Dewart Lake Aquatic Vegetation Management Plan

2020 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*), curly-leaf pondweed *(Potamogeton crispus)* and starry stonewort *(Nitellopsis obtusa*) are exotic plant species present in 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). This report also outlines starry stonewort (SSW) control practices through the Great Lakes Restoration Initiative (GLRI).

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 of the EWM in the lake in 2006 and gave good residual control of EWM for the next 3 years. By 2010, EWM was once again abundant in Dewart Lake.

In 2012, the Dewart Lake Protective Association contracted with EnviroScience Incorporated of Stow, Ohio, to initiate an 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; 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, Inc. (AWC) conducted both a spring and a summer tier II vegetation survey in 2015.

Given the abundance of EWM in the lake in 2016 and 2017, a whole lake Sonar One herbicide treatment was approved and implemented for 2018. On May 1, 2018, the entirety of Dewart Lake was treated with 1,904 lbs of Sonar One herbide. The goal of this treatment program was to maintain a Sonar herbicide concentration of at least 2.0 parts per billion (ppb) for at least 120 days. This goal was achieved, and no EWM was found in the summer 2018 or 2019 vegetation surveys.

AWC completed a visual survey of the lake on May 21, 2020, to attempt to locate any EWM that had started to grow back after the 2018 Sonar One treatment. AWC staff did not identify any EWM during this survey. AWC completed a second visual survey on June 8, 2020, no EWM was identitfied. On July 24, 2020, AWC staff completed a Tier II survey of the lake. No EWM was collected during this survey; therefore, no EWM treatments occurred during this season.

Starry stonewort was found for the first time in Dewart Lake in 2019. It was found adjacent to the Dewart Lake public access site. This one acre area of SSW was treated on June 11, 2020, with Cutrine Ultra and Hydrothol 191 herbicide. This same area was treated two more times with the same herbicides on July 29, 2020 and September 3, 2020. All SSW treatments were 100% funded by the Great Lakes Restoration Initiative (GLRI).

In 2021 EWM is expected to return to the lake. Areas of EWM re-growth should be treated with ProcellaCOR herbicide. SePRO corporation conducted plant tissue analysis in the fall of 2017 and determined that some EWM plants in Dewart Lake could potentially show some resistance to 2,4-D which is commonly used in EWM spot treatments. For this reason, ProcellaCOR is recommended instead of 2,4-D for Dewart Lake. This is not to say that 2, 4-D cannot work in Dewart Lake, but that Procellacor may be preferable. Aggressive SSW treatments should continue to be implemented to help control this invasive species from spreading to other areas of the lake.

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Problem Statement

Eurasian watermilfoil (EWM) impacts Dewart Lake in many areas. The milfoil can form dense mats in shallow areas, which can inhibit fishing, swimming, and boating. Dense invasive milfoil beds may also prevent the growth of beneficial native species, most of which lead to less recreational interference and more desirable fish habitat. Many of these EWM beds are offshore in open water, although EWM also becomes dense in near shore areas of the southeast and northwest corners of the lake. SSW, another type of invasive species, was discovered during the 2019 season. This species is also known to cause impairment to lake activities. Though its abundance is minimal it is expected to spread in Dewart Lake and may reach nuisance levels in many areas.

Objectives:

The following specific, quantifiable objectives are recommended to evaluate the success of EWM and SSW 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).
4. Maintain SSW abundance to a quantity that does not hinder lake activities using monetary resources available.

Treating EWM and SSW will not result in eradication of these species from Dewart Lake. However, if these objectives are met each year, the indication would be that invasive species are being controlled effectively on a seasonal basis without causing significant damage to the native plant community.

Aquatic Vegetation Management History

Table 1 summarizes the management history of EWM and SSW 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. No EWM treatment occurred during the 2019 and 2020 seasons.

Table 1: Dewart Lake Plant Management History

Year	Management Activity
Prior to 2006	Sporadic private treatments for EWM/natives
2006*	Whole lake Sonar Treatment for EWM (May 26,2006)
2007	No Herbicide Treatments needed
2008*	13 total acres of EWM treated with 2, 4-D at 2.0 ppm
2009*	45 total acres of EWM treated with 2, 4-D at 2.0 ppm
2010	20.83 acres of EWM treated with 2, 4-D at 2.0 ppm
2011	20.83 acres of EWM treated with 2, 4-D at 2.0 ppm
2012	14.54 acres of EWM treated with 2, 4-D at 2.0 ppm
2012*	25,000 Weevils stocked in 3 areas (sites S1,S2,S3)
2013	12.64 acres of EWM treated with 2, 4-D at 2.0 ppm
2013*	23,500 Weevils stocked in 3 areas (sites S1, S3, S4, S5)
2014	12.64 acres of EWM treated with 2, 4-D at 2.0 ppm
2014*	11,000 Weevils stocked (site S6)
2015*	14.54 acres of EWM treated with 2, 4-D at 2.0 ppm
2016*	12.71 acres of EWM treated with 2, 4-D at 2.0 ppm
2017*	27.75 acres of EWM treated with 2, 4-D at 2.0 ppm
2018*	Whole Lake Sonar One Treatment: Minimum 2.0 ppb for 120 days.
2019	1 acre of SSW treated twice with Cutrine Ultra at 2.4 gal/acft and Hydrothol 191 at 1 qt/surface acre
2020	1 acre SSW treated three separate times with Cutrine Ultra at 2.4 gal/acft and Hydrothol 191 at 1 qt/surface acre

*Completed at least partially with LARE funding
2019 SSW treatments funded by GLRI

2020 Vegetation Treatments

On June 11, 1.0 acre of SSW was treated on Dewart Lake. A second summer treatment took place in this same area on July 29. This same area was treated a third time on September 3. Cutrine Ultra and Hydrothol 191 were used to treat this area of SSW. Cutrine Ultra was applied at a rate of 2.4 gallons/acre-foot, while Hydrothol 191 was applied at 1 quart/surface-acre. Table 2 provides treatment details for the July and September treatments. Figure 1 displays where the SSW treatments occurred.

The 2018 Sonar One herbicide treatment effectively controlled EWM growth during the 2019and 2020 seasons. EWM was not encountered during the spring 2020 visual surveys or collected during the summer 2020 Tier II survey; therefore, no EWM treatments occurred in 2020.

Table 2: Dewart Lake 2020 SSW Treatment Details

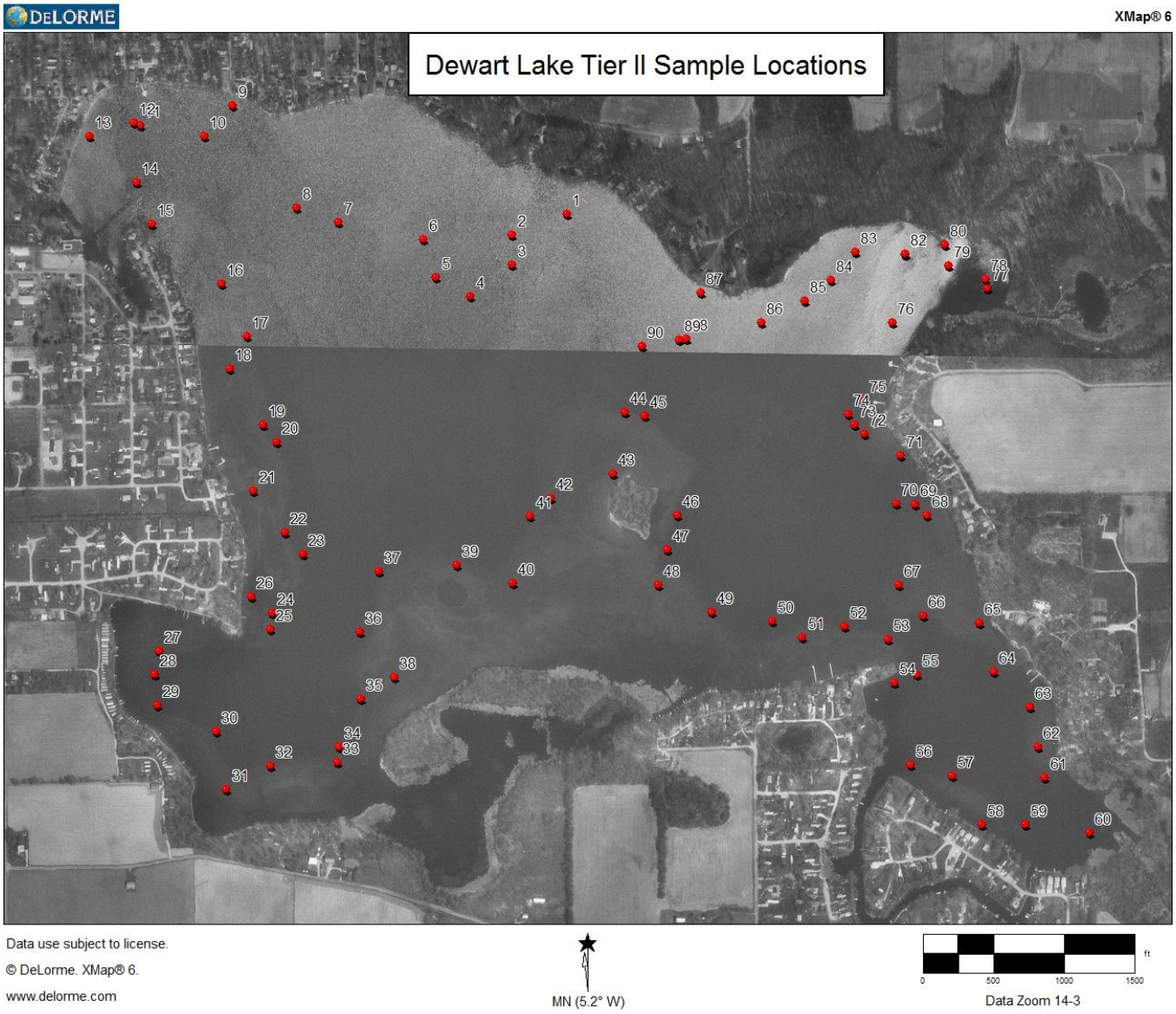
June 11, 2020 - Treatment Details					
Area	Acres	Species	Avg. Depth	Herbicide	Rate
1	1.0	SSW	3.0 feet	Cutrine Ultra Hydrothol 191	2.4 gal/acre foot 1 qt/surface acre
July 29, 2020 - Treatment Details					
Area	Acres	Species	Avg. Depth	Herbicide	Rate
1	1.0	SSW	3.0 feet	Cutrine Ultra Hydrothol 191	2.4 gal/acre foot 1 qt/surface acre
September 3, 2020 – Treatment Details					
Area	Area	Species	Avg. Depth	Herbicide	Rate
1	1.0	SSW	3.0 feet	Cutrine Ultra Hydrothol 191	2.4 gal/acre foot 1 qt/surface acre

Figure 1: Dewart Lake 2020 SSW Treatment Map

Tier II Survey Results

A Tier II aquatic plant survey was conducted on Dewart Lake on July 24, 2020. Aquatic plant sampling methods used for surveys on Dewart Lake are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR 2018). The sample locations used by Aquatic Weed Control 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



Non-native Plant Distribution

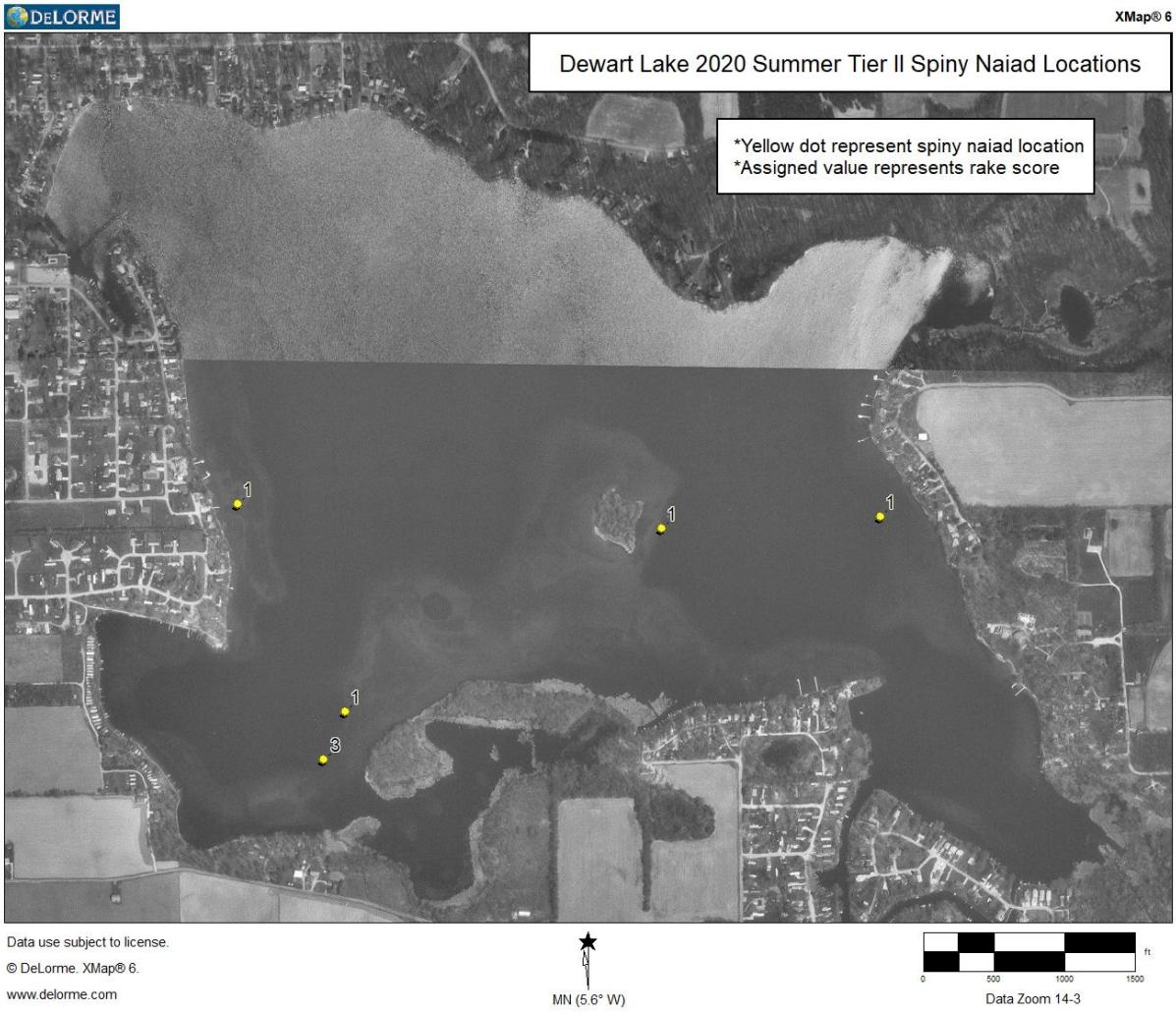
Eurasian Watermilfoil

Eurasian watermilfoil was not collected on the rake in the July 24, 2020 Tier II survey, nor was it observed in any area of the lake during this survey.

Spiny Naiad

Spiny naiad is an exotic species present in Dewart Lake. Figure 3 shows the sample locations where spiny naiad was collected during the summer Tier II survey. A yellow dot shows the spiny naiad collection site, with the abundance score listed beside the dot. In past Tier II surveys, the site frequency of spiny naiad has ranged from 0.0 to 4.4%. On July 24, 2020, spiny naiad frequency for all depth contours was 5.6%. Spiny naiad does not appear to be impairing lake use.

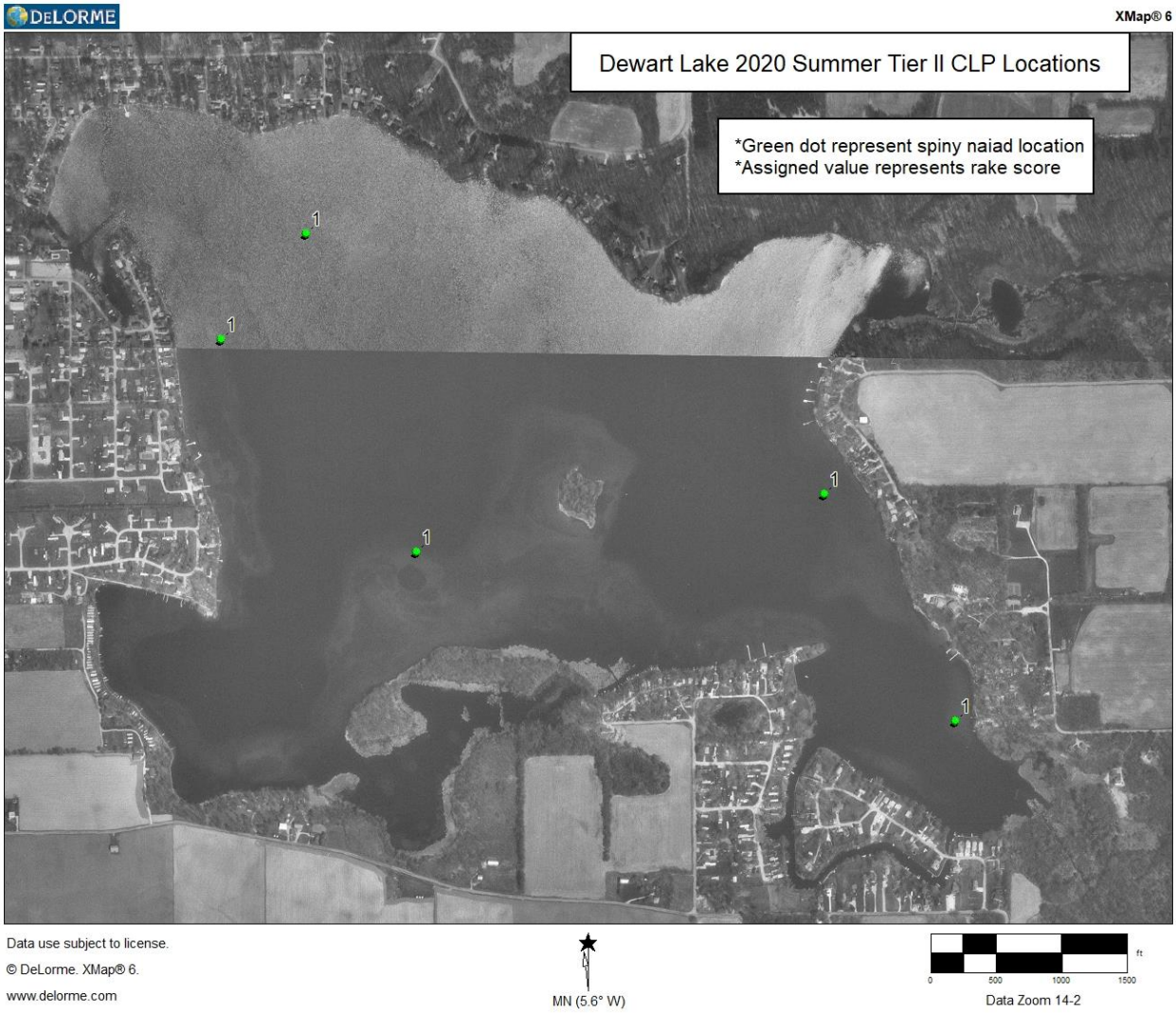
Figure 3: Dewart Lake Summer 2020 Tier II Spiny Naiad Locations



Curly-Leaf Pondweed

Curly-leaf pondweed (CLP) is an invasive species present in Dewart Lake. Figure 4 shows sites where CLP was collected during the summer Tier II survey. Green dots show CLP collection sites, with the abundance score listed beside each dot. In past Tier II surveys, the site frequency has ranged from 16.7 to 48.9% during spring surveys and 0.0 to 24.4% during summer surveys. On July 24, 2020, CLP frequency for all depth contours was 5.6%. Many Indiana lakes experienced severe CLP problems in 2020 as did Dewart Lake. The Blueberry Island Area was impacted significantly. This CLP abundance will not be reflected in summer Tier II surveys since CLP generally dies off as water temperatures climb above 75 degrees.

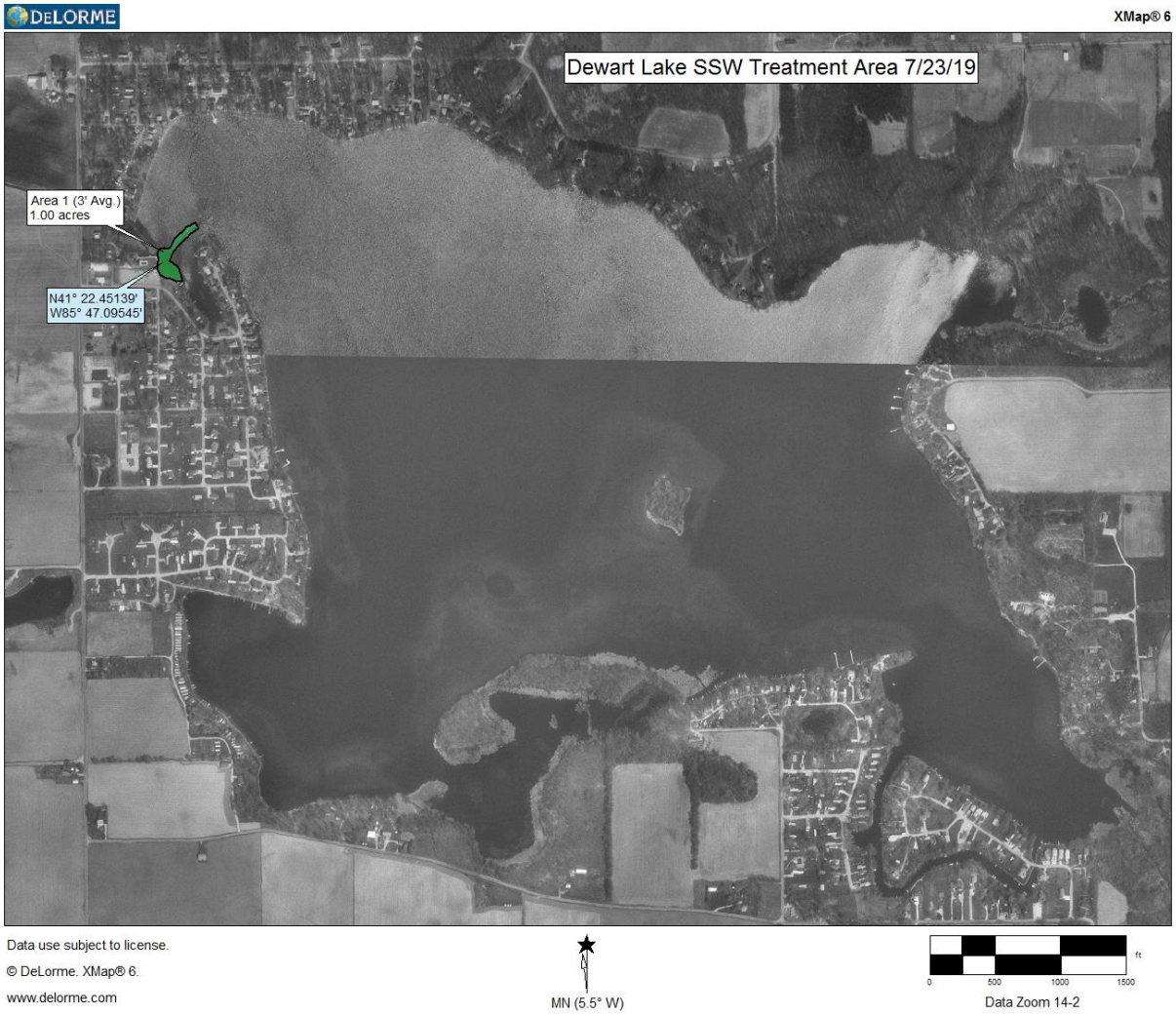
Figure 4: Dewart Lake Summer 2020 Tier II CLP Locations



Starry Stonewort

SSW is the newest invasive species found in Dewart Lake. Figure 5 outlines a green polygon where SSW was visually identified during the summer 2019 Tier II survey. This species was not collected at a sampling point during the 2020 Tier II survey, nor has it ever been collected in previous Tier II surveys. SSW did not impair lake use during the 2020 season. However, this species has the potential to quickly spread when compared to the other exotic species. Every effort should be implemented to slow the spread of SSW to other areas of the lake. Efforts should include herbicide treatments and limiting boat traffic through known locations when possible.

Figure 5: Dewart Lake SSW Location Map



Tier II Data Analysis

Results from the July 24, 2020 Tier II survey on Dewart Lake are summarized in Table 3. Site frequency, dominance, diversity and other metrics are shown for the entire survey and for each 5 foot depth contour where plants were present. In this survey, no plants were found deeper than 18.0 feet.

Multi-Year Data Presentations

Historical data from recent summer Tier II surveys of Dewart Lake are summarized in Table 4. These summaries help track long term trends in species abundance and frequency, along with overall plant metrics. These help to evaluate changes in the plant community over time. All historical spring Tier II surveys are included in the appendix to this report.

Table 3: Dewart Lake 2020 Tier II Data

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake

County:	Kosciusko	Secchi (ft):	9.5	Mean species/site:	2.17
Date:	7/24/2020	Sites with plants:	82	SE Mean species/site:	0.14
Littoral Depth (ft):	18.0	Sites with native plants:	82	Mean native species/site:	2.06
Littoral Sites:	89	Number of species:	14	SE Mean natives/site:	0.14
Total Sites:	90	Number of native species:	12	Species diversity:	0.86
		Maximum species/site:	6	Native species diversity:	0.85

All Depths	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	42.2	57.8	15.6	11.1	15.6	25.3
Coontail	38.9	61.1	25.6	5.6	7.8	16.2
Sago pondweed	37.8	62.2	30.0	7.8	0.0	10.7
Flat-stemmed pondweed	33.3	66.7	21.1	11.1	1.1	12.0
Illinois pondweed	20.0	80.0	15.6	3.3	1.1	6.2
Large-leaved pondweed	8.9	91.1	5.6	2.2	1.1	3.6
Water stargrass	8.9	91.1	7.8	1.1	0.0	2.2
Curly-leaf pondweed	5.6	94.4	5.6	0.0	0.0	1.1
Slender naiad	5.6	94.4	5.6	0.0	0.0	1.1
Spiny naiad	5.6	94.4	4.4	1.1	0.0	1.6
Eel grass	4.4	95.6	3.3	0.0	1.1	1.8
Nitella	3.3	96.7	3.3	0.0	0.0	0.7
Common bladdwort	1.1	98.9	1.1	0.0	0.0	0.2
Small pondweed	1.1	98.9	1.1	0.0	0.0	0.2
Filamentous Algae	15.6					

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake

County:	Kosciusko	Secchi (ft):	9.5	Mean species/site:	2.41
Date:	7/24/2020	Sites with plants:	29	SE Mean species/site:	0.25
Littoral Depth (ft):	18.0	Sites with native plants:	29	Mean native species/site:	2.34
Littoral Sites:	29	Number of species:	12	SE Mean natives/site:	0.24
Total Sites:	29	Number of native species:	10	Species diversity:	0.82
		Maximum species/site:	6	Native species diversity:	0.81

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Chara	82.8	17.2	20.7	27.6	34.5	55.2
Sago pondweed	37.9	62.1	34.5	3.4	0.0	9.0
Coontail	31.0	69.0	24.1	0.0	6.9	11.7
Illinois pondweed	27.6	72.4	24.1	3.4	0.0	6.9
Flat-stemmed pondweed	17.2	82.8	13.8	3.4	0.0	4.8
Large-leaved pondweed	13.8	86.2	3.4	6.9	3.4	8.3
Eel grass	10.3	89.7	10.3	0.0	0.0	2.1
Slender naiad	6.9	93.1	6.9	0.0	0.0	1.4
Common bladdwort	3.4	96.6	3.4	0.0	0.0	0.7
Curly-leaf pondweed	3.4	96.6	3.4	0.0	0.0	0.7
Spiny naiad	3.4	96.6	3.4	0.0	0.0	0.7
Water stargrass	3.4	96.6	3.4	0.0	0.0	0.7
Filamentous Algae	24.1					

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake

County:	Kosciusko	Secchi (ft):	9.5	Mean species/site:	2.48
Date:	7/24/2020	Sites with plants:	25	SE Mean species/site:	0.26
Littoral Depth (ft):	18.0	Sites with native plants:	25	Mean native species/site:	2.33
Littoral Sites:	27	Number of species:	12	SE Mean natives/site:	0.26
Total Sites:	27	Number of native species:	10	Species diversity:	0.85
		Maximum species/site:	5	Native species diversity:	0.83

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Sago pondweed	63.0	37.0	44.4	18.5	0.0	20.0
Flat-stemmed pondweed	44.4	55.6	22.2	18.5	3.7	19.3
Chara	40.7	59.3	18.5	7.4	14.8	23.0
Coontail	22.2	77.8	18.5	3.7	0.0	5.9
Illinois pondweed	22.2	77.8	11.1	7.4	3.7	10.4
Water stargrass	14.8	85.2	11.1	3.7	0.0	4.4
Large-leaved pondweed	11.1	88.9	11.1	0.0	0.0	2.2
Curly-leaf pondweed	7.4	92.6	7.4	0.0	0.0	1.5
Slender naiad	7.4	92.6	7.4	0.0	0.0	1.5
Spiny naiad	7.4	92.6	7.4	0.0	0.0	1.5
Eel grass	3.7	96.3	0.0	0.0	3.7	3.7
Nitella	3.7	96.3	3.7	0.0	0.0	0.7
Filamentous Algae	14.8					

2020 Tier II Data Continued

Occurrence and Abundance of Submersed Aquatic Plants in Dewart Lake

County:	Kosciusko	Secchi (ft):	9.5	Mean species/site:	2.13
Date:	7/24/2020	Sites with plants:	22	SE Mean species/site:	0.26
Littoral Depth (ft):	18.0	Sites with native plants:	22	Mean native species/site:	1.96
Littoral Sites:	24	Number of species:	11	SE Mean natives/site:	0.24
Total Sites:	24	Number of native species:	9	Species diversity:	0.82
		Maximum species/site:	5	Native species diversity:	0.79

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Coontail	66.7	33.3	33.3	12.5	20.8	35.0
Flat-stemmed pondweed	50.0	50.0	33.3	16.7	0.0	16.7
Sago pondweed	25.0	75.0	20.8	4.2	0.0	6.7
Illinois pondweed	16.7	83.3	16.7	0.0	0.0	3.3
Chara	12.5	87.5	12.5	0.0	0.0	2.5
Water stargrass	12.5	87.5	12.5	0.0	0.0	2.5
Curly-leaf pondweed	8.3	91.7	8.3	0.0	0.0	1.7
Spiny naiad	8.3	91.7	4.2	4.2	0.0	3.3
Large-leaved pondweed	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
Small pondweed	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):	9.5	Mean species/site:	0.70
Date:	7/24/2020	Sites with plants:	6	SE Mean species/site:	0.21
Littoral Depth (ft):	18.0	Sites with native plants:	6	Mean native species/site:	0.70
Littoral Sites:	9	Number of species:	3	SE Mean natives/site:	0.21
Total Sites:	10	Number of native species:	3	Species diversity:	0.57
		Maximum species/site:	2	Native species diversity:	0.57

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant
Species	Occurrence	0	1	3	5	Dominance
Coontail	40.0	60.0	30.0	10.0	0.0	12.0
Nitella	20.0	80.0	20.0	0.0	0.0	4.0
Flat-stemmed pondweed	10.0	90.0	10.0	0.0	0.0	2.0
Filamentous Algae	10.0					

Table 4: Dewart Lake Historical Summer Tier II Data

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	8/11/2017	8/9/2018	7/23/2019	7/24/2020
Total Sites:	103	90	90	90	90	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	10.5	8.0	8.5	9.5
Number of Species:	17	10	12	15	16	12	15	14	16	17	16	16	15	11	12	14
Number of Native Species	15	9	10	12	14	10	13	12	14	14	14	13	13	11	10	12
Sites with Plants	103	80	77	79	86	85	87	88	84	86	82	80	83	74	68	82
Sites with Native Plants	100	80	75	79	85	84	80	86	84	86	82	68	77	74	67	82
Maximum Plant Depth (ft)	20	20	17	19.5	20	20	18	20	20	18	18	19.5	19.5	18.0	17.0	18.0
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	0.85	0.77	0.81	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	0.83	0.77	0.79	0.85
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	1.63	1.24	1.23	2.06
Surveying Organization	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	IDNR	AWC	AWC	AWC	AWC	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	30.0	38.9	40.0	43.3	42.2	41.1	42.2
Eurasian watermilfoil	60.2	0.0	0.0	7.8	26.7	45.6	52.2	62.2	32.2	52.2	30.0	50.0	47.8	0.0	0.0	0.0
Illinois pondweed	11.7	0.0	1.1	1.1	2.2	10.0	4.4	14.4	11.1	5.6	16.7	22.2	31.1	4.4	4.4	20.0
Sago pondweed	12.6	0.0	35.6	31.1	30.0	25.6	15.6	15.6	33.3	43.3	31.1	11.1	16.7	3.3	22.2	37.8
Eel grass	1.0	1.1	0.0	1.1	1.1	4.4	1.1	1.1	2.2	1.1	2.2	1.1	5.6	4.4	1.1	4.4
Coontail	43.7	43.3	12.2	20.0	37.8	37.8	42.2	52.2	50.0	54.4	43.3	31.1	28.9	36.7	13.3	38.9
Slender naiad	18.4	2.2	5.6	6.7	13.3	14.4	12.2	4.4	2.2	5.6	20.0	26.7	18.9	0.0	0.0	5.6
Nitella	0.0	1.1	1.1	2.2	11.1	4.4	0.0	0.0	0.0	1.1	5.6	2.2	1.1	2.2	4.4	3.3
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	0.0	1.1	1.1	1.1
Spiny naiad	0.0	0.0	4.4	2.2	3.3	2.2	3.3	1.1	4.4	4.4	2.2	1.1	2.2	0.0	1.1	5.6
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	0.0	0.0	0.0	0.0
Flat-stemmed pondweed	2.9	5.6	0.0	1.1	10.0	5.6	3.3	0.0	1.1	5.6	7.8	5.6	7.8	10.0	27.8	33.3
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	2.2	1.1	5.6	1.1
Canada waterweed	3.9	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	3.3	1.1	5.6	0.0	0.0	0.0	0.0
Variable pondweed	13.6	2.2	2.2	4.4	2.2	0.0	12.2	12.2	6.7	18.9	0.0	0.0	1.1	0.0	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	1.1	0.0	2.2	0.0	0.0	6.7	5.6
Floating-leaf pondweed	2.3	0.0	0.0	0.0	0.0	0.0	1.1	2.2	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Southern naiad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	28.9	4.4	0.0	1.1	0.0	0.0	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	0.0	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	0.0	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	5.6	4.4	5.6	3.3	17.8	0.0	8.9
Large-leaved pondweed	5.8	2.2	3.3	1.1	6.7	6.7	3.3	3.3	1.1	2.2	1.1	3.3	2.2	1.1	2.2	8.9
Filamentous Algae	9.7	12.2	12.2	4.4	0.0	0.0	3.3	0.0	3.3	6.7	3.3	7.8	2.2	4.4	5.6	15.6
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	89.7	86.2	72.4	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	62.1	6.9	3.4	27.6
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	20.7	0.0	0.0	0.0
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	20.7	0.0	27.6	37.9
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	17.2	0.0	0.0	6.9
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	6.9	0.0	0.0	10.3
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	0.0	3.4	3.4	3.4
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	0.0	0.0	0.0	0.0
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	0.0	3.4	17.2	17.2
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	0.0	0.0	3.4	3.4
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	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	6.9	10.3	0.0	31.0
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	0.0	0.0	0.0	0.0
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	0.0	0.0	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	0.0	0.0	0.0	3.4
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	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	0.0	0.0	0.0	3.4
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	0.0	0.0	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	3.4	0.0	0.0	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	0.0	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	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	3.4	0.0	3.4	13.8
Small 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	3.4	0.0	6.9	0.0
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	3.4	6.9	6.9	24.1
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	44.4	37.0	48.1	40.7
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	81.5	0.0	0.0	0.0
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	29.6	11.1	40.7	63.0
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	7.4	11.1	3.7	3.7
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	37.0	7.4	3.7	22.2
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	14.8	37.0	14.8	22.2
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	33.3	0.0	0.0	7.4
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	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	0.0	3.7	7.4	0.0
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	0.0	0.0	0.0	0.0
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	7.4	0.0	0.0	7.4
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	18.5	18.5	59.3	44.4
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	0.0	0.0	3.7	3.7
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	3.7	0.0	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	7.4	33.3	0.0	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	3.7	3.7	3.7	11.1
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	0.0	0.0	0.0	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	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	0.0	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	0.0	0.0	14.8	7.4
Bladderwort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	3.7	3.7	7.4	14.8

Dewart Lake Historical Summer Tier II Data Continued

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	58.3	0.0	0.0	0.0
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	4.2	12.5	12.5	12.5
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	66.7	66.7	29.2	66.7
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	4.2	4.2	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	4.2	0.0	4.2	25.0
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	0.0	0.0	0.0	8.3
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	0.0	0.0	8.3	16.7
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	0.0	0.0	0.0	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	12.5	0.0	0.0	4.2
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	0.0	8.3	8.3	0.0
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	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	4.2	29.2	0.0	12.5
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	0.0	0.0	0.0	0.0
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	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	0.0	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	4.2	12.5	16.7	50.0
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	4.2	0.0	4.2	4.2
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	0.0	0.0	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	0.0	0.0	8.3	8.3
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	0.0	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	0.0	4.2	4.2	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	10.0	0.0	10.0	20.0
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	40.0	40.0	10.0	40.0
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	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	0.0	0.0	0.0	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	0.0	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	10.0	0.0	0.0	0.0
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	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	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	0.0	0.0	0.0	0.0
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	10.0	0.0	0.0	10.0
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	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	0.0	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	0.0	0.0	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	0.0	0.0	0.0	10.0

Water Clarity and Water Quality

Table 5 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. Secchi depth should continue to be monitored to watch for long term trends.

Table 5: 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
8/11/2017	10.5
8/9/2018	8
7/23/2019	8.5
7/24/2020	9.5

Dissolved Oxygen and Temperature Profiles

During the summer 2020 Tier II survey, AWC 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 was good in 2020. Adequate oxygen to support fish life was present down to about 15 feet in July of 2020. Data from the temperature profile indicated thermal stratification beginning at a depth of around 16 feet. The surface temperature was 81.5 degrees and dropped to a temperature of 58.8 degrees at a depth of 30 feet.

Figure 6: Dewart Lake 2020 Dissolved Oxygen Profile

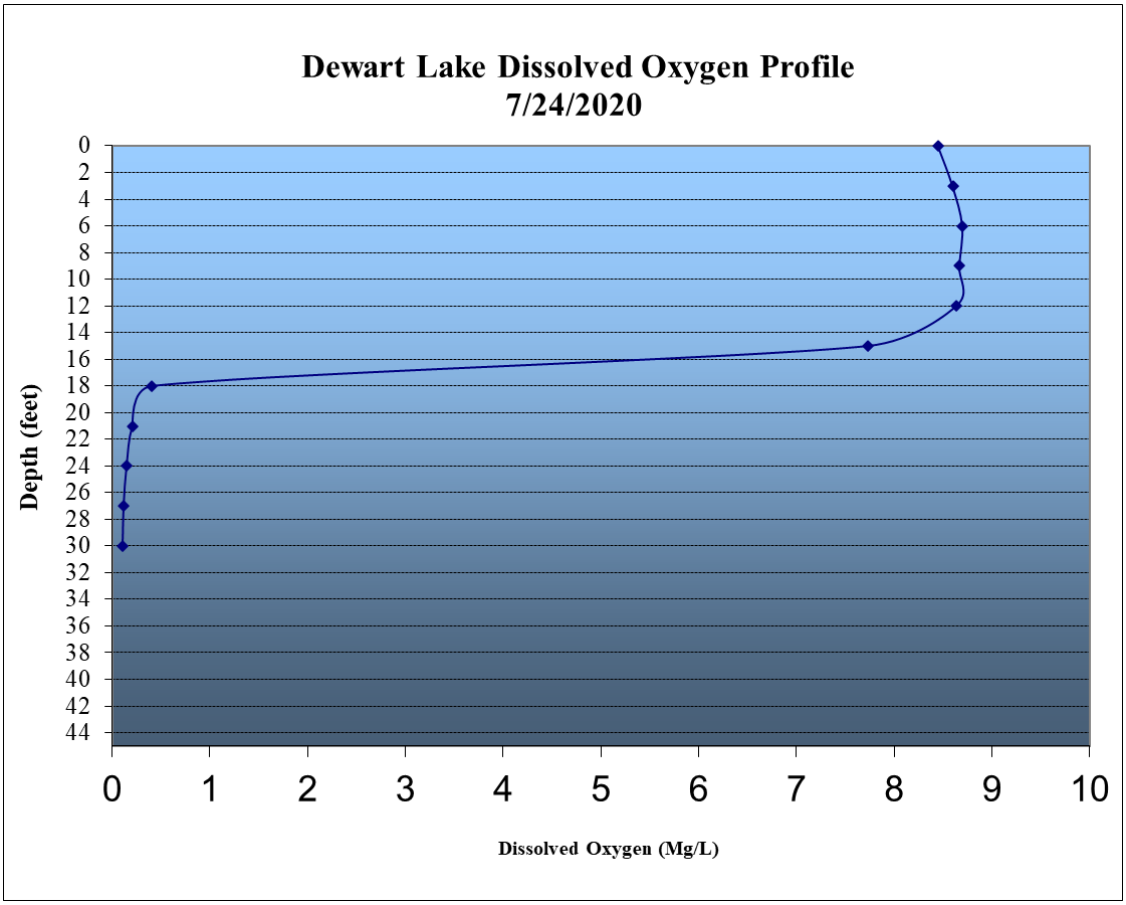
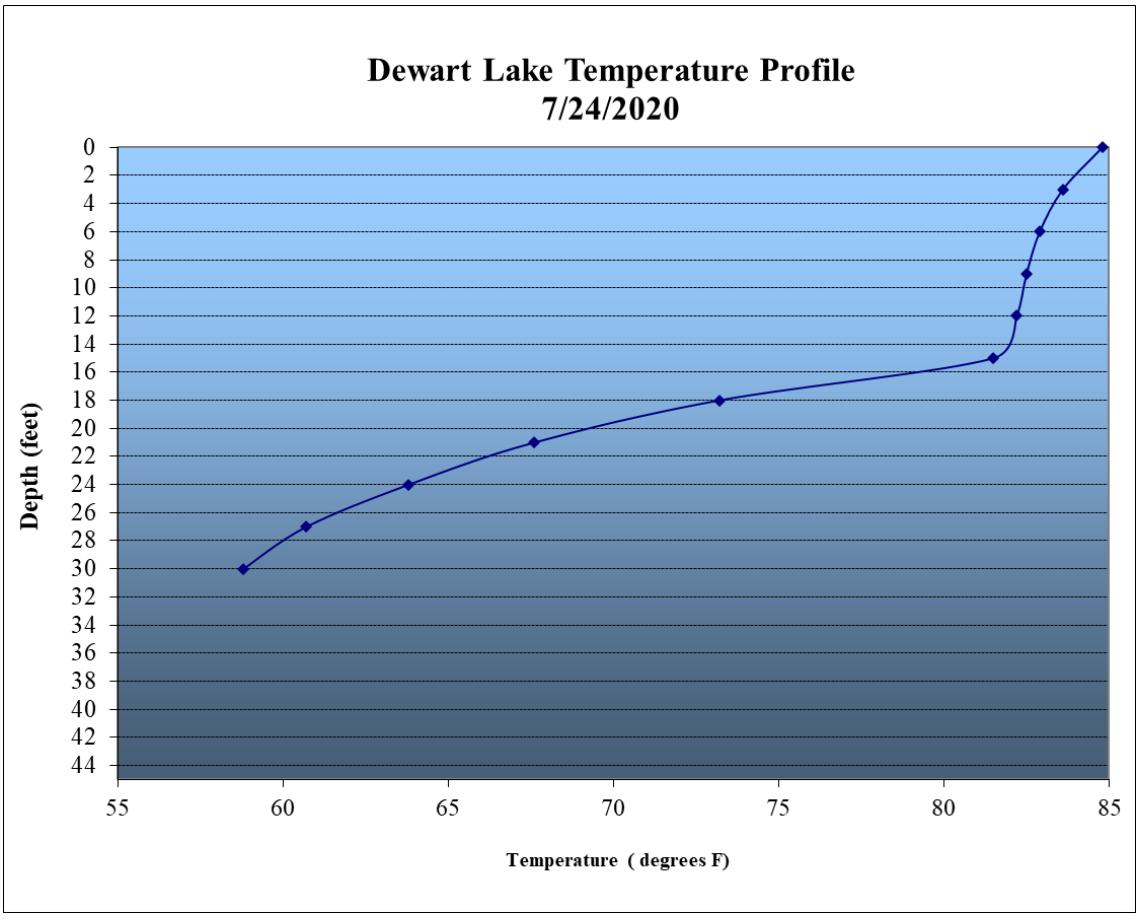


Figure 7: Dewart Lake 2020 Temperature Profile



Tier II Discussion

In the Dewart Lake summer 2020 Tier II survey, 12 species of native plants were collected, along with 2 non-native species (spiny naiad and CLP). Both EWM and SSW are invasive species that were not collected in this survey but are present in the lake. Native species richness in 2020 was recorded at 12 species; this was an increase from 10 species in 2019.

It appears that native plants are doing well in Dewart Lake. Native plant diversity was 0.85, which increased slightly from the 2019 value of 0.79. The highest native diversity value recorded in Dewart Lake Tier II surveys was 0.86 in 2009, 3 years after the first Sonar treatment. The number of sites at which native plants were collected in 2020 was 82 out of 90. This equates to a 91.0% native coverage in the littoral zone of Dewart Lake. This is above the management target objective of 85% plant coverage.

The plant management objectives established for Dewart Lake include reducing annual EWM site frequency to 10% or less, maintaining 12 native species collected each year, maintaining a native plant diversity of 0.80 each year, and also maintaining 85% plant coverage in Tier II surveys. The EWM objective was achieved during the 2020 season, as no EWM was collected during the Tier II survey. Likewise, 12 native species were collected and the native species diversity was recorded at 0.86, both of which meet the outlined objectives. Lastly, native plant coverage was recorded at 91.0%, which is above the outlined objective.

Chara and coontail are the two most dominant native plants in summer surveys on Dewart Lake. On July 24, 2020, chara and coontail were found at 42.2% and 38.9% of sample sites respectively. Flat-stemmed pondweed and sago pondweed appear to be increasing in population. Flat-stemmed pondweed was found at 33.3% of sample sites in 2020 compared to 27.8% in 2019. Sago pondweed was found at 37.8% of sample sites in 2020 compared to 22.2% in 2019. These native plants offer beneficial habitat for fish and invertebrates. Keeping invasive plants under control should help to foster favorable conditions for native plants to flourish.

Action Plan

It is difficult to estimate the amount of EWM that could be present in 2021. When areas of EWM growth are found they should be treated aggressively with ProcellaCOR herbicide. SePRO corporation conducted plant tissue analyses in fall of 2017 and determined that some EWM plants in Dewart Lake could potentially show some resistance to 2, 4-D, which is commonly used in EWM spot treatments. ProcellaCOR is recommended instead of 2, 4-D for Dewart Lake in 2021. 2,4-D should only be used for touch up treatments if an area would have to be treated twice within one season.

Treatment rates for ProcellaCOR herbicide vary based on plant density, treatment location, depth, and waterbody size. It is estimated that the maximum rate for ProcellaCOR spot treatments in Dewart Lake will be 3 PDU/acre-foot.

Aggressive SSW treatments should continue to help control this invasive species from spreading to other areas of the lake. Treatments completed during the 2020 season were funded by the GLRI and it is anticipated that the GLRI will fund the treatments again during the 2021 season. Cutrine Ultra herbicide should be applied at 2.4 gallons per acre-foot in combination with Hydrothol 191 at 1 quart per surface acre in confined lake areas. Personnel conducting the Tier II survey should also keep watch for any new areas of SSW growth. If any new areas of SSW are encountered during the 2021 season, then these areas should ideally be treated immediately and reported to AIS coordinator.

2021 Project Budget

Treat up to 40 acres of EWM with ProcellaCOR at up to 3 PDU/acre-foot (6 ft avg depth)	$26,000
Spring visual survey, summer Tier II survey and AVMP update	$5,000
Total Cost Estimate	$31,000
LARE Share (80% of EWM treatments and 80% AVMP)	$24,800
Association's Share (20% of EWM treatments and 20% of AVMP)	$6,200

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 association. 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.

Due to Covid -19 the only public meeting held in 2020 was the fall LARE permit meeting on October 7th. This was an online meeting with the IDNR. David Smith attended the meeting on behalf of Dewart Lake. Jim Donahoe, Justin Blotkamp, and David Keister of Aquatic Weed Control presented 2021 management recommendations which were discussed by Rod Edgell (LARE biologist), Debbie King (permit biologist), and Eric Fischer (invasive species coordinator) of the IDNR.

References Cited

IDNR. 2018. Tier II Aquatic Vegetation Survey Protocol. IN Department of Natural Resources. Indianapolis, Indiana.

Appendix

Dewart Lake Historical Spring Survey Data

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

Dewart Lake Historical Spring Survey Data 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

Common and Scientific Names of Aquatic Plants in Dewart Lake

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

Data Sheets and GPS Coordinates

Dewart Lake	Date				Secchi														
551 acres, mesotrophic																			
29 0-5, 27 5-10, 24 10-15, 10 15-20 - matches 2020 protocol																			
Latitude	Longitude	Depth	Site	algae	Chara	Sago pondweed	Coontail	Illinois pondweed	Flat-stemmed pondweed	Curly-leaf pondweed	Nitella	Eel grass	Large-leaved pondweed	Small pondweed	Slender naiad	Bladderwort	Eurasian watermilfoil	Spiny naiad	Water stargrass
41 37480	-85.77761	5	1		3	3													
41 37440	-85.77407	3.5	2		3	1		1											
41 37382	-85.77407	7	3			1		1											1
41 37371	-85.77509	15.5	4				3												
41 37358	-85.77589	6	5		1	1		3	1										
41 37431	-85.77631	4	6		3			1											
41 37464	-85.77850	6	7	p		3				1									
41 37492	-85.77956	10.5	8	p		3		1											
41 37690	-85.78122	3	9		3														
41 37631	-85.78194	15.5	10																
41 37652	-85.78360	15	11				5												
41 37656	-85.78375	5.5	12			3	1	3	1										1
41 37630	-85.78490	4.5	13		5														
41 37542	-85.78370	10	14				1		1										
41 37461	-85.78329	4	15		1	1		1	1			1	3						
41 37345	-85.78149	5.5	16		1								1						
41 37244	-85.78085	11	17		1			1	1	1									
41 37181	-85.78130	4	18		5	1		3					1						
41 37073	-85.78044	9	19			3													
41 37040	-85.78009	11.5	20				3		3										
41 36946	-85.78069	4	21		5	1			1									1	
41 36866	-85.77988	6	22		1	1		1	3										
41 36824	-85.77940	16.5	23				1		1										
41 36710	-85.78021	12	24				1		1										
41 36679	-85.78025	5.5	25		5														
41 36742	-85.78073	2	26		5														
41 36636	-85.78311	4	27		5			1											
41 36591	-85.78323	13	28		1		1		1										
41 36531	-85.78315	6	29		1	1							1						
41 36481	-85.78165	17	30								1								
41 36369	-85.78139	3.5	31		5	1	1	1											
41 36414	-85.78024	7	32		1		1		5										
41 36421	-85.77853	4.5	33		3	1	1	1											
41 36451	-85.78047	13	34		1	1	1		1									3	
41 36544	-85.77791	8	35		5	1												1	
41 36674	-85.77795	12.5	36				1												
41 36790	-85.77746	18	37								1								
41 36586	-85.77705	4	38		5	1													
41 36802	-85.77544	7.5	39			3			3	1									
41 36768	-85.77400	5	40		5	1		1				1							1
41 36896	-85.77356	11.5	41				1		1										
41 36932	-85.77303	7	42		5	1	1		3										
41 36979	-85.77147	4	43	p	3														
41 37098	-85.77113	16	44																
41 37090	-85.77067	11	45			1			3				1						
41 36898	-85.76977	6	46		5	1			1									1	
41 36832	-85.77007	12.5	47				5	1	1						1				
41 36764	-85.77027	4	48		1		1		1										
41 36712	-85.76868	7	49			1	1		1										
41 36694	-85.76732	18	50																
41 36662	-85.76657	4	51		5														
41 36684	-85.76546	12	52				3												
41 36601	-85.76434	10	53																
41 36576	-85.76418	4.5	54	p			1						5						
41 36592	-85.76360	17	55	p			1												
41 36416	-85.76376	8.5	56	p															
41 36395	-85.76270	10.5	57				3		1					1					
41 36301	-85.76193	3.5	58	p									3						
41 36301	-85.76082	5.5	59										1						3
41 36285	-85.75916	3	60	p			5					1							
41 36193	-85.76133	13	61	p			1												1
41 36451	-85.76049	4	62	p		1			3	1									
41 36578	-85.76069	6.5	63						3										1
41 36596	-85.76163	12	64				5												
41 36690	-85.76199	3.5	65		1		1								1				
41 36705	-85.76344	11	66					1	3										
41 36764	-85.76407	7	67						3										
41 36899	-85.76336	4.5	68		1														
41 36919	-85.76366	7.5	69			1		1	1			5			1				
41 36922	-85.76414	11.5	70						1	1								1	
41 37014	-85.76403	3	71		1														
41 37055	-85.76495	6	72	p	3														
41 37074	-85.76521	11	73			1	1		3										1
41 37095	-85.76538	19.5	74																
41 37120	-85.76495	3	75	p	3		1								1				
41 37270	-85.76423	13	76																
41 37337	-85.76180	4	77			1	5												
41 37354	-85.76183	5.5	78	p		1	3												
41 37381	-85.76279	12.5	79			1	1												
41 37470	-85.76289	4	80	p	1				1							1			
41 37402	-85.76391	14.5	81				5												
41 37404	-85.76382	7	82		3	1									1				
41 37407	-85.76518	3.5	83		5		1												
41 37352	-85.76582	13	84				5												
41 37313	-85.76649	7	85			1		5											
41 37270	-85.76760	10.5	86			1													1
41 37328	-85.76916	2.5	87		3														
41 37239	-85.76955	9	88			3					1								
41 37238	-85.76973	13.5	89																
41 37276	-85.77069	16.5	90				1												

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

2021 Aquatic Vegetation Control Permit

Page 1 of 4

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: Dewart Lake Protective Association	Lake Association Name: Dewart Lake Protective Association	
Street or Rural Route: P.O. Box 152		Telephone Number: 574-773-4941
City and State: Syracuse, IN		ZIP Code: 46567
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: Syracuse, IN	County: Kosciusko
Is the body of water a water supply or does it flow into a water supply?		☐ Yes ☒ No

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

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
1 - all EWM	all EWM up to 40 acres	up to 40	N/A	N/A

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
up to 15	May -September	☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

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

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
Eurasian Water Milfoil	✓	NA			
Chara		40			
Illinois Pondweed		10			
Coontail		20			
Sago Pondweed		10			
Flat Stemmed Pondweed		10			
water stargrass		10			

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):
2 all SSW	all ssw up to 3 acres	up to 3	NA	NA

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
4	May-Sept	■ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical to be used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Cutrine Ultra and Hydrothol 191

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

Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community	Aquatic Plant Name	Check if Target Species	% Relative Abundance of Community
SSW	✓	15			
Chara		30			
Bladderwort		15			
Eel grass		20			
Flat stemmed PW		20			

Treatment area number:	Latitude / Longitude or Universal Transverse Mercator (UTM):	Total acres to be controlled:	Proposed shoreline treatment length (ft):	Perpendicular distance from shoreline (ft):

Maximum depth of treatment (ft):	Expected date(s) of treatment(s):	Treatment method:
		☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

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

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

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

AGREEMENT

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

Signature of Applicant _____ Date (*month, day, year*) _____

Signature of Certified Applicator _____ Date (*month, day, year*) _____

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

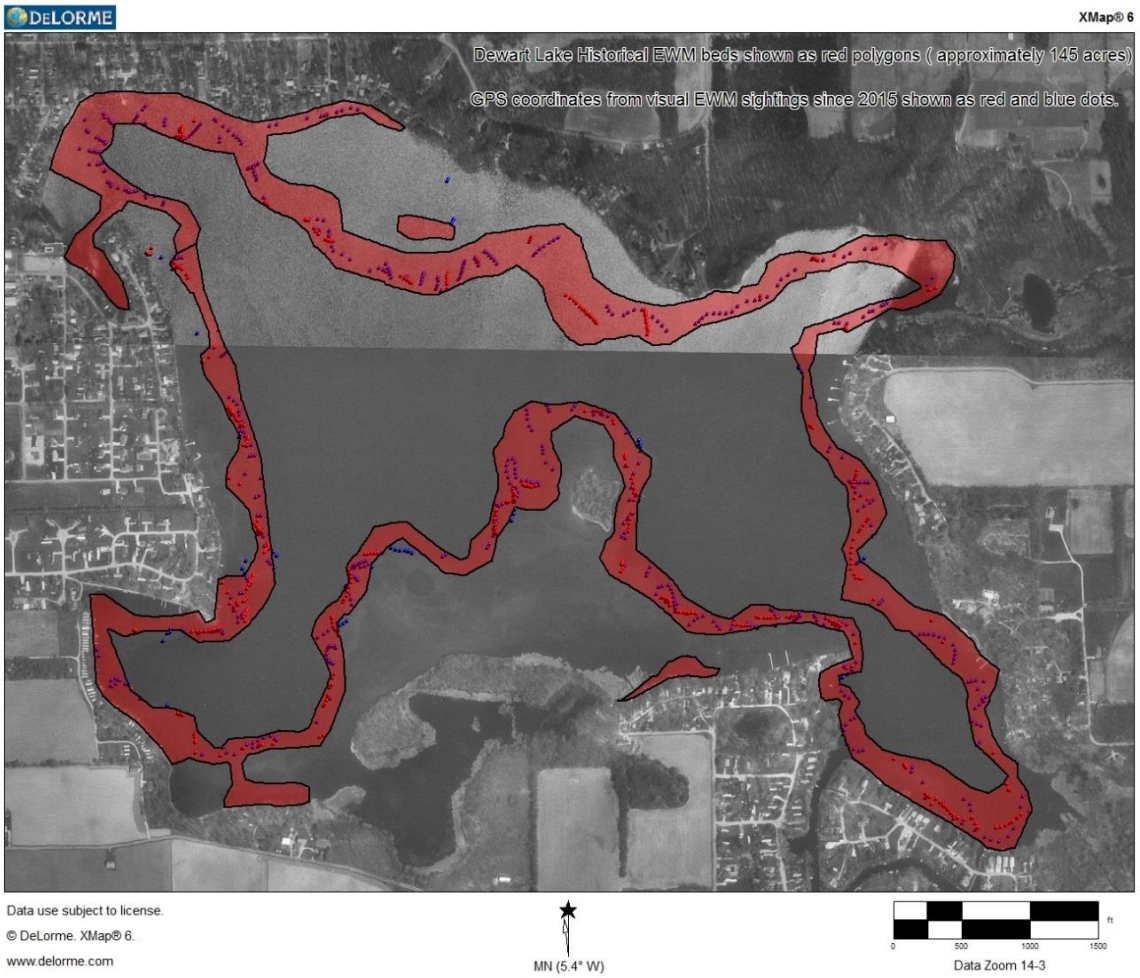
OFFICE USE ONLY

Permit Number	Check Number	Other

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

Permit Maps

The red areas below are the most likely potential EWM treatment areas for 2021. A map will be submitted to the IDNR prior to any EWM treatments in 2021.



The map below shows the known SSW location and the site of 2021 SSW treatments.