Dewart Lake Aquatic Vegetation Management Plan 2009 Update

Kosciusko County, Indiana

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

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Executive Summary

Dewart Lake was treated with Sonar (active ingredient: fluridone) on May 26, 2006. This treatment was designed to drastically reduce the Eurasian watermilfoil (EWM) population and allow native plants to colonize areas where the milfoil was previously dominant. Surveys by Aquatic Weed Control and the IDNR confirmed that the Sonar treatment had reduced EWM to the point that it was undetectable in summer of 2006. Eurasian Watermilfoil (EWM) was still undetectable in Dewart Lake in August of 2007. Coontail and other native plants experienced declines in site frequency during this time as well, which was expected following the Sonar treatment. This does not mean that temporary native damage is not a concern. The native plant community should be tracked closely along with the EWM population.

A visual survey was conducted on June 13, 2007 for the presence of EWM, and a late season Tier II survey was conducted on August 15, 2007 to monitor both native and invasive plant populations following the whole lake Sonar treatment in 2006. These surveys found no EWM plants in the lake. Sago pondweed, a beneficial native plant, had become dominant in many areas previously infested by EWM.

In 2007, no herbicide treatments of any kind were conducted on the main lake. This allowed for native plants to re-establish themselves after the expected decline caused by 2006 whole lake Sonar treatment. Algae treatments were allowed in the channel behind Blueberry Island.

The 2007 late season vegetation survey showed that many native plants were re-establishing themselves and that Eurasian watermilfoil was still undetectable in Dewart Lake. Aside from EWM the biggest population changes were seen in the coontail and sago pondweed populations. Coontail site frequency dropped from 43.3% in 2006 to 5.6 % in 2007. Sago pondweed frequency increased from 4.4% in 2006 to 28.9% in 2007. Curly leaf pondweed site frequency increased from1.3% in 2005 to 7.8% in 2006, to 8.9% in 2007.

In 2008, coontail site frequency increased from 5.6% (2007) to 16.7%. This was encouraging to see, because coontail is a native plant whose population had been reduced after the Sonar treatment. Sago pondweed frequency declined only slightly from 28.9% in 2007 to 26.7% in 2008. Water stargrass, another native plant appears to be increasing in the lake. Its site frequency rose from 13.3% in 2007 to 23.3% in 2008. Curly leaf pondweed site frequency declined from 8.9% in 2007 to 1.1% on July 25, 2008. This is encouraging. However, late season Tier II surveys will not accurately describe true curly leaf pondweed abundance. The curly leaf pondweed population should be monitored closely in years to come to ensure that its abundance does not increase in areas where EWM has been reduced.

Eurasian watermilfoil started its return to the lake in 2008. Following visual inspection, four acres were treated with 2, 4-D on June 9, 2008 for EWM control. Nine more acres were treated with 2, 4-D for EWM control on August 6, 2008 using data collected in the late season Tier II survey conducted on July 25, 2008.

In 2009, EWM started much more vigorous re-growth and EWM plant beds increased from 13 acres in 2008 to 45 acres in summer of 2009. This 2009 EWM acreage was predicted in the 2008 AVMP based on observations from other Sonar lakes. Forty-two acres of EWM were treated with DMA-4 herbicide on June 8, 2008 and an additional 3 acres were treated on June 17, 2009. EWM continued its return to the lake in summer and summer of 2009, which can be expected based on past Sonar treatments on other lakes in northern Indiana.

It is estimated that pre-Sonar treatment EWM acreage in Dewart Lake was approximately 140 to 150 acres of dense beds, with EWM being present in lower abundance in many other areas. Based on this estimate, the Sonar treatment is still having some residual effect on EWM, but much more re-growth is expected in 2010 which will be the fifth year of the treatment program.

Based on LARE policy, Dewart Lake will become a lower priority for LARE funding in 2010 because it has already received 4 years of treatment funding. Since EWM will increase in Dewart Lake in 2010 and little funding may be available, the possibility of the Dewart Lake Protective Association privately funding some spot treatments of EWM was discussed. IDNR and LARE biologists stated that they would like to see the Dewart Lake Protective Association fund EWM spot treatments in areas that are more than 200 feet from shore. These offshore treatments would be funded entirely by the lake association in 2010 with the understanding that making this commitment should increase Dewart Lake's funding priority for a possible Sonar treatment in 2011, based on LARE policy. This is not a guarantee of treatment funding in 2011. However, if funding is available in 2011, Dewart Lake may be given a very high priority because of the severity of the EWM problem in Dewart Lake and the investment and initiative taken by the Dewart Lake Protective Association to combat the EWM problem.

EWM acreage for 2010 cannot yet be determined. An estimate of up to 90 acres of offshore (200 ft) EWM beds is currently used for budgeting purposes. Actual EWM coverage could be much higher. However, these 90 acres should provide coverage for many high priority offshore areas that were known to be infested with EWM prior to the Sonar treatment. Actual treatment areas for 2010 will be based on observed EWM severity in infested high use offshore areas, as well as funding availability.

2010 Budget Recommendations

1. Chemically treat high priority offshore areas of EWM with 2, 4-D as funding allows

A. Treat up to 90 acres for EWM 200 feet offshore with 2, 4-D Up to $32,400

2010 Surveying and Planning

Option 1

Conduct a spring visual survey and late season Tier II aquatic vegetation survey to monitor both Eurasian milfoil and native plant populations. Emergent plant bed mapping should be conducted as well to identify any changes in emergent bed size and composition in the ecozone area.

Aquatic Vegetation Surveys (Tier II and Emergent) and AVMP Update Up to $6,000

Option 2

Conduct a spring visual survey and a Late Season Tier II survey. Instead of a full AVMP update, only a data summary table and maps describing the abundance of invasive species would be provided.

Late Season Tier II survey with invasive maps and data summary table only up to $2,250

Aquatic Weed Control

Acknowledgements

Aquatic vegetation surveys conducted on Dewart Lake were made possible by funding from the Dewart Lake Protective 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. Angela Sturdevant, an aquatic biologist 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 Dewart Lake Protective Association for their commitment to managing Eurasian Watermilfoil in this lake and for valuable discussion and input brought forward at the informational meetings held on July 14, 2009 and June 21, 2009.

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1.0 Introduction

Dewart Lake has been involved in the Lake and River Enhancement Program (LARE) since 2005, when the first LARE funded aquatic vegetation survey took place on May 19, 2005. Based on the results of the 2005 surveys, a whole lake Sonar treatment was conducted in the following spring on May 26, 2006 for the control of Eurasian watermilfoil. The treatment was successful, and Eurasian watermilfoil was not found in the late season plant surveys of 2006.

In 2007, no herbicide treatments were conducted on the main lake, giving native plants a chance to re-colonize areas of previous EWM infestation. A late season vegetation survey was conducted by Aquatic Weed Control on August 15, 2007. This survey found that EWM was still absent from the lake and that sago pondweed, a beneficial native plant, had become dominant in many areas previously infested by EWM.

Eurasian watermilfoil started its return to the lake in 2008. Following visual inspection, four acres were treated with 2, 4-D on June 9, 2008 for EWM control. Nine more acres were treated with 2, 4-D for EWM control on August 6, 2008 using data collected in the late season Tier II survey conducted on July 25, 2008.

An emergent vegetation survey in the proposed Dewart Lake Eco-zone area was conducted by Aquatic Weed Control on August 13, 2008. The main purpose of this survey was to map acreages for emergent plant beds and describe species composition in these beds. . This data can be used as a basis for comparison for future surveys on the proposed Eco-zone area.

In 2009, EWM started much more vigorous re-growth and EWM plant beds increased from 13 acres in 2008 to 45 acres in summer of 2009. Forty-two acres of EWM were treated with DMA-4 herbicide on June 8, 2008 and an additional 3 acres were treated on June 17, 2009. EWM continued its return to the lake in summer and summer of 2009, which can be expected based on past Sonar treatments on other lakes in northern Indiana.

Table 1 summarizes all LARE funded activities on Dewart Lake. The original aquatic vegetation management strategy started in 2005 and runs through 2009.

Table 1: Dewart Lake LARE History

Year	Action	Date	Funding Source
2005	Spring and Late Season Aquatic Vegetation Surveys Aquatic Vegetation Management Plan Development	Spring Survey May 19, 2005 Late Season Survey July 27, 2005	Lake and River Enhancement Dewart Lake Protective Association
2006	Whole Lake Sonar Treatment Aquatic Vegetation Surveys and Aquatic Vegetation Management Plan Update	Spring Survey May 18, 2006 Sonar Treatment May 26, 2006 Late Season Survey August 10, 2006	Lake and River Enhancement Dewart Lake Protective Association
2007	Visual Vegetation Survey for EWM No herbicide Treatments allowed to allow native plants to re-establish Late Season Aquatic Vegetation Survey and Aquatic Vegetation Management Plan Update	Visual Survey June 13, 2007 Summer 2007 Late Season Survey August 15, 2007	Lake and River Enhancement Dewart Lake Protective Association
2008	Visual Inspection for EWM 4 acres of EWM treated with 2, 4-D Late Season Aquatic Vegetation Survey 9 acres of EWM treated with 2, 4-D Emergent vegetation survey in proposed Eco-zone area AVMP Update	June 9, 2008 June 9, 2008 July 25, 2008 August 6, 2008 August 13, 2008	Lake and River Enhancement Dewart Lake Protective Association
2009	Visual Inspection for EWM 42 acres of EWM treated with 2, 4-D 3 acres of EWM treated with 2, 4-D Late Season Tier II Survey	June 8, 2009 June 8, 2009 June 17, 2009 July 24, 2009	Lake and River Enhancement Dewart Lake Protective 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 was measured 13.0 feet on July 27, 2005. It was measured at 8.0 feet On August 10, 2006. Secchi depth was measured at 7.8 feet in Dewart Lake on August 15, 2007 and at 7.2 feet on July 25, 2008. Secchi depth was measured at 7.4 feet on July 24, 2009. Water clarity was very similar from 2006 to 2009. It was higher, however, in 2005. The 2005 reading could be abnormal, or a decrease in water clarity might have taken place. Since water clarity has not changed in the past three years without Sonar treatments, it would seem likely that the 2005 reading was above normal.

3.0 Lake Uses Update

Lake uses have not changed significantly in Dewart Lake since the 2005 aquatic vegetation management plan. Detailed information on a recently completed creel survey for fishermen can be found in the 2007 AVMP.

The following excerpt is from a request by the Dewart Lake Association to construct 2 bioengineered seawalls. It was provided by Ken Brehob and the Dewart Lake Protective Association. Bioengineered seawalls have many ecological benefits over concrete seawalls and can be an excellent choice to stop erosion from wave action without having detrimental effects on aquatic habitat and organisms.

Request to Build DNR Funded Bioengineered Seawall on EMS D24 D Ln. Right of Way

Dewart Lake Protective Association--Ken Brehob, Treasurer and Chair Watershed Committee

* The DNR (LARE Grant) has funded the Dewart Lake Protective Association to build 2 bioengineered seawall demonstration projects on Dewart Lake. The DNR stipulates that the seawalls must be built on public land and they must be easily accessible for viewing by the public. Logan Girl Scout Camp will be the site of one seawall; we are requesting that the second site be on EMS D24D Lane right of way. No County funds are being requested.

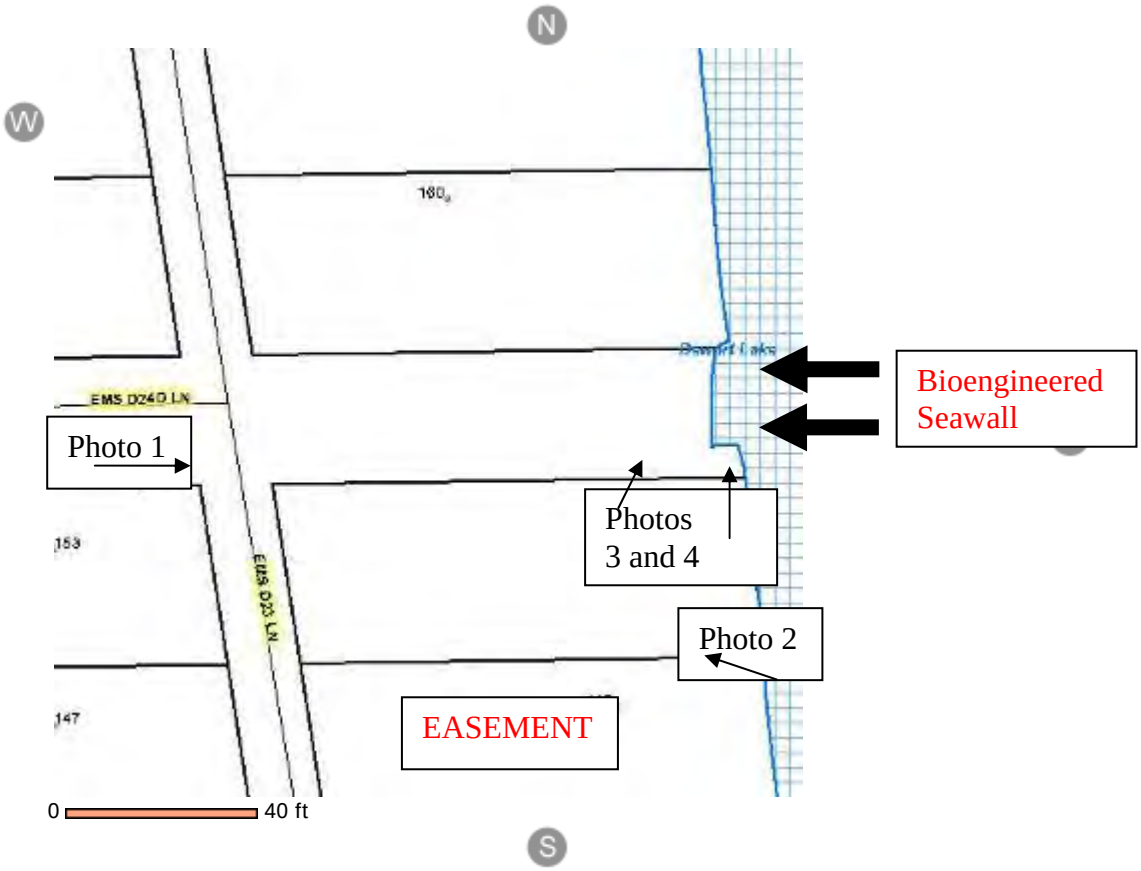
* The site for the seawall is illustrated in the pictures below and with an annotated County GIS map on the second page of this document.

* The bioengineered seawall is constructed of natural materials and will be used by the DNR for a field day(s) as a demonstration project to illustrate eco-friendly seawall design. The design will allow the public continued access to the lake from EMS D24D Lane. A similar bioengineered seawall has recently been constructed at the Fairgrounds on Winona Lake.

* Thank You for your time and consideration. Healthy lakes are important to Kosciusko County !!

The following pictures show the location of the potential bioengineered seawall site.

County GIS Plat Map of Bioengineered Seawall Site with Photo Locations



4.0 Fisheries Update

Jed Pearson was contacted for the most recent fisheries data available for Dewart Lake. A summary describing the results of the most recent IDNR fisheries survey on Dewart Lake can be found in the 2007 AVMP.

5.0 Problem Statement

Eurasian watermilfoil will continue to be the major management challenge for Dewart Lake in 2010. The challenge in 2010 will be to identify areas of EWM re-growth through proper vegetation survey techniques and manage them effectively with herbicide treatments. Much more EWM re-growth is expected in 2010 and spot treatments using 2, 4-D will likely be used to manage these areas.

The curly leaf pondweed population should also be monitored to ensure that it is not increasing in abundance in areas where EWM was previously dominant.

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.

Specific Objectives

The major objective for Dewart Lake has changed from a large scale treatment effort to reduce the dominant milfoil population, to spot treatments in areas where re-growth is observed in the future. One specific measurable goal would be to keep Eurasian watermilfoil infestation below 90 acres in 2010. Since 2010 will be the fifth year of the treatment program, much more re-growth is expected.

Coontail is again present in moderate levels in Dewart Lake as it was before the Sonar treatment. Coontail frequency was 30% in summer of 2009. It is hoped that coontail will become more abundant throughout the treatment program and approach 40% which is its pretreatment abundance.

The Dewart Lake Sonar treatment provided 3 years of excellent control, and is still showing residual effects on the EWM population. Re-colonization of previously infested areas with sago pondweed has also surpassed expectations. In 2007, sago pondweed was very abundant in areas previously occupied by Eurasian watermilfoil. In summer 2009, sago pondweed frequency was 23.3%. Ideally, sago pondweed abundance will remain above 20%. One concern is that EWM will overtake sago pondweed in deep water areas.

The curly leaf pondweed population should also be monitored. Ideally its site frequency in the summer of 2009 would remain below the summer of 2007 frequency of 8.9%, and below 40% in spring. Curly leaf was not collected in the summer 2009 survey. The removal of Eurasian watermilfoil could possibly trigger an increase in its abundance, as could the suspension of treatments on the main lake in the area where it is most abundant (Blueberry Island frontage).

7.0 Plant Management History Update

District 3 biologist, Jed Pearson, was contacted to determine any significant changes to aquatic vegetation control permits. Permits for aquatic vegetation control have not changed significantly since 2008, with the exception of the LARE funded EWM treatments.

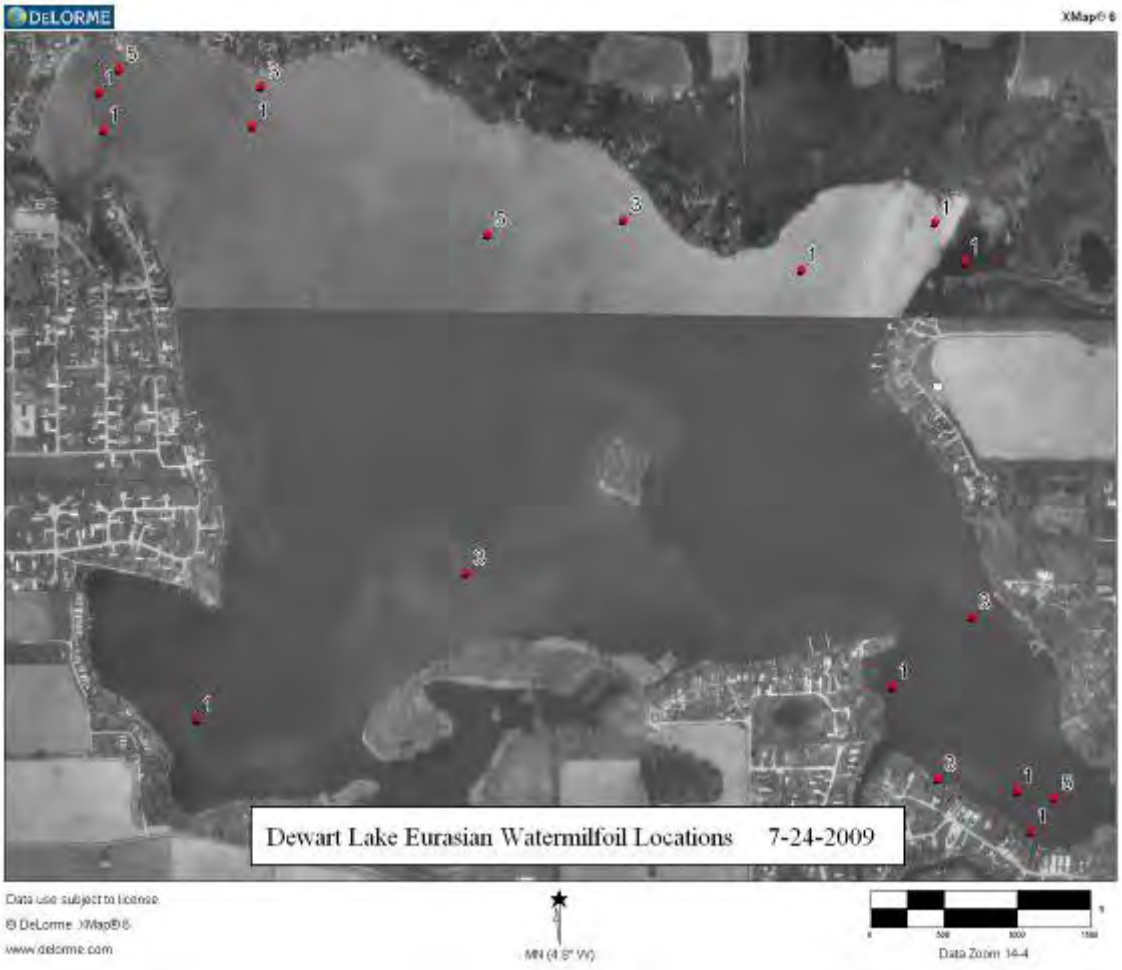
In 2009, 45 total acres were treated for EWM with 2, 4-D through funding from the Lake and River Enhancement Program and the Dewart Lake Protective Association. Following visual inspection, 42 were treated with 2, 4-D on June 8, 2009 for EWM control. Three more acres were treated with 2, 4-D for EWM control on June 17, 2009. Eurasian watermilfoil treatment areas for 2009 are outlined in red in Figure 1.

Figure 1: Dewart Lake 2009 EWM Treatment Areas

8.0 Aquatic Plant Community Characterization Update

Survey and data analysis methods have not changed since the 2008 Dewart Lake AVMP update. Eurasian watermilfoil was the only invasive plant species collected in the 2009 Tier II survey although curly leaf pondweed has historically been found in low abundance in summer Tier II surveys. Figure 2 shows sample locations where EWM was collected in 2009.

Figure 2: Dewart Lake 2009 EWM Locations



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.

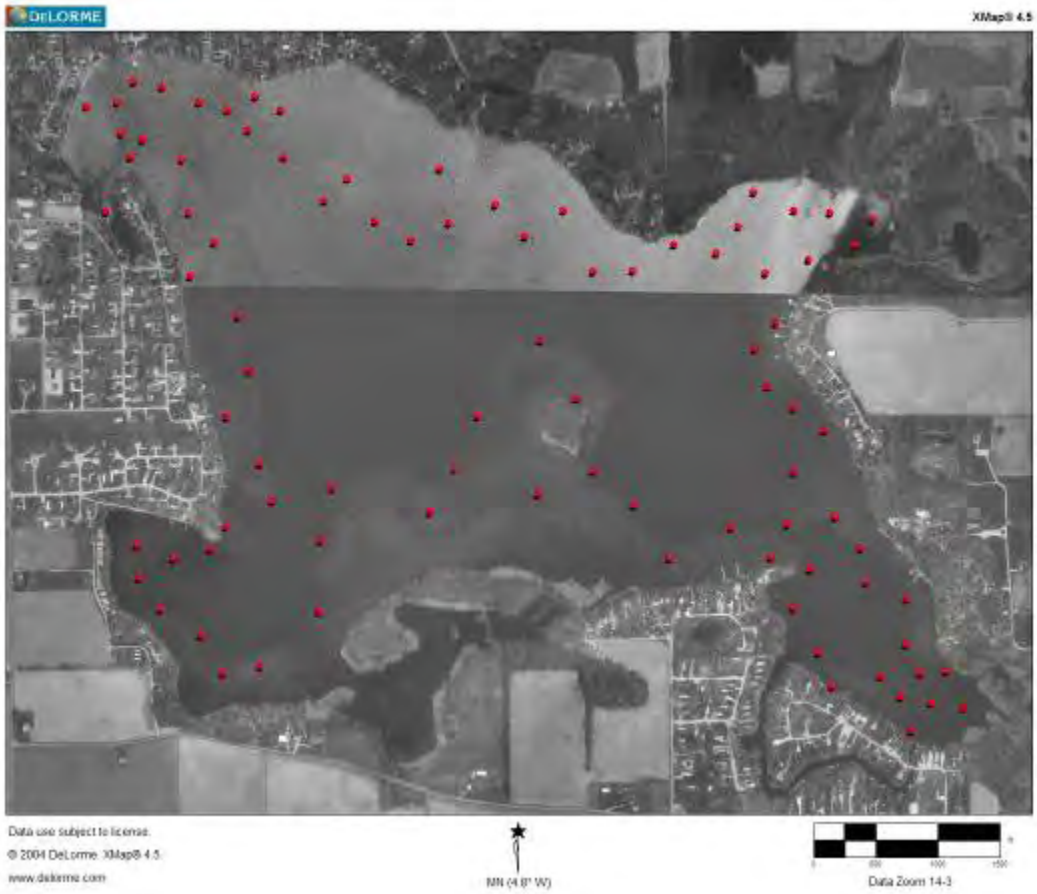
Dewart Lake is characterized by the IDNR as mesotrophic with 551 surface acres. Based on these characteristics, 90 sample sites are distributed between the 5 foot depth contours of the littoral zone of Dewart Lake. A 20 foot depth was used as the maximum depth of the littoral

zone. Sample locations have remained constant since 2006. At this time, the current sampling strategy for Dewart Lake appears adequate, and no changes are recommended for 2010.

8.2 Tier II Results

A 2009 late season Tier II survey was conducted on July 24, 2009 by Aquatic Weed Control. Secchi depth was measured at 7.4 feet. Based on Dewart Lake's classification as mesotrophic and its 551 surface acres, ninety rake samples were divided between each 5 foot depth contour of the littoral zone. A total of 15 species of submersed aquatic plants were collected during this survey which went down from 16 species in 2008. Figure 3 shows the locations of all sample sites for the Dewart Lake Tier II surveys.

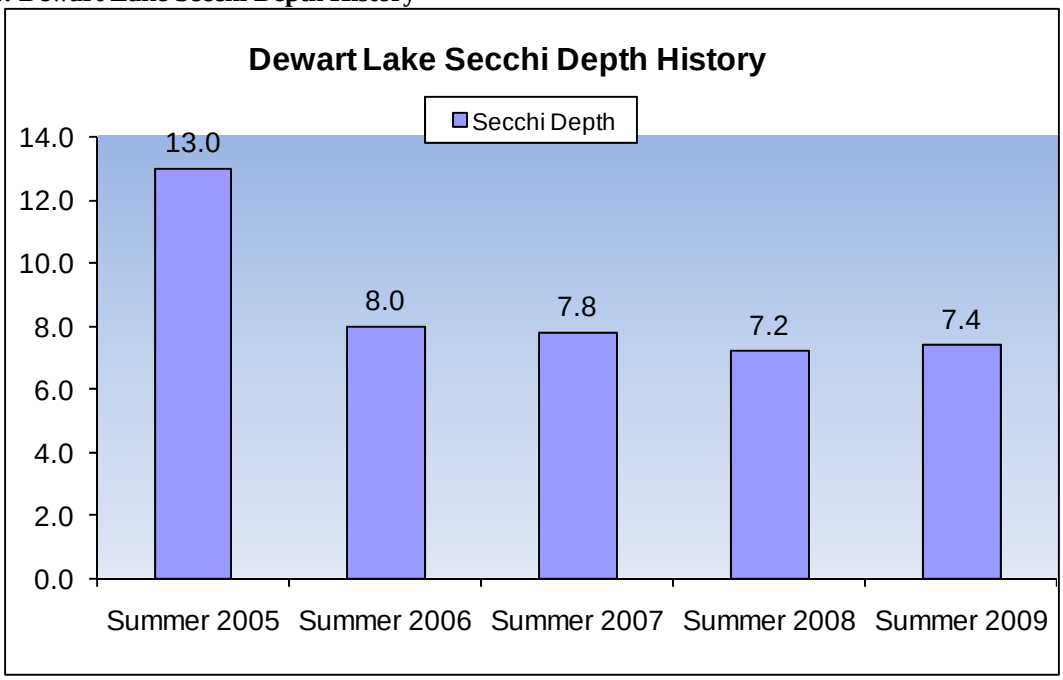
Figure 3: Dewart Lake Rake Sample Locations



Secchi Depth

Secchi depth in Dewart Lake appears to be stable over the past four years but is down from the 2005 value. Secchi depth was measured at 13.0 feet in summer of 2005 but has remained at 7 to 8 feet since then. It is unclear whether this decline could be linked to the Sonar treatment or whether this reading was an abnormal exception at Dewart Lake. Figure 4 shows the Secchi history for Dewart Lake during its involvement in the LARE program.

Figure 4: Dewart Lake Secchi Depth History



Tier II Data Analysis

The following tables are data summaries for the Tier II aquatic vegetation surveys on Dewart Lake. These tables help to describe the plant community and help to identify changes over time. Table 3 describes data from Aquatic Weed Control's 2009 late season Tier II survey.

Table 3: Dewart Lake 2009 Data Summary Table

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake

County:	Kosciusko	Total Sites:	90	Mean species/site:	1.67
Date:	7/24/2009	Sites with plants:	75	SE Mean species/site:	0.13
Secchi (ft):	7.4	Sites with native plants:	75	Mean native species/site:	1.46
Maximum Plant Depth (ft):	20.0	Number of species:	15	SE Mean natives/site:	0.11
Trophic Status:	Mesotrophic	Number of native species:	13	Species diversity:	0.87
		Maximum species/site:	5	Native species diversity:	0.85

All Depths (0 to 20 ft)	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	36.7	63.3	3.3	5.6	27.8	31.8
Coontail	30.0	70.0	5.6	6.7	17.8	22.9
Sago Pondweed	23.3	76.7	5.6	10.0	7.8	14.9
Eurasian Watermilfoil	20.0	80.0	11.1	5.6	3.3	8.9
Water Stargrass	14.4	85.6	6.7	6.7	1.1	6.4
Flat Stemmed Pondweed	11.1	88.9	3.3	4.4	3.3	6.7
Slender Naiad	6.7	93.3	4.4	1.1	1.1	2.7
Illiois Pondweed	5.6	94.4	4.4	1.1	0.0	1.6
Large Leaf Pondweed	4.4	95.6	1.1	2.2	1.1	2.7
Nitella	4.4	95.6	3.3	1.1	0.0	1.3
American Pondweed	3.3	96.7	1.1	2.2	0.0	1.6
Small Pondweed	3.3	96.7	1.1	1.1	1.1	2.0
Brittle Naiad	1.1	98.9	1.1	0.0	0.0	0.2
Elodea	1.1	98.9	1.1	0.0	0.0	0.2
Leafy Pondweed	1.1	98.9	0.0	1.1	0.0	0.7
Depth: 0 to 5 ft	**Frequency of**	**Rake score frequency per species**				**Plant**
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	69.0	31.0	0.0	13.8	55.2	63.4
Sago Pondweed	24.1	75.9	3.4	17.2	3.4	14.5
Coontail	20.7	79.3	6.9	3.4	10.3	13.8
Eurasian Watermilfoil	20.7	79.3	6.9	13.8	0.0	9.7
Flat Stemmed Pondweed	17.2	82.8	10.3	3.4	3.4	7.6
Water Stargrass	17.2	82.8	6.9	6.9	3.4	9.0
Illiois Pondweed	13.8	86.2	10.3	3.4	0.0	4.1
American Pondweed	10.3	89.7	3.4	6.9	0.0	4.8
Large Leaf Pondweed	6.9	93.1	0.0	3.4	3.4	5.5
Slender Naiad	6.9	93.1	6.9	0.0	0.0	1.4
Elodea	3.4	96.6	3.4	0.0	0.0	0.7
Small Pondweed	3.4	96.6	0.0	0.0	3.4	3.4
Depth: 5 to 10 ft	**Frequency of**	**Rake score frequency per species**				**Plant**
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	40.7	59.3	11.1	0.0	29.6	31.9
Sago Pondweed	40.7	59.3	7.4	11.1	22.2	30.4
Coontail	25.9	74.1	7.4	7.4	11.1	17.0
Water Stargrass	22.2	77.8	11.1	11.1	0.0	8.9
Eurasian Watermilfoil	18.5	81.5	11.1	3.7	3.7	8.1
Flat Stemmed Pondweed	11.1	88.9	0.0	7.4	3.7	8.1
Slender Naiad	11.1	88.9	3.7	3.7	3.7	6.7
Large Leaf Pondweed	7.4	92.6	3.7	3.7	0.0	3.0
Nitella	7.4	92.6	7.4	0.0	0.0	1.5
Small Pondweed	7.4	92.6	3.7	3.7	0.0	3.0
Brittle Naiad	3.7	96.3	3.7	0.0	0.0	0.7
Illiois Pondweed	3.7	96.3	3.7	0.0	0.0	0.7
Leafy Pondweed	3.7	96.3	0.0	3.7	0.0	2.2
Depth: 10 to 15 ft	**Frequency of**	**Rake score frequency per species**				**Plant**
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	45.8	54.2	4.2	8.3	33.3	39.2
Eurasian Watermilfoil	29.2	70.8	20.8	0.0	8.3	12.5
Sago Pondweed	12.5	87.5	8.3	4.2	0.0	4.2
Chara	8.3	91.7	0.0	4.2	4.2	6.7
Flat Stemmed Pondweed	8.3	91.7	0.0	4.2	4.2	6.7
Water Stargrass	8.3	91.7	4.2	4.2	0.0	3.3
Nitella	4.2	95.8	4.2	0.0	0.0	0.8
Slender Naiad	4.2	95.8	4.2	0.0	0.0	0.8
Depth: 15 to 20 ft	**Frequency of**	**Rake score frequency per species**				**Plant**
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	30.0	70.0	0.0	10.0	20.0	26.0
Nitella	10.0	90.0	0.0	10.0	0.0	6.0

Table 4 was provided by District 3 Fisheries Biologist Jed Pearson. It compiled and summarized data from all Tier II surveys conducted on Dewart Lake since 2005. It is an excellent source for identifying and documenting site frequency and dominance trends for individual plant species. It tracks species data through the course of the Sonar treatment program. It is important to note that differences in survey protocol in 2005 should be taken into account when analyzing this data.

Table 4: Dewart Lake 5 year Data Summary Table

[redacted]

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:

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

The most significant changes over this 5 year period have been in the EWM, coontail, and sago pondweed populations. Eurasian watermilfoil has declined greatly after the Sonar treatment and was not found in 2006 or 2007. It had extremely low abundance in 2008 and increased greatly in 2009 as it is starting to increase in abundance.

Coontail also showed large site frequency declines after the Sonar treatment and is now very close to pre-treatment abundance between 30% and 40% site frequency. This is encouraging because the initial reduction in the coontail population was a concern.

Sago pondweed, a beneficial native plant had a site frequency around 12% prior o the Sonar treatment. After treatment, sago frequency increased in abundance and remains very common in Dewart Lake with site frequencies around 25% to 30%.

Species Diversity

The species diversity indices listed in data analysis tables help to 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 overall species diversity index for Dewart Lake in July of 2009 was 0.87. In July of 2008 diversity was 0.86 which is up from 0.79 in 2007 and 0.77 in 2006. Native plant diversity in July of 2009 was 0.85. In July of 2008 native diversity was 0.84 which is also up from 0.78 in 2007. Native diversity was 0.80 in July of 2005 which was before the Sonar treatment. From this data, it would appear that the native diversity has not declined, and may have increased slightly following the Sonar program.

In both IDNR and AWC surveys, both species diversity and native species diversity were slightly higher in summer of 2009 than they were prior to the Sonar treatment.

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.

Dominance trends are similar to sight frequency, with Eurasian watermilfoil dominance dropping to 0 after the Sonar treatment and remaining at 0 through the 2007 growing season. Dominance of many native plants dropped as well after the treatment, but most native plants were near pre-treatment dominance values in 2008 and 2009.

8.3 Macrophyte Inventory Discussion

The submersed plant community of Dewart Lake covers roughly 260 acres of the lake, or 47% of the lake's total surface area. This is based on a littoral depth of approximately 20 feet. Eurasian watermilfoil was dominant in about 140 of these acres before the Sonar treatment. After treatment, Eurasian watermilfoil was reduced to the point that it was undetectable in the summer of 2006 and 2007. In 2008, 13 acres of EWM were treated, and in 2009 EWM acreage increased to 45 acres by early summer. EWM continued to re-grow in summer and summer of 2009. For 2010, it is difficult to determine EWM acreage, but it will likely be much greater than 45 acres and could be over 100 acres.

EWM site frequency in Aquatic Weed Control's 2009 Tier II survey was 20.0%. This is very similar to the IDNR's 2009 survey where site frequency for EWM was 26.7%. These values are up from 5.6% and 7.8% respectively in 2008. It is likely that EWM site frequency could be much greater in 2010.

After treatment in 2006, slight reductions were seen in overall species richness and plant diversity, and populations of some native plants were reduced. In 2007, species richness increased to 13 species and many native populations were increasing. In 2009, native plant diversity was greater than pre-treatment diversity.

After the Sonar treatment, sago pondweed increased rapidly in areas previously infested by EWM. Its site frequency increased from 4.4 in 2006 to 28.9 in 2007. Sago pondweed frequency has remained stable in 2008 and 2009 around 25% - 30%.

Coontail showed a large decrease in site frequency from 43.3 % in 2006 to just 5.6% in 2007. However, in 2008 and 2009 coontail abundance increased and is now close to pre-treatment levels between 30% and 40%.

In 2009, 15 different plants were collected in the Tier II survey. In 2008, 17 different plant species were collected in Dewart Lake which was up from 13 species in 2007. Prior to the Sonar treatment, 13 species were collected in 2005. Native diversity in 2009 was 0.85. Native Diversity in 2008 was 0.84. These values are greater than the pre-Sonar native diversity of 0.80 in 2005.

Curly leaf abundance remains low in the late season surveys although late season surveys are generally not accurate in determining peek curly leaf pondweed abundance. Curly leaf pondweed abundance had increased from1.3% in 2005 to 7.8% in 2006, to 8.9% in 2007. However, in 2008 curly leaf pondweed frequency declined to 1.1% and curly leaf pondweed was not collected in the AWC or the IDNR in 2009. This invasive population should continue to be monitored in future years.

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 Dewart Lake in 2009. No vouchers were taken that were suspected to be threatened or endangered in the Tier II or the emergent vegetation surveys.

9.0 Aquatic Vegetation Management Alternatives

Major Eurasian watermilfoil control practices have not changed significantly from the 2005 Alternatives.

No Action

If no action is taken in 2010, it is likely that EWM will increase greatly in abundance. As expected, EWM abundance started to increase significantly in 2009. Areas of heaviest infestation should be treated with liquid 2, 4-D to reduce EWM abundance and prevent its spread. Special attention may be given to offshore areas that are 200 feet or more from land.

Renovate and 2, 4-D Treatments

The differences between Renovate and 2, 4-D treatments for spot treatments of Eurasian watermilfoil are still being documented. Both of these herbicides are commonly used for spot treatments of Eurasian watermilfoil. They are both systemic herbicides, meaning they are translocated from the foliage of the plant into the root system. Renovate is more expensive than 2, 4-D, although the chemistries of the two products are very similar. The justification for the extra expense is that Renovate is said to have the potential for multiple years of control on Eurasian milfoil. It is also said that Renovate may have less impact on native species like coontail. However, in Aquatic Weed Control's experience these characteristics of Renovate have not been documented. Both normally provide effective seasonal control of Eurasian watermilfoil.

10.0 Public Involvement

A LARE meeting was held on November 19, 2009 to discuss issues pertaining to the LARE Program and lakes currently involved in the LARE program. Aquatic Weed Control, District 3 fisheries biologists, LARE aquatic biologist Angela Sturdevant, Dewart Lake representative Ken Brehob, and many other IDNR Fisheries and LARE staff were present. Based on LARE policy, Dewart Lake may receive lower funding priority in 2010 because it has already received treatment funding for four consecutive years. In 2010, the IDNR would prefer that the Dewart Lake Protective Association privately fund EWM spot treatments in heavily infested offshore areas in 2010 with the understanding that making this commitment should increase funding priority for 2011.

Public meetings for Dewart Lake were held on June 14 and June 21, 2009. Twenty-eight people turned in public questionnaires. Both of these meetings were open to the public. One was a board meeting and the other was a regularly scheduled association meeting. The meeting was positive and residents were happy with Eurasian milfoil control but concerned with returning milfoil beds. They were also very concerned about LARE funding for 2010 since Dewart Lake has received LARE treatment funding for 4

consecutive years. Other concerns were the amount of bass tournaments being held at the lake and a possible decrease in reed beds along the south side of the lake.

The Dewart Lake Protective Association is active, and lake association meetings help to keep the public informed about management practices on Dewart 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. Figure 5 summarizes responses to the 2009 public questionnaire.

Figure 5: Dewart Lake 2009 Public Questionnaire

Total: 28

Lake Use Survey — Lake name Dewart Lake

Are you a lake property owner? Yes 28 No 0

Are you currently a member of your lake association? Yes 28 No 0

How many years have you been at the lake? 2 or less – 0
2 – 5 years – 0
5-10 years – 3
Over 10 years – 25

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

25 Swimming	10 Irrigation
25 Boating	0 Drinking water
25 Fishing	1 Other Skiing

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 7 No 19

Do you currently participate in a weed control project on the lake? Yes 17 No 10

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 11 No 16

Does the level of vegetation in the lake affect your property values? Yes 11 No 16

Are you in favor of continuing efforts to control vegetation on the lake? Yes 25 No 3

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 23 No 3

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

- 13 Too many boats access the lake
- 14 Use of jet skis on the lake
- 3 Too much fishing
- 2 Fish population problem
- 3 Dredging needed
- 11 Overuse by nonresidents
- 10 Too many aquatic plants
- 0 Not enough aquatic plants
- 0 Poor water quality
- 1 Pier/funneling problem

Please add any comments:

Trash left in the lake (cans) - need DNR patrolling on weekends, need lower level of the water; turkey buzzard population is a big problem; too many fishing tournaments; too much Eurasian watermilfoil; we, on Dewart, have many more parking spots at public access than other lakes in our area of similar size; can size and number of bass tournaments be limited to fewer than now?, Reeds are disappearing on S side of lake, dredging needed at boat launch.

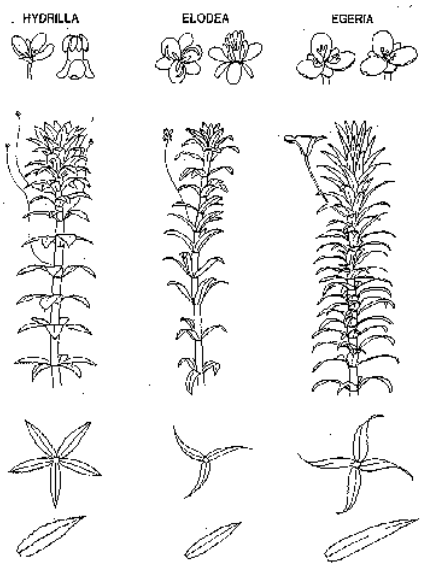
11.0 Public Education

The Dewart Lake Protective Association has been very aggressive in preventing the spread of invasive aquatic vegetation. They have privately helped to fund herbicide treatments and have submitted a proposal to the LARE program for additional herbicide treatment of Eurasian watermilfoil. This proposal resulted in the whole lake Sonar treatment.

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 federally listed as a 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 summer 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

In 2009, EWM started much more vigorous re-growth and EWM plant beds increased from 13 acres in 2008 to 45 acres in summer of 2009. Forty-two acres of EWM were treated with DMA-4 herbicide on June 8, 2008 and an additional 3 acres were treated on June 17, 2009. EWM continued its return to the lake in summer and summer of 2009, which can be expected based on past Sonar treatments on other lakes in northern Indiana.

It is estimated that pre-Sonar treatment EWM acreage in Dewart Lake was approximately 140 to 150 acres of dense beds, with EWM being present in lower abundance in many other areas. Based on this estimate, the Sonar treatment is still having some residual effect on EWM, but much more re-growth is expected in 2010 which will be the fifth year of the treatment program.

Based on LARE policy, Dewart Lake will become a lower priority for LARE funding in 2010 because it has already received 4 years of treatment funding. Since EWM will increase in Dewart Lake in 2010 and little funding may be available, the possibility of the Dewart Lake Protective Association privately funding some spot treatments of EWM was discussed. IDNR and LARE biologists stated that they would like to see the Dewart Lake Protective Association fund some EWM spot treatments in areas that are more than 200 feet from shore. These offshore treatments would be funded entirely by the lake association in 2010 with the understanding that making this commitment will greatly increase Dewart Lake's funding priority for a possible Sonar treatment in 2011. This is not a guarantee of treatment funding in 2011. However, if funding is available in 2011, Dewart Lake should be a priority because of the severity of the EWM problem in Dewart Lake.

EWM acreage for 2010 cannot yet be determined. An estimate of up to 90 acres of offshore EWM beds is currently used for budgeting purposes. Actual EWM coverage could be much higher. However, these 90 acres should provide coverage for many high priority offshore areas that were known to be infested with EWM prior to the Sonar treatment. The association is in no way obligated to treat all of these areas to receive high priority for treatment funding in 2011. Actual treatment areas for 2010 will be developed based on observed EWM severity in infested high use offshore areas, as well as funding availability.

Herbicide Treatment Specifications

If 2, 4-D is used for herbicide treatments, then a concentration at or near 1.76 parts per million should be used to ensure adequate control.

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 2010

2010 Budget Recommendations

1. Chemically treat high priority offshore areas of EWM with 2, 4-D as funding allows

A. Treat up to 90 acres for EWM 200 feet offshore with 2, 4-D Up to $32,400

2010 Surveying and Planning

Option 1

Conduct a spring visual survey and late season Tier II aquatic vegetation survey to monitor both Eurasian milfoil and native plant populations. Emergent plant bed mapping may be conducted as well.

Aquatic Vegetation Surveys (Tier II and Emergent) and AVMP Update Up to $6,000

Option 2

Conduct a spring visual survey and a Late Season Tier II survey. Instead of a full AVMP update, only a data summary table and maps describing the abundance of invasive species would be provided.

Late Season Tier II survey with invasive maps and data summary table only $2,250

14.0 Monitoring and plan Update Procedures

In 2010 Aquatic Weed Control will conduct a spring visual vegetation survey to search for areas of Eurasian watermilfoil re-growth. In offshore areas where re-growth is observed, 2, 4-D treatments may follow provided they summer under allowed areas and acreages of the 2009 aquatic vegetation control permit for Dewart Lake. A late season Tier II aquatic vegetation survey will also be conducted to evaluate both native and invasive plant populations. These surveys should help to detect any additional areas of Eurasian watermilfoil re-growth and will also document changes in the native plant

community, as well as provide more data on the response of plant populations to whole lake Sonar treatments.

The LARE program has the option to fund a complete AVMP or AVMP update, but may choose to fund a Tier II survey only, which would significantly reduce costs.

It is also possible that emergent plant beds in Dewart Lake may be mapped again as well. Emergent beds in the proposed Dewart Lake Eco-Zone were mapped in 2008.

15.0 References (for 2009 update only)

IDNR 2007. Tier II Aquatic Vegetation Survey Procedure Manual. IN Department of Natural Resources. Division of Fish & Wildlife. Indianapolis, Indiana.

Dewart Lake Proctective Association Website. www.dewartlake.org. Online postings of the Dewart Lake Protective Assocaiton. Syracuse, IN. 2007

16.0 Appendices

16.1 Herbicide Calculations

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 Species Distribution Maps

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Figure 6: Dewart Lake 2009 EWM Locations

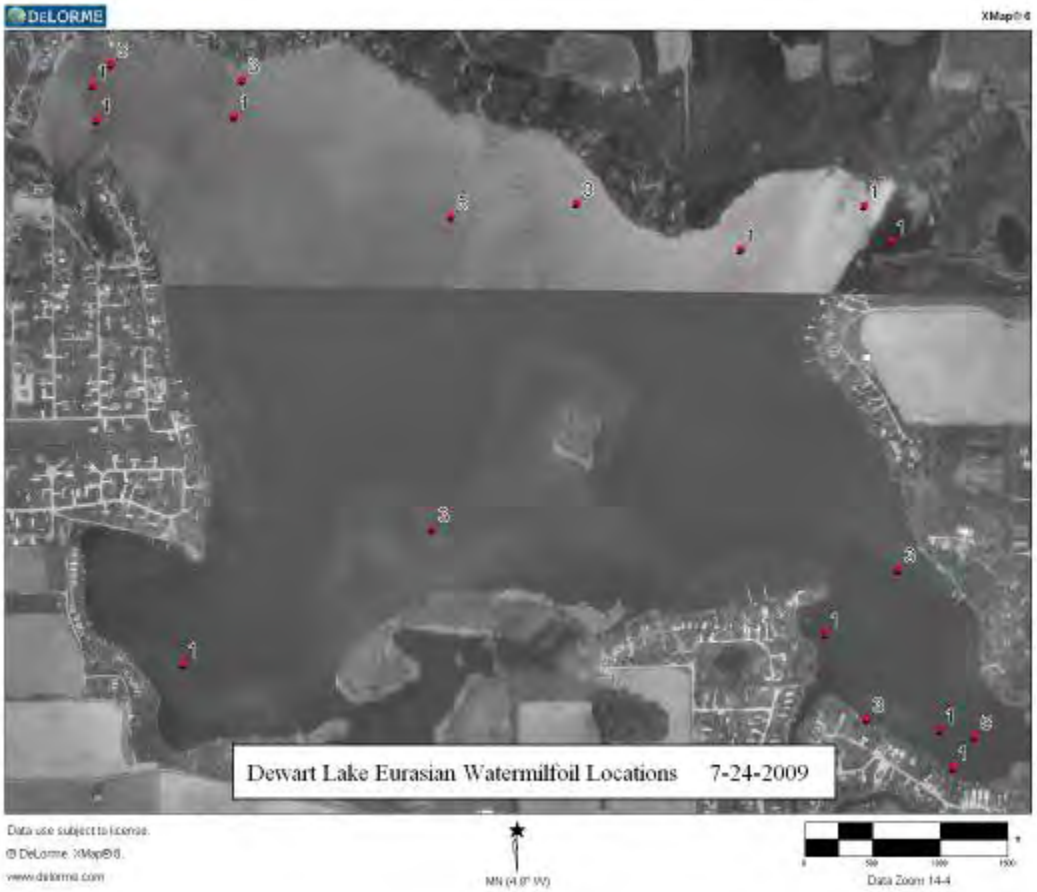


Figure 7: Dewart Lake 2009 Elodea Locations

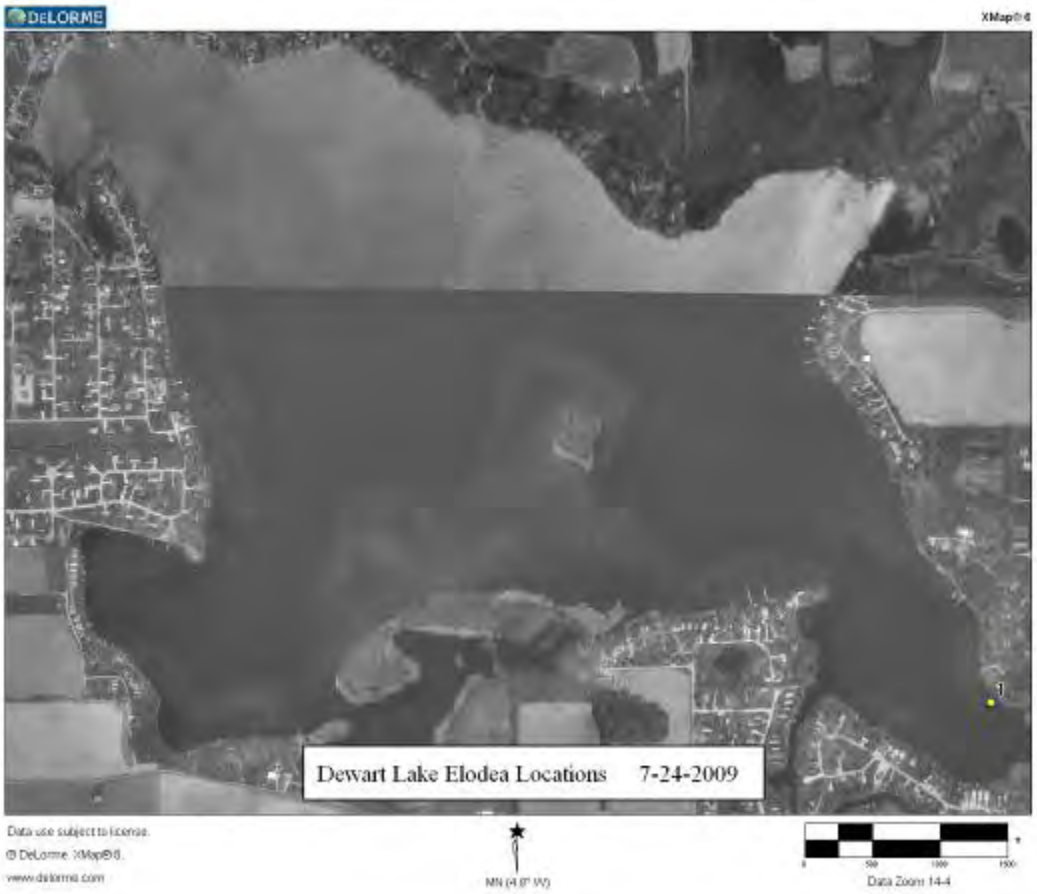


Figure 8: Dewart Lake 2009 Chara Locations

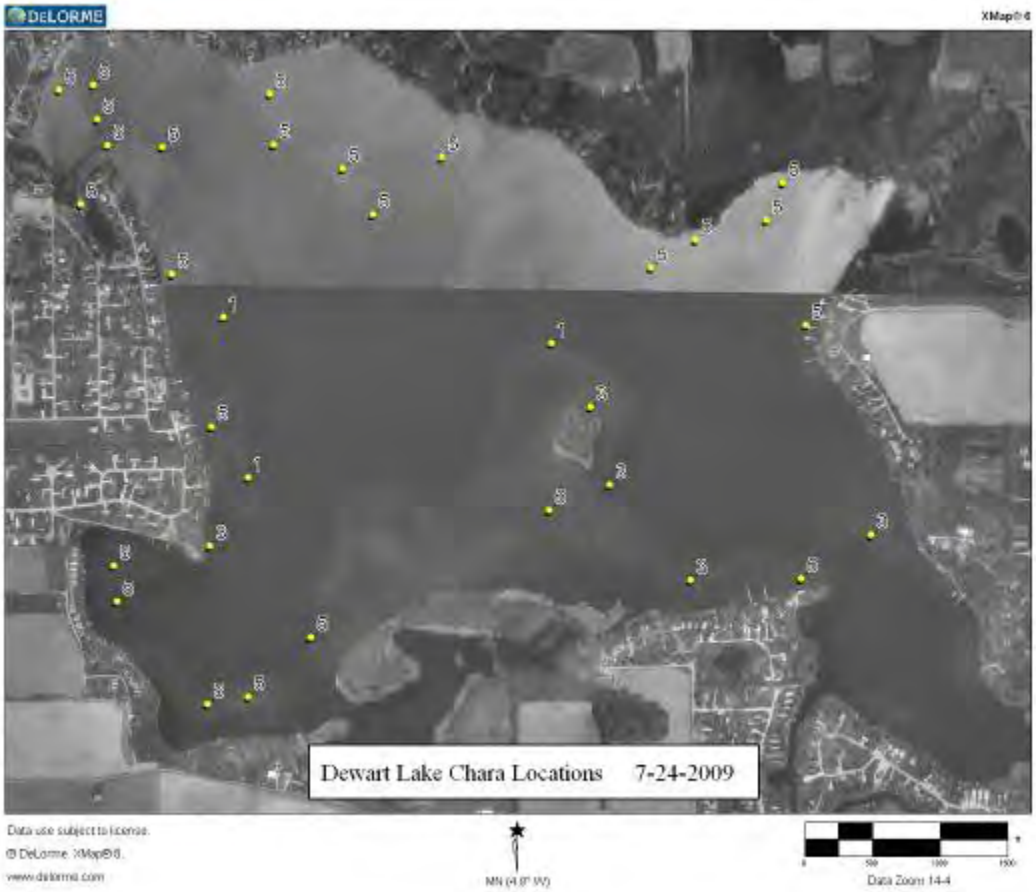


Figure 9: Dewart Lake 2009 Coontail Locations

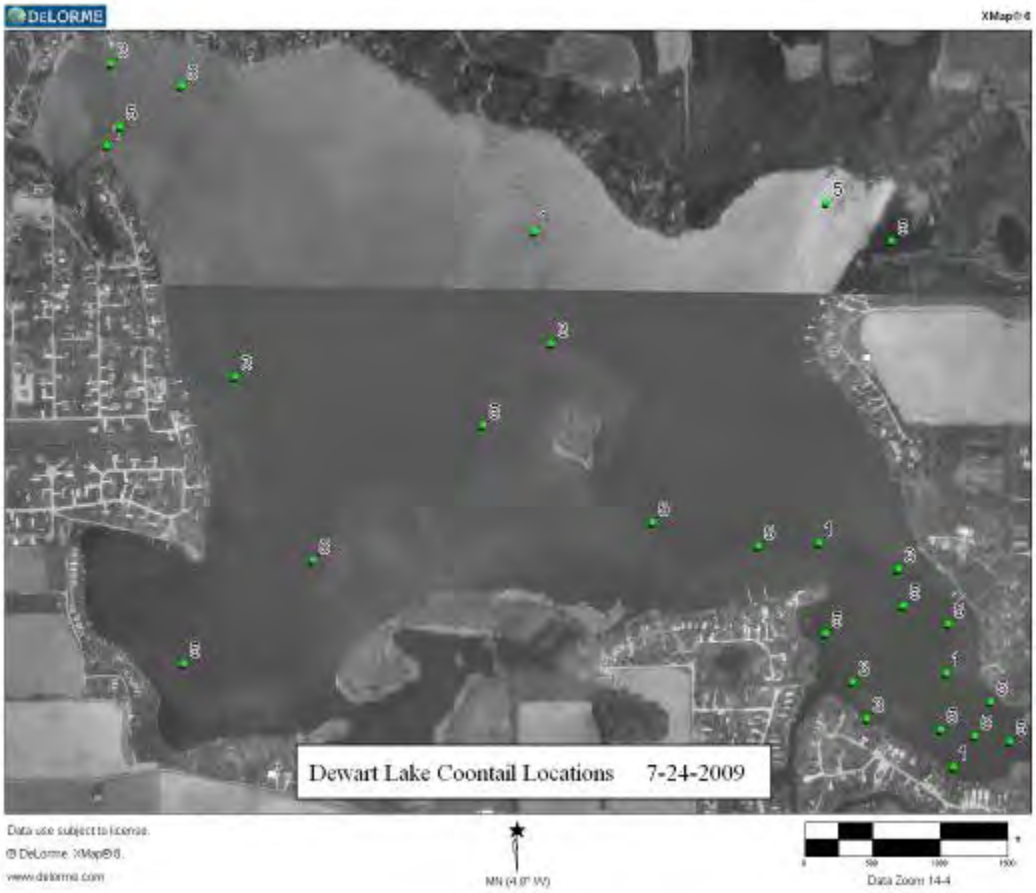


Figure 10: Dewart Lake 2009 Brittle Naiad Locations

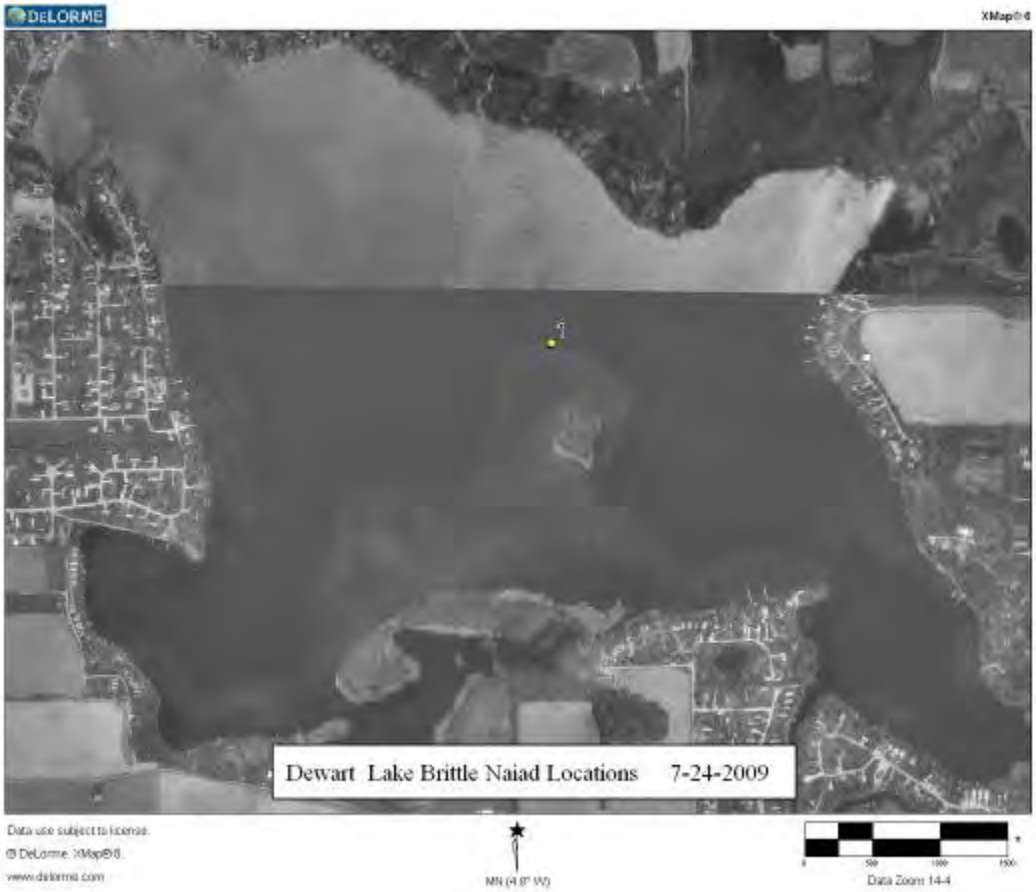


Figure 11: Dewart Lake 2009 American Pondweed Locations

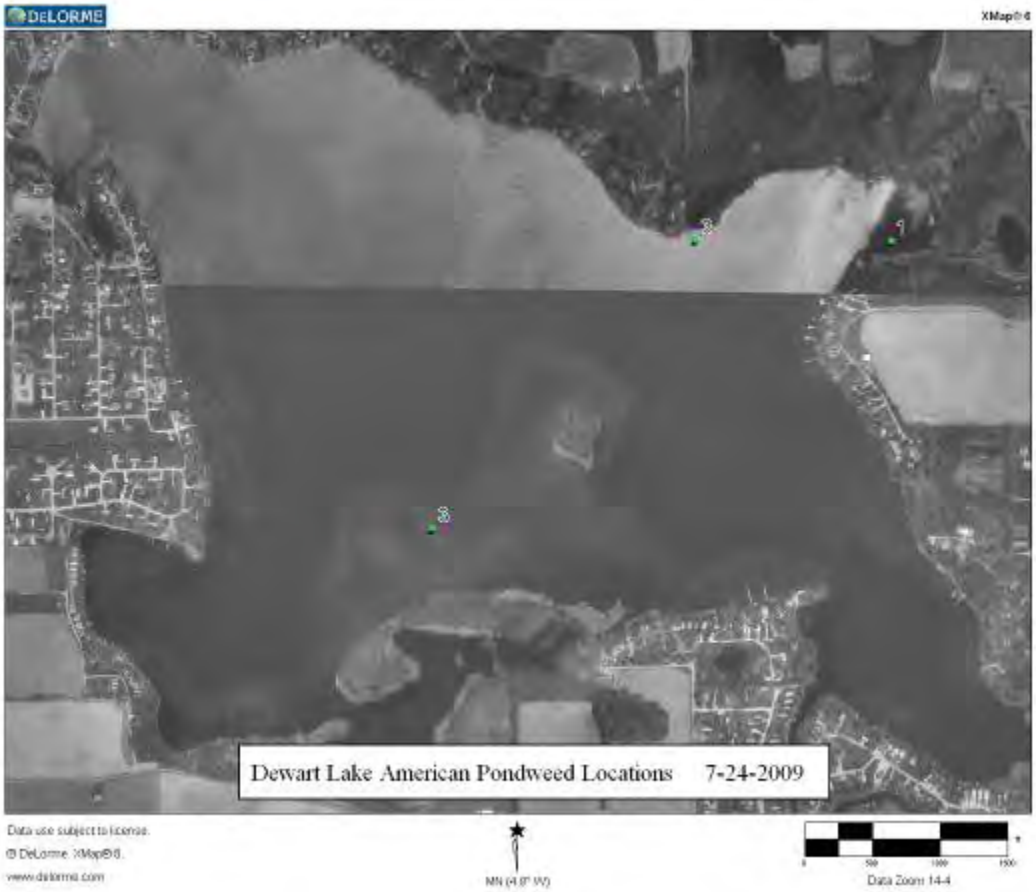


Figure 12: Dewart Lake 2009 Waterstargrass Locations

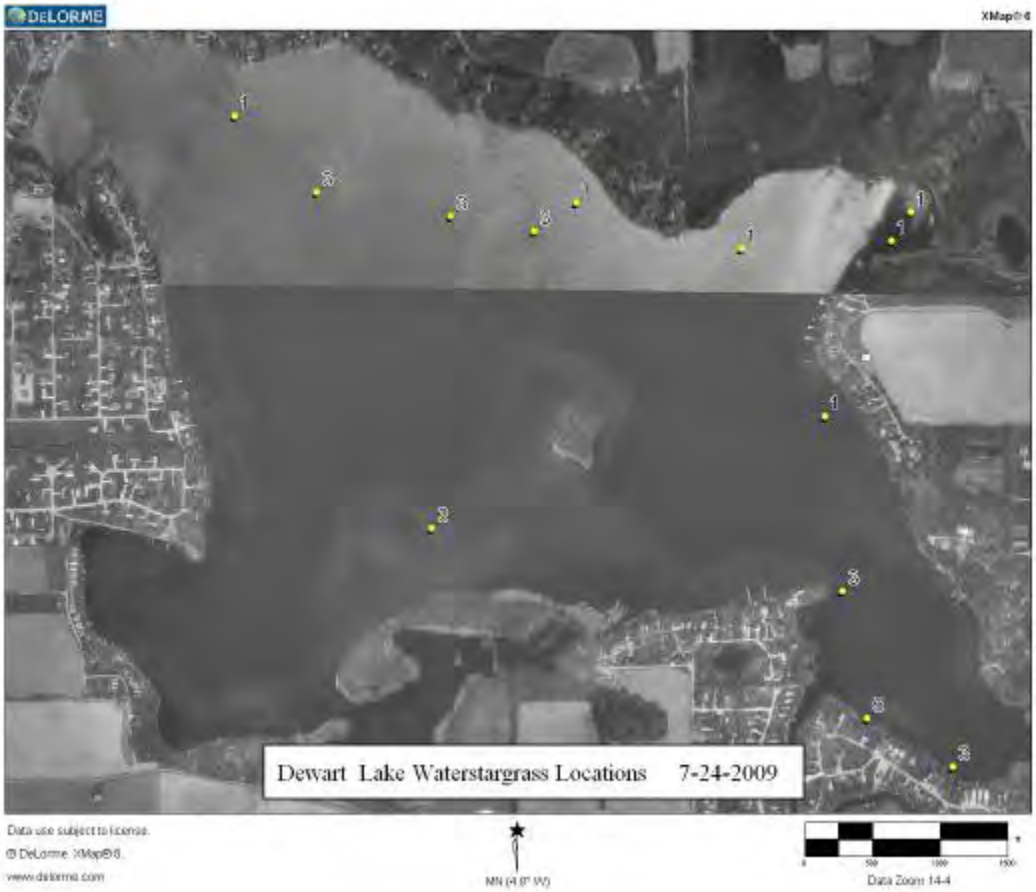


Figure 13: Dewart Lake 2009 Small Pondweed Locations

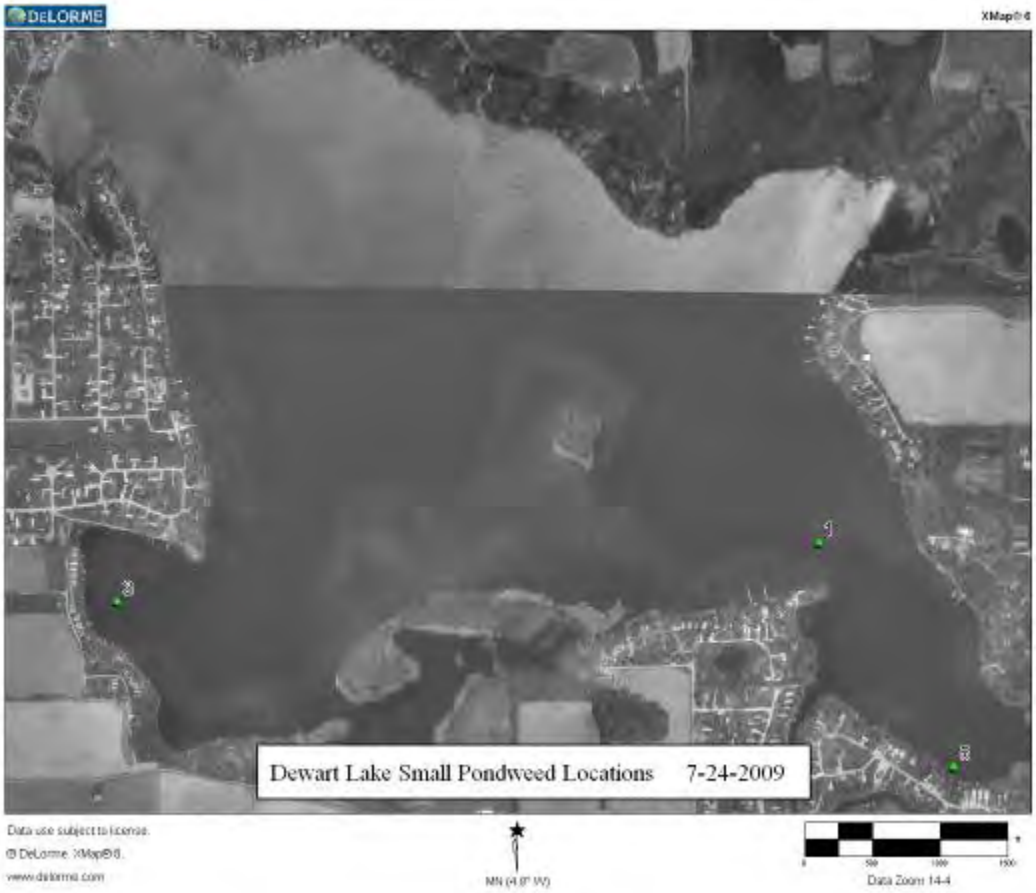


Figure 14: Dewart Lake 2009 Slender Naiad Locations

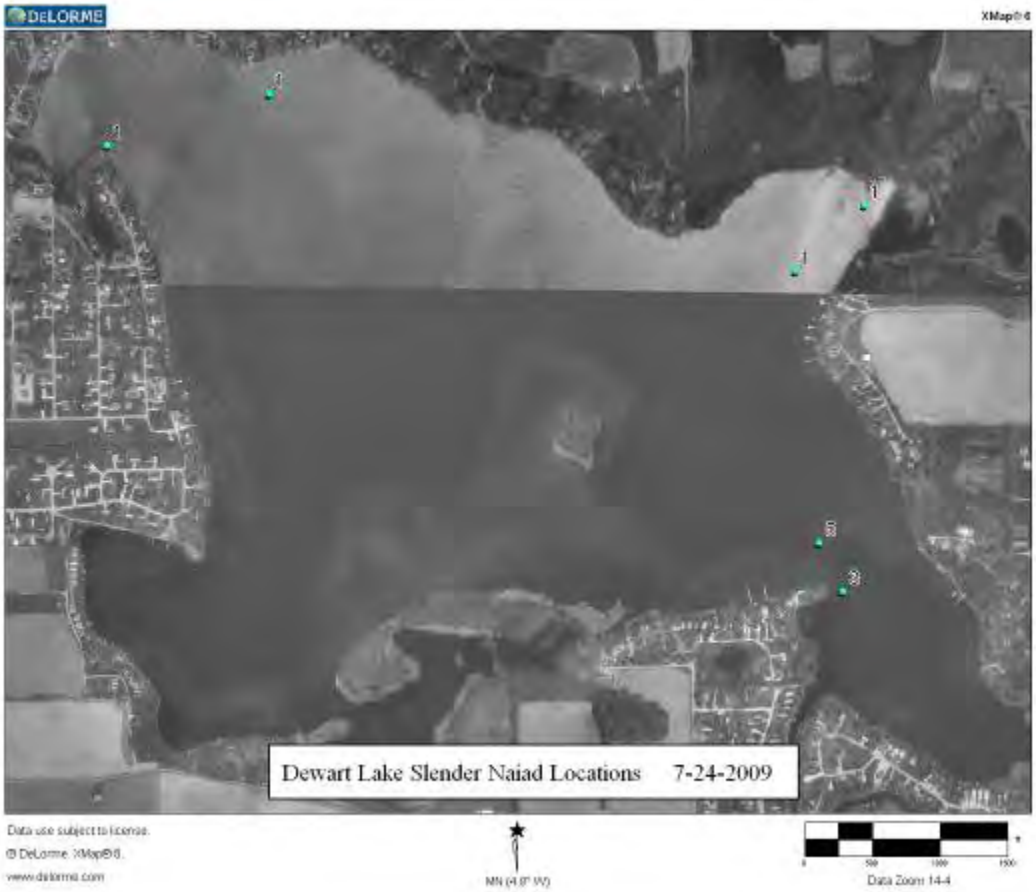


Figure 15: Dewart Lake 2009 Sago Pondweed Locations

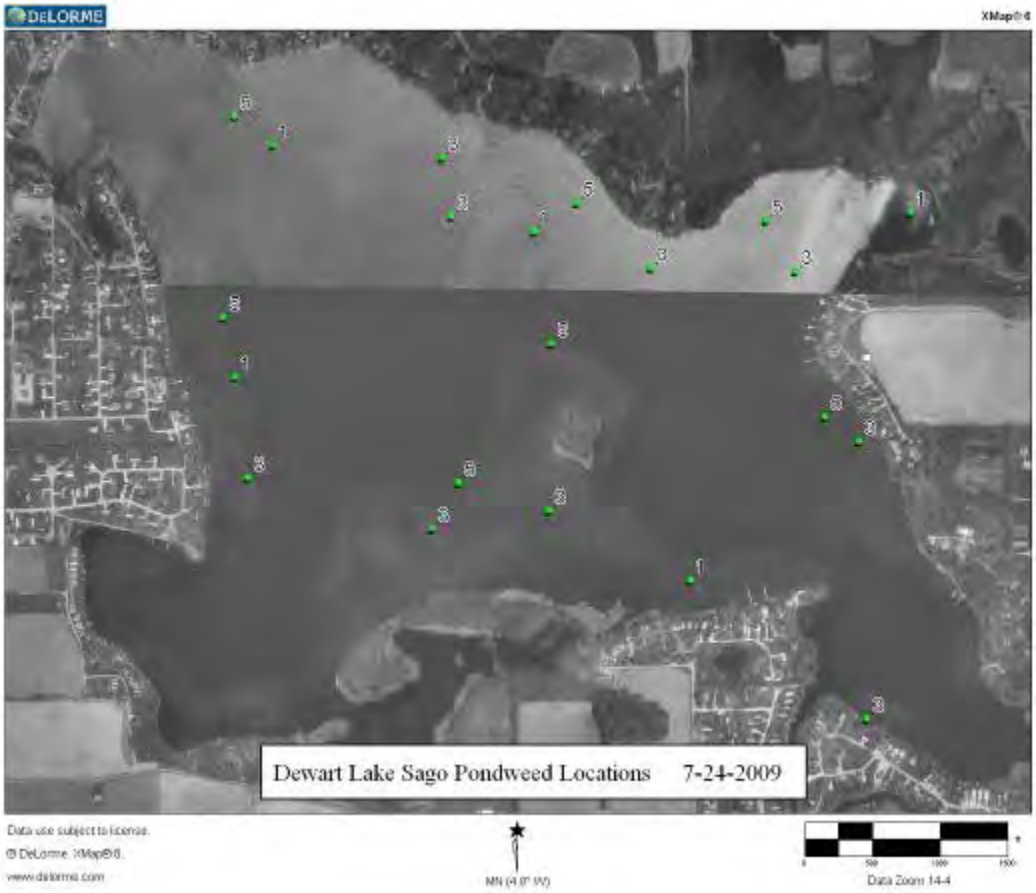


Figure 16: Dewart Lake 2009 Nitella Locations

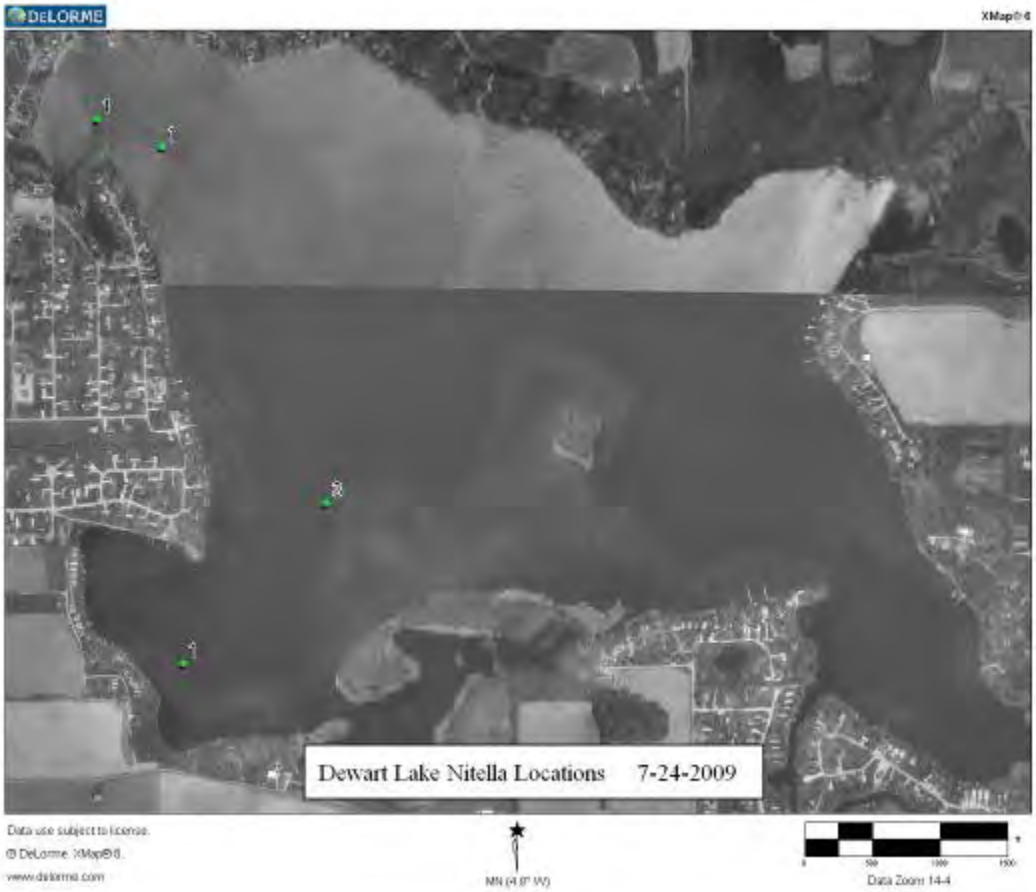


Figure 17: Dewart Lake 2009 Leafy Pondweed Locations

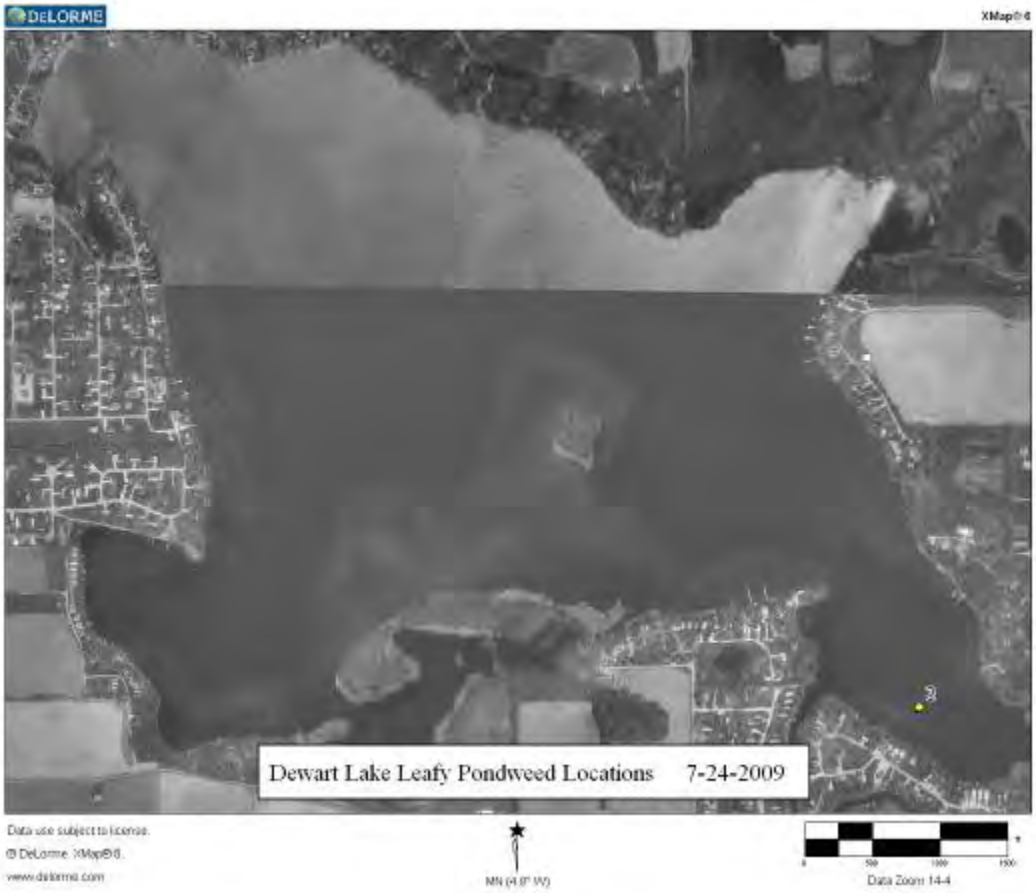
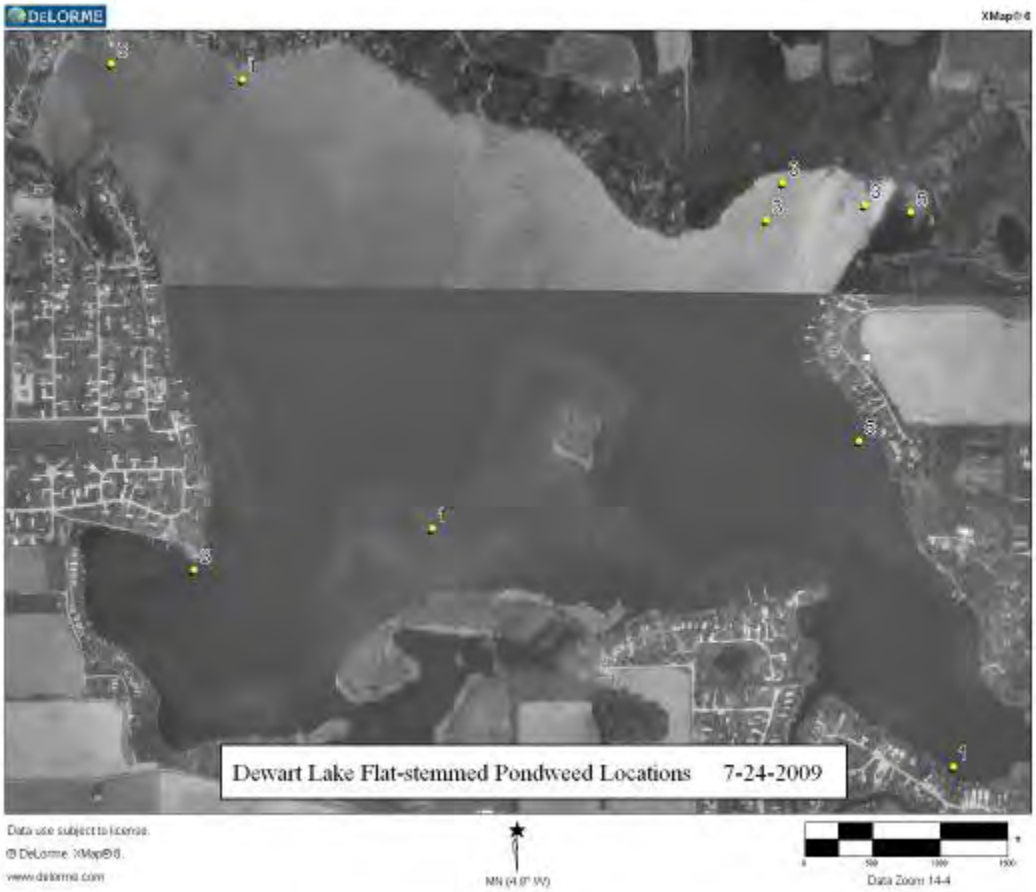


Figure 18: Dewart Lake 2009 Large-leaf Pondweed Locations

Figure 19: Dewart Lake 2009 Illinois Pondweed Locations

Figure 20: Dewart Lake 2009 Flat-stemmed Pondweed Locations



16.3 Data Sheets

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization:

Contact Information:

Waterbody Name:

Lake ID:

County(s):

Date:

Habitat Stratum:

Avg. Lake Depth (ft):

Lake Level:

GPS Metadata

Datum: Zone: Accuracy:

Crew Leader:

Recorder:

Method:

Secchi Depth (ft):

Total # of Points Surveyed:

Total # of Species:

Littoral Zone Size (acres):

- ❑ Measured
- ❑ Estimated

Littoral Zone Max. Depth (ft):

- ❑ Measured
- ❑ Estimate (historical Secchi)
- ❑ Estimated (current Secchi)

Notable Conditions:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 1 of

WATERBODY NAME: [illegible]	DATE: [illegible]
COUNTY: [illegible]	SECCHI DEPTH (FT): 7.4 ft
SITE ID: [illegible]	MAX PLANT DEPTH (FT): 18 ft
SURVEYING ORGANIZATION: Aquatic Weed Control	WEATHER: Cloudy Sunny
CREW LEADER: [illegible]	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: [illegible]	[illegible]
CONTACT INFO:	*Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.*

Species Codes: CHAR, SAGI, NAFL, CORDEM, POTE, POTZOS, MYRSPI, ZOSMAR, FLOA, STAR

Point #	R/T	Latitude	Longitude	Depth	CHAR	SAGI	NAFL	CORDEM	POTE	POTZOS	MYRSPI	ZOSMAR	FLOA	STAR	Notes
1	R	GPS Points	1		–				1						
			2		5		1	1							
			3		5										Abundant
			4		–										
			5		–										
			6		5				1						
			7		1	5									
			8			1		3							
			9		5										
					1	3									
					–										
					3										
										3					LARGE-3
					–										
					5										
					5										Small-3
					–										
								5							[illegible]
					5										
					5										
					5										
								5							
						3				1	3	3			Floridan-3 Americana-3
						5									
								5							
					5	3									
					1	5		3							Brittle Naiad-?
					3										
					2										
								5							
					3	1									
								5							

Other plant species observed at lake:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 2 of 3

WATERBODY NAME: [illegible]	DATE: July 24, 2009
COUNTY: Kosciusko County	SECCHI DEPTH (FT): 7.4 ft
SITE ID: [illegible]	MAX PLANT DEPTH (FT): 18 ft
SURVEYING ORGANIZATION: [illegible] Weed Control	WEATHER: Mostly Sunny
CREW LEADER: Dave Kessler	COMMENTS (Include voucher codes - V1, V2...): Water Temp 75.0
RECORDER: Dave Kessler	
CONTACT INFO: 574-533-2297	Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

Species Codes:

Point #	R/T	Latitude	Longitude	Depth	[illegible]	Sago	[illegible]	[illegible]	RATL	FIRT	[illegible]	[illegible]	Notes
	R	GPS Point		5	5								
				4			3					3	LARGE - 1
				19				5			1		
				22				3					
				[illegible]		3		3			3	5	LARGE - 3
				[illegible]									Total - 3
								5			1		
				[illegible]				1		1	1	3	Small - 5
				[illegible]				5			5		
				[illegible]				5					
				[illegible]				5					Elodea - 1
				[illegible]	—								
								1					
								—					
								5					
								3			3		
					3								
							5	1					Small
					—								
						3				5			
						5						1	
					—								
					—								
			53		5				1				
			52			3	1						
					—								
								5			1	1	Amer... 1
						1				5		1	LARGE - 5
							1			5	1		
								5					
					5					3			
					5	5				3			
											1	1	

Other plant species observed at lake:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page ___ of ___

WATERBODY NAME: [illegible]	DATE: July 24, 2007
COUNTY: Kosciusko County	SECCHI DEPTH (FT): [illegible]
SITE ID: Dewart Lake	MAX PLANT DEPTH (FT): 15 ft
SURVEYING ORGANIZATION: [illegible]	WEATHER: [illegible]
CREW LEADER: Dave Kreiter	COMMENTS (Include voucher codes - V1, V2...):
RECORDER: Dave Kreiter	[illegible]
CONTACT INFO: 574-533-2597	Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.

Point #	R/T	Latitude	Longitude	Depth	CHAR	SAGA	NJUC	[illegible]	ALSI	EIAT	ELWA	SAAD	Notes
	R	GPS Points			5								
					5	3							
					–								
						5					3	1	
						1		1				3	
					–								
						3					5	3	
					5	3							
					–								
					5								
					5								
												3	
					5	1							
					5		1						
						5			1		1	1	
					–								
										1	3		LARGE-5
								5					
					–								
								3		5	5		
					5						1		
					5				3				
					5						1		[illegible]
		0	9.22	76.5		8	0.15	66.7					
		1	9.18	76.6		9	0.10	62.9					
		2	9.67	76.2		10	0.08	61.3					
		3	9.13	75.7		11	0.07	59.7					
		4	8.83	74.8		12	0.07	59.0					
		5	4.70	72.1									
		6	1.03	71.0									
		7	0.17	69.2									

Other plant species observed at lake:

Rake Sample Location GPS Coordinates

Table 5: GPS Coordinates for Rake Sample Locations

Latitude	Longitude	site
41.37388	-85.7843	1
41.39008	-85.7836	2
41.39003	-85.7821	3
41.37386	-85.7819	4
41.37321	-85.7811	5
41.37245	-85.7818	6
41.3716	-85.7804	7
41.37038	-85.7801	8
41.36936	-85.7808	9
41.36833	-85.7798	10
41.36902	-85.7795	11
41.36695	-85.7808	12
41.36646	-85.7812	13
41.36626	-85.7823	14
41.36654	-85.7834	15
41.36583	-85.7833	16
41.36515	-85.7827	17
41.36457	-85.7815	18
41.36374	-85.7809	19
41.36388	-85.7798	20
41.36509	-85.7781	21
41.36666	-85.778	22
41.36782	-85.7777	23
41.3673	-85.7748	24
41.36824	-85.7741	25
41.36939	-85.7734	26
41.36767	-85.7716	27
41.37105	-85.7716	28
41.36977	-85.7705	29
41.36819	-85.77	30
41.36744	-85.7688	31
41.36625	-85.7678	32
41.36695	-85.766	33
41.36628	-85.7648	34
41.36602	-85.7637	35
41.36517	-85.7642	36
41.36418	-85.7634	37
41.36345	-85.763	38
41.36368	-85.7616	39
41.36323	-85.761	40
41.36247	-85.7607	41
41.36309	-85.7601	42
41.36298	-85.9092	43
41.36379	-85.9097	44
41.36374	-85.7604	45

41.36437	-85.7609	46
41.36536	-85.7608	47
41.36574	-85.7621	48
41.36649	-85.7622	49
41.36717	-85.7629	50
41.36701	-85.7643	51
41.36816	-85.7641	52
41.36908	-85.7633	53
41.36957	-85.7642	54
41.37003	-85.7649	55
41.37085	-85.7653	56
41.37143	-85.7647	57
41.37253	-85.765	58
41.37283	-85.7637	59
41.37313	-85.7624	60
41.37372	-85.7619	61
41.37386	-85.7631	62
41.37391	-85.7641	63
41.37431	-85.7653	64
41.37355	-85.7658	65
41.37298	-85.7664	66
41.37316	-85.7677	67
41.37258	-85.7689	68
41.37256	-85.77	69
41.37391	-85.7709	70
41.37334	-85.772	71
41.37403	-85.7729	72
41.37363	-85.7743	73
41.37482	-85.7745	74
41.37324	-85.7904	90
41.37367	-85.7764	76
41.3746	-85.7772	77
41.37412	-85.7779	78
41.39008	-85.7791	79
41.37612	-85.7792	80
41.39067	-85.7801	81
41.37611	-85.7807	82
41.37641	-85.7799	83
41.37628	-85.7816	84
41.37661	-85.7827	85
41.37673	-85.7835	86
41.37629	-85.784	87
41.3762	-85.7849	88
41.39061	-85.7839	89
41.39047	-85.7832	90

END

16.4 IDNR Vegetation Control Permit

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			Return to: Page 1 of
APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT	**FOR OFFICE USE ONLY**		DEPARTMENT OF NATURAL RESOURCES
State Form 26727 (R4 / 2-04)	License No.		Division of Fish and Wildlife
Approved State Board of Accounts 2004			Commercial License Clerk
☐ Whole Lake ☒ Multiple Treatment Areas	Date Issued		402 West Washington Street, Room W273
Check type of permit			Indianapolis, IN 46204
INSTRUCTIONS: Please print or type information	Lake County		FEE: $5.00

Applicant's Name	Lake Assoc. Name: Dewart Lake Protective Association Inc.	
Rural Route or Street: P. O. Box 152		Phone Number: 574-658-9762
City and State: Syracuse IN		ZIP Code: 46567
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): Dewart Lake	Nearest Town: Syracuse	County: Kosciusko
Does water flow into a water supply		☐ Yes ☒ No

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

Treatment Area #	1	LAT/LONG or UTM's	N 41 degrees 22.196 W85 degrees 46.413
Total acres to be controlled	90	Proposed shoreline Length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	5	Expected date(s) of treatment(s)	May or August 2007 - depending on survey

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. 2-4,D

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

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Areas done based on surveys		
Plant species present based on surveys		

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) Late May early June / Mid July / late August	

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. Reward, Aquakleen, Aquathak K , Copper sulfate

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

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

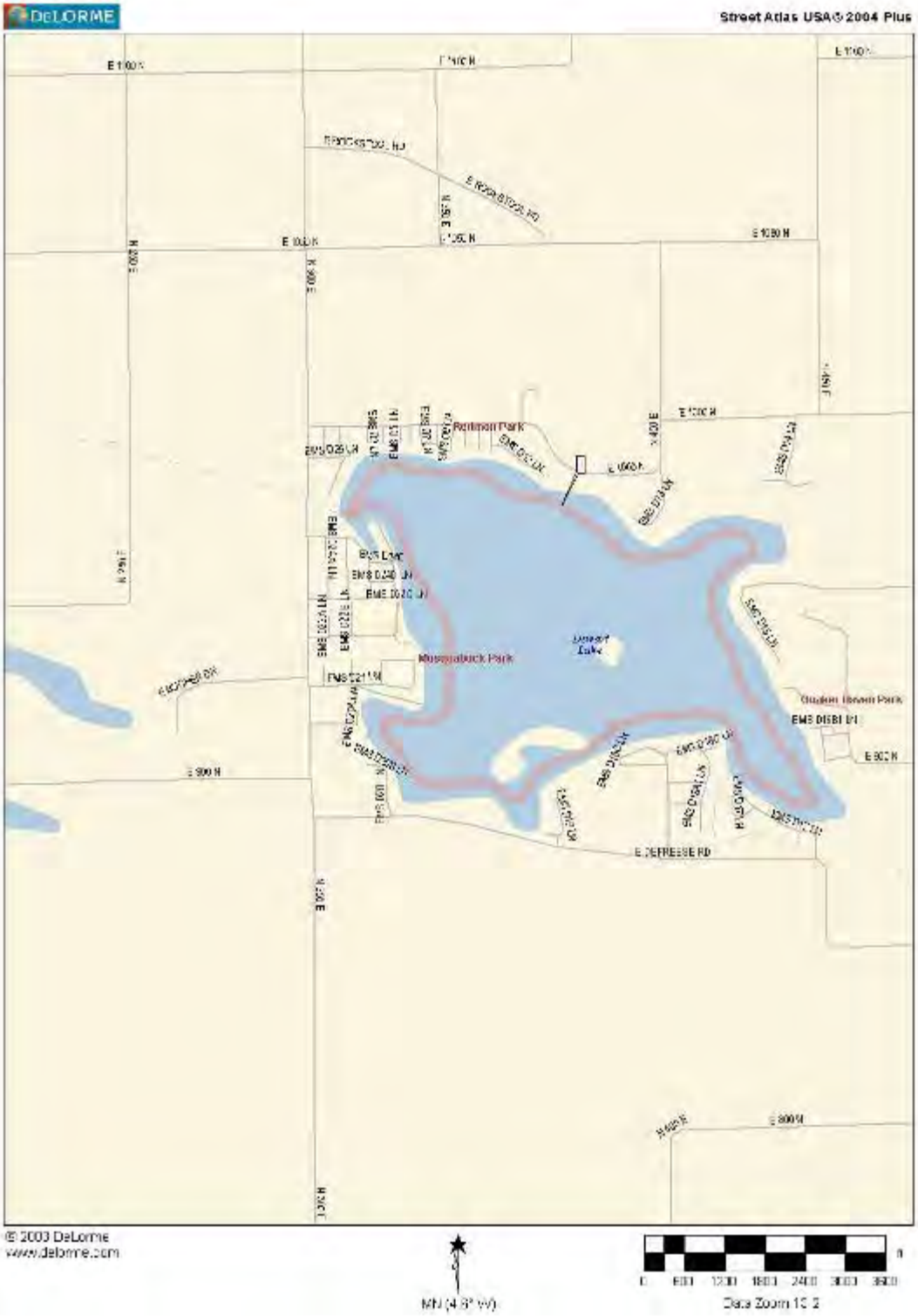
INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

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

Dewart Lake 2010 Possible Treatement Areas