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ECHO LAKE
BARRON COUNTY

2017 AQUATIC PLANT MANAGEMENT IMPLEMENTATION SUMMARY REPORT
WDNR WBIC: 2630100

Prepared by: Dave Blumer, Lake Educator

January 15, 2018

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 2017 season and discusses Eurasian watermilfoil (EWM) management planning and implementation for 2018. Based on 2016 fall EWM bed-mapping results, a chemical treatment proposal for 2017 was completed. Physical removal of EWM and several summer and fall surveys were completed in 2017, in addition to a whole-lake point-intercept survey in preparation for an APM Plan revision in 2018. Based on 2017 fall EWM bed-mapping results a chemical treatment was proposed for the spring of 2018. The following list of education and management actions were completed in 2017.

- 2017 EWM Treatment and EWM Readiness Survey
- 2017 Summer EWM Surveys and Fall Bed-Mapping
- Manual Rake Removal
- Clean Boats Clean Waters
- Shoreland Habitat Assessment
- AIS and Purple Loosestrife Monitoring
- Citizen Lake Monitoring Network Water Quality Testing
- Annual Meeting

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

2017 PROPOSED TREATMENT AND 2017 EWM READINESS SURVEY

The 2016 summer EWM physical removal projects and the fall bed mapping survey that identified a cluster of 51 EWM plants in the boat landing bay (these plants were removed). Outside of the cluster several additional plants were found scattered near the boat landing. In 2016, only three individual plants were found outside of the northwestern bay (Figure 1). Based on this survey information a 2017 spring treatment proposal was created for the 0.37 acre "high density" area in the northwestern bay (Figure 2).

In place of a full pre-treatment survey, LEAPS conducted an EWM readiness survey in late May of 2017. While there was not as much EWM as was found in the fall bed mapping survey, there was enough present to justify the proposed treatment. This treatment took place on June 23rd, 2017.

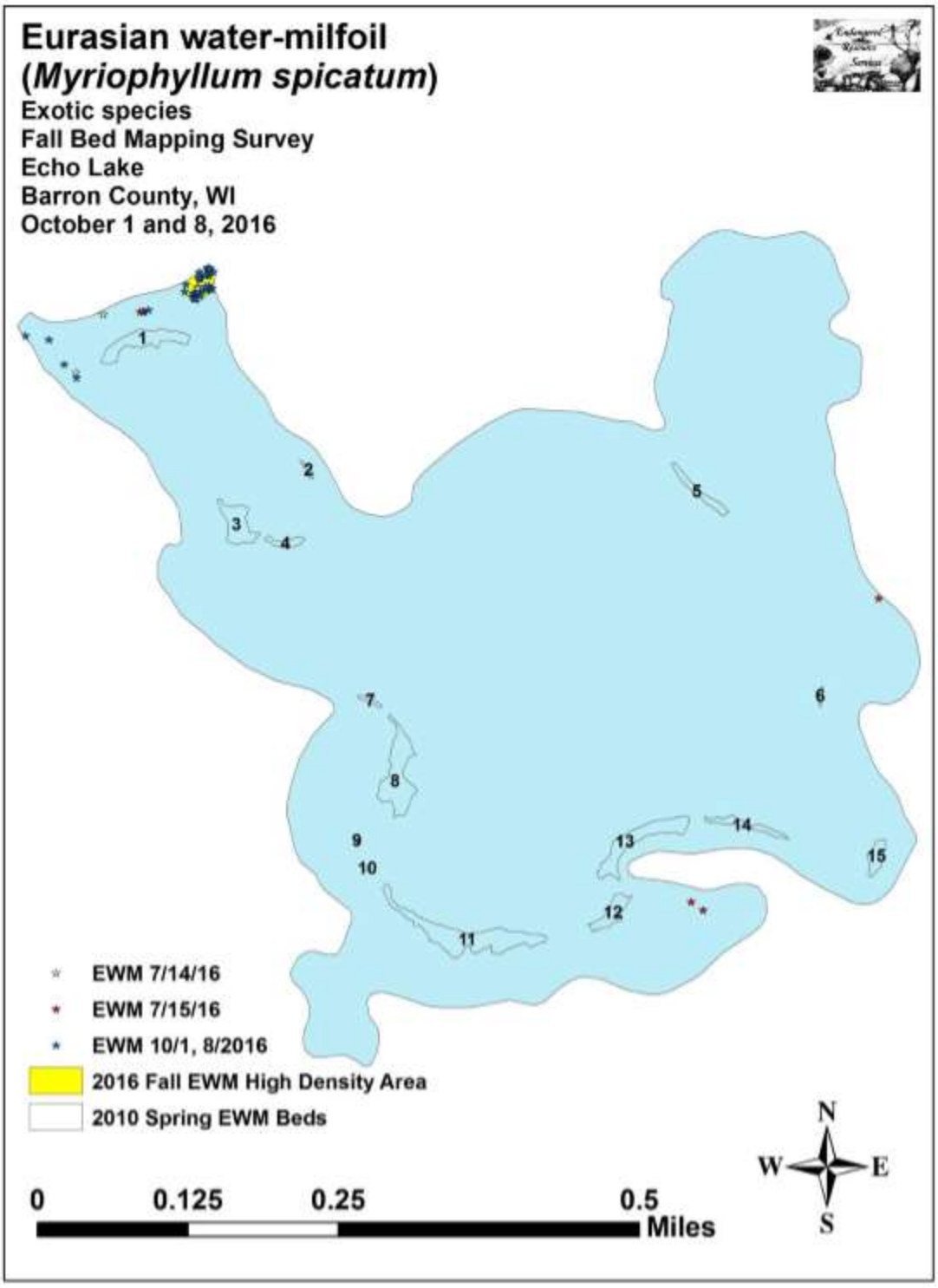

Figure 1: 2016 EWM bed mapping survey

Figure 2: 2017 Spring treatment area

2017 SUMMER EWM SURVEYS AND FALL EWM BED-MAPPING

Endangered Resource Services, LLC (ERS) conducted the first formal EWM survey on June 23rd. As was the case in 2016, heavy spring rainfalls had caused water levels to be up 1-2 ft which resulted in poor water clarity. Surveyors searched over 11 miles of transects around the lake with special focus on the areas where EWM had historically been found, but only managed to find and remove three individual plants. Two of these plants were in the northwest bay with the remaining plant in the south central portion of the lake.

In July, ERS returned to do a littoral point-intercept survey for all aquatic plants as well as another rake removal survey for EWM. The July survey showed a sharp uptick in EWM growth finding and rake removing a total of 45 plants- 24 in the northeast bay and 21 in the southeast finger bay. The point-intercept survey showed a healthy and diverse native plant community with a total of 45 different species. The FQI was 45.6 which is significantly higher than the average for this area of Wisconsin which is only 20.9. This is an indication of an incredibly healthy native plant community.

In addition to the chemical treatment, the ELA also supported a meandering rake removal survey around the lake. This survey occurred on September 21st. During this survey, Dave Blumer from LEAPS and ELA president Mike Clohisy found and removed approximately 20 EWM plants spread around the lake (Figure 3). There was no EWM found in the treatment area.

Figure 3: 2017 EWM Meandering Survey Physical Removal

Due to the amount of EWM found during the meandering survey, an additional survey was completed by ERS along with SCUBA removal of plants found in deeper areas. In the northwest boat landing bay, EWM continued to be rare following the treatment as surveyors found and removed a total of seven plants. In the northeast and east-central bays, surveyors found several super clusters of plants in deep water (HDAs 5A and 5B) that were actively fragmenting. They also found fragments drifting to the northeast into the far northeast corner of the bay where they removed at least 101 plants (Figure 4). In the southeast finger bay and along the south shoreline, we found and removed approximately 45 more plants that were concentrated in two areas. Despite this uptick, ERS was able to remove every EWM plant found – a total of 209 plants. In total, the high density areas of EWM covered 0.59 acres of the lake.

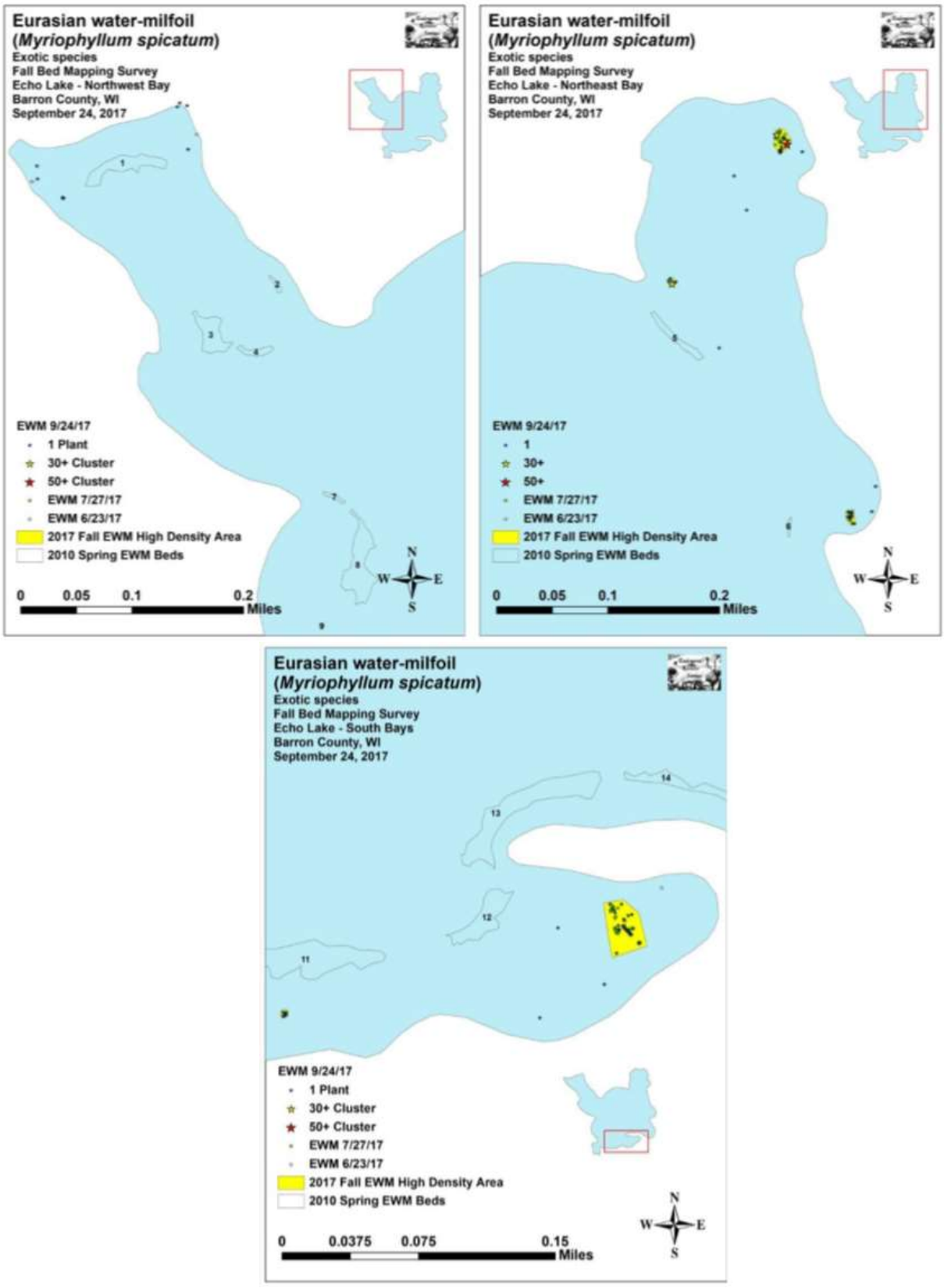

Figure 4: 2017 EWM locations

EWM MANAGEMENT IN ECHO LAKE

2017 EWM MANAGEMENT

The expansion of EWM in the northwest bay of the lake in the fall of 2016 led to a 2017 spring EWM treatment covering 0.37 acres. Navigate (granular 2,4-D) was used at maximum label rate to knock this area of EWM down. No EWM was found in the area that had been chemically treated in the spring after the treatment. All EWM that was found after the treatment was rake removed either by ERS or by the ELA through their consultant and lake volunteers. The high water conditions seen in 2016 persisted through the entire 2017 open water season. This contributed to poorer water clarity that may have been part of the reason for the rapid growth of EWM seen in the July survey due to many native plants dying off along the edges of the littoral zone and the subsequent release of nutrients.

2018 PROPOSED EWM MANAGEMENT

While very little EWM was found in the northwestern bay that was treated in the spring of 2017, significantly more was found outside of this area. Based on the 2017 fall survey results, a chemical treatment proposal has been created for 2018. This proposal recommends treating five high density areas of EWM totaling 1.49 acres in the eastern half of the lake with granular 2,4-D (Navigate) at the maximum label rate. Additionally, summer surveys and rake removal will continue on the lake. A fall EWM bed-mapping survey will also be completed.

CLEAN BOATS, CLEAN WATERS

Similar to 2016, the water level in Echo Lake was extremely high for much of the summer, only getting down to a more normal lake level late in the summer. Despite the high water, the boat landing on Echo was still difficult to launch at. Even so, 97 hours of water craft inspection time was logged by volunteers, contacting 36 people. All CBCW data for 2017 was submitted to the SWIMS database.

AIS AND PURPLE LOOSESTRIFE MONITORING AND REMOVAL

At least two of the ELA Board Members spent time on the lake in 2017 looking for EWM and other AIS. As was the case in 2016, no purple loosestrife was found along the shorelines. Curly-leaf pondweed is another AIS that has historically been found within the lake. In the past, CLP has not become a nuisance within the lake. It is commonly present in small areas with low density. 2017 was very similar. Despite the spring of 2017 allowing CLP populations to skyrocket throughout the season in many nearby lakes, there was absolutely no CLP found by board members during the general AIS survey or ERS during their early-season survey that was specifically searching for CLP.

Zebra mussels have always been a concern on Echo Lake, so monitors have mentioned them during watercraft inspection. In the fall of 2016, zebra mussels were found in a lake on the Burnett/Washburn County Line about 40 miles north of Echo Lake. Additional precautions and education efforts were implemented in 2017 to address this now more immediate threat.

HABITAT ASSESSEMENT SURVEY

This survey, developed by the Wisconsin Department of Natural Resources (WDNR), is a means to identify best management practices that could be implemented along the shoreline to reduce runoff in the nearshore area (from the waterline back 35-ft inland) and improve habitat. Native plantings, rain gardens, runoff diversions, rock infiltration trenches, tree and shrub planting, no-mow areas, etc. are all examples of said best management practices. The survey is completed from the water with each parcel evaluated based on a list of criteria including the amount of impervious surface, slope of the parcel, tree cover, shrub and native grasses, and so on. The result is a document that can be used by the sponsoring organization to prioritize efforts now or in the future that focus on shoreland improvement projects that can be covered by the new Healthy Lakes Grant Program. What the sponsoring organization chooses to do with the document is up to them.

PROTOCOL

This survey is intended to provide management recommendations to individual property owners based on an assessment of their property. The protocol involves photographing each parcel from the lake which is then matched to land use information about the riparian zone. For this survey, the riparian zone is defined as the strip of land, along the shore, from the high water level back 35 feet. The information collected includes ground cover which includes lawn, impervious surfaces, and native plants. Additional land use information includes the number of human structures in the riparian zone and various other runoff concerns. This protocol also assesses the amount of woody debris present in the lake however this is done for the entire lake instead of for each individual parcel. Woody debris provides habitat for fish, birds, and numerous other types of wildlife as well as providing some protection from bank erosion. The WDNR protocol defines woody debris as wood in no deeper than 2 feet of water that is at least 4 inches in diameter, at the widest point, and at least 5 feet long. This survey only found 15 pieces of qualifying woody debris around Echo Lake

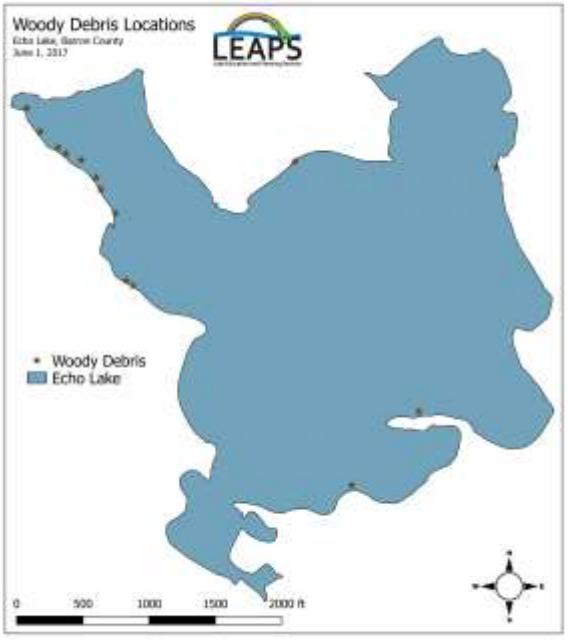

Figure 5: Woody debris around Echo Lake

PRIORITY RANKING PARAMETERS

The priority rankings that accompany each parcel evaluation were developed by LEAPS in order to determine the needs of the each lake that the survey is conducted on with concern to the projects that could realistically be completely on each parcel. The parameters used to determine the priority were considered to be those that would contribute most significantly to the rainwater runoff and the quality of the habitat. This includes percentage of canopy cover, as well as the percentage of undisturbed vegetation and a summed percentage of ground covered by manicured lawn and impervious surfaces. Additional consideration was given to the number of buildings present in the riparian zone, the presence or absence of trails to the lake, lawns that sloped directly to the lake, bare soil deposits that can run into the lake, and any other runoff concerns such as the large patches of artificial beach. For each factor being considered, there are value ranges assigned to determine the color, the value ranges can be seen below in Table 1. Values that fall within the red range are worth 2 points, values in the yellow range are worth 1 point, and values in the white range are not given any points. The points are then summed and the properties prioritized based on the point range for the entire lake.

Table 1 - Value ranges for color assignments of each parameter of concern

Parameter	Red range (2 points)	Yellow Range (1 Point)	White (No points)
Percent canopy cover	0-33%	34-66%	>66%
Percent shrub and herbaceous (undisturbed)	0-33%	34-66%	>66%
Percent lawn, impervious, and other surfaces	>66%	34-66%	0-33%
Number of buildings and other human structures	>1	1	0
Trail to lake	N/A	1 (Present)	0 (Absent)
Presence/ Absence of lawn or soil sloping to lake	N/A	1 (Present)	0 (Absent)
Presence/Absence of bare soil/sand deposits	1 (Present)	N/A	0 (Absent)
Presence/ Absence of other runoff concerns	1 (Present)	N/A	0 (Absent)

LAKE-WIDE SUMMARY

To establish priority rankings for this lake, it was important to consider the entire lake. The maximum possible score was 16 points, but the highest scoring parcel only scored 10 points. From here, four levels of concern were established: red, orange, yellow, and white. These colors correspond to the priority of concern red properties are of high concern, orange are moderate, yellow is low, and white parcels are of almost no concern. Table 2 and Figure 6 summarize the survey results for the entire lake.

Table 2 - Score ranges and priority rankings for the 87 parcels surrounding Echo Lake

Color	Overall Score	Priority	Number of Parcels
Red	8-10 Points	High	14
Orange	6-7 Points	Moderate	25
Yellow	3-5 Points	Low	13
White	0-2 Points	No Concern	35

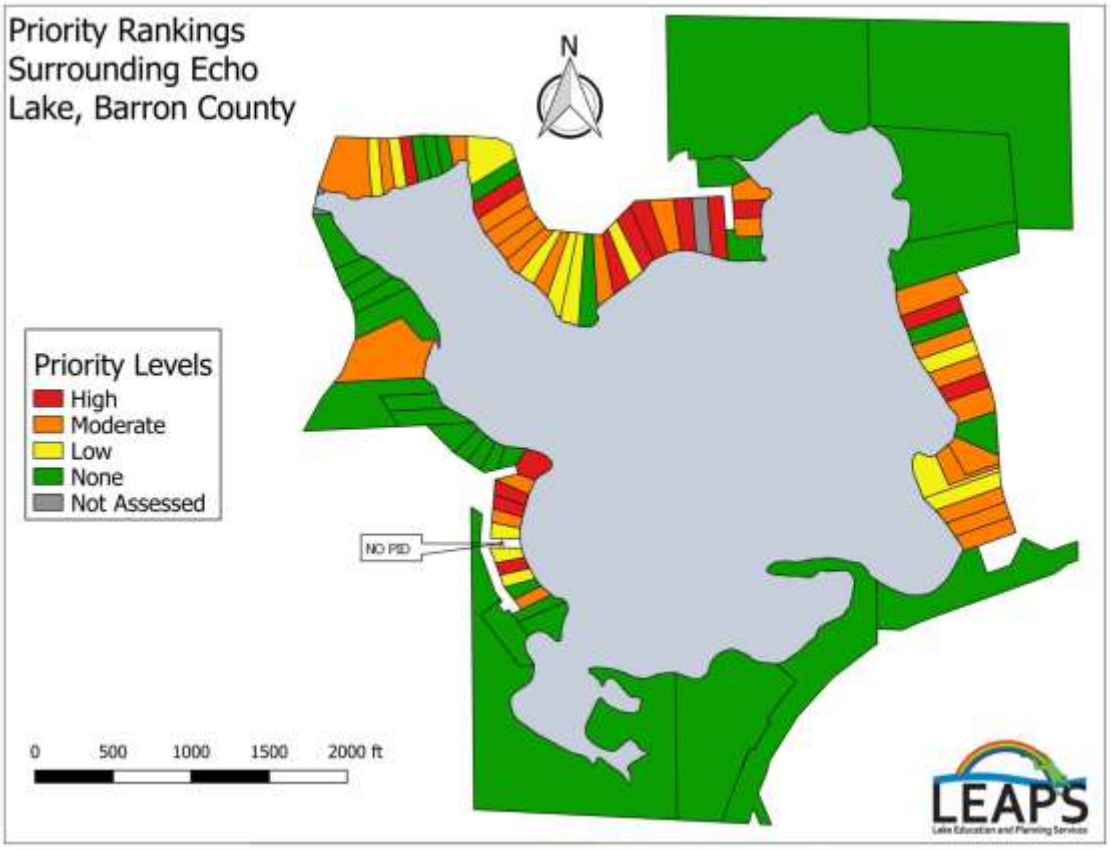

Figure 6: Priority rankings for shoreland habitat around Echo Lake

A separate document from this report summarizes the evaluations of each parcel. The evaluations in the separate document include the numbers used to determine the overall score as well as a photograph, and management recommendations for each parcel. Photos were intended to provide reference for individual property owners. The photos were matched to the correct properties to our best knowledge though there are likely several that do not fully match. However assessments are correctly matched to the appropriate parcel. It is important to note that while ranking each parcel ONLY the 35-ft along the shoreline was considered. The photos were not used to assess properties and can be misleading for certain parameters, particularly canopy cover. For example, some parcels appear mostly shaded, but only have 15% canopy cover. This is likely because the assessment only considered 35-ft back and the canopy cover started beyond that mark. In addition, there are other

considerations such as camera angle, time of day, etc. All evaluations were done in the field to prevent any misdirection that would have been caused by using photos to assess the properties.

The management recommendations are explained, in more detail, in the section of the separate document following the rankings. Generally speaking, there are very few recommendations for properties scoring under 4 points, so these have been marked with no priority ranking. Many of the low priority parcels would benefit from native plantings along the shore to act as a buffer zone. The high and moderate priorities would do well with rain gardens, rock infiltrations, as well as several other remedies. These are all general patterns, but it is important to note that there is a good amount of variation between each parcel. To account for this, there are specific management recommendations for each parcel. The recommendations for each parcel are meant to give property owners an idea of some of inexpensive small scale projects that would best suit the needs of their property. The projects suggested come primarily from the WDNR's Healthy Lakes Initiative which means most of them are eligible for grant funding through the WDNR.

LAKE MANAGEMENT BEST PRACTICES (HEALTHY LAKES INITIATIVE)

The Healthy Lakes Initiative is a program that has been set up by the WDNR to provide support through information and grant funding to small scale projects that will help improve both shoreline habitat and lake health. The grants available for these projects are intended for fairly small, inexpensive projects, so there is $1000 limit in grant funding per project with a 25% match required from either the Lake Association or property owner. This program is focused on helping individual property owners improve their shoreline. There are five projects that are eligible for Healthy Lakes Grants. The projects that qualify for these grants are installing fish sticks, rain gardens, native plantings, diversions, and rock infiltrations.

Fish sticks is taking trees from inland, and installing them in the lake to mimic shore trees that will eventually fall into the lake. The trees used must be taken from a minimum of 35 feet inland and are then secured to the shore with cables for approximately 3 years. This provides habitat for fish, birds, and many other animals. In addition to providing habitat, fish sticks help protect the shoreline from some bank erosion. Fish sticks project costs range anywhere from $100 to $1000, averaging about $500. These are very low maintenance because it is only necessary to occasionally check the cables to ensure they are secure. This practice would help improve almost any of the developed parcels.

Rain gardens are shallow depressions that contain loose soil and native plants. These are intended to capture the runoff, allowing the water to be filtered, naturally through the ground instead of flowing directly into the lake. Rain gardens are designed to allow the rainwater to soak into the ground with 1-2 days, to prevent any of the issues created by standing water. The project cost for rain garden range anywhere from $500 to $9,500, but this is very dependent on the size of the rain garden. The maintenance is fairly low, only requiring watering for about two weeks, until the plants have established. Weeding is occasionally needed during the first year. This project is best suited to parcels on a smaller incline to catch rainwater runoff that would otherwise run into the lake.

Native plantings are intended to establish a buffer zone between the developed portion of a parcel and the lake. The buffer helps filter and slow rainwater runoff so much of it filters into the ground. This buffer zone is created by changing a strip of turf grass, at least ten feet wide, along the shoreline to a natural area composed of native shoreline plants. Similar to rain gardens, these are fairly low maintenance requiring water only until the plants have become established. The only ongoing maintenance is the removal of any invasive species that find their way into the planting. On average, native plantings cost around $1000. This project will work for almost any developed parcel that does not have a sand beach as the primary frontage.

Diversions are placed across a sloping path or driveway to divert runoff water to an area where it can be absorbed into the ground instead of flowing directly into the lake. In addition to helping improve lake health, these can also reduce the effects of erosion on the paths that the diversions are installed on. Diversions are created by entrenching a log or creating a small earthen berm approximately 30 degrees from the angle of the slope. The cost of these range anywhere from $25 to $3,750, but the average diversion costs $200. These are very low maintenance, and only require some debris removal that could get stuck in the diversion and occasionally ensuring everything is still secure and in place. This practice does not work well for the purposes of this particular survey, but it is mentioned here as a nod to projects that could be completed further inland than this survey was meant to assess.

Rock infiltrations are meant for relatively low traffic areas as a way to catch rainwater runoff and divert it into the ground. These consist of a pit which is no more than five feet deep. This pit is lined with filter fabric and filled with small rock. More filter fabric is placed on top and larger rock is then placed over that to hold everything in place. These range in price from $500 to $9,500, on average costing $3800. This requires some maintenance to function properly. It is necessary to remove any debris such as leaves or pine needles that may collect. It is also necessary to occasionally clean out the rock as it collects sediment. This works well around building that can be seen in the riparian zone. The rock infiltrations allow for rainwater coming off of the roof to be collected and filtered without damaging the building it surrounds.

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 2017. Total phosphorus testing was completed on four dates in 2017. Dissolved oxygen and temperature profiles were completed on three different dates, and chlorophyll a was completed on four dates. Figure 7 shows the average summer (July-August) Secchi disk readings since CLMN began. In 2017, the average summer (July-Aug) Secchi disk reading for Echo Lake - Deep Hole (Barron County, WBIC: 2630200) was 9.5 feet, up one foot from 2016, but still lower than years prior. The primary reason for this was the extremely high water in the lake in 2016 which continued through 2017. The average for the Northwest Georegion was 8.1 feet. Typically the summer (July-Aug) water was reported as **clear** and **blue**.

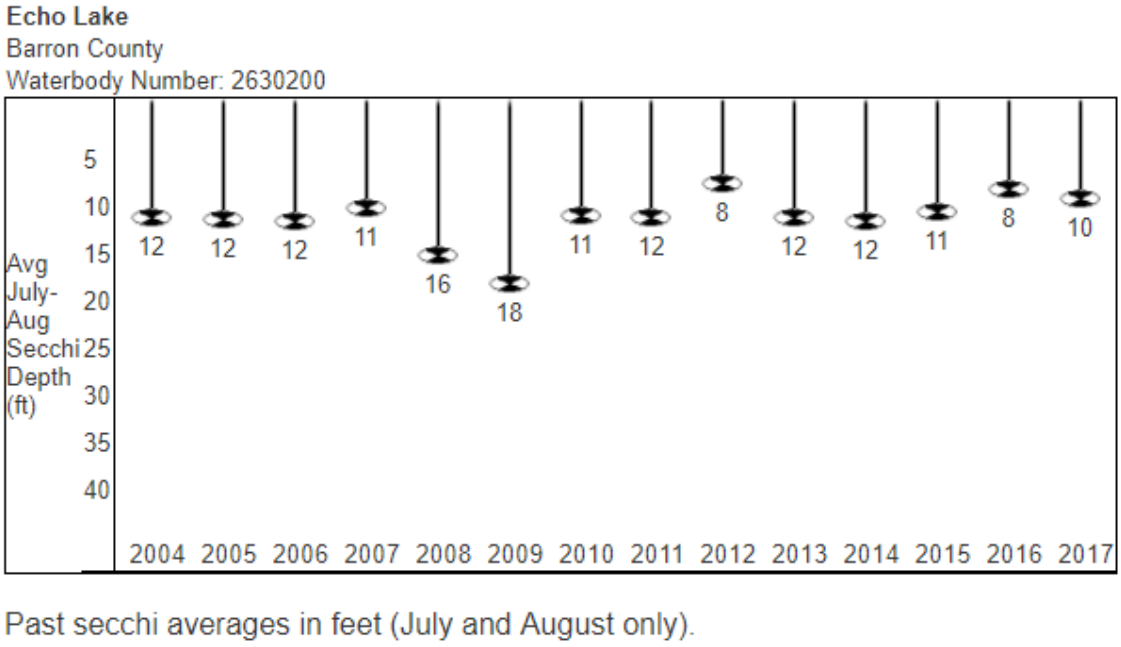

Figure 7: Average summer (July and August) Secchi disk readings at the Deep Hole

Chemistry data was collected on Echo Lake - Deep Hole in 2017. The average summer Chlorophyll was 5.3 µg/l compared to a Northwest Georegion summer average of 15.3 µg/l, and down from the 6.4 µg/l average in 2016. The summer Total Phosphorus average was 20.6 µg/l, noticeably higher than the 17.8 µg/l in 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 47, two points lower than it was in 2016 (Figure 8). This TSI suggests that Echo Lake - Deep Hole was mesotrophic, but is fairly close to being consider eutrophic (at a TSI of 50). Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

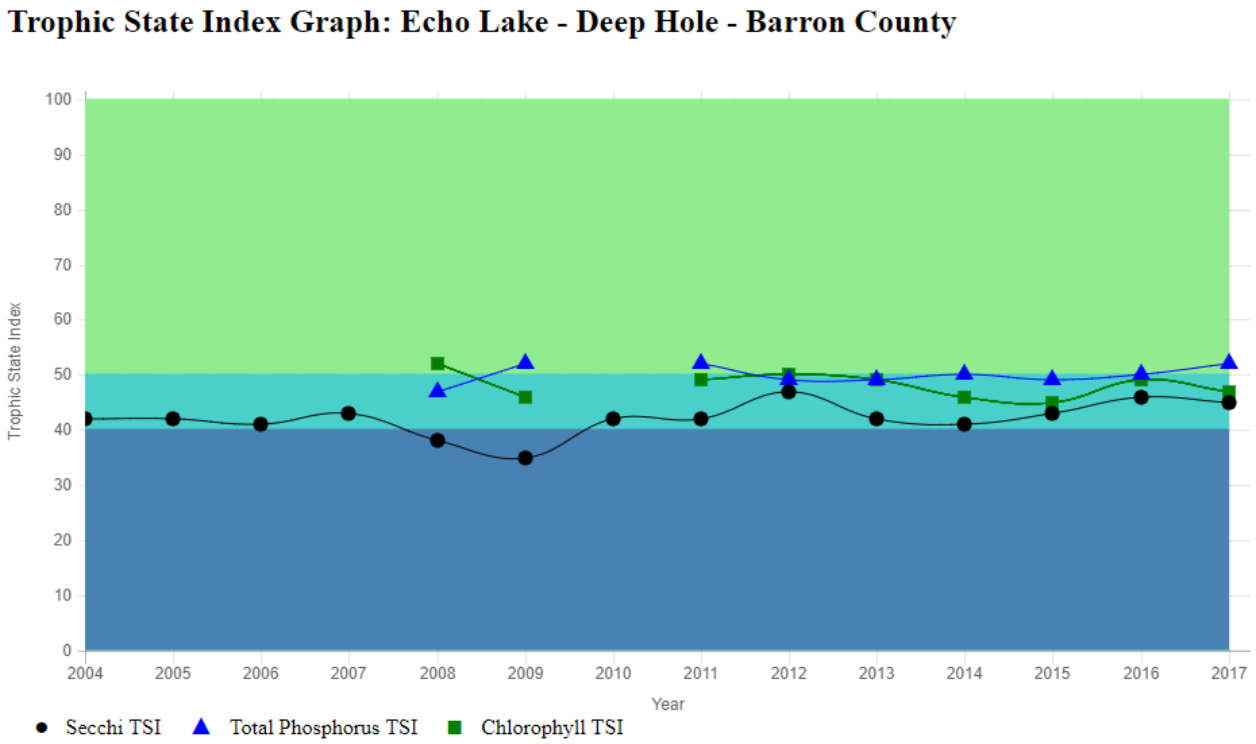

Figure 8: Summer (July and August) TSI values for total phosphorus and chlorophyll-a at the Deep Hole on Echo Lake

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 June-August. A thermocline was established some time between late June and early July at a depth of about 15 feet. Waters below 20 feet were considered anoxic (without oxygen) from late July until the lake begins to turnover in the fall (Figure 9).

06/17/2017		
Depth FEET	Temp. DEGREES F	D.O. MG/L
0	76.8	9.43
3	76	9.54
6	75.5	9.55
9	74.9	9.38
12	68.8	10.42
15	58	6.15
18	54.5	4.3
21	49.8	4.17
24	51.8	4.4
27	48.4	3.61
30	48.6	3.77
33	48.5	2.49
36	47.9	.36
39	47.9	.07
42	47.9	.04
45	47.8	.03

07/16/2017		
Depth FEET	Temp. DEGREES F	D.O. MG/L
0	77.4	9.08
3	77.1	9.15
6	76.6	9.18
9	76	9.18
12	72	6.8
15	63.2	2.33
18	57.3	.22
21	54.6	.18
24	52.3	.11
27	51.1	.06
30	50.2	.04
31	48.8	.03
33	48.6	.02
36	48.6	.01

08/12/2017		
Depth FEET	Temp. DEGREES F	D.O. MG/L
0	74.2	8.42
3	73.8	8.43
6	73.2	8.47
9	72.8	8.51
12	72.6	8.44
15	68.3	1.34
18	59.9	.13
21	55.4	.07
24	53	.05
27	51.5	.04
30	50.4	.04
33	49.8	.03
36	48.9	.03
39	48.7	.02
42	48.7	.01

Figure 9: Temperature and Dissolved Oxygen Profiles for Echo Lake in 2017

ANNUAL MEETING AND LAKE EVENT

The ELA held its annual membership meeting on May 28, 2017 from 9:00am to 12:00pm at the cul-de-sac off 15-1/2 Avenue. Five board members and 27 other constituents were present. Henry Lahn opened the meeting with a welcome to all in attendance, giving a brief overview of what was to be covered today at the annual meeting:

Finance: Lesher gave a report on the dollar balance in our lake account that is $35,557.88, noting that the DNR reimbursement request is $4,025.77 Dues paid to date totals $2,580. Mike also stated that he had copies of the financial statement available to anyone who wished to review the checks and balances. Mike also read a brief overview of last year's annual meeting, which was approved as read.

President Lahn discussed the results of the 2016 fall survey which showed very few milfoil plants present in Echo Lake. The 2017 spring survey confirmed that .37 acres is recommended for treatment.
The six cabin owners in the treatment area have been notified and treatment will take place in the next two weeks. Henry also urged everyone to be on the lookout for milfoil plants and to remove them when seen.

Dave Blumer, our lake management consultant, stated that the 2016 education grant is finished. In December, 2016 we were notified that we did receive another educational grant from the WDNR which will assist in the control of milfoil over the next 2 years. Mr. Blumer has put together a plan for the milfoil management program that will completed for the next two years, which includes survey work, clean boats clean waters and education. Mr. Blumer went on to describe the need to do an aquatic management study and plan every 5 years. This plan helps with reestablishing a foundation for continued monitoring and treatment of the lake. In closing, Mr. Blumer informed everyone that zebra mussels were found in Big McKensie Lake 33 miles north of Echo Lake. Echo Lake is considered unsuitable for Zebra Mussels, but we must still be aware of the potential for exposure to them. Dock out day is an excellent time to be on the lookout for these invasive species.

Blumer also had samples of native and non-native milfoils on display and handouts for lake constituents.

The high lake level was brought up but the board advised that we were not prepared to take on that problem and that our charter covers only invasive species. A lake owner suggested that those in favor of higher water or lower water levels stay after the meeting to discuss what could or should be done.

Before annual elections President Lahn wished the association well as he is selling his property and thanked everyone for their support of the Lake Association and to make sure we keep things going in the right direction.

Last item of business was election of officers. We need three new people to pick up three board positions being vacated by Lahn, Young and Uher. Hansen and Johnson are staying on the board. A motion was made to keep Hansen and Johnson as board members and all approved.

There were also three nominations for new board members. The included Shirley Steinmetz,
Mike Closky, and Marty Michael. A motion was made to approve these 3 new board members and the vote was unanimous to approve.

The meeting adjourned at 11:25 am