

Date: August 3, 2021

To: Round Lake Association
Terry Schultz

Subject: Round Lake Curly Leaf Survey

From: Sarah Fogderud
A.W. Research Laboratories, Inc.
16326 Airport Road
Brainerd, MN 56401
218-829-7974
sarah@awlab.com

Table of Contents

Introduction & Method.....	3
Figure 1: 2021 CLP Survey Boat Track.....	3
Results.....	4
Table 1: CLP 4-Year Comparison	4
Figure 2: 2021 CLP Areas.....	4
Table 2: 2021 CLP Density, Stand Composition, and Acreage	5
Figure 5: 2020 CLP Area	8
Table 4: 2020 CLP Density, Stand Composition, and Acreage	8
Figure 6: 2019 CLP Area	9
Table 5: 2019 CLP Density, Stand Composition, and Acreage	9
Figure 7: 2018 CLP Area	10
Table 6: 2018 CLP Density, Stand Composition, and Acreage	10
Figure 8: 2017 CLP (DNR Survey)	11
Table 7: 2017 CLP Density, Stand Composition, and Acreage	11

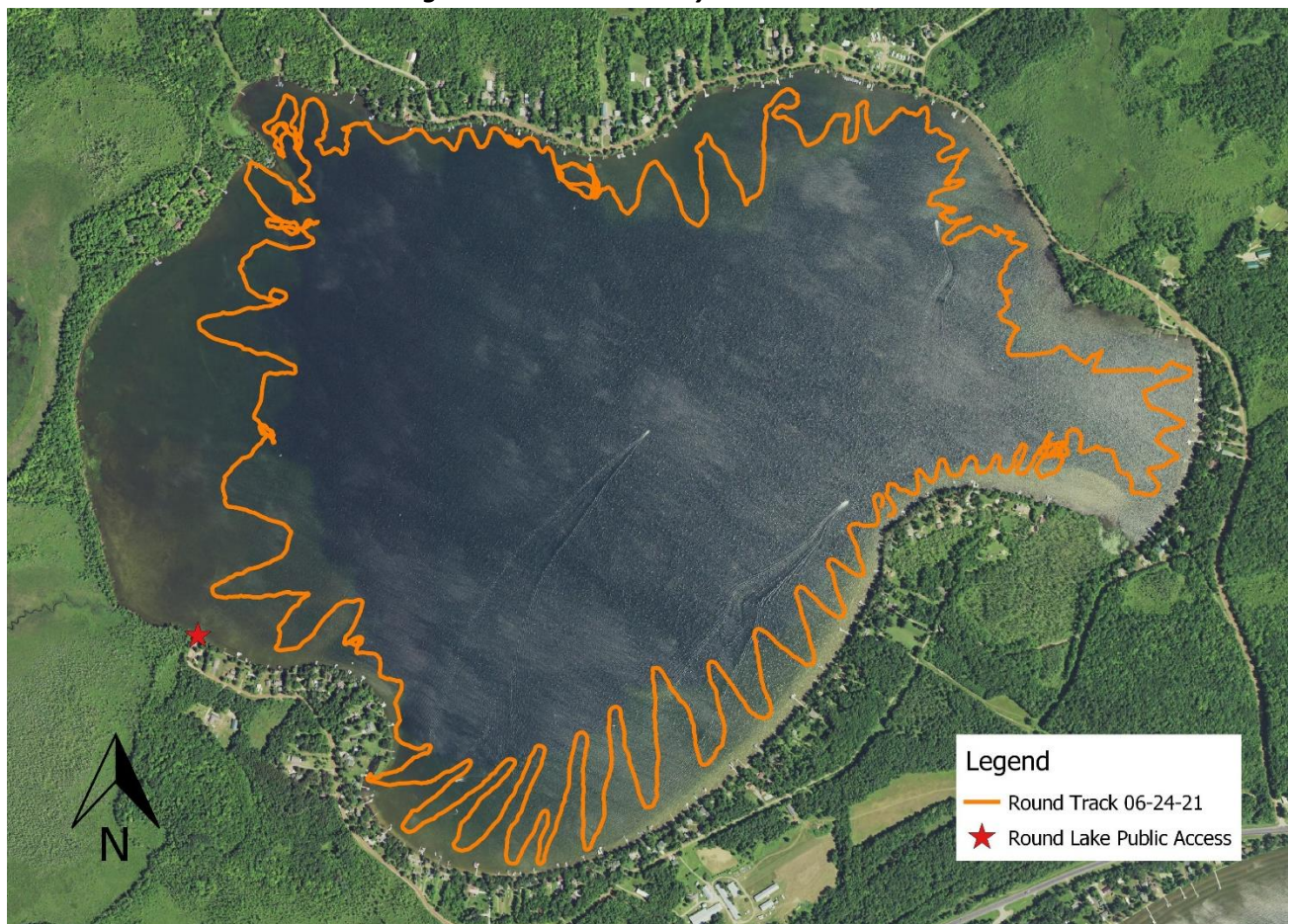
Introduction & Method

Sarah Fogderud of A.W. Research Laboratories, Inc. (AWRL) completed a vegetation survey of Round Lake on June 24, 2021. The goal of the survey was to delineate areas of curly leaf pondweed (CLP) plant stands within the lake.

The entire littoral zone of the lake was surveyed visually following a zig-zag pattern (Figure 1). When CLP was spotted from the boat a GPS unit was used to mark the location or to trace the outline of larger areas. The density of each CLP stand was noted as either “sparse” or “common”. A sampling rake was used in some locations to confirm the presence of CLP and other plant species. Each CLP stand was labeled as either “mono” for a monoculture of CLP, or “mixed” to denote that a variety of species was present within the stand. In 2018, surveyors spent more time surveying the lake for additional plant species, while the 2019, 2020, and 2021 surveys have focused on only delineating the CLP in Round Lake.

Thank you to Terry Schultz and Becky Schultz for the use of their boat and for their assistance with the survey.

Figure 1: 2021 CLP Survey Boat Track



Results

CLP was found at 16 locations on the lake for a total of 4.88 acres. In addition to CLP, several other native plant species were identified from the boat or using the sampling rake including northern milfoil, white water crowfoot, elodea, chara, white stem pondweed, coontail, clasping leaf pondweed, large-leaf pondweed, and flatstem pondweed.

The results show that the total acreage of CLP in Round Lake increased by 49% from a total of 3.28 acres in 2020 to 4.88 acres in 2021. Table 1 below displays a 4-year comparison of the CLP survey findings.

Table 1: CLP 4-Year Comparison

Year	# CLP Areas	Total Acres
2017	11	6.32
2018	9	3.42
2019	21	6.97
2020	23	3.28
2021	16	4.88

Figure 2: 2021 CLP Areas

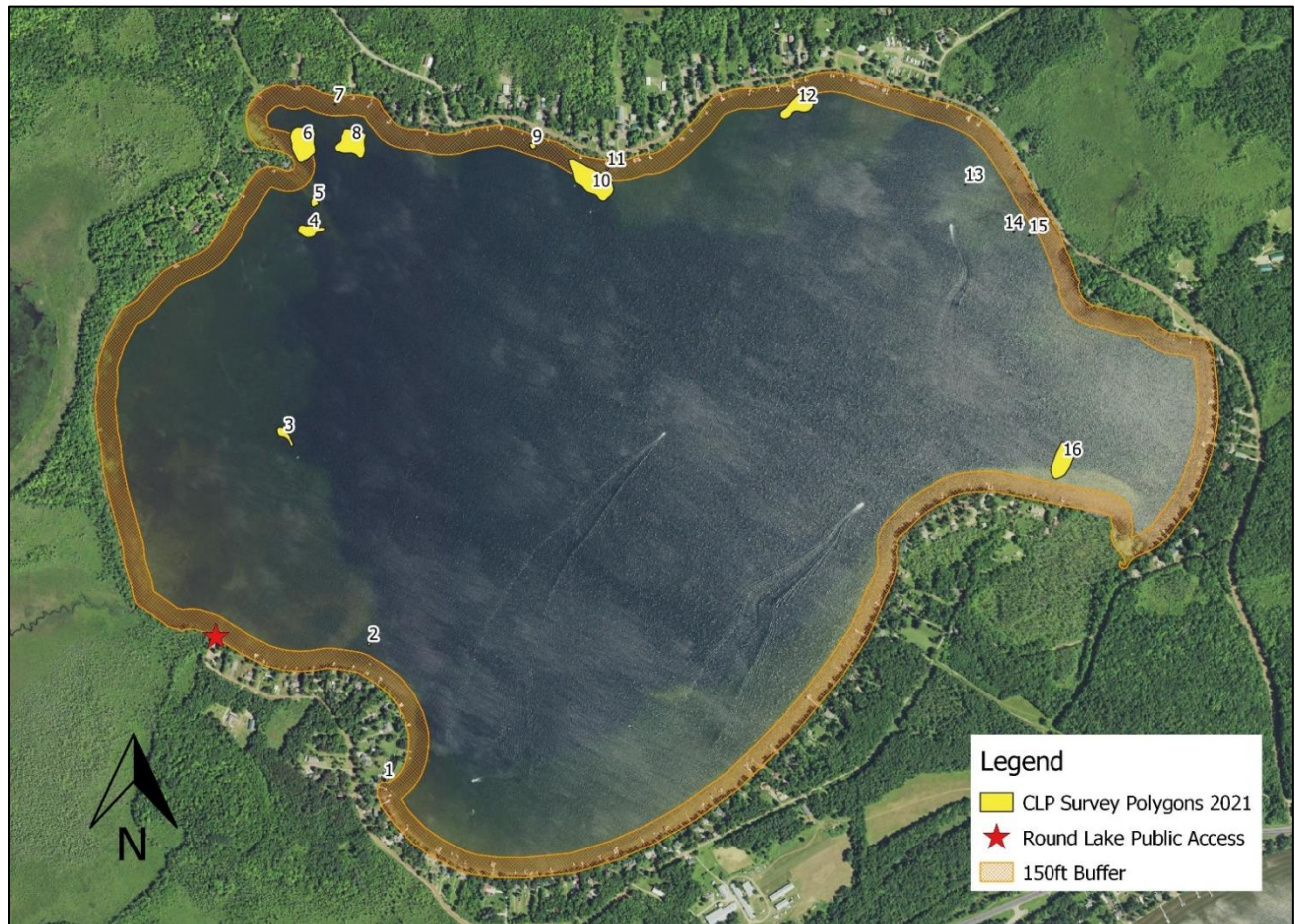


Table 2 below shows the CLP density, stand composition, and calculated acres for the 2021 survey. All sites with CLP present in 2021 had a mixed stand composition – meaning that we observed multiple plant species growing in addition to the CLP. This indicates that while there are areas where CLP is growing strongly, there are no monoculture areas of CLP in Round Lake. Areas that were once rated as a monoculture in prior years now have a mixed stand composition.

Table 2: 2021 CLP Density, Stand Composition, and Acreage

Polygon ID	CLP Density	CLP Stand	CLP Acres
1	sparse	mixed	0.00408
2	sparse	mixed	0.00842
3	sparse	mixed	0.15292
4	common	mixed	0.28801
5	common	mixed	0.0601
6	common	mixed	0.90371
7	sparse	mixed	0.00222
8	common	mixed	0.79791
9	common	mixed	0.03705
10	common	mixed	1.22481
11	sparse	mixed	0.00614
12	common	mixed	0.59728
13	sparse	mixed	0.00125
14	sparse	mixed	0.00283
15	sparse	mixed	0.00357
16	common	mixed	0.79139
TOTAL			4.8817

The results of the 2021 survey show that while the overall acreage of CLP has increased, the density has decreased. In 2019, 71% of the CLP stands had a “common” density rating. In 2021 we saw that improve to just 50% of stands with a “common” density rating. So, while the CLP areas have expanded somewhat, the CLP plants are growing more sparsely in these areas. In addition, at 5 of the 2021 CLP locations (Polygon IDs 1, 2, 13, 14, 15) just a handful of plants were identified.

Figure 3 below shows the northwest portion of Round Lake with the CLP survey results for 2019, 2020, and 2021 shown in green, purple, and yellow respectively. Portions of the northwest bay (areas 6 and 8 in Figure 3) of the lake was treated by Professional Lake Management in May of 2020. This resulted in a large reduction in the CLP growth from 2019 to 2020. In 2021, we observed that the CLP had rebounded somewhat in these locations (polygons 6 and 8 in Figure 3). The acreage of CLP increased from 2020; however, the stands remain mixed with native plant growing alongside the CLP. This area may be a candidate for another treatment in May 2022 to keep the CLP under control. Table 3 shows the fluctuation in acres of curly leaf pondweed in the treatment area of the northwest bay of Round Lake from 2017 through 2021.

Just south of the northwest bay there was a large stand of CLP identified in 2019. This area was not treated in 2020 but we did see a small reduction in the growth from 2019 to 2020 likely due to less favorable environmental conditions for CLP in 2020. In 2021 we saw a substantial decrease in CLP (polygons 4 and 5 in Figure 3). The cause of this reduction is unknown.

Table 3: Acres of CLP in Treatment Area of the Northwest Bay

Year	CLP Acres	Treatment Notes
2017	1.67	Before treatment
2018	0.769	Before treatment
2019	2.66	Before treatment
2020	0.707	Year of treatment
2021	1.70	After treatment

Figure 3: Close-up of NW Section of Round Lake, 2019-2021 Survey Results

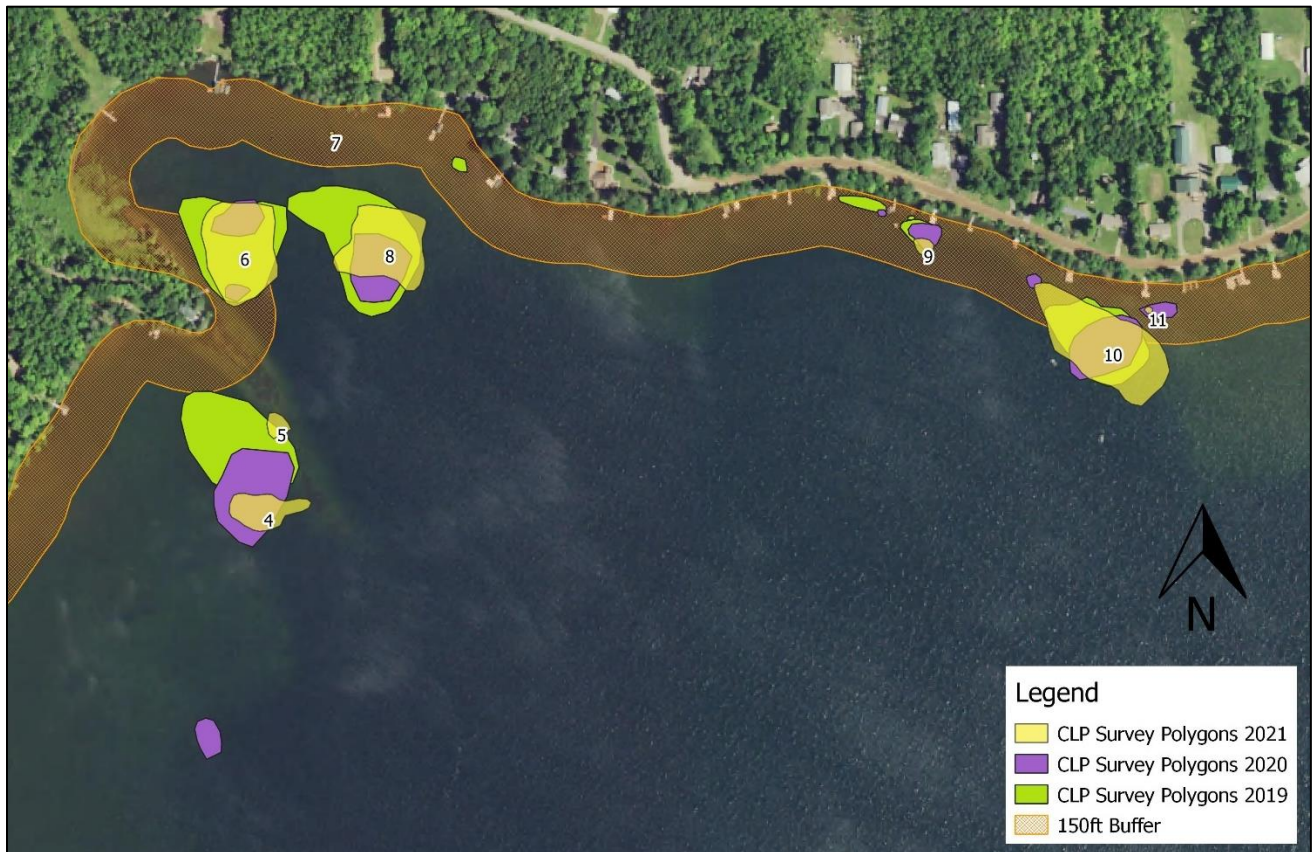


Figure 4 shows a closeup of a large CLP area in the southeast bay of the lake. Like the northwest bay, this area saw a large reduction in CLP from 1.33 acres in 2019 (2019 polygons 20 and 21) to 0.172 acres in 2020 (2020 polygon 23), which we attributed to more difficult growing conditions in 2020. Our 2021 survey showed that this area has again increased in size from 2020 with 0.791 acres (polygon 16) and has shifted slightly to the south.

Figure 4: Close-up of SE Section of Round Lake, 2019-2021 Survey Results



Figures 5-8 show the CLP areas from the 2020, 2019, and 2018 surveys completed by AWRL and the 2017 survey completed by the MN Department of Natural Resources.

Tables 4, 5, 6, and 7 show the acreage for each CLP stand and the total acreage calculated for the lake in 2020, 2019, 2018 and 2017 respectively.

Figure 5: 2020 CLP Area

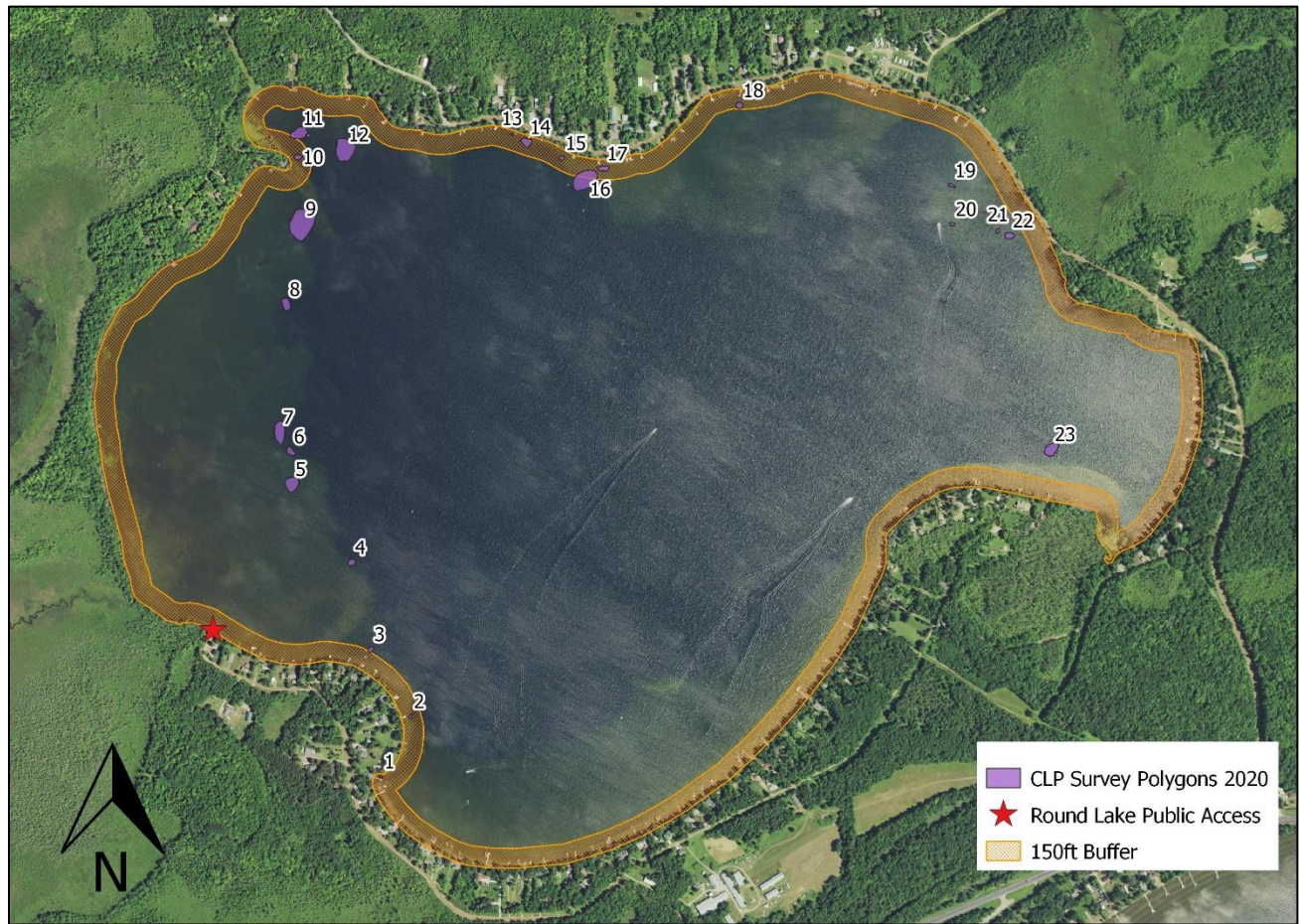


Table 4: 2020 CLP Density, Stand Composition, and Acreage

Polygon ID	CLP Density	CLP Stand	CLP Acres	Polygon ID	CLP Density	CLP Stand	CLP Acres
1	sparse	mixed	0.006447	14	sparse	mixed	0.091282
2	sparse	mixed	0.013510	15	sparse	mixed	0.023420
3	common	mixed	0.030067	16	common	mono	0.499388
4	common	mixed	0.051765	17	common	mono	0.065289
5	common	mono	0.210057	18	common	mixed	0.047357
6	sparse	mixed	0.067923	19	sparse	mixed	0.021309
7	common	mixed	0.251350	20	sparse	mixed	0.018298
8	common	mixed	0.114105	21	sparse	mixed	0.018082
9	common	mixed	0.800871	22	sparse	mixed	0.062166
10	common	mixed	0.042702	23	sparse	mixed	0.171703
11	sparse	mixed	0.197616	Total			3.278146
12	common	mixed	0.466590				
13	sparse	mixed	0.006849				

Figure 6: 2019 CLP Area

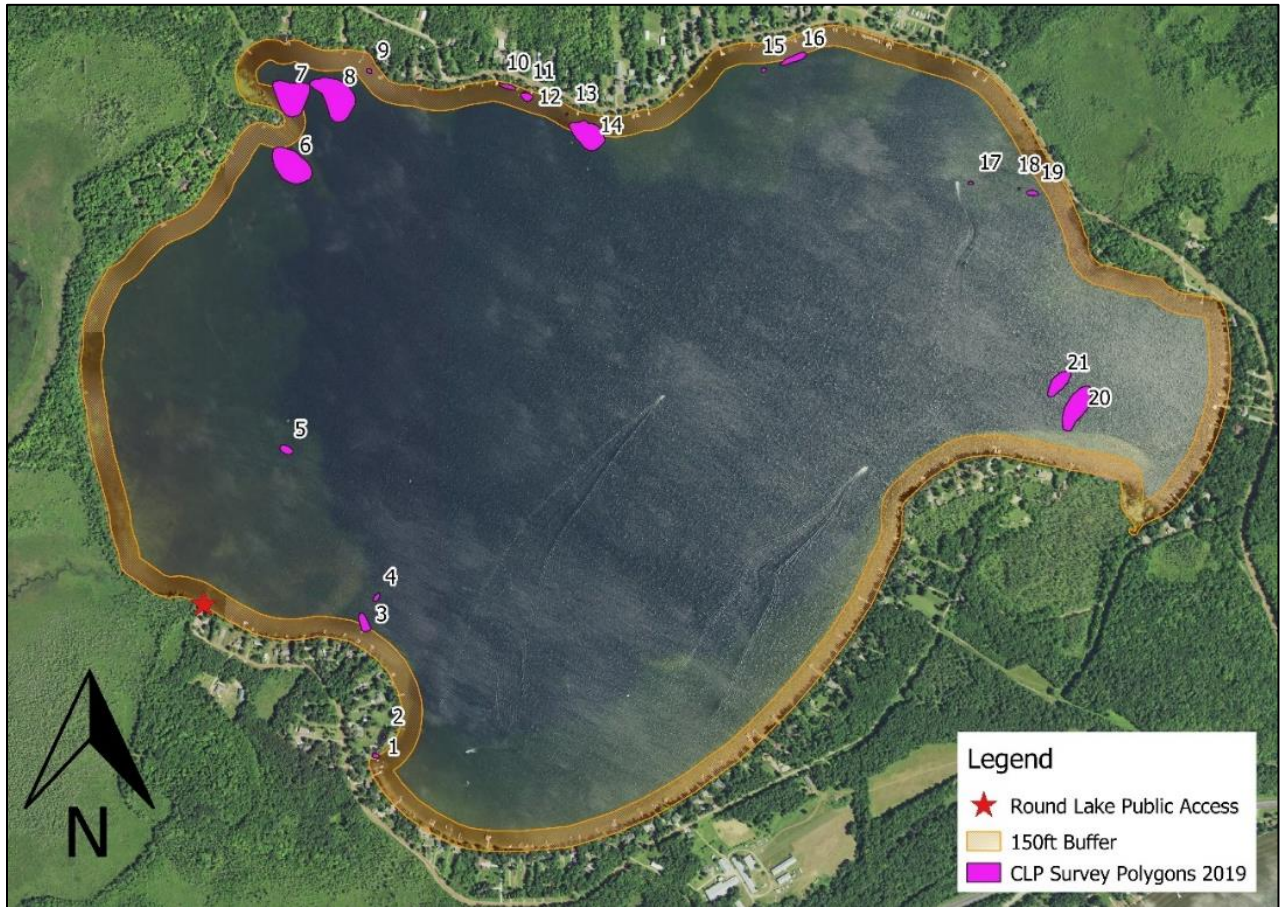


Table 5: 2019 CLP Density, Stand Composition, and Acreage

Polygon ID	CLP Density	CLP Stand	CLP Acres	Polygon ID	CLP Density	CLP Stand	CLP Acres
1	common	mixed	0.035489	12	common	mixed	0.097542
2	sparse	mixed	0.008602	13	sparse	mixed	0.005730
3	common	mixed	0.177208	14	common	mixed	0.857532
4	sparse	mixed	0.044047	15	sparse	mixed	0.023382
5	common	mixed	0.110292	16	common	mixed	0.181827
6	common	mixed	1.252249	17	sparse	mixed	0.018077
7	common	mono	1.182999	18	common	mono	0.006320
8	common	mixed	1.472460	19	sparse	mixed	0.059392
9	common	mixed	0.025741	20	common	mixed	0.929538
10	common	mono	0.069153	21	common	mixed	0.404821
11	common	mixed	0.003386	Total			6.965787

Figure 7: 2018 CLP Area

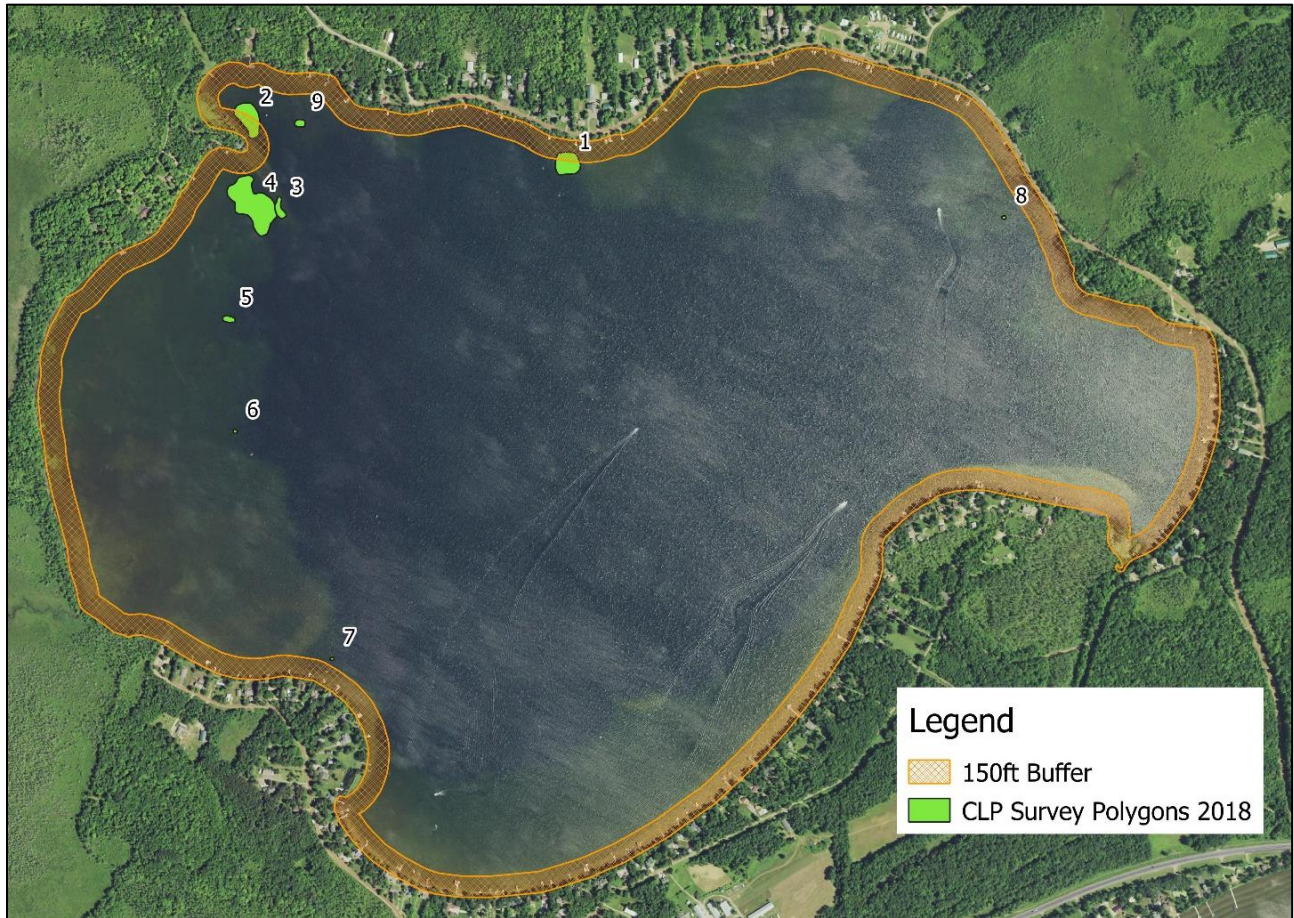


Table 6: 2018 CLP Density, Stand Composition, and Acreage

Polygon ID	CLP Density	CLP Stand	CLP Acres
1	sparse	mixed	0.56201
2	sparse	mixed	0.690959
3	common	mono	0.157249
4	sparse	mixed	1.809224
5	common	mixed	0.076469
6	common	mixed	0.014868
7	sparse	mixed	0.012031
8	sparse	mixed	0.014204
9	sparse	mixed	0.078131
Total			3.415145

Figure 8: 2017 CLP (DNR Survey)

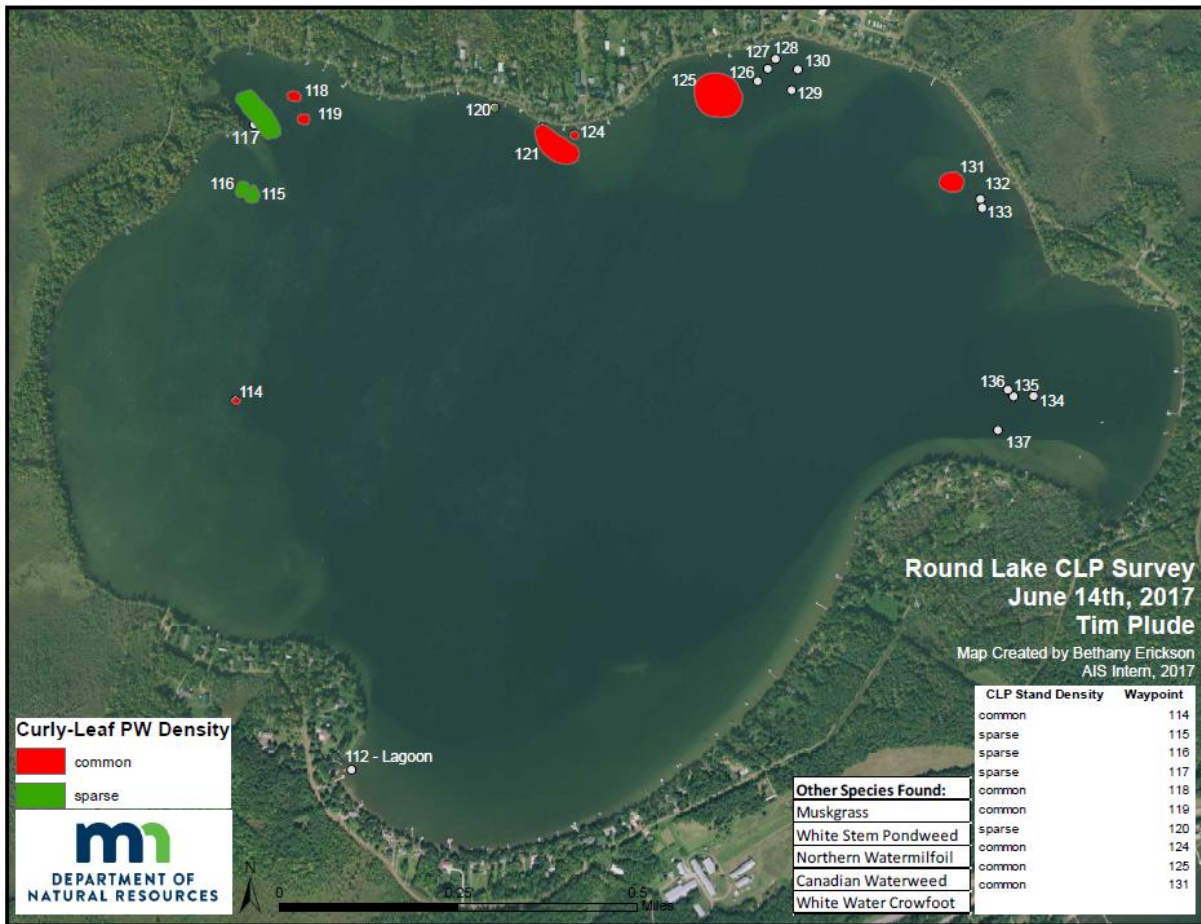


Table 7: 2017 CLP Density, Stand Composition, and Acreage

Polygon ID	CLP Density	CLP Stand	Acres
114	common	mixed	0.055579
115	sparse	mixed	0.269351
116	sparse	mixed	0.238363
117	sparse	mixed	1.372634
118	common	mono	0.151252
119	common	mono	0.141498
120	sparse	mixed	0.026865
121	common	mixed	1.32868
124	common	mono	0.071838
125	common	mixed	2.158212
131	common	mono	0.501635
Total			6.315907