

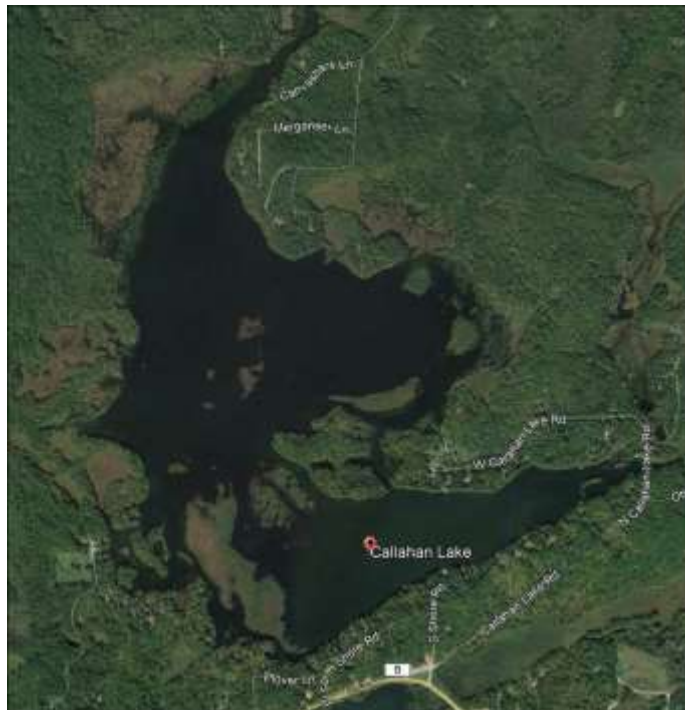
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CALLAHAN AND MUD LAKES SAWYER COUNTY

2020 AQUATIC PLANT MANAGEMENT
IMPLEMENTATION SUMMARY REPORT
WDNR WBIC: CALLAHAN 2434700; MUD
2434800

Prepared by: Dave Blumer, Lake Educator

April 21, 2021



CALLAHAN LAKES PROTECTIVE
ASSOCIATION
HAYWARD, WI 54843

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CALLAHAN AND MUD LAKES 2020 AQUATIC INVASIVE SPECIES EDUCATION PROJECT AND PLANT MANAGEMENT IMPLEMENTATION SUMMARY REPORT

PREPARED FOR THE CALLAHAN LAKES PROTECTIVE ASSOCIATION

INTRODUCTION

This report discusses activities completed by the Callahan Lakes Protective Association (CLPA) and Lake Education and Planning Services (LEAPS) during the 2020 season related to an AIS education, prevention, and planning (AEPP) grant that was awarded at the beginning of 2020.

The following list of education and management actions were completed in 2020.

- 2020 EWM Management Planning and Implementation on Callahan and Mud Lakes
- 2020 Pre-treatment, Point-intercept, Aquatic Plant Survey
- 2020 Fall EWM Fall Bed-Mapping on Callahan and Mud Lakes
- 2021 EWM Management Planning
- 2020 Whole-lake, Point-intercept, Aquatic Plant Surveying on Callahan and Mud Lakes
- 2020 AIS Education and Monitoring
- 2020 Citizen Lake Monitoring Network Water Quality Testing – Callahan and Mud Lakes
- 2020 Public Use Survey

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

2020 EWM MANAGEMENT PLANNING AND IMPLEMENTATION

2020 PRELIMINARY MUD AND CALLAHAN LAKES CHEMICAL TREATMENT

The AEPP grant that began in 2020 does not cover actual chemical treatment of EWM in Callahan and Mud Lakes but it does cover planning and implementation support. 2020 preliminary chemical treatment planning was based on visual survey work done early in late May 2020 by Lake Education and Planning Services (LEAPS). From this survey initial plans were drawn up to treat two areas totaling 9.52 acres in Mud Lake and one area totaling 0.76 acres in Callahan Lake (Table 1, Figure 1).

Table 1: 2020 preliminary EWM chemical treatment proposals for Mud and Callahan Lakes

| 2020 Mud Lake Preliminary EWM Treatment Proposal (5/29/2020) | | | | | | | | |
|--|------------|-------------|-------------------|--------------|--------------------|----------------------------------|------------------------------|----------------------|
| New Name | Bed Number | Acres | Mean Depth (feet) | Acre-feet | Treatment a.i. ppm | Application rate (gal/acre-foot) | Shredder Amine 4 gal/acre-ft | 2019 Treatment Notes |
| Mud-SWBay | BedM2020-1 | 2.26 | 5.00 | 11.30 | 4.0 | 32.09 | 2.84 | new site in 2020 |
| Mud-SEShore | BedM2020-2 | 7.26 | 5.00 | 36.30 | 4.00 | 103.09 | 2.84 | new site in 2020 |
| Total | | 9.52 | | 47.60 | | 135.18 | | |

| 2020 Callahan Lake Preliminary EWM Treatment Proposal (5/29/2020) | | | | | | | | |
|---|------------|-------|-------------------|-----------|--------------------|----------------------------------|------------------------------|----------------------|
| New Name | Bed Number | Acres | Mean Depth (feet) | Acre-feet | Treatment a.i. ppm | Application rate (gal/acre-foot) | Shredder Amine 4 gal/acre-ft | 2019 Treatment Notes |
| Cal-SEBay | BedC2020-1 | 0.76 | 5.00 | 3.80 | 4.0 | 10.79 | 2.84 | new site in 2020 |

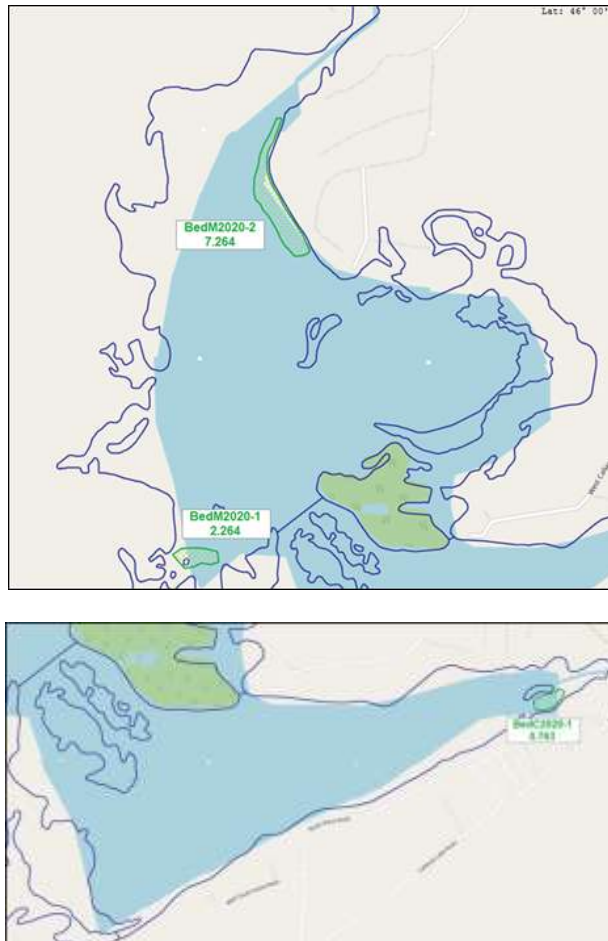


Figure 1: 2020 Preliminary EWM chemical treatment proposal for Callahan and Mud Lakes

2020 PRE-TREATMENT SURVEY WORK

Based on this preliminary treatment proposal, Endangered Resource Services (ERS) was contracted with to complete a pre-treatment aquatic plant survey. To complete this survey, LEAPS provided proposed treatment area shapefiles to ERS, and then ERS generated pre/post survey points based on the size and shape of the areas. A 115 point offset sampling grid at 22m resolution was created by ERS approximating to just over 11 pts/acre – well above the minimum of 4 pts/acre required by WDNR protocol for pre/post treatment surveys (Figure 3). ERS completed the pre-treatment survey on June 8, 2020. During the survey it was found that EWM dominated the majority of Bed A, but was scattered and patchy in Beds B and C. During the pretreatment survey, EWM was present in the rake at 54 points (46.96% coverage) with 33 additional visual sightings. 28 points were rated a rake fullness of 3, 10 a 2, and the remaining 16 a 1 for a mean rake of 2.22. The 38 points with a rake fullness of 2 or 3 suggested 33.04% of the treatment area had a significant infestation. As a result of the pre-treatment survey, the actual areas to be chemically treated were modified slightly.

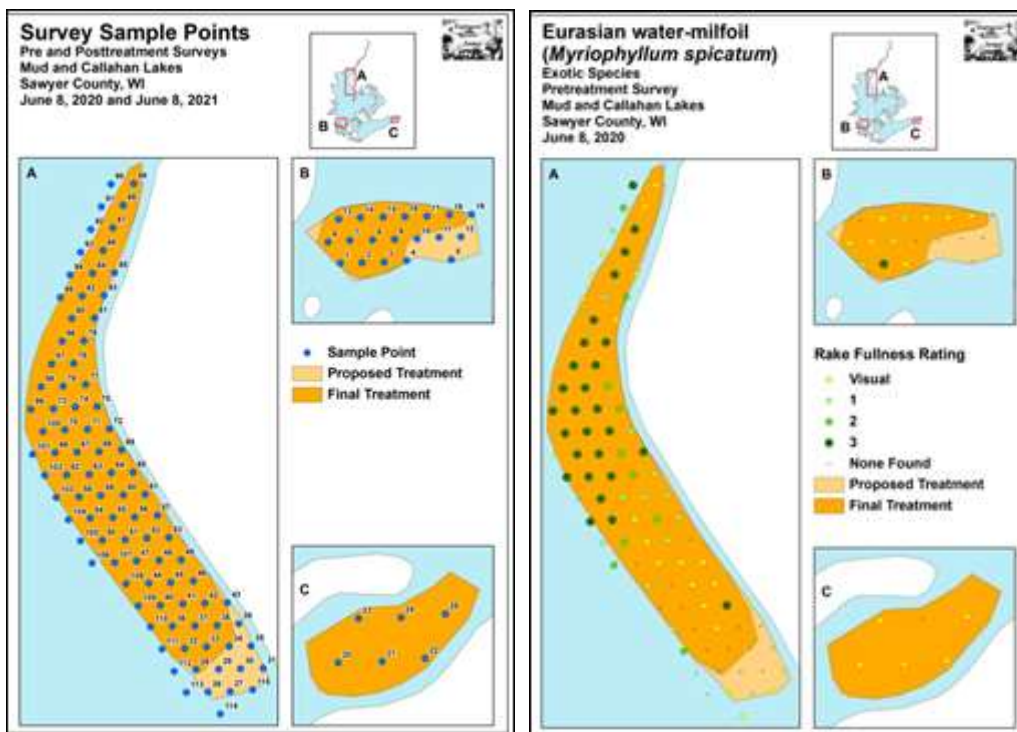


Figure 2: 2020 ERS pre and post treatment survey points

2020 FINAL MUD AND CALLAHAN LAKES CHEMICAL TREATMENT

On June 10, the proposed treatment area for Mud Lake was modified. The Callahan Lake proposal stayed the same. Instead of two areas totaling 9.52 acres, it became two areas totaling 9.81 acres (Table 2, Figure 3). Chemical treatment was conducted by Northern Aquatic Services (Dresser, WI) on June 22nd. The reported water temperature at the time of treatment was 71°F, while the air temp was 71°F. Winds were out of the northwest at 3mph. Liquid herbicide (Shredder Amine 4 (2,4D based)) was used for all chemical treatment in 2020.

Table 2: 2020 final Chemical treatment details for Mud and Callahan Lakes

| 2020 Mud Lake FINAL EWM Treatment Proposal (6/10/2020) | | | | | | | | |
|--|------------|-------------|-------------------|--------------|--------------------|----------------------------------|------------------------------|----------------------|
| New Name | Bed Number | Acres | Mean Depth (feet) | Acre-feet | Treatment a.i. ppm | Application rate (gal/acre-feet) | Shredder Amine 4 gal/acre-ft | 2019 Treatment Notes |
| Mud-SWBay | BedM2020-1 | 1.66 | 5.00 | 8.30 | 4.0 | 23.57 | 2.84 | new site in 2020 |
| Mud-SEShore | BedM2020-2 | 8.15 | 5.00 | 40.75 | 4.00 | 115.73 | 2.84 | new site in 2020 |
| Total | | 9.81 | | 49.05 | | 139.30 | | |

| 2020 Callahan Lake FINAL EWM Treatment Proposal (6/10/2020) | | | | | | | | |
|---|------------|-------|-------------------|-----------|--------------------|----------------------------------|------------------------------|----------------------|
| New Name | Bed Number | Acres | Mean Depth (feet) | Acre-feet | Treatment a.i. ppm | Application rate (gal/acre-feet) | Shredder Amine 4 gal/acre-ft | 2019 Treatment Notes |
| Cal-SEBay | BedC2020-1 | 0.76 | 5.00 | 3.80 | 4.0 | 10.79 | 2.84 | new site in 2020 |



Figure 3: 2020 Final EWM chemical treatment proposal for Callahan and Mud Lakes

2020 POST-TREATMENT SURVEY

A post-treatment survey was not completed in 2020, due to budget and Covid-19 restraints. Currently the plan is to complete a post-treatment survey of the same points in 2021.

2020 PRE-TREATMENT DISTRIBUTION OF NATIVE PLANTS

Table 3 reflects the statistics associated with the 2020 pre-treatment aquatic plant survey. Given that the survey was completed in early June, it is not surprising that there were a few more native plants present than one would normally expect. Fern-leaf pondweed was the most widely distributed native species in the pretreatment survey. Common waterweed was the second most common native species, Large-leaf pondweed was the third most common native species, Flat-stem pondweed was the fourth most widely distributed native species, and Coontail was the fifth most widely distributed native species in the pretreatment survey.

Table 3: 2020 Pre-treatment Survey Summary Statistics Mud and Callahan Lakes

| Summary Statistics: | Pre | Post |
|---|-------|------|
| Total number of points sampled | 115 | 115 |
| Total number of sites with vegetation | 115 | |
| Total number of sites shallower than the maximum depth of plants | 115 | |
| Freq. of occur. at sites shallower than max. depth of plants (in percent) | 100.0 | |
| Simpson Diversity Index | 0.87 | |
| Mean Coefficient of Conservatism | 6.5 | |
| Floristic Quality Index | 28.8 | |
| Maximum depth of plants (ft) | 8.5 | |
| Mean depth of plants (ft) | 5.9 | |
| Median depth of plants (ft) | 6.0 | |
| Average number of all species per site (shallower than max depth) | 3.45 | |
| Average number of all species per site (veg. sites only) | 3.45 | |
| Average number of native species per site (shallower than max depth) | 2.98 | |
| Average number of native species per site (sites with native veg. only) | 3.09 | |
| Species Richness | 21 | |
| Mean Rake Fullness (veg. sites only) | 2.33 | |

Table 4 reflects all of the aquatic plants found during the 2020 pre-treatment survey. Since there is no post-treatment survey, there is no comparison for results of the treatment.

Table 4: Frequencies and Mean Rake Sample of Aquatic Macrophytes Pretreatment Survey - Mud and Callahan Lakes, Sawyer County June 8, 2020

| Species | Common Name | Total Sites | Relative Freq. | Freq. in Veg. | Freq. in Lit. | Mean Rake | Visual Sites |
|-----------------------------------|------------------------------|-------------|----------------|---------------|---------------|-----------|--------------|
| <i>Potamogeton rubiginus</i> | Fern pondweed | 92 | 23.17 | 80.00 | 80.00 | 1.80 | 0 |
| <i>Elodea canadensis</i> | Common waterweed | 65 | 16.37 | 56.52 | 56.52 | 1.22 | 0 |
| <i>Myriophyllum spicatum</i> | Eurasian water-milfoil | 54 | 13.60 | 46.96 | 46.96 | 2.22 | 33 |
| <i>Potamogeton amplifolius</i> | Large-leaf pondweed | 38 | 9.57 | 33.04 | 33.04 | 1.34 | 0 |
| <i>Potamogeton costariformis</i> | Flat-stem pondweed | 32 | 8.06 | 27.83 | 27.83 | 1.03 | 0 |
| <i>Ceratophyllum demersum</i> | Coontail | 31 | 7.81 | 26.96 | 26.96 | 1.10 | 0 |
| <i>Utricularia vulgaris</i> | Common bladderwort | 19 | 4.79 | 16.52 | 16.52 | 1.26 | 0 |
| <i>Sagittaria beckii</i> | Water marigold | 17 | 4.28 | 14.78 | 14.78 | 1.24 | 0 |
| <i>Myriophyllum sibiricum</i> | Northern water-milfoil | 14 | 3.53 | 12.17 | 12.17 | 1.29 | 0 |
| | Freshwater sponge | 12 | * | 10.43 | 10.43 | 1.00 | 0 |
| <i>Potamogeton gracilongus</i> | White-stem pondweed | 11 | 2.77 | 9.57 | 9.57 | 1.00 | 0 |
| <i>Cyperus</i> sp. | Muskgrass | 3 | 0.76 | 2.61 | 2.61 | 1.33 | 0 |
| <i>Myriophyllum heterophyllum</i> | Various-leaved water-milfoil | 3 | 0.76 | 2.61 | 2.61 | 1.00 | 0 |
| <i>Myriophyllum verticillatum</i> | Whorled water-milfoil | 3 | 0.76 | 2.61 | 2.61 | 1.00 | 0 |
| <i>Potamogeton pusillus</i> | Small pondweed | 3 | 0.76 | 2.61 | 2.61 | 1.00 | 0 |
| <i>Potamogeton americanus</i> | Wild celery | 3 | 0.76 | 2.61 | 2.61 | 1.00 | 0 |
| <i>Heteranthera dubia</i> | Water star-grass | 2 | 0.50 | 1.74 | 1.74 | 1.00 | 0 |
| <i>Lemna truxis</i> | Forked duckweed | 2 | 0.50 | 1.74 | 1.74 | 1.00 | 0 |
| <i>Potamogeton illinoensis</i> | Illinois pondweed | 2 | 0.50 | 1.74 | 1.74 | 1.00 | 0 |
| <i>Najas</i> sp. | Nitella | 1 | 0.25 | 0.87 | 0.87 | 1.00 | 0 |
| <i>Potamogeton amplifolius</i> | Ribbon-leaf pondweed | 1 | 0.25 | 0.87 | 0.87 | 2.00 | 0 |
| <i>Potamogeton richardsonii</i> | Clasping-leaf pondweed | 1 | 0.25 | 0.87 | 0.87 | 1.00 | 0 |

* Excluded from relative frequency analysis

More information about the 2020 pre-treatment survey results can be found in the Eurasian water-milfoil (*Myriophyllum spicatum*) Pretreatment and Posttreatment Macrophyte Surveys Mud and Callahan Lakes (WBIC: 2434800/2434700) Sawyer County, Wisconsin authored by Matt Berg, ERS.

2020 FALL EWM FALL BED-MAPPING

2020 fall EWM bedmapping surveys were completed by ERS September 5&6, 2020 on both Mud and Callahan Lakes. During the survey, the visible littoral zone of each lake was searched. By definition, a “bed” was determined to be any area where it was visually estimated that EWM made up >50% of the area’s plants, was generally continuous with clearly defined borders, and was canopied or close enough to being canopied that it would likely interfere with boat traffic. After a bed was located, the surveyor motored around the perimeter taking GPS coordinates at regular intervals. The surveyors also estimated the rake density range and mean rake fullness of the bed, the range and mean depth of the bed, whether it was canopied, and the impact it was likely to have on navigation (none – easily avoidable with a natural channel around or narrow enough to motor through/minor – one prop clear to get through or access open water/moderate – several prop clears needed to navigate through/severe – multiple prop clears and difficult to impossible to row through). These data were then mapped using ArcMap 9.3.1. The WDNR’s Forestry Tools Extension was used to determine the acreage of each bed to the nearest hundredth of an acre. Individual EWM plants were also GPS marked that occurred outside of the beds as they were generally few in number.

On September 5-6, 2020, 36.8km (22.9 miles) of transects was searched throughout Mud Lake’s visible littoral zone. This, coupled with the 42.8km (26.6 miles) of transects searched during the point-intercept survey resulted in a total search of 79.6km (49.5 miles) (Figure 4). Collectively, 28 beds that covered 11.06 acres (2.38% of the lake’s surface area) were mapped (Figure 4). Outside of these areas, an additional 57 additional isolated plants were marked (Figure 4).

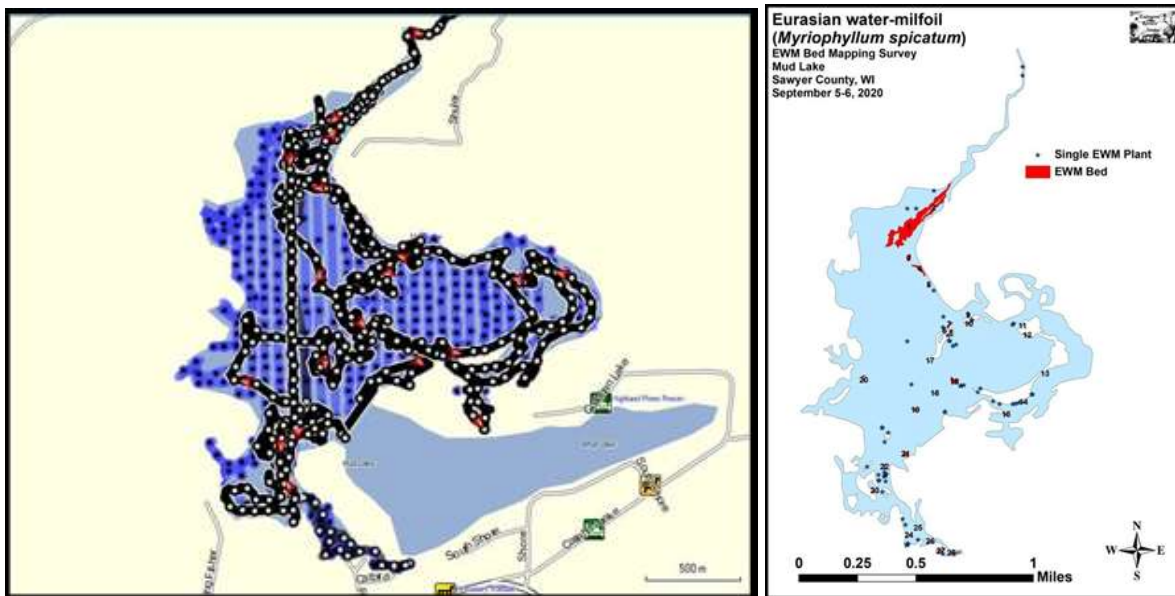


Figure 4: Fall littoral and summer transects on Mud Lake (left); EWM locations (right)

On September 5-6, 2020, 12.1km (7.5 miles) of transects was searched throughout Callahan Lake’s visible littoral zone. This, coupled with the 17.7km (11.0 miles) of transects searched during the point-intercept survey resulted in a total search of 29.8km (18.5 miles) (Figure 5). Collectively, 18 beds that covered 3.26 acres (2.36% of the lake’s surface area) were mapped (Figure 5). Outside of these areas, an additional 40 additional isolated plants were marked (Figure 5).

levels using targeted management will likely continue to produce satisfactory control while simultaneously minimizing financial and ecological costs.

EWM currently occupies a small percentage of Callahan Lake's surface area, but it is well established making eradication an unrealistic expectation. Although the species grows well in the Mud/Callahan system, active management has dramatically reduced the levels of EWM from an estimated 55 acres covering 39.86% of the lake's surface area in 2008 (Kleczewski 2009) to 3.26 acres (2.32% coverage) in 2020 – a decline of 94.07%. This control has come at a high economic cost, and, as herbicides are non-selective, has also likely had significant impacts on the aquatic plant community. In the future, maintaining EWM at its current low levels using targeted management will likely continue to produce satisfactory control while simultaneously minimizing financial and ecological costs.

2021 MANAGEMENT IN MUD AND CALLAHAN LAKES

It is expected that chemical management of EWM will continue in Mud and Callahan Lakes in 2021. 2021 WDNR chemical application permits have already been submitted based on 2021 EWM management planning that includes 3.97 acres in Callahan Lake, and 11.33 acres in Mud Lake.

By the end of 2021, a new Aquatic Plant Management Plan will be complete that lays out management strategies beyond 2021. It is expected that WDNR surface water grant funding will be sought to support management of EWM past 2021.

2020 WHOLE-LAKE, POINT-INTERCEPT SURVEYS ON MUD AND CALLAHAN LAKES

Along with 2020 pre- and post-treatment PI surveys and fall EWM bedmapping surveys, ERS also completed whole-lake, point-intercept, aquatic plant surveys on both lakes following WDNR guidelines. These surveys were last completed in 2008. Both lakes were surveyed between August 10 & 11th, 2020. Final reports are expected before the end of April 2021 and will be sent to the WDNR.

2020 AIS EDUCATION AND MONITORING

Several AIS education, prevention, and monitoring activities were enacted in 2020 including watercraft inspection, AIS monitoring, and review of signage. An AIS Education Workshop was not completed in 2020 due to Covid 19.

2020 CLEAN BOATS, CLEAN WATERS (CBCW)

In 2020, the CLPA was supposed to complete 100 hours of paid and/or volunteer watercraft inspection at two landings, a local resort landing on Callahan Lake, and the Chief River landing on the north end of Mud Lake. The owners of the Callahan Lake Resort recorded approximately 180 hours of inspection time at the Callahan Lake landing, but they did not record any data collected using CBCW forms, or submit any data to the SWIMS database. There was no time put in at the Chief River landing, due in part to Covid 19.

It is expected that this activity will be better accomplished in 2021.

2020 AIS MONITORING

Between May and September 2020, 25 different people participated in AIS monitoring and removal between the two lakes. CLMN AIS Monitoring End-of-season reports for each month have been completed and sent to the WDNR. These volunteers completed 235 hours of monitoring time between them. The primary invasive species these folks encountered was EWM. But at different times during the season curly-leaf pondweed, purple loosestrife, and zebra mussels were looked for. Zebra mussels were primarily looked for at the end of the season when folks were removing their boats, docks, and lifts for the season.

Despite not having a formal AIS Education Workshop, these people eagerly spent time doing the best they could. With this base of volunteers and an AIS Workshop, it is expected that 2021 AIS monitoring will be even better.

2020 AIS EDUCATION ACTIVITIES

Several CLPA volunteers shared AIS education materials with lake property owners in 2020. More than 20 hours were put in by volunteers to share AIS information. This was done in lieu of an actual AIS Workshop.

AIS SIGNAGE

AIS signage will be reviewed and improved if necessary in 2021.

2020 CITIZEN LAKE MONITORING NETWORK (CLMN) WATER QUALITY TESTING – CALLAHAN AND MUD LAKES

Between the Citizen Lake Monitoring Network (CLMN) and the AIS education, prevention, and planning grant, both Callahan and Mud lakes were sampled 9 times between May 28 and September 29. This included seven different Secchi disk readings of water clarity and three chemistry (total phosphorus and chlorophyll-a) sampling dates. Chemistry data was collected three times between July and September according to what was set up in the grant project.

The average summer (July-Aug) secchi disk reading for Mud Lake - Deepest Spot (Sawyer County, WBIC: 2434800) was 11.06 feet. The average for the Central Georegion was 10.1 feet. Typically the summer (July-Aug) water was reported as clear and brown. With this particular lake, it is important to note that the Secchi disc hit the bottom of the lake for 7 of the Secchi readings during the 2020 monitoring season. This indicates that the water clarity was actually greater than the Secchi readings imply. This suggests that the Secchi depth may have been mostly impacted by tannins, stain from decaying matter. Tannins are natural and not a result of pollution. Tannins can be distinguished from suspended sediment because the water, even though it's brown, it looks clear, like tea. Though tannins are not harmful per se, they are often not perceived as aesthetically pleasing as clear water. Tannins can also be important for decreasing light penetration into the water and decreasing algal growth.

Chemistry data was collected on Mud Lake - Deepest Spot. The average summer Chlorophyll was 1.9 $\mu\text{g}/\text{l}$ (compared to a Central Georegion summer average of 7.6 $\mu\text{g}/\text{l}$). The summer Total Phosphorus average was 19 $\mu\text{g}/\text{l}$. Lakes that have more than 20 $\mu\text{g}/\text{l}$ and impoundments that have more than 30 $\mu\text{g}/\text{l}$ of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Mud Lake - Deepest Spot was 39. The TSI suggests that Mud Lake - Deepest Spot was oligotrophic. This TSI suggests deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.

The average summer (July-Aug) secchi disk reading for Callahan Lake - Deepest Spot (Sawyer County, WBIC: 2434700) was 10.86 feet. The average for the Central Georegion was 10.1 feet. Typically the summer (July-Aug) water was reported as clear and yellow. With this particular lake, it is important to note that the Secchi disc hit the bottom of the lake for 7 of the Secchi readings during the 2020 monitoring season. This indicates that the water clarity was actually greater than the Secchi readings imply.

Chemistry data was collected on Callahan Lake - Deepest Spot. The average summer Chlorophyll was 2.9 $\mu\text{g}/\text{l}$ (compared to a Central Georegion summer average of 7.6 $\mu\text{g}/\text{l}$). The summer Total Phosphorus average was 21.1 $\mu\text{g}/\text{l}$. Lakes that have more than 20 $\mu\text{g}/\text{l}$ and impoundments that have more than 30 $\mu\text{g}/\text{l}$ of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Callahan Lake - Deepest Spot was 43. The TSI suggests that Callahan Lake - Deepest Spot was mesotrophic. Mesotrophic lakes are characterized by moderately clear water, but have a increasing chance of low dissolved oxygen in deep water during the summer.

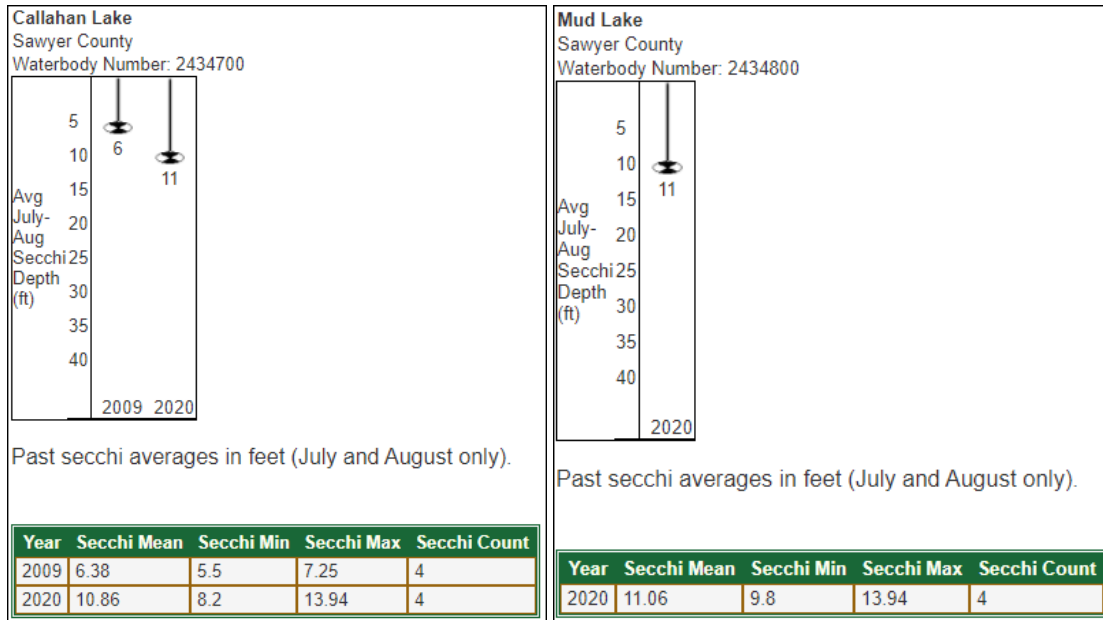


Figure 6: 2020 Average summer (July and August) Secchi disk readings from Callahan and Mud Lakes

Dissolved oxygen and temperature profiles were collected on both lakes a single time in August. Callahan Lake had low oxygen levels right at the bottom of the lake. Mud Lake was mixed.

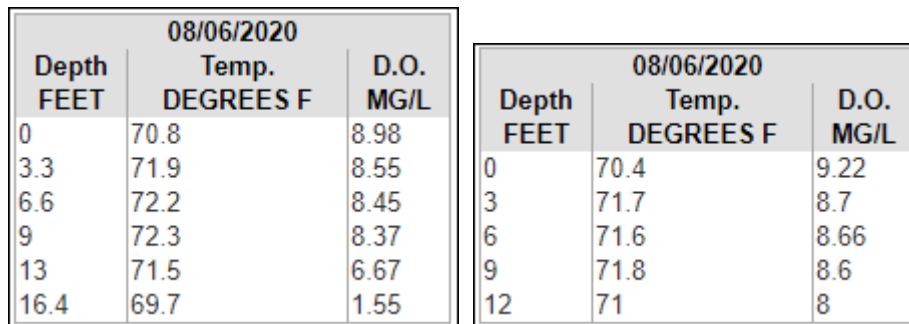


Figure 7: Callahan Lake DO/temp profile (left); Mud Lake DO/temp profile (right)

2020 PUBLIC SURVEY

In 2020, a Public Use Survey was developed by LEAPS with input from the CLPA and review by the WDNR. The seven page survey was sent to all property owners on the two lakes, approximately 107 properties. Forty-nine surveys were completed and returned. When the surveys were sent out a cover letter was attached the read the following:

Dear Callahan and Mud Lake Property Owner/ User,

The Callahan Lake Protective Association (CLPA) is currently updating an existing Aquatic Plant Management (APM) Plan for Callahan and Mud lakes. An update of this plan is necessary to continue and improve management of a non-native, invasive aquatic plant called Eurasian watermilfoil or EWM. An APM Plan evaluates the current conditions of the lakes, assesses management alternatives, seeks public input, and then makes management recommendations to be implemented over the next five years.

As a part of the update, the CLPA wishes to get input from lake property owners and lake users about their use of the lakes and feelings and opinions related to issues that may be affecting the lakes. This Lake User Survey gives you the opportunity to voice your opinions and concerns regarding the lakes. Survey results will be used to help reevaluate aquatic plant and lake management recommendations in the existing plan, and make new recommendations if necessary. Results will also help focus education and information efforts on the part of the CLPA to better serve its membership. In addition, it may open doors for grant money to help complete future management actions. Your responses are greatly appreciated and an important and valuable part of the lake management process.

This survey has been mailed to every property owner on the lakes and is being made available to others who might wish to complete it. The completed survey should be returned to LEAPS in the envelope provided. Honest and complete responses to the survey questions are important. If you choose to remain anonymous in your responses, you may do so. Please complete the survey and send it back by July 27, 2020.

A copy of the survey will be available on-line at <https://leapsllc.com/index.php/callaban-lake-protective-association-callaban-mud-lakes/>. Results will be tallied by LEAPS and shared with the CLPA. Results will also be posted on the same webpage. A summary presentation will be given later this fall or early next spring. Thank You for your time and interest in this survey.

A Survey Summary was completed by LEAPS and will be incorporated into the update of the APM Plan in 2021. The Survey Summary will be included as a deliverable with the current reimbursement request.