

**Pretty Lake  
Aquatic Vegetation Management Plan  
2009 Update  
Marshall County, Indiana**

**February 22, 2010**



Prepared for:  
**Pretty Lake Association**  
319 W. Jefferson St.  
Plymouth, IN 46563

Prepared by:  
**AQUATIC  
CONTROL**  
PO Box 100  
Seymour, Indiana 47274

## Executive Summary

Aquatic Control was contracted by the Pretty Lake Association (PLA) to complete aquatic vegetation sampling in order to update the Pretty Lake 2007-2011 Aquatic Vegetation Management Plan (Aquatic Control 2007). Funding for the update was obtained from the Pretty Lake Association and the Indiana Department of Natural Resources-Division of Fish and Wildlife as part of the Lake and River Enhancement program (LARE).

Pretty Lake is a natural lake located in Plymouth, Indiana. The lake is approximately 97 acres, has a maximum depth of 40 feet, and an average depth of 21.7 feet. The primary species of concern within Pretty Lake is the invasive aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*), hereafter called milfoil. Curlyleaf pondweed (*Potamogeton crispus*) is another invasive species present in Pretty Lake. Purple loosestrife (*Lythrum salicaria*), is an invasive emergent species that is present along the northwest shore of Pretty Lake.

Eurasian watermilfoil was found to be abundant and interfering with lake use during the 2006 LARE funded sampling events on Pretty Lake. This led to the recommendation to initiate a whole lake fluridone treatment. The Association was awarded LARE grants for treatment of milfoil in 2008. On April 30, 2008 Sonar (active ingredient: fluridone) was applied to Pretty Lake in order to control milfoil. A Tier 2 survey was completed in the summer of 2008 and no milfoil was detected.

The 2008 plan update recommended monitoring of the plant population with a spring invasive species mapping survey and a summer Tier 2 survey in 2009. If any milfoil was detected it was to be treated with Renovate herbicide (active ingredient: triclopyr). The 2008 update also recommended treating purple loosestrife along the northwest shoreline, completing treatments on near-shore high use areas if vegetation reaches a nuisance level, and updating the vegetation management plan at the end of the 2009 season.

In 2009, vegetation management activities began on May 27<sup>th</sup> with an invasive species mapping survey. No Eurasian watermilfoil was detected during this survey; however, curlyleaf pondweed appeared to have expanded and was covering approximately 8.3 acres of the littoral zone. A Tier 2 survey was completed August 12<sup>th</sup> and once again no milfoil was detected. Native vegetation had expanded and was growing in many dense near-shore beds.

The 2008 whole lake treatment has now kept milfoil at undetectable levels since June of 2008. No milfoil treatments were required this season and it is difficult to predict what will be needed for milfoil control in 2010. However, based on the fact that no milfoil was detected, the density of native vegetation, the lack of inflow, and the fact that access to the lake is limited, we predict that no more than two acres of milfoil may need treated in 2010. In order to find areas of milfoil a similar survey strategy should be employed with invasive mapping in May and a Tier 2 survey in late summer.

Curlyleaf pondweed has continued to expand following the whole lake treatment. A 15.0 acre area should be treated in mid to late April once the water reaches a consistent 50 degrees Fahrenheit. These areas should be treated with 1.0 ppm Aquathol K (active ingredient: endothal). This area should be treated for 3-4 consecutive seasons in an attempt to exhaust curlyleaf pondweed turion supplies.

Currently, there is a relatively abundant and diverse native plant population present in Pretty Lake. The native plants, specifically eel grass (*Valisneria americana*) and water stargrass (*Heteranthera dubia*), reached the surface near shore and were interfering with lake use by late summer 2009. Residents expressed their frustration at the public meeting over the increased density of vegetation this season. This vegetation is beneficial to the overall health of the lake ecosystem, but can be controlled in small areas with likely little negative ecological impact. Some small-scale control of native vegetation should be completed next season in high use areas. No more than 50% of the shoreline should be treated.

No controls were completed on purple loosestrife this season. However, Josh Grubaugh, with IDNR-Division of Nature Preserves, inspected the loosestrife plants and found high levels of *Galerucella* leaf eating beetles. Rich Dunbar, also with the division of Nature Preserves, believes that it will just be a matter of time before purple loosestrife reductions occur (Rich Dunbar, email to author, June 12, 2009).

The following is a condensed list of actions discussed above that should be initiated in 2010:

1. Complete an invasive species mapping survey in the spring of 2010 in order to locate any areas of Eurasian watermilfoil and continue these surveys through 2011. Complete Tier 2 surveys in mid to late summer in order to document changes in the native community following and detect the presence of invasive species.
2. If detected, treat Eurasian watermilfoil wherever it occurs with Renovate aquatic herbicide (active ingredient: triclopyr) in an effort to keep milfoil from returning to pre-fluridone treatment levels. It is likely that less than 2.0 acres of milfoil may require treatment.
3. Treat 15.0 acre area of curlyleaf pondweed with 1.0 ppm of Aquathol K once water reaches a consistent 50 degrees F.
4. Complete controls on native vegetation in high use areas to reduce potential nuisance conditions. Treatment should be limited to less than 50% of the shoreline. This treatment will require an on-site inspection by IDNR biologists.
5. Monitor the purple loosestrife population along the northwest shoreline in order to assess beetle's effectiveness at control.
6. Continue to assess, adjust, and update the Pretty Lake Management Plan through 2011.

## Acknowledgements

Funding for the vegetation sampling and preparation of an aquatic vegetation management plan was provided by the Pretty Lake Association and the Indiana Department of Natural Resources Lake and River Enhancement Program. Aquatic Control, Inc. completed the fieldwork, data processing, and map generation. Special thanks are due to Sue Palumbo, Dale Gott, Sharon Gott, Barb Miller, and the Pretty Lake Association for their ongoing support of this project. Special thanks are given to Chip Long, Assistant District Fisheries Biologist for the Indiana Department of Natural Resources-Division of Fish and Wildlife, for his assistance and review of this plan. Special thanks are also given to Gwen White and Angela Studevant, Aquatic Biologists from the Lake and River Enhancement Program (LARE) for their review and assistance on this plan. Author of this report is Nathan Long of Aquatic Control. The author would like to acknowledge the valuable input from Brendan Hastie, Joey Leach, and Barbie Huber of Aquatic Control for their field assistance, map generation, review, and editing of this report.

## Table of Contents

Executive Summary .....	i
Acknowledgements .....	iii
Table of Contents .....	iv
List of Figures .....	v
List of Tables .....	vi
1.0 Introduction .....	1
2.0 Problem Statement .....	1
3.0 Watershed and Waterbody Characteristics .....	2
4.0 2009 Plant Sampling Results .....	4
4.1 Spring Survey (Invasive Plant Mapping) .....	4
4.2 Summer Survey (Tier 2 Survey) .....	5
4.3 Aquatic Vegetation Sampling Discussion .....	10
5.0 2009 Vegetation Control .....	14
6.0 Action Plan and Budget Update .....	14
7.0 Public Participation .....	17
8.0 References Cited .....	20
9.0 Appendix Update .....	21
8.1 August Tier 2 Survey Data .....	21
8.2 2009 Vegetation Control Permit Application .....	22

## List of Figures

Figure 1. Pretty Lake Watershed, Marshall County, Indiana .....	3
Figure 2. Curlyleaf pondweed beds, Pretty Lake, May 27, 2009 .....	4
Figure 3. Pretty Lake, eel grass distribution and abundance, August 12, 2009 .....	6
Figure 4. Pretty Lake, common coontail distribution and abundance, August 12, 2009 .....	6
Figure 5. Pretty Lake, water stargrass distribution and abundance, August 12, 2009 .....	7
Figure 6. Pretty Lake, curlyleaf pondweed distribution and abundance, August 12, 2009 .....	7
Figure 7. Pretty Lake, Richardson’s pondweed distribution and abundance, August 12, 2009 .....	8
Figure 8. Water stargrass bed along south shore, August 12, 2009 .....	11
Figure 9. Pretty Lake, percent occurrence of species in the last 3 Tier 2 surveys .....	12
Figure 10. Pretty Lake, purple loostrike stands along northwest shore.....	13
Figure 11. Pretty Lake, native vegetation growing around dock, August 12, 2009.....	14
Figure 12. Pretty Lake, proposed curlyleaf pondweed treatment areas.....	16
Figure 13. Illustration of hydrilla and native elodea.....	19

### List of Tables

Table 1. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (0-19 ft) .....	5
Table 2. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (0-5 ft) .....	9
Table 3. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (5-10 ft) .....	9
Table 4. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (10-15 ft) .....	10
Table 5. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (15-20 ft) .....	10
Table 6. Pretty Lake, percent occurrence of submersed species in the Last three summer Tier 2 surveys .....	12
Table 7. Comparison of Tier 2 data from Pretty Lake .....	13
Table 8. Budget estimates for management options .....	17
Table 9. Pretty Lake public meeting survey results, September 21, 2009 .....	18

## 1.0 INTRODUCTION

Pretty Lake is an approximately 97 acre natural lake in Marshall County, Indiana with a maximum depth of 40 feet and an average depth of 21.7 feet. The Pretty Lake watershed is 539 acres and the lake has a hydraulic retention time of approximately three years (JFNEW 2009). The majority of the lake is residentially developed. There is currently a single private access site along the north shore of Pretty Lake.

This report was created in order to update the Pretty Lake Aquatic Vegetation Management Plan. The plan update was funded by the Indiana Department of Natural Resources Lake and River Enhancement Program (LARE) and the Pretty Lake Association. The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for additional LARE funds. Major items covered include the 2009 sampling results, a review of the 2009 vegetation controls, an update on the watershed and waterbody characteristics, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan following the reference section and prior to the appendix.

The aquatic vegetation management goals of the original plan are listed below:

- 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
- Direct efforts to preventing and controlling the negative impacts of aquatic invasive species
- Provide reasonable public recreational access while minimizing the negative impacts on plant, fish, and wildlife resources

More specific objectives, designed to help meet the goals listed above, were also included in the original plan along with specific actions designed to achieve these objectives.

These objectives are listed below:

- Maintain and enhance the abundance of rooted floating and emergent aquatic plant species
- Maintain the density and diversity of submersed vegetation
- Reduce Eurasian watermilfoil density and abundance
- Prevent further spread of purple loosestrife
- Monitor the curlyleaf pondweed population and control if necessary
- Create public awareness of the potential for hydrilla invasion and post signs for cleaning off boats at all private and public access sites
- Control vegetation around docks and at the boat ramp in order to allow for boat access

## 2.0 PROBLEM STATEMENT

Native aquatic vegetation is an important component of lakes in Indiana. This vegetation provides habitat for fish and invertebrates, food for wildlife, and may also help improve

water quality. Invasive species are typically the main problem causing plants in aquatic ecosystems. The primary species of concern within Pretty Lake is the invasive species Eurasian watermilfoil. This plant develops dense canopy forming monocultures which compete with beneficial native vegetation, impair boating and swimming, and can negatively impact fisheries. Milfoil was found to be abundant in Pretty Lake during the original plant surveys conducted in 2006. It was found at 47.5% of the sites in the 2006 summer Tier 2 survey, in 24.8 acres during the 2006 spring Tier I survey, and 21.6 acres during the summer 2006 Tier 1 survey. Curlyleaf pondweed is another submersed invasive species that is present in Pretty Lake and has the potential to create nuisance conditions. Purple loosestrife is an invasive emergent species that was also detected and appears to be spreading along the northwest shore. Purple loosestrife will not likely create nuisance conditions for lake users, but could have negative impacts on native wetland species in and around Pretty Lake. Native species have increased in density since the whole lake treatment. According to lake residents, dense native vegetation made boating and swimming difficult in near-shore areas in 2009. Water stargrass (*Heteranthera dubia*) and eel grass (*Vallisneria americana*) were the primary native species that were creating these nuisance conditions in high use areas.

### **3.0 WATERSHED AND WATERBODY CHARACTERISTICS (Summarized from JFNEW 2009)**

Pretty Lake lies in the Yellow Creek watershed near Plymouth, Indiana. Pretty Lake's watershed encompasses approximately 539 acres including the areas of the lake. Slightly more than half of the area draining to the lake is utilized for row crops. Forested areas, grasslands, and wetlands cover approximately 68 acres or 12% of the entire watershed, while residential land uses account for less than 5% of the watershed's total acreage. Comparatively, the Country Club covers 22% and Pretty lake itself covers 18% of the total watershed. The Pretty Lake watershed area is illustrated in Figure 1.



**Figure 1. Pretty Lake Watershed, Marshall County, Indiana (JFNEW 2009).**

Pretty Lake has one “tributary” drainage that enters the lake through a drain tile on the north side of the lake. The tile drainage carries water from approximately 202 acres of the watershed. The maximum flow documented from this tile was 0.2 cubic feet per second after 0.5 inches of rainfall. The remainder of the water flowing to the lake comes directly from the 240 acres surrounding the lake.

Pretty Lake itself contains excellent water quality. Historical data for the lake suggest that Pretty Lake’s water quality has remained relatively stable or declined only slightly over the past 33 years. The lake has better water clarity and lower nutrient levels than most Indiana lakes. Evaluating the lake using various trophic state indices suggest the lake is oligotrophic to mesotrophic nature.

The Lake possesses a long hydraulic residence time of 3.0 years. Therefore, continued good water quality in Pretty Lake will require in-lake management and shoreline best management practices. Pretty Lake’s relatively small watershed area to lake area ratio of 5.6:1 suggests near shore residents have substantial control over influencing the health of their lake.

Recommended management techniques from the 2009 Diagnostic Study include: cultivating near shore aquatic vegetation, phosphorus free fertilizer use, proper disposal of organic wastes, stormwater filtration, conversion of agricultural ground to wetland, grass, or forest land, purple loosestrife control, and intercepting the tile flow with a wetland filter or open water pond (JFNEW 2009).

#### 4.0 2009 PLANT SAMPLING RESULTS

Two surveys were completed in 2009 in order to document changes in the plant community and to determine success or failure of control techniques. A spring invasive species mapping survey was completed in May of 2009. The purpose of this survey was to document the abundance of invasive species. A Tier 2 survey was completed in August of the same year. This survey was conducted to monitor the effectiveness of potential treatment, monitor the changes in the native plant community, and to help plan for future plant management.

#### 4.1 Spring Survey (Invasive Plant Mapping)

On May 27, 2009 an invasive species survey was completed on Pretty Lake. A Secchi depth was taken prior to sampling and was found to be 13.0 feet. No Eurasian watermilfoil was detected during the survey, however, 8.3 acres of curlyleaf pondweed was mapped (Figure 2). Curlyleaf was distributed around the majority of the lake with the largest concentrations along the northern half.

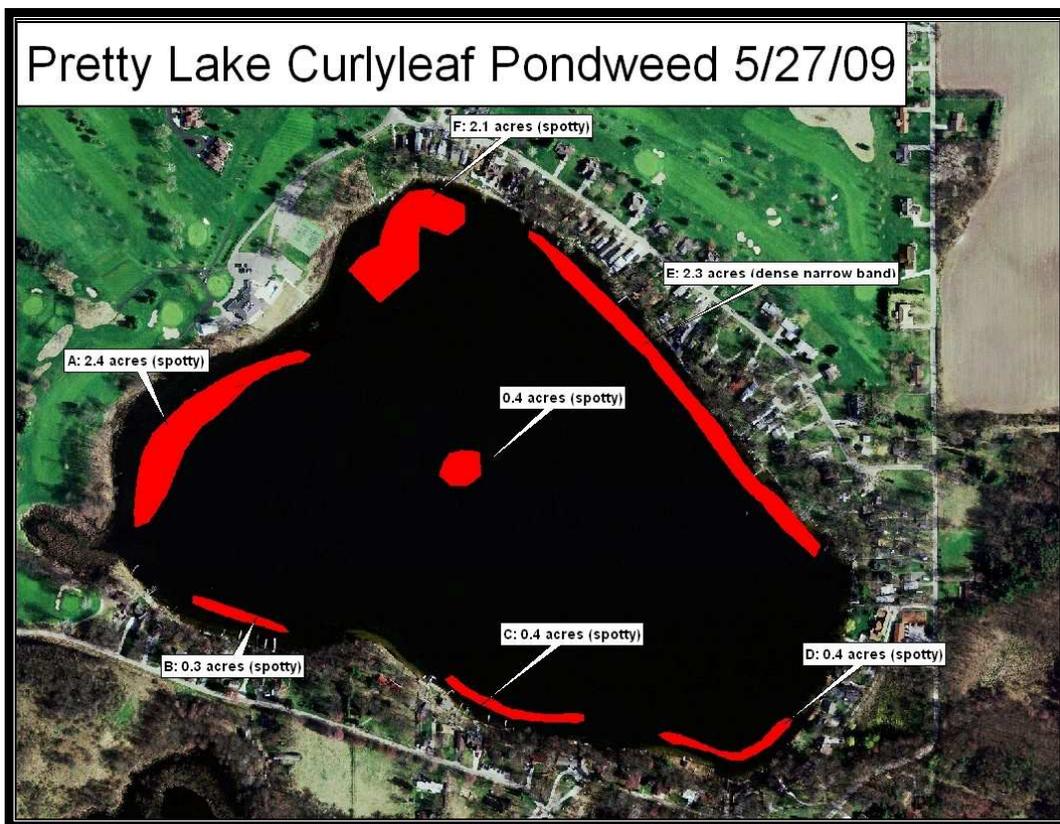


Figure 2. Curlyleaf pondweed beds, Pretty Lake, May 27, 2009.

#### 4.2 Summer Survey (Tier 2 Survey)

Tier 2 sampling took place on August 12, 2009. The survey was conducted according to IDNR Tier 2 Survey protocol (IDNR 2007). A Secchi disk reading was taken prior to sampling and was found to be 12.0 feet. Plants were present to a maximum depth of 19.0 feet. Forty sites were sampled throughout the littoral zone. The same points used in the 2008 Tier 2 survey were used in the 2009 survey. A total of 11 species were collected of which 10 were native. Thirty-five of the forty sites contained vegetation. The maximum number of species collected at a site was 5 and the average number of species per site was 1.90. No voucher samples were taken during the 2009 Tier 2 survey. Table 1 shows the overall results from the Tier 2 survey. Eel Grass was found at the highest percentage of sample sites (42.5%) (Figure 3). Common coontail (*Ceratophyllum demersum*) was the second most frequently occurring species (37.5%) (Figure 4), followed by water stargrass (Figure 5), and chara (*Chara sp.*). The only invasive species collected was curlyleaf pondweed and it occurred at 15% of sample sites (Figure 6). Illinois pondweed (*Potamogeton illionensis*) was collected at 15.0% of sites followed by largeleaf pondweed (*Potamogeton amplifolius*), slender naiad (*Najas flexilis*), small pondweed (*Potamogeton pusillus*), and flatstem pondweed (*Potamogeton zosteriformis*) which were all collected at less than 10% of sites. Richardson's pondweed (*Potamogeton richardsonii*), listed as imperiled and rare in the state of Indiana, was present at a single location (Figure 7). Purple loosestrife, blueflag iris (*Iris versicolor*), spatterdock (*Nuphar sp.*), pickerel weed (*Pontederia cordata*), and swamp loosestrife (*Decodon verticillatis*) were observed during the survey but not collected on a rake sample (Tier 2 surveys are designed to sample the submersed aquatic plant community).

**Table 1. Occurrence and abundance of submersed aquatic plants in Pretty Lake August 12, 2009 (0-19 ft).**

Occurrence and Abundance of Submersed Aquatic Plants in Pretty Lake.						
County:	Marshall	Total Sites:	40	Mean species/site:	1.90	
Date:	8/12/09	Sites with plants:	35	SE Mean species/site:	0.21	
Secchi (ft):	12	Sites with native plants:	32	Mean native species/site:	1.75	
Max Plant Depth (ft):	19	Number of species:	11	SE Mean natives/site:	0.21	
Trophic Status:	Meso	Number of native species:	10	Species diversity:	0.85	
		Maximum species/site:	5	Native species diversity:	0.83	
All Depths (0 to 19 ft) Species	Frequency of Occurrence	Rake score frequency per sp				Plant Dominance
		0	1	3	5	
Eel grass	42.5	57.5	25.0	17.5	0.0	15.5
Common coontail	37.5	62.5	17.5	5.0	15.0	21.5
Water stargrass	35.0	65.0	20.0	5.0	10.0	17.0
Chara	20.0	80.0	7.5	2.5	10.0	13.0
Curlyleaf pondweed	15.0	85.0	15.0	0.0	0.0	3.0
Illinois pondweed	15.0	85.0	10.0	2.5	2.5	6.0
Largeleaf pondweed	7.5	92.5	2.5	0.0	5.0	5.5
Slender naiad	7.5	92.5	7.5	0.0	0.0	1.5
Small pondweed	5.0	95.0	5.0	0.0	0.0	1.0
Flatstem pondweed	2.5	97.5	2.5	0.0	0.0	0.5
Richardson's pondweed	2.5	97.5	0.0	2.5	0.0	1.5
Filamentous Algae	12.5					
Other Species Observed: Purple loosestrife, blueflag iris, spatterdock, pickerel weed, swamp loosestrife						

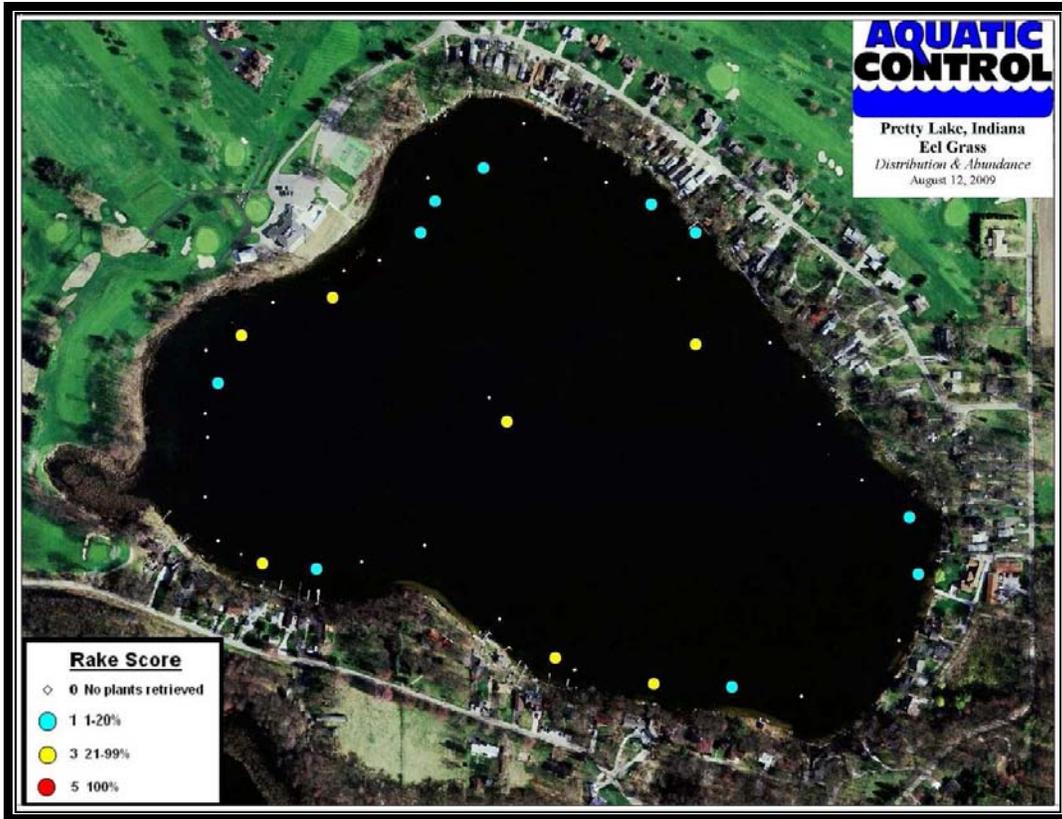


Figure 3. Pretty Lake, eel grass distribution and abundance, August 12, 2009.

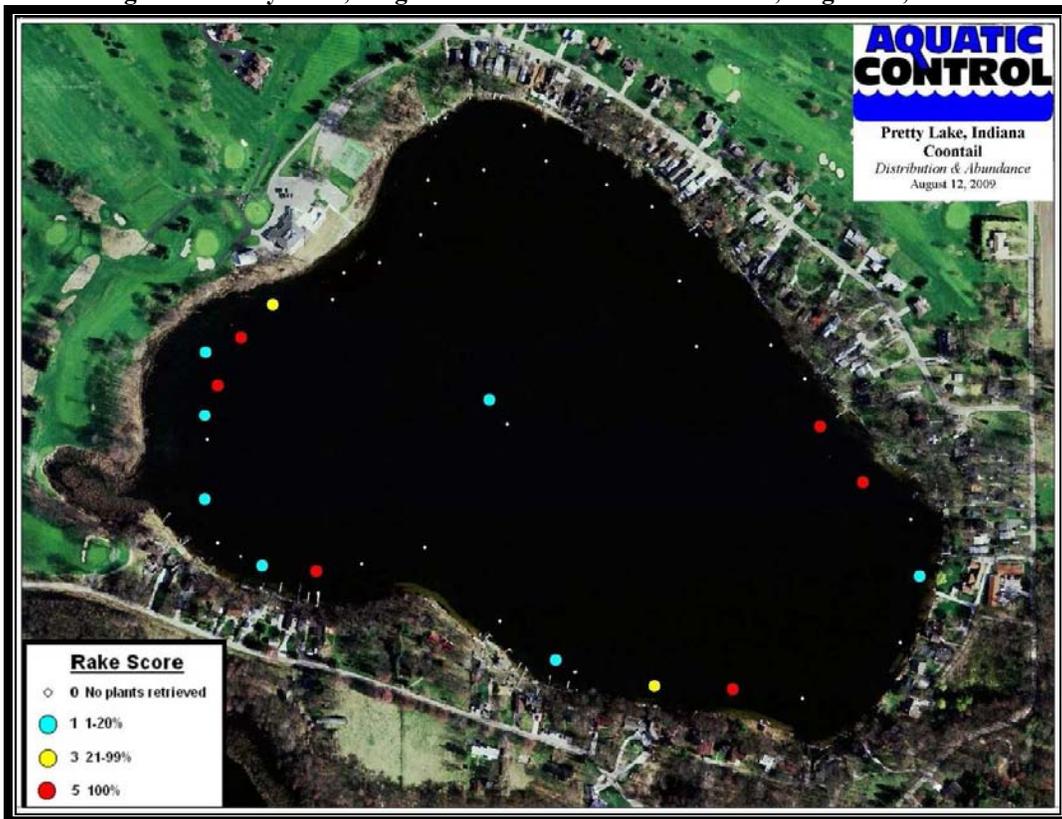


Figure 4. Pretty Lake, common coontail distribution and abundance, August 12, 2009.

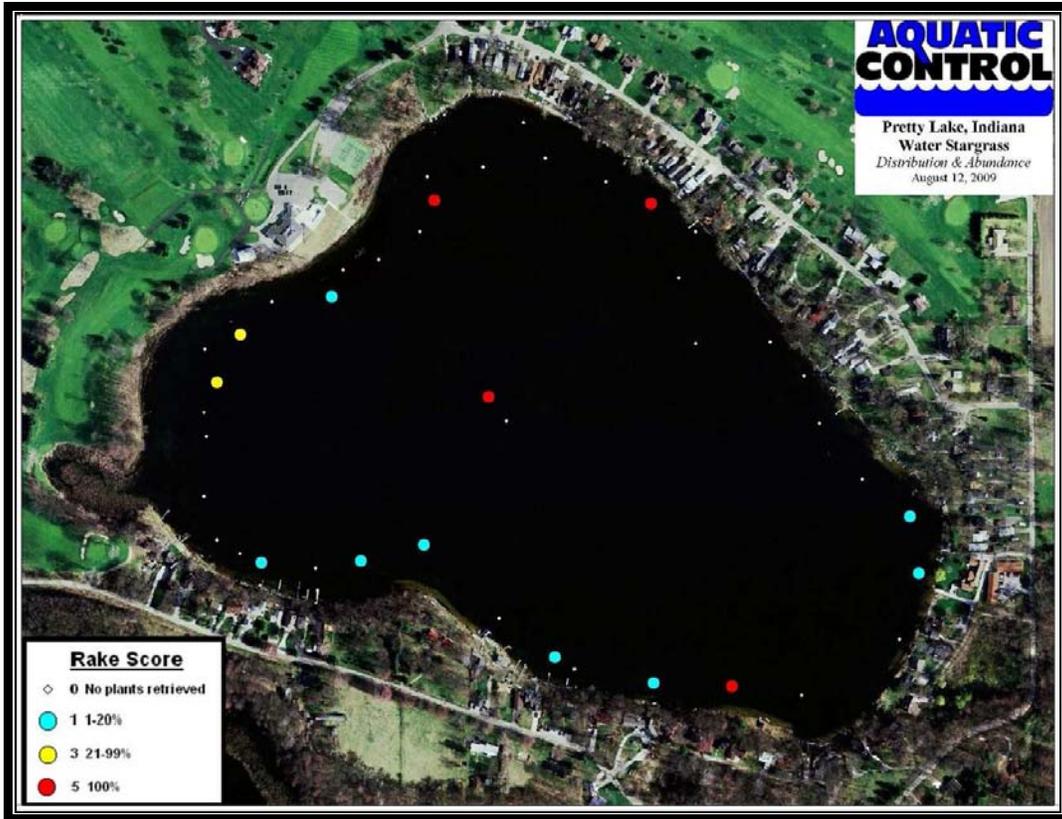


Figure 5. Pretty Lake, water stargrass distribution and abundance, August 12, 2009.

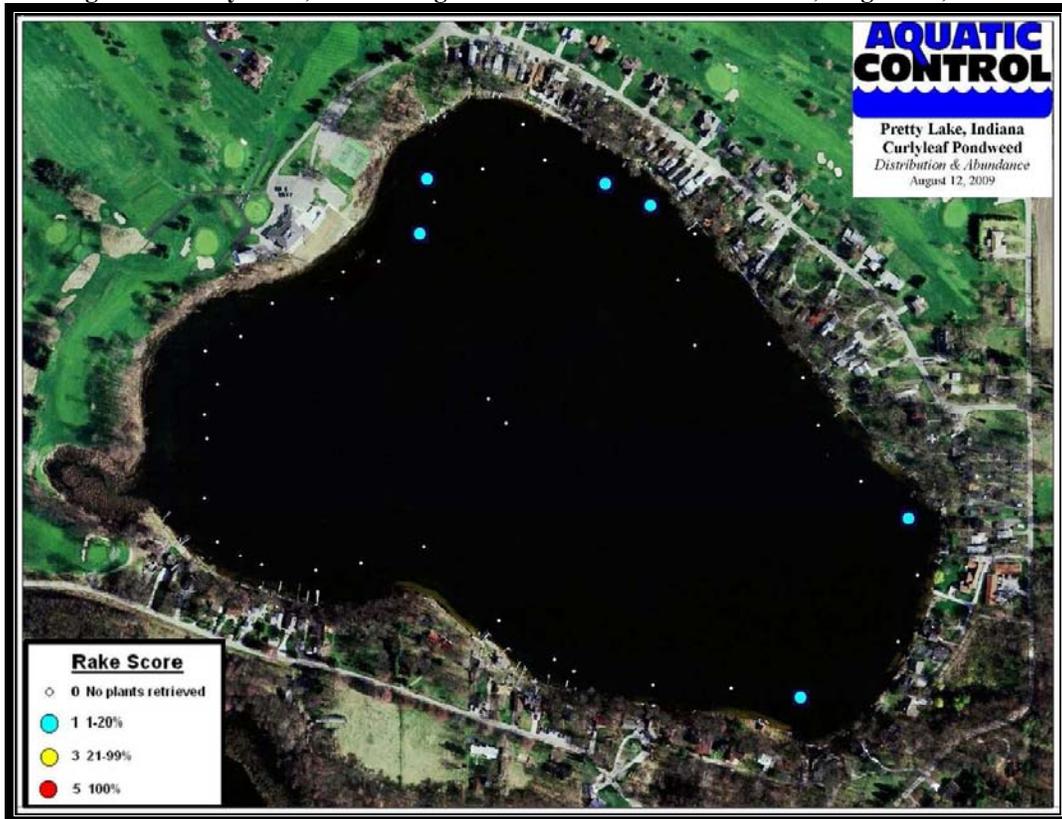


Figure 6. Pretty Lake, curlyleaf pondweed distribution and abundance, August 12, 2009.

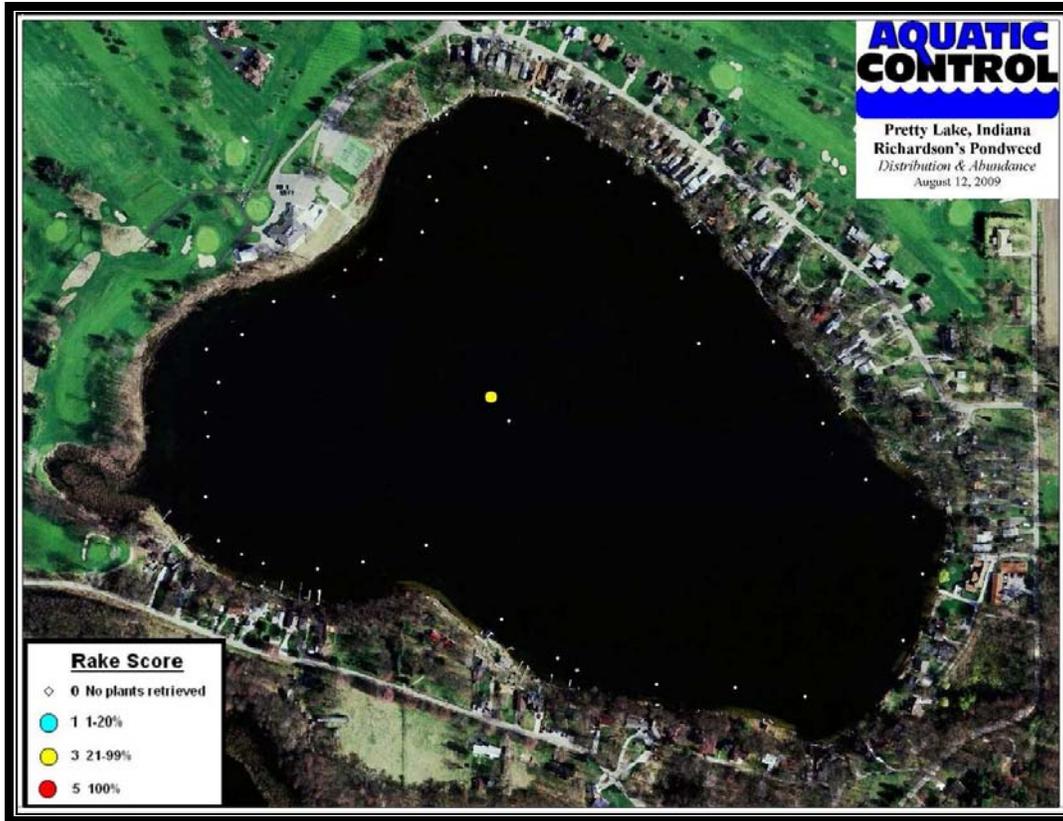


Figure 6. Pretty Lake, Richardson's pondweed distribution and abundance, August 12, 2009.

It is also important to look at the species distribution throughout different depth ranges. Twelve sites were sampled from 0-5 feet. All 12 sites contained vegetation. A total of 7 native and 1 invasive species were collected at the shallow sites. The maximum number of species collected at a single site was 5 and the mean number of native species per site was 3.00. As expected, the shallow sites appeared to have a higher level diversity and abundance of aquatic vegetation compared to the other depth ranges. Eel grass was the most abundant species collected at this depth range (Table 2).

**Table 2. Occurrence and abundance of submersed aquatic plants in Pretty Lake 0-5 feet, August 12, 2009.**

Occurrence and Abundance of Submersed Aquatic Plants in Pretty Lake (0-5ft).						
County:	Marshall	Total Sites:	12	Mean species/site:	3.17	
Date:	8/12/09	Sites with plants:	12	SE Mean species/site:	0.34	
Secchi (ft):	12	Sites with native plants:	12	Mean native species/site:	3.00	
Max Plant Depth (ft):	19	Number of species:	8	SE Mean natives/site:	0.33	
Trophic Status:	Meso	# of native species:	7	Species diversity:	0.82	
		Max species/site:	5	Native diversity:	0.80	
Frequency of Occurrence						
Depth: 0 to 5 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		0	1	3	5	
Eel grass	83.3	16.7	58.3	25.0	0.0	26.7
Water stargrass	75.0	25.0	33.3	16.7	25.0	41.7
Chara	50.0	50.0	16.7	8.3	25.0	33.3
Coontail	50.0	50.0	25.0	0.0	25.0	30.0
Curlyleaf pondweed	16.7	83.3	16.7	0.0	0.0	3.3
Slender naiad	16.7	83.3	16.7	0.0	0.0	3.3
Small pondweed	16.7	83.3	16.7	0.0	0.0	3.3
Richardson's pondweed	8.3	91.7	0.0	8.3	0.0	5.0

Plants were also present at all of the 5-10 feet sample sites and eel grass also occurred at the highest percentage of these sites. A total of 8 species were collected from this depth range of which 7 were native. The maximum number of species collected at a site was 3 and the mean number of native species per site was 1.91 (Table 3).

**Table 3. Occurrence and abundance of submersed aquatic plants in Pretty Lake 5-10 feet, August 12, 2009.**

Occurrence and Abundance of Submersed Aquatic Plants in Pretty Lake (5-10ft).						
County:	Marshall	Total Sites:	11	Mean species/site:	2.09	
Date:	8/12/09	Sites with plants:	11	SE Mean species/site:	0.25	
Secchi (ft):	12	Sites with native plants:	10	Mean native species/site:	1.91	
Max Plant Depth (ft):	19	Number of species:	8	SE Mean natives/site:	0.31	
Trophic Status:	Meso	# of native species:	7	Species diversity:	0.83	
		Max species/site:	3	Native diversity:	0.81	
Frequency of Occurrence						
Depth: 5 to 10 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		0	1	3	5	
Eel grass	54.5	45.5	18.2	36.4	0.0	25.5
Coontail	45.5	54.5	18.2	9.1	18.2	27.3
Largeleaf pondweed	27.3	72.7	9.1	0.0	18.2	20.0
Water stargrass	27.3	72.7	18.2	0.0	9.1	12.7
Chara	18.2	81.8	9.1	0.0	9.1	10.9
Curlyleaf pondweed	18.2	81.8	18.2	0.0	0.0	3.6
Flatstem pondweed	9.1	90.9	9.1	0.0	0.0	1.8
Slender naiad	9.1	90.9	9.1	0.0	0.0	1.8

Seven sample sites fell between the 10 to 15 foot depth range. Only five of the seven sites had vegetation. A total of 4 species were collected from this depth range of which 3 were native. The maximum number of species collected at a site was 2 and the mean number of native species per site was 0.57. Curlyleaf pondweed and water stargrass were the most frequently occurring species at this depth range (Table 4).

**Table 4. Occurrence and abundance of submersed aquatic plants in Pretty Lake 10-15 feet, August 12, 2009.**

Occurrence and Abundance of Submersed Aquatic Plants in Pretty Lake (10-15ft).						
County:	Marshall	Total Sites:	7	Mean species/site:	0.86	
Date:	8/12/09	Sites with plants:	5	SE Mean species/site:	0.26	
Secchi (ft):	12	Sites with native plants:	3	Mean native species/site:	0.57	
Max Plant Depth (ft):	19	Number of species:	4	SE Mean natives/site:	0.30	
Trophic Status:	Meso	# of native species:	3	Species diversity:	0.72	
		Max species/site:	2	Native diversity:	0.63	
Frequency of Occurrence						
Depth: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		0	1	3	5	
Curlyleaf pondweed	28.6	71.4	28.6	0.0	0.0	5.7
Water stargrass	28.6	71.4	28.6	0.0	0.0	5.7
Eel grass	14.3	85.7	14.3	0.0	0.0	2.9
Illinois pondweed	14.3	85.7	0.0	14.3	0.0	8.6

Ten sample sites fell between the 15 to 20 foot depth range. This depth range had the lowest diversity of native vegetation. Only seven of the ten sites had vegetation. The maximum number of species collected at a site was 2 and the mean number of native species per site was 0.90. Illinois pondweed and common coontail were the only species collected of which Illinois pondweed occurred more frequently (Table 5).

**Table 5. Occurrence and abundance of submersed aquatic plants in Pretty Lake 15-20 feet, August 12, 2009.**

Occurrence and Abundance of Submersed Aquatic Plants in Pretty Lake (15-19ft).						
County:	Marshall	Total Sites:	10	Mean species/site:	0.90	
Date:	8/12/09	Sites with plants:	7	SE Mean species/site:	0.23	
Secchi (ft):	12	Sites with native plants:	7	Mean native species/site:	0.90	
Max Plant Depth (ft):	19	Number of species:	2	SE Mean natives/site:	0.23	
Trophic Status:	Meso	# of native species:	2	Species diversity:	0.49	
		Maximum species/site:	2	Native diversity:	0.49	
Frequency of Occurrence						
Depth: 15 to 19 ft	Frequency of Occurrence	Rake score frequency per sp.				Plant Dominance
Species		0	1	3	5	
Illinois pondweed	50.0	50.0	40.0	0.0	10.0	18.0
Coontail	40.0	60.0	20.0	10.0	10.0	20.0

### 4.3 Aquatic Vegetation Sampling Discussion

The 2009 Tier 2 survey revealed that Pretty Lake has a healthy and diverse plant community that appears to have increased in diversity and abundance since the 2008 sampling. A diverse native plant community is important for the water quality and fish production of Pretty Lake and should be maintained as this is one of the primary goals of the plan.

Eurasian watermilfoil was found at 47.5% of the sites in the 2006 summer Tier 2 survey, in 24.8 acres during the 2006 spring Tier I survey, 21.6 acres during the summer 2006 Tier 1 survey, and 5.3 acres during the 2009 spring invasive species mapping survey. No Eurasian watermilfoil has been found in Pretty Lake following the 2008 fluridone treatment. The treatment appears to have been successful at controlling this invasive species for the past 1.5 years.

Curlyleaf pondweed appears to be expanding in Pretty Lake since the whole lake treatment. Curlyleaf was found growing in over 21.6 acres of Pretty Lake during the 2006 spring Tier 1 survey. It was present in only 3.3 acres during the 2008 invasive species mapping survey, but increased to 8.1 acres by the spring 2009 invasive mapping survey. In addition, curlyleaf pondweed showed up for the first time in the summer Tier 2 survey and was present at 15% of sample sites.

Eel grass has been the most abundant native species within Pretty Lake in the last three Tier 2 surveys. Eel grass was at 52.5% of the sampling sites during the 2006 Tier 2 survey, 55.0% in 2008, and 42.5% of sampling stations during the summer 2009 Tier 2 survey. The data suggests that vegetation control techniques used thus far have had little impact on the eel grass population within Pretty Lake.

Richardson's pondweed was found at 2.5% of the sampling sites during the 2008 summer Tier 2 survey and found again at a single site in 2009. This species was not observed during the 2006 Tier 2 survey. Richardson's pondweed is listed on the Endangered, Rare, and Extirpated Plants of Indiana as imperiled and rare. Special attention to its distribution and locations should be made in order to limit the amount of damage to this species through future management practices.

One of the most dramatic changes in the plant community was the increase in water stargrass. This plant, which is generally considered beneficial, was not found prior to the 2008 whole lake treatment. However, in the summer of 2008 it was collected at 7.5% of sites and increased to 35.0% of sites by 2009. Water stargrass tends to be tolerant of fluridone and appears to have replaced milfoil in many of the areas. Residents have expressed concern over this plants density near shore (Figure 8). Controls may be needed to keep this plant from becoming a nuisance. Unfortunately, it is a very difficult species to control with aquatic herbicides.

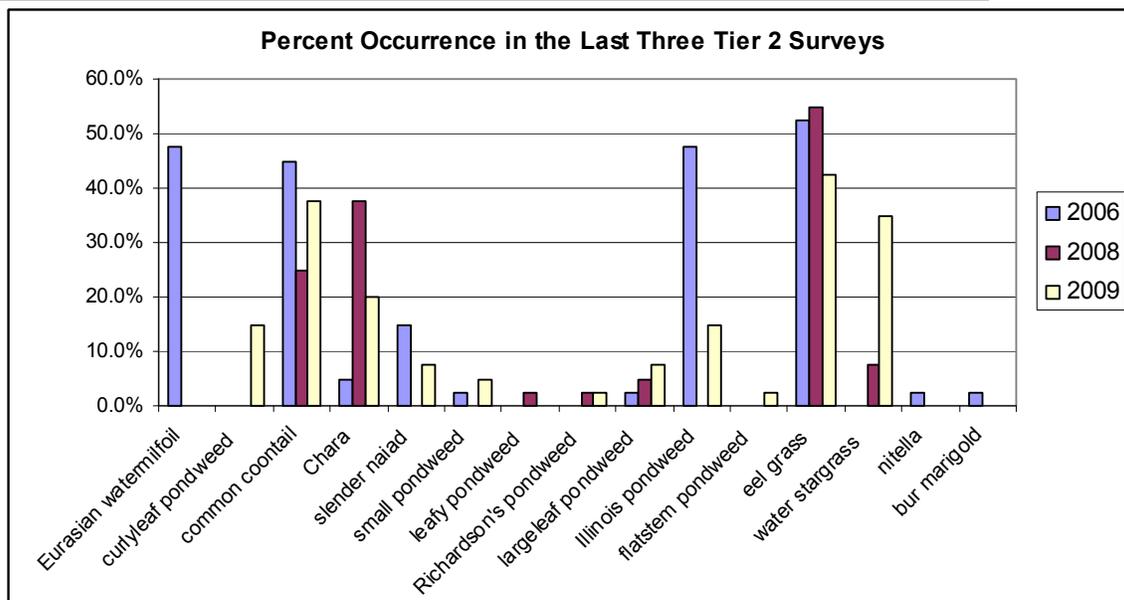


Figure 8. Pretty Lake, water stargrass bed along the south shore, August 12, 2009.

Illinois pondweed and slender naiad appear to be recovering from a reduction in 2008. However, Bur marigold (*Bidens beckii*), a species listed as imperiled and threatened on the Endangered, Rare and Extirpated Plants of Indiana, has not been observed since 2006. Table 6 and Figure 9 help to better illustrate these changes in species occurrence in the last three Tier 2 surveys.

**Table 6. Pretty Lake, percent occurrence of submersed species in the last three summer Tier 2 surveys.**

Species	2006	2008	2009
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	47.5%	-	-
curlyleaf pondweed ( <i>Potamogeton crispus</i> )	-	-	15.0%
common coontail ( <i>Ceratophyllum demersum</i> )	45.0%	25.0%	37.5%
Chara (Chara spp.)	5.0%	37.5%	20.0%
slender naiad ( <i>Najas flexillis</i> )	15.0%	-	7.5%
small pondweed ( <i>Potamogeton pusillus</i> )	2.5%	-	5.0%
leafy pondweed ( <i>Potamogeton foliosus</i> )	-	2.5%	-
Richardson's pondweed ( <i>Potamogeton richardsonii</i> )	-	2.5%	2.5%
largeleaf pondweed ( <i>Potamogeton amplifolius</i> )	2.5%	5.0%	7.5%
Illinois pondweed ( <i>Potamogeton illinoensis</i> )	47.5%	-	15.0%
flatstem pondweed ( <i>Potamogeton zosteriformis</i> )	-	-	2.5%
eel grass ( <i>Vallisneria americana</i> )	52.5%	55.0%	42.5%
water stargrass ( <i>Zosterella dubia</i> )	-	7.5%	35.0%
nitella ( <i>Nitella spp.</i> )	2.5%	-	-
bur marigold ( <i>Bidens beckii</i> )	2.5%	-	-



**Figure 9. Pretty Lake, percent occurrence of species in the last three summer tier 2 surveys (Data from Table 6).**

Data collected concerning overall diversity and abundance metrics from the past three Tier 2 surveys is displayed in Table 7. The data suggest that there has been an increase in native species diversity and abundance since the last survey. Concern was expressed about the decline in lake clarity during the 2008 treatment season. This measurement also increased in 2009.

**Table 7. Comparison of Tier 2 data from Pretty Lake.**

Tier 2 Metric	Aug-06	Aug-08	Aug-09
Secchi	15	9	12
Max Plant Depth	20	20	19
Total Sites	40	40	40
Sites with Plants	39	32	35
Sites with Native Plants	37	32	35
Number of Species	10	7	11
Number of Native Species	9	7	10
Maximum Species/Site	4	4	5
Mean Species/Site	2.25	1.35	1.90
Mean Native Species/Site	1.78	1.35	1.75
Species Diversity Index	0.81	0.72	0.85
Native Species Diversity Index	0.70	0.72	0.83

No surveys designed to document emergent or rooted floating vegetation were completed in 2009. However, dense stands of purple loosestrife were once again observed growing along the northwest shore near the lake club house (Figure 10). According to Rich Dunbar with the Division of Nature Preserves, *Galerucella* leaf eating beetles used for biological control of purple loosestrife were abundant on the plants this summer, although not yet in numbers that would result in dramatic declines in loosestrife. Usually once they become established at a site it is only a matter of time before loosestrife declines. The bio-control insects will not eliminate purple loosestrife, but will reduce it to a level where native plants can compete (Rich Dunbar, email to author, June 12, 2009).



**Figure 10. Pretty Lake, purple loosestrife stands along northwest shore, August 12, 2009.**

## 5.0 VEGETATION CONTROL

No permitted aquatic vegetation controls were completed on Pretty Lake in 2009. However, residents did express their concern over the density of submersed native vegetation in late summer. The plants creating the most concern were primarily eel grass and water stargrass which were growing in the shallow areas in and around docks (Figure 11).



Figure 11. Pretty Lake, native vegetation growing around dock, August 12, 2009.

## 6.0 ACTION PLAN AND BUDGET UPDATE

The objectives below are from the original plan and continue to be applied to the current plan:

- Maintain and enhance the abundance of rooted floating and emergent aquatic plant species
- Maintain the density and diversity of submersed vegetation
- Reduce Eurasian watermilfoil density and abundance
- Prevent further spread of purple loosestrife
- Monitor the curlyleaf pondweed population and control if necessary
- Create public awareness of the potential for hydrilla invasion and post signs for cleaning off boats at all private and public access sites
- Control vegetation around docks and at the boat ramp in order to allow for boat access

The primary plant management action for the 2009 season was vegetation sampling. This action allowed managers to assess if the objective of reducing milfoil abundance is being achieved as well as monitoring the curlyleaf pondweed population and assessing changes

in native plant populations. The data lends one to believe that milfoil control was maintained and that native vegetation was not negatively impacted by the 2008 whole lake treatment. However curlyleaf pondweed appears to have expanded from pre-whole lake treatment levels.

Vegetation monitoring should also be an important component of the 2010 action plan. The first survey should be completed in late May or early June and be focused on detecting any areas of Eurasian watermilfoil that have returned. If any areas are located, the location should be recorded on a GPS device and downloaded onto a GIS program. These areas should be treated with Renovate aquatic herbicide (active ingredient: triclopyr) as soon as possible. If areas less than 1.0 acre of milfoil are discovered that area should be treated with the granular formulation (Renovate OTF), while continuous areas over 1.0 acres should be treated with the liquid formulation (Renovate 3). Bur Marigold is one of the few native submersed species that may be impacted by Renovate or 2,4-D. This species has not been detected since the whole lake treatment. Plans were to reintroduce bur marigold following the treatment, but IDNR wished to wait a few more seasons to see if it comes back on its own. In addition, IDNR wanted to avoid reintroduction of any undesirable plants or animals that may be associated with an attempted reintroduction. If bur marigold is found within 250-feet of a potential milfoil treatment area, the granular formulation of Renovate should be used in an effort to reduce dilution from targeted treatment area. If the two species are intermixed diver removal should be used if milfoil is limited to just a few plants. Renovate will incur a higher per acre charge than treatments with 2,4-D, but data collected from past treatments (LARE and privately funded) leads the author to believe that this product may be more effective for long term milfoil control. Due to the lack of inflow from milfoil infested lakes, the lack of public use that may bring milfoil into the lake, and the fact that no milfoil was collected or observed in 2009, it is likely that less than 2.0 acres would require treatment. The cost of such a treatment should not exceed \$1,000.

A second survey should be completed in late summer and focus on assessing the native plant community and also locating potential areas of Eurasian watermilfoil that may not have been present or detected during the spring invasive survey. A Tier 2 survey, similar to the one completed in 2009, should be sufficient. The same points used in the past Tier 2 surveys should be used in future surveys.

Curlyleaf pondweed should be treated in early spring in order to reduce nuisance conditions caused by this invasive plant, reduce its spread to new areas, and over the long term, reduce the turion (reproductive structure) abundance so that the Association can afford controlling this species once LARE funds are exhausted. Figure 12 is a map of the proposed curlyleaf treatment area. This map was created by combining the data from the last several surveys. These areas should be treated with 1.0 ppm of Aquathol K for a minimum of three consecutive seasons. The treatment should be completed once water temperatures reach a consistent temperature of 50 degrees Fahrenheit. The cost of this treatment should not exceed \$5,000.00.



Figure 12. Clear Lake, proposed curlyleaf pondweed treatment areas

Purple loosestrife continues to be present along the northwest shoreline of Pretty Lake. Inspections this season revealed the presence of insects that are known to limit the growth and density of this plant. Purple loosestrife should continue to be visually monitored and if there is no reduction herbicide applications may be needed. Purple loosestrife herbicide control is included in the application permit located in the Appendix. This has been left in the permit in case this plant continues to spread and herbicide control is needed.

Native submersed plants are an integral part of the Pretty Lake ecosystem. However, there may be a need for some limited shoreline spot treatments for control of native species if they reach nuisance levels. IDNR limits the amount of treatment to less than half of the shoreline. If more than half of the residents request treatment, it will be up to the Association and their plant manager to decide on what areas are most impaired by nuisance vegetation and treatment of these areas may require and on-site inspection by IDNR biologists. It is unlikely that more than half of the shoreline would require treatment. The potential shoreline treatment permit and map is included in the Appendix.

The vegetation management plan will need to be updated in 2010. The update should include all data gathered from 2010 surveys, 2010 vegetation controls, and action plan and budget updates. Along with the plan update, a public meeting should be planned for next fall. These meetings will allow for lake user input and education, while the biologist meeting will help to formulate and approve any needed changes to the action plan.

Pretty Lake has excellent water quality when compared to other lakes in the region. A diagnostic study was completed in 2009. Recommended management techniques from the 2009 Diagnostic Study include: cultivating near shore aquatic vegetation, phosphorus

free fertilizer use, proper disposal of organic wastes, stormwater filtration, conversion of agricultural ground to wetland, grass, or forest land, purple loosestrife control, and intercepting the tile flow with a wetland filter or open water pond (JFNEW 2009). The Association should take action on these recommendations in order to preserve and possibly enhance this priceless aquatic resource.

Table 8 shows the projected budget estimate for the next three years. It is important to keep in mind that LARE funds are only designed for control of invasive species. It is recommended that the Association request \$1,000 for treating up to 2 acres of Eurasian watermilfoil with triclopyr, \$5,000 for treatment of 15 acres of curlyleaf pondweed, and \$4,000 for plant sampling and updating the 2010 plan. This budget deviates from the previous year's budget due to the inclusion of curlyleaf pondweed and the reduction in anticipated milfoil acreage. PLA is supportive of this plan and prepared to pay the cost share for these actions.

**Table 8. Budget estimates for management options.**

	2010	2011	2012
Selective treatment of Eurasian watermilfoil with Renovate herbicide (8 acres)	\$1,000	\$1,000	\$1,000
Treatment of curlyleaf pondweed for a minimum of 3 consecutive seasons (15 acres)	\$5,000	\$5,000	\$5,000
Plant sampling and plan updates (potential LARE funding with 10% match)	\$4,000	\$4,000	\$4,000
<b>Potential LARE Funded Total:</b>	<b>\$10,000</b>	<b>\$10,000</b>	<b>\$10,000</b>
Shoreline lot treatments to be funded by individual lot owners	<b>\$3,500</b>	<b>\$3,500</b>	<b>\$3,500</b>

## 7.0 PUBLIC PARTICIPATION

An effective aquatic vegetation management plan must include input from lake users. A public meeting was held on September 21, 2009 at the Plymouth Country Club. The public meeting was held in order to gain input concerning the plan from lake users, educate lake users on the benefits of native vegetation, inform lake users about the 2009 vegetation controls, and to update lake users on 2010 plans. Twelve people were present at the meeting and 11 filled out lake user surveys (Table 9). All of those surveyed were property owners and members of the lake association. As far as uses of the lake, 100% of them used the lake for boating, 91% used the lake for swimming, 82% used the lake for fishing, and 27% used the lake for irrigation.

Concerning problems with the lake, 82% said there were too many plants (an increase from 14% in 2008) and 9% said dredging was needed. Those were the only problems which were checked on the survey. There was an apparent increase in the number of individuals that also believed that they had nuisance levels of aquatic plants along their shoreline from 29% in 2008 to 64% in 2009.

Overall it appeared that those in attendance were pleased with the results of the invasive controls, but there was frustration over the amount of native vegetation that moved into the areas once occupied by milfoil. It was recommended to the group that they pursue some small scale spot treatments next season to reduce the density of vegetation in and around their dock areas. Another public meeting should be held in the fall of 2010.

**Table 9. Pretty Lake, public meeting survey results, September 21, 2009.**

<b>Pretty Lake 9/21/09</b>		
Are you a lake property owner?	Yes: 100%	No: 0%
Are you currently a member of your lake association?	Yes: 100%	No: 0%
How many years have you been at the lake?	2 or Less: 0%	5 to 10: 18%
	2 to 5: 9%	Over 10: 73%
How do you use the lake (mark all that apply)	Swimming 91%	Irrigation 27%
	Boating 100%	Drinking water 0%
	Fishing 82%	Other? _____
Do you have aquatic plants at your shoreline in nuisance quantities?	Yes: 64% No: 27%	
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes: 73% No: 27%	
Does the level of vegetation in the lake affect your property values?	Yes: 27% No: 45%	
Are you in favor of continuing efforts to control vegetation on the lake?	Yes: 100% No: 0%	
Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded?	Yes: 91% No: 0%	
Were you satisfied with the results of the LARE funded invasive treatments this season?	Yes: 82% No: 0%	
Mark any of these you think are problems on your lake:		
0% Too many boats access the lake		
0% Use of jet skis on the lake		
0% Too much fishing		
0% Fish population problem		
9% Dredging needed		
0% Overuse by nonresidents		
82% Too many aquatic plants		
0% Not enough aquatic plants		
0% Poor water quality		
0% Pier/funneling problem		

Another topic discussed at the public meeting was the recent discovery of hydrilla (*Hydrilla verticillata*) in Lake Manitou. Hydrilla is an invasive aquatic species that was originally discovered in Florida in the 1960's. There are many characteristics of hydrilla that make it a threat to Indiana waterways. This species can grow in lower light conditions than most native species, grows faster than most native species, and can shade out other species by forming a surface canopy. Hydrilla can be easily confused with native elodea. The best way to distinguish hydrilla from native elodea is that hydrilla typically has five leaves along each whorl along with visible serrated edges along the leaf margin (Figure 13). What makes controlling the spread of hydrilla difficult is the fact that it can be spread by fragments. **That is why it is vitally important that lake users remove all plants and sediment from their boats when entering and leaving Pretty Lake.** At this time, hydrilla has not been discovered in Pretty Lake. More information about controlling the spread of hydrilla can be found at [www.protectyourwaters.net](http://www.protectyourwaters.net).



Figure 13. Illustration of hydrilla on the left compared to native elodea on the right. Hydrilla typically contains five toothed leaves per whorl while native elodea typically has three leaves per whorl and the teeth are not visible on the leaves (Illustrations provided by Applied Biochemist).

## 8.0 REFERENCES CITED

- Aquatic Control Inc. 2007. Pretty Lake Aquatic Vegetation Management Plan. Prepared for the Pretty Lake Association. Plymouth, IN.
- Aquatic Control Inc. 2009. Pretty Lake Aquatic Vegetation Management Plan 2008 Update. Prepared for the Pretty lake Association. Plymouth, IN.
- Endangered, Threatened, and Rare Vascular Plant Species Documented from Indiana 10 April 1996. Division of Natural Preserves, Indiana Department of Natural Resources. 14 February 2009.  
< <http://www.in.gov/dnr/naturepr/endanger/plant.html> >
- IDNR. 2007. Procedure Manual for Surveying Aquatic Vegetation: Tier II Reconnaissance Surveys. IN Department of Natural Resources, Division of Fish and Wildlife
- JFNew & Associations. 2009. Pretty Lake Diagnostic Study. Prepared for the Pretty Lake Association. Marshall County, IN.

## 9.0 APPENDIX UPDATE

### 9.1 August Tier 2 Survey Data

WPT	Lat	Long	Depth	Rake score	Curlyleaf pondweed	Fil. Algae	Coontail	Chara	Eel grass	Water stargrass	Slender naiad	Illinois pondweed	Small pondweed	Largeleaf pondweed	Flatstem pondweed	Richardson's pondweed
1	41.32461	-86.368401	5	1			1	1	1	1	1					
2	41.32518	-86.368517	5	3	1				1	1						
3	41.32555	-86.369155	6	5			5									
4	41.32611	-86.369721	19	5			5					5				
5	41.32659	-86.36992	16	1								1				
6	41.32693	-86.370376	4	3				3								
7	41.32691	-86.371359	7	5				5	3		1					
8	41.32756	-86.371586	19	1								1				
9	41.32802	-86.371366	14	3					1			3				
10	41.3283	-86.371952	5	5	1			1	1	5	1					
11	41.32852	-86.372553	10	1	1											
12	41.32876	-86.373361	16	0												
13	41.32912	-86.373651	17	0												
14	41.32867	-86.374187	5	5				5	1							
15	41.32857	-86.374922	14	1	1											
16	41.32834	-86.374831	5	5				5	1	5			1			
17	41.32802	-86.375016	9	1	1	P			1							
18	41.32775	-86.375567	16	0												
19	41.32765	-86.376043	8	5				1						5		
20	41.32738	-86.376188	4	5				5	3	1						
21	41.32733	-86.376988	16	3			3					1				
22	41.327	-86.377401	5	5			5		3	3						
23	41.32685	-86.377872	18	1			1									
24	41.32653	-86.377714	5	5			5		1	3			1			
25	41.32622	-86.377882	19	1		P	1									
26	41.32598	-86.377854	8	5										5	1	
27	41.32538	-86.377888	8	1		P	1							1		
28	41.32495	-86.377714	15	0												
29	41.32472	-86.377124	4	3			1		3	1						
30	41.32466	-86.376407	4	5		P	5		1							
31	41.32474	-86.375805	13	1						1						
32	41.3249	-86.374972	13	1						1						
33	41.32613	-86.373873	7	3		P			3							
34	41.32638	-86.374112	4	5			1			5						3
35	41.32416	-86.37397	14	0												
36	41.32378	-86.373224	8	3			1		3	1						
37	41.32352	-86.37192	9	5			3		3	1						
38	41.32349	-86.370882	6	5			5		1	5						
39	41.3234	-86.369953	13	1	1											
40	41.32395	-86.368661	19	1								1				

9.2 2009 Vegetation Control Permit Application



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**

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

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY	
License No.	
Date Issued	
Lake County	

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

FEE: \$5.00

Applicant's Name <b>Sue Palumbo</b>		Lake Assoc. Name <b>Pretty Lake Conservation Club</b>	
Rural Route or Street <b>319 W. Jefferson St.</b>		Phone Number <b>574-935-0610</b>	
City and State <b>Plymouth, IN</b>		ZIP Code <b>46563</b>	
Certified Applicator (if applicable)		Company or Inc. Name	
Rural Route or Street		Phone Number	
City and State		ZIP Code	

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

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

Treatment Area # <b>1</b>	LAT/LONG or UTM's <b>center @ N41.32769 W86.37108</b>	
Total acres to be controlled <b>5.9</b>	Proposed shoreline treatment length (ft) <b>2770</b>	Perpendicular distance from shoreline (ft) <b>100</b>
Maximum Depth of Treatment (ft) <b>6</b>	Expected date(s) of treatment(s) <b>Prior to July 1</b>	
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <b>Combination of Reward, Aquathol, and Komeen</b>		
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) <b>June 6 Tier I survey</b>		

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
eel grass	x	25
chara	x	20
largeleaf pondweed		10
water stargrass	x	20
leafy pondweed	x	3
richardsons pondweed		2
common coontail	x	15
curlyleaf pondweed	x	5



Treatment Area #	2	LAT/LONG or UTM's center @ N41.32312 W86.36934	
Total acres to be controlled	5.5	Proposed shoreline treatment length (ft)	962
Maximum Depth of Treatment (ft)	6	Perpendicular distance from shoreline (ft)	100
Treatment method:		Expected date(s) of treatment(s) Prior to July 1	
<input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Reward, Komeen, Aquathol combination</u>			
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) <u>June TI survey</u>			
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
eel grass	x	25	
chara	x	20	
largeleaf pondweed		5	
water stargrass	x	20	
leafy pondweed	x	5	
richardsons pondweed		5	
common coontail	x	15	
curlyleaf pondweed	x	5	
Treatment Area #	3	LAT/LONG or UTM's center @ N41.32462 W86.37705	
Total acres to be controlled	2.1	Proposed shoreline treatment length (ft)	1020
Maximum Depth of Treatment (ft)	6	Perpendicular distance from shoreline (ft)	100
Treatment method:		Expected date(s) of treatment(s) Prior to July 1	
<input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Reward, Komeen, Aquathol Combination</u>			
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____			
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
eel grass	x	30	
chara	x	10	
largeleaf pondweed		5	
water stargrass	x	25	
leafy pondweed	x	5	
richardsons pondweed		5	
common coontail	x	20	
Curlyleaf pondweed	x	5	

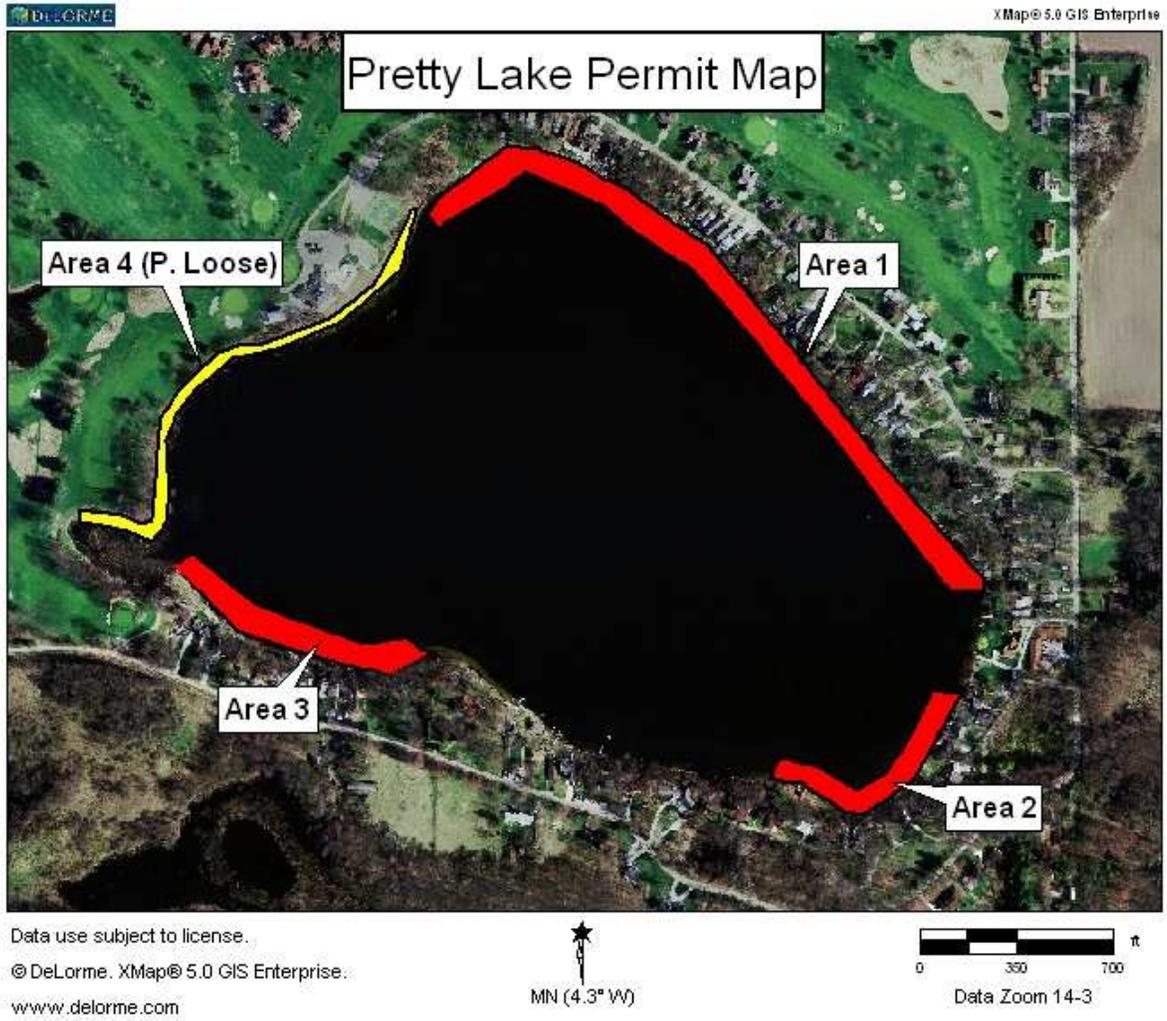
Treatment Area #	4	LAT/LONG or UTM's center @ N41.32735 W86.37801	
Total acres to be controlled	1.8	Proposed shoreline treatment length (ft)	1850
		Perpendicular distance from shoreline (ft)	100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s) Late June or July	
Treatment method:	<input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Renovate for selective purple loosestrife control</u>			
Plant survey method:	<input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____		
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Purple loosestrife	x	90	
Swamp loosestrife		2	
Pickeral weed		2	
Common cattail		2	
bulrush		1	
spatterdock		1	
sedge species		2	
Treatment Area #	5	LAT/LONG or UTM's Treatment of Eurasian watermilfoil where and if it is found	
Total acres to be controlled	n.a.	Proposed shoreline treatment length (ft)	n.a.
		Perpendicular distance from shoreline (ft)	n.a.
Maximum Depth of Treatment (ft)	n.a.	Expected date(s) of treatment(s) n.a.	
Treatment method:	<input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical		
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Renovate herbicide for selective Eurasian watermilfoil control</u>			
Plant survey method:	<input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____		
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Eurasian watermilfoil	x	0	
eel grass		20	
Chara		10	
Coontail		20	
water stargrass		20	
largeleaf pondweed		3	
leafy pondweed		2	
Richardsons pondweed		3	
Slender naiad		2	
curlyleaf pondweed		15	

Treatment Area # 6		LAT/LONG or UTM's See Map	
Total acres to be controlled 15	Proposed shoreline treatment length (ft) 5800	Perpendicular distance from shoreline (ft) 200	
Maximum Depth of Treatment (ft) 10	Expected date(s) of treatment(s) Prior to April 30 or once water hits consistent 50 degrees		
Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>Aquathol K 1.0 ppm for early season control</u>			
Plant survey method: <input checked="" type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____			
Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community	
Eurasian watermilfoil		0	
eel grass		20	
Chara		10	
Coontail		20	
water stargrass		20	
largeleaf pondweed		3	
leafy pondweed		2	
Richardsons pondweed		3	
Slender naiad		2	
curlyleaf pondweed	x	15	
<i>INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.</i>			
Applicant Signature			Date
Certified Applicant's Signature			Date

FOR OFFICE ONLY			
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Fisheries Staff Specialist	
<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Environmental Staff Specialist	
Mail check or money order in the amount of \$5.00 to:			
<b>DEPARTMENT OF NATURAL RESOURCES</b> DIVISION OF FISH AND WILDLIFE COMMERCIAL LICENSE CLERK 402 WEST WASHINGTON STREET ROOM W273 INDIANAPOLIS, IN 46204			



Permit Map 1-Page 5 of 6



Pretty Lake Permit Map 2 (Area 6)- Page 6 of 6

