

LAKE EDUCATION AND PLANNING SERVICES, LLC

RED CEDAR LAKES

2023 MANAGEMENT SUMMARY REPORT

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RED CEDAR LAKES ASSOCIATION

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INTRODUCTION

This report discusses lake management activities completed by the Red Cedar Lakes Association (RCLA) and Lake Education and Planning Services (LEAPS) throughout 2023 in Hemlock, Red Cedar, Bass, and Balsam Lakes. The following actions were completed by LEAPS and additional contractors to assist the RCLA in aquatic plant management and lake stewardship education.

2023 LEAPS PROFESSIONAL SERVICES AGREEMENT AND SCHEDULE OF TASKS

A Professional Services Agreement (PSA) and Schedule of Tasks was agreed between the RCLA and LEAPS in February 2023. The following tasks were included in that agreement.

1. 2023 CLP Management Planning and Implementation Support (\$2,700.00)
 - a. Treatment planning, WDNR permit preparation, and a pre-treatment CLP survey
2. 2023 Aquatic Plant Survey Support (\$2,700.00)
 - a. CLP bed mapping and GIS support for wild rice mapping
3. 2023 Purple Loosestrife Beetle Rearing Support (\$720.00)
4. 2023 Woody Debris Surveys on Bass and Hemlock Lakes (\$1,800.00)
5. 2023 General Project Support (\$1,640.00)

The sum of the agreement was \$9,560.00.

2023 CURLY-LEAF PONDWEED (CLP) MANAGEMENT PLANNING AND IMPLEMENTATION

The year 2023 was the fifth year included in an AIS Control of and Established Infestation (ACEI) grant awarded to the RCLA back in April 2019 to cover CLP management planning and implementation through June 2022. Originally intended to support fairly large-scale chemical treatment of CLP across all three lakes – Balsam, Red Cedar, and Hemlock for three years, the grant was supposed to run out of funding going into 2022. However, the amount of CLP that needed management in each of the three years 2019, 2020, and 2021 did not reach the expected amounts, so management of CLP was expanded to include 2022 and 2023. Very limited CLP in both 2022 and 2023 will likely make it prudent to extend the existing grant yet another year, through the end of 2024.

Over the course of the last five years (2019 to 2023) the amount of CLP chemically treated in the system has not reached original expectations. Table 1 reflects what has been chemically treated in all three lakes since 2019.

Year	Balsam Lake (acres)	Red Cedar Lake (acres)	Hemlock Lake (acres)
2019	3.94	13.31	10.68
2020	2.73	2.69	3.85
2021	2.55	0	0
2022	0.82	2.42	0
2023	0	0	0

DIVER ASSISTED SUCTION HARVEST (DASH)

Instead of using aquatic herbicides to manage CLP in the three lakes in 2023, the Red Cedar Lakes Association hired Aquatic Plant Management, Inc (APM) to complete DASH in Balsam Lake and Red Cedar Lake. In early May 2023, a WDNR Mechanical Harvesting Permit was submitted to the WDNR by the RCLA. The DASH permit was approved by the WDNR on May 25, 2023. The permit request included 15 small beds of CLP in Balsam Lake totaling 5.7 acres (Figure 1). APM was contracted for 2 days of DASH removal of CLP as a pilot project to determine its effectiveness. Removal was completed on June 1 & 2. Weather conditions were good on June 1 with

sunny skies providing 6.4 hours in the water removing CLP. The weather was not good on June 2, as thunderstorms reduced the time in the water to only 2.3 hours.

In all, APM was able to remove 77.0 cubic feet of CLP from Balsam Lake. Only two of the 15 beds were included in their removal project, at best perhaps up to an acre of CLP (Figure 2). To complete what little CLP removal they did, the total cost was \$4,202.38. That much money could have been used to manage between 5 and 6 acres of CLP with the endothall-based aquatic herbicide Aquathol K.



Figure 1: June 2022 Bed Mapping Results – 15 beds of CLP with a mean of 0.38 acres = 5.7 acres

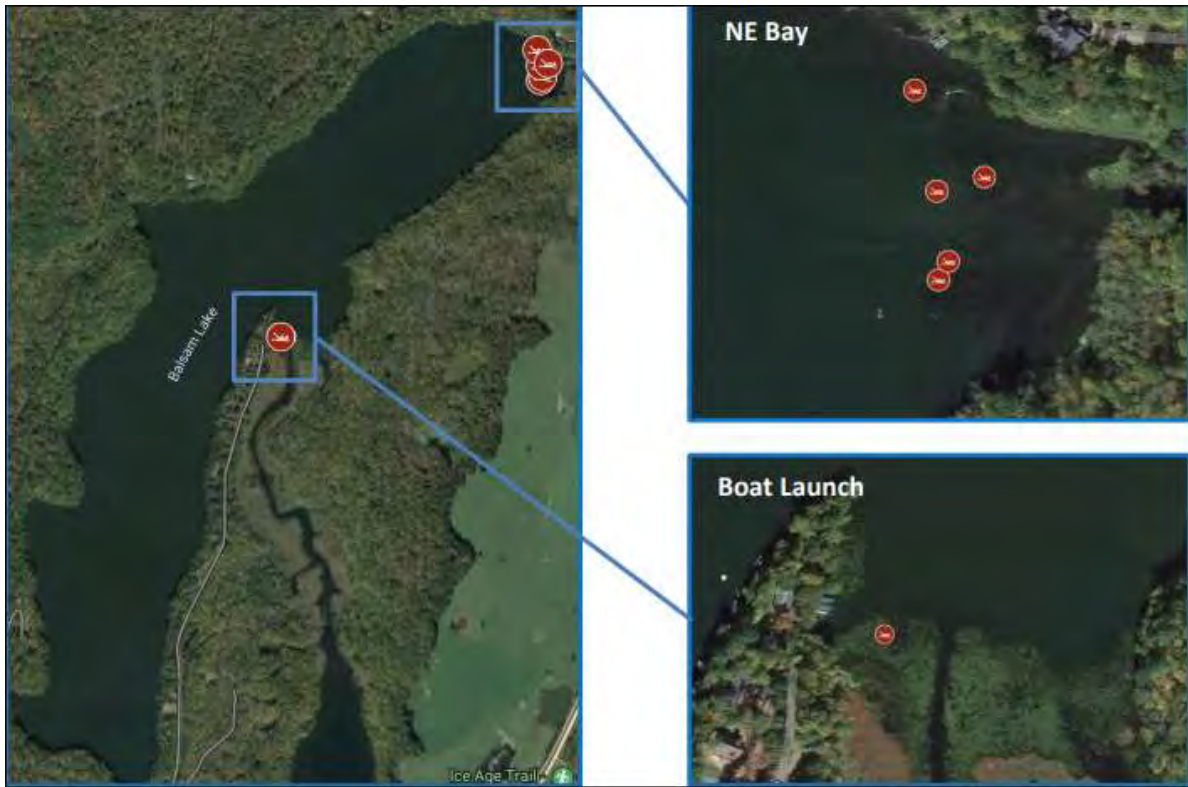


Figure 2: APM DASH sites from June 1 & 2, 2023

2023 AQUATIC PLANT SURVEY RESULTS

2023 BALSAM LAKE CLP BED MAPPING RESULTS

CLP bed mapping in Balsam Lake, completed on two different dates in 2023. The first survey on May 27 documented 42 points with CLP. A repeat survey was completed on June 22. In that survey an additional 20 points was added and one bed of CLP totaling 0.31 acres was mapped on the north end of the lake (Figure 4). All other CLP was mostly scattered plants or small clumps (Figure 3). As previously mentioned, DASH was used to remove CLP from two areas of the lake – the north end and near the boat landing. Despite the removal of 77cuft of CLP from these two areas in early June, it was difficult to tell any difference in abundance or density.



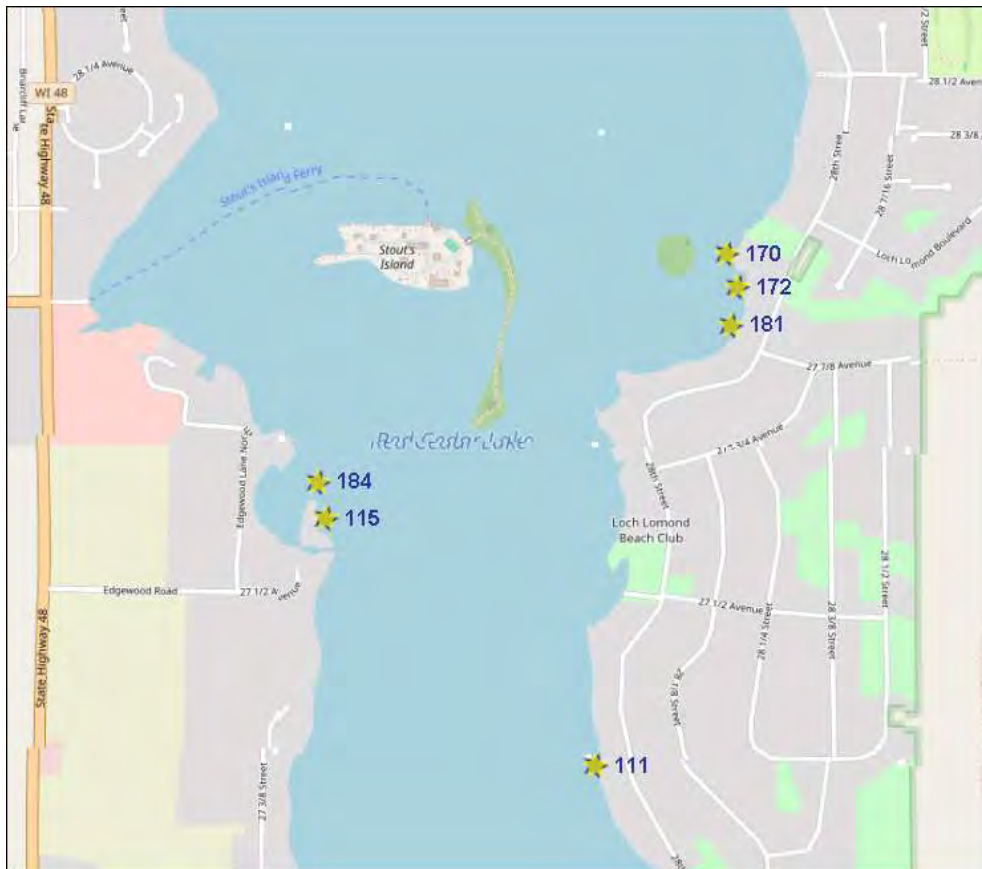
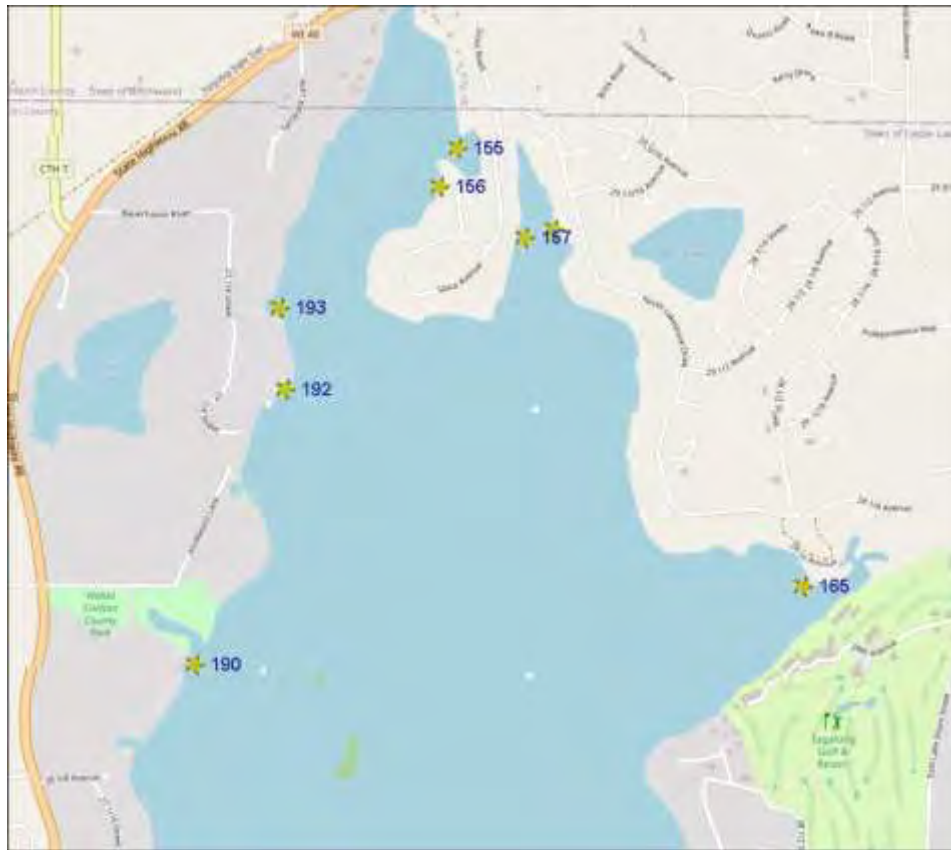
Figure 3: May 27, 2023 Balsam Lake CLP points – LEAPS



Figure 4: Balsam Lake CLP bed (0.31 acres) mapped on June 22, 2023 (LEAPS)

2023 RED CEDAR LAKE CLP BED MAPPING RESULTS

A CLP bed mapping survey on Red Cedar Lake on June 22 & 24 documented 118 points with CLP (Figure 5). A majority of these points were individual plants or small clumps, not dense enough or large enough to be considered a bed. Only two areas had what was considered a bed of CLP. The two areas totaled 0.5 acres (Figure 6). After the survey it was determined that at least in 2023, DASH could have removed nearly all of the CLP that was found. However, it would likely take several days to make it around the lake removing all the CLP.



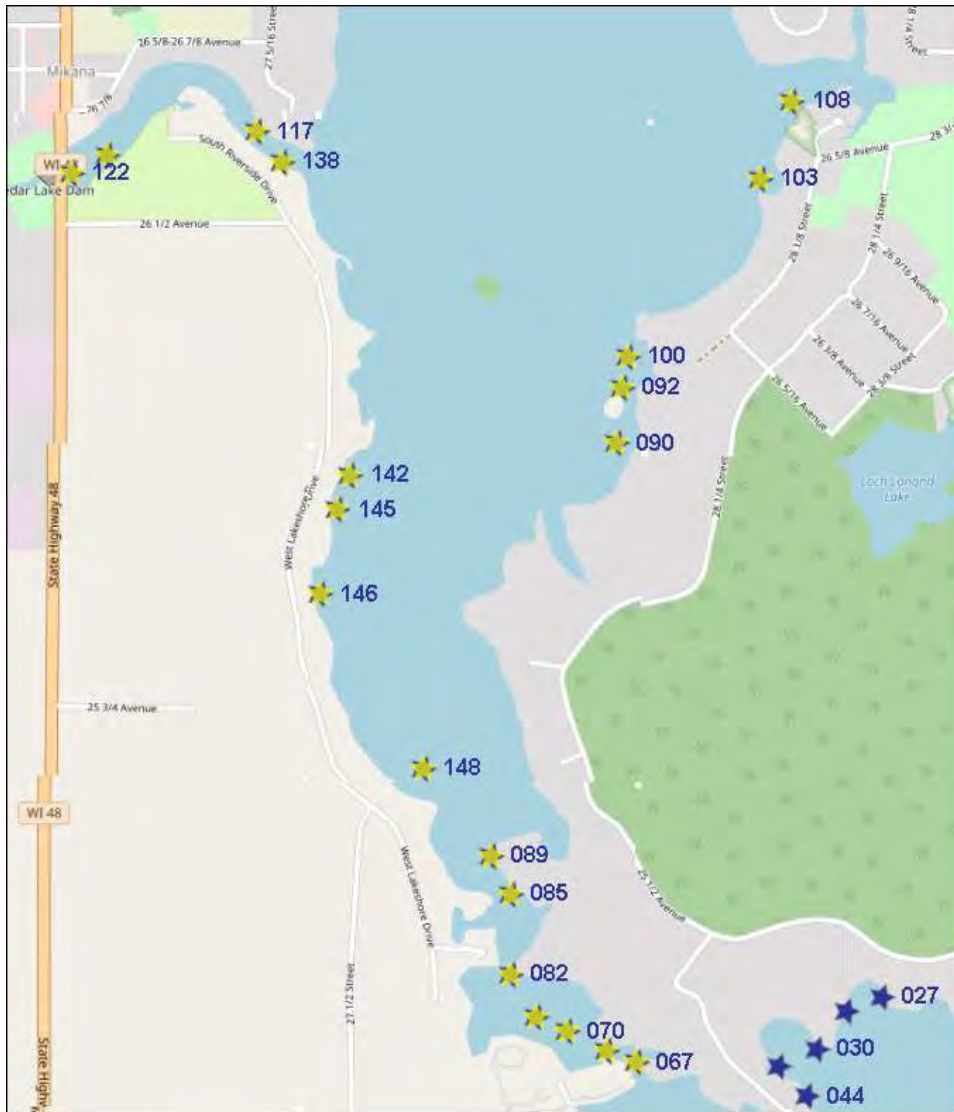


Figure 5: 2023 CLP mapping results from the North, Middle, and Lower Basins of Red Cedar Lake - LEAPS

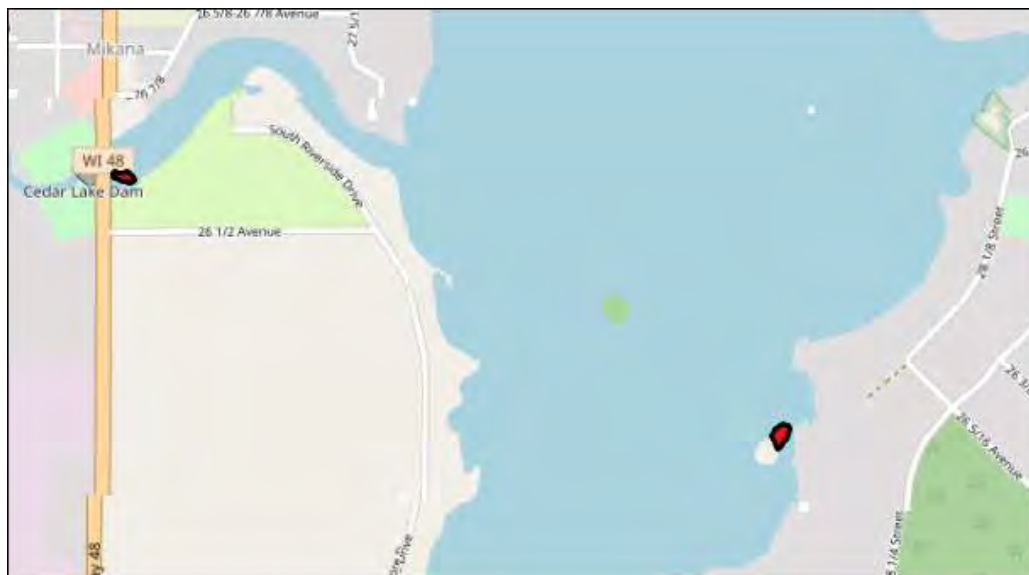


Figure 6: 2023 Red Cedar Lake CLP beds (0.5 acres) – LEAPS

2023 HEMLOCK LAKE CLP BED MAPPING RESULTS

A CLP bed mapping survey on Hemlock Lake on June 22 documented 65 points with CLP (Figure 7). Like both Balsam and Red Cedar Lakes, the CLP was mostly individual plants and small clumps scattered along the shore. Two small areas met the criteria for a CLP bed – 50% of the plants present being CLP and a definable edge. These areas were both located in the two northern-most bays on either side of the largest point protruding from the north shore of the lake. Combined the beds only covered 0.012 acres.

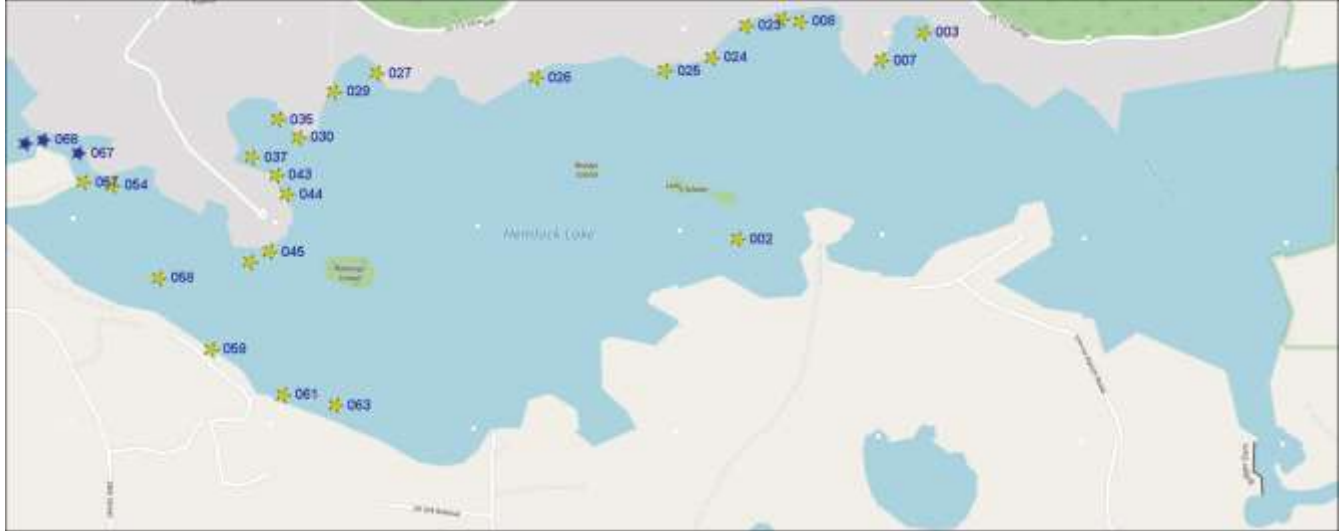


Figure 7: 2023 CLP mapping results from Hemlock Lake - LEAPS

2023 MURPHY FLOWAGE CLP BED MAPPING RESULTS

CLP was not mapped in Murphy Flowage in 2023.

2024 PRELIMINARY CLP MANAGEMENT PLANNING

In the fall of 2023, no plans had been made to chemically treat any CLP in the lakes. The option to chemically treat CLP in 2024 was left open in case conditions in the spring of 2024 favor more accelerated growth of CLP.

As early season 2024 unfolded, it became clear that it was possible that 2024 would present ideal conditions for abundant CLP growth in the system. A preliminary management plan that included 5 acres of management in Balsam Lake, 34 acres of management in Red Cedar Lake, and 16.5 acres of management in Hemlock was drawn up and a WDNR Chemical Application Permit applied for. Aquathol K, and endothal-based herbicide would be used. After a pre-treatment survey in mid-May the preliminary plan was modified to include no herbicide application on Balsam Lake, 18 acres in Red Cedar, and 15.4 acres in Hemlock.

2023 PURPLE LOOSESTRIFE BIO-CONTROL

The RCLA worked in cooperation with LEAPS and the Birchwood Charter School to raise and release *Galerucella* beetles used for control of purple loosestrife in 2023. LEAPS gathered the rootstock and materials, and then worked with teachers and students at the Charter School to pot the rootstock and place nets on the pots. The beetle rearing station was tended to by the Charter School until it was time to inoculate their netted plants with beetles.

LEAPS collected the beetles from areas close to Birchwood, and then worked with students and teachers to inoculate the plants. From that point on, the RCLA and the Charter School cooperated to determine a release date for the

beetles and with the help of summer school students, released the beetles on the bogs in the channel between the main body of Red Cedar Lake and Hemlock Lake.



Figure 8: Slide from the 2023 RCLA Annual Meeting

2023 AIS MONITORING AND EDUCATION

Volunteers have performed aquatic invasive species (AIS) monitoring on a regular basis in the lakes, and the RCLA has several committees dedicated to AIS monitoring, prevention, education, and removal. To stay ahead of the current infestations, as well as any other future AIS concerns, monitoring and education will continue in the future to prevent new introductions and limit their spread should they occur. LEAPS promotes and provides AIS education through events geared towards education and by attending RCLA meetings.

The RCLA Annual Meeting held July 8, 2023. Agenda items included the following:



Presentations were made by each Committee during the meeting.

The RCLA prepared and distributed two newsletters in 2023, one in the spring and one in the fall. The newsletters contain updates from every Committee currently in play with the RCLA:

- Aquatic Invasive Species Committee
- Nature Committee
- Shoreline & Island Restoration Committee
- Fish Habitat Committee
- Water Quality Committee
- Communication Committee
- Coupon Book Committee
- Lake Information & Safety Committee
- Membership Committee

Digital copies of the newsletter, meeting minutes, management plans, plant survey results, water quality results, and a host of other information is available on the RCLA webpage at <https://www.redcedarlakes.com/>.

2023 CLEAN BOATS, CLEAN WATERS

LEAPS assisted the RCLA in organizing Clean Boats, Clean Waters (CBCW) in 2023. The group was approved for a CBCW grant to support these efforts. Several paid employees (hired by LEAPS) and volunteers (from the RCLA) spent time at several landings in 2023 - Hemlock, Waldo Carlson, 48&V, and Balsam lakes boat landings.

HEMLOCK LAKE

LEAPS paid inspectors and RCLA monitors put in 153 hours on Hemlock Lake during the 2023 season. Of that time, 121 hours were put in by LEAPS employees. The remaining 32 hours were put in by inspectors paid directly by the RCLA. A total of 134 boats were inspected. A total of 260 people were contacted by watercraft inspectors.

RED CEDAR LAKE

WALDO CARLSON

LEAPS paid inspectors and RCLA monitors put in 243.5 hours on the Waldo Carlson landing on Red Cedar Lake during the 2023 season. Of that time, 129 hours were put in by LEAPS employees. The remaining 114.5 hours were put in by inspectors paid directly by the RCLA. A total of 352 boats were inspected. A total of 656 people were contacted by watercraft inspectors.

48&V

In 2023, LEAPS paid inspectors and RCLA monitors put in 126 hours on the 48&V landing on Red Cedar Lake during the 2023 season. Of that time, 50 hours were put in by LEAPS employees. The remaining 76 hours were put in by inspectors paid directly by the RCLA. A total of 78 boats were inspected. A total of 136 people were contacted by watercraft inspectors.

LOCH LOMOND

No watercraft inspection time was put in at the Loch Lomond landing on Red Cedar Lake in 2023.

BALSAM LAKE, WASHBURN COUNTY

LEAPS inspectors put in 24 hours of watercraft inspection time at the Balsam Lake landing in 2023. A total of 10 boats were inspected and 15 people were contacted.

DECONTAMINATION STATIONS

There are Decontamination Stations in place at both the Balsam and Hemlock Lake landings. In addition, the Waldo Carlson and Loch Lomond boat launches on Red Cedar Lake also have Decontamination Stations.

2023 CITIZEN LAKE MONITORING WATER QUALITY TESTING

BALSAM LAKE

Balsam Lake - Deep Hole Near Birchwood WI in Washburn County was sampled on 11 different days during the 2023 season. Parameters sampled included: water clarity (Secchi disk), temperature, dissolved oxygen, total phosphorus, chlorophyll-a. The Trophic State Index values for the three parameters – Secchi disk readings of water clarity, total phosphorus, and chlorophyll-a places Balsam Lake mostly in the eutrophic, or nutrient-rich category for lakes (Figure 9). Balsam Lake is considered a deep, two-story fishery lake, although it does not currently support a cold-water fishery. When compared to other two-story fishery lakes, these values identify Balsam Lakes as way worse than average for all parameters (Figure 10). There are no significant trends, good or bad, for any of the three main parameters.

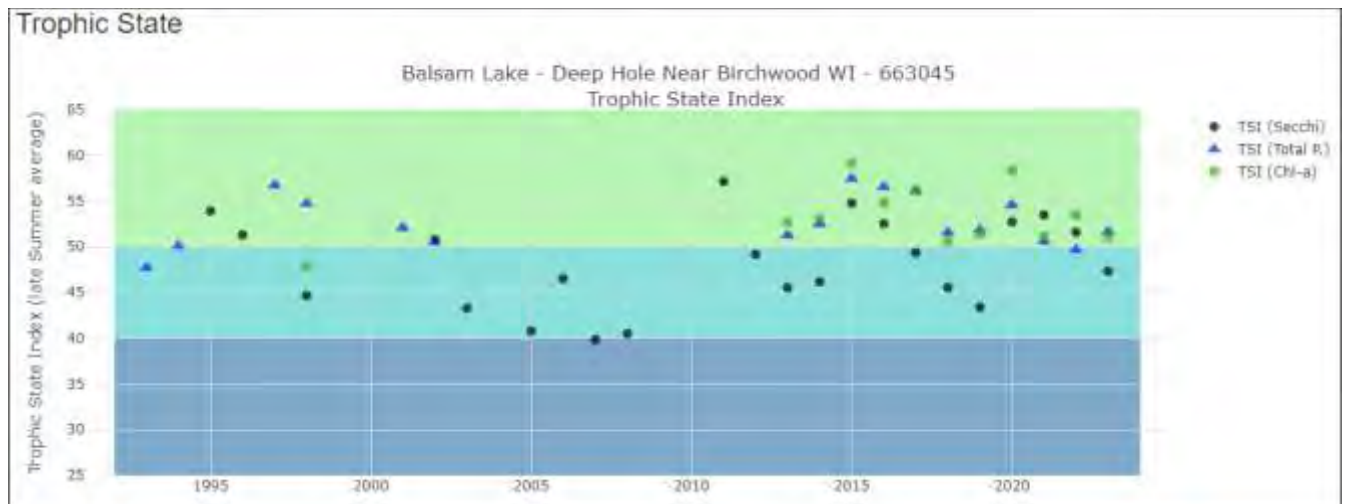


Figure 9: Historic TSI values for Secchi, total phosphorus, and chlorophyll-a in Balsam Lake, Washburn County at the Deep Hole Near Birchwood (WEx, 2024)

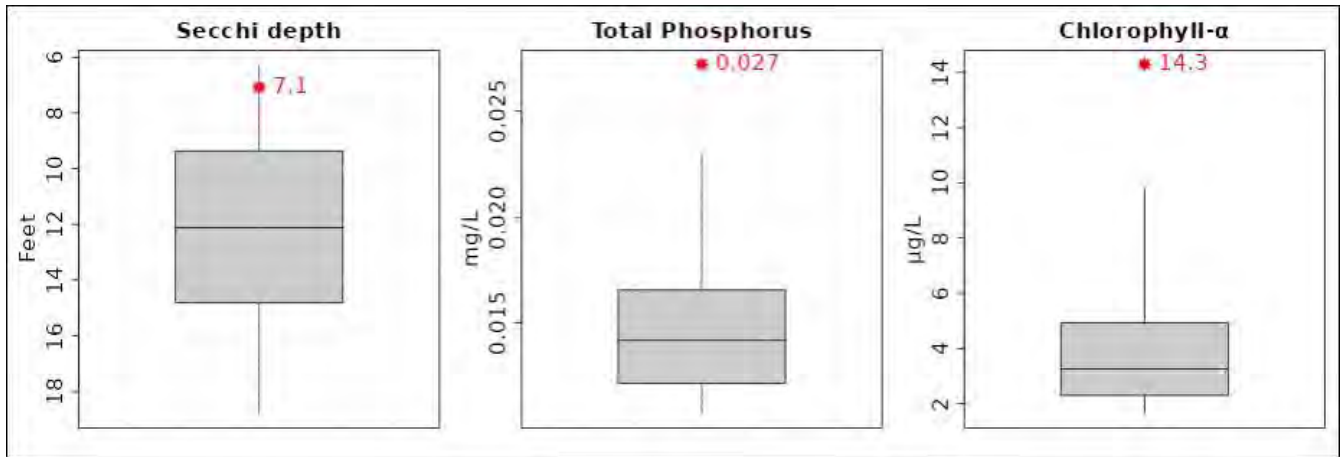


Figure 10: Trophic status compared to similar lakes using data from the last 10 years (WEx, 2024)

RED CEDAR LAKE

Red Cedar Lake - Deep Hole North was sampled on 10 different days during the 2023 season. Parameters sampled included: water clarity (Secchi disk), temperature, dissolved oxygen, total phosphorus, chlorophyll. The Trophic State Index values for the three parameters – Secchi disk readings of water clarity, total phosphorus, and chlorophyll-a places Red Cedar Lake split between the mesotrophic and eutrophic categories (Figure 11). Eutrophic lakes are nutrient-rich, with either a lot of aquatic plants or a lot of algae. Mesotrophic lakes are less nutrient rich but may still have a lot of vegetation. Red Cedar Lake is considered a deep, two-story fishery lake, although its ability to support a cold-water fishery is marginal at best. When compared to other two-story fishery lakes, these values identify Red Cedar Lake as way worse than average for all parameters (Figure 12). In the late summer, there are significant trends toward improving water clarity and quality in Secchi disk readings, total phosphorus, and chlorophyll.

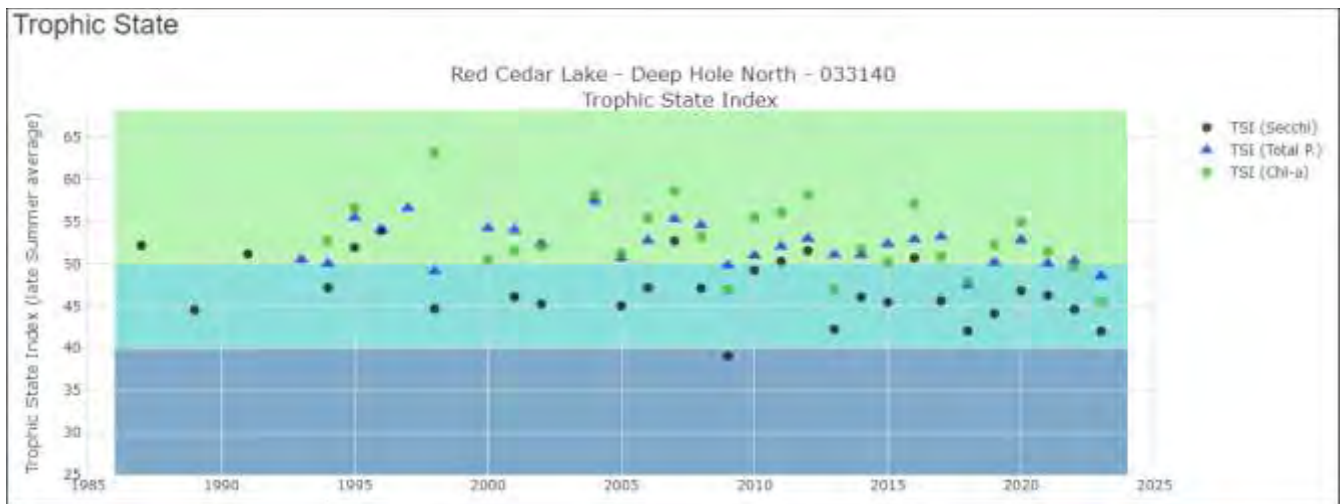


Figure 11: Historic TSI values for Secchi, total phosphorus, and chlorophyll-a in Red Cedar Lake, Barron County at the Deep Hole North (WEx, 2024)

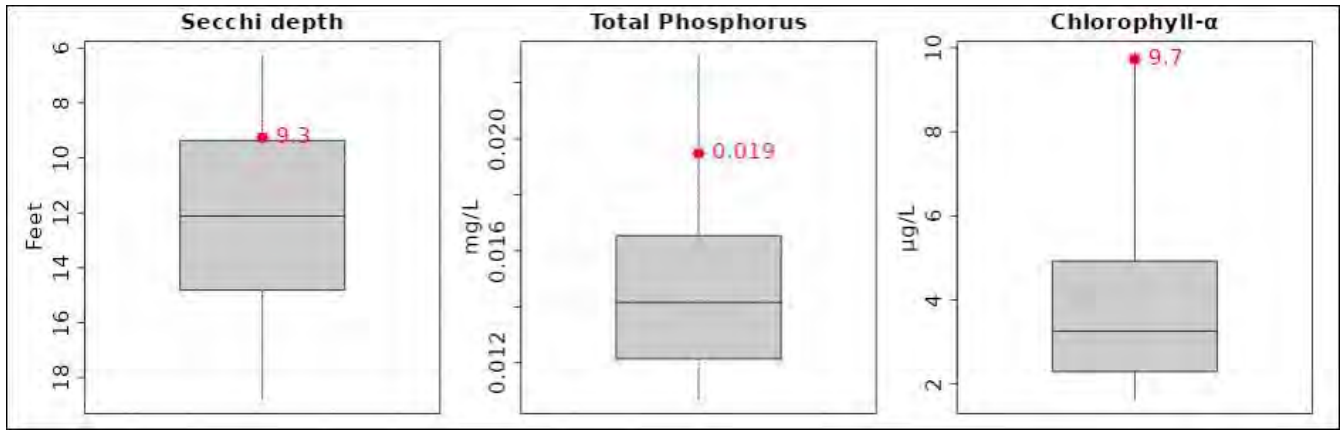


Figure 12: Trophic status compared to similar lakes using data from the last 10 years (WEx, 2024)

HEMLOCK LAKE

No water quality data was submitted to the WDNR SWIMS database for Hemlock Lake - Deep Hole in Barron County in 2023.

The Trophic State Index values for three parameters – Secchi disk readings of water clarity, total phosphorus, and chlorophyll-a places Hemlock Lake in the eutrophic, or nutrient-rich category for lakes (Figure 13). When compared to similar lakes, these values identify Hemlock Lakes as better than average in all three categories (Figure 14). There are no significant trends, good or bad, for any of the three main parameters.

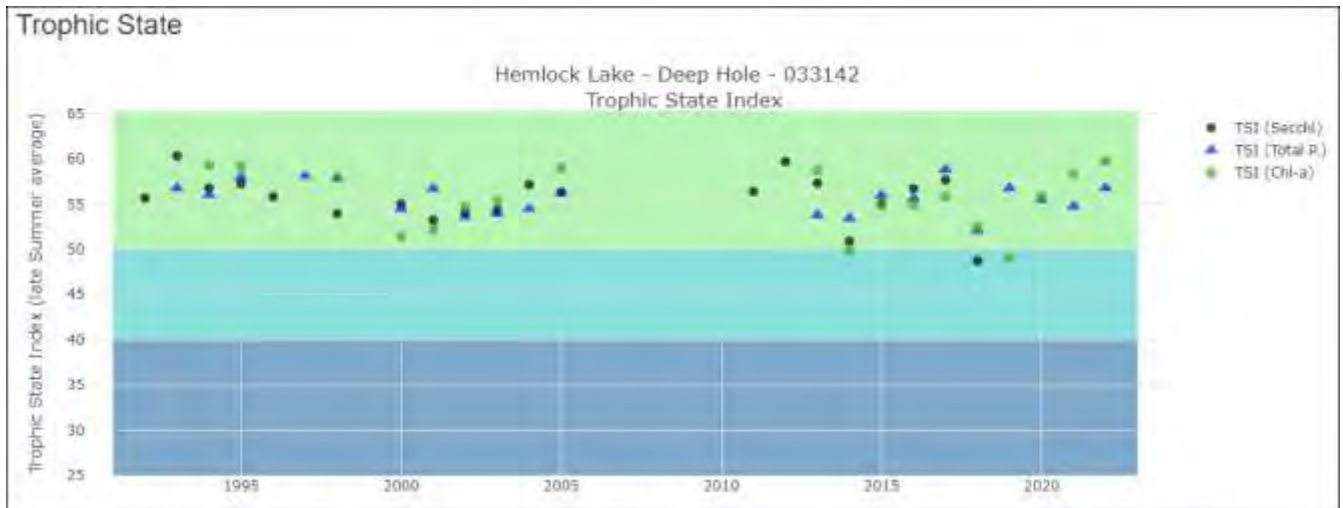


Figure 13: Historic TSI values for Secchi, total phosphorus, and chlorophyll-a in Hemlock Lake, Barron County (WEx, 2024)

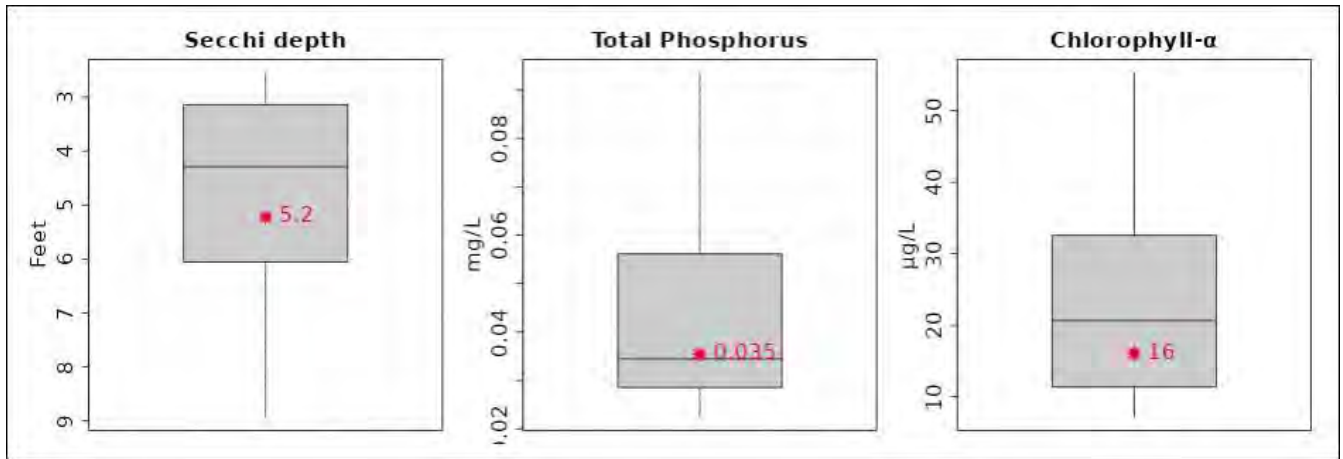


Figure 14: Trophic status compared to similar lakes using data from the last 10 years (WEx, 2024)

TEMPERATURE AND DISSOLVED OXYGEN

Temperature and dissolved oxygen (DO) profiles were collected from both Balsam and Red Cedar Lakes in 2023. The last time temperature and DO were collected from Hemlock Lake was in 2020. Balsam and Red Cedar are considered deep water, stratified lakes. When a lake stratifies, it means that in the summer, the water column separates in to three distinct layers, the epilimnion (warm surface water), the hypolimnion (colder bottom water), and the thermocline (a transition zone between the surface and bottom waters). Water at the surface of the lake is warmer and oxygen rich. Water at the bottom of the lake is colder and generally loses oxygen through the early part of the season until there is no oxygen left in the bottom waters. When there is no oxygen, it means there can be no fish and it means that additional nutrients may be dumped back into the water column when previously bound phosphorus breaks away from the iron in the sediment.

In the not so distant past, both Red Cedar and Balsam Lake were considered cold-water lakes capable of supporting a cold water fishery of cisco and whitefish. Not anymore. The water in the bottom of both lakes becomes devoid of oxygen too soon in the season, and where there is enough oxygen present, the water is too warm to support the cold-water species.

Figure 15 shows a typical mid-summer (July) profile for Balsam Lake. The thermocline gets established at about 20-ft. DO concentration plummets after 20-ft. Water temperature drops substantially as well. Of note is that there seems to be a band of oxygen producing algae that hovers right near the thermocline as indicated by the DO concentration at about 18-ft being so high compared to the rest. This is likely not an anomaly as it happens quite frequently in Balsam Lake.

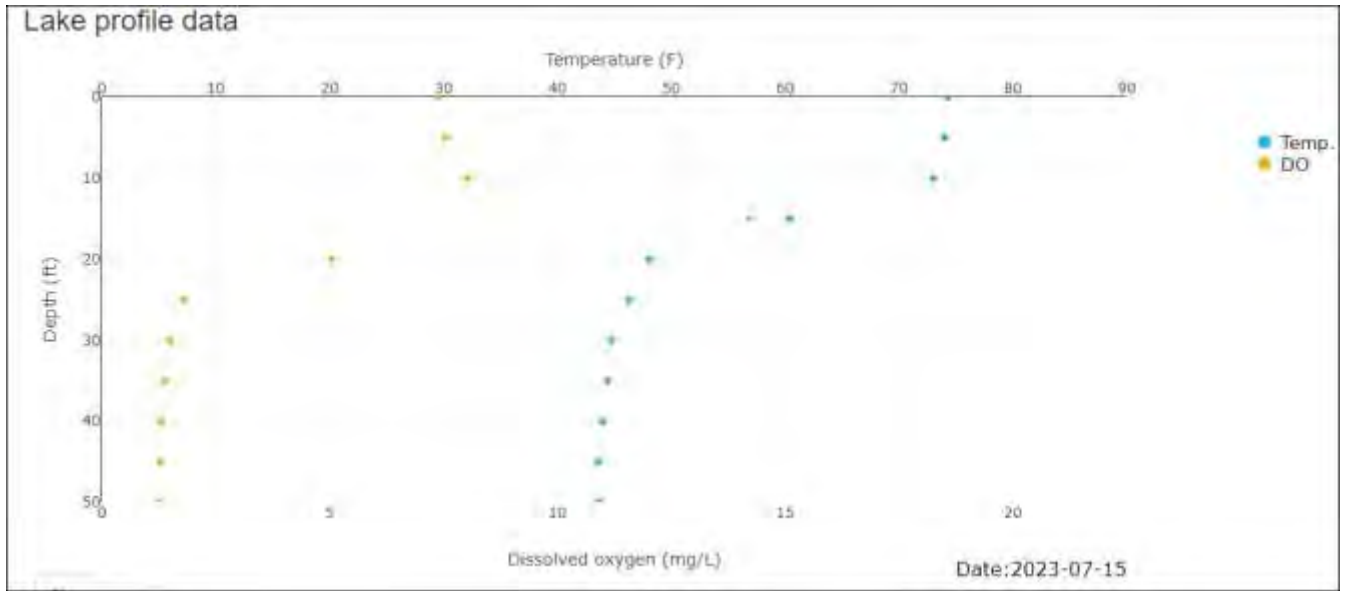


Figure 15: Temperature and DO profile from July 2023 – Balsam Lake (WEx, 2024)

Figure 16 shows a typical mid-summer (July) profile in Red Cedar Lake. Like Balsam, a thermocline gets established around 20-ft. DO concentration plummets after 20-ft. Water temperature drops substantially as well. Red Cedar Lake does not show the band of algae near the thermocline like Balsam Lake does.

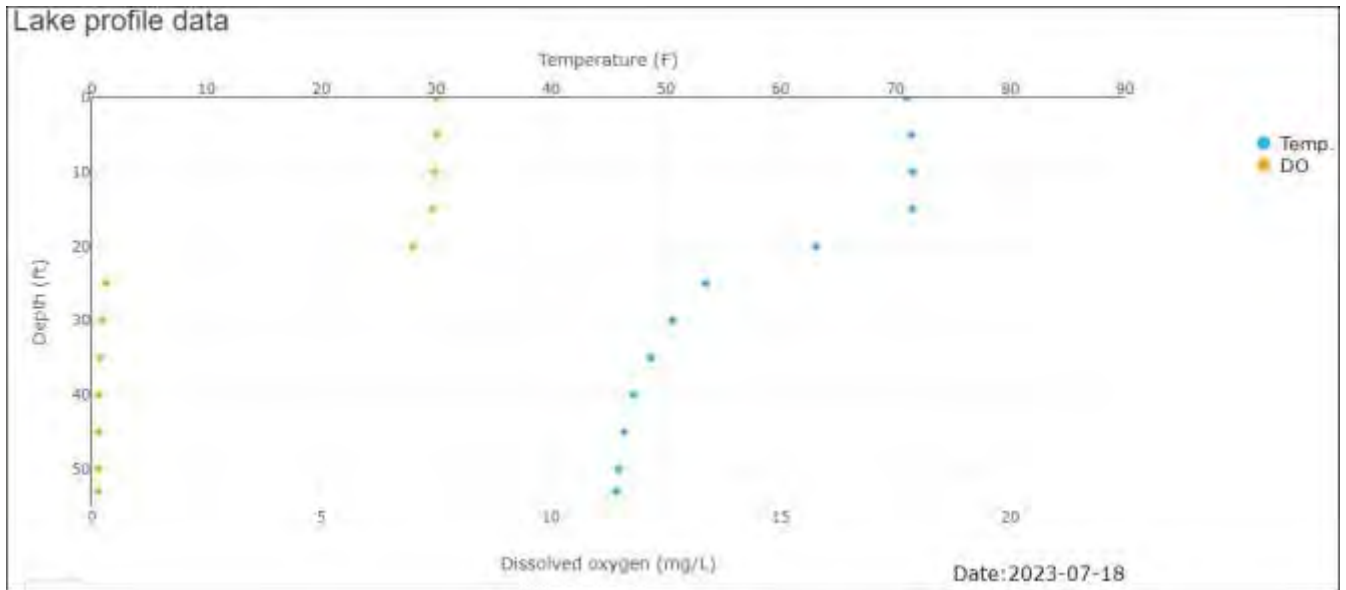


Figure 16: Temperature and DO profile from July 2023 – Red Cedar Lake (WEx, 2024)

Hemlock Lake is considered a shallow drainage lake. The last profile data was collected in 2020. But in the late 20-teens Hemlock Lake also appeared to stratify in the summer with a thermocline established at about 12-15 feet (Figure 17). Below that, DO plummets and water temperature drops. In many previous years, Hemlock Lake remains mostly mixed and does not form a hard and fast thermocline. Until new data is collected, however, Hemlock Lake is considered a stratified lake.

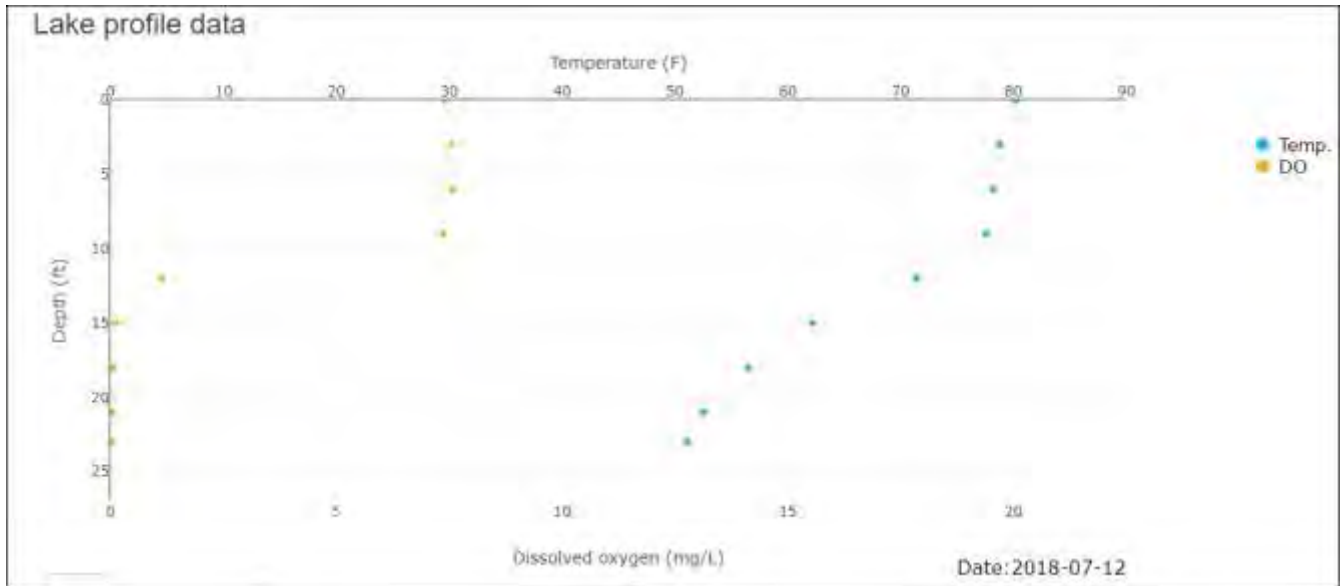


Figure 17: Temperature and DO profile from July 2018 – Hemlock Lake (WEx, 2024)

2023-2032 RED CEDAR LAKES COMPREHENSIVE LAKE MANAGEMENT PLAN

The 2023-32 Red Cedar Lakes Comprehensive Lake Management Plan was completed in 2023. Five key strategies to reduce nutrient loading to the system were laid out in the Plan. More details about the plan can be found on the RCLA website.

CURRENT GRANT STATUS

The only currently active grant still in play for the Red Cedar Lakes is the ACEI grant awarded back in 2019. The RCLA has received grants annually to support the Clean Boats Clean Waters watercraft inspection program. The 2023 project is complete, and a new grant has been awarded for 2024.

The RCLA also has one or more Healthy Lakes grants to support island restoration and shoreland habitat improvement projects.

2023 RCLA Management Summary Report was completed by Dave Blumer, LEAPS on June 5, 2023.



Balsam Lake CLP Removal Report 2023

PO Box 1134 Minocqua, WI 54548



Balsam Lake CLP Removal Summary 2023

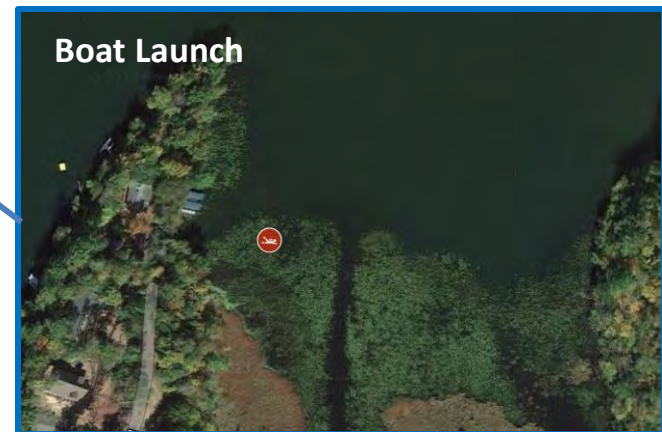
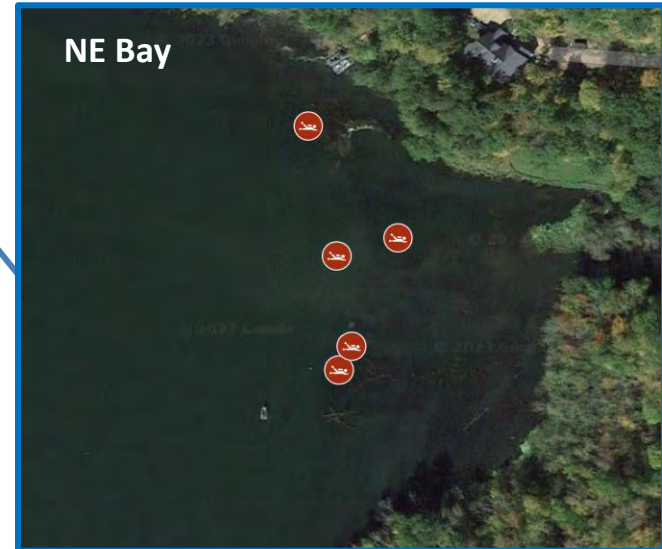
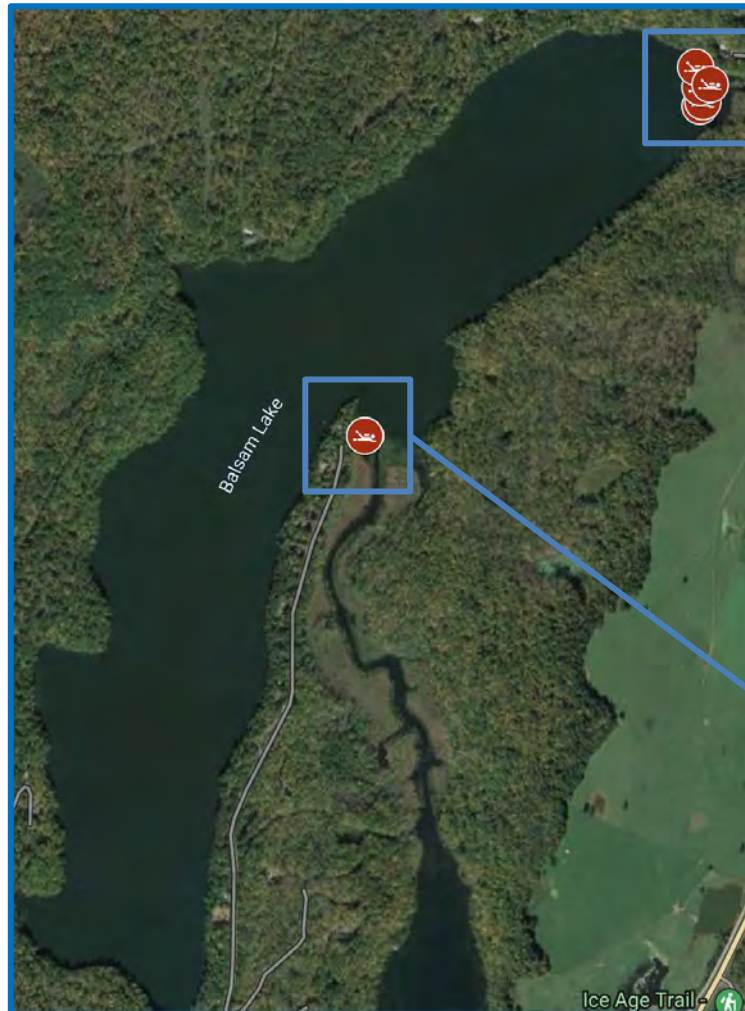
Dive Background: In early June Aquatic Plant Management LLC (APM) conducted two (2) days of Diver Assisted Suction Harvesting (DASH) for Curly Leaf Pondweed (CLP) on Balsam Lake in Barron County, WI. The team focused their efforts at two sites as prioritized by the Red Cedar Lake Association. In total APM was able to remove **77.0 cubic feet of CLP** from Balsam Lake.

Date	Weather Conditions	Water Temp (F)	Underwater Dive Time (hrs)	AIS Removed (cubic ft)
6/1/2023	Sunny		6.4	59.0
6/2/2023	Thunderstorms		2.3	18.0
Grand Total			8.7	77.0

Dive Location	Avg. Water Depth	# of Dives	Underwater Dive Time	AIS Removed (cubic feet)
Boat Launch	2.0	3	2.3	18.0
NE Bay	5.1	5	6.4	59.0
Grand Total	3.9	8	8.7	77.0

Dive Highlights and Recommendations: The dive team spent two days at Balsam Lake, however storms forced the second day to end earlier than planned. The team spent the bulk of their time focusing on CLP in the northeast section of the lake. Overall, Balsam Lake should continue to take an Integrated Pest Management (IPM) approach and evaluate different strategies to manage the CLP population on the lake. Continued monitoring and management efforts are important to prevent the spread of CLP throughout Balsam Lake.

Map of Balsam Lake Dive Sites





Detailed Diving Activities

Date	Dive Location	Latitude	Longitude	Underwater Dive Time (hrs)	AIS Removed (cubic ft)	AIS Density	Avg Water Depth (ft)	Native Species	Native By-Catch	Substrate Type
6/1/2023	NE Bay	45.66374	-91.56829	1.83	21.0	Small Plant Colony	5.0	Charophytes	8.0	Organic
6/1/2023	NE Bay	45.66382	-91.56823	1.33	12.0	Small Plant Colony	5.5	Charophytes	3.0	Organic
6/1/2023	NE Bay	45.66412	-91.56830	2.17	18.0	Small Plant Colony	5.0	Charophytes	4.0	Organic
6/1/2023	NE Bay	45.66455	-91.56843	0.33	3.0	Scattered	6.0	Charophytes	0.5	Organic
6/1/2023	NE Bay	45.66418	-91.56801	0.75	5.0	Scattered	4.0	Charophytes	0.5	Organic
6/2/2023	Boat Launch	45.65688	-91.57820	1.00	6.0	Surface Matting	2.0	Charophytes	2.0	Organic
6/2/2023	Boat Launch	45.65688	-91.57820	0.58	6.0	Surface Matting	2.0	Charophytes	2.0	Organic
6/2/2023	Boat Launch	45.65688	-91.57820	0.75	6.0	Surface Matting	2.0	Charophytes	2.0	Organic
Total	8			8.74	77.0					

2023 Balsam Lake CLP Meandering Survey 5/27 and 6/22/2023 (LEAPS)



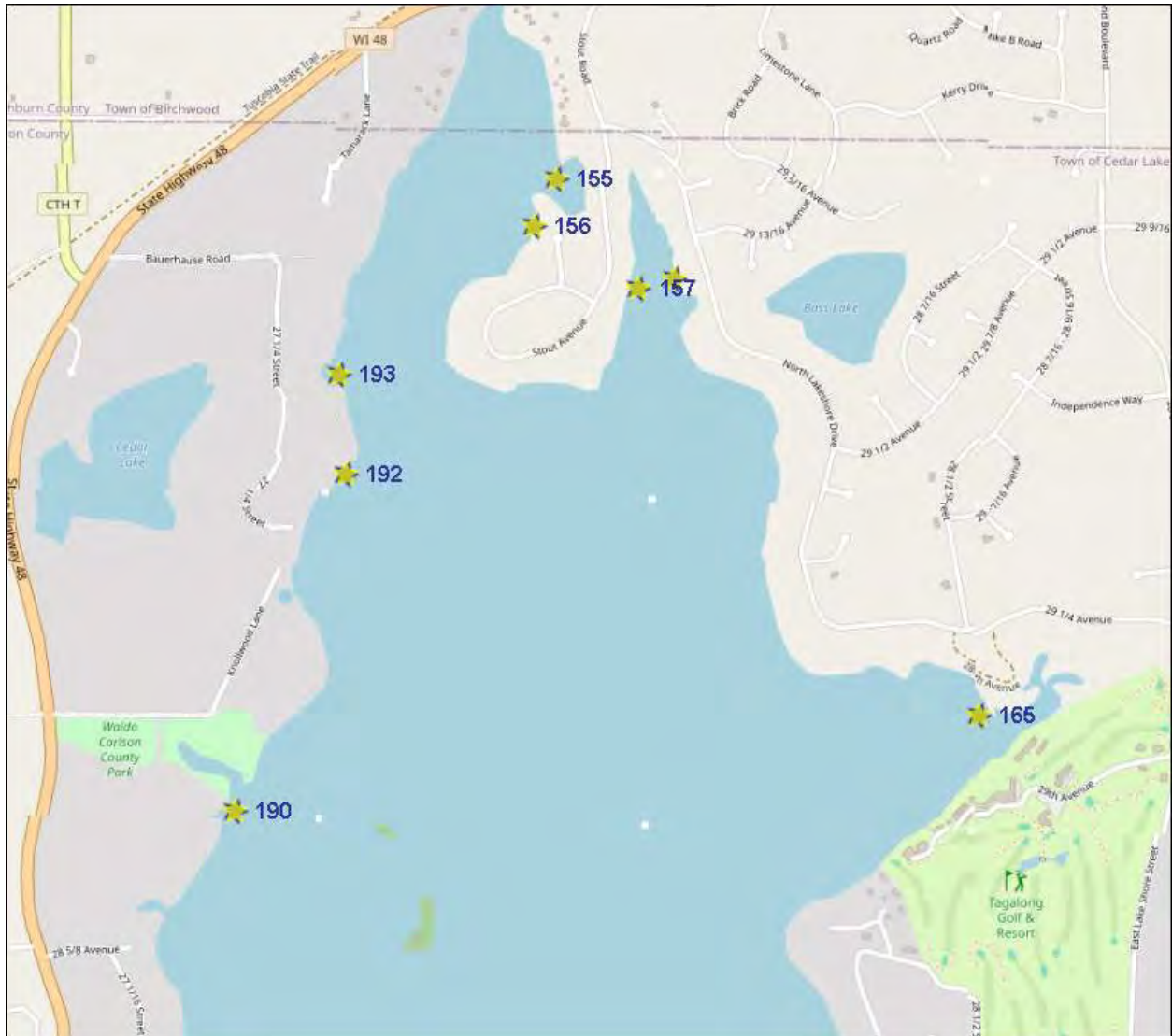
The first 2023 CLP survey of Balsam Lake was completed on May 27. During that survey, 42 points with CLP were mapped.



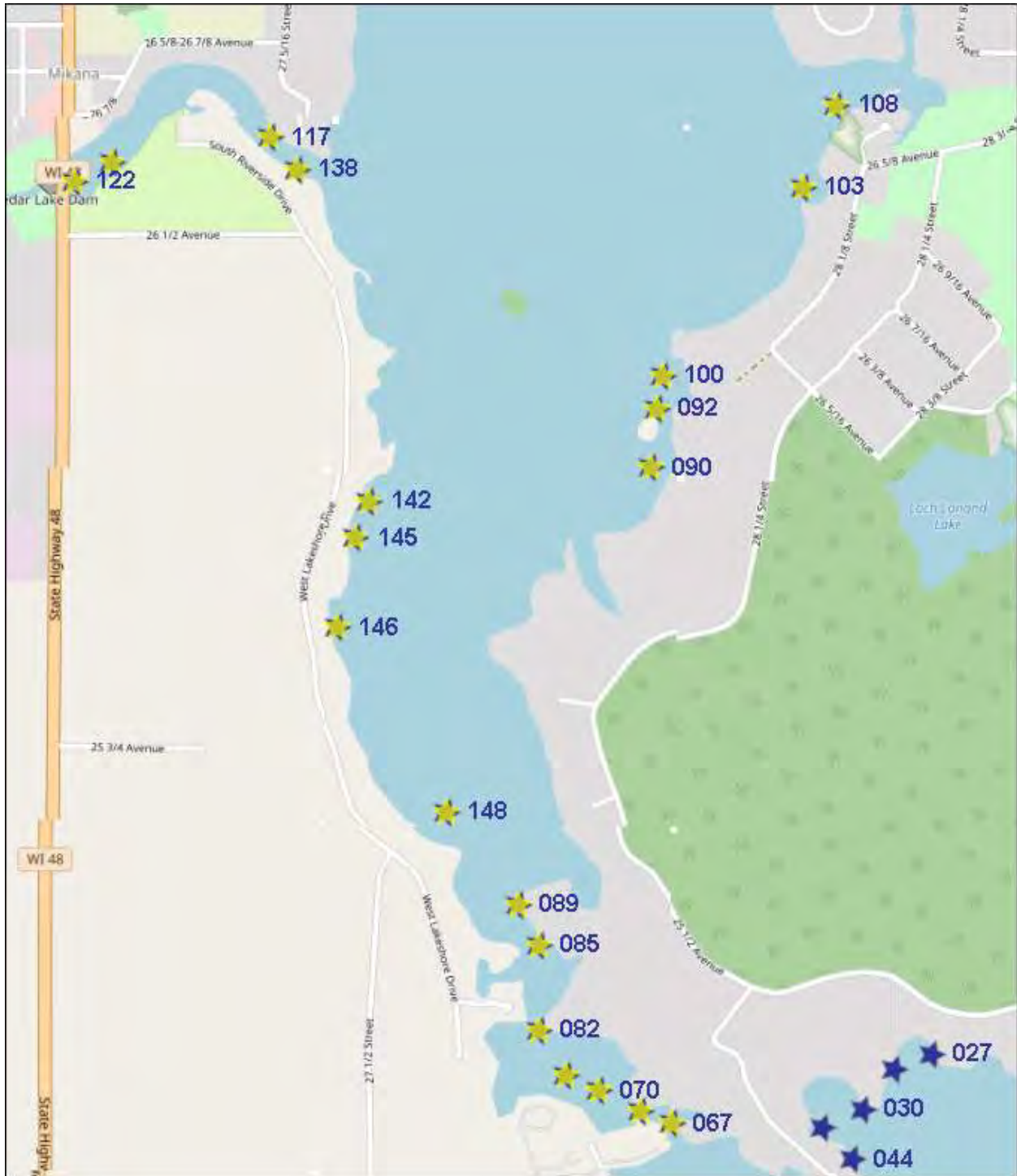
2023 Re-survey of Balsam Lake completed on June 24, after DASH removal. CLP was still prevalent in both the north end and the south end channel leading to Red Cedar Lake. These areas were considered high density areas, with the north end CLP bed covering an estimated 0.31 acres. A CLP bed is defined as an area where greater than 50% of the plants are CLP and there is a definable edge.



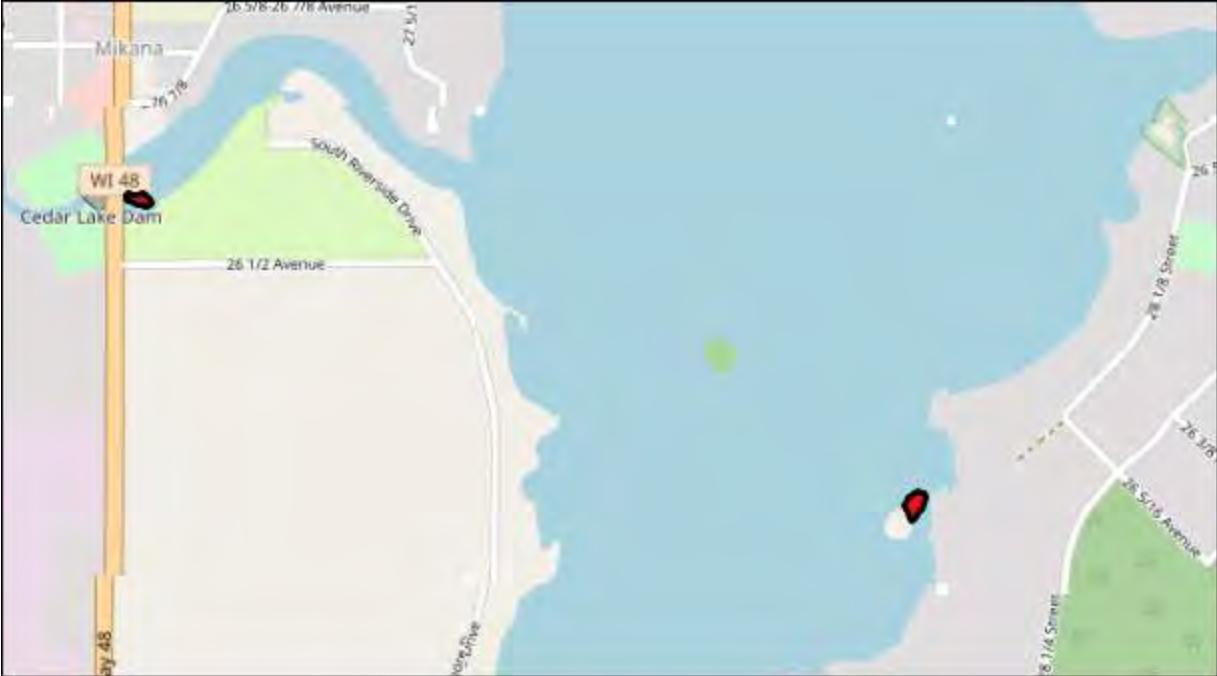
2023 Red Cedar Lake CLP Meandering Survey Points June 22 & 24, 2023 (LEAPS)







A total of 118 points with CLP were taken during the June survey. Nearly all these points were individual plants or small clumps. Only two areas were determined to be bed-forming (greater than 50% of the plants present are CLP and the area has a definable edge). They totaled 0.5 acres (see next figure). The survey determined that CLP was widespread, but only a couple of areas were dense enough to cause any navigation impact. Mostly the CLP plants were just providing some early season fish habitat.



2023 Balsam Lake CLP Meandering Survey – June 22, 2023 (LEAPS)

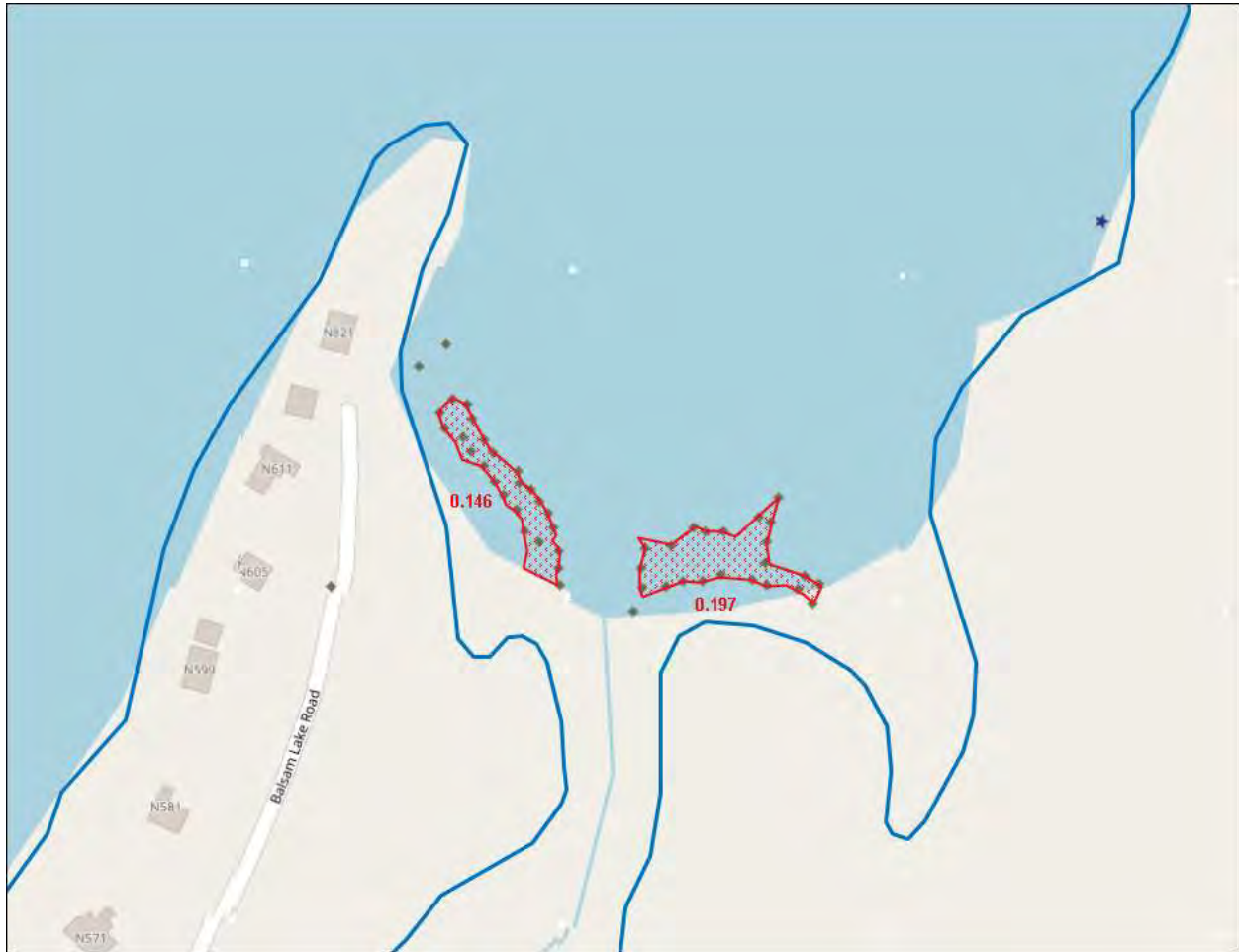


65 points where CLP was identified, however only 0.11 acres of CLP was considered “bed-forming”, meaning at least 50% of the plants present are CLP and the area has a definable edge.

2023 Wild Rice Mapping – Balsam Lake, Washburn County (part of the Red Cedar Lakes)

Field mapping – Valeri Bausch

Desktop mapping – Dave Blumer



West side of Mud Lake Channel = 0.15 acres

East side of Mud Lake Channel = 0.20 acres





Figure 1: Wild rice photos taken Valerie Bausch during the 2023 wild rice survey on Balsam Lake

Coarse Woody Habitat (CWH) in Bass Lake, Barron County (near Red Cedar Lake)

LEAPS, October 17, 2023



Survey Details: 0.73 miles of shoreline, 20.4 acres of open water.

83 points with CWH (114 points/mile)

50 points connected to shore

33 points not connected to shore

12 points with a branchiness rating of "2" (yellow crosses)

22 points with a branchiness rating of "1"

Natural shorelines often have 300 or more points with CWH per mile of shoreline.

Some developed lakes only have 2 or 3 points, or no points with CWH per mile of shoreline.

Bass Lake is in pretty good condition in reference to CWH.

2023 Hemlock Lake, Barron County Coarse Woody Habitat Survey

On Oct. 1, 2023 Dave Blumer from LEAPS surveyed the accessible shoreline of Hemlock Lake in a 14-ft johnboat. During the survey, any shoreline that was accessible to the small craft was traversed. Several areas of Hemlock Lake were either <2.0ft of water, or the actual shoreline was behind sometimes hundreds of feet of shallow, swampy, inaccessible marsh. This includes the entire eastern end of the lake where Hemlock Creek enters. Figure 1 shows the areas where the immediate shoreline was not surveyed, represented by the green hash areas. Most of the property behind these areas was also undeveloped, so one would expect a fair amount of CWH, but that habitat would not extend into any amount or depth of open water.

The survey that was completed covered approximately 5.92 acres of shoreline of the lake. During the survey, 94 points with CWH were located. To be included in the survey, the CWH had to be at least 5ft long and at least 4in in diameter somewhere along the length. At each point that is documented, the type of CWH is assessed. Type includes trees and logs down in the water but attached to or lying on shore as well; trees, logs and stumps in the water but not attached to the shore; and the level of branchiness the CWH has. Branchiness is based on no branches, a few branches or broken stumps protruding from the main log, and lots of branching like what would be seen if an entire tree crown had fallen in the water.

Of the 94 points documented, 73 were connected to shore and 21 were not connected to shore. There were 18 points with abundant branchiness, 38 with few branches, and 38 w/no branches at all.

The number of locations with CWH (94) on Hemlock Lake represented a dispersion of 16 points or examples of CWH for each mile of shoreline assessed. A similar survey completed on Bass Lake found CWH at 114 points per mile. On Balsam Lake, a survey indicated 37 points per mile.



94 points, 73 connected to shore, 21 not connected to shore: 38 w/no branches, 38 with few branches, and 18 full crowns

Green Hash Areas: ≤ 2 ft in undeveloped areas of the lake, these were not surveyed.

5.92 miles of shoreline were surveyed giving 16 points/mile of shoreline.