0	4.7
Filamentous Algae	23.5					

2.2 Plant Sampling Discussion

The spring invasive survey found more Eurasian watermilfoil than anticipated. This may be due to the high abundance of Eurasian watermilfoil found in the summer 2014 Tier 2 survey or could be associated with favorable spring growing conditions in 2015. LARE funded selective treatments appeared to successfully control targeted Eurasian watermilfoil in 2015. The objective of maintaining Eurasian watermilfoil percent occurrence below 10% was met on both lakes (Figure 13 & 14). Eurasian watermilfoil was only found at only 5.6% of sites in Big Chapman Lake and was not collected in Little Chapman. Curly-leaf pondweed was not collected in either lake.

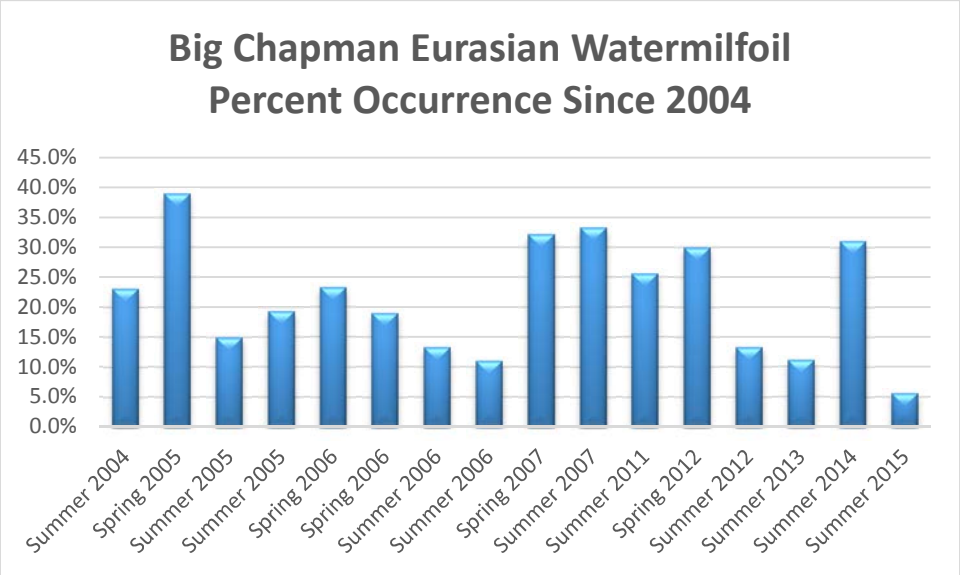

Figure 13. Eurasian watermilfoil percent occurrence in Big Chapman Lake since 2004.

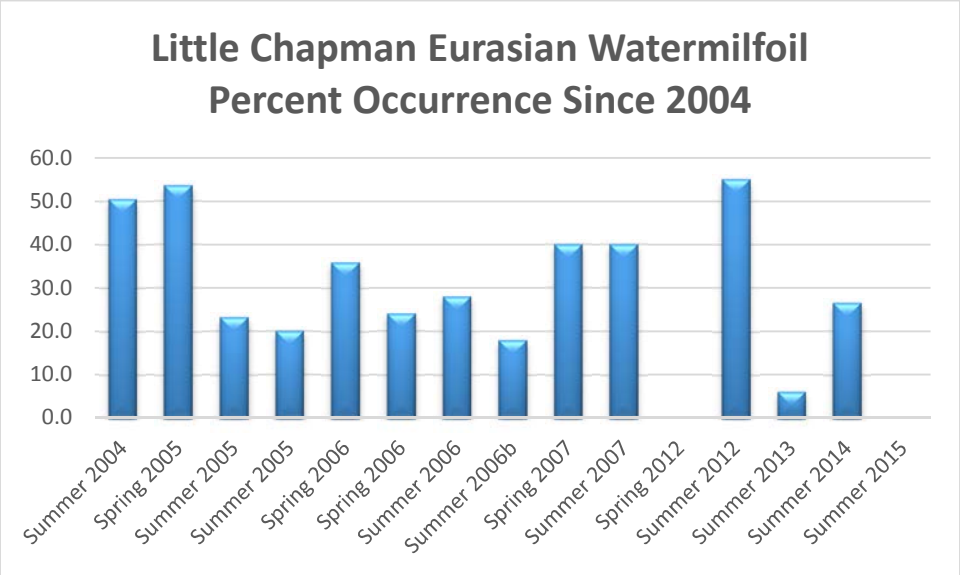

Figure 14. Eurasian watermilfoil percent occurrence in Little Chapman Lake since 2004.

One important objective is to maintain 85% native coverage of Big Chapman Lake. This objective has been met every year except 2012 and 2013 (80% & 73% respectively). Percent native coverage was 92% this season which is the highest level since 2006 and well above the objective. Another objective focuses on vegetation diversity and it is to maintain at least 11 native species collected. Only 10 native species were collected in Big Chapman in 2015. Little Chapman is a more nutrient rich lake thus it has different native abundance and diversity objectives. The percent native coverage objective is to maintain 65% or greater coverage. This year 58% of the sites sampled contained vegetation. In addition to the low overall coverage it appears that diversity has declined as only four native species were collected which is below the stated objective of six native species. A comparison of past Tier 2 survey results on both lakes can be found in Table 7 and 8. Species comparison by depth is listed in the Appendix.

Table 7. Comparison of Tier 2 Survey Results Since 2004 in Big Chapman Lake (species breakout by depth located in Appendix).

Surveyor	AWP	IDNR	IDNR	JF NEW	JFNew	IDNR	JFNew	IDNR	JFNew	IDNR	IDNR	IDNR	ARS	ARS	ARS	ATW	AC
Date	2004[b]	2005[a]	2005[b]	2005[a]	2005[b]	2006[a]	2006[a]	2006[b]	2006[b]	2007[a]	2007[b]	2011[b]	2012[a]	2012[b]	2013[b]	2014[b]	2015[b]
Total Sites		100	100	101	83	90	90	90	90	90	90	90	90	90	90	90	90
Littoral Sites		100	100	101	83	87	90	86	90	87	89	87	90	90	90	89	90
Sites with Plants		93	98	94	83	75	85	82	83	83	83	81	80	76	66	84	83
Sites with Native Plants		78	94	78		66	82	82	83	80	75	79	77	72	66	80	83
Percent Littoral Coverage	99%	93%	98%	93%	100%	86%	94%	95%	92%	95%	93%	93%	89%	84%	73%	84%	92%
Secchi (ft)		18.0	11.5	18.0	6.5	16.0	13.5	6.5	7.0	9.5	12.0		11.5	12.8	2.0	10.0	7.5
Number of Species	16	13	17	13	19	13	13	13	17	15	10	13	16	13	12	19	12
Number of Native Species	14	11	14	11	15	11	11	10	15	12	7	10	13	11	9	15	10
Maximum Plant Depth		21.5	23.0	21.5	19.5	18.5	20.0	18.0	20.0	18.0	19.5	19.0	20.0	20.0	20.0	20.0	20.0
Species Diversity	0.88	0.82	0.88	0.82	0.89	0.84	0.84	0.86	0.88	0.86	0.85	0.88	0.86	0.84	0.88	0.90	0.88
Native Species Diversity	0.86	0.72	0.85	0.72	0.86	0.77	0.77	0.81	0.86	0.80	0.79	0.84	0.82	0.82	0.86	0.87	0.86
Mean Native Species/Site	2.26	1.03	1.91	1.03	2.70	1.06	1.06	1..79	2.72	1.58	1.17	1.69	1.44	1.56	1.58	1.66	1.66
Species Frequency of Occurrence - All Depths																	
Eurasian watermilfoil	23.1	39.0	15.0	38.6	19.3	23.3	19.0	13.3	11.0	32.2	33.3	25.6	30.0	13.3	11.1	31.1	5.6
Curly-leaf pondweed	7.7	22.0	3.0	21.8	4.8	21.1	26.0	3.3	4.0	10.0	2.2	3.3	8.9	1.1		2.2	
Brittle naiad					3.6		3.0									16.7	
Spiny naiad	17.9		35.0		48.2		9.0	36.7	20.0	6.7	32.2	24.4		13.3	40.0	32.2	18.9
Coontail	26.9	23.0	25.0	22.8	26.5	20.0	32.0	30.0	40.0	27.8	13.3	24.4	33.3	27.8	20.0	16.7	23.3
Chara sp.	70.5	48.0	52.0	47.5	77.1	42.2	50.0	47.8	46.0	51.1	38.9	42.2	43.3	51.1	24.4	37.8	40.0
Bladderwort sp.			8.0	5.0				6.7			7.8	20.0					
Common bladderwort	12.8	5.0			30.1	3.3	6.0		7.0	8.9			1.1	2.2		5.6	22.2
Mixed bladderwort							2.0										
Creeping bladderwort							1.0										
Northern bladderwort													6.7	5.6			
Naiad sp.	7.7		11.0			3.3		5.6		3.3		2.2					
Slender naiad							1.0						1.1	8.9	22.2		3.3
Southern naiad					12.1		3.0		2.0								
Northern watermilfoil	12.8				8.4		2.0	5.6	9.0	4.4			3.3				
Water stargrass	9.0	7.0	2.0	6.9													
Nitella		6.0	8.0	5.9	2.4	1.1	12.0	6.7	13.0	1.1	2.2	3.3	15.6	8.9		22.2	23.3
Water-weed	3.8	1.0				1.1		3.3		1.1							
Canada waterweed			4.0	1.0	8.4		7.0		7.0				1.1				
Slender waterweed							1.0										
American pondweed			2.0		6.0				1.0								
Illinois pondweed	5.1	1.0	5.0	1.0	9.6		3.0		1.0	4.4			11.1	17.8		17.8	8.9
Floating-leaf pondweed	2.6																
White-stemmed pondweed	3.8																
Leafy pondweed					2.4							4.4				5.6	
Large-leaved pondweed	6.4	1.0	1.0	1.0	2.4	3.3	3.0		1.0				1.1		3.3	1.1	
Flat-stemmed pondweed	5.0	4.0	3.0	4.0	7.2	13.3		2.2		1.1		1.1				1.1	
Horned pondweed						3.3										1.1	
Richardson's pondweed		1.0		1.0													
Sago pondweed	25.6		34.0		56.6		18.0	25.6	26.0	33.3	20.0	16.7	14.4	17.8	10.0	8.9	13.3
Small pondweed							1.0		1.0					1.1		10.0	3.3
Variable pondweed	12.8	7.0	8.0	6.9	9.6	10.0	6.0	45.6	6.0	3.3	11.1	20.0	2.2		21.1	1.1	2.2
Water-thread pondweed*															3.3	4.4	
Fries' pondweed													7.8			2.2	
Fern pondweed																1.1	
Eel grass	25.6		29.0		26.5	4.4	1.0		16.0	17.8	23.3	34.4	2.2	1.1	33.3	27.8	25.6
Filamentous algae				1.0	7.2												3.3

[a]Spring Survey
[b]Summer Survey

Table 8. Comparison of Tier 2 Survey Results Since 2004 in Little Chapman Lake (species breakout by depth located in Appendix).

Surveyor	AWP	IDNR	IDNR	JFN	JFN	IDNR	JFN	IDNR	JNF	IDNR	IDNR	ARS	ARS	ARS	ATW	AC
Date	2004[b]	2005[a]	2005[b]	2005[a]	2005[b]	2006[a]	2006[a]	2006[b]	2006[b]	2007[a]	2007[b]	2012[a]	2012[b]	2013[b]	2014[b]	2015[b]
Total Sites		56	56	56	60	50	50	50	50	50	50	49	49	49	49	50
Littoral Sites		55	42	50	60	38	40	41	49	50	40	49	48	48	49	40
Sites with Plants		43	31	38	54	30	40	27	40	37	28	45	39	33	45	29
Sites with Native Plants		27	30	24		23	36	23	36	34	24	45	39	33	45	29
Percent Littoral Coverage	92%	78%	74%	76%	90%	79%	100%	56%	81%	74%	70%	92%	81%	68%	92%	73%
Secchi (ft)		4.5	6.0	4.5	3.5	5.0	3.3	4.0	2.8	5.0	5.5	9.0	7.5	5.0	6.0	3.5
Number of Species	11	6	7	6	9	8	10	8	10	7	6	8	9	9	9	4
Number of Native Species	9	5	5	4	5	6	8	7	8	5	5	6	7	6	6	4
Maximum Plant Depth		13.5	9.5	15.0	10.5	9.0	10.0	10.5	14.0	15.0	10.0	15.0	14.0	14.0	12.0	10.0
Species Diversity	0.82	0.71	0.75	0.71	0.83	0.78	0.84	0.77	0.80	0.76	0.76	0.76	0.78	0.77	0.76	0.62
Native Species Diversity	0.78	0.41	0.66	0.44	0.59	0.69	0.76	0.68	0.74	0.68	0.74	0.65	0.78	0.72	0.63	0.62
Mean Native Species/Site	1.50	0.57	0.77	1.42	1.72	0.58	0.61	0.66	1.34	0.94	0.72	1.43	1.41	1.10	1.37	1.00
Species Frequency of Occurrence - All Depths																
Eurasian watermilfoil	50.5	53.6	23.2	56.0	20.0	36.0	24.0	28.0	18.0	40.0	40.0	55.1		6.1	26.5	
Curly-leaf pondweed		30.4	1.8	28.0	5.0	14.0	16.0		4.0	2.0		10.2			2.0	
Brittle naiad	7.5				16.7								8.2	6.1		
Spiny naiad	5.0												2.0	2.0	12.2	
Coontail	55.0	42.9	39.3	42.0	51.7	28.0	36.0	32.0	42.0	46.0	28.0	75.5	57.1	36.7	69.4	50.0
Chara sp.	22.5	7.1	10.7	8.0	21.7	12.0	10.0	8.0	16.0	18.0	14.0	18.4	26.5	4.1	8.2	16.0
Common bladderwort									2.0						6.1	
Naiad sp.							4.0	4.0			4.0					
Slender naiad									2.0			2.0	12.2	2.0		
Southern naiad					10.0				4.0							
Northern watermilfoil	10.0						26.0		20.0							
Water stargrass			1.8						2.0			2.0				
Nitella						2.0				2.0						
Water-weed		1.8														
Canada waterweed				2.0												
Illinois pondweed						2.0		2.0							8.2	
Leafy pondweed					1.7											
Large-leaved pondweed									2.0				4.1			
Flat-stemmed pondweed	5.0	5.4		6.0		4.0										
Sago pondweed	5.0		7.1		36.7		12.0	6.0	18.0	12.0	10.0		8.2	28.6	2.0	2.0
Small pondweed							2.0						6.1	4.1		
Variable pondweed	5.0						6.0		6.0							
Water-thread pondweed								2.0								
Fries' pondweed									2.0			18.4				
Eel grass	52.5	17.9	17.9		33.3	10.0	2.0	16.0	18.0	16.0	16.0	26.5	26.5	34.7	42.9	32.0
Filamentous algae				18.0	51.7										8.2	26.0

[a]Spring Survey
[b]Summer Survey

3.0 PLANT MANAGEMENT DISCUSSION & ACTION PLAN

If left unmanaged, Eurasian watermilfoil, could potentially become a severe problem on the Chapman Lakes by impeding boating, fishing, swimming, and property values. In addition, this species could have negative impacts on the native submersed plant community and overall ecology of the lake. Controls have successfully limited the abundance of invasive species. It is recommended that selective herbicide treatments be continued next season. It is estimated that up to 70 acres of Eurasian watermilfoil may

need treatment next season. Of this 70 acres, it is estimated that approximately 53 acres will require treatment in Big Chapman (28 acres main lake & 25 acres in channels) and 17 acres will require treatment in Little Chapman (15 acres in main lake & 2 acres in channels). Big Chapman areas should be treated with 2,4-D granular at a rate of 2.0 ppm. Liquid 2,4-D can be used at the same rate on larger areas of Little Chapman. Narrow bands or small areas may require granular 2,4-D. This strategy worked well in 2015 and actual products to be used can be determined following the 2016 invasive survey. The cost of treatment of Eurasian watermilfoil would be approximately $25,000.00. Vegetation sampling should consist of an invasive species mapping survey in spring and a Tier 2 survey in late summer. The cost of the plant survey along with the plan update would be approximately $5,500.00.

One of the primary concerns of lake users is the abundance of eel grass, especially on the east side of Chapman Lake. Eel grass is considered a beneficial species for fish and wildlife, so control will be closely monitored by IDNR. It is advised that eel grass control should be a three pronged approach that involves herbicide treatment in permitted areas, physical removal of washed up plant material, and education and/or restrictions on near shore boating which is likely helping to create the floating mats. CLCA has expressed interest in managing this plant if control is needed and allowed. This plant typically reaches potentially nuisance levels in mid to late summer. CLCA will contact their vegetation control contractor if problem areas arise. The contractor can then inspect these areas and submit a potential treatment map to IDNR whom will decide on whether treatment is warranted. This decision will be based upon whether eel grass is impacting navigation and whether there is sufficient areas of native vegetation in the rest of the lake to support a healthy fishery. A potential eel grass treatment area is included in the 2016 permit application. This area encompasses 7 acres. This plant can be difficult to control at this late growth stage. Cost of treatment can range from $900-$1,000/acre.

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

1. Complete Invasive Species Sampling in the spring of 2016 in order to map out Eurasian watermilfoil treatment areas.

2. Complete treatment of Eurasian watermilfoil with 2.0 ppm 2,4-D (liquid formulation in larger shallow areas of Little Chapman and granular formulation in Big Chapman). Treatment should be completed in the spring of 2016.

3. Continue summer Tier 2 surveys on all lakes, in order to monitor the changes in the native plant population and assess the effectiveness of vegetation controls.

4. Work at limiting the impact of eel grass through herbicide treatments, manual removal of washed up fragments, and education of boaters on the impact of near shore boating.

2016 Budget	Cost Estimate
Pretreatment visual survey, Tier 2 Survey, and AVMP Update	$5,500.00
Treatment of up to 70 acres of Eurasian watermilfoil	$25,000.00
Treatment of 7 acres of eel grass on east side of Big Chapman (not funded by LARE)	$6,650.00
Total Treatment Cost Estimate:	$36,650.00
LARE Grant Request:	$30,500.00
LARE Share:	$24,400.00
Association Cost Share if Grant Awarded:	$6,100.00

4.0 PUBLIC INVOLVEMENT

Aquatic Control Inc. attended a meeting of the CLCA on September 2, 2015, to present the results of the herbicide treatment and surveys and to discuss the 2016 strategy. Seventeen individuals attended the meeting and filled out the Lake Use Survey (Table 9). Several individuals expressed their pleasure with how the Eurasian watermilfoil treatments turned out. The primary plant management concern was over the abundance of eel grass along the east side of Big Chapman Lake. Some individuals were concerned over the channels becoming too shallow and expressed the need for dredging in these areas.

Table 9. Lake User Survey, September 2, 2015.

Chapman Lake Conservation Association Meeting 9/2/15		
Are you a lake property owner?	Yes 100%	No 0%
Are you currently a member of your lake association?	Yes 94%	No 6%
How many years have you been at the lake?	2 or Less: 0%	5 to 10: 0%
	2 to 5: 12.0%	Over 10: 88%
How do you use the lake (mark all that apply)	Swimming 94%	Irrigation 53%
	Boating 94%	Drinking water 0.0%
	Fishing 94%	Geothermal 6%
Do you have aquatic plants at your shoreline in nuisance quantities?	Yes: 88% No: 12%	
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes: 82% No: 18%	
Does the level of vegetation in the lake affect your property values?	Yes: 71% No: 29%	
Are you in favor of continuing efforts to control vegetation on the lake?	Yes: 100.0% No: 0.0%	
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: 94% No: 6%	
Mark any of these you think are problems on your lake:		
24% Too many boats access the lake		
29% Use of jet skis on the lake		
0% Too much fishing		
6% Fish population problem		
82% Dredging needed		
24% Overuse by nonresidents		
47% Too many aquatic plants		
0% Not enough aquatic plants		
6% Poor water quality		
24% Pier/funneling problem		
Comments:		
1. Channel in front of arrowhead park needs dredged and too many weeds		
2. Weeds and dredging needed in my channel.		

5.0 REFERENCES CITED

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6.0 APPENDICIES

6.1 Data Sheets

6.1.1 Big Chapman Lake

WPT	Lat	Long	Depth	Eurasian watermilfoil	Spiny naiad	Fil. Algae	Eel grass	Coontail	Sago pondweed	Slender Naiad	Chara	Variable pondweed	Illinois pondweed	Common bladderwort	Small pondweed	Nitella
1	41.282453	-85.778141	2.0			P	1	3								
2	41.283858	-85.779097	5.0								5					
3	41.286315	-85.778106	3.0			P		1								
4	41.290103	-85.780462	4.0								3			5		
5	41.29043	-85.782289	4.0								5		1			
6	41.296213	-85.784024	4.0		5				3					5		
7	41.292586	-85.786259	4.0								5					
8	41.291589	-85.789015	4.0								5			1		
9	41.290907	-85.789329	5.0								5					
10	41.289582	-85.7908	4.0							1	5		1			
11	41.286144	-85.78888	3.0								5	1				
12	41.285865	-85.793334	4.0								5					
13	41.286841	-85.796432	3.0								5					
14	41.285865	-85.798538	3.0								5					
15	41.285259	-85.799338	5.0		5						5			3		
16	41.283676	-85.800752	3.0								5					
17	41.282378	-85.799388	2.0								5					
18	41.282845	-85.79811	3.0								5			5		
19	41.282587	-85.796454	2.0								5		1			
20	41.281444	-85.795854	3.0								5		1	3		
21	41.280296	-85.795469	3.0								5	1	1			
22	41.280044	-85.794462	4.0				1				5					
23	41.280307	-85.792735	3.0								5					
24	41.280688	-85.792207	4.0								1			1		
25	41.280785	-85.790958	2.0								5		1	3		
26	41.281863	-85.790986	4.0								5			5		
27	41.281879	-85.789009	3.0								5			1		
28	41.282764	-85.78676	3.0				1				5		1			
29	41.283301	-85.784733	5.0								5			3		
30	41.284765	-85.779193	7.0		3				1							
31	41.286986	-85.779886	8.0				5									
32	41.28719	-85.780621	10.0		1		3	1	5							
33	41.29051	-85.78312	6.0								5					
34	41.294882	-85.783306	6.0		3		1		1						1	1
35	41.291851	-85.785933	8.0				5			1				5		
36	41.288998	-85.790317	10.0		5				1	1						
37	41.286567	-85.78886	8.0				3		1							
38	41.285318	-85.78976	6.0								5					
39	41.285291	-85.790431	10.0	5				5	1							
40	41.285623	-85.79405	6.0													3
41	41.286229	-85.797984	6.0			P		1			5		3			
42	41.285602	-85.798741	7.0				5		5		1				1	
43	41.284786	-85.799819	6.0								3					
44	41.282077	-85.800946	7.0					5								
45	41.282287	-85.799925	8.0		1		3									
46	41.283263	-85.796506	9.0								1					
47	41.282174	-85.795764	10.0		5		5							1		3
48	41.280565	-85.795357	9.0				5				3			3		
49	41.280495	-85.793572	6.0								5			1		
50	41.280511	-85.792837	8.0													
51	41.281326	-85.790617	10.0		5											1
52	41.281616	-85.790695	10.0								5			1		
53	41.282324	-85.79096	7.0		5				3					5		
54	41.282088	-85.78789	10.0		5		5				1					
55	41.283	-85.786548	8.0					5								
56	41.283435	-85.785599	9.0		5		5									1
57	41.287211	-85.781237	11.0	1				5	1							
58	41.288181	-85.780762	14.0					5								1
59	41.292002	-85.784171	12.0											1		1
60	41.291977	-85.785521	11.0				1	1								1
61	41.290341	-85.789865	11.0													
62	41.288069	-85.789894	11.0	5				5								
63	41.287029	-85.78923	15.0					3								1
64	41.285291	-85.791397	15.0					1								
65	41.285776	-85.794641	13.0		5		1	3								
66	41.286541	-85.795755	13.0	1	5		5							1		1
67	41.286141	-85.796501	11.0					5								3
68	41.286272	-85.797325	15.0	1				5								1
69	41.282702	-85.79921	14.0													1
70	41.283834	-85.797486	14.0		3		5									1
71	41.283419	-85.796833	14.0					5								
72	41.28086	-85.795377	14.0				3	1	5						1	
73	41.280162	-85.795048	11.0					5								
74	41.280361	-85.794367	13.0				1									
75	41.28105	-85.791183	12.0													3
76	41.282271	-85.79124	14.0													
77	41.282311	-85.78967	15.0													5
78	41.282477	-85.787482	13.0													3
79	41.283215	-85.786329	12.0		1		1	1								
80	41.284406	-85.784326	12.0		5		3		3					1		
81	41.287946	-85.782313	20.0													
82	41.290585	-85.789274	17.0				3									
83	41.28801	-85.789139	18.0													5
84	41.28602	-85.795028	17.0													5
85	41.284953	-85.798941	20.0													
86	41.283027	-85.800689	18.0					5								
87	41.283499	-85.796663	19.0													
88	41.281144	-85.7953	20.0													1
89	41.280645	-85.792823	16.0													
90	41.281031	-85.791552	18.0													5

6.1.2 Little Chapman Lake

WPT	Lat	Long	Depth	Fil. Algae	Eel grass	Coontail	Sago pondweed	Chara
1	41.277083	-85.79282	5.0	P			1	
2	41.277249	-85.792299	4.0		5	3		
3	41.277378	-85.79085	3.0		5			1
4	41.276799	-85.790593	4.0		5	3		
5	41.275973	-85.789429	3.5		5	3		
6	41.274991	-85.789108	4.0		5	3		
7	41.274465	-85.788309	3.5	P				1
8	41.273655	-85.787381	1.5		5	1		
9	41.272057	-85.787252	3.0		3	5		
10	41.271611	-85.786817	4.0		5	1		1
11	41.270726	-85.786646	2.0					
12	41.270136	-85.787145	4.5		3	5		1
13	41.268243	-85.789251	5.0		5	5		
14	41.267813	-85.792327	4.5			5		1
15	41.267969	-85.791749	4.5			1		
16	41.269525	-85.79339	2.5	P		3		
17	41.270716	-85.792919	1.5	P	3	1		
18	41.271536	-85.794432	5.0			5		
19	41.273044	-85.792891	2.0	P		1		
20	41.27395	-85.792398	4.5			5		
21	41.275576	-85.792355	4.0	P				
22	41.277351	-85.793804	2.0	P	1	1		1
23	41.27674	-85.794925	5.0	P		5		
24	41.277094	-85.792048	6.5			3		
25	41.276595	-85.790692	10.0		1	1		
26	41.275533	-85.789257	5.5		5	5		
27	41.27387	-85.787887	6.0					
28	41.273092	-85.787537	8.0		1	1		3
29	41.272599	-85.787273	6.5		3			1
30	41.270539	-85.78698	9.0					
31	41.269616	-85.787523	7.0					
32	41.269401	-85.787708	8.5					
33	41.268693	-85.788758	7.5					
34	41.267964	-85.790335	10.0					
35	41.267733	-85.791113	9.0	P		3		
36	41.269348	-85.791855	9.0	P				
37	41.269825	-85.792897	6.0	P		1		
38	41.2738	-85.793639	9.0					
39	41.274819	-85.792348	9.0					
40	41.276423	-85.792619	5.5	P		5		
41	41.276118	-85.790542	15.0					
42	41.274755	-85.78935	14.0					
43	41.274079	-85.7882	11.0					
44	41.271102	-85.78688	14.0					
45	41.269503	-85.788015	13.0					
46	41.268661	-85.790741	15.0					
47	41.272008	-85.794096	13.5					
48	41.273403	-85.792168	13.0					
49	41.275206	-85.791919	13.5					
50	41.276016	-85.792254	10.5	P				

6.2 IDNR VEGETATION PERMIT APPLICATIONS

6.2.1 2016 Big Chapman Lake Permit

Page 1 of 3

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 Chapman Lake Conservation Assocation	Lake Association Name	
Street or Rural Route 69 EMS C2 Lane		Telephone Number 574-274-4752
City and State Warsaw, IN		ZIP Code 46582
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) Big Chapman Lake	Nearest Town Warsaw	County Kosciusko
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	Main Lake Areas TBD following survey Potential Areas on Map	28	n/a	n/a

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
n/a	Late May/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 herbicide 2.0 ppm for selective EWM 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
Common coontail	☐	15	Illinois pondweed	☐	5
Chara	☐	25	Bladderwort	☐	5
E. Milfoil	✓	5	Curlyleaf pondweed	☐	5
Sago pondweed	☐	5		☐	
Eel grass	☐	10		☐	
Nitella	☐	10		☐	
Small Pondweed	☐	1		☐	
Variable pondweed	☐	1		☐	
Common naiad	☐	1		☐	
Spiny naiad	☐	12		☐	

Page 2 of 3

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	Chapman Lake Channel areas tbd following survey	25	n.a.	n.a.

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
6	May/early 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 herbicide 2.0 ppm for selective BWM 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
Coontail	☐	10	nitella	☐	5
chara	☐	20	eel grass	☐	10
sago pondweed	☐	5	spiny naiad	☐	5
Eurasian watermilfoil	✓	10	curlyleaf pondweed	☐	20
Illinois pondweed	☐	5	bladderwort	☐	10

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	See Map (Potential eel grass area on East Side)	7	2825	100-400ft

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
5	Late July/Aug	■ 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. Komeen crystal, Nautique, and or hydrothol for eel grass control for boat access

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
Eel grass	✓	50	Spiny naiad	☐	10
Coontail	☐	10		☐	
Sago pondweed	☐	10		☐	
Chara	☐	10		☐	
Nitella	☐	10		☐	

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.

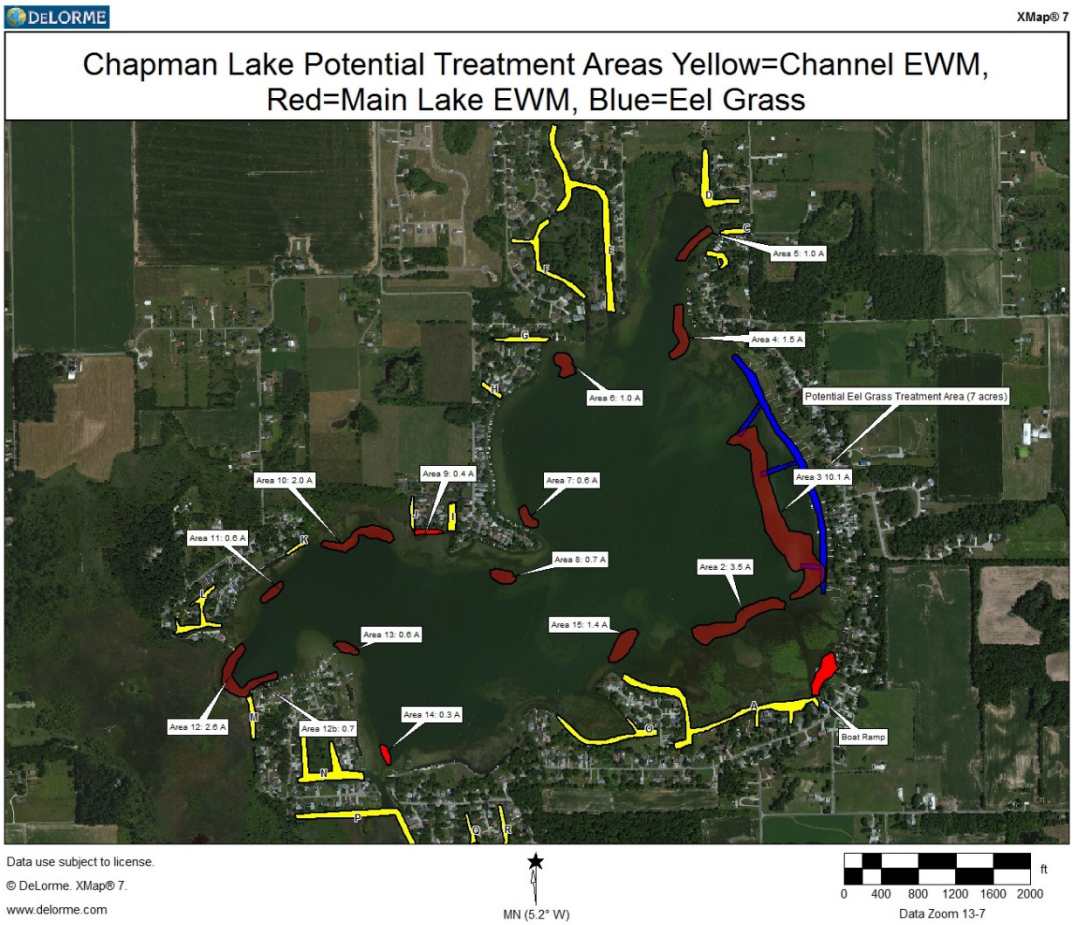
OFFICE USE ONLY

Permit Number	Check Number	Other

☐ Denied ☐ Approved ☐ Approved w/Conditions — Fisheries Section Approval

AQUATIC CONTROL Est. 1966

Page 3 of 3 Big Chapman Lake Permit Map



6.2.2 2016 Little Chapman Lake Permit

Page 1 of 3

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 Chapman Lakes Conservation Association	Lake Association Name Chapman Lakes Conservation Association	
Street or Rural Route 69 EMS C2 Lane		Telephone Number 574-274-4752
City and State Warsaw, IN		ZIP Code 46582
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) Little Chapman Lake	Nearest Town Warsaw	County Kosciusko
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	See Map, Main Lake Areas to be determined following invasive survey	15	n/a	n/a

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
n/a	Late May/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 herbicide 2.0 ppm for selective EWM 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
Common coontail	☐	50		☐	
Chara	☐	25		☐	
E. Milfoil	✓	10		☐	
Sago pondweed	☐	5		☐	
Eel grass	☐	5		☐	
Curlyleaf pondweed	☐	5		☐	
	☐			☐	
	☐			✓	
	☐			☐	
	☐			☐	

Page 2 of 3

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
	☐			☐	
	☐			☐	
	☐			☐	
	☐			☐	
	☐			☐	

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
	☐			☐	
	☐			☐	
	☐			☐	
	☐			☐	
	☐			☐	

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*) _____

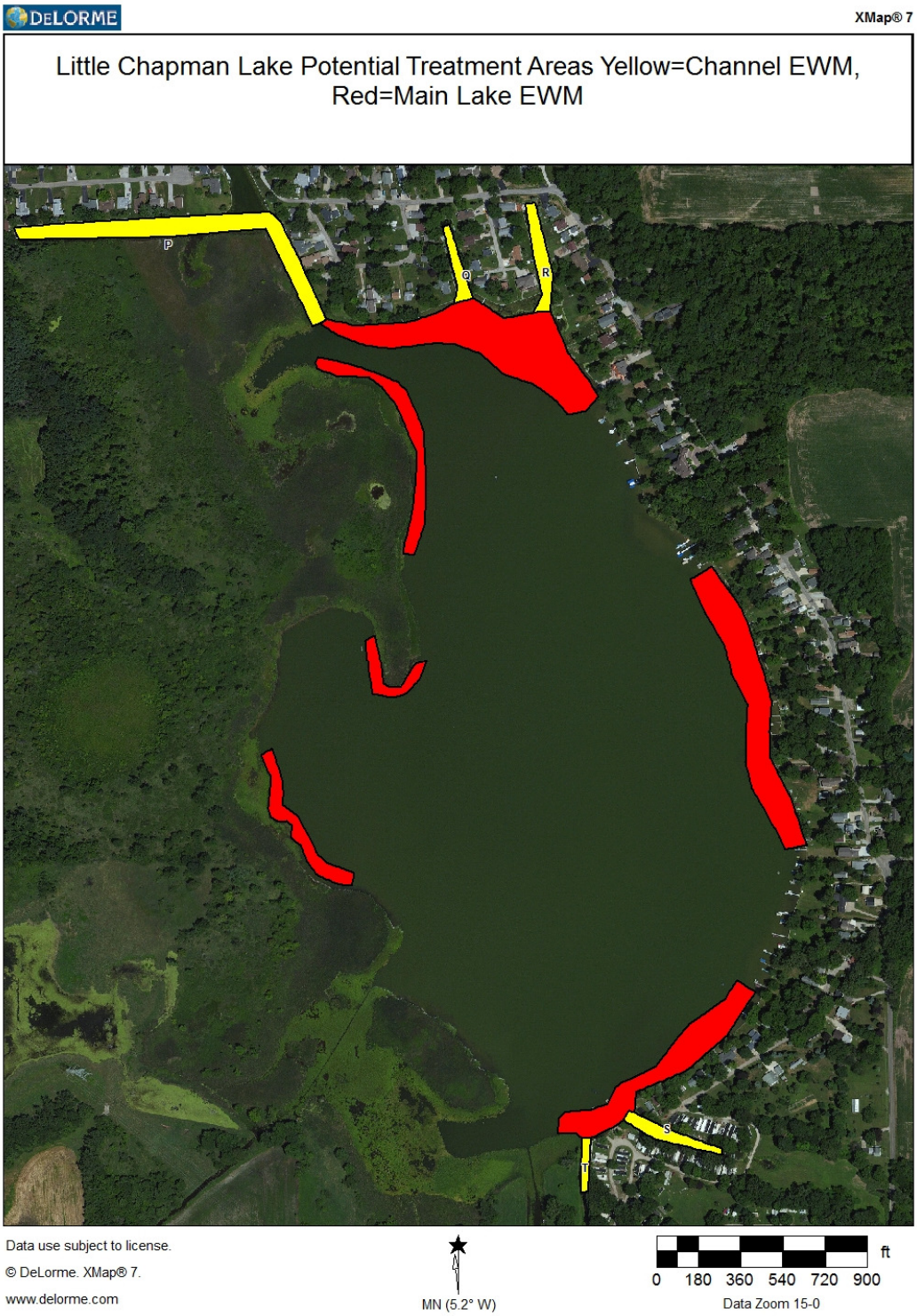
Make check or money order payable to DNR - Division of Fish and Wildlife in the amount of $5.00
Return completed application with the $5.00 permit fee to the address shown on page 1.

OFFICE USE ONLY

Permit Number	Check Number	Other
☐ Denied ☐ Approved ☐ Approved w/Conditions	Fisheries Section Approval	

AQUATIC CONTROL Est. 1966

Page 3 of 3 Little Chapman Lake Permit Map



6.3 Grant Application (Sponsor needs to fill out Section I and sign)

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

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

ACTIVITIES RELATED TO AQUATIC VEGETATION MANAGEMENT FOR LAKES	
I. APPLICANT INFORMATION	
A. Project sponsor *(applicant)*:	
Name:	
Address *(number and street)*:	
City, State, and ZIP Code:	
Is the project sponsor already listed as a vendor with the state of Indiana? ☐ Yes ☐ No *If the answer is no, a Vendor Information Form (State Form 53788) must be submitted to the Indiana State Auditor before the sponsor can receive funds from the State of Indiana.*	
B. Contact person for the sponsor organization	
Name:	Title:
Address *(number and street)*:	
City, State, and ZIP Code:	
Telephone number *(Day)*:	Telephone number *(Evening)*:
FAX number:	E-mail address:
C. Briefly describe the past and present activities of the sponsor organization.	
D. Describe the legal status of the sponsor organization, i.e., indicate what the sponsor has done to acquire official standing. State when the organization was established. List current officers' / officials' names.	
E. If the sponsor organization is a property owners or lake association, what percentage of the affected lake's residents are members of the group?	
F. Are there other organizations also representing residents of the affected lake? What relationship do those organizations have with the sponsor/applicant on matters related to this proposed project?	
G. Briefly describe the financial resources available to the sponsor organization *(e.g. dues, contributions, fund drives, taxes, etc.)*.	
II. LAKE/WATERSHED INFORMATION	
A. Lake(s) or River name(s): Big and Little Chapman Lakes	B. County(ies): Kosciusko
C. Lake size (acres): Big Chapman (), Little Chapman (272),	D. Watershed (drainage basin) size (acres), *(if known)*: 4567
E. 12 digit Hydrologic Unit Code (HUC) 07120005120106	

1

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F. Describe how the general public can gain access to the lake(s) *(i.e., the number and types of access sites, their location, ownership, and any fees charged).*

Public access on south side of Big Chapman.

III. PROJECT INFORMATION

A. For what specific purpose or need is funding being sought?

AVMP Update

Development of a new or updated aquatic vegetation management plan?

Yes, update

Management of aquatic vegetation?

Yes, selective Eurasian watermilfoil control

Other? *(Explain)*

B. Describe any studies or restoration measures that have been completed for the lake/watershed.

Chapman Lake Diagnostic Study-2001
Chapman Engineering Feasibility Studay-2003
Lozier & Highlan Park Drains Feasibility Study-2006
Cahpman Lake Litttoral Zone Restoration Research Project 2007-2009
Chapman Lake AVMP Update-2007
Chapman Lake Strategic Lake Management Plan-2007
Chapman Lakes Watershed Highland Drain Design-Build Project-2008
Chapman Lakes Sediment Removal Plan-2009
Chapman Lakes AVMP Update-2013
Chapman Lakes AVMP Update-2014
Little Chapman Lake Drain and Stream Band Design-Build Project-2014
Barbee and Chapman Lake Chaiins Water monitoring-2014
Arrowhead Drain Design/Build Report-2014

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

Species	Total Acreage Including Channels	Channel Only Acreage	Chemical Name	Treatment Cost
Eurasian watermilfoil	70	27	2,4-d (2.0 ppm)	25000

D. What is the total estimated cost of the project? $ 30,500

AQUATIC CONTROL Est. 1966

Itemized by specific expenses:
Planning and Surveys *(AVMP or update)*: $ 5500
Herbicide treatment costs: $ 25,000
Other *(revegetation, ecozones, etc)*: $
Anticipated cost-share to be contributed by sponsor ($ or %): 20

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

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

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

Application deadline is January 31st

AQUATIC CONTROL Est. 1966

6.4 Species List

Scientific Name	Common Name
Ceratophyllum demersum	coontail
Chara sp.	chara
Elodea canadensis	Canada waterwead
Elodea nutalii	Slender waterweed
Heteranthera dubia	water stargrass
Myriophyllum heterophyllum	variable watermilfoil
Myriophyllum sibiricum	northern watermilfoil
Myriophyllum spicatum	Eurasian watermilfoil
Najas flexillis	slender naiad
Najas guadalupensis	southern naiad
Najas minor	brittle naiad
Najas marina	spiny naiad
Nitella	nitella
Potamogeton amplifoilus	large-leaved pondweed
Potamogeton crispus	curly-leaf pondweed
Potamogeton diversifolius	water-thread pondweed
Potamogeton foliosus	leafy pondweed
Potamogeton friesii	Fries' pondweed
Potamogeton gramineus	variable pondweed
Potamogeton illinoesis	Illinois pondweed
Potamogeton natans	floating-leaf pondweed
Potamogeton nodosis	American pondweed
Potamogeton praelongus	white-stemmed pondweed
Potamogeton pusillus	small pondweed
Potamogeton richardsonii	Richardson's pondweed
Potamogeton robbinsii	Fern pondweed
Potamogeton zosteriformis	flat-stemmed pondweed
Ranunculus aquatilis	white water crowfoot
Stuckenia pectinata	sago pondweed
Utricularia intermedia	flat-leaved bladderwort
Utricularia macrorhiza	common bladderwort
Vallisneria americana	eel grass
Zannichellia palustris	horned pondweed

6.5 Tier 2 Comparison

6.5.1 Big Chapman Tier 2 Comparison

Surveyor	AWP	IDNR	IDNR	JF NEW	JFNew	IDNR	JFNew	IDNR	JFNew	IDNR	IDNR	IDNR	ARS	ARS	ARS	ATW	AC
Date	2004[b]	2005[a]	2005[b]	2005[a]	2005[b]	2006[a]	2006[a]	2006[b]	2006[b]	2007[a]	2007[b]	2011[b]	2012[a]	2012[b]	2013[b]	2014[b]	2015[b]
Total Sites		100	100	101	83	90	90	90	90	90	90	90	90	90	90	90	90
Littoral Sites		100	100	101	83	87	90	86	90	87	89	87	90	90	90	89	90
Sites with Plants		93	98	94	83	75	85	82	83	83	83	81	80	76	66	84	83
Sites with Native Plants		78	94	78		66	82	82	83	80	75	79	77	72	66	80	83
Percent Littoral Coverage	99%	93%	98%	93%	100%	86%	94%	95%	92%	95%	93%	93%	89%	84%	73%	84%	92%
Secchi (ft)		18.0	11.5	18.0	6.5	16.0	13.5	6.5	7.0	9.5	12.0		11.5	12.8	2.0	10.0	7.5
Number of Species	16	13	17	13	19	13	13	13	17	15	10	13	16	13	12	19	12
Number of Native Species	14	11	14	11	15	11	11	10	15	12	7	10	13	11	9	15	10
Maximum Plant Depth		21.5	23.0	21.5	19.5	18.5	20.0	18.0	20.0	18.0	19.5	19.0	20.0	20.0	20.0	20.0	20.0
Species Diversity	0.88	0.82	0.88	0.82	0.89	0.84	0.84	0.86	0.88	0.86	0.85	0.88	0.86	0.84	0.88	0.90	0.88
Native Species Diversity	0.86	0.72	0.85	0.72	0.86	0.77	0.77	0.81	0.86	0.80	0.79	0.84	0.82	0.82	0.86	0.87	0.86
Mean Native Species/Site	2.26	1.03	1.91	1.03	2.70	1.06	1.06	1..79	2.72	1.58	1.17	1.69	1.44	1.56	1.58	1.66	1.66
Species Frequency of Occurrence - All Depths																	
Eurasian watermilfoil	23.1	39.0	15.0	38.6	19.3	23.3	19.0	13.3	11.0	32.2	33.3	25.6	30.0	13.3	11.1	31.1	5.6
Curly-leaf pondweed	7.7	22.0	3.0	21.8	4.8	21.1	26.0	3.3	4.0	10.0	2.2	3.3	8.9	1.1		2.2	
Brittle naiad					3.6		3.0									16.7	
Spiny naiad	17.9		35.0		48.2		9.0	36.7	20.0	6.7	32.2	24.4		13.3	40.0	32.2	18.9
Coontail	26.9	23.0	25.0	22.8	26.5	20.0	32.0	30.0	40.0	27.8	13.3	24.4	33.3	27.8	20.0	16.7	23.3
Chara sp.	70.5	48.0	52.0	47.5	77.1	42.2	50.0	47.8	46.0	51.1	38.9	42.2	43.3	51.1	24.4	37.8	40.0
Bladderwort sp.			8.0	5.0				6.7			7.8	20.0					
Common bladderwort	12.8	5.0			30.1	3.3	6.0		7.0	8.9			1.1	2.2		5.6	22.2
Mixed bladderwort							2.0										
Creeping bladderwort							1.0										
Northern bladderwort													6.7	5.6			
Naiad sp.	7.7		11.0			3.3		5.6		3.3		2.2					
Slender naiad							1.0						1.1	8.9	22.2		3.3
Southern naiad					12.1		3.0		2.0								
Northern watermilfoil	12.8				8.4		2.0	5.6	9.0	4.4			3.3				
Water stargrass	9.0	7.0	2.0	6.9													
Nitella		6.0	8.0	5.9	2.4	1.1	12.0	6.7	13.0	1.1	2.2	3.3	15.6	8.9		22.2	23.3
Water-weed	3.8	1.0				1.1		3.3		1.1							
Canada waterweed			4.0	1.0	8.4		7.0		7.0				1.1				
Slender waterweed							1.0										
American pondweed			2.0		6.0				1.0								
Illinois pondweed	5.1	1.0	5.0	1.0	9.6		3.0		1.0	4.4			11.1	17.8		17.8	8.9
Floating-leaf pondweed	2.6																
White-stemmed pondweed	3.8																
Leafy pondweed					2.4							4.4				5.6	
Large-leaved pondweed	6.4	1.0	1.0	1.0	2.4	3.3	3.0		1.0				1.1		3.3	1.1	
Flat-stemmed pondweed	5.0	4.0	3.0	4.0	7.2	13.3		2.2		1.1		1.1				1.1	
Horned pondweed						3.3										1.1	
Richardson's pondweed		1.0		1.0													
Sago pondweed	25.6		34.0		56.6		18.0	25.6	26.0	33.3	20.0	16.7	14.4	17.8	10.0	8.9	13.3
Small pondweed							1.0		1.0					1.1		10.0	3.3
Variable pondweed	12.8	7.0	8.0	6.9	9.6	10.0	6.0	45.6	6.0	3.3	11.1	20.0	2.2		21.1	1.1	2.2
Water-thread pondweed*															3.3	4.4	
Fries' pondweed													7.8			2.2	
Fern pondweed																1.1	
Eel grass	25.6		29.0		26.5	4.4	1.0		16.0	17.8	23.3	34.4	2.2	1.1	33.3	27.8	25.6
Filamentous algae				1.0	7.2												3.3

Species Frequency of Occurrence - 0-5																	
Eurasian watermilfoil		14.7	3.1			3.4	10.0	3.6	14.0	20.0	9.7	3.4	31.0	6.9	3.5	30.8	
Curly-leaf pondweed						6.9	3.0	3.6					20.7		3.5		
Brittle naiad																11.5	
Spiny naiad			43.8				13.0	46.4	31.0	6.7	12.9	24.1		13.8	41.4	11.5	6.9
Coontail		2.9	6.3			3.4	7.0	3.6	31.0	6.7	6.5	10.3	34.5	34.5	24.9		6.9
Chara sp.		91.2	93.8			86.2	97.0	78.6	93.0	92.0	87.1	82.8	44.8	41.4		65.4	89.7
Bladderwort sp.		8.8			9.4	6.9		7.1			6.5	31.0					
Common bladderwort							17.0		14.0						3.5	15.4	37.9
Mixed bladderwort							3.0										
Creeping bladderwort							3.0										
Northern bladderwort													3.4				
Naiad sp.			12.5			6.9						3.4					
Water stargrass		8.8	3.1														
Slender naiad														10.3	34.5		3.4
Southern naiad									3.0								
Liverwort species																	
Northern watermilfoil								7.1	3.0	3.3							
Nitella													20.7	20.7		3.8	
Water-weed			3.1					3.6									
Canada waterweed									7.0				3.4				
American pondweed			6.3													11.5	
Illinois pondweed			9.4							6.7			6.9	17.2	17.2	42.3	24.1
Leafy pondweed																3.8	
Large-leaved pondweed		2.9	3.1			3.4			3.0	2.0				3.4			
Flat-stemmed pondweed		2.9				6.9											
Horned pondweed						3.4										3.8	
Richardon's pondweed																11.5	
Sago pondweed			31.3				21.0	28.6	21.0	30.0	16.1	10.3	13.8	20.7	34.5	11.5	3.4
Small pondweed															17.2	7.7	
Variable pondweed		14.7	12.5			17.2	3.0	57.1	14.0	6.7	13.0	41.4					6.9
Eel grass					25.0	10.3			24.0			6.9		3.4		34.6	10.3
Fries' pondweed																3.8	
Fern pondweed																3.8	
Filamentous algae																	6.9
Species Frequency of Occurrence - 5-10																	
Eurasian watermilfoil		47.2	26.7			40.7	26.0	17.9	19.0	44.4	44.4	33.3	37.0	18.5	22.2	41.7	3.7
Curly-leaf pondweed		16.7	46.7			14.8	11.0	7.1	4.0	11.1		3.7				5.6	
Brittle naiad							4.0									30.6	
Spiny naiad			3.3				15.0	57.1	30.0	7.4	63.0	48.1		22.2	44.4	58.3	37.0
Coontail		27.8	23.3			14.8	22.0	25.0	37.0	33.3	18.5	22.2	18.5	25.9	7.4	16.7	18.5
Chara sp.		41.7	63.3			40.7	48.0	57.1	44.0	48.1	22.2	37.0	55.6	63.0	33.3	27.8	37.0
Bladderwort sp.		5.6	13.3			3.7		14.3		3.7	11.1	33.3					
Common bladderwort									7.0						14.8	2.8	22.2
Mixed bladderwort							4.0										
Northern bladderwort													11.1	11.1			
Slender naiad							4.0							14.8	29.6		7.4
Northern watermilfoil							4.0	10.7	26.0	3.7							
Naiad sp.			16.7					7.1		3.7		3.7					
Water-weed			6.7					3.6		3.7							
Water stargrass		5.6	3.3														
Nitella								10.7	4.0				14.8	3.7	11.1	11.1	18.5
Canada waterweed							11.0		4.0								
American pondweed									4.0							2.8	
Illinois pondweed			6.7				7.0		4.0	3.7			7.4	18.5	29.6	13.9	3.7
Leafy pondweed												3.7				11.1	
Large-leaved pondweed						7.4	4.0										
Flat-stemmed pondweed		5.6				25.9		3.6				3.7					
Horned pondweed						3.7											
Sago pondweed			36.7				12.0	46.4	56.0	51.9	29.6	33.3	3.7	18.5	25.9	13.9	29.6
Small pondweed							4.0									13.9	7.4
Variable pondweed		2.8	10.0			14.8	7.0	60.7	4.0	3.7	25.9	22.2				2.8	
Fries' pondweed													18.5			2.8	
Eel grass			46.7			3.7	4.0		26.0	29.6	44.4	66.7	3.7		22.2	38.9	40.7
Filamentous algae																	3.7

Species Frequency of Occurrence - 10-15																	
Eurasian watermilfoil		80.0	25.0			37.5	30.0	27.3		43.5	56.5	54.2	25.0	16.7	12.5	30.8	16.7
Curly-leaf pondweed		60.0	10.0			41.7	67.0		13.0	21.7	8.7	8.3	8.3		4.2		
Brittle naiad																7.7	
Spiny naiad			30.0					18.2	4.0	8.7	34.9	8.3		8.3	41.7	30.8	20.8
Coontail		20.0	40.0			41.7	75.0	36.6	65.0	43.5	8.7	41.7	50.0	20.8	29.2	30.8	54.2
Chara sp.		13.3	15.0			4.2	13.0	22.7	9.0	17.4	8.7	16.7	41.7		41.7	30.8	
Bladderwort sp.			5.0								8.7						
Common bladderwort													4.2	8.3	33.3		12.5
Northern bladderwort														8.3			
Northern watermilfoil													8.3				
Slender naiad													4.2	4.2	8.3		
Southern naiad							8.0		4.0								
Northern watermilfoil							4.0			8.7			12.5				
Naiad sp.			5.0					13.6									
Water stargrass		6.7															
Nitella		6.7	5.0			4.2	21.0	13.6	35.0	4.3	4.3	4.2	12.5	4.2	4.2	53.8	50.0
Water-weed								4.5						62.5			
Canada waterweed							4.0		13.0								
Slender waterweed							4.0										
Illinois pondweed		6.7								4.3			20.8	20.8	20.8		
Leafy pondweed												8.3					
Large-leaved pondweed													4.2				
Sago pondweed			50.0					9.1	9.0	30.4	21.7	12.5		20.8	50.0		12.5
Small pondweed									4.0						4.2	15.4	4.2
Variable pondweed			5.0				13.0	36.4					4.2				
Flat-stemmed pondweed			5.0			8.3				4.3							
Horned pondweed						4.2											
Fries' pondweed													4.2				
Eel grass			25.0							26.1	39.1	45.8	4.2		8.3	15.4	33.3
Species Frequency of Occurrence - 15-20																	
Eurasian watermilfoil		36.4							10.0	10.0	22.2		20.0	10.0		7.1	
Curly-leaf pondweed		54.5				30.0	20.0			10.0							
Spiny naiad															20.0	7.1	
Coontail		81.8	50.0			30.0	30.0	41.7	20.0	40.0	33.3	30.0	30.0	30.0	20.0	35.7	10.0
Chara sp.						10.0	20.0			20.0			10.0	20.0	20.0	21.4	
Southern naiad							20.0										
Naiad sp.						10.0				20.0							
Nitella		27.3	7.1				50.0		30.0		11.1	20.0	10.0			57.1	40.0
Water-weed		9.1				10.0											
Illinois pondweed														20.8	10.0		
Leafy pondweed			28.6									10.0			10.0		
Large-leaved pondweed																	
Flat-stemmed pondweed		9.1	14.3			10.0		8.3									
Richardson's pondweed		9.1															
Sago pondweed			21.4				40.0						10.0		10.0		
Small pondweed														10.0	10.0		
Variable pondweed		9.1					13.0						10.0				
Fries' pondweed													10.0				
Eel Grass			14.3							20.0							10.0
Species Frequency of Occurrence - 20-25																	
Nitella			75.0														

6.5.2 Little Chapman Lake Tier 2 Comparison

Surveyor	AWP	IDNR	IDNR	JFN	JFN	IDNR	JFN	IDNR	JNF	IDNR	IDNR	ARS	ARS	ARS	ATW	AC
Date	2004[b]	2005[a]	2005[b]	2005[a]	2005[b]	2006[a]	2006[a]	2006[b]	2006[b]	2007[a]	2007[b]	2012[a]	2012[b]	2013[b]	2014[b]	2015[b]
Total Sites		56	56	56	60	50	50	50	50	50	50	49	49	49	49	50
Littoral Sites		55	42	50	60	38	40	41	49	50	40	49	48	48	49	40
Sites with Plants		43	31	38	54	30	40	27	40	37	28	45	39	33	45	29
Sites with Native Plants		27	30	24		23	36	23	36	34	24	45	39	33	45	29
Percent Littoral Coverage	92%	78%	74%	76%	90%	79%	100%	56%	81%	74%	70%	92%	81%	68%	92%	73%
Secchi (ft)		4.5	6.0	4.5	3.5	5.0	3.3	4.0	2.8	5.0	5.5	9.0	7.5	5.0	6.0	3.5
Number of Species	11	6	7	6	9	8	10	8	10	7	6	8	9	9	9	4
Number of Native Species	9	5	5	4	5	6	8	7	8	5	5	6	7	6	6	4
Maximum Plant Depth		13.5	9.5	15.0	10.5	9.0	10.0	10.5	14.0	15.0	10.0	15.0	14.0	14.0	12.0	10.0
Species Diversity	0.82	0.71	0.75	0.71	0.83	0.78	0.84	0.77	0.80	0.76	0.76	0.76	0.78	0.77	0.76	0.62
Native Species Diversity	0.78	0.41	0.66	0.44	0.59	0.69	0.76	0.68	0.74	0.68	0.74	0.65	0.78	0.72	0.63	0.62
Mean Native Species/Site	1.50	0.57	0.77	1.42	1.72	0.58	0.61	0.66	1.34	0.94	0.72	1.43	1.41	1.10	1.37	1.00
Species Frequency of Occurrence - All Depths																
Eurasian watermilfoil	50.5	53.6	23.2	56.0	20.0	36.0	24.0	28.0	18.0	40.0	40.0	55.1		6.1	26.5	
Curly-leaf pondweed		30.4	1.8	28.0	5.0	14.0	16.0		4.0	2.0		10.2			2.0	
Brittle naiad	7.5				16.7								8.2	6.1		
Spiny naiad	5.0												2.0	2.0	12.2	
Coontail	55.0	42.9	39.3	42.0	51.7	28.0	36.0	32.0	42.0	46.0	28.0	75.5	57.1	36.7	69.4	50.0
Chara sp.	22.5	7.1	10.7	8.0	21.7	12.0	10.0	8.0	16.0	18.0	14.0	18.4	26.5	4.1	8.2	16.0
Common bladderwort									2.0						6.1	
Naiad sp.							4.0	4.0			4.0					
Slender naiad									2.0			2.0	12.2	2.0		
Southern naiad					10.0				4.0							
Northern watermilfoil	10.0						26.0		20.0							
Water stargrass			1.8						2.0			2.0				
Nitella						2.0				2.0						
Water-weed		1.8														
Canada waterweed				2.0												
Illinois pondweed						2.0		2.0							8.2	
Leafy pondweed					1.7											
Large-leaved pondweed									2.0				4.1			
Flat-stemmed pondweed	5.0	5.4		6.0		4.0										
Sago pondweed	5.0		7.1		36.7		12.0	6.0	18.0	12.0	10.0		8.2	28.6	2.0	2.0
Small pondweed							2.0						6.1	4.1		
Variable pondweed	5.0						6.0		6.0							
Water-thread pondweed								2.0								
Fries' pondweed									2.0			18.4				
Eel grass	52.5	17.9	17.9		33.3	10.0	2.0	16.0	18.0	16.0	16.0	26.5	26.5	34.7	42.9	32.0
Filamentous algae				18.0	51.7										8.2	26.0

Species Frequency of Occurrence - 0-5																
Eurasian watermilfoil		59.1	38.1				26.0	52.2		56.5	56.5	59.1			44.4	
Curly-leaf pondweed		22.7	4.8			17.4	9.0		9.0			22.7			5.6	
Brittle naiad														4.5		
Spiny naiad													4.5	4.5	22.2	
Coontail		59.1	47.6			43.5	48.0	52.2	48.0	56.5	34.8	77.3	68.2	54.5	61.1	78.3
Chara sp.		13.6	28.6			17.4	22.0	17.4	26.0	30.4	26.4	18.2	22.7	9.1	16.7	26.1
Common bladderwort									4.0						5.6	
Naiad sp.						4.3		8.7			8.7					
Slender naiad									4.0				9.1			
Southern naiad							9.0		4.0							
Northern watermilfoil							43.0		30.0							
Water stargrass									4.0			4.5				
Waterweed sp.		4.5														
Illinois pondweed															22.2	
Large-leaved pondweed						4.3			4.0				4.5			
Flat-stemmed pondweed		9.1				4.3										
Richardon's pondweed			14.3													
Sago pondweed							17.0	13.0	35.0	26.1	21.7			22.7	5.6	4.3
Small pondweed							4.0						4.5			
Variable pondweed							13.0		13.0							
Water-thread pondweed								4.3								
Fries' pondweed									4.0			13.6				
Eel grass			36.1			21.7		30.4	35.0	21.7	30.4	9.1	13.6	18.2	61.1	52.2
Filamentous algae																34.8
Species Frequency of Occurrence - 5-10																
Eurasian watermilfoil		65.2	22.7			35.3	41.0	11.8	6.0	35.3	41.2	58.5		17.6	19.2	
Curly-leaf pondweed		52.2				17.6	35.0			5.9						
Brittle naiad													23.5	17.6		
Spiny naiad															7.7	
Coontail		47.8	54.5			23.5	41.0	17.6	41.0	41.2	35.3	64.7	47.1	54.5	80.8	41.2
Chara sp.		4.3				11.8			6.0		5.9	23.5	41.2		3.8	11.8
Common bladderwort															7.7	
Slender naiad									6.0			5.9	23.5	5.9		
Northern watermilfoil							12.0		12.0	11.8						
Northern naiad																
Water stargrass			4.5													
Nitella										5.9						
Illinois pondweed								5.9								
Flat-stemmed pondweed						5.9										
Sago pondweed			4.5				12.0						23.5	47.1		
Small pondweed													11.8	11.8		
Fries' pondweed												35.3				
Eel grass			9.1				6.0	5.9	6.0	11.8	5.9	64.7	58.8	76.5	38.5	23.5
Filamentous algae															11.5	23.5
Species Frequency of Occurrence - 10-15																
Eurasian watermilfoil		22.2						20.0		10.0		40.0	10.0			
Coontail								30.0	10.0	30.0		90.0	50.0	23.5	40.0	
Chara sp.								10.0				10.0	10.0			
Flat-stemmed pondweed		11.1														
Sago pondweed								20.0						10.0		
Eel grass										10.0						
Filamentous algae															20.0	