Silver Lake 2008 Aquatic Vegetation Management Plan Update

Kosciusko County, Indiana

http://129.79.145.7/arcims/statewide%5Fmxd/viewer.htm

Prepared for:

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Executive Summary

Approximately 30 combined acres of Silver Lake and North Little Lakes were chemically treated with Aquathol K on April 17, 2008. This treatment was part of an early season treatment program designed to reduce the curly leaf pondweed population in Silver Lake. Curly leaf pondweed (CLP) was found throughout Silver Lake prior to this treatment program. The entire littoral zone of Silver Lake was treated, as well as the littoral zone of North Little Lake. Silver Lake has now been treated for 4 years, while North Little Lake has been treated for 3 years. These treatments are not expected to eliminate curly leaf pondweed in Silver Lake but should help to prevent its spread and help beneficial native plants compete with the invader.

Ten acres of North Little lake were also treated with 2, 4-D on June 26, 2008 for the control of Eurasian watermilfoil (EWM). Eurasian Watermilfoil is found in only moderate levels in North Little Lake, and the 2, 4-D treatments are designed to prevent its spread.

One Tier II aquatic vegetation survey was conducted on Silver Lake in 2008. This survey was conducted on August 6, 2008, after all herbicide treatments had been conducted on Silver and North Little Lakes. The purpose of this survey was to document any changes in the plant community from past surveys, and to monitor the lake's curly leaf pondweed and Eurasian watermilfoil populations, along with the native plant community.

Curly leaf pondweed (CLP) was not collected in Silver Lake in the August 2008 Tier II survey. Site frequency of CLP in North Little Lake was 20% in August 2008 which is down from 30% in fall of 2007. Normally curly leaf pondweed abundance decreases from spring to fall. It is difficult to know true curly leaf pondweed spring abundance while performing early season Aquathol treatments.

The current treatment strategy will continue for North Little Lake in 2009. The entire littoral zone of North Little Lake will be treated with Aquathol K for the control of curly leaf pondweed. This will be the fourth year of the CLP treatment program in North Little Lake. North Little Lake will be treated later in the growing season with 2, 4-D for the control of Eurasian watermilfoil.

No early season Aquathol treatment will take place on Silver Lake in 2009. These early season treatments have been conducted for 4 years in a row. Late season surveys indicate a reduction in CLP frequency, and visual observations confirm dramatically reduced CLP beds in spring, but it is unknown whether the treatments have reduced the CLP turion bank in the sediment of Silver Lake. Since no early season Aquathol treatment will take place on Silver Lake in 2009 a spring Tier II survey will be conducted to determine spring abundance of CLP. Another late season Tier II survey will also be conducted to monitor both native and exotic plant populations. A new five-year vegetation management plan will be established after the results of the current management strategy have been evaluated through the 2009 Tier II surveys.

Coontail, the most abundant plant in Silver Lake, will not be treated with LARE funding. Coontail treatments may be permitted but must be privately funded. Private treatments of coontail may be beneficial in areas around docks and piers to improve utility of the lake. A summary of management recommendations and cost estimates are included on the following page.

2009 Treatment Recommendations

Treat 10 acres in North Little Lake with Aquathol K for curly leaf pondweed	$3,250
Treat 10 acres in North Little Lake with 2, 4-D for Eurasian Watermilfoil	$3,700

Survey and Planning Recommendations

Conduct 2 Tier II surveys (spring and late season) Update the AVMP for Silver and North Little Lakes as well as development of a new 5 year management strategy	$8,000

Total 2009 Cost Estimates

North Little Lake Aquathol treatment for CLP	$3,250
North Little Lake 2, 4-D treatment for EWM	$3,700
Tier II surveys and AVMP update	$8,000
Total Cost	$14,950
LARE Share	$13,455
Association's Share	$1,495

Acknowledgements

Aquatic vegetation surveys and herbicide treatments conducted on Silver Lake were made possible by funding from the Silver Lake Association and the Indiana Department of Natural Resources through the Lake and River Enhancement Program. Aquatic Weed Control would like to extend special thanks to Indiana Department of Natural Resources (IDNR) District 3 biologist Jed Pearson for providing procedural training for Tier II aquatic vegetation surveys. IDNR District 4 Fisheries Biologist Ed Braun provided consultation in the development of this management strategy. Gwen White and Angela Sturdevant, aquatic biologists for the IDNR Division of Fish and Wildlife provided valuable consultation regarding the requirements and objectives of this lake management plan. Aquatic Weed Control would also like to thank the members of the Silver Lake Association for their commitment to improving this lake and for valuable discussion and input brought forward at the informational meeting held on June 14, 2008.

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1.0 Introduction

Silver Lake has been involved in the Lake and River Enhancement Program (LARE) since 2004, when the first LARE funded aquatic vegetation survey took place on August 25, 2004. Based on the results of this survey, curly leaf pondweed was very prevalent in Silver Lake, and the areas of infestation were targeted for early season Aquathol K herbicide treatments. Early season curly leaf pondweed treatments have been conducted on Silver Lake for four consecutive years, while they have been conducted on North Little Lake for three consecutive years. North Little Lake was treated for the control of EWM for the first time in 2007. It was also treated for EWM in 2008. Table 1 summarizes all LARE funded activities on Silver Lake. The time frame for the original management plan was 2004 through 2008.

Table 1: Silver Lake LARE History

Year	Action	Date	Funding Source
2004	Late Season Aquatic Vegetation Survey. AVMP Development	Late Season Survey August 25, 2004	Lake and River Enhancement Silver Lake Association
2005	Spring and Late Season Aquatic Vegetation Surveys as well Aquathol K application and AVMP Update	Spring Survey April 14, 2005 Aquathol K Application ~30 acres –Silver Lake- April 15, 2005 July Survey July 15, 2005	Lake and River Enhancement Silver Lake Association
2006	Spring and Late Season Aquatic Vegetation Surveys as well Aquathol K application and AVMP Update	Spring Survey April 20, 2006 Aquathol K Application-silver and North Little Lakes ~30 acres- April 26, 2006 Late Season Survey July 26, 2006	Lake and River Enhancement Silver Lake Association
2007	Spring and Fall Tier II Vegetation surveys as well as Aquathol K and 2, 4-D applications for CLP and EWM Aquatic Vegetation Management Plan Development	Spring Survey April 27, 2007 Aquathol K Application-Silver and North Little Lakes ~30 acres- April 27, 2007 2, 4-D Application for EWM June 19, 2007 Late Season Survey July 25, 2007	Lake and River Enhancement Silver Lake Association
2008	Early season Aquathol treatment for CLP on Silver and North Little Lakes 2, 4-D application for EWM on North Little Lake Fall Tier II plant survey and AVMP Update	Aquathol K Application-Silver and North Little Lakes ~30 acres- April 17, 2008 2, 4-D Application for EWM June 26, 2008 Late Season Survey August 6, 2008	Lake and River Enhancement Silver Lake Association

Table 2 was compiled by the IDNR and gives both common and scientific names of many plants mentioned in this report. It also gives species codes which may be referenced on some data sheets.

Table 2: Common and Scientific Plant Names

Species Code	Scientific Name	Common Name	Vegetation Type
ALGA	Any species of filamentous alga (incl. *Spyrogyra, Cladophora, Hydrodictyon*)	algae	N
AZO001	*Azolla* sp.	A mosquito fern species	N
AZOCAR	*Azolla caroliniana*	Carolina mosquito fern	N
AZOMEX	*Azolla mexicana*	Mexican mosquito fern	N
CERDEM	*Ceratophyllum demersum*	coontail	S
CHARA	*Chara* sp.	A chara species	S
EGEDEN	*EGERIA DENSA*	BRAZILIAN ELODEA	S
ELOCAN	*Elodea Canadensis*	Canada waterweed	S
ELONUT	*Elodea nuttallii*	western waterweed	S
HYIVER	*HYDRILLA VERTICILLATA*	HYDRILLA	S
LEM001	*Lemna* sp.	duckweeds (species within Lemnaceae)	N
LEMMIO	*Lemna minor*	small or common duckweed	N
LEMTRI	*Lemna trisulca*	star duckweed	N
LUDDEC	*Ludwigia decurrens*	primrose-willow	F
MYRSIB	*Myriophyllum sibiricum*	northern watermilfoil	S
MYRSPI	*MYRIOPHYLLUM SPICATUM*	EURASIAN WATERMILFOIL	S
MYR001	*Myriophyllum* sp.	a watermilfoil species	S
NAJFLE	*Najas flexilis*	slender naiad	S
NAJGRA	*Najas gracillima*	Northern naiad	S
NAJGUA	*Najas guadalupensis*	Southern naiad	S
NAJMIN	*NAJAS MINOR*	BRITTLE WATERNYMPH	S
NELLUT	*Nelumbo lutea*	American lotus	F
NITELL	*Nitella* sp.	a nitella species	S
NOAQVG		no aquatic vegetation at site	N
NUPADV	*Nuphar advena*	spatterdock	F
NUPVAR	*Nuphar variegata* (formerly *N. luteum*)	bullhead lily (yellow pond lily)	F
NYMODT	*Nymphaea oderata subsp. tuberosa*	white water lily (fragrant water lily)	F

POTCRI	*POTAMOGETON CRISPUS*	CURLY-LEAF PONDWEED	S
POTEPI	*Potamogeton epihydrus*	ribbon-leaf pondweed	S
POTFOF	*Potamogeton foliosus*	leafy pondweed	S
POTGRA	*Potamogeton gramineus*	variable pondweed	S
POTILL	*Potamogeton illinoensis*	Illinois pondweed	S
POTNLV	*Potamogeton foliosus*, *P. pusillus*, or other unidentified narrow-leaved pondweeds	narrow-leaved pondweeds	S
POTNOD	*Potamogeton nodosus* (formerly *P. americanus*)	American pondweed	S
POTPRA	*Potamogeton praelongus*	white-stemmed pondweed	S
POTPUP	*Potamogeton pusillus*	small pondweed	S
POTRIC	*Potamogeton richardsonii*	Richardson's pondweed	S
POTZOS	*Potamogeton zosteriformis*	flat-stemmed pondweed	S
RANFLA	*Ranunculus flabellaris*	yellow water crowfoot (yellow water buttercup)	S
RANLON	*Ranunculus longirostris* (incl. *R. trichophyllus*)	white water crowfoot (rigid white water crowfoot)	S
RICCIA	*Riccia* sp., *Ricciocarpus* sp.	A liverwort species	N
SPIPOL	*Spirodela polyrhiza*	greater duckweed	N
STUPEC	*Stuckenia pectinata*	sago pondweed	S
UNKN01		Unknown specimen No. 1	
UNKN02		Unknown specimen No. 2	
UTRMAC	*Utricularia macrorhiza* (also known as *U. vulgaris*)	common bladderwort	S
VALAME	*Vallisneria americana*	wild celery or eel grass	S
WOA001	*Wolffia* sp.	A watermeal species	N
WOACOL	*Wolffia columbiana*	watermeal	N
ZANPAL	*Zannichellia palustris*	horned pondweed	S
ZOSDUB	*Zosterella dubia* (also known as *Heteranthera dubia*)	water stargrass	S

Note: The scientific and common names of EXOTIC species are shown in ALL CAPITAL LETTERS.

Key to Vegetation Types:
F = floating-leaved, rooted vegetation
N = non-rooted floating vegetation
S = submersed vegetation

2.0 Watershed and Lake Characteristics Update

Secchi depth in Silver Lake was measured at 4.0 feet on April 27, 2007 and at 3.5 feet on July 25, 2007 by Aquatic Weed Control. On August 6, 2008, secchi depth was measured at 2.7 feet. Low water clarity likely contributes to the fact that plants seldom grow in depths of more than 8 to 9 feet in Silver Lake. More water testing may be conducted on Silver Lake starting in 2009 through a voluntary lake monitoring program.

Nutrient and Sediment Removal

Silver lake has needs for both sediment removal and dam improvements to deal with recent flooding issues. Street drainage form the town of Silver Lake may add to nutrient and sediment problems. Sediment removal is greatly needed in the area around the main inlet. The Silver lake watershed did recently receive a grant through the Soil and Water Conservation District to help with watershed improvement projects. No recent water quality monitoring has taken place and no other recent studies have been conducted on the Silver Lake watershed (Walker, 2008).

3.0 Lake Uses Update

Silver Lake continues to receive very high levels of public use during the summer months. Lake uses have not changed significantly since 2007. No IDNR public access site is available, but boaters and fishermen enter the lake from the county right of way access and a private access point on Silver Lake.

4.0 Fisheries Update

Ed Braun, District 4 Fisheries Biologist was contacted, and the most recent fisheries survey on Silver Lake took place in 2006 (Benson, 2006). It was included in the 2006 Aquatic Vegetation Management Plan Update.

5.0 Problem Statement

Curly leaf pondweed will continue to be the major challenge in Silver Lake, while Eurasian watermilfoil and curly leaf pondweed are both challenges in maintaining a healthy plant community in North Little Lake. These species form dense mats of vegetation that impede native plant growth, as well as recreation. They also provide poor fish habitat. Early season Aquathol treatments provide effective control for curly leaf pondweed and overall infestation should decrease as a result of the treatment program. Spring 2009 survey data will provide some insight into how much the CLP population in Silver Lake has been reduced by the Aquathol treatment program.

In North Little Lake 2, 4-D treatments provide maintenance for Eurasian watermilfoil. These treatments should help native species compete with these invasive plants. Coontail, a native species in Silver Lake is also present at nuisance levels in many areas. Coontail treatments are not eligible for LARE funding.

6.0 Management Goals and Objectives

The management goals outlined by the IDNR Division of Fish and Wildlife have not changed. They are restated below:

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

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

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

One quantifiable goal would be to see Curly Leaf Pondweed site frequency below 10% at the height of its growth in spring 2009. Since Silver Lake is one of the very first early season Aquathol treatment programs in Indiana, it is unclear how the lake will respond in the first year without the treatment.

7.0 Plant Management History Update

Ed Braun, District 4 Fisheries Biologist was contacted to determine any significant changes in vegetation control permits. Acreages for the treatment of private lots have not changed significantly. Only two to three private lots on the entire lake were treated for coontail with contact herbicides. These lots were along the south shoreline of the lake.

Aquathol treatments for curly leaf pondweed in both Silver and North Little Lakes continued in 2008. Approximately 30 acres were treated with Aquathol on April 17, 2008. Treatment areas did not change from 2006 and 2007. Curly leaf pondweed treatment areas are shown in Figure 1. Ten acres of Eurasian watermilfoil in North Little Lake were treated with liquid 2, 4-D in both 2007 and 2008. The entire littoral zone was treated. This treatment area for North Little Lake was the same as the curly leaf pondweed treatment area which is shown in red in Figure 1.

Figure 1: Early Season Aquathol Treatment Areas

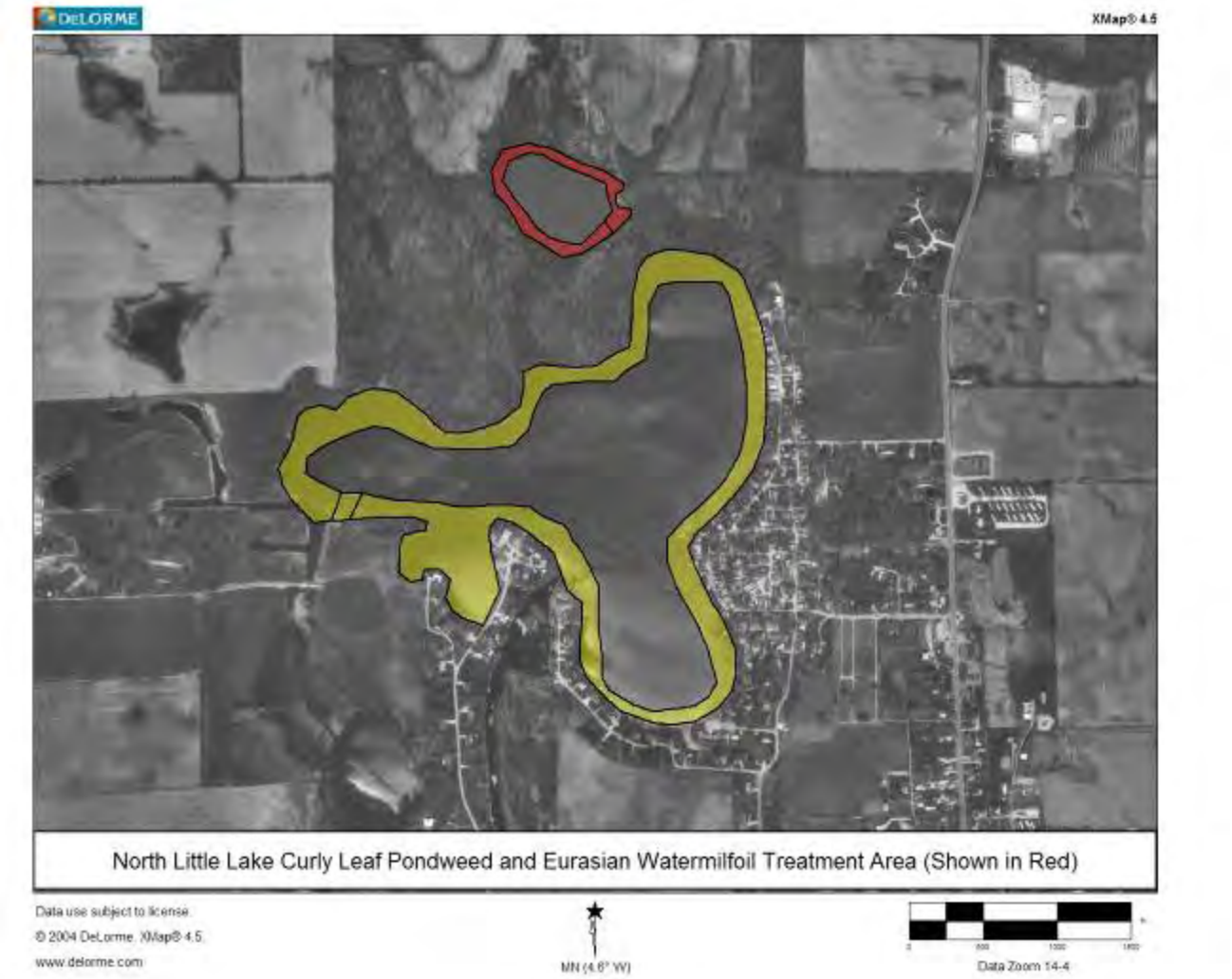
8.0 Aquatic Plant Community Characterization Update

Survey and data analysis techniques have not changed since the completion of the 2007 Aquatic Vegetation Management Plan Update. Figure 2 and Figure 3 indicate locations of the two invasive species in Silver Lake (curly leaf pondweed and Eurasian watermilfoil). Curly leaf pondweed is suspected to be present in low abundance throughout the Aquathol K treatment area (Figure 1). The Eurasian watermilfoil treatment area in North Little Lake is shown in red in Figure 4.

Figure 2: 2008 Eurasian Watermilfoil Locations

Figure 3: 2008 Curly Leaf Pondweed Locations

Figure 4: North Little Lake CLP and EWM Treatment Area: Shown in Red



8.1 Methods Update

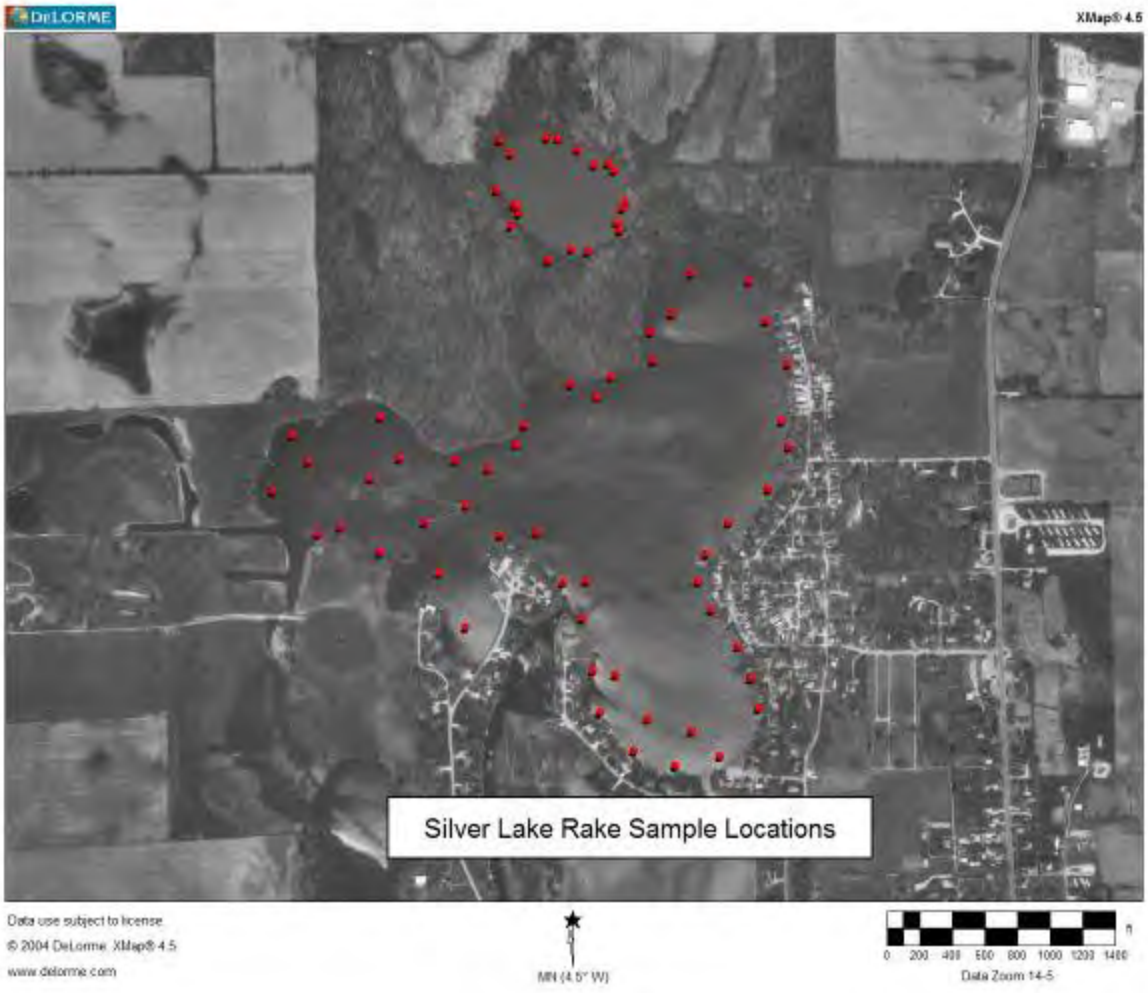
The Tier II survey protocol was updated by the IDNR in 2006 and 2007. The 2006 Tier II protocol requires that sample sites be stratified by depth contour and that data analysis be provided for each depth contour. Rake scores for plant species are recorded as 1, 3, or 5, as opposed to the original scoring system of 1, 2, 3, 4, or 5.

Silver Lake is characterized by the IDNR as eutrophic with 102 surface acres. Maximum sampling depth was 15 feet in Silver and North Little Lakes. In accordance with the protocol 50 total sample sites are collected in Silver Lake with 23 sites in 0 – 5 feet of water, 17 sites in 5 – 10 feet of water and 10 sites in 10 – 15 feet of water. North Little Lake is not included in the IDNR lakes classification chart but is roughly 10 acres. Twenty sample sites are collected in North Little Lake with 10 sites in 0 – 5 feet of water, 8 sites in 5 – 10 feet of water and 2 sites in 10 -15 feet of water. At this time no changes in sampling distribution are recommended for Silver and North Little Lakes.

8.2.1 Tier II Results

In 2008, one Tier II aquatic vegetation survey was conducted on August 6th. Secchi depth was measured at 2.7 feet, which is down from 3.5 feet in July of 2007. Fifty rake samples were divided between each 5 foot depth contour of Silver Lake's littoral zone in each survey. Twenty sample sites were distributed throughout the littoral zone of North Little Lake. Figure 5 shows the locations of all sample sites during the 2008 Tier II survey. Sample sites are identical to 2006 and 2007 sample sites.

Figure 5: Silver Lake Rake Sample Locations



Tier II Data Analysis

The following tables are data summaries for the 2008 aquatic vegetation survey. These tables help to describe the plant community and will help identify any changes that take place in the years to come. Tables labeled as "Overall" analyze each sample site in Silver and North Little Lakes. The other tables describe plants found in each depth contour of the littoral zones (0-5 feet, 5-10 feet, etc).

In the data analysis tables, "littoral sites" indicates the number of sample sites which had a depth that was less than the maximum depth at which plants were found. The littoral depth indicates the maximum depth at which plants were found.

Silver Lake 2008 Data Analysis

Table 3: Silver Lake 2008 Data Analysis- Overall

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	Silver Lake	Secchi:	2.7	SE Mean Species/site:	0.09
Date:	8/6/2008	Littoral sites with plants:	16	Mean natives/site:	0.36
Littoral depth (ft):	9.0	Number of species:	4	SE Mean natives/site:	0.08
Littoral sites:	38	Maximum species/site:	3	Species diversity:	0.36
Total sites:	50	Mean number species/site:	0.38	Native diversity:	0.29
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	30.0	6.0	12.0	12.0	20.4
Slender Naiad	4.0	0.0	2.0	2.0	3.2
Elodea	2.0	2.0	0.0	0.0	0.4
Eurasian Watermilfoil	2.0	2.0	0.0	0.0	0.4
Filamentous Algae	18.0				

Table 4: Silver Lake 2008 Data Analysis 0 - 5 Feet

Occurrence and Abundance of Submersed Aquatic Plants 0-5 Feet					
Lake:	Silver Lake	Secchi:	2.7	SE Mean Species/site:	0.16
Date:	8/6/2008	Littoral sites with plants:	14	Mean natives/site:	0.70
Littoral depth (ft):	9.0	Number of species:	4	SE Mean natives/site:	0.13
Littoral sites:	23	Maximum species/site:	3	Species diversity:	0.39
Total sites:	23	Mean number species/site:	0.74	Native diversity:	0.32
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	56.5	4.3	26.1	26.1	42.6
Slender Naiad	8.7	0.0	4.3	4.3	7.0
Elodea	4.3	4.3	0.0	0.0	0.9
Eurasian Watermilfoil	4.3	4.3	0.0	0.0	0.9
Filamentous Algae	30.4				

Table 5: Silver Lake Data Analysis: 5 - 10 Feet

Occurrence and Abundance of Submersed Aquatic Plants 5-10 Feet					
Lake:	Silver Lake	Secchi:	2.7	SE Mean Species/site:	0.08
Date:	8/6/2008	Littoral sites with plants:	2	Mean natives/site:	0.12
Littoral depth (ft):	9.0	Number of species:	1	SE Mean natives/site:	0.08
Littoral sites:	15	Maximum species/site:	1	Species diversity:	0.00
Total sites:	17	Mean number species/site:	0.12	Native diversity:	0.00
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	11.8	11.8	0.0	0.0	2.4
Filamentous Algae	11.8				

North Little Lake 2008 Data Analysis

Table 6: North Little Lake Data Analysis: Overall

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	North Little Lake	Secchi:	2.7	SE Mean Species/site:	0.22
Date:	8/6/2008	Littoral sites with plants:	9	Mean natives/site:	0.50
Littoral depth (ft):	8.0	Number of species:	4	SE Mean natives/site:	0.15
Littoral sites:	13	Maximum species/site:	3	Species diversity:	0.72
Total sites:	20	Mean number species/site:	0.80	Native diversity:	0.48
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	30.0	5.0	20.0	5.0	18.0
Small Pondweed	20.0	20.0	10.0	10.0	8.0
Curly Leaf Pondweed	20.0	20.0	0.0	0.0	4.0
Eurasian Watermilfoil	10.0	10.0	0.0	0.0	2.0
Filamentous Algae	0.0				

Table 7: North Little Lake Data Analysis 0 - 5 Feet

Occurrence and Abundance of Submersed Aquatic Plants 0-5 Feet					
Lake:	North Little	Secchi:	2.7	SE Mean Species/site:	0.33
Date:	8/6/2008	Littoral sites with plants:	6	Mean natives/site:	0.60
Littoral depth (ft):	8.0	Number of species:	4	SE Mean natives/site:	0.22
Littoral sites:	10	Maximum species/site:	3	Species diversity:	0.72
Total sites:	10	Mean number species/site:	1.00	Native diversity:	0.44
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	40.0	0.0	30.0	10.0	28.0
Curly Leaf Pondweed	20.0	20.0	0.0	0.0	4.0
Eurasian Watermilfoil	20.0	20.0	0.0	0.0	4.0
Small Pondweed	20.0	20.0	0.0	0.0	4.0
Filamentous Algae	0.0				

Table 8: North Little Lake 2008 Data Analysis: 5 - 10 Feet

Occurrence and Abundance of Submersed Aquatic Plants 5-10 Feet					
Lake:	North Little Lake	Secchi:	2.7	SE Mean Species/site:	0.40
Date:	8/6/2008	Littoral sites with plants:	3	Mean natives/site:	0.57
Littoral depth (ft):	8.0	Number of species:	3	SE Mean natives/site:	0.30
Littoral sites:	2	Maximum species/site:	2	Species diversity:	0.67
Total sites:	7	Mean number species/site:	0.86	Native diversity:	0.50
			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Small Pondweed	28.6	0.0	28.6	0.0	17.1
Coontail	28.6	14.3	14.3	0.0	11.4
Curly Leaf Pondweed	28.6	28.6	0.0	0.0	5.7
Filamentous Algae	0.0				

2007 North Little Lake Data

For reference purposes, Table 9 describes 2007 North Little Lake plant distribution.

Table 9: 2007 North Little Lake Data

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake:	North Little	Secchi:	3.5	SE Mean Species/site:	0.2
Date:	7/25/07	Littoral sites with plants:	16	Mean natives/site:	0.80
Littoral depth (ft):	13.0	Number of species:	4	SE Mean natives/site:	0.09
Littoral sites:	18	Maximum species/site:	3	Species diversity:	0.54
Total sites:	20	Mean number species/site:	1.20	Native diversity:	0.12

			Score Frequency		
Common Name	**Site Frequency**	**1**	**3**	**5**	**Dominance**
Coontail	75.0	25.0	35.0	15.0	41.0
Curly-leaf Pondweed	30.0	25.0	5.0	0.0	8.0
Eurasian Watermilfoil	10.0	10.0	0.0	0.0	2.0
Small Pondweed	5.0	0.0	5.0	0.0	3.0
Filamentous Algae	20.0				

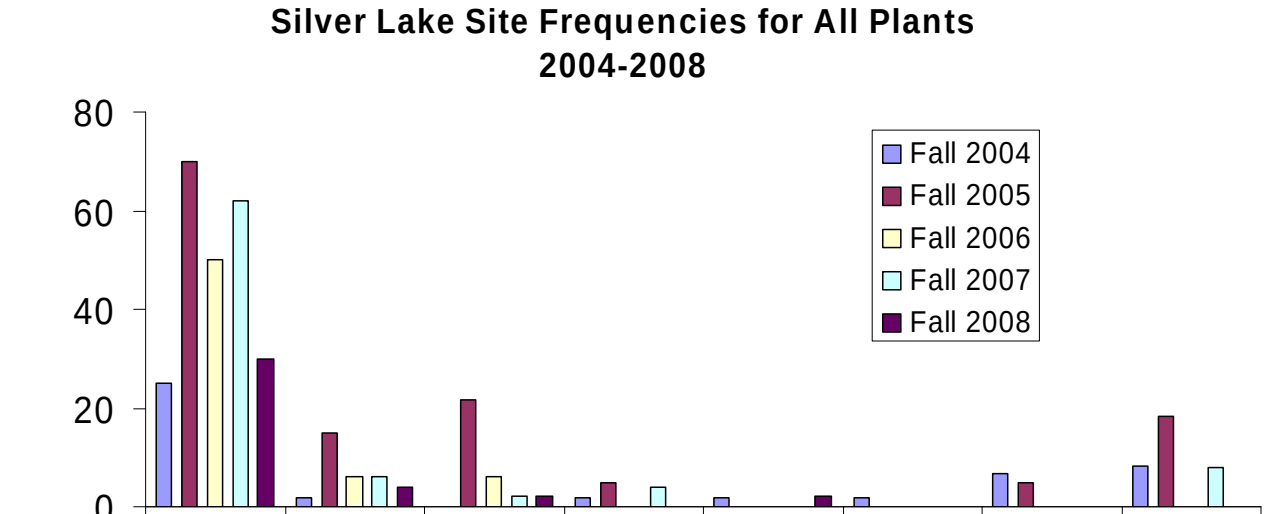
Site Frequency

Site frequency is a measure of how often a species was collected during the Tier II survey. It can be calculated by the following equation:

$$\text{Site Frequency} = \frac{\text{(\# of sites where the species was collected)}}{\text{Total \# of littoral sample sites}} \times 100$$

Figure 6 shows site frequencies for every plant collected in any of the late season Tier II surveys since the lake was involved in the LARE program with the exception of duckweed. Natural die offs make it difficult to describe the curly leaf pondweed population in late summer. Coontail remains the most frequently collected plant in every survey. Slender naiad, Elodea and chara are also found in low abundance in Silver Lake.

Figure 6: Silver Lake Site Frequency Histories



	Coontail	Slender Naiad	Elodea sp	Chara	Eurasian Milfoil	Eel grass	Sago Pondweed	Curly Leaf p.w.
Fall 2004	25	1.7	0	1.7	1.7	1.7	6.7	8.3
Fall 2005	70	15	21.7	5	0	0	5	18.3
Fall 2006	50.0	6.0	6.0	0	0	0	0	0
Fall 2007	62	6	2	4	0	0	0	8
Fall 2008	30	4	2	0	2	0	0	0

Species Diversity

The species diversity indices listed in data analysis tables describe the overall plant community. A species diversity index is actually measured as a value of uncertainty (H). If a species is chosen at random from a collection containing a certain number of species, the diversity index (H) is the probability that a chosen species will be different from the previous random selection. The diversity index (H) will always be between 0 and 1. The higher the H value, the more likely it is that the next species chosen from the collection at random will be different from the previous selection (Smith, 2001). This index is dependent upon species richness and species evenness, meaning that species

diversity is a function of how many different species are present and how evenly they are spread throughout the ecosystem.

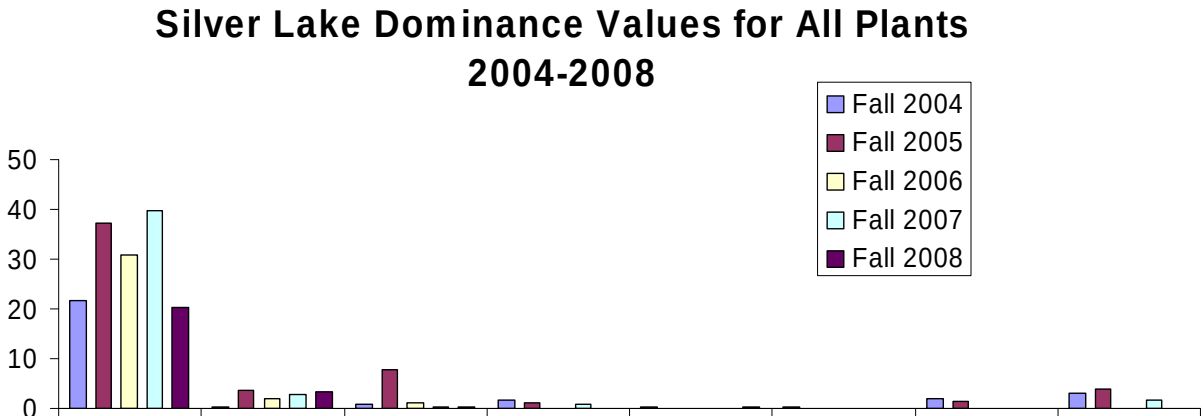
The species diversity index for Silver Lake in August 2008 was 0.36 which is between the 2006 and 2007 diversity values of 0.33 and 0.46. Native plant diversity in August of 2008 was 0.29, which is down from the 2006 and 2007 native diversity values of 0.33 and 0.36. North Little Lake species diversity in August of 2008 was 0.72 which is similar to the 2006 and 2007 values of 0.72 and 0.54. Native diversity in North Little Lake was 0.48 which is also between the 2006 and 2007 native diversity values of 0.57 and 0.12.

Species Dominance

Species dominance is dependent upon how many times a species occurs, and its relative coverage area or biomass within the system. In this survey, the abundance rating given to each species at each sample site was used to determine dominance. The dominance of a particular species in this Tier II survey increases as its site frequency and relative abundance increase.

Figure 7 tracks dominance values for each plant collected at Silver Lake during its involvement in the LARE program with the exception of duckweed. Trends are similar to sight frequency, with coontail being by far the most dominant plant collected in each survey. Curly leaf pondweed may be under-represented in this graph as it usually dies off naturally during the summer.

Figure 7: Silver Lake Dominance Histories

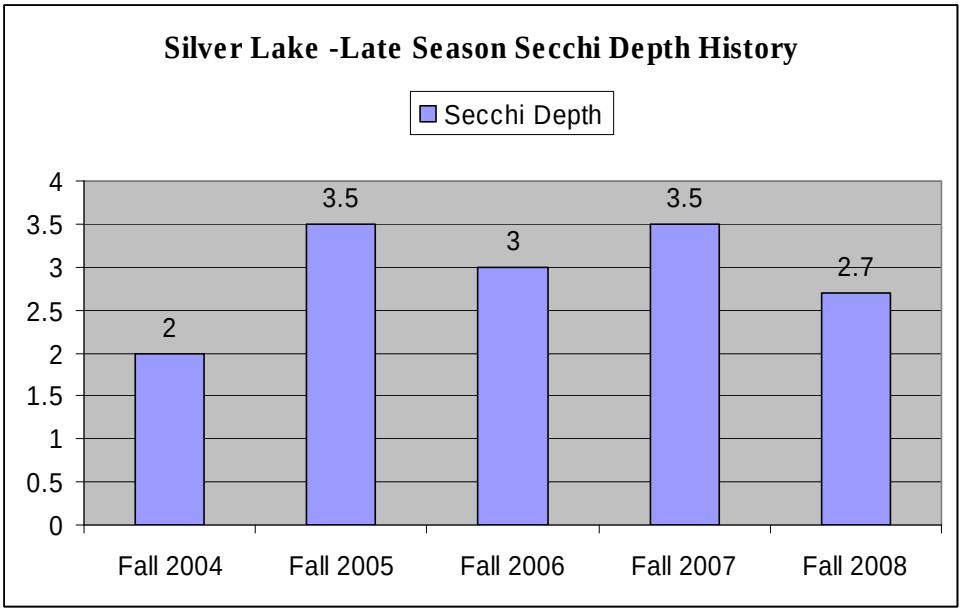


	Coontail	Slender Naiad	Elodea sp	Chara	Eurasian milfoil	Eelgrass	Sago Pondweed	Curly Leaf p.w.
Fall 2004	21.7	0.3	0.7	1.7	0.3	0.3	2	3
Fall 2005	37.3	3.7	7.7	1	0	0	1.3	4
Fall 2006	30.8	2.0	1.2	0	0	0	0	0
Fall 2007	39.6	2.8	0.4	0.8	0	0	0	1.6
Fall 2008	20.4	3.2	0.4	0	0.4	0	0	0

Secchi History

Secchi depth has remained relatively stable during Silver Lake's involvement in the LARE program. Water clarity is low in Silver Lake, especially in the summer months, which is likely a result of runoff and algal blooms. This low water clarity may inhibit native plant growth and aid CLP and EWM which can grow in areas with low water clarity. Figure 8 shows late season Secchi disk readings recorded over the past five years.

Figure 8: Silver Lake Secchi History



8.3 Macrophyte Inventory Discussion

The submersed plant community of Silver Lake covers roughly 30 acres of Silver and North Little Lakes. Based upon the available survey data, curly leaf pondweed occurs only in very low abundance in Silver Lake. However, late season surveys do not accurately reflect CLP abundance because CLP is at the height of its growth in late spring. Because the early season Aquathol treatment is most effective on young CLP plants, they are controlled before they would be accurately represented in a spring survey. Because of the required timing of the treatments, true CLP spring abundance in Silver and North Little lakes is unknown.

Curly leaf pondweed (CLP) was not collected in Silver Lake in the August 2008 Tier II survey. Site frequency of CLP in North Little Lake was 20% in August 2008 which is down from 30% in fall of 2007. Normally curly leaf pondweed abundance decreases from spring to fall. It is difficult to know true curly leaf pondweed spring abundance while performing early season Aquathol treatments. North Little lake showed greater abundance of CLP than did Silver Lake in August of 2008. This may be expected since the early season Aquathol treatments on North Little Lake started one year after the Aquathol treatments on Silver Lake. North Little Lake should be treated with Aquathol next spring to complete four consecutive years of early season CLP control.

North Little Lake also has a moderate abundance of Eurasian watermilfoil that appears to be effectively controlled by annual 2, 4-D treatments. These 2, 4-D treatments target the milfoil only and must be performed on an annual basis to provide season long control. Multiple years of control are not expected, and Eurasian watermilfoil abundance is not expected to decline from year to year. Post- treatment site frequency of EWM in North Little Lake was 10% in both 2007 and 2008.

Secchi disk readings are low, with readings of 4.0 and 3.5 feet recorded in 2007. In 2008, the secchi disk reading in August was 2.7 feet (Figure 8).

Species diversity values for Silver Lake in and North Little Lakes in August of 2008 were 0.36 and 0.72 respectively. In fall of 2007 Silver Lake species diversity was 0.46 while North Little Lake diversity was 0.54. These values indicate that Silver Lake has low species diversity when compared with Pearson's (2004) study of 21 northern Indiana Lakes. The average species diversity value in Pearson's study was 0.66. Silver Lake diversity values are frequently lower than this average.

Coontail is the most abundant plant throughout both lakes. Coontail site frequency showed a decline from 62% in 2007 to 30% in 2008. This decline may be explained by exceptionally heavy planktonic algal blooms which may be tied to dry weather in July and August of 2008. Coontail grows to nuisance levels in many areas of the lake and impedes boat traffic in some areas.

In summary, Silver Lake is characterized by a submersed plant community with relatively low plant diversity, low water clarity (secchi depth 2.7 - 4 ft.), an abundant coontail population, as well as a low abundance of curly leaf pondweed. North Little Lake has a greater population of curly leaf pondweed, as well as moderate abundances of Eurasian watermilfoil.

Threatened and Endangered Species

The Indiana Natural Heritage Data Center is part of the Natural Heritage Network, a worldwide system of Heritage Programs. This program is designed to provide information about Indiana's diversity of natural ecosystems, species, landscape features, and outdoor amenities, and to assure adequate methods for evaluating this information and setting sound land protection priorities. The inventory is a continuous attempt to determine the state's most significant natural areas through an intensive statewide inventory.

The Indiana Natural Heritage Data Center has compiled a list of Indiana plant species that are federally or state listed as endangered, threatened or rare. The following is an excerpt taken directly from the Indiana Natural Heritage Database website. Link: Indiana Natural Heritage Data Center.

"The Indiana Natural Heritage Data Center, set up in 1978, represents a comprehensive process, becoming an increasingly valuable tool for decision makers and scientists as it progresses."
No state or federally listed plant species were found in Silver Lake in 2008. No vouchers were taken that were suspected as being endangered.

9.0 Aquatic Vegetation Management Alternatives

(See 2004 Lake Management Plan)
Major curly leaf pondweed control practices have not changed significantly from the 2004 alternatives.

An Aquathol K treatment is recommended for North Little Lake in 2009 to complete the 4 year curly leaf pondweed treatment program. Liquid 2, 4-D may also be applied to control EWM in North Little Lake. The entire littoral zone should be treated. Maximum plant depth can vary from year to year based on water clarity, but it is estimated that approximately 10 acres in North Little Lake should be treated for CLP and EWM.

10.0 Public Involvement

A LARE meeting was held on November 10, 2008 to discuss issues pertaining to Silver Lake. District 4 Fisheries Biologist, Ed Braun, Aquatic Weed Control, and LARE Aquatic biologists, Angela Sturdevant and Gwen White, were all present and discussed the plant community of Silver Lake.

A public lake meeting was held for Silver Lake on June 14, 2008. Approximately 25 people were pin attendance. Monthly meetings are held starting in May and running through October. Next years meeting will likely be held in June as well. Jim Donahoe of Aquatic Weed Control summarized LARE management activities and outlined the treatment strategy to help contain both the curly leaf pondweed population and the Eurasian watermilfoil population in Silver and North Little Lakes. Residents were happy with curly leaf control and concerned about an overabundance of coontail.

The Silver Lake Association is active, and lake association meetings help to keep the public informed about management practices on Silver Lake. Other avenues that may be used to inform the public would be periodic newsletters, an email list, an association website, or posting signs at public access sites.

Public questionnaires were not handed out at the public lake association meeting. Some citizens were concerned because of the amount of coontail in Silver Lake. Coontail is extremely abundant and causes major recreational interference in parts of Silver Lake. At this time, LARE will not fund any treatment for coontail, as it is a native plant. Any coontail treatments must be privately funded.

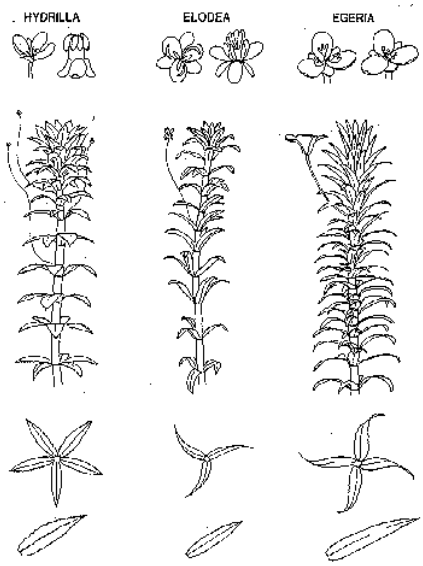
11.0 Public Education

The Silver Lake Association has been very aggressive in preventing the spread of invasive aquatic vegetation. They have submitted a proposal to the LARE program for additional herbicide treatment of curly leaf pondweed and Eurasian watermilfoil. This proposal resulted in the early season Aquathol and 2, 4-D treatments to control curly leaf pondweed and Eurasian watermilfoil.

More information on stopping the spread of invasive aquatic organisms can be found at http://www.protectyourwaters.net/. These items include thoroughly cleaning equipment after use in a lake and removing all water from bilges, livewells, etc.

11.1 Hydrilla

Hydrilla (*Hydrilla verticillata*) is an invasive aquatic plant species common throughout the southern United States. It is listed as a federally noxious weed and causes severe ecological and recreational problems wherever it grows. It is considered to be much more destructive than other invasives like Eurasian watermilfoil and curly leaf pondweed because of its reproductive adaptations. It grows by fragmentation, as does Eurasian watermilfoil, but it also produces turions which can remain dormant in the sediment for 4 years or more (Van and Steward, 1990). It produces tubers at its root tips which can also reproduce after multiple years of dormancy. It can grow 1 inch each day and it quickly out-competes native plants. It forms dense beds that eliminate native plants, stunt fish populations, impede recreation and cause a drastic decrease in biodiversity (Colle and Shireman, 1980). Millions of dollars are spent each year for hydrilla maintenance each year in Florida alone. Eradication is unlikely once a population has been well established, although eradication has been achieved in newly infested waters using a herbicide called Sonar. Sonar is applied at a rate of 6 parts per billion and this concentration is maintained in the water for 180 days. Early detection can be crucial to an effective eradication program, and all lake residents and users are encouraged to be on the look-out for this invader.



In fall of 2006, this plant was found in Lake Manitou, in Rochester, Indiana. This is the first instance of hydrilla in the upper Midwest. Prior to its appearance in Lake Manitou, The closest infestations of hydrilla were in Tennessee and Pennsylvania.

Hydrilla can easily be confused with native elodea. The major difference is that elodea has sets of leaves on the stem in whorls of three, while hydrilla usually has whorls of 5 leaves, although 4 to 9 leaves per whorl are possible with hydrilla. Hydrilla will also have small serrations on the leaf edges. More information on hydrilla can be found at the University of Florida's Center for Aquatic Invasive Plants (http://plants.ifas.ufl.edu/). More general information on aquatic invaders can be found at www.protectyourwaters.net.

12.0 Integrated Management Action Strategy

Silver Lake will not be treated with Aquathol K in 2009. Four consecutive years of early season Aquathol treatments have taken place to help reduce the CLP turion bank in the sediment of Silver Lake. A spring Tier II aquatic vegetation survey will be used to measure CLP abundance. This survey show true CLP abundance in Silver Lake. Spring Tier II surveys conducted in recent years had to be performed before the early season Aquathol treatment and before CLP had reached its optimum abundance for the year.

North Little Lake will be treated with Aquathol K for curly leaf pondweed in 2009. Aquathol treatments on North Little Lake started one year after the first treatment on Silver Lake. This will be the fourth consecutive early season Aquathol treatment for North Little Lake. Ideally, these treatments will take place in late April or early May when water temperatures are at or below 56 to 57 degrees Fahrenheit.

Ten acres in North Little Lake will also be treated with 2, 4-D for the control of Eurasian watermilfoil. This treatment will take place later in summer, after the early season Aquathol treatment. These treatments are not expected to eradicate the two invasive species but should help native plants to compete with them. However, treating the curly leaf population early each year should reduce the amount of curly leaf turions left in the sediment, therefore further reducing the amount of curly leaf pondweed left in North Little Lake.

Two Tier II surveys may be conducted on Silver and North Little Lakes in 2009. These surveys will determine the extent of curly leaf pondweed distribution and abundance, as well as providing insight into EWM and native population changes. A new 5 year management strategy may be developed for Silver Lake after the current treatment strategy has been evaluated through the 2009 Tier II surveys.

The Lake and River Enhancement Program will likely not distribute funds for the control of native species, so additional treatments to control coontail will have to be privately funded.

Treatment Specifications

Aquathol K Treatments should be applied at a rate of 1 part per million to achieve adequate control of Curly Leaf Pondweed. Water temperature at the time of treatment should be at or below 56 to 57 degrees. 2, 4-D treatments should be applied at a rate of 1.76 parts per million to achieve adequate control of Eurasian watermilfoil.

Lake and River Enhancement Deadlines

December 15 – Rough drafts of LARE AMVPs and AVMP updates due to LARE staff

January 15 – Grant application due to LARE Staff

February 15 – Revisions of AVMPs and updates due back to contractors

March 1 – Final drafts of AVMPs and AVMP updates due to LARE Staff

March 15 – LARE funding decisions announced

13.0 Project Budget

2009 Treatment Recommendations

Treat 10 acres in North Little Lake with Aquathol K for curly leaf pondweed	$3,250
Treat 10 acres in North Little Lake with 2, 4-D for Eurasian Watermilfoil	$3,700

Survey and Planning Recommendations

Conduct 2 Tier II surveys (spring and late season) Update the AVMP for Silver and North Little Lakes as well as development of a new 5 year management strategy	$8,000

Total 2009 Cost Estimates

North Little Lake Aquathol treatment for CLP	$3,250
North Little Lake 2, 4-D treatment for EWM	$3,700
Tier II surveys and AVMP update	$8,000
Total Cost	$14,950
LARE Share	$13,455
Association's Share	$1,495

14.0 Monitoring and Plan Update Procedures

Two Tier II quantitative surveys may be conducted in 2009 to evaluate the curly leaf pondweed population. One should take place in spring and the other in late summer. Since there will be no early season Aquathol treatment to reduce CLP abundance in Silver Lake, this will be an excellent time to evaluate the true spring CLP abundance. Data from these surveys will be useful for comparison for the 2009 AVMP Update. Since this is one of the first early season Aquathol treatment programs funded by the LARE program, it could give valuable insight into the effectiveness of this type of treatment for curly leaf pondweed. A new five-year vegetation management plan will be established after the results of the current management strategy have been evaluated through the 2009 Tier II surveys.

15.0 References

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16.0 Appendices

16.1 Calculations

Fluridone Calculations:
The following paragraph is taken directly from the Sonar A.S. label. It outlines the specific procedures for calculating the amount of Fluridone needed to treat a body of water.

Application Rate Calculation - Ponds, Lakes and Reservoirs

The amount of Sonar A.S. to be applied to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:
Quarts of Sonar A.S. required per treated surface acre = Average water depth of treatment site (feet)
x Desired ppb concentration of active ingredient
x 0.0027
For example, the quarts per acre of Sonar A.S. required to provide a concentration of 25 ppb of active ingredient in water with an average depth of 5 feet is calculated as follows:
5 **x** 25 **x** 0.0027 = 0.33 quarts per treated surface acre
When measuring quantities of Sonar A.S., quarts may be converted to fluid ounces by multiplying quarts to be measured **x** 32. For example, 0.33 quarts **x** 32 = 10.5 fluid ounces.
Note: Calculated rates should not exceed the maximum allowable rate in quarts per treated surface acre for the water depth listed in the application rate table for the site to be treated.

The following chart outlines rate calculations for DMA – 4 IVM Herbicide. It was taken directly from the DMA – 4 IVM specimen label on Dow AgroSciences website. http://www.dowagro.com/ivm/invasive/prod/dma.htm

Submerged Aquatic Weeds: Including Eurasian Water Milfoil *(Myriophyllum spicatum)*

Treatment Site	Maximum Application Rate [1]	Specific Use Directions
Aquatic Weed Control in Ponds, Lakes, Reservoirs, Marshes, Bayous, Drainage Ditches, Canals, Rivers and Streams that are Quiescent or Slow Moving, Including Programs of the Tennessee Valley Authority	2.84 gallons (10.8 lb of acid equivalent) per acre foot	**Application Timing:** For best results, apply in spring or early summer when aquatic weeds appear. Check for weed growth in areas heavily infested the previous year. A second application may be needed when weeds show signs of recovery, but no later than mid-August in most areas. **Subsurface Application:** Apply DMA 4 IVM undiluted directly to the water through a boat mounted distribution system. Shoreline areas should be treated by subsurface injection application by boat to avoid aerial drift. **Surface Application:** Use power operated boat mounted boom sprayer. If rate is less than 5 gallons per acre, dilute to a minimum spray volume of 5 gallons per surface acre. **Aerial Application:** Use drift control spray equipment or thickening agents mixed with sprays to reduce drift. Apply through standard boom systems in a minimum spray volume of 5 gallons per surface acre. For Microfoil® drift control spray systems, apply DMA 4 IVM in a total spray volume of 12 to 15 gallons per acre. Apply to attain a concentration of 2 to 4 ppm (see table below).

[1] DMA 4 IVM contains 3.8 lb of acid equivalent per gallon of product.

Amount to Apply to Attain a Concentration of 2 to 4 ppm			
Surface Area	Average Depth (ft)	2,4-D Acid Equivalent to Apply (lb/acre)	Amount of DMA 4 IVM to Apply (gal/acre)
1 acre	1	5.4 to 10.8	1.42 to 2.84
	2	10.8 to 21.6	2.84 to 5.68
	3	16.2 to 32.4	4.26 to 8.53
	4	21.6 to 43.2	5.68 to 11.37
	5	27.0 to 54.0	7.10 to 14.21

The following table outlines rate calculations for Renovate 3 herbicide based on desired PPM and average depth of treatment area. It is taken directly from the Renovate 3 specimen label on SePRO Corporation's website: www.sepro.com

Concentration of Triclopyr Acid in Water (ppm ae)					
	Gallons of Renovate 3 per surface acre at specified depth				
Water Depth (feet)	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	0.7	0.9	1.4	1.8	2.3
2	1.4	1.8	3.3	3.6	4.6
3	2.1	2.9	4.1	5.4	6.8
4	2.7	3.6	5.4	7.2	9.1
5	3.4	4.5	6.8	9.0	11.3
6	4.1	5.4	8.1	10.9	13.6
7	4.8	6.3	9.5	12.7	15.8
8	5.5	7.2	10.9	14.5	18.1
9	6.1	8.1	12.2	16.3	20.4
10	6.8	9.0	13.6	18.1	22.6
15	10.2	13.6	20.4	27.2	33.9
20	13.6	18.1	27.2	36.2	45.3

16.2 Common Aquatic Plants of Indiana

(See 2004 Management Plan)

16.3 Pesticide Use Restrictions Summary:

The following table was produced by Purdue University and included in the Professional Aquatic Applicators Training Manual. It gives a summary of water use restrictions on all major chemicals available for use in the aquatics market.

Table 10: Pesticide Use Restrictions

Table 1. Aquatic Herbicides and Their Use Restrictions. Always check the label because these restrictions are subject to change.

	Human			Animal	Irrigation		
	Drinking	Swimming	Fish Consumption	Drinking	Turf	Forage	Food Crops
	waiting period, in days						
Copper Chelate	0	0[a]	0	0	0	0	0
Copper Sulfate	0	0[a]	0	0	0	0	0
Diquat	1–3	0[a]	0	1	1–3	1–3	5
Endothall (granular)[b]	7	0[a]	3	0	7	7	7
Endothall (liquid)[b]	7–25	0[a]	3	7–25	7–25[d]	7–25	7–25
Endothall 191 (granular)[c]	7–25	0[a]	3	7–25	7–25	7–25	7–25
Endothall 191 (liquid)[c]	7–25	0[a]	3	7–25	7–25	7–25	7–25
Fluridone	0[e]	0[a]	0	0	7–30	7–30	7–30
Glyphosate	0[e]	0[a]	0	0	0	0	0
2,4-D (granular)	*	0[a]	0	*	*	*	*

[a]Although this compound has no waiting period for swimming, it is always advisable to wait 24 hours before permitting swimming in the direct area of treatment.

[b]Trade name is Aquathol®.

[c]Trade name is Hydrothol®.

[d]May be used for sprinkling bent grass immediately.

[e]Do not apply this product within 1/4 (fluridone) to 1/2 (glyphosate) mile upstream of potable water intakes.

[f]Do not use treated water for domestic purposes, livestock watering (2,4-D, dairy animals only), or irrigation.

16.4 Resources for Aquatic Management

In addition to the LARE Program, there are many other sources of potential funding to help improve the quality of Indiana Lakes. Many government agencies assist in projects designed to improve environmental quality.

The USDA has many programs to assist environmental improvement. More information on the following programs can be found at www.usda.gov.

Watershed Protection and Flood Prevention Program (USDA

Conservation Reserve Program (USDA)

Wetlands Reserve Program (USDA)

Grassland Reserve Program (USDA)

Wildlife Habitat Incentive Program (USDA)

Small Watershed Rehabilitation Program (USDA)

The following programs are offered by the U.S. Fish and Wildlife Service. More information about the Fish and Wildlife service can be found at www.fws.gov

Partners for Fish and Wildlife Program (U.S. Fish and Wildlife Service)

Bring Back the Natives Program (U.S. Fish and Wildlife Service)

Native Plant Conservation Program (U.S. Fish and Wildlife Service)

The Environmental Protection Agency, the Indiana Department of Environmental Management, and the U.S. Forest Service also have numerous programs for funding. A few of these are listed below. More information can be found at www.in.gov/idem and www.fs.fed.us/

U.S. Environmental Protection Agency Environmental Education Program (EPA)

NPDES Related State Program Grants (IDEM)

Community Forestry Grant Program (U.S. Forest Service)

16.5 State Regulations for Aquatic Plant Management

The following information is found on the IDNR website and outlines general regulations for the management of aquatic plants in public waters.

AQUATIC PLANT CONTROL PERMIT REGULATIONS
Indiana Department of Natural Resources

Note: In addition to a permit from IDNR, public water supplies cannot be treated without prior written approval from the IDEM Drinking Water Section. **Amended state statute adds biological and mechanical control (use of weed harvesters) to the permit requirements, reduces the area allowed for treatment without a permit to 625 sq ft, and updates the reference to IDEM.** *These changes become effective on July 1, 2002.*

Chapter 9. Regulation of Fishing
IC 14-22-9-10

Sec. 10. (a) This section does not apply to the following:

(1) A privately owned lake, farm pond, or public or private drainage ditch.

(2) A landowner or tenant adjacent to public waters or boundary waters of the state, who chemically, mechanically, or physically controls aquatic vegetation in the immediate vicinity of a boat landing or bathing beach on or adjacent to the real property of the landowner or tenant if the following conditions exist:

(A) The area where vegetation is to be controlled does not exceed:

(i) twenty-five (25) feet along the legally established, average, or normal shoreline;

(ii) a water depth of six (6) feet; and

(iii) a total surface area of six hundred twenty-five (625) square feet.

(B) Control of vegetation does not occur in a public waterway of the state.

(b) A person may not chemically, mechanically, physically, or biologically control aquatic vegetation in the public waters or boundary waters of the state without a permit issued by the department. All procedures to control aquatic vegetation under this section shall be conducted in accordance with rules adopted by the department under IC 4-22-2.

(c) Upon receipt of an application for a permit to control aquatic vegetation and the payment of a fee of five dollars ($5), the department may issue a permit to the applicant. However, if the aquatic vegetation proposed to be controlled is present in a public water supply, the department may not, without prior written approval from the department of environmental management, approve a permit for control of the aquatic vegetation.

(d) This section does not do any of the following:

(1) Act as a bar to a suit or cause of action by a person or governmental agency.

(2) Relieve the permittee from liability, rules, restrictions, or permits that may be required of the permittee by any other governmental agency.

(3) Affect water pollution control laws (as defined in IC 13-11-2-261) and the rules adopted under water pollution control laws (as defined in IC 13-11-2-261).

As added by P.L.1-1995, SEC.15. Amended by P.L.1-1996, SEC.64.

312 IAC 9-10-3 Aquatic vegetation control permits

Authority: IC 14-22-2-6; IC 14-22-9-10
Affected: IC 14-22-9-10

Sec. 3. (a) Except as provided under IC 14-22-9-10(a), a person shall obtain a permit under this section before applying a substance to waters of this state to seek aquatic vegetation control.

(b) An application for an aquatic vegetation control permit shall be made on a departmental form and must include the following information:

(1) The common name of the plants to be controlled.

(2) The acreage to be treated.

(3) The maximum depth of the water where plants are to be treated.

(4) The name and amount of the chemical to be used.

(c) A permit issued under this section is limited to the terms of the application and to conditions imposed on the permit by the department.

(d) Five (5) days before the application of a substance permitted under this section, the permit holder must post clearly, visible signs at the treatment area indicating the substance that will be applied and what precautions should be taken.

(e) A permit issued under this section is void if the waters to be treated are supplied to the public by a private company or governmental agency. *(Natural Resources Commission; 312*

16.6 Species Distribution Maps

Figure 9: Silver Lake Rake Sample Locations

Figure 10: 2008 Coontail Locations

Figure 11: 2008 Curly Leaf Pondweed Locations

Figure 12: 2008 Elodea Locations

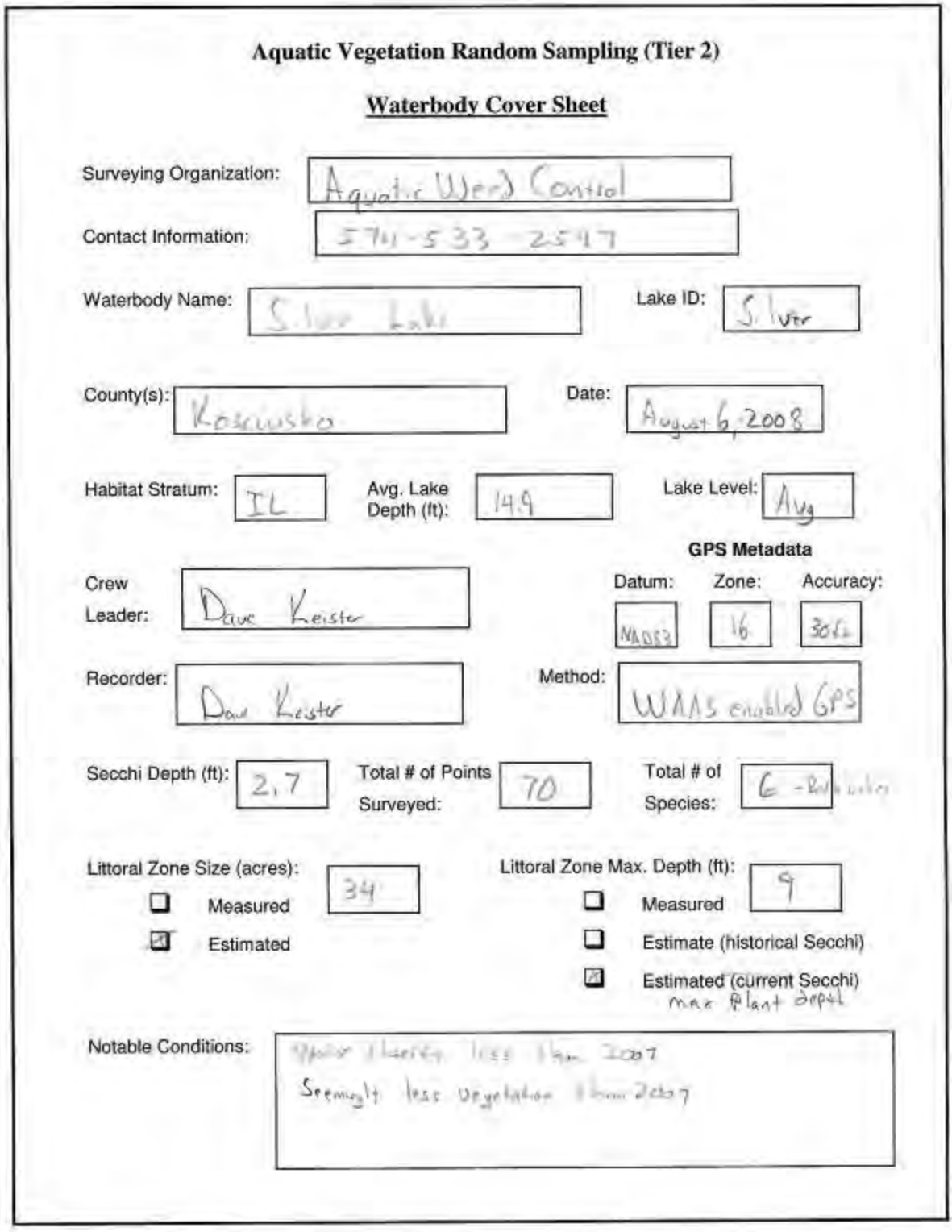
Figure 13: 2008 Eurasian Watermilfoil Locations

Figure 14: 2008 Slender Naiad Locations

Figure 15: Silver Lake Small Pondweed Locations

16.7 Data Sheets

Figure 16: 2008 Data Sheet Cover



Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization: Aquatic Weed Control

Contact Information: 541-533-2547

Waterbody Name: Silver Lake Lake ID: Silver

County(s): Kosciusko Date: August 6, 2008

Habitat Stratum: IL Avg. Lake Depth (ft): 14.9 Lake Level: Avg

Crew Leader: Dave Keister

GPS Metadata — Datum: NAD83 Zone: 16 Accuracy: 30ft

Recorder: Dave Keister Method: WAAS enabled GPS

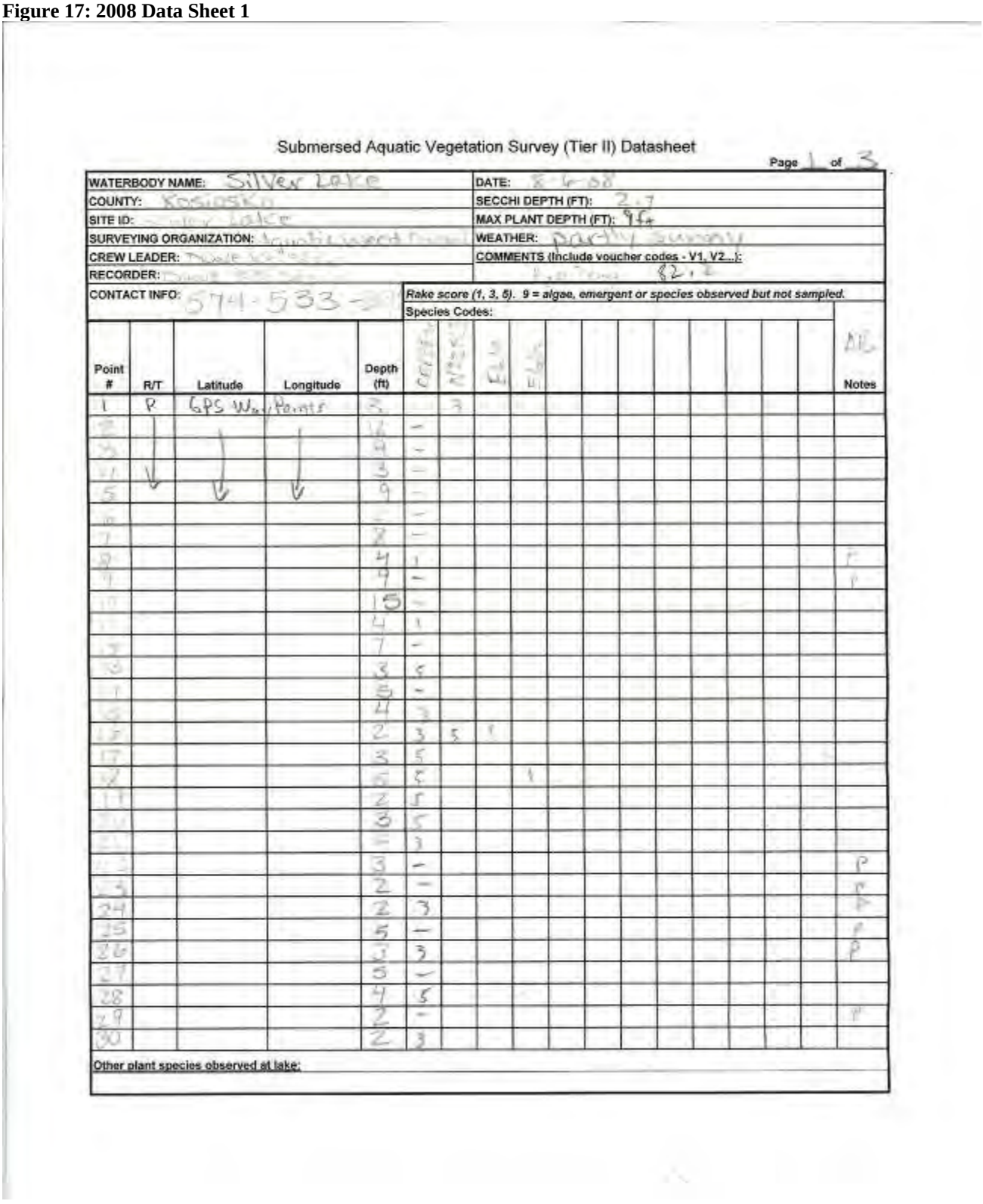
Secchi Depth (ft): 2.7 Total # of Points Surveyed: 70 Total # of Species: 6 -Rare

Littoral Zone Size (acres): 34
- ☐ Measured
- ☑ Estimated

Littoral Zone Max. Depth (ft): 9
- ☐ Measured
- ☐ Estimate (historical Secchi)
- ☑ Estimated (current Secchi) max plant depth

Notable Conditions: Water clarity less than 2007
Seemingly less vegetation than 2007

Figure 17: 2008 Data Sheet 1



Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 1 of 3

WATERBODY NAME: Silver Lake	DATE: 8-6-08
COUNTY: Kosciusko	SECCHI DEPTH (FT): 2.7
SITE ID: Silver Lake	MAX PLANT DEPTH (FT): 9ft
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Partly Sunny
CREW LEADER: [illegible]	COMMENTS (Include voucher codes - V1, V2...): 82.2
RECORDER: [illegible]	
CONTACT INFO: 574-533-[illegible]	*Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.*
	Species Codes:

Point #	R/T	Latitude	Longitude	Depth (ft)	[illegible]	[illegible]	[illegible]	[illegible]									Notes
1	R	GPS Waypoints		3		3											
2	↓	↓	↓	6	–												
3				4	–												
4				3	–												
5				9	–												
6				–	–												
7				2	–												
8				4	1												F
9				4	–												P
10				15	–												
11				4	1												
12				7	–												
13				3	5												
14				5	–												
15				4	3												
16				2	3	5	1										
17				3	5												
18				6	5			1									
19				2	5												
20				3	5												
21				–	3												
22				3	–												P
23				2	–												P
24				2	3												P
25				5	–												P
26				2	3												P
27				5	–												
28				4	5												
29				2	–												P
30				2	3												

Other plant species observed at lake:

Figure 18: 2008 Data Sheet 2

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 2 of 2

WATERBODY NAME: Silver Lake	DATE: 8-6-08
COUNTY: Kosciusko	SECCHI DEPTH (FT): 2.7
SITE ID: Silver	MAX PLANT DEPTH (FT): 9
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Partly Sunny
CREW LEADER: Dave Kreisler	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Dave Kreisler	
CONTACT INFO: 574-533-2597	

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

Species Codes:

Point #	R/T	Latitude	Longitude	Depth (ft)													Notes
31	R	GPS Waypoints		9	-												
32				15	-												
33				7	-												
34				10	-												
35				9	-												
36				14	-												
37				7	-												
38				3	-												
39				8	-												
40				8	-												
41				15	-												
42				12	-												
43				7	1												P
44				15	-												
45				15	-												
46				14	-												
47				9	1												
48				14	-												
49				7	-												
50				7	-												

Other plant species observed at lake:

Figure 19: 2008 Data Sheet 3

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 3 of 3

WATERBODY NAME: Northlittle Lake	DATE: 8-6-08
COUNTY: Kosciusko	SECCHI DEPTH (FT): 2.7
SITE ID: Northlittle Lake	MAX PLANT DEPTH (FT): 9
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Sunny
CREW LEADER: Dave Kaiser	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Dave Kaiser	
CONTACT INFO: 574-533-2697	

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

Species Codes:

Point #	R/T	Latitude	Longitude	Depth (ft)																Notes
1	R	GPS Waypoints		7	3	3	1													
2	↓	↓	↓	4	-															
3				3	1															
4				5																
5				4	5															
6				5	3			1												
7				2																
8				3																
9				3		1	1													
10				3	-															
11				9			3	1												
12				8	1		3													
13				3	3			1												
14				9	-															
15				10	-															
16				9	-															
17				10	-															
18				14	-															
19				13	-															
20				15	-															

Other plant species observed at lake:

Sample Site GPS coordinates

Table 11: Sample Location Coordinates

Site	Latitude	Longitude
1	41.08021	-85.8991
2	41.08073	-85.8986
3	41.08129	-85.8977
4	41.08243	-85.8974
5	41.082	-85.8973
6	41.08339	-85.8973
7	41.08412	-85.8978
8	41.08478	-85.8981
9	41.08492	-85.8994
10	41.08423	-85.8999
11	41.08394	-85.9003
12	41.08345	-85.9003
13	41.08319	-85.9012
14	41.08306	-85.9021
15	41.08237	-85.9031
16	41.08178	-85.9047
17	41.0825	-85.9064
18	41.0822	-85.9083
19	41.08127	-85.9087
20	41.08054	-85.9077
21	41.08025	-85.9064
22	41.0799	-85.905
23	41.07898	-85.9045
24	41.08053	-85.9037
25	41.07972	-85.9023
26	41.07826	-85.9016
27	41.07691	-85.9007
28	41.07683	-85.8988
29	41.07762	-85.8979
30	41.07866	-85.8984
31	41.07974	-85.8993
32	41.08285	-85.9015
33	41.08204	-85.9033
34	41.08164	-85.9039
35	41.08182	-85.9059
36	41.08147	-85.9066
37	41.08175	-85.9079
38	41.08067	-85.9072
39	41.08074	-85.9053
40	41.08103	-85.9044
41	41.08057	-85.9029
42	41.07975	-85.9018
43	41.07912	-85.9018
44	41.07818	-85.9011
45	41.07755	-85.9014
46	41.07744	-85.9004
47	41.07666	-85.8998

48	41.07723	-85.8994
49	41.07812	-85.8981
50	41.07927	-85.899
51	41.08612	-85.9009
52	41.08676	-85.9013
53	41.08699	-85.902
54	41.0872	-85.9026
55	41.08715	-85.9037
56	41.0863	-85.9038
57	41.08571	-85.9034
58	41.08513	-85.9026
59	41.08528	-85.9017
60	41.08564	-85.901
61	41.08602	-85.901
62	41.08665	-85.9011
63	41.08717	-85.9024
64	41.08607	-85.9034
65	41.08593	-85.9033
66	41.08533	-85.9021
67	41.08577	-85.9011
68	41.08674	-85.9016
69	41.08693	-85.9035
70	41.08604	-85.9033

16.8 IDNR Aquatic Vegetation Control Permit

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)
Approved State Board of Accounts 2004
[X] 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
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	Lake Assoc. Name	
Jim Walker	Silver Lake Conservation Association Inc,	
Rural Route or Street: 3332 West Neher Road		Phone Number: 260-352-0806
City and State: Silver Lake IN		ZIP Code: 46982
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
North Little	Silver Lake	Kosciusko
Does water flow into a water supply		[ ] Yes [X] No

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

Treatment Area # 1	LAT/LONG or UTM's: Entire perimeter of Lake		
Total acres to be controlled: 10	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft): 5	Expected date(s) of treatment(s): Mid May 2007		
Treatment method: [X] Chemical [ ] Physical	[ ] Biological Control	[ ] Mechanical	

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

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian Milfoil	X	80
Curley Leaf	X	20

Page ___ of ___

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

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

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

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

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

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

☐ Approved ☐ Disapproved	Fisheries Staff Specialist
☐ Approved ☐ Disapproved	Environmental Staff Specialist

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

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