

# Dewart Lake Aquatic Vegetation Management Plan 2016 Update

Kosciusko County, Indiana



Prepared for:

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## Executive Summary

Dewart Lake, located in Kosciusko County, Indiana has 551 surface acres with a maximum depth of 82 feet and an average depth of 16.3 feet. Eurasian watermilfoil (*Myriophyllum spicatum*), spiny naiad (*Najas marina*) and curly-leaf pondweed (*Potamogeton crispus*) are exotic plant species present in many areas of the lake where depths are less than 15 feet. The following report summarizes Eurasian watermilfoil (EWM) control practices implemented on Dewart Lake through the Lake and River Enhancement Program (LARE). It also outlines future exotic plant management options.

The Dewart Lake Protective Association has been controlling EWM both privately and with assistance from LARE since 2006. The entire lake was treated with Sonar herbicide on May 26, 2006. This treatment effectively controlled all the EWM in the lake in 2006 and gave good residual control of EWM for the next 3 years. Native plants showed short term declines which was expected. Native diversity would appear to have recovered completely from the Sonar treatment based on the available tier II data although it should be noted that tier II plant sampling protocol has changed since 2005.

By 2010, EWM was once again very abundant in Dewart Lake. The Dewart Lake Protective Association decided to explore plant management options other than just herbicide treatment alone. In 2012, the Dewart Lake Protective Association contracted with EnviroScience Incorporated of Stow, Ohio to initiate a EWM weevil stocking program. In 2012, EnviroScience stocked 25,000 weevils (*Euhrychiopsis lecontei*) at three different locations in Dewart Lake. This was the beginning of a three year stocking program designed to gradually reduce the abundance and severity of EWM in Dewart Lake. In 2013, 23,500 weevils were stocked at four locations, and in 2014, 11,000 weevils were stocked at one location.

During the three years of the weevil stocking program the IDNR conducted tier II vegetation surveys each summer to monitor both native and invasive plant populations. Aquatic Weed control conducted both a spring and a summer tier II vegetation survey in 2015. In 2016, a visual plant survey was conducted in spring and a tier II plant survey was conducted in summer.

Summer EWM frequency had increased each year from 2007 to 2012 as it recovered following the Sonar treatments. Summer EWM site frequency from 2007 to 2012 was 0.0, 7.8, 26.7, 45.6, 52.2, and 62.2 respectively. Summer tier II EWM frequencies from 2013 to 2016 were 32.2, 37.9, 30.0, and 50.0 percent respectively.

In 2016 EWM was abundant in spring and dominated the plant community in approximately 145 acres of the lake. The most dense 12.71 acres were treated selectively with 2, 4-D on June 22, 2016.

For 2017, a spring visual survey should give an idea of EWM severity and acreage. The map produced from this survey can be used as a treatment map if needed. It was generally decided at the permit meeting on September 19, 2016 that EWM treatments should only be conducted in areas where EWM infestation is severe and nearing the surface of the lake. The IDNR will permit treatment for up to a total 25 acres on the main lake (including private treatments).

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## Problem Statement

Eurasian watermilfoil (EWM) is impacting Dewart Lake in many areas. The milfoil can form dense mats in shallow areas, which can inhibit fishing, swimming, and boating. Dense milfoil beds may also prevent the growth of beneficial native species which often provide less recreational interference and more desirable fish habitat. Many of these beds are offshore in open water, although EWM also becomes dense in near shore areas of the southeast and northwest corners of the lake.

## Objectives:

The following specific, quantifiable objectives are recommended to evaluate the success of EWM management activities in Dewart Lake.

1. Strive to reduce Eurasian watermilfoil to less than 10% site frequency each year in summer tier II surveys.
2. Maintain at least 12 native plant species collected each year in the summer tier II survey and native species diversity of 0.80 in summer tier II surveys (IDNR, 2016).
3. Maintain native coverage of 85% each year in the summer tier II survey (IDNR, 2016).

Treating EWM will not eradicate it from Dewart Lake. However, if these objectives are met each year, the indication would be that EWM is being controlled effectively on a seasonal basis without causing significant damage to the native plant community.

## Aquatic Vegetation Management History

Table 1 summarizes the treatment history of EWM at Dewart Lake from 2006 until the present. The Dewart Lake Association has always been very committed to managing EWM infestations. The acreages of EWM treatments in Dewart Lake vary from year to year based on funding availability and EWM abundance. All of the weevil stockings by EnviroScience are listed in this table as well.

**Table 1: Dewart Lake Plant Management History**

<b>Year</b>	<b>Management Activity</b>
<b>Prior to 2006</b>	Sporadic private treatments for EWM/natives
<b>2006*</b>	Whole lake Sonar Treatment for EWM (May 26,2006)
<b>2007</b>	No Herbicide Treatments needed
<b>2008*</b>	13 total acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2009*</b>	45 total acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2010</b>	20.83 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2011</b>	20.83 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2012</b>	14.54 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2012*</b>	25,000 Weevils stocked in 3 areas (sites S1,S2,S3)
<b>2013</b>	12.64 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2013*</b>	23,500 Weevils stocked in 3 areas (sites S1, S3, S4, S5)
<b>2014</b>	12.64 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2014*</b>	11,000 Weevils stocked (site S6)
<b>2015*</b>	14.54 acres of EWM treated with 2, 4-D at 2.0 ppm
<b>2016*</b>	12.71 acres of EWM treated with 2, 4-D at 2.0 ppm

\*Completed at least partially with LARE funding

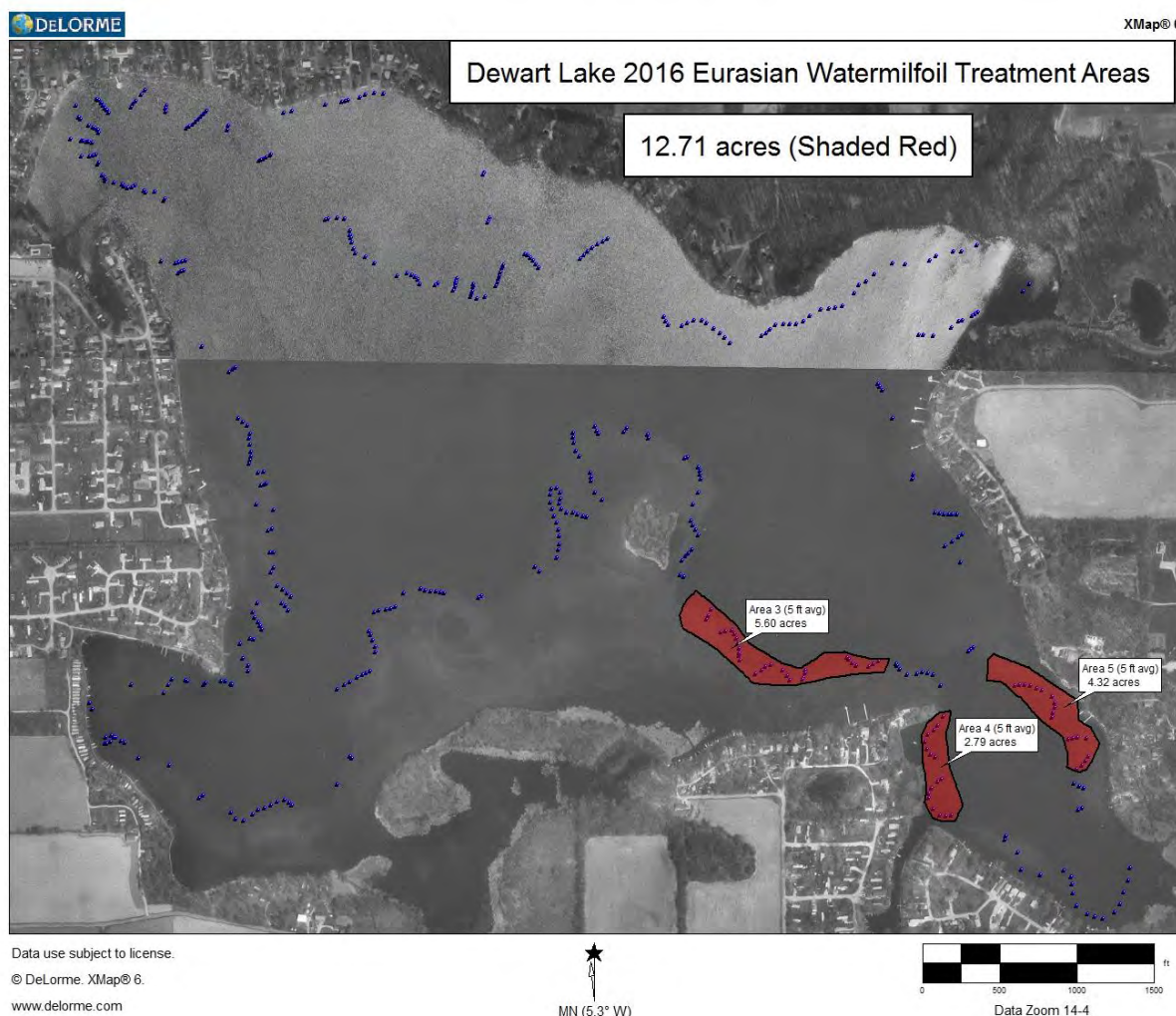
## 2016 Vegetation Treatments

On June 22, 2016, 12.71 acres of Eurasian watermilfoil (EWM) beds in Dewart Lake were treated with 2, 4-D at a rate of 2.0 ppm. This treatment was funded with a 50/50 cost share by both the Dewart Lake Protective Association and the IDNR through the LARE program. The 2016 EWM are shaded red in Figure 1. The descriptions of treatment areas in Table 2 correspond to the areas in Figure 1 as well.

**Table 2: Dewart Lake 2015 EWM Treatment Details**

Area	Acres	Avg. Depth	Herbicide	Rate
3	5.60	5 feet	DMA-4	2.0 ppm
4	2.79	5 feet	DMA-4	2.0 ppm
5	4.32	5 feet	DMA-4	2.0 ppm

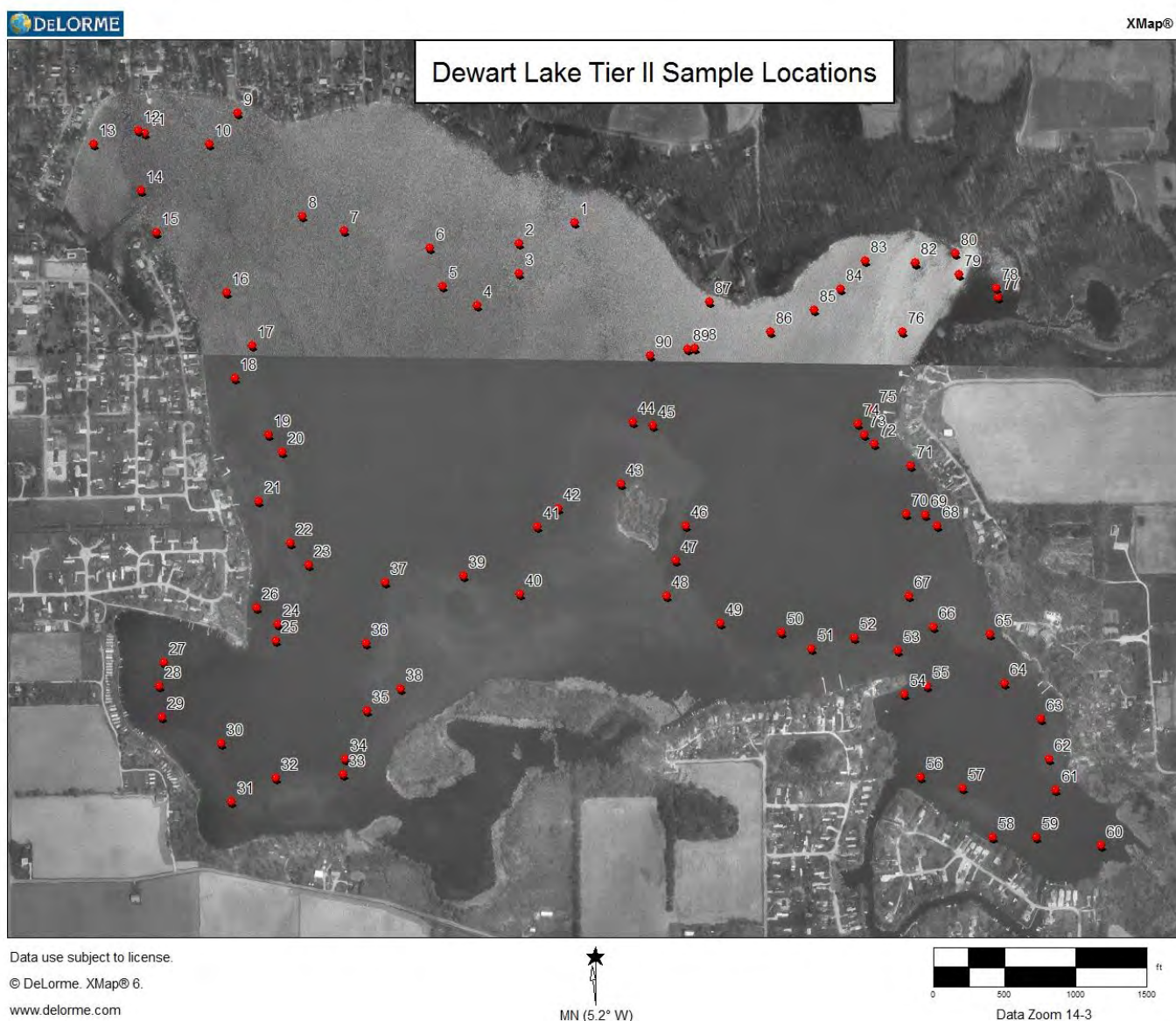
**Figure 1: Dewart Lake 2016 Eurasian Watermilfoil Treatment Areas**



## Tier II Survey Results

Aquatic plant sampling methods used for surveys on Dewart Lake are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR 2014). The sample locations used by Aquatic Weed Control in 2016 were obtained from the IDNR. This was done to ensure consistency in the sampling process from year to year. These same locations will continue to be used in the future to help maintain consistency. Common and scientific names of all plants collected are listed in the appendix to this report. Figure 2 shows rake sample locations for the Dewart Lake tier II surveys. Ninety sample sites are spaced randomly throughout each five foot depth contour of the lake's littoral zone.

Figure 2: Dewart Lake Tier II Sample Locations

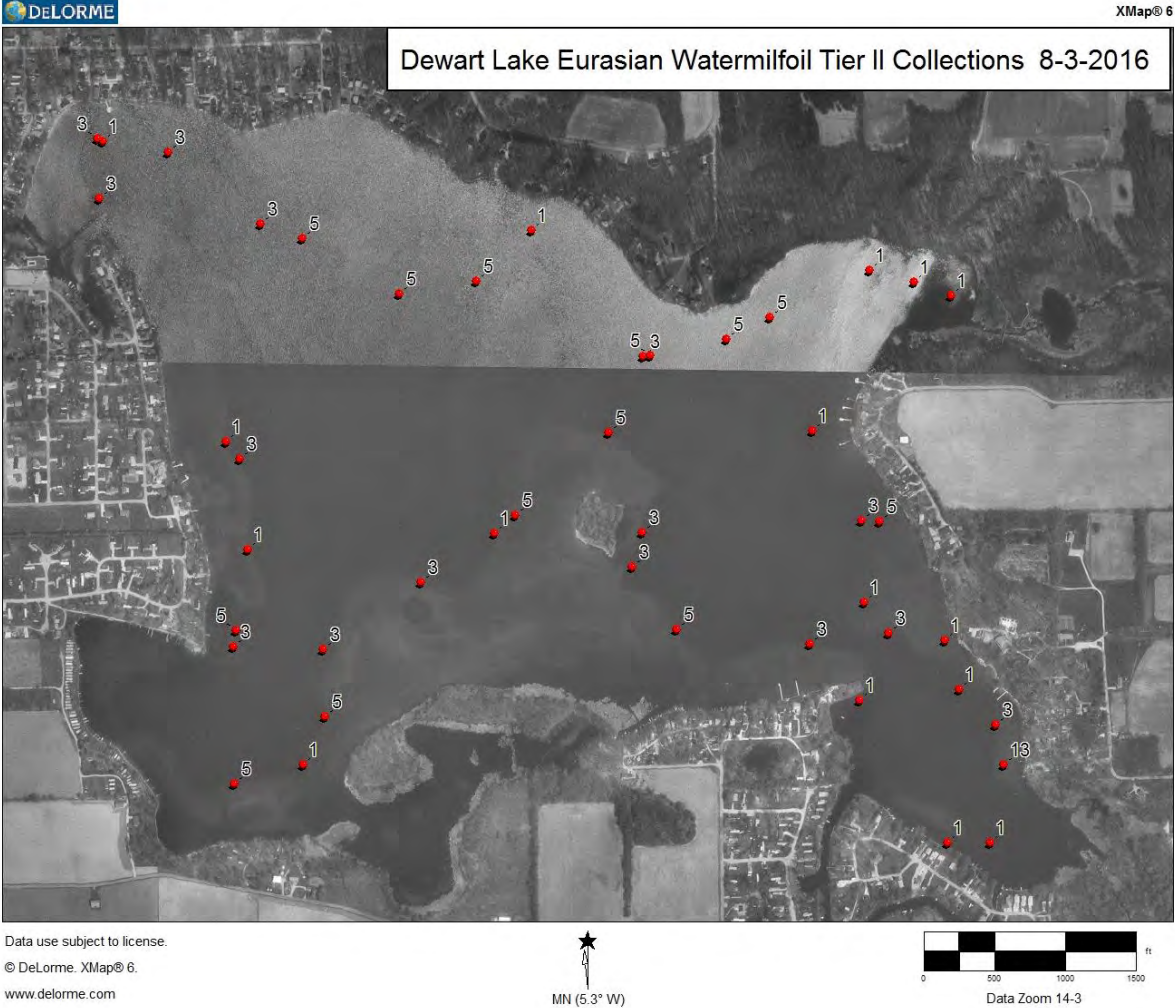


### Exotic Plant Distribution

### Eurasian Watermilfoil Abundance

The 2016 tier II survey was conducted on August 3<sup>rd</sup>. EWM frequency in the spring survey was 50.0. This is up from 30.0 percent in summer of 2015. All tier II sample locations where EWM was collected in the summer 2016 tier II survey are shown in Figure 3. As shown, EWM is abundant throughout the lake, especially in depths of 5 to 10 feet where its site frequency was 81.5 percent.

**Figure 3: Dewart Lake Summer 2016 EWM Locations**



### Curly-Leaf Pondweed Abundance

Curly-leaf pondweed (CLP) was found at just 2 sample locations in the summer 2016 tier II survey. However, spring surveys provide a better picture of CLP abundance. CLP is always most abundant in spring and dies off naturally as water temperatures rise in summer. The last spring tier II survey was conducted in 2015 and found CLP frequency to be 16.0 percent. The two tier II sites where CLP was collected in the summer 2016 tier II survey are described in Figure 4.

**Figure 4: Dewart Lake Summer 2016 Curly-Leaf Pondweed Locations**





## Spiny Naiad Abundance

Spiny naiad was collected at just one 1 sample location in the summer 2016 tier II survey. In the past few years spiny naiad has been found in very low abundance and it does not appear that spiny naiad is causing any significant problems in Dewart Lake. The one site where spiny naiad was collected in summer of 2016 is shown in Figure 5.

**Figure 5: Dewart Lake Summer 2016 Spiny Naiad Locations**



## Tier II Data Analysis

Results from the August 3, 2016 tier II survey on Dewart Lake is summarized in Table 3. Site frequency, dominance, diversity, and other metrics are shown for the entire survey (overall) and also for each 5 foot depth contour where plants were present. In this, no plants were found deeper than 19.5 feet.

**Table 3: Dewart Lake 2016 Tier II Data Analysis**

<b>Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake</b>						
County: Kosciusko	Secchi (ft): 11	Mean species/site: 2.14				
Date: 8/3/2016	Sites with plants: 80	SE Mean species/site: 0.15				
Littoral Depth (ft): 19.5	Sites with native plants: 68	Mean native species/site: 1.61				
Littoral Sites: 90	Number of species: 16	SE Mean natives/site: 0.13				
Total Sites: 90	Number of native species: 13	Species diversity: 0.86				
	Maximum species/site: 6	Native species diversity: 0.84				

All Depths Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
		0	1	3	5	
Eurasian watermilfoil	50.0	50.0	18.9	16.7	14.4	28.2
Chara	40.0	60.0	12.2	14.4	13.3	24.4
Coontail	31.1	68.9	14.4	11.1	5.6	15.1
Slender naiad	26.7	73.3	23.3	3.3	0.0	6.7
Illinois pondweed	22.2	77.8	13.3	8.9	0.0	8.0
Sago pondweed	11.1	88.9	8.9	2.2	0.0	3.1
Canada waterweed	5.6	94.4	4.4	1.1	0.0	1.6
Flat-stemmed pondweed	5.6	94.4	5.6	0.0	0.0	1.1
Small pondweed	5.6	94.4	3.3	2.2	0.0	2.0
Water stargrass	5.6	94.4	4.4	1.1	0.0	1.6
Large-leaved pondweed	3.3	96.7	3.3	0.0	0.0	0.7
Curly-leaf pondweed	2.2	97.8	1.1	1.1	0.0	0.9
Nitella	2.2	97.8	0.0	1.1	1.1	1.8
American pondweed	1.1	98.9	1.1	0.0	0.0	0.2
Eel grass	1.1	98.9	1.1	0.0	0.0	0.2
Spiny naiad	1.1	98.9	1.1	0.0	0.0	0.2
Filamentous Algae	7.8					

<b>Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake</b>						
County: Kosciusko	Secchi (ft): 11	Mean species/site: 2.10				
Date: 8/3/2016	Sites with plants: 27	SE Mean species/site: 0.22				
Littoral Depth (ft): 19.5	Sites with native plants: 26	Mean native species/site: 1.93				
Littoral Sites: 29	Number of species: 11	SE Mean natives/site: 0.21				
Total Sites: 29	Number of native species: 10	Species diversity: 0.77				
	Maximum species/site: 5	Native species diversity: 0.73				

Depths: 0 to 5 ft Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
		0	1	3	5	
Chara	82.8	17.2	17.2	34.5	31.0	55.2
Illinois pondweed	48.3	51.7	27.6	20.7	0.0	17.9
Slender naiad	20.7	79.3	17.2	3.4	0.0	5.5
Eurasian watermilfoil	17.2	82.8	17.2	0.0	0.0	3.4
Sago pondweed	13.8	86.2	10.3	3.4	0.0	4.1
Coontail	6.9	93.1	3.4	0.0	3.4	4.1
Flat-stemmed pondweed	6.9	93.1	6.9	0.0	0.0	1.4
American pondweed	3.4	96.6	3.4	0.0	0.0	0.7
Canada waterweed	3.4	96.6	3.4	0.0	0.0	0.7
Eel grass	3.4	96.6	3.4	0.0	0.0	0.7
Large-leaved pondweed	3.4	96.6	3.4	0.0	0.0	0.7
Filamentous Algae	6.9					

<b>Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake</b>						
County: Kosciusko	Secchi (ft): 11	Mean species/site: 2.59				
Date: 8/3/2016	Sites with plants: 26	SE Mean species/site: 0.27				
Littoral Depth (ft): 19.5	Sites with native plants: 21	Mean native species/site: 1.70				
Littoral Sites: 27	Number of species: 13	SE Mean natives/site: 0.23				
Total Sites: 27	Number of native species: 10	Species diversity: 0.84				
	Maximum species/site: 5	Native species diversity: 0.87				

Depths: 5 to 10 ft Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
		0	1	3	5	
Eurasian watermilfoil	81.5	18.5	22.2	22.2	37.0	54.8
Coontail	33.3	66.7	18.5	14.8	0.0	12.6
Chara	29.6	70.4	14.8	7.4	7.4	14.8
Slender naiad	29.6	70.4	25.9	3.7	0.0	7.4
Illinois pondweed	18.5	81.5	11.1	7.4	0.0	6.7
Sago pondweed	14.8	85.2	14.8	0.0	0.0	3.0
Water stargrass	14.8	85.2	11.1	3.7	0.0	4.4
Flat-stemmed pondweed	11.1	88.9	11.1	0.0	0.0	2.2
Canada waterweed	7.4	92.6	3.7	3.7	0.0	3.0
Small pondweed	7.4	92.6	7.4	0.0	0.0	1.5
Curly-leaf pondweed	3.7	96.3	0.0	3.7	0.0	2.2
Large-leaved pondweed	3.7	96.3	3.7	0.0	0.0	0.7
Spiny naiad	3.7	96.3	3.7	0.0	0.0	0.7
Filamentous Algae	11.1					

Table 3 continued

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake							
County: Kosciusko		Secchi (ft): 11		Mean species/site: 2.29			
Date: 8/3/2016		Sites with plants: 23		SE Mean species/site: 0.32			
Littoral Depth (ft): 19.5		Sites with native plants: 17		Mean native species/site: 1.58			
Littoral Sites: 24		Number of species: 12		SE Mean natives/site: 0.31			
Total Sites: 24		Number of native species: 10		Species diversity: 0.81			
		Maximum species/site: 6		Native species diversity: 0.77			
Depths: 10 to 15 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance	
Species		0	1	3	5		
Eurasian watermilfoil	66.7	33.3	20.8	33.3	12.5	36.7	
Coontail	58.3	41.7	25.0	16.7	16.7	31.7	
Slender naiad	41.7	58.3	37.5	4.2	0.0	10.0	
Chara	16.7	83.3	8.3	4.2	4.2	8.3	
Canada waterweed	8.3	91.7	8.3	0.0	0.0	1.7	
Sago pondweed	8.3	91.7	4.2	4.2	0.0	3.3	
Small pondweed	8.3	91.7	4.2	4.2	0.0	3.3	
Curly-leaf pondweed	4.2	95.8	4.2	0.0	0.0	0.8	
Illinois pondweed	4.2	95.8	4.2	0.0	0.0	0.8	
Large-leaved pondweed	4.2	95.8	4.2	0.0	0.0	0.8	
Nitella	4.2	95.8	0.0	0.0	4.2	4.2	
Water stargrass	4.2	95.8	4.2	0.0	0.0	0.8	
Filamentous Algae	8.3						
Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake							
County: Kosciusko		Secchi (ft): 11		Mean species/site: 0.70			
Date: 8/3/2016		Sites with plants: 4		SE Mean species/site: 0.30			
Littoral Depth (ft): 19.5		Sites with native plants: 4		Mean native species/site: 0.50			
Littoral Sites: 10		Number of species: 4		SE Mean natives/site: 0.22			
Total Sites: 10		Number of native species: 3		Species diversity: 0.69			
		Maximum species/site: 2		Native species diversity: 0.56			
Depths: 15 to 20 ft	Frequency of Occurrence	Rake score frequency per species				Plant Dominance	
Species		0	1	3	5		
Coontail	30.0	70.0	10.0	20.0	0.0	14.0	
Eurasian watermilfoil	20.0	80.0	10.0	10.0	0.0	8.0	
Nitella	10.0	90.0	0.0	10.0	0.0	6.0	
Small pondweed	10.0	90.0	0.0	10.0	0.0	6.0	

**Multi-Year Data Presentations**

Data from recent tier II surveys of Dewart Lake is summarized in Table 4 and Table 5. These summaries help track long term trends in species abundance and frequency, along with overall plant metrics. All historical spring tier II surveys are described in Table 4 while all historical summer tier II data is described in Table 5.

**Table 4: Dewart Lake Historical Tier II Data - Spring Surveys**

Dewart Lake Multi-Year Data Presentation- Spring Surveys					
Date:	5/23/2006	5/23/2007	5/22/2008	5/27/2010	5/26/2015
Total Sites:	90	90	90	90	90
Secchi (ft):	22	13	17.5	10.4	8.3
Number of Species:	11	9	12	14	16
Number of Native Species:	9	8	10	12	14
Sites with Plants	83	79	79	85	86
Sites with Native Plants	68	50	66	81	81
Maximum Plant Depth (ft)	19	20	20	19	18
Species Diversity:	0.79	0.73	0.78	0.85	0.85
Native Species Diversity:	0.73	0.72	0.73	0.79	0.81
Mean Native Species/Site:	0.94	0.69	0.81	1.31	1.54
Surveying Organization	IDNR	IDNR	IDNR	AWC	AWC
Species Frequency of Occurrence - All Depths					
Chara	23.3	30.0	38.9	41.1	41.1
Eurasian watermilfoil	67.8	0.0	3.3	43.3	56.7
Illinois pondweed	0.0	0.0	0.0	4.4	7.8
Sago pondweed	10.0	17.8	5.6	12.2	34.4
Eel grass	0.0	0.0	1.1	0.0	2.2
Coontail	41.1	5.6	11.1	37.8	36.7
Slender naiad	2.2	0.0	1.1	0.0	2.2
Nitella	1.1	3.3	3.3	2.2	2.2
Bladderwort	0.0	0.0	0.0	0.0	1.1
American pondweed	0.0	0.0	0.0	2.2	0.0
Whorled watermilfoil	0.0	0.0	0.0	1.1	0.0
Flat-stemmed pondweed	2.2	1.1	5.6	14.4	1.1
Small pondweed	0.0	0.0	0.0	0.0	4.4
Canada waterweed	0.0	0.0	0.0	2.2	0.0
Variable pondweed	6.7	1.1	0.0	0.0	7.8
Curly-leaf pondweed	35.6	48.9	42.2	33.3	16.7
Floating-leaf pondweed	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	1.1
Leafy pondweed	0.0	0.0	3.3	7.8	0.0
Water stargrass	5.6	5.6	8.9	4.4	5.6
Large-leaved pondweed	2.2	4.4	2.2	1.1	6.7
Filamentous Algae	12.2	34.4	31.1	0.0	7.8
Species Frequency of Occurrence - 0 to 5 ft					
Chara	65.5	65.5	69.0	79.3	86.2
Illinois pondweed	0.0	0.0	0.0	6.9	17.2
Eurasian watermilfoil	27.6	0.0	3.4	27.6	27.6
Sago pondweed	10.3	6.9	0.0	3.4	31.0
Slender naiad	0.0	0.0	0.0	0.0	3.4
Eel grass	0.0	0.0	0.0	0.0	3.4
American pondweed	0.0	0.0	0.0	6.9	0.0
Flat-stemmed pondweed	0.0	3.4	0.0	10.3	0.0
Coontail	6.9	0.0	3.4	20.7	10.3
Canada waterweed	0.0	0.0	0.0	3.4	0.0
Variable pondweed	20.7	3.4	0.0	0.0	20.7
Curly-leaf pondweed	6.9	13.8	13.8	20.7	3.4
Leafy pondweed	0.0	0.0	0.0	10.3	0.0
Small pondweed	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	0.0	0.0	3.4	3.4
Southern naiad	0.0	0.0	0.0	0.0	3.4
Large-leaved pondweed	3.4	6.9	3.4	0.0	13.8
Filamentous Algae	24.1	79.3	58.6	0.0	13.8
Species Frequency of Occurrence - 5 to 10 ft					
Chara	7.4	29.6	48.1	44.4	33.3
Eurasian watermilfoil	96.3	0.0	0.0	66.7	85.2
Sago pondweed	14.8	48.1	11.1	14.8	74.1
Eel grass	0.0	0.0	3.7	0.0	3.7
Illinois pondweed	0.0	0.0	0.0	7.4	7.4
Coontail	29.6	11.1	3.7	37.0	25.9
Slender naiad	0.0	0.0	3.7	0.0	3.7
Small pondweed	0.0	0.0	0.0	0.0	11.1
Bladderwort	0.0	0.0	0.0	0.0	3.7
Canada waterweed	0.0	0.0	0.0	3.7	0.0
Flat-stemmed pondweed	3.7	0.0	3.7	22.2	3.7
Nitella	0.0	0.0	0.0	0.0	3.7
Variable pondweed	0.0	0.0	0.0	0.0	3.7
Water stargrass	18.5	14.8	14.8	0.0	3.7
Large-leaved pondweed	3.7	7.4	3.7	3.7	7.4
Leafy pondweed	0.0	0.0	0.0	11.1	0.0
Whorled watermilfoil	0.0	0.0	0.0	3.7	0.0
Curly-leaf pondweed	29.6	51.9	33.3	40.7	3.7
Filamentous Algae	7.4	18.5	40.7	0.0	3.7

Table 4 continued

Species Frequency of Occurrence - 10 to 15 ft					
Eurasian watermilfoil	95.8	0.0	8.3	54.2	58.3
Chara	0.0	0.0	8.3	4.2	12.5
Coontail	87.5	8.3	25.0	54.2	75.0
Sago pondweed	8.3	4.2	8.3	25.0	8.3
Slender naiad	4.2	0.0	0.0	0.0	0.0
Nitella	0.0	0.0	4.2	4.2	0.0
Water stargrass	0.0	4.2	16.7	0.0	8.3
Leafy pondweed	0.0	0.0	12.5	4.2	0.0
Flat-stemmed pondweed	4.2	0.0	12.5	16.7	0.0
Small pondweed	0.0	0.0	0.0	0.0	4.2
Curly-leaf pondweed	66.7	87.5	79.2	41.7	41.7
Filamentous Algae	4.2	12.5	0.0	0.0	4.2
Species Frequency of Occurrence - 15 to 20 ft					
Nitella	10.0	30.0	20.0	10.0	10.0
Coontail	60.0	0.0	20.0	50.0	50.0
Chara	0.0	0.0	0.0	10.0	0.0
Slender naiad	10.0	0.0	0.0	0.0	0.0
Eurasian watermilfoil	40.0	0.0	0.0	0.0	60.0
Curly-leaf pondweed	60.0	50.0	60.0	30.0	30.0
Water stargrass	0.0	0.0	0.0	0.0	10.0
Flat-stemmed pondweed	0.0	0.0	10.0	0.0	0.0
Filamentous Algae	10.0	0.0	0.0	0.0	10.0

Table 5: Dewart Lake Historical Tier II Data - Summer Surveys

Dewart Lake Multi-Year Data Presentation- Summer Surveys												
Date:	8/1/2005	7/31/2006	8/1/2007	7/29/2008	7/30/2009	8/11/2010	8/17/2011	8/16/2012	8/8/2013	8/7/2014	7/31/2015	8/3/2016
Total Sites:	103	90	90	90	90	90	90	90	90	90	90	90
Secchi (ft):	7.5	11	9	7.5	8.5	-	12	-	-	7.5	9.2	11
Number of Species:	17	10	12	15	16	12	15	14	16	17	16	16
Number of Native Species:	15	9	10	12	14	10	13	12	14	14	14	13
Sites with Plants	103	80	77	79	86	85	87	88	84	86	82	80
Sites with Native Plants	100	80	75	79	85	84	80	86	84	86	82	68
Maximum Plant Depth (ft)	20	20	17	19.5	20	20	18	20	20	18	18	19.5
Species Diversity:	0.85	0.72	0.79	0.83	0.88	0.86	0.83	0.8	0.85	0.86	0.86	0.86
Native Species Diversity:	0.84	0.71	0.73	0.8	0.86	0.83	0.8	0.78	0.81	0.83	0.84	0.84
Mean Native Species/Site:	1.86	1.12	1.36	1.43	1.84	1.79	1.49	1.47	1.66	2.07	1.79	1.61
Surveying Organization	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	AWC	AWC
Species Frequency of Occurrence - All Depths												
Chara	50.5	37.8	56.7	43.3	35.6	47.8	45.6	37.8	34.4	75.9	38.9	40.0
Eurasian watermilfoil	60.2	0.0	0.0	7.8	26.7	45.6	52.2	62.2	32.2	37.9	30.0	50.0
Illinois pondweed	11.7	0.0	1.1	1.1	2.2	10.0	4.4	14.4	11.1	17.2	16.7	22.2
Sago pondweed	12.6	0.0	35.6	31.1	30.0	25.6	15.6	15.6	33.3	48.3	31.1	11.1
Eel grass	1.0	1.1	0.0	1.1	1.1	4.4	1.1	1.1	2.2	0.0	2.2	1.1
Coontail	43.7	43.3	12.2	20.0	37.8	37.8	42.2	52.2	50.0	17.2	43.3	31.1
Slender naiad	18.4	2.2	5.6	6.7	13.3	14.4	12.2	4.4	2.2	17.2	20.0	26.7
Nitella	0.0	1.1	1.1	2.2	11.1	4.4	0.0	0.0	0.0	0.0	5.6	2.2
Bladderwort	1.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0
Spiny naiad	0.0	0.0	4.4	2.2	3.3	2.2	3.3	1.1	4.4	6.9	2.2	1.1
American pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Flat-stemmed pondweed	2.9	5.6	0.0	1.1	10.0	5.6	3.3	0.0	1.1	6.9	7.8	5.6
Small pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.6
Canada waterweed	3.9	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	3.4	1.1	5.6
Variable pondweed	13.6	2.2	2.2	4.4	2.2	0.0	12.2	12.2	6.7	37.9	0.0	0.0
Curly-leaf pondweed	1.9	2.2	24.4	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
Floating-leaf pondweed	2.3	0.0	0.0	0.0	0.0	0.0	1.1	2.2	0.0	3.4	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	37.9	4.4	0.0
Leafy pondweed	1.0	0.0	1.1	3.3	5.6	0.0	3.3	1.1	2.2	0.0	0.0	0.0
Northern watermilfoil	1.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	6.7	0.0	0.0	0.0
Water stargrass	18.4	16.7	16.7	27.8	23.3	22.2	0.0	0.0	1.1	6.9	4.4	5.6
Large-leaved pondweed	5.8	2.2	3.3	1.1	6.7	6.7	3.3	3.3	1.1	6.9	1.1	3.3
Filamentous Algae	9.7	12.2	12.2	4.4	0.0	0.0	3.3	0.0	3.3	10.3	3.3	7.8
Species Frequency of Occurrence - 0 to 5 ft												
Chara	88.6	80.0	83.9	89.7	89.7	86.2	82.8	82.8	82.8	75.9	89.7	82.8
Illinois pondweed	20.5	0.0	3.2	0.0	3.4	24.1	6.9	41.4	27.6	17.2	48.3	48.3
Eurasian watermilfoil	29.5	0.0	0.0	3.4	10.3	17.2	31.0	37.9	27.6	37.9	17.2	17.2
Sago pondweed	4.5	0.0	16.1	3.4	13.8	6.9	0.0	20.7	17.2	48.3	24.1	13.8
Slender naiad	29.5	3.3	0.0	0.0	10.3	17.2	27.6	0.0	6.9	17.2	13.8	20.7
Eel grass	0.0	0.0	0.0	0.0	0.0	6.9	3.4	3.4	6.9	0.0	0.0	3.4
Bladderwort	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0
American pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4
Flat-stemmed pondweed	4.5	3.3	0.0	0.0	0.0	3.4	3.4	0.0	3.4	6.9	6.9	6.9
Spiny naiad	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4	6.9	6.9	3.4	0.0
Richardson's pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coontail	13.6	10.0	3.2	6.9	13.8	6.9	10.3	17.2	13.8	17.2	17.2	6.9
Canada waterweed	2.3	0.0	0.0	0.0	0.0	0.0	3.4	3.4	3.4	3.4	3.4	3.4
Variable pondweed	27.3	3.3	6.5	6.9	3.4	0.0	27.6	31.0	13.8	37.9	0.0	0.0
Curly-leaf pondweed	0.0	0.0	3.2	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	3.4	3.4	0.0	3.4	0.0	0.0	0.0	0.0	0.0
Water stargrass	11.4	10.0	9.7	6.9	3.4	6.9	0.0	0.0	0.0	6.9	0.0	0.0
Floating-leaf pondweed	2.3	0.0	0.0	0.0	0.0	0.0	3.4	6.9	0.0	3.4	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	37.9	3.4	0.0
Northern watermilfoil	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0
Nitella	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Large-leaved pondweed	4.5	3.3	3.2	0.0	10.3	13.8	10.3	10.3	3.4	6.9	3.4	3.4
Filamentous Algae	2.3	13.3	12.9	3.4	0.0	0.0	6.9	0.0	3.4	10.3	3.4	6.9

Table 5 continued

Species Frequency of Occurrence - 5 to 10 ft												
Chara	36.4	30.8	68.0	40.7	22.2	55.6	51.9	32.1	25.9	14.8	33.3	29.6
Eurasian watermilfoil	78.8	0.0	0.0	7.4	33.3	70.4	70.4	96.4	55.6	85.2	55.6	81.5
Sago pondweed	27.3	0.0	72.0	51.9	59.3	40.7	37.0	21.4	70.4	74.1	63.0	14.8
Eel grass	3.0	3.8	0.0	3.7	3.7	0.0	0.0	0.0	0.0	3.7	7.4	0.0
Illinois pondweed	9.1	0.0	0.0	3.7	3.7	7.4	3.7	0.0	7.4	0.0	3.7	18.5
Coontail	45.5	38.5	8.0	22.2	29.6	44.4	37.0	53.6	59.3	63.0	37.0	33.3
Slender naiad	18.2	0.0	20.0	11.1	22.2	7.4	11.1	3.6	0.0	0.0	14.8	29.6
Richardson's pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0
Small pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4
Canada waterweed	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	7.4
Spiny naiad	0.0	0.0	8.0	7.4	11.1	3.7	7.4	0.0	7.4	7.4	3.7	3.7
Flat-stemmed pondweed	3.0	7.7	0.0	0.0	18.5	11.1	0.0	0.0	0.0	11.1	11.1	11.1
Nitella	0.0	0.0	0.0	0.0	18.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0
Variable pondweed	6.1	3.8	0.0	7.4	3.7	0.0	11.1	7.1	7.4	14.8	0.0	0.0
Water stargrass	36.4	23.1	28.0	29.6	37.0	40.7	0.0	0.0	3.7	7.4	11.1	14.8
Large-leaved pondweed	12.1	0.0	4.0	3.7	11.1	3.7	0.0	0.0	0.0	0.0	0.0	3.7
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.9	37.0	7.4	0.0
Leafy pondweed	3.0	0.0	4.0	3.7	3.7	0.0	7.4	0.0	0.0	0.0	0.0	0.0
Northern watermilfoil	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	7.4	0.0	0.0	0.0
Curly-leaf pondweed	0.0	0.0	32.0	3.7	0.0	0.0	0.0	0.0	0.0	3.7	0.0	3.7
Filamentous Algae	21.2	15.4	12.0	11.1	0.0	0.0	3.7	0.0	7.4	3.7	7.4	11.1
Species Frequency of Occurrence - 10 to 15 ft												
Eurasian watermilfoil	84.6	0.0	0.0	12.5	45.8	70.8	66.7	60.9	20.8	50.0	29.2	66.7
Chara	7.7	8.3	29.2	8.3	0.0	12.5	8.3	4.3	0.0	4.2	0.0	16.7
Coontail	84.6	75.0	25.0	25.0	66.7	66.7	83.3	82.6	83.3	91.7	87.5	58.3
Eel grass	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Sago pondweed	15.4	0.0	33.3	41.7	29.2	33.3	16.7	8.7	20.8	20.8	16.7	8.3
Spiny naiad	0.0	0.0	8.3	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0
Illinois pondweed	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	4.2
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	4.2	0.0
Slender naiad	0.0	0.0	0.0	12.5	12.5	20.8	0.0	0.0	0.0	0.0	37.5	41.7
Nitella	0.0	0.0	0.0	4.2	12.5	8.3	0.0	0.0	0.0	0.0	8.3	4.2
Bladderwort	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	15.4	20.8	20.8	54.2	37.5	29.2	0.0	0.0	0.0	4.2	4.2	4.2
Canada waterweed	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3
Large-leaved pondweed	0.0	4.2	4.2	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	4.2
Leafy pondweed	0.0	0.0	0.0	4.2	12.5	0.0	0.0	4.3	4.2	0.0	0.0	0.0
Flat-stemmed pondweed	0.0	4.2	0.0	4.2	16.7	4.2	8.3	0.0	0.0	0.0	8.3	0.0
Small pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	8.3
Variable pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
Curly-leaf pondweed	15.4	8.3	50.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2
Northern watermilfoil	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	12.5	0.0	0.0	0.0
Filamentous Algae	7.7	8.3	12.5	0.0	4.2	0.0	0.0	0.0	0.0	4.2	0.0	8.3
Species Frequency of Occurrence - 15 to 20 ft												
Nitella	0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	10.0	30.0	10.0
Coontail	100.0	80.0	20.0	40.0	60.0	40.0	50.0	80.0	50.0	50.0	30.0	30.0
Chara	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0
Slender naiad	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0
Sago pondweed	0.0	0.0	10.0	30.0	0.0	20.0	0.0	0.0	10.0	0.0	0.0	0.0
Eurasian watermilfoil	92.3	0.0	0.0	10.0	10.0	0.0	30.0	40.0	10.0	10.0	0.0	20.0
Curly-leaf pondweed	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water stargrass	0.0	10.0	0.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Small pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
Flat-stemmed pondweed	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada waterweed	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leafy pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Variable pondweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0
Filamentous Algae	7.7	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0

## Water Clarity and Water Quality

Table 6 summarizes the Secchi readings taken in each tier II survey on Dewart Lake since 2005. Water clarity can fluctuate greatly based on weather, rain events, and algal blooms. It appears that water clarity in Dewart Lake is moderate to good when compared to many other lakes in the area. Water clarity appears to have changed very little since 2005.

**Table 6: Dewart Lake Secchi History**

Date	Secchi (ft.):
8/1/2005	7.5
5/23/2006	22
7/31/2006	11
5/23/2007	13
8/1/2007	9
5/22/2008	17.5
7/29/2008	7.5
7/30/2009	8.5
5/27/2010	10.4
8/11/2010	-
8/17/2011	12
8/16/2012	-
8/8/2013	-
8/7/2014	7.5
5/26/2015	8.3
7/31/2015	9.2
8/3/2016	11.0

## Dissolved Oxygen and Temperature Profiles

During the summer 2016 tier II survey, Aquatic Weed Control collected data to construct dissolved oxygen and temperature profiles for Dewart Lake. These profiles are described in Figure 6 and Figure 7. Dissolved oxygen in Dewart Lake is moderate. Adequate oxygen to support fish life was present down to about 15 feet in August of 2016. Data from the temperature profile indicated weak thermal stratification beginning at a depth of around 10 feet. The surface temperature was 85.9 degrees and dropped to a temperature of 56.0 degrees at a depth of 30 feet.



Figure 6: Dewart Lake 2016 Dissolved Oxygen Profile

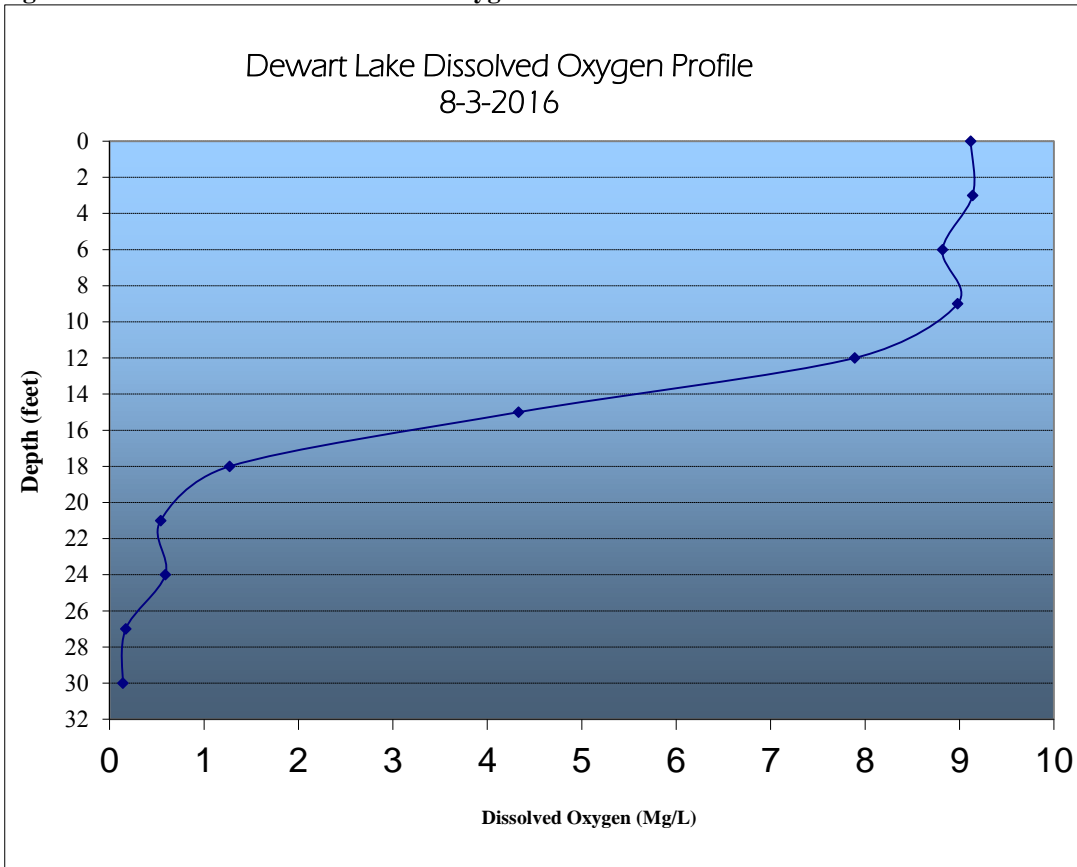
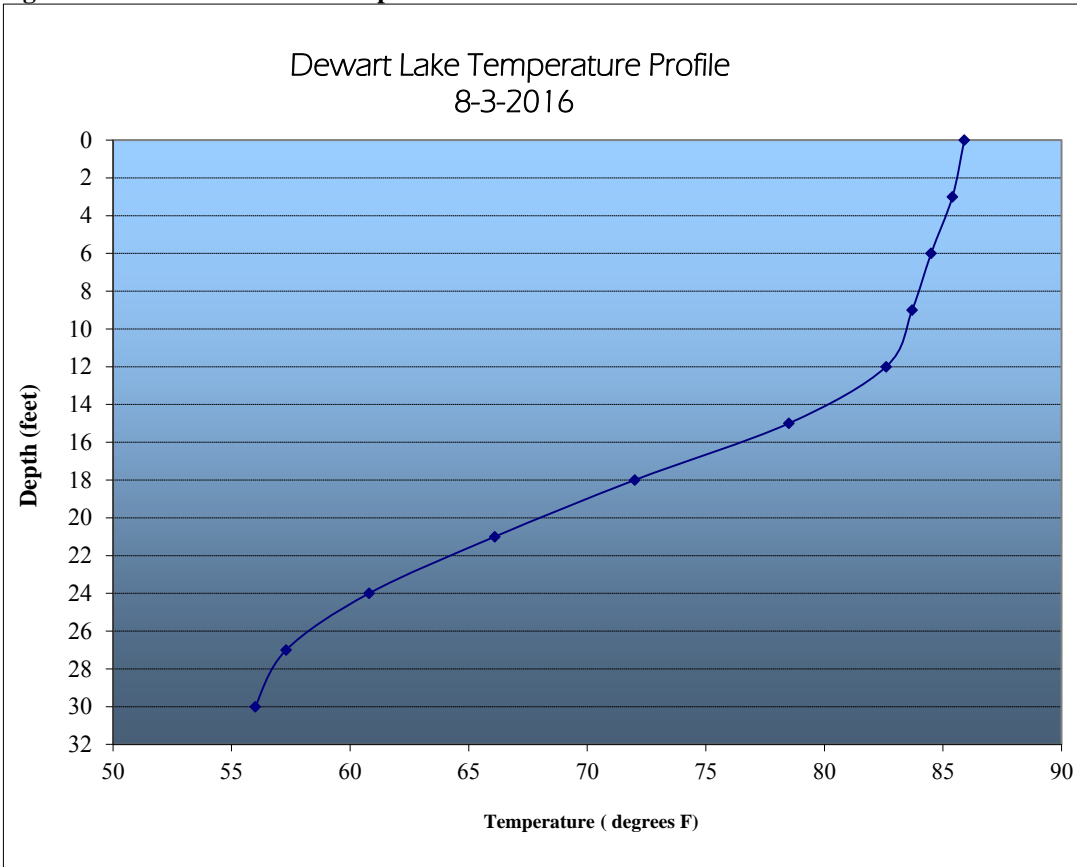


Figure 7: Dewart Lake 2016 Temperature Profile



## Tier II Discussion

In the Dewart Lake Summer 2016 tier II survey, three exotic plant species were collected along with 13 native plant species.

Eurasian watermilfoil (EWM), spiny naiad, and curly-leaf pondweed (CLP) were the three exotic plants collected in Dewart Lake in 2016. In the summer 2016 tier II survey, spiny naiad site frequency was 1.1 percent. Curly leaf pondweed frequency was 2.2 percent and EWM frequency was 50.0 percent. At this time, it does not appear that either CLP or spiny naiad is causing major lake use problems in Dewart Lake. EWM does become dense in many areas and is currently the most significant management concern.

EWM frequency had increased each year from 2007 to 2012 as it recovered following the Sonar treatment in 2006. Summer EWM site frequency from 2007 to 2012 was 0.0, 7.8, 26.7, 45.6, 52.2, and 62.2 respectively. In the summer of 2013, EWM frequency was down to 32.2 percent and stayed relatively stable with summer frequencies of 37.9 in 2014 and 30.0 in 2015. Tier II data from 2016 showed an increase in EWM abundance with a site frequency of 50.0 percent.

The tier II data from the years of the weevil stocking could indicate that the weevils are having an impact on the EWM population by reducing frequency from spring to summer. However, it is difficult to say for sure as natural reductions in EWM from spring to fall can also occur. It is unknown if the weevils are still having an impact on EWM density. While EWM frequency was quite high in 2016, that is not to say that weevils could not be preventing some EWM from reaching the surface of the lake.

The summary and results of the weevil stockings is available online:

[http://www.in.gov/dnr/fishwild/files/fw-1163\\_Dewart\\_Lake\\_2015\\_Weevil\\_Survey\\_Kosciusko\\_County\\_Oct\\_2015.pdf](http://www.in.gov/dnr/fishwild/files/fw-1163_Dewart_Lake_2015_Weevil_Survey_Kosciusko_County_Oct_2015.pdf)

## Native Plant Trends

The 2016 tier II survey collected 13 native plant species which is very comparable to past years. Native plant diversity was good in summer of 2016 at 0.84. This is as high as native plant diversity has been since 2009. It appears that native plant diversity has remained very stable since 2005. Native vegetation is somewhat dense in many areas of Dewart Lake and diversity is high compared to many other area lakes. However, the native population should continue to be monitored to verify that species richness and diversity do not decline significantly in the future.

The plant management objectives outlined in this report include reducing annual EWM site frequency to 10% or less, while maintaining 12 native species collected each year. The IDNR also established the objectives of maintaining a native plant diversity of 0.80 each year while also maintaining 85% plant coverage in tier II surveys. The native objectives were met in 2016 while the EWM control objective was not. Given EWM abundance in Dewart Lake and the limited amount of treatment, it is not likely that the EWM control objective of 10% frequency will be met in the near future. Currently the IDNR will allow up to 28 acres to be treated annually.

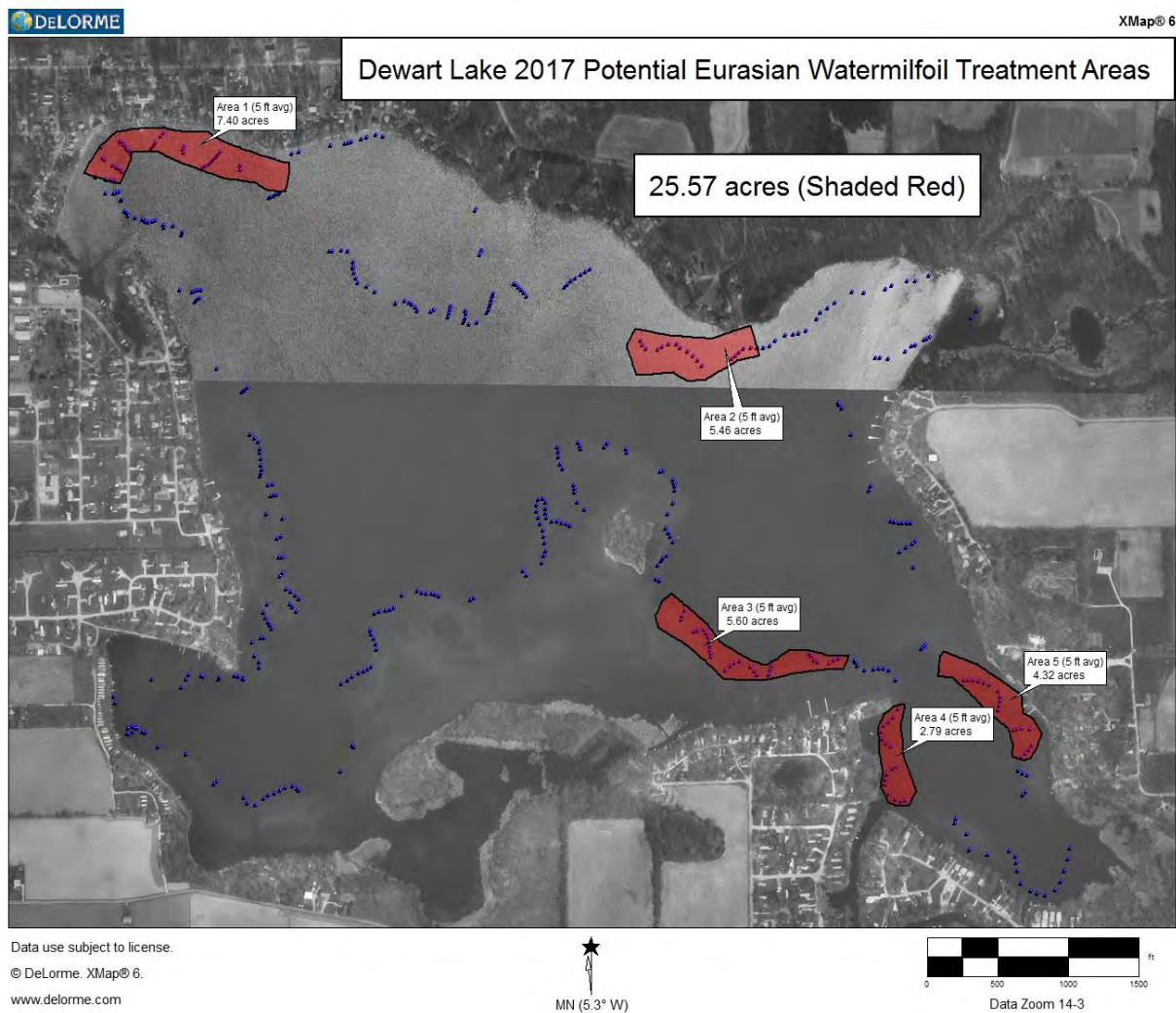
Chara and coontail are the two most dominant native plants in summer surveys on Dewart Lake. On August 3, 2016, Chara and Coontail were found at 40.0 and 31.1 percent of sample sites respectively. Both of these plants offer beneficial habitat for fish and invertebrates. Helping to keep invasive plants under control should help to foster more favorable conditions for native plants to flourish.

**Action Plan**

For 2017, a spring visual survey should give an idea of EWM severity and acreage. The map produced from this survey can be used as a treatment map if needed. It was generally decided at the permit meeting in September of 2016 that EWM treatments should only be conducted in areas where EWM infestation is severe and nearing the surface of the lake. The IDNR will permit treatment for up to a total of 28 acres on the main lake (including private treatments).

LARE staff along with the DLPA would like to continue to protect areas where EWM weevils have been stocked and EWM treatments are not likely to be allowed in historical weevil stocking sites. The following map shows potential treatment areas for 2017 although actual areas will depend upon the results of a visual survey in spring of 2017. A map will be submitted to the IDNR for approval prior to any herbicide treatments.

**Figure 8: Dewart Lake 2017 Potential EWM Treatment Areas**



## Surveys and Planning

A visual survey should be sufficient in the spring of 2017 to verify EWM abundance and locations prior to any herbicide treatments. A summer (post treatment) tier II survey should be used to monitor both EWM and native plant populations and update the AVMP. It is also possible that the association could apply for survey funding in 2017 as opposed to a full AVMP update in 2017. Cost figures below include estimates for a full 2017 AVMP update as this would represent the maximum cost share for the association.

### 2017 Project Budget

Treat up to 25 acres of EWM on Dewart Lake with liquid 2, 4-D at 2.0 ppm. (up to 6 ft avg depth)	\$ 8,750
Spring visual survey, summer Tier II survey and plan update	\$ 5,000

\*\*The association may decide to conduct a survey without an AVMP. The cost estimate for this is \$2,500.

Total cost estimate and Grant Request	up to \$ 13,750
LARE share (80% of AVMP, 50% of treatment)	up to \$ 8,375
Assocaitions share (20% of avmp, 50% of treatment)	up to \$ 5,375

## Public Involvement

Parties interested in the improvement of Dewart Lake include members of the Dewart Lake Protective Association as well as others who access the lake at the IDNR owned access site. The most common and often most effective methods for keeping the public informed about aquatic vegetation management practices are lake association meetings as well as periodical newsletters sent out by the associations. It is recommended that association members encourage neighbors and other lake users to attend lake association meetings so that interested parties are well informed about the LARE program. Making sure that meetings are well advertised and planned well in advance of the meeting dates are ways to help ensure good attendance. Carry-in dinners, door prizes, contests, guest speakers, and discussion panels are all excellent ways to boost attendance, encourage involvement, and keep association members informed about lake management activities.

The Dewart Lake Association held a public meeting on June 12, 2016 to discuss issues related to the LARE program. Jim Donahoe of Aquatic Weed Control attended this meeting to summarize LARE activities on the lake. Attendance was good with 18 lake use surveys being returned. The majority of association members were very much in favor of continuing efforts to control invasive plant species. Two people commented that they thought the weevil stockings were effective. The results of the 2016 survey responses are summarized in Figure 9.

**Figure 9: Dewart Lake 2016 Public Questionnaire**

Lake Use Survey

Lake name Dewart Lake

Are you a lake property owner? Yes 17 No 1

Are you currently a member of your lake association? Yes 18 No 0

How many years have you been at the lake? 2 or less 0  
 2 – 5 years 0  
 5-10 years 4  
 Over 10 years 14

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

18 Swimming                      5 Irrigation  
18 Boating                          Drinking water  
17 Fishing                         1 Other fun \_\_\_\_\_

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 14 No 4

Do you currently participate in a weed control project on the lake? Yes 14 No 4

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 12 No 4

Does the level of vegetation in the lake affect your property values? Yes 7 No 10

Are you in favor of continuing efforts to control vegetation on the lake? Yes 17 No 1

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 16 No    

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

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

Please add any comments:

Great lake - no problems as long as weeds are controlled

Best lake in Indiana-weevils were great!!

Aquatic vegetation has interfered with use of this lake in the past.

Use of jet skis by underage and under-skilled drivers

I think weevils worked! Not in favor of total lake spraying!

Have to wait too late into the summer for treatment.

## References Cited

IDNR. 2014. Tier II Aquatic Vegetation Survey Protocol. IN Department of Natural Resources. Indianapolis, Indiana.

## Appendix

### Common and Scientific Names of Aquatic Plants in Dewart Lake

Common Name	Scientific Name
American pondweed	<i>Potamogeton nodosus</i>
Bladderwort	<i>Utricularia sp.</i>
Chara	<i>Chara sp.</i>
Coontail	<i>Ceratophyllum demersum</i>
Curly-leaf pondweed	<i>Potamogeton crispus</i>
Eel grass	<i>Vallisneria americana</i>
Canada waterweed	<i>Elodea canadensis</i>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Flat-stemmed pondweed	<i>Potamogeton zosteriformis</i>
Floating-leaf pondweed	<i>Potamogeton natans</i>
Illinois pondweed	<i>Potamogeton illinoensis</i>
Large-leaved pondweed	<i>Potamogeton amplifolius</i>
Leafy pondweed	<i>Potamogeton foliosus</i>
Nitella	<i>Nitella sp.</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
Northern watermilfoil	<i>Myriophyllum sibiricum</i>
Sago pondweed	<i>Potamogeton pectinatus</i>
Slender naiad	<i>Najas flexilis</i>
Spiny naiad	<i>Najas marina</i>
Southern naiad	<i>Najas guadalupensis</i>
Small pondweed	<i>Potamogeton pusillus</i>
Variable pondweed	<i>Potamogeton gramineus</i>
Water stargrass	<i>Heteranthera dubia</i>
Whorled watermilfoil	<i>Myriophyllum verticillatum</i>

## Data Sheets and GPS Coordinates

Dewart Lake		Date	8/2/2016	Eurasian watermilfoil	Spiny naiad	Secchi	Chara	Il1	Sago pondweed	Coontail	Illinois pondweed	Flat-stemmed pondweed	Water stargrass	Nitella	Large-leaved pondweed	Small pondweed	Canada waterweed	Eel grass	Slender naiad	American pondweed	Algae
Latitude	Longitude	Depth	Site																		
41.37461	-86.77791	5	1	1					3											1	
41.37440	-86.77402	2	3.5	1						1										1	
41.37282	-86.77402	7	3	5						1											
41.37371	-86.77508	16.5	4														1				
41.37258	-86.77508	6	5	5																1	
41.37431	-86.77631	4	6																		
41.37464	-86.77858	6	7	5																	
41.37492	-86.77956	10.5	8	3																	
41.37500	-86.78122	3	9	3								3							1		p
41.37631	-86.78184	15.5	10	3											3						
41.37652	-86.78300	15	11	1							1										
41.37656	-86.78375	5.5	12	3						1							1			1	
41.37670	-86.78400	4.5	13	3								1									
41.37540	-86.78370	10	14	3							1									1	
41.37461	-86.78329	4	15	3							3										
41.37246	-86.78148	5.5	16									3									
41.37744	-86.78085	11	17																	3	
41.37101	-86.78138	4	18									1								1	
41.37073	-86.78044	9	19	1																	p
41.37000	-86.78009	11.5	20	3																	
41.36966	-86.77988	6	22	1	1																
41.36946	-86.78069	4	21	5													1			1	
41.36874	-86.77940	16.5	23								1										
41.36710	-86.78020	12	24	5							3										
41.36679	-86.78075	5.5	25	3																1	
41.36749	-86.78073	2	26	5								1									
41.36636	-86.78311	4	27	3								1									
41.36581	-86.78329	13	28																		
41.36531	-86.78315	6	29	3								1									
41.36481	-86.78165	17	30																	1	
41.36399	-86.78139	3.5	31	5								1									1
41.36414	-86.78024	7	32	5																	
41.36421	-86.77953	4.5	33																		
41.36451	-86.77847	13	34	1							1										
41.36544	-86.77791	8	35	5																	
41.36674	-86.77736	12.5	36	3																	p
41.36700	-86.77746	18	37																		
41.36596	-86.77705	4	38																		
41.36802	-86.77644	7.5	39	3																	
41.36768	-86.77400	5	40									1									
41.36886	-86.77356	11.5	41	1																	
41.36932	-86.77303	7	42	5																1	
41.36878	-86.77142	4	43							1										1	
41.37098	-86.77113	16	44																		
41.37090	-86.77062	11	45	5																	



Dewart Lake		Date	8/3/2016																	
Latitude	Longitude	Depth	Site	Eurasian watermilfoil	Spiny naiad	Secchi	Chara	Sago pondweed	Coontail	Illinois pondweed	Flat-stemmed pondweed	Water stargrass	Nitella	Large-leaved pondweed	Small pondweed	Canada waterweed	Eel grass	Slender naiad	American pondweed	Algae
41.36888	-85.76777	6	46	3			1													
41.36832	-85.77017	12.5	47	3			3		5										1	
41.36764	-85.77077	4	48				3													
41.36712	-85.76888	7	49	5																
41.36684	-85.76732	18	50																	
41.36602	-85.76657	4	51				5			3										
41.36584	-85.76546	12	52	3			1		3										1	
41.36501	-85.76434	10	53						3											
41.36576	-85.76418	4.5	54	1																p
41.36502	-85.76361	17	55																	
41.36416	-85.76376	8.5	56						3											
41.36365	-85.76271	10.5	57						1										1	p
41.36311	-85.76183	3.5	58	1			3				1									
41.36201	-85.76082	5.5	59	1																p
41.36295	-85.75916	3	60						1											p
41.36303	-85.76033	13	61						1											
41.36451	-85.76141	4	62				5													
41.36528	-85.76068	6.5	63	3			3		1											
41.36596	-85.76163	12	64	1			1		1						1				1	
41.36641	-85.76198	3.5	65	1			3												3	
41.36716	-85.76344	11	66	3					3										1	
41.36764	-85.76407	7	67	1			1												3	
41.36691	-85.76336	4.5	68																	
41.36614	-85.76368	7.5	69	5																
41.36622	-85.76414	11.5	70	3					1							1			1	
41.37014	-85.76401	3	71																	
41.37055	-85.76495	6	72																	
41.37074	-85.76521	11	73				1													
41.37095	-85.76538	19.5	74	1					3											
41.37121	-85.76485	3	75				1												1	
41.37270	-85.76423	13	76																	
41.37337	-85.76181	4	77																1	
41.37454	-85.76383	5.5	78	1					3										3	
41.37381	-85.76274	12.5	79	1					5										1	
41.37420	-85.76268	4	80				3													
41.37412	-85.76391	14.5	81																	p
41.37414	-85.76310	7	82	1			5													
41.37417	-85.76518	3.5	83				5													
41.37359	-85.76502	13	84						3										1	
41.37371	-85.76641	7	85	5					5										1	
41.37371	-85.76641	10.5	86	5					3										1	
41.37291	-85.76916	2.5	87				1													
41.37238	-85.76955	9	88	5																
41.37238	-85.76973	13.5	89	3																
41.37274	-85.77163	16.5	90																	

**Tier II Sample Site GPS Coordinates.**

Latitude	Longitude	Depth	Site
41.37480	-85.77261	5	1
41.37440	-85.77402	3.5	2
41.37382	-85.77402	7	3
41.37321	-85.77509	15.5	4
41.37358	-85.77599	6	5
41.37431	-85.77631	4	6
41.37464	-85.77850	6	7
41.37492	-85.77956	10.5	8
41.37690	-85.78122	3	9
41.37631	-85.78194	15.5	10
41.37652	-85.78360	15	11
41.37656	-85.78375	5.5	12
41.37630	-85.78490	4.5	13
41.37542	-85.78370	10	14
41.37461	-85.78329	4	15
41.37345	-85.78149	5.5	16
41.37244	-85.78085	11	17
41.37181	-85.78130	4	18
41.37073	-85.78044	9	19
41.37040	-85.78009	11.5	20
41.36946	-85.78069	4	21
41.36866	-85.77988	6	22
41.36824	-85.77940	16.5	23
41.36710	-85.78020	12	24
41.36679	-85.78025	5.5	25
41.36742	-85.78073	2	26
41.36636	-85.78311	4	27
41.36591	-85.78323	13	28
41.36531	-85.78315	6	29
41.36481	-85.78165	17	30
41.36369	-85.78139	3.5	31
41.36414	-85.78024	7	32
41.36421	-85.77853	4.5	33
41.36451	-85.77847	13	34
41.36544	-85.77791	8	35
41.36674	-85.77795	12.5	36
41.36790	-85.77746	18	37
41.36586	-85.77705	4	38
41.36802	-85.77544	7.5	39
41.36768	-85.77400	5	40
41.36896	-85.77356	11.5	41

41.36932	-85.77303	7	42
41.36979	-85.77142	4	43
41.37098	-85.77113	16	44
41.37090	-85.77062	11	45
41.36898	-85.76977	6	46
41.36832	-85.77002	12.5	47
41.36764	-85.77027	4	48
41.36712	-85.76888	7	49
41.36694	-85.76732	18	50
41.36662	-85.76657	4	51
41.36684	-85.76546	12	52
41.36660	-85.76434	10	53
41.36576	-85.76418	4.5	54
41.36592	-85.76360	17	55
41.36416	-85.76376	8.5	56
41.36395	-85.76270	10.5	57
41.36301	-85.76193	3.5	58
41.36301	-85.76082	5.5	59
41.36285	-85.75916	3	60
41.36393	-85.76033	13	61
41.36451	-85.76049	4	62
41.36528	-85.76069	6.5	63
41.36596	-85.76163	12	64
41.36690	-85.76199	3.5	65
41.36705	-85.76344	11	66
41.36764	-85.76407	7	67
41.36899	-85.76336	4.5	68
41.36919	-85.76366	7.5	69
41.36922	-85.76414	11.5	70
41.37014	-85.76403	3	71
41.37055	-85.76495	6	72
41.37074	-85.76521	11	73
41.37095	-85.76538	19.5	74
41.37120	-85.76495	3	75
41.37270	-85.76423	13	76
41.37337	-85.76180	4	77
41.37354	-85.76183	5.5	78
41.37381	-85.76279	12.5	79
41.37420	-85.76289	4	80
41.37402	-85.76391	14.5	81
41.37404	-85.76392	7	82
41.37407	-85.76518	3.5	83
41.37352	-85.76582	13	84

41.37313	-85.76649	7	85
41.37270	-85.76760	10.5	86
41.37328	-85.76916	2.5	87
41.37239	-85.76955	9	88
41.37238	-85.76973	13.5	89
41.37226	-85.77069	16.5	90

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**2017 LARE Treatment Permit**

Possible EWM treatment areas for 2017 are unknown. The permit and map below represents potential EWM treatment areas for Dewart Lake in 2017. After the spring 2017 visual survey, a defined, specific treatment map and permit amendment will be submitted to the IDNR. No treatments will be made without prior approval from LARE, the lake association, and District 3 Fisheries biologist Jed Pearson.



**APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT**  
 State Form 26727 (R5 / 9-13)  
 Approved by State Board of Accounts, 2013

DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF FISH AND WILDLIFE  
 ATTN: COMMERCIAL LICENSE CLERK  
 402 W. Washington Street, Rm W273  
 Indianapolis, IN 46204  
 Telephone Number: (317) 232-4102  
 Fax Number: (317) 232-8150

**FEE \$5.00**

Check type of permit:  
 Whole Lake     Multiple Treatment Areas

**INSTRUCTIONS:** 1. Please print or type information.  
 2. Applicant must sign the application and is the only signature required. If applicant is also the certified chemical applicator that will be performing the treatment(s), he/she will also sign as the Certified Applicator.

Applicant Name		Lake Association Name	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Certified Applicator Name	Company or Corporation Name	Certification Number	
Street or Rural Route		Telephone Number	
City and State		ZIP Code	
Water Body Name (One application per water body) Dewart Lake		Nearest Town	County Kosciusko
Is the body of water a water supply or does it flow into a water supply?			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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

Treatment area number: red areas	Latitude / Longitude or Universal Transverse Mercator (UTM): on map	Total acres to be controlled: up to 25	Proposed shoreline treatment length (ft): see map	Perpendicular distance from shoreline (ft): see map	
10	Expected date(s) of treatment(s): June	Treatment method: <input checked="" type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. <u>2, 4-D</u>					
Plant survey method: <input type="checkbox"/> Rake <input checked="" type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian Water Milfoil	<input checked="" type="checkbox"/>	40		<input type="checkbox"/>	
Curly Leaf	<input type="checkbox"/>	10		<input type="checkbox"/>	
Chara	<input type="checkbox"/>	30		<input type="checkbox"/>	
Coontail	<input type="checkbox"/>	10		<input type="checkbox"/>	
Sago Pondweed	<input type="checkbox"/>	10		<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	



Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):	
Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: <input type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____					
Plant survey method: <input type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):	
Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method: <input type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Biological Control <input type="checkbox"/> Mechanical			
Based on treatment method, describe chemical to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____					
Plant survey method: <input type="checkbox"/> Rake <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify) _____					
Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	
	<input type="checkbox"/>			<input type="checkbox"/>	

**AGREEMENT**

I have read and understand the Indiana Aquatic Vegetation Control Permit Laws and agree to abide by them. Under the penalties of perjury (IC 35-44-2-1), I affirm the information supplied by me is true and correct to the best of my knowledge.

Signature of Applicant \_\_\_\_\_ Date (month, day, year) \_\_\_\_\_

Signature of Certified Applicator \_\_\_\_\_ Date (month, day, year) \_\_\_\_\_

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

**OFFICE USE ONLY**

Permit Number	Check Number	Other
<input type="checkbox"/> Denied <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions		Fisheries Section Approval

# Permit Map

The red areas below are potential EWM treatment areas for 2017.

