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ECHO LAKE
BARRON COUNTY

2018 AQUATIC PLANT MANAGEMENT IMPLEMENTATION SUMMARY REPORT
WDNR WBIC: 2630100

Prepared by: Dave Blumer, Lake Educator

July 11, 2019

ECHO LAKE ASSOCIATION
TURTLE LAKE, WI 54889

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PREPARED FOR THE ECHO LAKE ASSOCIATION

INTRODUCTION

This report discusses aquatic plant management activities completed by the Echo Lake Association (ELA) and Lake Education and Planning Services (LEAPS) during the 2018 and early 2019 season and discusses Eurasian watermilfoil (EWM) management planning and implementation for 2018 and 2019. Based on 2017 fall EWM bed-mapping results, an EWM chemical treatment proposal was completed for 2018. However, due to slow growth of EWM in the spring of 2018, the proposal was ultimately discarded in favor of more intensive physical and diver removal. Physical removal of EWM and several summer and fall surveys were completed in 2018. The following list of education and management actions were completed in 2018 and early 2019.

- 2017 Fall EWM Mapping, 2018 Proposed Treatment, And 2018 EWM Readiness Survey
- 2018 Summer EWM Removal Surveys and Fall EWM Bed-Mapping
- EWM Management in Echo Lake
- Clean Boats Clean Waters
- AIS and Purple Loosestrife Monitoring and Removal
- Citizen Lake Monitoring Network (CLMN) Water Quality Testing
- 2018 & 2019 Annual Meeting
- 2017-19 AEPP Grant Project

Each of these actions will be summarized in the following sections of this report.

2017 FALL EWM MAPPING, 2018 PROPOSED TREATMENT, AND 2018 EWM READINESS SURVEY

Two surveys in the fall of 2017 identified five EWM high density areas with dozens of individual or small clusters of plants (Figures 1 & 2). Individual plants in shallower water were rake removed or diver removed, but those in deeper water were not. It is the EWM in these high density areas that were targeted for chemical treatment in the spring of 2018.

Based on the 2017 fall survey results, a preliminary EWM chemical treatment plan was developed that included five treated areas covering 1.49 acres (Figure 3, Table 1). The intent was to treat these areas with a granular 2,4-D product at full label rate.

In place of a full pre-treatment survey, LEAPS conducted several EWM readiness surveys in late May and early June to determine if the areas proposed for treatment had enough EWM to warrant the use of chemicals. Despite several surveys, through early June, not enough EWM was identified and the entire 2018 treatment was canceled. Based on 2018 summer survey results this was probably a mistake.

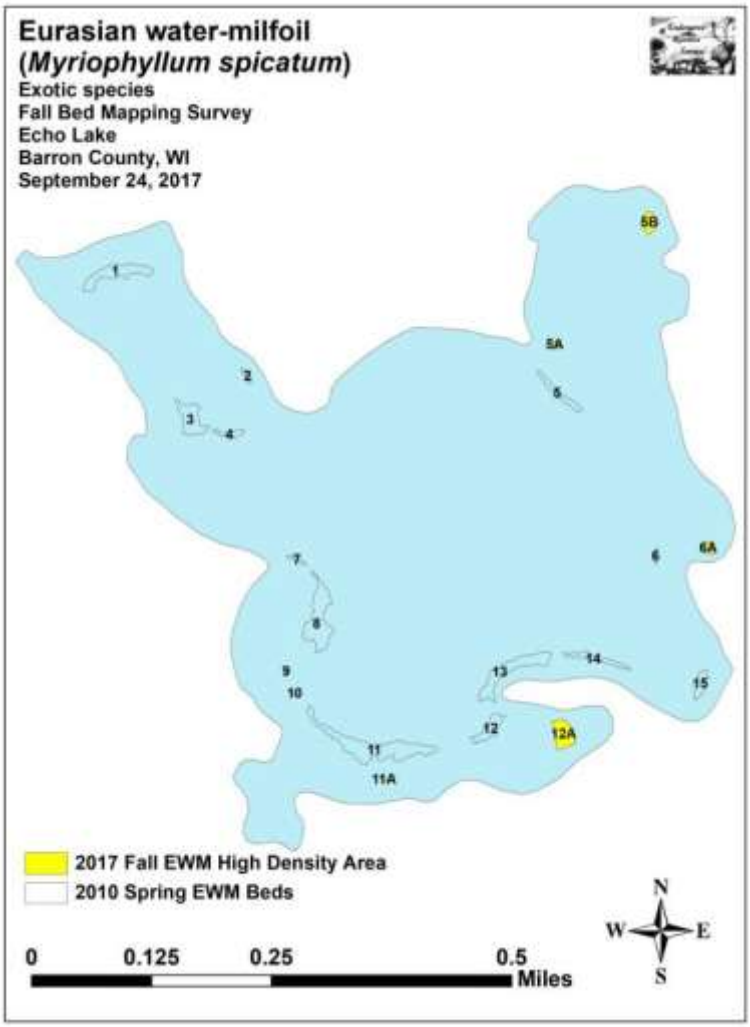

Figure 1: 2017 Fall EWM bed mapping survey

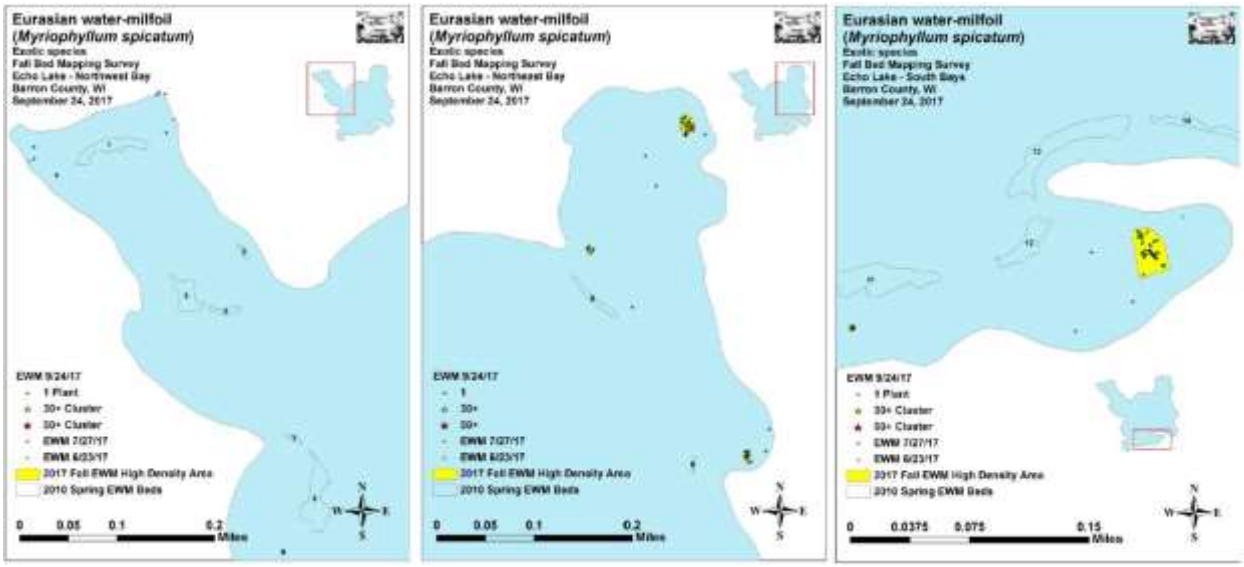

Figure 2: 2017 fall EWM high density areas with individual plants identified

Figure 3: 2018 preliminary spring treatment area

Table 1: 2018 preliminary EWM chemical treatment plan (December 2017)

2018 Echo Lake Preliminary EWM Treatment Plan Rev12-07-2017 (LEAPS)						
Name	Acres	Mean Depth (feet)	Acre-feet	Target 2,4-D (ppm a.e.)	Navigate Application (pounds)	Navigate Dose (pounds/acre)
Bed1-18	0.16	5.0	0.80	4.00	45.4	284
Bed2-18	0.26	5.0	1.30	4.00	73.8	284
Bed3-18	0.24	7.0	1.68	4.00	95.4	398
Bed4-18	0.73	5.0	3.65	4.00	207.3	284
Bed5-18	0.10	5.0	0.50	4.00	28.4	284
TOTAL	***1.49***		***7.93***		***450.4***	

Application Rates	
Target 2,4-D a.e.	lb/ac-ft*
1.50	21.3
2.00	28.4
2.50	35.5
3.00	42.6
3.25	46.15
3.50	49.7
4.00	56.8
*Granular 2,4-D	

2018 SUMMER EWM REMOVAL SURVEYS AND FALL EWM BED-MAPPING

Endangered Resource Services, LLC (ERS) conducted three surveys of the lake in 2018. The first formal EWM survey after the treatment readiness surveys was completed on June 18, 2018. As was the case in 2017, heavy snows and spring rainfalls in 2018 caused the water levels to be high during the June 18th survey. During the survey, at least 90 individual or small clumps of EWM plants were rake removed. Two areas were particularly bad – the northwest shore (23 plants found and removed) and the northeast bay (60 plants found and removed). EWM removal in the fall of 2017 in this area only included rake removal. Removal in the northeast bay in 2017 was completed by diving which still proved somewhat ineffectual. Diver removal in the fall of 2017 in other parts of the lake did prove effective as only 7 new individual plants were found in the rest of the lake during the June 18th survey.

ERS returned to the lake on July 22, 2018 and repeated the earlier survey. Between the June 18 and July 22 surveys there was a sharp uptick in EWM as 143 individual and small clumps of plants were found and rake removed. Like in June, the majority of plants were along the northwest shore and in the northeast bay. A few plants were found in the south bay along the highway and in the east central bay (Figure 4).

Finally, ERS returned to the lake in October to do a fall survey and rake removal. During the survey, 180 plants were found. Like 2017, no true beds of EWM were mapped however; the northeast bay where 165 of the 180 were located, a high density area was delineated covering 6.38 acres. This was more than five acres greater than the total of all five high density areas delineated in the fall of 2017 and the highest total acreage in the last seven years (Table 2, Figure 5). A few additional plants were found along the northwest shore, but rake removal earlier in the season seemed to be effective at keeping the levels down. Only a couple of plants were found in the southeast bay along the highway during the October survey, and these were rake removed.

Figure 4: July 22, 2018 EWM meandering survey and physical removal

Table 2: Fall EWM Bed Mapping Summary 2012-2018 (ERS, 2018)

Bed Number	2018 Fall HDA Acreage	2017 Fall HDA Acreage	2016 Fall HDA Acreage	2015 Fall Bed Acreage	2014 Fall Bed Acreage	2013 Fall Bed Acreage	2012 Fall Bed Acreage	Years Treated	2018 Fall Bed /HDA Field Notes
1	0	0	0.32	0	0	0	0	2010, 2014, 2017	Scattered EWM
2	0	0	0	0	0	0	0	2010	No EWM found
3	0	0	0	0	0	0	0	2010	No EWM found
4	0	0	0	0	0	0	0	2010	No EWM found
4B	0	0	0	0	0	0	0	2014	No EWM found
5	0	0	0	0	0	0	0	2010	No EWM found
5A	0	0.03	0	0	0	0	0	None	No EWM found
5B	6.38	0.16	0	0	0	0	0	None	Regular EWM
6	0	0	0	0	0	0	0	2010, 2013	No EWM found
6A	0	0.06	0	0	0	0	0	None	No EWM found
7	0	0	0	0	0	0	0	2010	No EWM found
8	0	0	0	0	0	0.02	0.09	'10, '11, '13, '14	No EWM found
8A, B, C, D	0	0	0	0	0	0.02	0.05	2012, 2013	No EWM found
9	0	0	0	0	0	0	0	2010, 2011	No EWM found
10	0	0	0	0	0	0	0	2010	No EWM found
11	0	0	0	0	0	0	0	'10, '11, '12, '14	No EWM found
11A	0	0.01	0	0	0	0	0	None	No EWM found
12	0	0	0	0	0	0	0	2010, 2014	No EWM found
12A	0	0.33	0	0	0	0	0.03	None	3 EWM plants
12B	0	0	0	0	0	0	0.04	None	No EWM found
13	0	0	0	0	0	0	0	2010, 2014	No EWM found
14	0	0	0	0	0	0	0	2010	No EWM found
15	0	0	0	0	0	0	0	2010, 2014	No EWM found
Total	**6.38**	**0.59**	**0.32**	**0.00**	**0.00**	**0.04**	**0.21**		

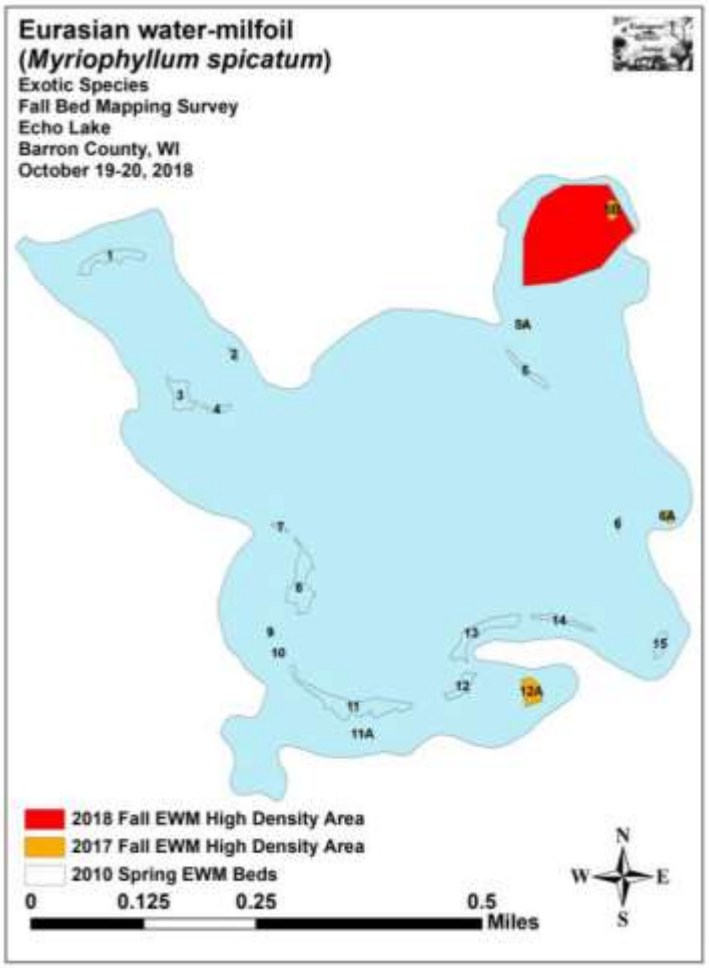

Figure 5: 2017 and 2018 EWM high density areas (ERS, 2018)

EWM MANAGEMENT IN ECHO LAKE

2018 EWM MANAGEMENT

Despite the amount of EWM found in the fall 2017 survey, and the fact that a treatment proposal covering five high density areas totaling 1.49 acres was drawn up, no chemical treatment was completed in the spring of 2018. This was primarily to do with the inability to identify significant enough EWM growth during the pre-treatment readiness surveys in the proposed treatment areas to warrant chemical management. Again, however, based on the amount of EWM found later in June and throughout the season in 2018, it may have been beneficial to complete the 2018 proposed treatment.

The amount of EWM rake removed in 2018 increased over what was removed in 2017 and proved effective in some areas like the northwest shoreline and in the southeast bay along the highway, but less effective in other areas of the lake. Because of this, a preliminary chemical treatment proposal was developed for the spring of 2019.

2019 PROPOSED EWM MANAGEMENT

Based on 2018 EWM survey and rake removal results, two areas covering 6.44 acres were proposed for chemical treatment in the spring of 2019 (Figure 6, Table 3). The majority of EWM found and rake removed in Echo Lake in 2018 was in the northeast bay and along the northwest shoreline. It is these two areas that were included in the 2019 preliminary EWM treatment proposal.

Figure 6: 2019 Echo Lake preliminary EWM treatment proposal map (LEAPS, 2019)

Table 3: 2019 Echo Lake preliminary EWM chemical treatment details (LEAPS, 2019)

2019 Echo Lake Preliminary EWM Treatment Plan 3-31-2019(LEAPS)						
Name	Acres	Mean Depth (feet)	Acre-feet	Target 2,4-D (ppm a.e.)	Shredder Amine 4 Application (gallons)	Shredder Dose (gallons/acre)
NEBAY-19	4.81	6.4	30.78	4.00	87.4	18
NWBAY-19	1.63	6.3	10.27	4.00	29.2	18
TOTAL	***6.44***		***41.05***		***116.6***	
Estimated Herbicide Cost						
DMA 4/ Shredder Amine 4		liquid 2,4-D	116.6	40.00	$4,664.00	

2019 EWM READINESS SURVEYS AND FINAL CHEMICAL TREATMENT PLAN

Two pre-treatment readiness surveys for EWM were completed on Echo Lake in the spring of 2019. On May 25, 2019 LEAPS was on the lake surveying the proposed treatment areas for EWM. Several individual plants were found in the northeast bay, but nowhere else. LEAPS returned to the lake on June 2 and again surveyed the proposed treatment areas and the rest of the lake. More plants were found in the northeast bay, but only two isolated plants were found along the northwest shoreline, and these were removed. As a result of the readiness survey work, the proposed treatment area along the northwest shore was canceled. The northeast bay treatment area was modified to include a smaller, but more congruent treatment area with less area extended into untreated water (Figure 7). The treatment was completed on June 6th. The water temperature was 76°F. No post-treatment survey work had been completed yet when this document was prepared.

2019 Echo Lake FINAL EWM Treatment Plan 6-02-2019(LEAPS)						
Name	Acres	Mean Depth (feet)	Acre-feet	Target 2,4-D (ppm a.e.)	Shredder Amine 4 Application (gallons)	Shredder Dose (gallons/acre)
NEBAY-19	3.84	7.50	28.80	4.00	81.8	21
TOTAL	***3.84***		***28.80***		***81.8***	

Figure 7: 2019 Echo Lake final EWM chemical treatment (LEAPS, 2019)

CLEAN BOATS, CLEAN WATERS

In 2017 the water level in Echo Lake was still very high for most of the season. Despite the high water, the boat landing on Echo is still difficult to launch at. In 2018, at least 103.5 hours of CBCW inspection was completed. More than 30 boats either entering or leaving Echo Lake were inspected with more than 30 people contacted. These numbers have been pretty consistent over the last three years of CBCW inspection. All CBCW data for 2018 was submitted to the SWIMS database.

Shirley Steinmetz is again planning on coordinating the 2019 CBCW program for Echo Lake.

AIS AND PURPLE LOOSESTRIFE MONITORING AND REMOVAL

At least two of the ELA Board Members spent time on the lake in 2018 looking for EWM and other AIS. In addition, a small group of people spent several hours on the lake on August 19, 2018 with a LEAPS representative to learn about EWM and other plants and how to identify EWM in the water and do physical or rake removal. At the same time, the shores of the lake were surveyed for purple loosestrife. No purple loosestrife was found. In the fall of 2018, lake property owners were encouraged by the ELA to inspect their docks and lifts for the presence of zebra mussels. Not everyone participated, but those that did found no suspect evidence of zebra mussels. During the spring EWM readiness surveys, CLP was looked for in the littoral zone of the lake, but none was found.

On June 15, 2019, another group of ELA volunteers and a LEAPS representative spent time on the lake going through the Citizen Lake Monitoring Network water quality sampling program and then searching for and removing EWM. None was found in the treated area, but in the southeast bay by the highway upwards of 30 or more individual plants or small clumps of plants were removed by rake. The volunteers on the tour learned through hands on training how to rake remove EWM. It is expected that this group of volunteers will continue to look for and physically remove EWM found in 2019.

CITIZEN LAKE MONITORING NETWORK (CLMN) WATER QUALITY TESTING

Water quality testing as a part of the CLMN Expanded Monitoring Program continued on Echo Lake in 2018. Total phosphorus testing was completed on three dates in 2018. Dissolved oxygen and temperature profiles were completed on four different dates, and chlorophyll a was completed on T\two dates. Figure 8 shows the average summer (July-August) Secchi disk readings since CLMN began. In 2018, the average summer (July-Aug) Secchi disk reading for Echo Lake - Deep Hole (Barron County, WBIC: 2630200) was 12 feet, up 2.5 feet from 2017 and 3.5 feet from 2016. The average for the Northwest Georegion was 8.6 feet in 2018. Typically the summer (July-Aug) water was reported as **clear** and **green**.

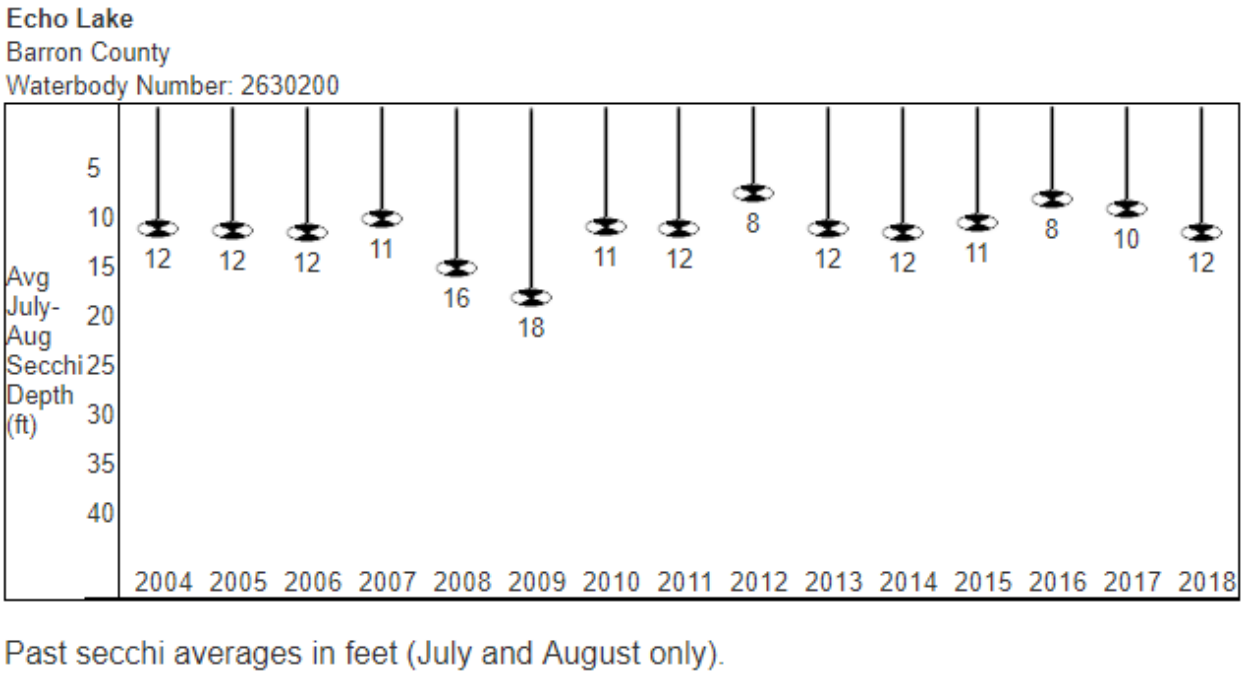

Figure 8: Average summer (July and August) Secchi disk readings at the Deep Hole

Chemistry data was collected on Echo Lake - Deep Hole in 2018. The average summer Chlorophyll was 3.7 µg/l compared to a Northwest Georegion summer average of 16.1 µg/l. The summer Total Phosphorus average was 13.1 µg/l, way lower than 2017 and lower than 2016. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Echo Lake - Deep Hole was 45, two points lower than it was in 2017, and four points lower than it was in 2016 (Figure 9). This TSI suggests that Echo Lake - Deep Hole was solidly mesotrophic in 2018. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

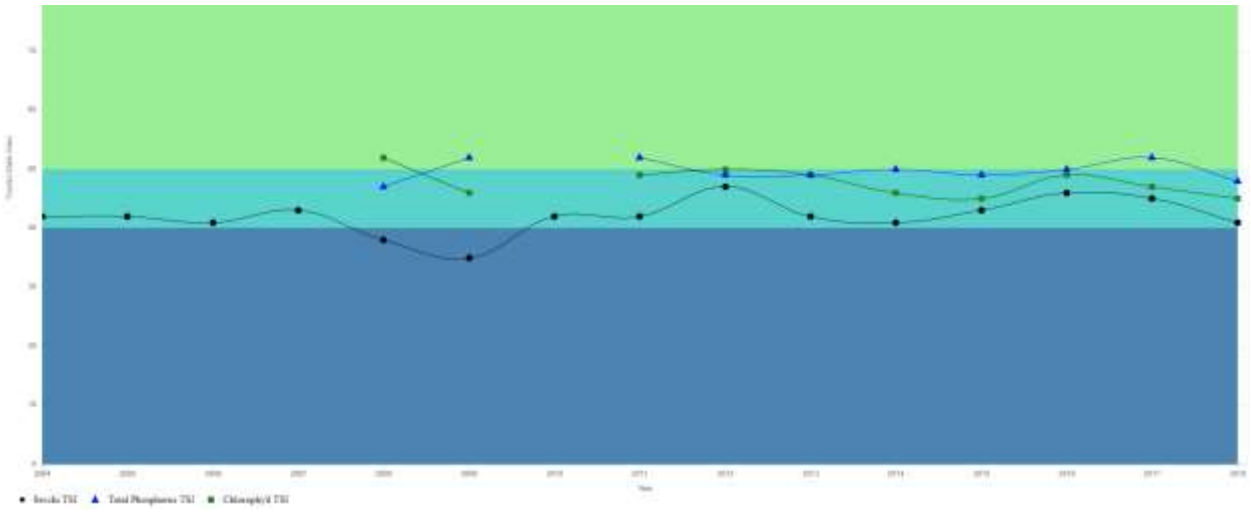

Figure 9: Summer (July and August) TSI values for total phosphorus and chlorophyll-a at the Deep Hole on Echo Lake

Dissovled oxygen and temperature profiles indicate that Echo Lake is dimictic meaning it has both a spring and fall turnover and stratifies in the summer. Stratification was documented in profiles taken by volunteers in May, July, and September. A thermocline had begun forming in late May, and was solidly in place as of the July testing at between 15 and 18 feet of water. Dissolved oxygen levels plumeted to almost nothing below the thermocline. The thermocline was still in place during the September sample. In 2017, waters below 20 feet were considered anoxic (without oxygen) from late July until the lake began to turnover in the fall. These results were again confirmed in 2018 (Figure 10).

05/28/2018

Depth FEET	Temp. DEGREES F	D.O. MG/L
0	78.4	8.95
3	76.5	9.17
6	74	9.36
9	68.1	10.09
12	53.9	10.91
15	47.1	8.63
18	44.8	6.22
21	43.5	6.19
24	42.3	5.19
27	41.47	3.69
30	41.3	3.1
33	41.2	1.64
36	41	.45
39	41.1	.06

07/08/2018

Depth FEET	Temp. DEGREES F	D.O. MG/L
0	78.6	8.58
3	78.3	8.62
6	78.1	8.63
9	77.8	8.64
12	77.6	8.63
15	77.3	8.65
18	49.6	3.17
21	46.9	1.35
24	44.9	.81
27	43.6	.46
30	42.6	.06
33	42.3	.06
36	42.3	.05
39	42.3	.03

07/25/2018

Depth FEET	Temp. DEGREES F	D.O. MG/L
0	79.8	8.6
3	79	8.69
6	78.3	8.69
9	77.8	8.67
12	76.2	8.16
15	63.2	7.42
18	53.2	5.05
21	47.5	.19
24	45.6	.11
27	44.4	.07
30	43.5	.06
33	43	.05
36	42.6	.05
39	42.7	.04
42	42.8	.02

09/08/2018

Depth FEET	Temp. DEGREES F	D.O. MG/L
0	70	9.26
3	70.6	9.16
6	70.7	9.13
9	70.7	9.08
12	70.5	8.78
15	69.6	7.5
18	62.3	2.33
21	53.2	.53
24	48.3	.13
27	46.7	.08
30	44.9	.06
33	44.1	.06
36	44	.04
39	44.1	.03
42	44.1	.03

Figure 10: Temperature and Dissolved Oxygen Profiles for Echo Lake in 2018

2018 & 2019 ANNUAL MEETING

The ELA held its annual membership meeting on May 27, 2018 from 10:00am to 12:00pm at the cul-de-sac off 15-1/2 Avenue.

During the meeting a representative from LEAPS presented the results of the 2017 summer point-intercept aquatic plant survey, discussed the 2018 EWM chemical treatment plan, and discussed management options that were likely to put in the updated Aquatic Plant Management Plan. At the same time, the LEAPS representative brought along examples of different aquatic invasive species including EWM, CLP, and zebra mussels and discussed how to identify these and what to do for monitoring and removal. Shirley Steinmetz encouraged ELA constituents to get involved in CBCW inspection activities at the landing in 2018.

The 2019 Annual Meeting was held on May 25, 2019. LEAPS was not able to be there, however a handout was prepared for the meeting and AIS identification materials provided to be on display during the meeting. The ELA constituency was informed that the new Echo Lake APM Plan was up on the LEAPS webpage at www.leapsllc.com for review. In addition to the new APM Plan, EWM management plans for 2019 were posted on the webpage and introduced by the ELA President during the meeting.

2017-19 AEPP GRANT PROJECT

The ELA was awarded and Aquatic Invasive Species Education, Prevention, and Planning grant in the spring of 2017 with tasks covering the time period between February 15, 2017 and June 30, 2019. Tasks included in the grant funded project were as follows:

- Watercraft inspection (2017, 2018, and 2019)
- EWM monitoring and treatment planning (2017, 2018, and 2019)
- Volunteer AIS monitoring (2017 and 2018)
- AIS outreach and education (2017, 2018, and 2019)
- Shoreline and woody habitat surveys (2017 & 2018)
- Early Season (cold water) and summer point-intercept aquatic plant surveys (2017)
- Update of the existing APM Plan (2018 & 2019)

Specific deliverables for this project include AIS monitoring and watercraft inspection data in SWIMS, examples of AIS education and outreach, shoreland habitat assessment and woody debris report, aquatic plant survey results, and the updated APM Plan.

All that remains in this project is to file a final reimbursement which requires a final summary report and a completed APM Plan. The APM Plan is complete in draft form waiting on approval by the ELA and the WDNR. Watercraft inspection has been completed and the data recorded. All EWM management planning has been completed. The shoreland habitat assessment has been completed and a report prepared and delivered to the ELA. AIS monitoring has been recorded in the SWIMS database. All aquatic plant survey work has been completed and results worked into the update of the existing APM Plan.