LAKE EDUCATION AND PLANNING SERVICES, LLC
302 21 ¼ STREET
CHETEK, WISCONSIN 54728

ECHO LAKE
BARRON COUNTY

2014 AQUATIC PLANT MANAGEMENT IMPLEMENTATION SUMMARY REPORT
WDNR WBIC: 2630100

Prepared by: Dave Blumer, Lake Educator

April 2, 2015

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 2014 season and provides a proposed Eurasian watermilfoil (EWM) control plan for 2015. The 2015 treatment proposal provides the Association with the information needed to contract with a certified aquatic herbicide applicator to complete the necessary WDNR permitting and herbicide treatment. The following list of education and management actions were completed in 2014.

- Pre-treatment aquatic plant survey
- Herbicide application
- Post-treatment aquatic plant survey
- Clean Boats Clean Waters
- Purple loosestrife survey and removal
- Fall EWM bed-mapping
- 2015 EWM management planning
- Citizen Lake Monitoring Network Water Quality Testing
- Lake Fair and Annual Meeting

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

PRE-TREATMENT AQUATIC PLANT SURVEY, TREATMENT, AND POST-TREATMENT AQUATIC PLANT SURVEY

PRE-TREATMENT

A fall EWM bed-mapping survey completed on October 6, 2013 identified two beds of EWM that totaled 0.04 acres and an additional 209 EWM plants outside of these areas (Figure 1). These plants appeared to be recolonizing at very low densities, areas of the lake that in previous years supported wide-spread and dense EWM growth. Based on this survey, 9 areas totaling 3.67 acres were proposed for chemical treatment in the spring of 2014 with granular 2, 4-D (Navigate) at a rate of 3.5 ppm (Figure 2). A 139 point pre-treatment survey set up by Endangered Resource Services (ERS) and completed on June 1 found EWM at 7 points, as a visual at 19 more points, and was interspersed between points throughout. Because of this, it was decided that the proposed treatment would not be changed. During the pre-treatment survey, the littoral zone extended to a maximum of 12.0-ft with a mean and median depth for all plants at 7.0-ft and 7.0-ft respectively. EWM was found throughout the majority of the littoral zone in 5-9 feet of water growing over organic and sandy muck.

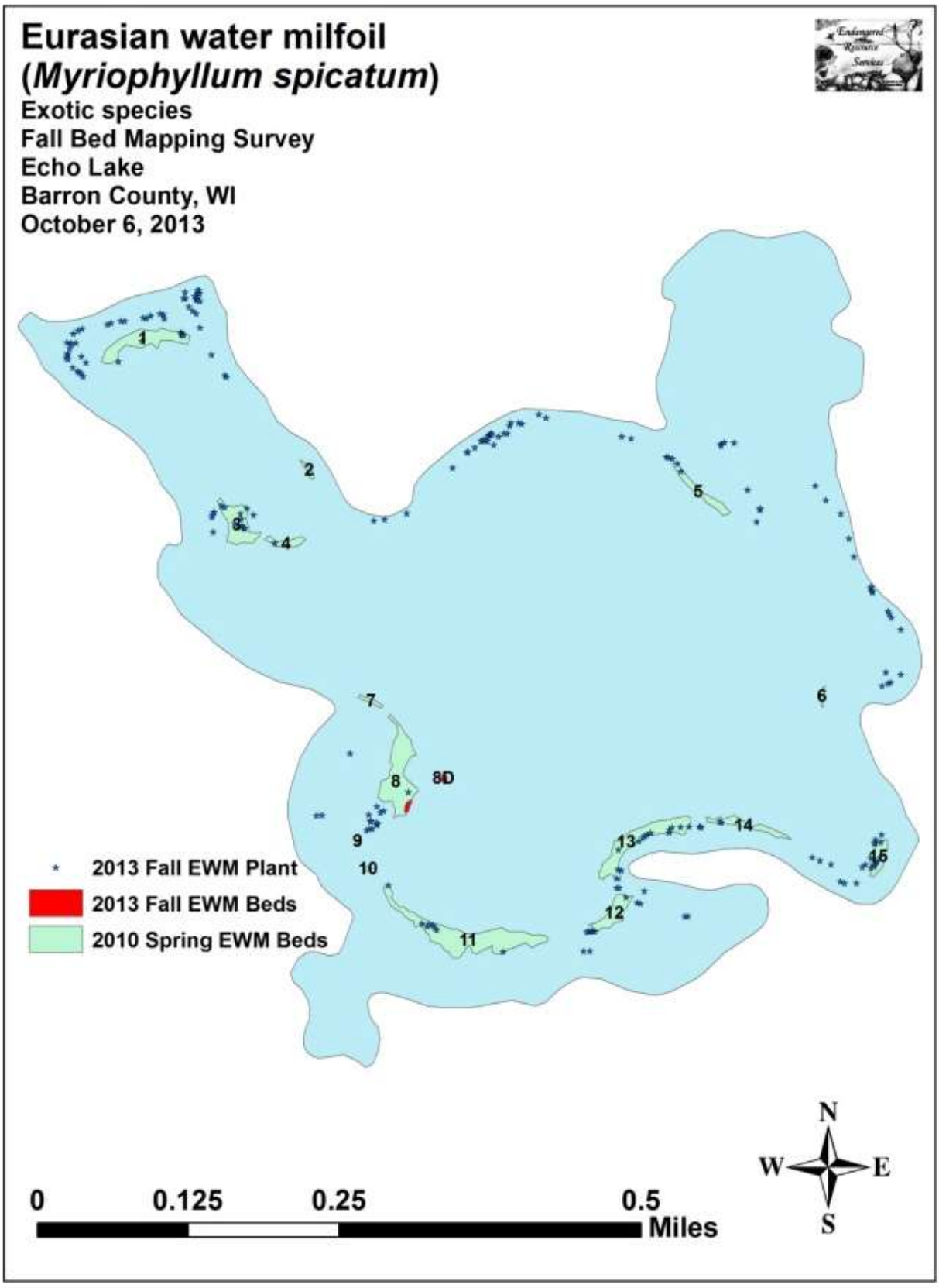


Figure 1: 2013 fall EWM bed-mapping results with beds and individual plants

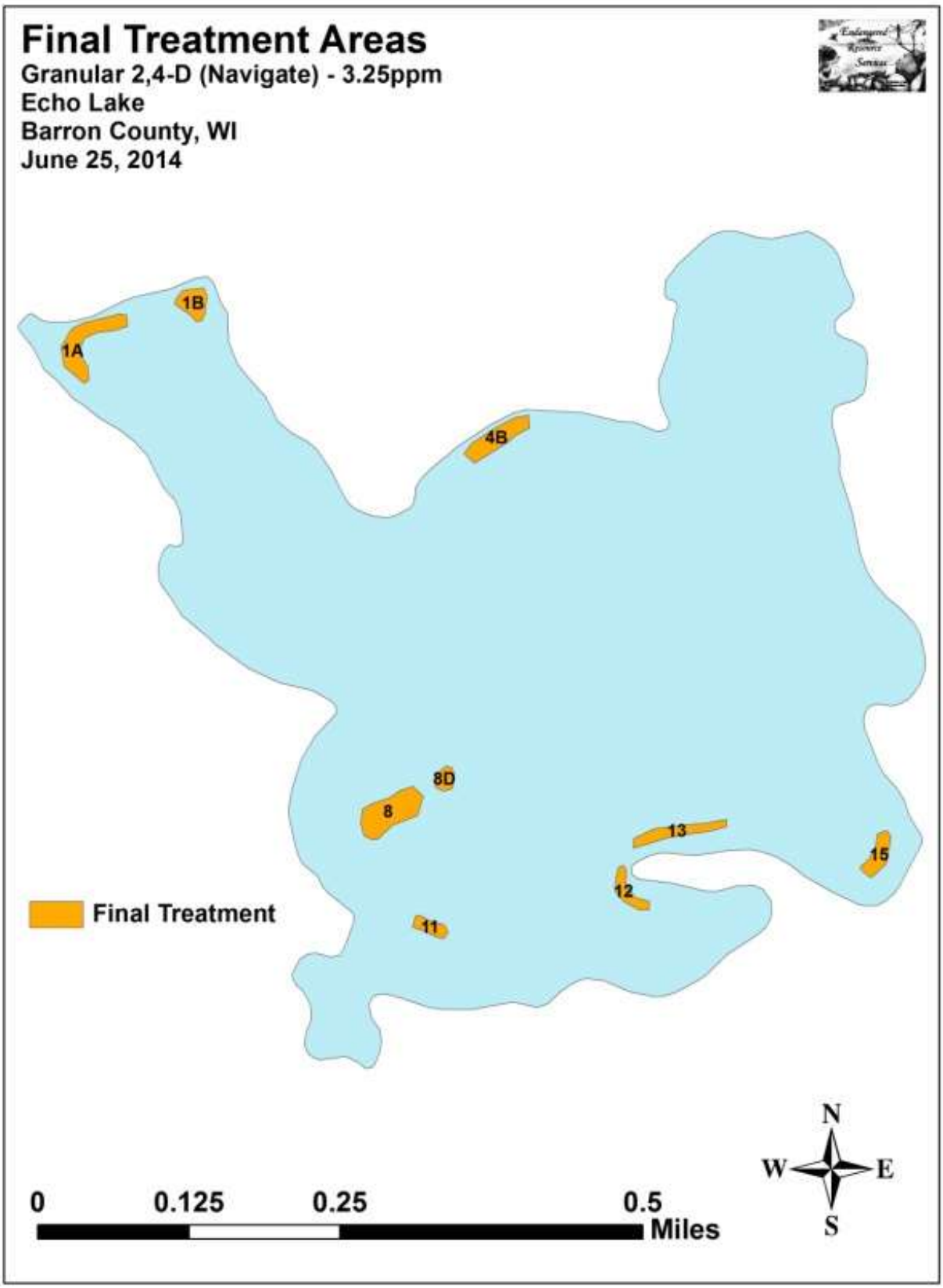


Figure 2: 2014 spring treatment areas totaling 3.67 acres

2014 TREATMENT

Application of Navigate® herbicide was completed by Lake Management Inc. on June 25th. Surface water temperature was 70°F with little wind. A description of the sites and the amount of herbicide applied is in Table 1. Ideally, this treatment should have been completed earlier in the season when water temperatures were closer to 65°F.

Table 1: 2014 EWM Herbicide Management Details

Name	Acres	Mean Depth (feet)	Target 2,4-D (ppm a.e.)	Navigate Application (pounds)	Navigate Dose (pounds/acre)
E1-14	0.69	4.8	3.25	152.8	222
E2-14	.32	4.3	3.25	63.5	198
E3-14	.53	7.4	3.25	181.0	342
E4-14	.31	8.3	3.25	118.7	383
E5-14	.41	7.3	3.25	138.1	337
E6-14	.25	7.4	3.25	85.4	342
E7-14	.19	10.2	3.25	89.4	471
E8-14	.81	7.9	3.25	295.3	365
E9-14	.16	12.2	3.25	90.1	563
TOTAL	***3.67***			***1214.4***	

POST-TREATMENT

During the pre-treatment survey plant diversity within the beds was moderate with a Simpson Diversity Index of 0.66. This value increased to a moderately high 0.77 post-treatment. Mean native species richness at sites with vegetation was 1.73/site pre-treatment, and this value also increased to 1.88/site post-treatment. Mean total rake fullness at sites with vegetation decreased slightly from 1.83 pre-treatment to 1.80 post-treatment. All pre and post treatment comparison statistics are in Table 2.

Table 2: 2014 Pre and Post Treatment Point-intercept Survey Statistics

Summary Statistics:	Pre	Post
Total number of points sampled	139	139
Total number of sites with vegetation	139	138
Total number of sites shallower than the maximum depth of plants	139	139
Frequency of occurrence at sites shallower than maximum depth of plants	100.0	99.3
Simpson Diversity Index	0.66	0.77
Mean C	6.2	7.4
Floristic Quality Index	18.7	32.1
Maximum depth of plants (ft)	12.0	11.5
Mean depth of plants (ft)	7.0	6.9
Median depth of plants (ft)	7.0	7.0
Average number of all species per site (shallower than max depth)	1.78	1.86
Average number of all species per site (veg. sites only)	1.78	1.88
Average number of native species per site (shallower than max depth)	1.73	1.86
Average number of native species per site (native veg. sites only)	1.73	1.88
Species richness	10	19
Mean rake fullness (veg. sites only)	1.83	1.80

During the post-treatment survey, no EWM was found in any of the treatment areas. This decrease in total EWM was moderately significant (Figure 3).

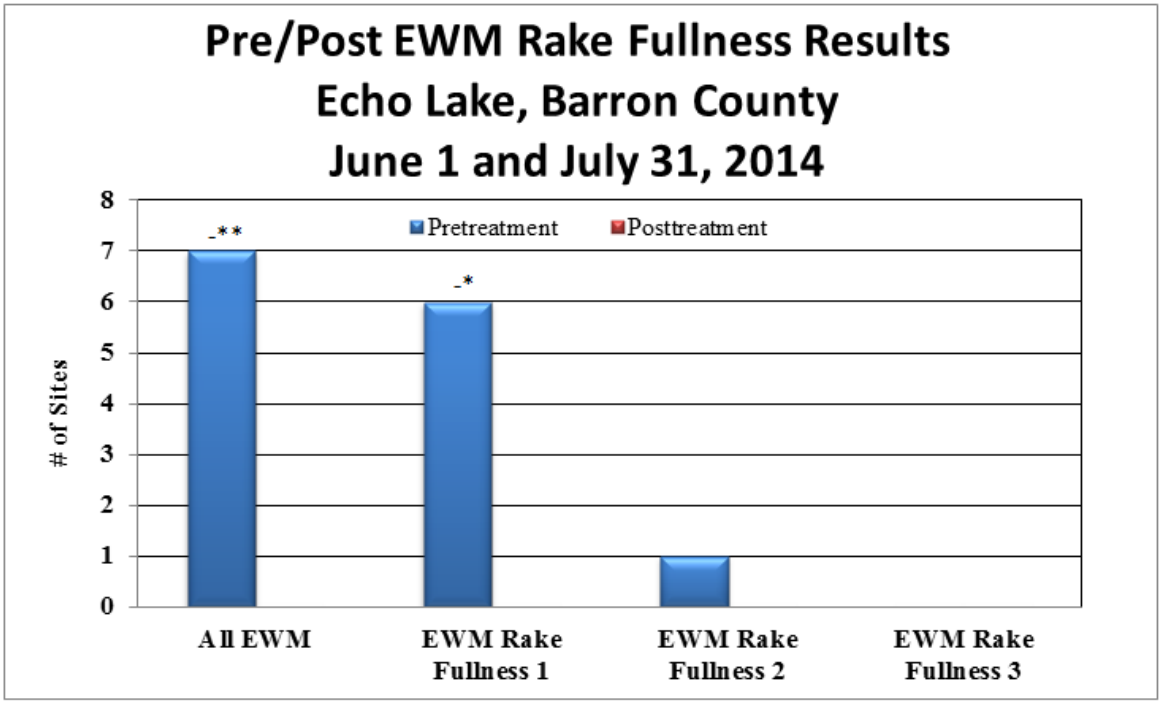
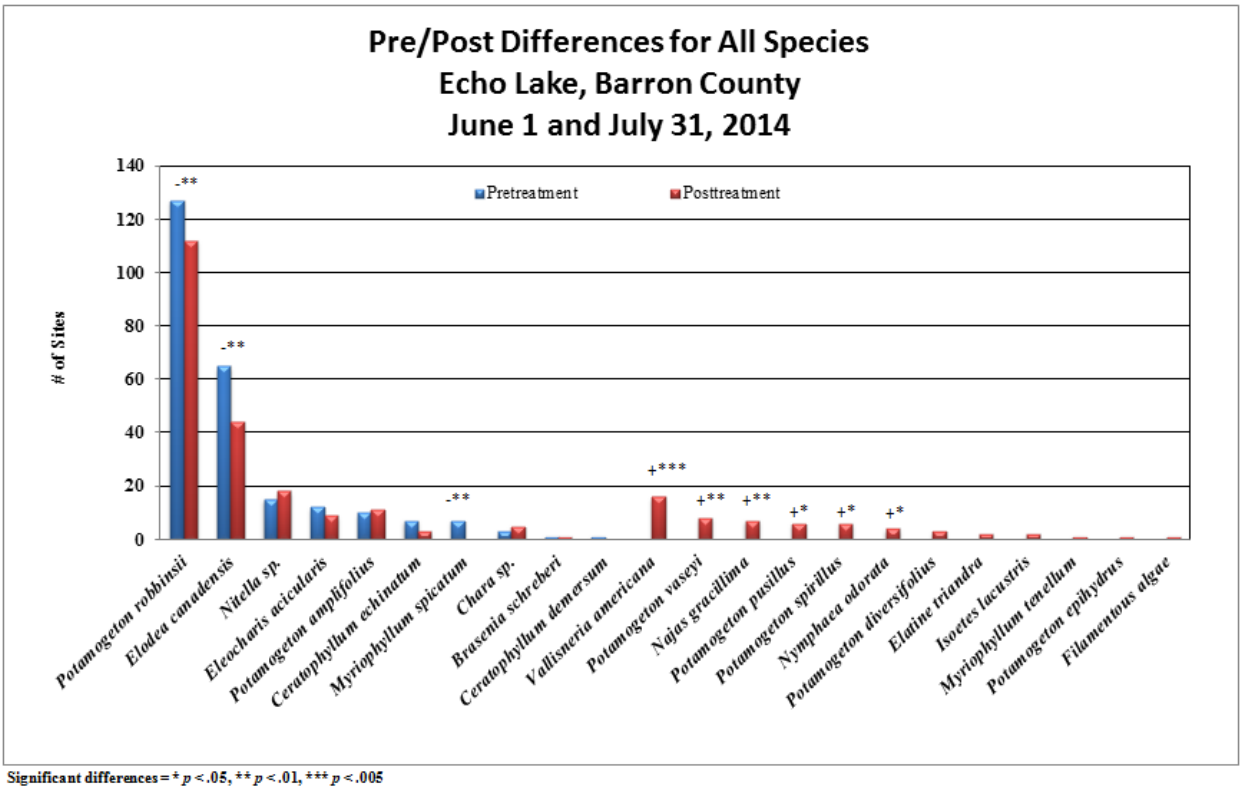


Figure 3: Pre/Post Changes in EWM Rake Fullness (ERS, 2013)

Fern pondweed and common waterweed were the two most common native species in both the pre and post-treatment surveys both showed a moderately significant decline in distribution post-treatment. change post-treatment (Figure 4). Conversely, wild celery showed a highly significant increase; Vasey's pondweed, and northern naiad showed moderately significant increases; small pondweed, spiral-fruited pondweed, and white water lily showed significant increases. More information related to the pre and post-treatment survey including species maps is available in Eurasian water milfoil (Myriophyllum spicatum) Pre/Post Herbicide and Fall Bed Mapping Surveys Echo Lake – WBIC: 2630200 Barron County, Wisconsin (Berg, 2014).



Significant differences = * $p < .05$, ** $p < .01$, *** $p < .005$

Figure 4: 2014 Pre/post changes in aquatic plants

2014 RAKE AND DIVER REMOVAL OF EWM

During the July 31 post-treatment survey, 14 EWM plants were raked removed by the survey team. Then on August 22, a lake littoral zone survey by ELA volunteers and aided by students from Grantsburg High School's SCUBA team, found and removed a similar number of EWM plants (Figure 5). Several pontoon boats from the ELA and LEAPS originally joined the August 22 Event, but because of the very limited amount of EWM found, most had departed when these photos were taken.

Figure 5: ELA pontoon support and Grantsburg High School Dive Team teacher and students, August 22, 2014 (Photos by LEAPS)

CLEAN BOATS, CLEAN WATERS

Water levels were again very low on Echo Lake making general access at the boat landing difficult. Some watercraft inspection time was put in at the landing. 2014 CBCW data is currently being collected and entered into the SWIMS database.

AIS AND PURPLE LOOSESTRIFE MONITORING AND REMOVAL

As can be seen by the photos in Figure 5, ELA volunteers and the Grantsburg High School Dive Team also searched for and physically removed purple loosestrife from the lake during the August 22 event. Another ELA volunteer monitored the littoral zone of the lake for CLP and other non-native AIS, but found none. Property owners on the lake are encouraged through the ELA to check their docks closely for zebra mussels when pulling them out of the water at the end of the season. No suspicious findings were reported to the ELA.

2014 FALL EWM BED-MAPPING

A fall EWM bed-mapping survey was completed on September 28, 2014 by ERS. No EWM beds were present, however 28 individual plants were found (Figure 6). These plants were primarily located in 4-8ft of water, and almost all of them were found on the rock bar southeast of the boat landing (former Bed 3), and in the northeast bay. Compared to 2012 when five beds totaling 0.21 acres and 35 additional EWM plants were found, and in 2013 when two beds totaling 0.04 acres and 209 additional plants were found, 2014 has to be considered an extremely successful control year. The June treatment, along with rake and diver removal efforts seemed to have knocked out the vast majority of EWM plants in the lake while having minimal impact on native vegetation. The following is a description of 2014 beds as compared to 2013.

DESCRIPTIONS OF CURRENT AND FORMER EWM BEDS

Bed 1 – Six EWM plants found and rake removed in the boat landing bay post-treatment. All of them were represented by single stems suggesting they were new sprouts from fragments that had drifted in.

Bed 2 – No EWM plants were found in this area during any of the four trips plant survey trips to the lake in 2014.

Bed 3 and 4 – All plants found in these areas were rake removed. Large-leaf pondweed continues to be common in this area, and most EWM plants were found in 6-8ft of water interspersed with them.

Bed 4B – No EWM was found in this area after the treatment.

Bed 5 – A few single stem sprouts were found in this area during each of the surveys. There were also a few mature plants on the south end of the area that were removed with SCUBA in August.

Northeast Bay – Although historically present here, no EWM had been found in this area in the past four years. Rising water levels in the lake appear to again make this suitable habitat for the plant, and this area should be carefully searched in 2015.

Eastern Shoreline/Bed 6 – There were no EWM plants in the former bed, but clusters of plants were found around several docks scattered among the watershield in the southeast end of the midlake bay.

Beds 7 and 8 – These areas have consistently supported scattered but continuous EWM plants in the past, but none were found in these areas post-treatment.

Bed 8D – A single EWM plant was rake removed in September from the center of the rock hump.

Beds 8A-C, and 9-15 – No EWM was found anywhere in these beds during three post-treatment surveys.

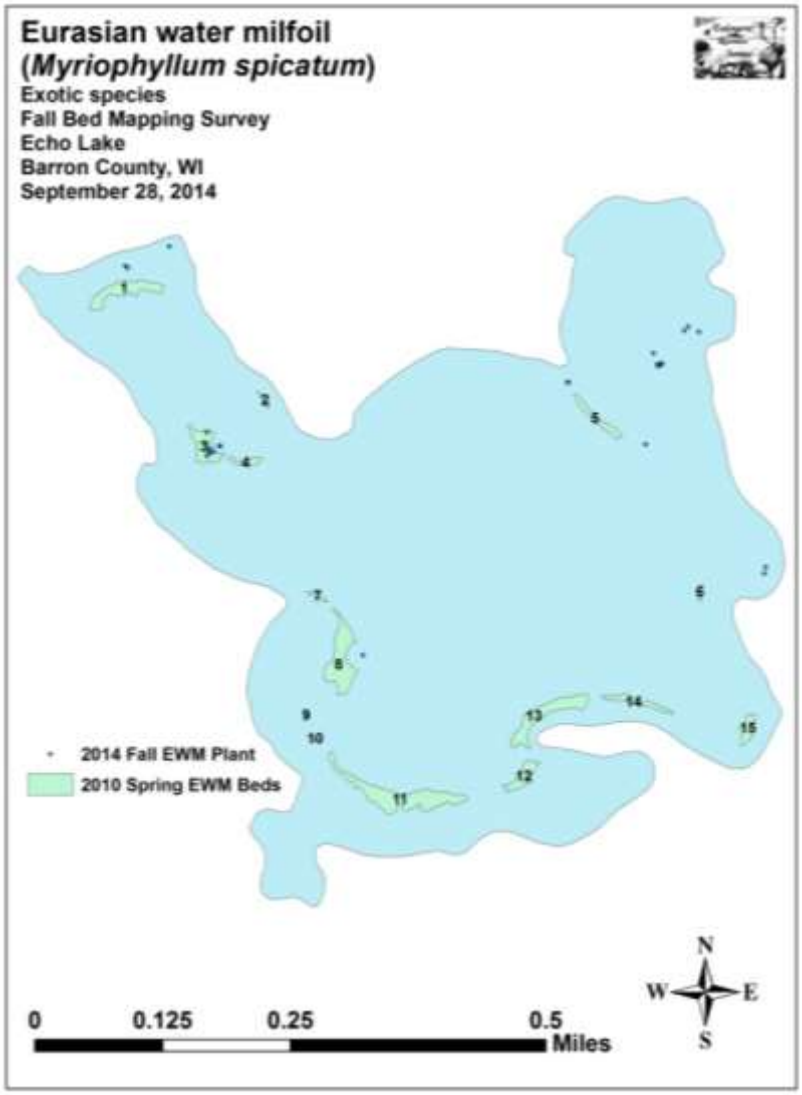


Figure 6: October 2014 fall EWM survey results

2015 EWM PRELIMINARY MANAGEMENT PLANNING

A EWM treatment proposal has been made for 2015 that includes 4 areas totaling 1.14 acres using Navigate granular herbicide at 3.5 - 4.0 ppm. The concentration of herbicide used depends on bed size and average depth of the treatment area (Table 3, Figure 7). Aquatic plant survey work to support management will be similar to past survey work, including a pre-treatment survey, post-treatment survey and a fall bed-mapping survey. It is possible though that the post-treatment survey will be combined with a bed mapping survey and done later in the season, depending on WDNR expectations. If that is done, then the true fall EWM bed-mapping would be discontinued.

Table 3: 2015 Preliminary EWM Herbicide Management Proposal

2015 Echo Lake Preliminary EWM Treatment Plan 1-8-2015(DLB)						
Name	Acres	Mean Depth (feet)	Acre-feet	Target 2,4-D (ppm a.e.)	Navigate Application (pounds)	Navigate Dose (pounds/acre)
Bed1-15	0.16	4.5	0.72	4.00	40.9	256
Bed2-15	.35	7.0	2.45	4.00	139.2	398
Bed3-15	.56	6.0	3.36	3.50	167.0	298
Bed4-15	.07	5.0	0.35	4.00	19.9	284
TOTAL	***1.14***		***6.88***		***366.9***	

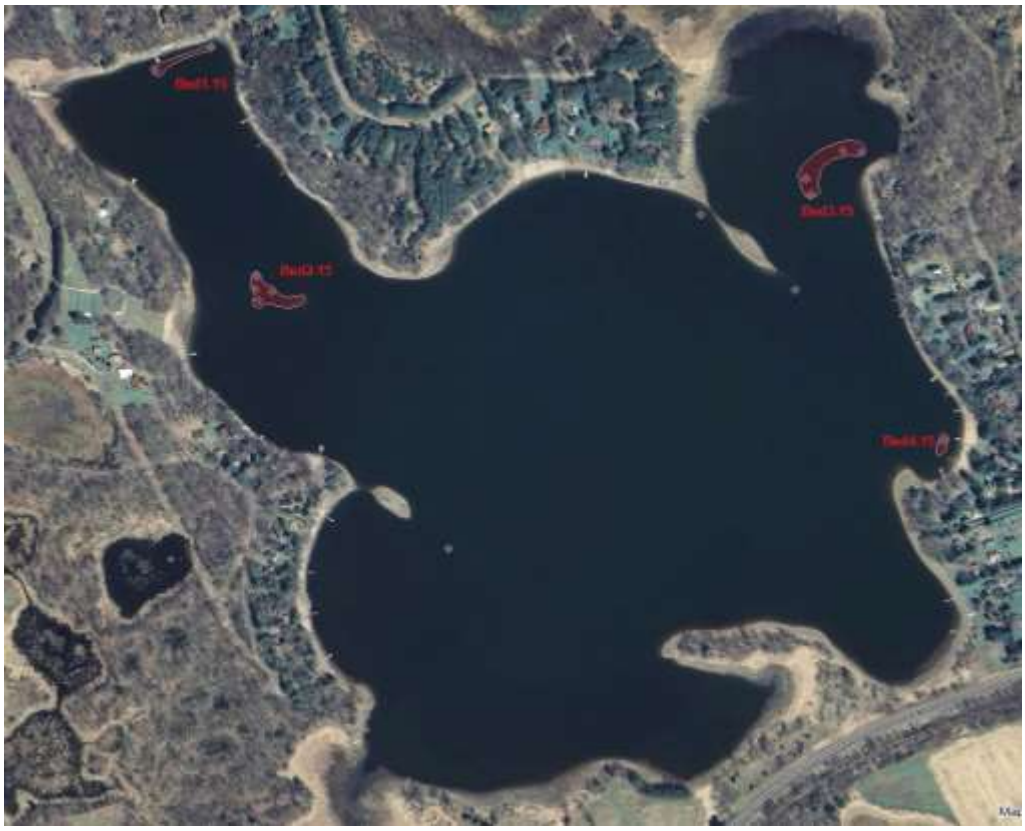


Figure 7: 2015 Proposed treatment areas

A WDNR permit request for herbicide application is currently being prepared by Lake Management Inc. and the ELA for EWM treatment in 2015.

CITIZEN LAKE MONITORING NETWORK (CLMN) WATER QUALITY TESTING

Figure 8 shows the average summer (July-August) Secchi disk readings since CLMN began. In 2014, the average summer (July-Aug) Secchi disk reading for Echo Lake at the Deep Hole was 12.0 feet. The average for the Northwest Georegion was 8.4 feet. Typically the summer (July-Aug) water was reported as CLEAR and BLUE. This suggests that the Secchi depth may be mostly impacted by

algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish.

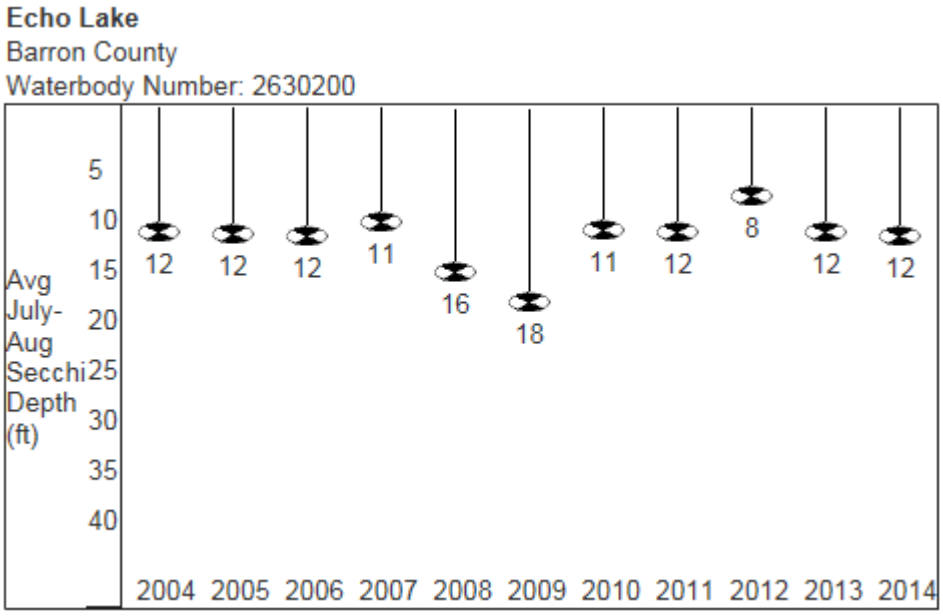


Figure 8: Average summer (July and August) Secchi disk readings at the Deep Hole

CLMN chemistry data collected in 2014 at the Deep Hole in Echo Lake showed an average summer Chlorophyll level of 4.2µg/l (compared to a Northwest Georegion summer average of 16.6µg/l). The summer Total Phosphorus average for 2014 was 16.8µg/l. Lakes that have more than 20µg/l of total phosphorus may experience noticeable algae blooms.

Figure 9 shows the average summer Trophic State Index (TSI) value for total phosphorus, chlorophyll, and Secchi disk readings. The overall Trophic State Index in 2014 (based on chlorophyll) for the Deep Hole in Echo Lake was 46. The TSI suggests that Echo Lake at the Deep Hole in 2014 was mesotrophic. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

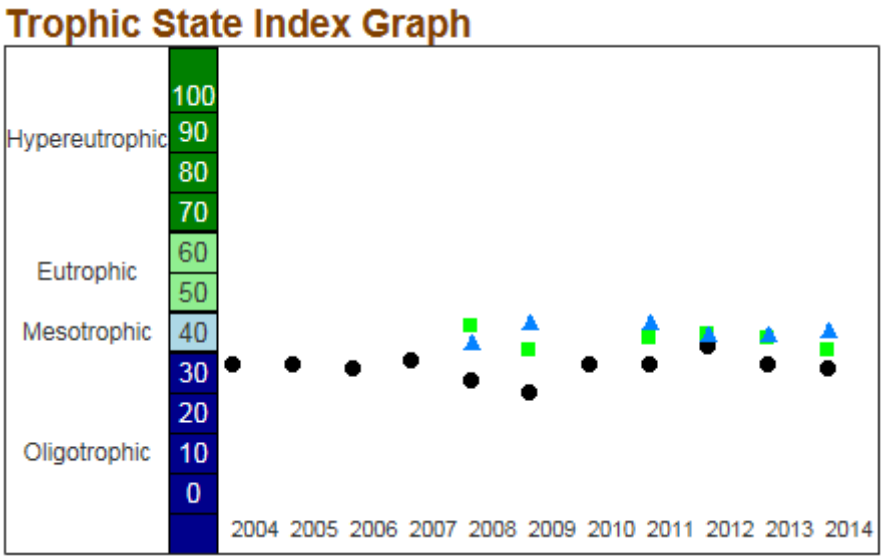


Figure 9: Summer (July and August) TSI values for total phosphorus and chlorophyll-a at the Deep Hole on Echo Lake

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 June-September. Typically the thermocline establishes at around 18-20 feet deep, with dissolved oxygen levels below 2.0 ppm below 27-ft in June, and below 18-ft July-September.

ANNUAL MEETING AND LAKE EVENT

The ELA held its annual membership meeting on May 25, 2014 from 9:00am to 12:00pm at the cul-de-sac off 15-1/2 Avenue. Tom Schroeder from the Beaver Lake Management District was invited to speak about the benefits of a Lake District. Several members of the ELA also spoke about their efforts to find out more information about the formation of a Lake District. A Lake District has not been formed yet, but the discussion is still in process. Dave Blumer from Lake Education and Planning Services (LEAPS) also presented at the Annual Meeting, sounding the alarm about being vigilant when monitoring for EWM in the lake. If physical removal is not a part of the management efforts, the cost of management will go up significantly as will the amount of EWM in the lake. A pdf or the powerpoint presentation made by LEAPS is included in this document.

Plans were made to set up a lake event on August 22 to teach property owners how to identify and remove EWM effectively from the water. This event was implemented, although there were few participants simply because there was not much to remove in 2014. Information about AIS was distributed to participants at the Annual Meeting which was attended by more than 25 property owners.