



*Aquatic Enhancement
& Survey, Inc.*



Draft Aquatic Vegetation Management Plan Update 2022

Clear and Round Lakes, Steuben County, Indiana

Prepared for the Clear Lake Township Land Conservancy

By

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November 5, 2022

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Acknowledgements

This work was performed by Aquatic Enhancement & Survey, Inc. under contract with the Clear Lake Township Land Conservancy (CLTLC). It was funded by the CLTLC in keeping with their mission to: Preserve, protect, and manage the natural environment within the watershed and township for future generations. I would like to thank the following persons who contributed time, data, and literature necessary for the preparation of this update: Bridget Harrison and the other staff and members of the CLTLC, Rod Edgell of the Indiana Department of Natural Resources, Barbara Hendrick of Coldwell Banker Real Estate Group. Work for the preparation of this document was performed by Scott Banfield, Tyler Harrington, Sue Smith, and Mary Vandenberg of Aquatic Enhancement & Survey, Inc.

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Executive Summary

Clear and Round Lakes are two interconnected kettle lakes of 800 and 34.5 acres respectively, located in Steuben County Indiana. They are generally low in nutrients and have good water clarity. The Clear Lake Township Land Conservancy (CLTLC) serves as a key organization of stewardship for the lakes and their watersheds. Both lakes have been noted to host the invasive plants Eurasian watermilfoil (*Myriophyllum spicatum*), curly-leaf pondweed (*Potamogeton crispus*) and starry stonewort (*Nitellopsis obtusa*). The invasive wetland plant, purple loosestrife (*Lythrum salicaria*) has colonized riparian areas at the lakes. The non-native species spiny naiad (*Najas marina*), has also been noted to be present on Round Lake, but does not appear to present a threat to the ecological or recreational integrity of the lakes. The invasive watermilfoil identification was further refined in 2022 when samples collected from both lakes were genetically identified as hybrid watermilfoil, a cross between native Northern watermilfoil (*Myriophyllum sibiricum*) and Eurasian watermilfoil.

Guidance for lake-wide management of aquatic plants at Clear and Round Lakes began in 2013 when the CLTLC retained Aquatic Restoration Systems, LLC to draft an aquatic vegetation management plan (AVMP) for the lakes. This work was partially funded through a cost-share grant with the Indiana Department of Natural Resources (IDNR), Lake and River Enhancement (LARE) program. At that time the lakes had not experienced significant problems with invasive aquatic plant species, but the CLTLC was interested in assessing the status of the aquatic plant community to see if any concerns might be revealed. Due to the relatively minor colonization by invasive plants at that time, the 2013 AVMP did not recommend any management activities other than the continued monitoring.

In response to more recent growing concerns about the increasing presence of invasive aquatic plants at the lakes the CLTLC retained Aquatic Ecosystem Services, LLC (formerly Aquatic Restoration Systems, LLC) to draft an updated AVMP for the lakes in 2021. Both lakes were experiencing significant problems with invasive watermilfoil. Starry stonewort had also been providing impairment to navigation on parts of Round Lake. In the new AVMP it was noted that invasive watermilfoil had colonized 95 acres of Clear Lake and 6 acres of Round Lake. Curly-leaf pondweed was noted on 16.7 acres of Clear Lake and .5 acres of Round Lake. Starry stonewort on Clear Lake was minimal, but 6 acres were noted on Round Lake. The plan presented treatment of all areas of invasive watermilfoil colonization with ProcettaCOR herbicide as the best management option, but adjusting for budget concerns, recommended the treatment of a prioritized 52 acres to reduce impairments to recreational activities.

For 2022 the CLTLC was granted \$8000.00 in LARE cost-share funding to perform a treatment for invasive watermilfoil using ProcettaCOR herbicide at Clear Lake and perform a summer Tier II aquatic plant survey on both lakes. The CLTLC hired Aquatic Enhancement & Survey, Inc. (AES) to treat invasive watermilfoil on both lakes and produce this update to their AVMP. In April and May we mapped 109.77 acres of invasive watermilfoil across both lakes. Colonization by curly-leaf pondweed was found to be insignificant on both lakes. On June 1, we treated 52 acres of invasive watermilfoil on Clear Lake and 6.8 acres of invasive watermilfoil on Round Lake using ProcettaCOR. Results were generally satisfactory. The area of starry stonewort colonization noted on Clear and Round Lakes in 2022 was .28 acres and 17.44 acres respectively.

In 2023 it's proposed to repeat the use ProcettaCOR herbicide to treat up to 52 acres of invasive watermilfoil on Clear Lake and up to 2 acres of invasive watermilfoil on Round Lake. An AVMP plan update is also proposed. The estimated maximum cost of all 2023 activities is expected to be \$83,948.00.

1. Problem Statement

The invasive plants hybrid watermilfoil, starry stonewort, and curly-leaf pondweed are present in Clear and Round Lakes. Hybrid watermilfoil growth provides impairment to both lakes indirectly by out-competing more beneficial native species and potentially contributing to a loss of plant diversity or an alteration of aquatic community functioning. Starry stonewort has also been noted to provide impairment to Round Lake. The invasive vegetation has had a direct affect by impairing the recreational use and the aesthetic appeal of both lakes.

2. Goals and Objectives

The following goals are from the most recent AVMP and have been established by the IDNR for all Indiana lakes, including Clear and Round Lakes and others applying for LARE funding:

- Develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality, and is resistant to minor habitat disturbances and invasive species.
- Direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species.
- Provide reasonable public recreational access while minimizing the negative impacts on plant, fish and wildlife resources.

To measure progress toward the above goals at Clear and Round Lakes (in plan year 1, 2022) the following objectives have been established:

- 1. A frequency of invasive watermilfoil in a Tier II survey not to exceed 20% of sample points on Clear Lake with a coverage of less than 40 acres and on Round Lake not to exceed 10% of sample points with a coverage not to exceed two acres.
- 2. A frequency of curly-leaf pondweed in a Tier II survey not to exceed 10% of sample points on Clear Lake and 5% on Round Lakes with less than 10 acres of coverage on Clear Lake and less than 1.0 acre on Round Lake.
- 3. Maintain a minimum of 12 native species on Clear Lake and 10 native species on Round Lake in a Tier II survey.

3. Management History

Treatments for nuisance aquatic plants at Clear and Round Lakes prior to 2018 were limited to a relatively small number of private frontages on each lake. IDNR became aware of the colonization of Round Lake by starry stonewort in 2016 and initiated treatments there in the 2018 season utilizing Great Lakes Restoration Initiative (GLRI) funding. These treatments were repeated in 2019 through 2022, with a small amount of starry stonewort treatment also taking place on Clear Lake in 2022. They and are expected to continue in the 2023 season.

Guidance for lake-wide management and monitoring of aquatic plants at Clear and Round Lakes began in 2013 when the CLTLC retained Aquatic Restoration Systems, LLC to draft an aquatic vegetation management plan (AVMP) for the lakes. This work was partially funded through a cost-share grant with the Indiana Department of Natural Resources (IDNR), Lake and River Enhancement (LARE) program. At that time the lakes had not experienced significant problems with invasive aquatic plant species, but the CLTLC was interested in assessing the status of the aquatic plant community to see if any concerns might be revealed. Due to the relatively minor

colonization by invasive plants at that time, the 2013 AVMP did not recommend any management activities other than continued monitoring.

In response to growing concerns about the increasing presence of invasive aquatic plants at the lakes in 2019 through 2020 the CLTLC retained Aquatic Ecosystem Services, LLC (formerly Aquatic Restoration Systems, LLC) to draft an updated AVMP for the lakes in 2021. Both lakes were experiencing significant problems with invasive watermilfoil. Starry stonewort had also been providing impairment to navigation on parts of Round Lake. In the new AVMP it was noted that invasive watermilfoil had colonized 95 acres of Clear Lake and 6 acres of Round Lake. Curly-leaf pondweed was noted on 16.7 acres of Clear Lake and .5 acres of Round Lake. Starry stonewort on Clear Lake was minimal, but 6 acres were noted on Round Lake. The plan presented treatment of all areas of invasive watermilfoil colonization with ProcellaCOR herbicide as the best option, but adjusting for budget concerns, recommended the treatment of a prioritized 52 acres to reduce impairments to recreational activities.

4. 2022 Season Non-native Growth and Treatment

For the 2022 season the CLTLC planned to treat up to 52 acres of invasive watermilfoil growth on Clear Lake. Cost share funding was obtained from the IDNR, LARE program to assist with some portion of treatment and perform a Tier II aquatic plant survey. Aquatic Enhancement & Survey, Inc. (AES) was hired to work with the CLTLC to map and treat invasive plant growth and also to perform the Tier II aquatic plant survey and draft this update to their AVMP.

AES personnel visited Clear and Round Lakes on April 21, May 18, and May 28 to observe and map areas of the lakes colonized by invasive plants. We noted 102.97 acres of invasive watermilfoil areas on Clear Lake and 6.8 acres of invasive watermilfoil areas on Round Lake (fig. 1). We did not observe any significant areas of curly-leaf pondweed or starry stonewort colonization at that time.

After discussion with the CLTLC it was decided to treat 52 acres of invasive watermilfoil growth on Clear Lake as planned, and also treat the 6.8 acres of invasive watermilfoil growth on Round Lake. ProcellaCOR herbicide was selected for the treatments based on its' potential efficacy in achieving multi-seasonal control with a single application. Dose rates for the treatment areas were determined through the use of specialized training provided to AES by the product manufacturer, along with a manufacturer-provided product use guide and personal consultations with the manufacturer's representative, taking into account the needs of the CLTLC and other lake users. It should be noted that immediately prior to treatment on June 1 the LARE biologist expressed concerns about the treatment affecting non-target plants and specified that LARE funding could only be utilized if the treatment area to which LARE was contributing was treated at a dose rate lower than that recommended and planned by AES. A dose of 3 PDU per acre-foot was desired rather than the 4 PDU per acre-foot dose that had been planned. The lower dose rate desired by LARE was integrated into the treatment regime and the treatment was completed that day. ProcellaCOR herbicide was used at rates varying from 3-5 PDU per acre-foot. The June 1 treatment map for Clear and Round Lakes is displayed in figure 2. The treatment data is displayed in table 1. We visited the lakes again on June 30 to remap the post-treatment extent of invasive watermilfoil growth. Results of the 52-acre treatment were dramatic. Invasive watermilfoil was no longer noted on Round Lake and we were only able to find .9 acres of remaining invasive watermilfoil colonization on Clear Lake (fig. 3). The lakes were visited again on October 5 to assess the extent of any late-season regrowth of invasive watermilfoil and also to assess later-season starry stonewort colonization. The October 5 invasive watermilfoil colonization is represented by the red areas in figure 4. We observed no invasive watermilfoil

recolonization on Round Lake. On Clear Lake very little recovery/recolonization was noted in areas that had been treated at the 4 PDU per acre-foot rate. We did note a partial recolonization in the large treatment area (treatment area 1) in the central flat that had been treated at the reduced 3 PDU/ac.-ft. rate. A total of 21.7 acres of invasive watermilfoil growth was observed on Clear Lake. On Clear and Round Lakes, we observed .28 and 17.44 acres of starry stonewort respectively. October 5 starry stonewort growth is represented by the green areas in figure 4.

Treatments for starry stonewort took place on Clear and Round Lakes twice in the 2022 season. These treatments are arranged by IDNR utilizing Great Lakes Restoration Initiative (GLRI) grant funding. IDNR contracted with Aquatic Weed Control, a private lake management contractor, to perform the treatments. On Clear Lake .75 acres were treated twice using Cutrine Ultra and Hydrothol 191. These treatments took place on July 11 and August 18. On Round Lake 11.62 acres were treated using Cutrine Ultra, also on July 11 and again on August 18. The starry stonewort treatment data for Clear and Round Lakes is shown in tables 2 and 3 respectively. The treatment areas for Clear and Round Lakes are shown in figures 5 and 6 respectively.

ProcellaCOR Dose Table										
Date	Lake	Plant								
6/1/2022	Clear Lake	inv. Milfoil								
Area	M.A. Acres	Depth	Acre-feet	AOI	% AOI	PDU range	Plant Density	Shoreline	PDU/ac.-ft.	PDU dose
1	22.50	4.0	90.00	707	3.2	3-5	high	n	3	270.0
2	5.00	7.0	35.00	707	0.7	4-5	high	n	5	175.0
3	5.75	5.0	28.75	707	0.8	4-5	high	n	5	143.8
4	16.75	7.0	117.25	707	2.4	3-5	high	n	5	586.3
5	2.00	6.0	12.00	707	0.3	4-5	high	n	5	60.0
Totals	52.00		283.00							1235.0
Avg. treatment area depth			5.4							
ProcellaCOR Dose Table										
Date	Lake	Plant								
6/1/2022	Round Lake	inv. Milfoil								
Area	M.A. Acres	Depth	Acre-feet	AOI	% AOI	PDU range	Plant Density	Shoreline	PDU/ac.-ft.	PDU dose
1	6.80	6.0	40.80	36	18.9	3-4	high	n	3	122.4
Totals	6.8		40.80							122.4
Avg. treatment area depth			6.0							

Table 1 Treatment data for the 6/1/22 Clear and Round Lakes invasive watermilfoil treatment

Area	Acres	Avg Depth	Ac-Ft	per 10ac-ft	Hydrothol Prescription	Open water or confined	qt of hydrothol
Treatment Area 1	0.75	4	3	0.3	1 qt per acre	open water	0.75

Table 2 Starry stonewort treatment data for the Clear Lake July 11 and August 18 treatments.

Area	Acres	Avg Depth	Ac-Ft	per 10ac-ft		Open water or confined
Area 1	5.1	4	20.4	2.04		confined
Area 2	3.18	4	12.72	1.272		confined
Area 3	0.95	4	3.8	0.38		confined
Area 4	2.39	4	9.56	0.956		confined
	11.62		46.48	4.648		

Table 3 4 Starry stonewort treatment data for the Round Lake July 11 and August 18 treatments.



Figure 1 Invasive watermilfoil colonization noted on Clear and Round Lakes in April and May of 2022 (109.77 acres).

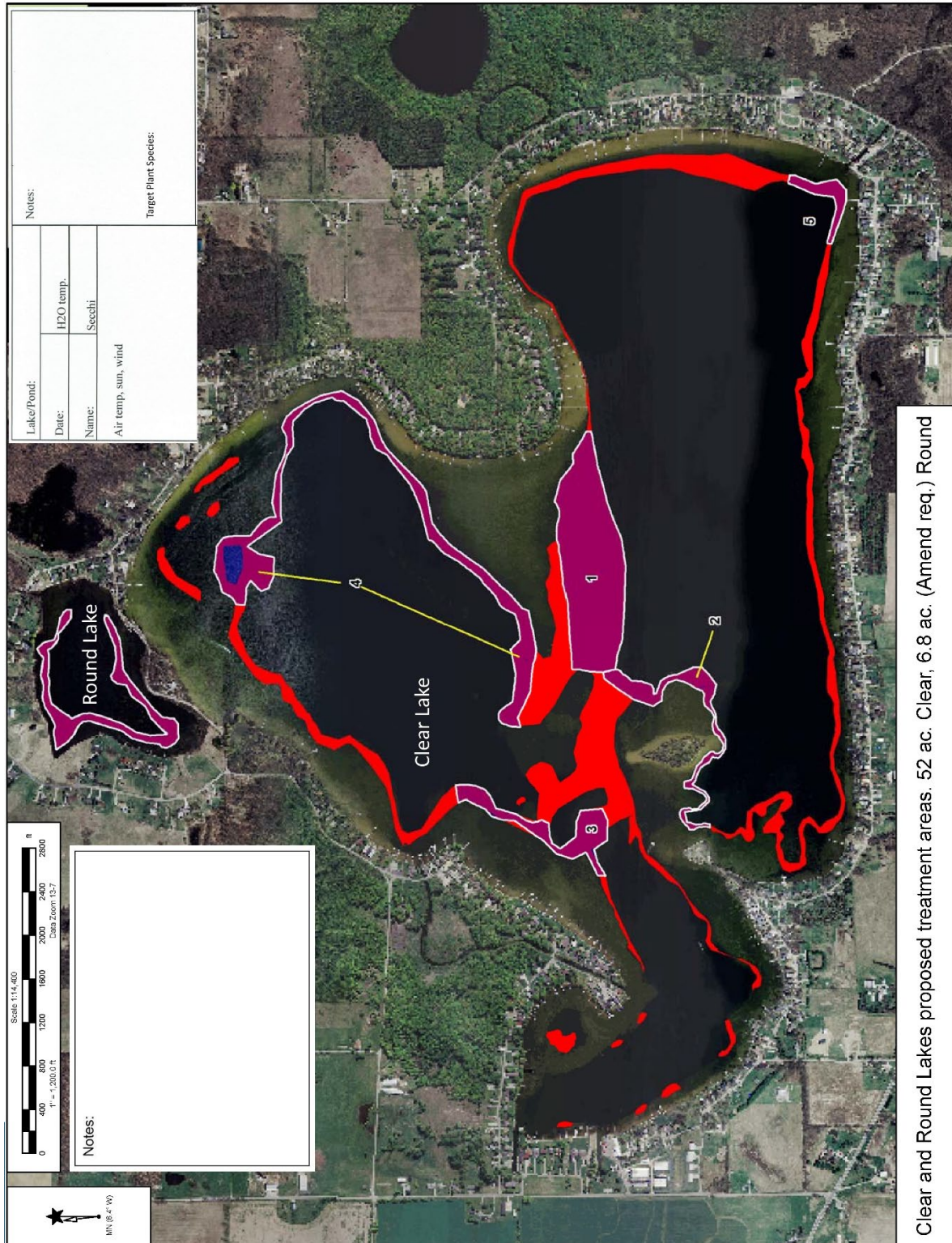


Figure 2 June 1 invasive watermilfoil treatment areas. Areas of invasive watermilfoil growth are shown in red. June 1 treatment areas are shown in pink.

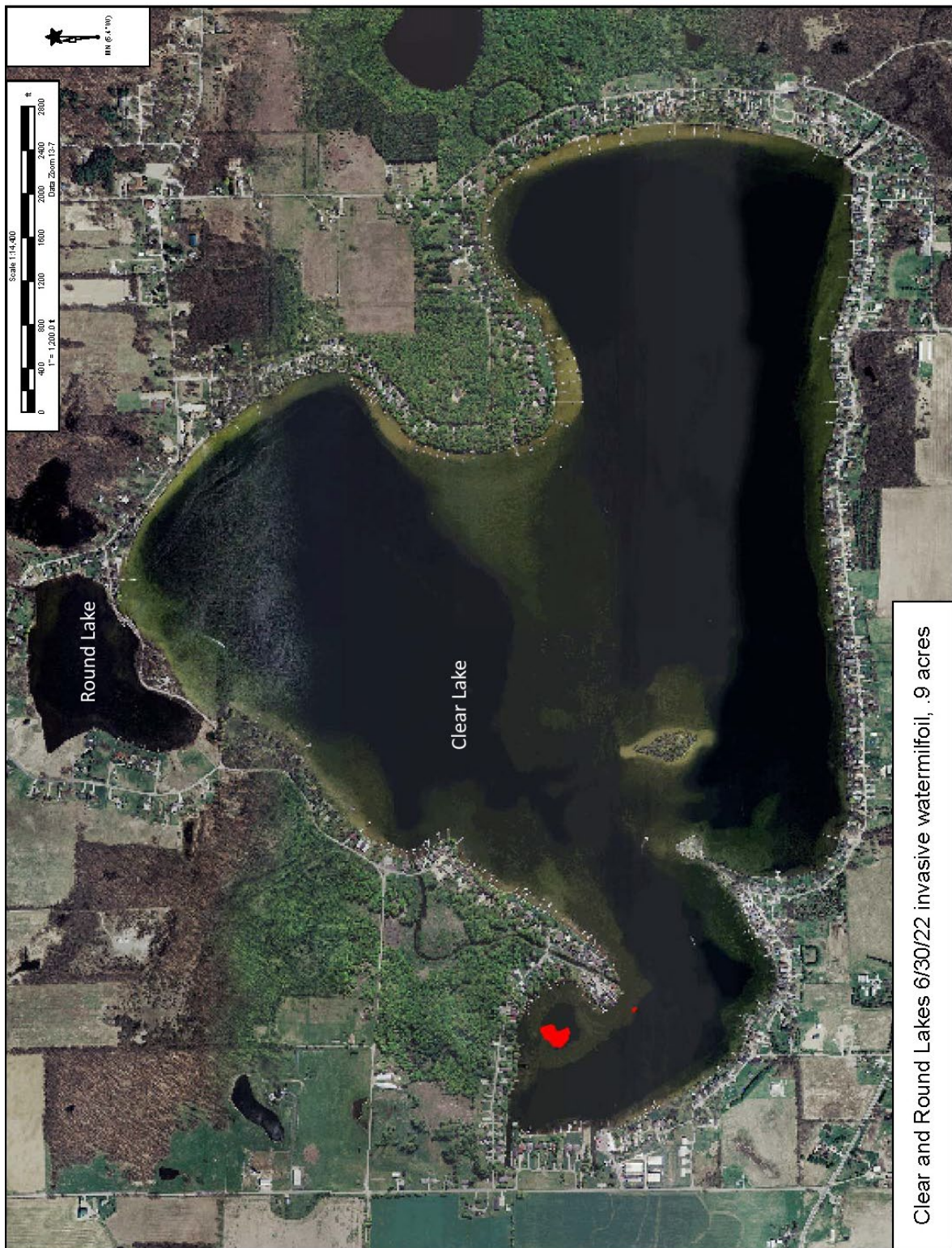


Figure 3 post-treatment invasive watermilfoil areas noted June 30. None was noted on Round, while .9 acres was noted on Clear Lake.

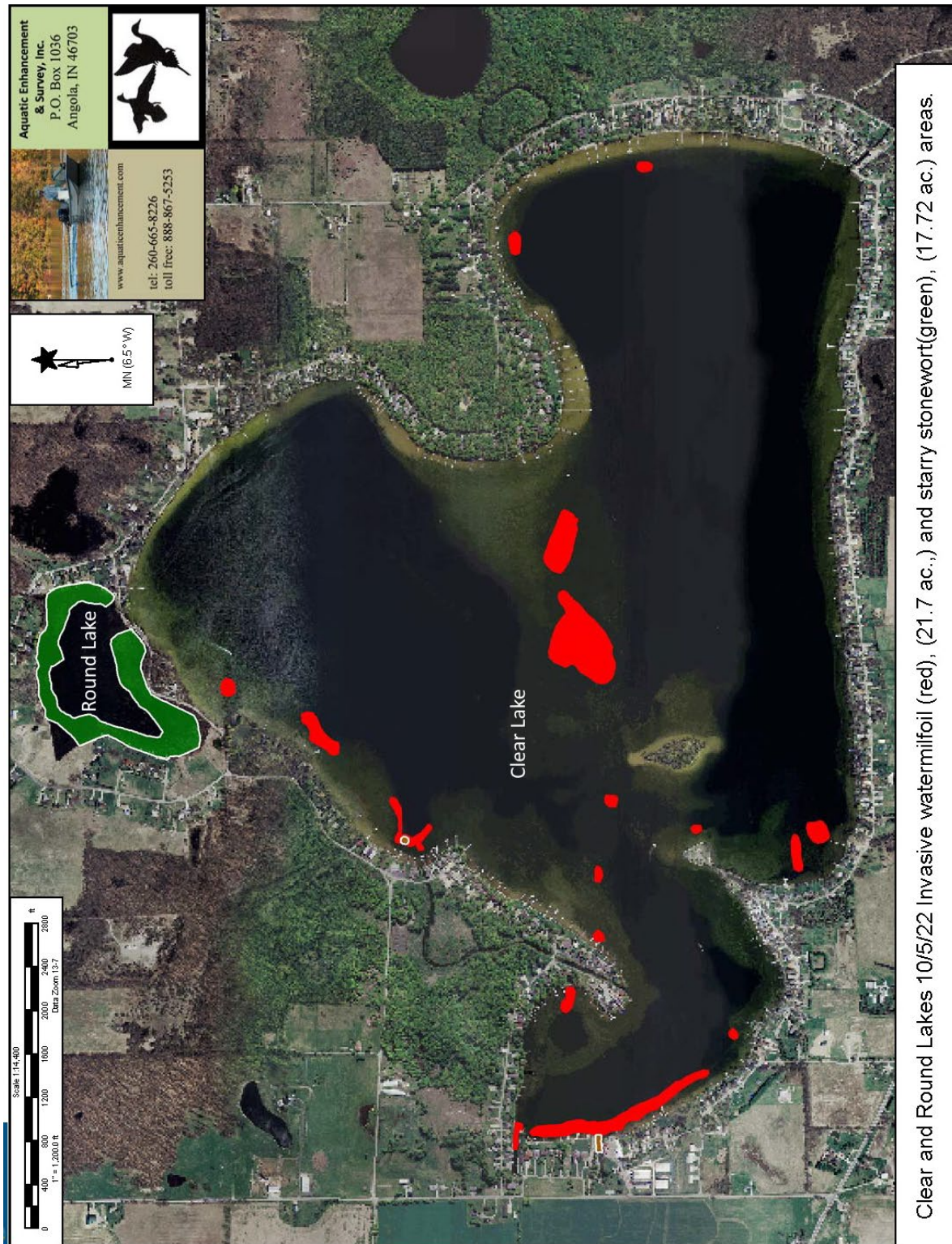


Figure 4 Invasive watermilfoil (red) and starry stonewort (green, white outline) growth noted October 5. No invasive watermilfoil was seen on Round Lake, while 21.7 acres was noted on Clear Lake. On Clear and Round starry stonewort had colonized .28 and 17.44 acres respectively.



Figure 5 Areas of July 11 and August 18 starry stonewort treatments on Clear Lake. Note, this treatment area was actually .75 acres.



Figure 6 Areas of July 11 and August 18 starry stonewort treatments on Round Lake. The treatment area total was 11.62 acres.

5. Tier II Survey Results

Tier II plant surveys were performed on Clear and Round Lakes on August 26 and August 29 respectively. Tier II surveys generate objective data for use in tracking the lakes' plant communities from season to season, and assessing the effects of management activities. Aquatic plant sampling methods used for the surveys are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR 2018). The sampling sites used on Clear and Round Lakes were nearly identical to those used in 2021. A single sampling site from the previous survey on Clear Lake was relocated to better adhere to Tier II survey protocols. The sampling sites used for Clear and Round Lakes are displayed in figures 7 and 8 respectively. Survey results for Clear Lake are shown in tables 4 through 6. Survey results for Round Lake are shown in tables 10 and 11. A summary of all-years Tier II data for Clear Lake is shown in tables 7 through 9. A summary for all-years of Tier II data for Round Lake is shown in tables 12 through 14. Figures 9 and 10 show the locations of 2022 Tier II occurrences of invasive plant species for Clear and Round Lakes respectively.

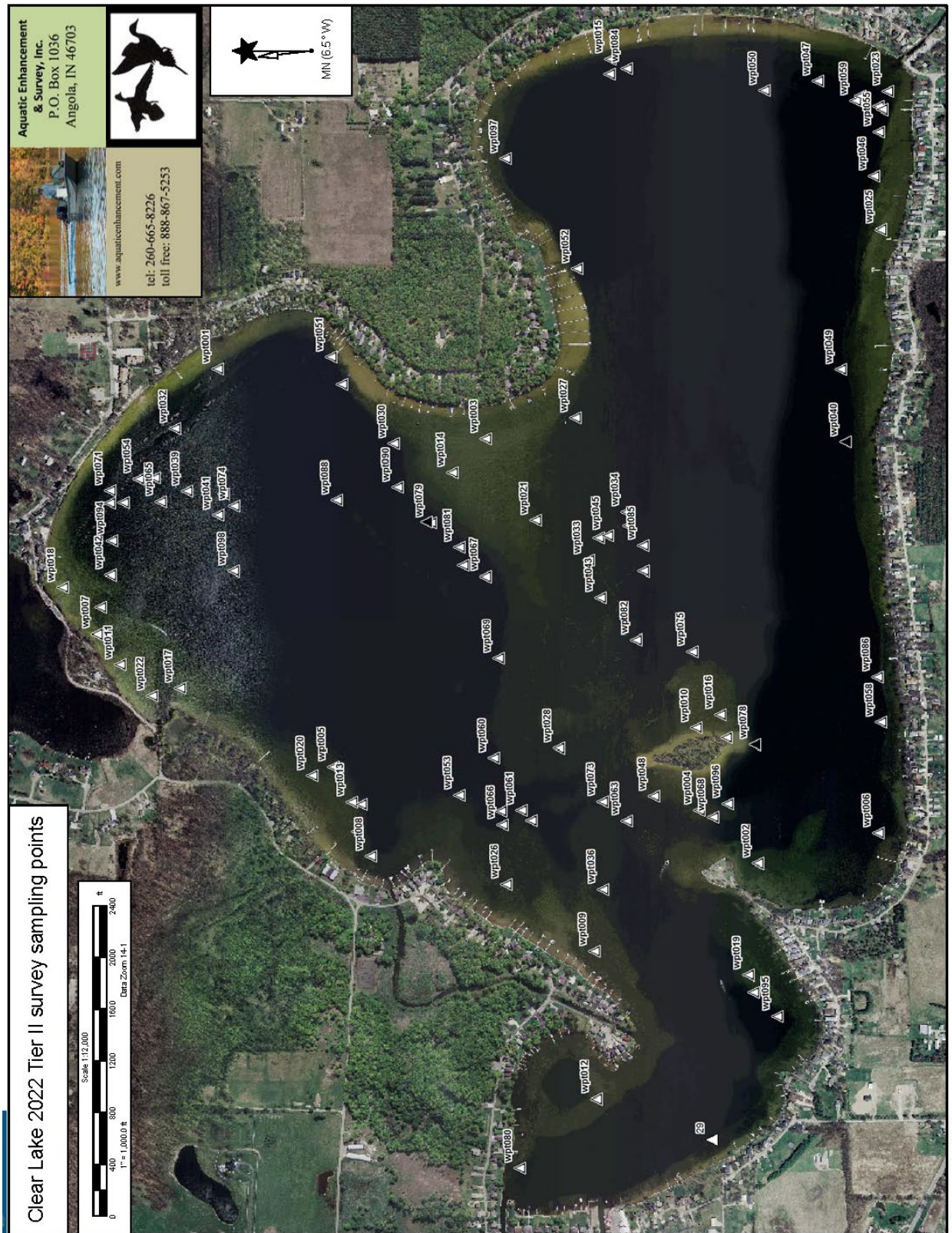


Figure 7 Tier II sampling sites for Clear Lake



Figure 8 Tier II sampling sites for Round Lake

Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 1.59			
Date: 8/26/2022		Sites with plants: 73		SE Mean species/site: 0.13			
Littoral Depth (ft): 23.0		Sites with native plants: 73		Mean native species/site: 1.51			
Littoral Sites: 95		Number of species: 15		SE Mean natives/site: 0.13			
Total Sites: 100		Number of native species: 12		Species diversity: 0.85			
		Maximum species/site: 5		Native species diversity: 0.83			
All Depths		Frequency of	Rake score frequency per species				Plant
Species		Occurrence	0	1	3	5	Dominance
chara		43.0	57.0	14.0	4.0	25.0	30.2
Illinois pondweed		29.0	71.0	19.0	4.0	6.0	12.2
eelgrass/tapegrass		23.0	77.0	12.0	0.0	11.0	13.4
sago pondweed		16.0	84.0	5.0	2.0	9.0	11.2
coontail		15.0	85.0	10.0	4.0	1.0	5.4
slender (common) naiad		12.0	88.0	7.0	2.0	3.0	5.6
CURLY-LEAF PONDWEED		4.0	96.0	4.0	0.0	0.0	0.8
southern naiad		4.0	96.0	2.0	1.0	1.0	2.0
HYBRID WATERMILFOIL		3.0	97.0	1.0	0.0	2.0	2.2
common waterweed		2.0	98.0	1.0	0.0	1.0	1.2
Fries' pondweed		2.0	98.0	2.0	0.0	0.0	0.4
Richardson's pondweed		2.0	98.0	0.0	1.0	1.0	1.6
white-stemmed pondweed		2.0	98.0	1.0	0.0	1.0	1.2
large-leaved pondweed		1.0	99.0	0.0	0.0	1.0	1.0
STARRY STONEWORT		1.0	99.0	0.0	0.0	1.0	1.0

Table 5 Clear Lake Tier II results overall

Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 2.40			
Date: 8/26/2022		Sites with plants: 25		SE Mean species/site: 0.22			
Littoral Depth (ft): 23.0		Sites with native plants: 25		Mean native species/site: 2.32			
Littoral Sites: 25		Number of species: 11		SE Mean natives/site: 0.21			
Total Sites: 25		Number of native species: 9		Species diversity: 0.76			
		Maximum species/site: 5		Native species diversity: 0.75			
Depths: 0 to 5 ft		Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species			0	1	3	5	
chara		88.0	12.0	24.0	8.0	56.0	65.6
Illinois pondweed		60.0	40.0	36.0	12.0	12.0	26.4
slender (common) naiad		44.0	56.0	28.0	8.0	8.0	18.4
eelgrass/tapegrass		12.0	88.0	0.0	0.0	12.0	12.0
sago pondweed		12.0	88.0	0.0	0.0	12.0	12.0
common waterweed		4.0	96.0	0.0	0.0	4.0	4.0
coontail		4.0	96.0	0.0	4.0	0.0	2.4
HYBRID WATERMILFOIL		4.0	96.0	0.0	0.0	4.0	4.0
Richardson's pondweed		4.0	96.0	0.0	0.0	4.0	4.0
southern naiad		4.0	96.0	0.0	0.0	4.0	4.0
STARRY STONEWORT		4.0	96.0	0.0	0.0	4.0	4.0
Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 2.52			
Date: 8/26/2022		Sites with plants: 22		SE Mean species/site: 0.27			
Littoral Depth (ft): 23.0		Sites with native plants: 22		Mean native species/site: 2.43			
Littoral Sites: 23		Number of species: 9		SE Mean natives/site: 0.24			
Total Sites: 23		Number of native species: 8		Species diversity: 0.79			
		Maximum species/site: 5		Native species diversity: 0.78			
Depths: 5 to 10 ft		Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species			0	1	3	5	
chara		65.2	34.8	13.0	4.3	47.8	53.0
eelgrass/tapegrass		65.2	34.8	39.1	0.0	26.1	33.9
Illinois pondweed		52.2	47.8	34.8	4.3	13.0	22.6
sago pondweed		43.5	56.5	8.7	8.7	26.1	33.0
HYBRID WATERMILFOIL		8.7	91.3	4.3	0.0	4.3	5.2
coontail		4.3	95.7	0.0	4.3	0.0	2.6
large-leaved pondweed		4.3	95.7	0.0	0.0	4.3	4.3
slender (common) naiad		4.3	95.7	0.0	0.0	4.3	4.3
southern naiad		4.3	95.7	0.0	4.3	0.0	2.6

Table 6 Clear Lake Tier II results for the 0-5, and 5-10-foot depth zones.

Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 1.18			
Date: 8/26/2022		Sites with plants: 17		SE Mean species/site: 0.20			
Littoral Depth (ft): 23.0		Sites with native plants: 17		Mean native species/site: 1.09			
Littoral Sites: 22		Number of species: 10		SE Mean natives/site: 0.19			
Total Sites: 22		Number of native species: 9		Species diversity: 0.84			
		Maximum species/site: 3		Native species diversity: 0.82			
Depths: 10 to 15 ft		Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species			0	1	3	5	
coontail		36.4	63.6	22.7	9.1	4.5	14.5
eelgrass/tapegrass		18.2	81.8	9.1	0.0	9.1	10.9
sago pondweed		13.6	86.4	13.6	0.0	0.0	2.7
chara		9.1	90.9	9.1	0.0	0.0	1.8
CURLY-LEAF PONDWEED		9.1	90.9	9.1	0.0	0.0	1.8
Illinois pondweed		9.1	90.9	9.1	0.0	0.0	1.8
southern naiad		9.1	90.9	9.1	0.0	0.0	1.8
Fries' pondweed		4.5	95.5	4.5	0.0	0.0	0.9
Richardson's pondweed		4.5	95.5	0.0	4.5	0.0	2.7
white-stemmed pondweed		4.5	95.5	0.0	0.0	4.5	4.5
Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 0.60			
Date: 8/26/2022		Sites with plants: 8		SE Mean species/site: 0.18			
Littoral Depth (ft): 23.0		Sites with native plants: 8		Mean native species/site: 0.50			
Littoral Sites: 20		Number of species: 6		SE Mean natives/site: 0.15			
Total Sites: 20		Number of native species: 5		Species diversity: 0.78			
		Maximum species/site: 2		Native species diversity: 0.72			
Depths: 15 to 20 ft		Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species			0	1	3	5	
coontail		20.0	80.0	20.0	0.0	0.0	4.0
chara		15.0	85.0	15.0	0.0	0.0	3.0
CURLY-LEAF PONDWEED		10.0	90.0	10.0	0.0	0.0	2.0
eelgrass/tapegrass		5.0	95.0	5.0	0.0	0.0	1.0
Fries' pondweed		5.0	95.0	5.0	0.0	0.0	1.0
white-stemmed pondweed		5.0	95.0	5.0	0.0	0.0	1.0
Occurrence and Abundance of Submersed Aquatic Plants in Clear Lake_____.							
County: Steuben		Secchi (ft): 12.3		Mean species/site: 0.30			
Date: 8/26/2022		Sites with plants: 1		SE Mean species/site: 0.30			
Littoral Depth (ft): 23.0		Sites with native plants: 1		Mean native species/site: 0.30			
Littoral Sites: 5		Number of species: 3		SE Mean natives/site: 0.30			
Total Sites: 10		Number of native species: 3		Species diversity: 0.67			
		Maximum species/site: 3		Native species diversity: 0.67			
Depths: 20 to 25 ft		Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species			0	1	3	5	
chara		10.0	90.0	0.0	10.0	0.0	6.0
common waterweed		10.0	90.0	10.0	0.0	0.0	2.0
coontail		10.0	90.0	10.0	0.0	0.0	2.0

Table 7. Clear Lake Tier II results for the 10-15, 15-20, and 20-25-foot depth zones

Survey Period	Spring Surveys		Summer Surveys			
Date	6/11/13	5/25/21	8/22/12	8/6/13	7/19/21	8/26/22
Surveyors	AQRS	AQES	IDNR	AQRS	AQES	AES
Total Sites	100	100	100	100	100	100
Secchi (ft)	9.8	7.6	22.0	12.5	9.4	12.3
Number of Species	15	12	21	17	17	15
Number of Native Species	13	10	20	15	15	12
Species Diversity	0.83	0.84	0.89	0.84	0.87	0.85
Native Species Diversity	0.79	0.79	0.88	0.82	0.86	0.83
Mean Native Species/Site	1.08	0.84	1.80	1.30	1.64	1.51
Sites with plants	66	99	89	57	97	73
Sites with native plants	63	50	87	56	80	73
Max. plant depth	21.3	24.5	25.0	19.4	23.5	23.0
Species Frequency of Occurrence - All Depths 0-25 ft.						
chara	33.3	29.0	34.0	45.0	43.0	43.0
Illinois pondweed	14.0	16.0		21.0	18.0	29.0
eelgrass/tapegrass	3.3		30.0	12.0	18.0	23.0
sago pondweed	2.0	3.0	13.0	15.0	11.0	16.0
coontail	5.0	14.0	35.0	6.0	32.0	15.0
slender (common) naiad	10.0	2.0	18.0	3.0	3.0	12.0
CURLY-LEAF PONDWEED	4.0	21.0	1.0		3.0	4.0
southern naiad						4.0
INVASIVE WATERMILFOIL	9.0	33.0	25.0	9.0	43.0	3.0
Fries' pondweed	7.0				2.0	2.0
Richardson's pondweed			18.0		4.0	2.0
white-stemmed pondweed	1.0	2.0		2.0		2.0
large-leaved pondweed	1.0			2.0		1.0
STARRY STONEWORT						1.0
common bladderwort		12.0	1.0	2.0	9.0	
variable watermilfoil			5.0	1.0		
Canada waterweed	4.0		29.0	3.0	5.0	2.0
flat-stemmed pondweed	3.0	2.0	14.0	2.0	3.0	
nitella sp.	5.0	3.0	10.0	3.0	5.0	
small pondweed	1.0		13.0	1.0	9.0	
variable pondweed			23.3		1.0	
SPINY NAIAD			1.0	1.0		
northern watermilfoil	14.0		31.0	13.0		
water stargrass		1.0	17.0		1.0	

Table 8 Summary of Clear Lake Tier II data 2013-2022, all depths

Survey Period	Spring Surveys		Summer Surveys			
Date	6/11/13	5/25/21	8/22/12	8/6/13	7/19/21	8/26/22
Species Frequency of Occurrence - 0 to 5 ft.						
chara	84.0	56.0	72.0	76.0	72.0	88.0
Illinois pondweed	36.0	36.0		44.0	52.0	60.0
eelgrass/tapegrass	4.0		16.0	8.0	8.0	12.0
sago pondweed			8.0	8.0	4.0	12.0
coontail		4.0	4.0		8.0	4.0
slender (common) naiad			36.0	8.0	4.0	44.0
CURLY-LEAF PONDWEED		8.0				
southern naiad						4.0
INVASIVE WATERMILFOIL	4.0	4.0	4.0	4.0	28.0	4.0
common waterweed						4.0
Fries' pondweed	4.0					
Richardson's pondweed			4.0			4.0
white-stemmed pondweed	4.0					
large-leaved pondweed	4.0					
STARRY STONEWORT						4.0
common bladderwort		8.0		4.0	8.0	
variable watermilfoil			40.0			
Canada waterweed	4.0		8.0		4.0	
flat-stemmed pondweed	4.0		4.0	4.0	4.0	
nitella sp.			8.0	4.0		
small pondweed			4.0			
northern watermilfoil	4.0		12.0	4.0		
water stargrass		4.0	4.0			
Species Frequency of Occurrence - 5 to 10 ft.						
chara	78.3	52.2	56.5	78.3	82.6	65.0
Illinois pondweed	21.7	30.4		17.4	17.4	52.2
eelgrass/tapegrass	4.3		60.9	17.4	43.5	65.2
sago pondweed	4.3	4.3	39.1	39.1	30.4	43.5
coontail	4.3	4.3	26.1		21.7	4.3
slender (common) naiad		4.3	17.4		4.3	4.3
CURLY-LEAF PONDWEED		8.7			4.3	
southern naiad						4.3
INVASIVE WATERMILFOIL	17.4	56.5	39.1	8.7	69.6	8.7
Fries' pondweed					4.3	
Richardson's pondweed			26.1		4.3	
white-stemmed pondweed		4.3				
large-leaved pondweed				8.7		4.3
common bladderwort		26.1		4.3	26.1	
variable watermilfoil			4.3			
Canada waterweed	4.3		39.1		4.3	
flat-stemmed pondweed			17.4		4.3	
nitella sp.		4.3				
small pondweed			21.7	4.3	13.0	
variable pondweed			43.5			
SPINY NAIAD				4.3		
northern watermilfoil	8.7		65.2	21.7		
water stargrass			30.4			

Table 9 Summary of Clear Lake Tier II data 2013-2022, 0-5 ft and 5-10 ft contours

Survey Period	Spring Surveys		Summer Surveys			
Date	6/11/13	5/25/21	8/22/12	8/6/13	7/19/21	8/26/22
Species Frequency of Occurrence - 10 to 15 ft.						
chara	9.1	13.0	4.5	13.6	13.0	9.1
Illinois pondweed		3.7		13.6		9.1
eelgrass/tapegrass	9.1		45.0	13.6	8.7	18.2
sago pondweed	4.5	8.7	4.5	13.6	4.3	13.6
coontail	18.2	30.4	63.6	22.7	56.5	36.4
slender (common) naiad			9.1	4.5	4.3	
CURLY-LEAF PONDWEED	13.6	47.8	4.5		8.7	9.1
southern naiad						9.1
INVASIVE WATERMILFOIL	13.6	34.8	40.9	13.6	52.2	
Fries' pondweed	4.5				4.3	4.5
Richardson's pondweed			31.8		13.0	4.5
white-stemmed pondweed		4.3		4.5		4.5
common bladderwort		13.0	4.5		4.3	
variable watermilfoil			9.1			
Canada waterweed	22.7		50.0	13.6	8.7	
flat-stemmed pondweed		8.7	27.3	4.5		
nitella sp.	9.1	4.3		4.5	4.3	
small pondweed	4.5		18.2		13.0	
variable pondweed			9.1			
northern watermilfoil	22.7		50.0	18.2		
water stargrass			31.8			
Species Frequency of Occurrence - 15 to 20 ft.						
chara	5.0		5.3	20.0	15.8	15.0
Illinois pondweed				15.0	5.3	
eelgrass/tapegrass			5.3	10.0	15.8	5.0
sago pondweed			5.3	5.0	10.5	
coontail		26.3	47.4	5.0	52.6	20.0
slender (common) naiad			5.3			
CURLY-LEAF PONDWEED	5.0	31.6				10.0
INVASIVE WATERMILFOIL	5.0	52.6	26.3	10.0	36.8	
Fries' pondweed	15.0					5.0
Richardson's pondweed			15.8			
white-stemmed pondweed				5.0		5.0
common bladderwort		5.3				
Canada waterweed	5.0		26.3		5.3	
flat-stemmed pondweed			10.5		5.3	
nitella sp.	10.0		21.1	5.0	15.8	
small pondweed			5.3		15.8	
variable pondweed			5.3			
northern watermilfoil	25.0		10.5	15.0		
water stargrass			10.5		5.3	
Species Frequency of Occurrence - 20 to 25 ft.						
chara	10.0			10.0		10.0
eelgrass/tapegrass				10.0	10.0	
coontail			33.3		20.0	10.0
slender (common) naiad		10.0	11.1			
INVASIVE WATERMILFOIL		10.0		10.0	10.0	
variable watermilfoil				10.0	10.0	
Canada waterweed			11.1			10.0
flat-stemmed pondweed	20.0					
nitella sp.	10.0	10.0	44.4		10.0	
small pondweed			11.1			
northern watermilfoil	10.0					

Table 10 Summary of Clear Lake Tier II data 2013-2022, 10-15 ft., 15-20 ft., and 20-25 ft. contours

Occurrence and Abundance of Submersed Aquatic Plants in Round Lake ____.							
County: Steuben		Secchi (ft): 10.2		Mean species/site: 1.30			
Date: 8/29/2022		Sites with plants: 27		SE Mean species/site: 0.17			
Littoral Depth (ft): 16.0		Sites with native plants: 12		Mean native species/site: 0.57			
Littoral Sites: 28		Number of species: 7		SE Mean natives/site: 0.16			
Total Sites: 30		Number of native species: 6		Species diversity: 0.63			
		Maximum species/site: 4		Native species diversity: 0.74			
All Depths	Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
STARRY STONEWORT		73.3	26.7	10.0	3.3	60.0	64.0
Chara		23.3	76.7	6.7	0.0	16.7	18.0
Illinois pondweed		13.3	86.7	6.7	3.3	3.3	6.7
large-leaved pondweed		6.7	93.3	0.0	0.0	6.7	6.7
sago pondweed		6.7	93.3	3.3	3.3	0.0	2.7
Common bladderwort		3.3	96.7	3.3	0.0	0.0	0.7
tapegrass/eelgrass		3.3	96.7	3.3	0.0	0.0	0.7

Table 11 Round Lake Tier II results overall

Occurrence and Abundance of Submersed Aquatic Plants in Round Lake ____.							
County: Steuben		Secchi (ft): 10.2		Mean species/site: 2.00			
Date: 8/29/2022		Sites with plants: 10		SE Mean species/site: 0.37			
Littoral Depth (ft): 16.0		Sites with native plants: 7		Mean native species/site: 1.20			
Littoral Sites: 10		Number of species: 7		SE Mean natives/site: 0.36			
Total Sites: 10		Number of native species: 6		Species diversity: 0.76			
		Maximum species/site: 4		Native species diversity: 0.78			
Depths: 0 to 5 ft	Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
STARRY STONEWORT		80.0	20.0	30.0	10.0	40.0	52.0
Illinois pondweed		40.0	60.0	20.0	10.0	10.0	20.0
Chara		30.0	70.0	0.0	0.0	30.0	30.0
sago pondweed		20.0	80.0	10.0	10.0	0.0	8.0
Common bladderwort		10.0	90.0	10.0	0.0	0.0	2.0
large-leaved pondweed		10.0	90.0	0.0	0.0	10.0	10.0
tapegrass/eelgrass		10.0	90.0	10.0	0.0	0.0	2.0
Occurrence and Abundance of Submersed Aquatic Plants in Round Lake ____.							
County: Steuben		Secchi (ft): 10.2		Mean species/site: 1.10			
Date: 8/29/2022		Sites with plants: 9		SE Mean species/site: 0.18			
Littoral Depth (ft): 16.0		Sites with native plants: 2		Mean native species/site: 0.20			
Littoral Sites: 10		Number of species: 3		SE Mean natives/site: 0.13			
Total Sites: 10		Number of native species: 2		Species diversity: 0.31			
		Maximum species/site: 2		Native species diversity: 0.50			
Depths: 5 to 10 ft	Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
STARRY STONEWORT		90.0	10.0	0.0	0.0	90.0	90.0
Chara		10.0	90.0	0.0	0.0	10.0	10.0
large-leaved pondweed		10.0	90.0	0.0	0.0	10.0	10.0
Occurrence and Abundance of Submersed Aquatic Plants in Round Lake ____.							
County: Steuben		Secchi (ft): 10.2		Mean species/site: 1.00			
Date: 8/29/2022		Sites with plants: 7		SE Mean species/site: 0.00			
Littoral Depth (ft): 16.0		Sites with native plants: 2		Mean native species/site: 0.29			
Littoral Sites: 7		Number of species: 2		SE Mean natives/site: 0.18			
Total Sites: 7		Number of native species: 1		Species diversity: 0.41			
		Maximum species/site: 1		Native species diversity: 0.00			
Depths: 10 to 15 ft	Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
STARRY STONEWORT		71.4	28.6	0.0	0.0	71.4	71.4
Chara		28.6	71.4	14.3	0.0	14.3	17.1
Occurrence and Abundance of Submersed Aquatic Plants in Round Lake ____.							
County: Steuben		Secchi (ft): 10.2		Mean species/site: 0.33			
Date: 8/29/2022		Sites with plants: 1		SE Mean species/site: 0.33			
Littoral Depth (ft): 16.0		Sites with native plants: 1		Mean native species/site: 0.33			
Littoral Sites: 1		Number of species: 1		SE Mean natives/site: 0.33			
Total Sites: 3		Number of native species: 1		Species diversity: 0.00			
		Maximum species/site: 1		Native species diversity: 0.00			
Depths: 15 to 20 ft	Species	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
			0	1	3	5	
Chara		33.3	66.7	33.3	0.0	0.0	6.7

Table 12 Round Lake Tier II results for various depth zones

Survey Period	Spring Surveys		Summer Surveys								
Date	AQRS	AQES	IDNR	AQRS	IDNR	IDNR	IDNR	IDNR	AQES	IDNR	AES
Surveyors	6/11/13	5/25/21	8/22/12	8/6/13	8/10/16	9/21/17	8/29/19	8/25/20	7/19/21	8/25/21	8/29/22
Total Sites	30	30	30	30	30	30	30	30	30	30	30
Secchi (ft)	9.2	9.2	nd	9.8	11.5	13	9.0	9.5	6.0	nd	10.2
Number of Species	13	9	18	13	16	11	14	12	8	11	7
Number of Native Species	10	6	15	10	13	8	11	9	5	8	6
Species Diversity	0.87	0.82	0.90	0.87	0.89	0.87	0.82	0.72	0.79	0.80	0.63
Native Species Diversity	0.84	0.80	0.89	0.85	0.88	0.79	0.88	0.86	0.77	0.73	0.74
Mean Native Species/Site	1.70	0.60	2.80	1.63	2.13	1.33	0.90	0.67	0.57	1.20	0.57
Sites with plants	26	27	28	20	29	30	28	27	23	27	27
Sites with native plants	25	12	nd	20	28	21	16	13	12	21	12
Max. plant depth	20.2	19.1	nd	21.0	18.0	18.5	15.5	14.5	18.5	15.0	16.0
Species Frequency of Occurrence - All Depths 0-25 ft.											
common bladderwort	43.3	13.3	16.7	40.0	26.7	30.0		6.7		13.3	3.3
chara	33.3	16.7	50.0	30.0	53.3	46.7	3.3	6.7	16.7	23.3	23.3
coontail	26.7	10.0	26.7	13.3			3.3				
variable watermilfoil	3.3	10.0		6.7	10.0		10.0	3.3	6.7	6.7	
STARRY STONEWORT		43.3			10.0	23.3	26.7	80.0	46.7	73.3	73.3
common waterweed	10.0		6.7	3.3	3.3						
CURLY-LEAF PONDWEED	23.3	6.7	3.3	3.3					3.3		
INVASIVE WATERMILFOIL	6.7	16.7	13.3	3.3		33.3	20.0	10.0	20.0	26.7	
flat-stemmed pondweed			3.3		3.3		3.3				
humped bladderwort							13.3	16.7	6.7	53.3	
Illinois pondweed	23.3		3.3	20.0					16.7		13.3
nitella sp.	6.7	6.7		10.0	23.3	6.7	16.7	10.0	10.0	3.3	
slender naiad	10.0		60.0	23.3	16.7		3.3				
small pondweed		3.3									
American pondweed					20.0						
purple bladderwort					16.7		10.0				
variable pondweed			23.3		13.3	20.0	10.0	10.0		13.3	
SPINY NAIAD	3.3		40.0	3.3	10.0	23.3		3.3		3.3	
northern watermilfoil					10.0	3.3					
eelgrass/tapegrass					3.3	6.7	3.3				3.3
southern naiad	3.3				6.7	6.7				3.3	
large-leaved pondweed	6.7		23.3	6.7	6.7	13.3	10.0	3.3		3.3	16.7
Richardson's pondweed			3.3		3.3						
sago pondweed			3.3								6.7
whorled watermilfoil								6.7			
water bulrush								3.3			

Table 13 Summary of Round Lake Tier II data 2012-2022, all depths

Survey Period	Spring Surveys		Summer Surveys								
Date	AQRS	AQES	IDNR	AQRS	IDNR	IDNR	IDNR	IDNR	AQES	IDNR	AES
Surveyors	6/11/13	5/25/21	8/22/12	8/6/13	8/10/16	9/21/17	8/29/19	8/25/20	7/19/21	8/25/21	8/29/22
Species Frequency of Occurrence - 0 to 5 ft.											
common bladderwort	60.0	40.0	20.0	60.0	20.0	10.0		10.0		10.0	10.0
chara	60.0	30.0	80.0	50.0	80.0	80.0	10.0	20.0	40.0	50.0	30.0
coontail	20.0	20.0	30.0	20.0							
variable watermilfoil		20.0		20.0	30.0		20.0	10.0	20.0		
STARRY STONEWORT		10.0			10.0	30.0	80.0	80.0	20.0	70.0	80.0
common waterweed					10.0						
INVASIVE WATERMILFOIL		20.0	10.0			20.0	30.0	10.0	30.0	20.0	
flat-stemmed pondweed			10.0		10.0		10.0				
humped bladderwort							30.0	20.0	10.0	60.0	
Illinois pondweed				20.0					20.0		40.0
nitella sp.								10.0			
slender (common) naiad	10.0		40.0	40.0	20.0		10.0				
American pondweed					30.0						
purple bladderwort			30.0		30.0						
variable pondweed			40.0	variable	20.0	30.0	30.0	30.0		20.0	
SPINY NAIAD			30.0			20.0	20.0				
eelgrass/tapegrass			10.0		10.0	10.0					10.0
southern naiad						20.0					
large-leaved pondweed	10.0		20.0			10.0	10.0				10.0
Richardson's pondweed			10.0		10.0						
sago pondweed			10.0								20.0
water bulrush							30.0	10.0			
Species Frequency of Occurrence - 5 to 10 ft.											
common bladderwort	70.0		30.0	60.0	50.0	50.0				30.0	
chara	40.0	22.2	50.0	40.0	70.0	50.0				20.0	10.0
coontail	20.0		20.0				10.0				
variable watermilfoil	10.0	11.1					10.0			20.0	
STARRY STONEWORT		77.8			10.0	20.0	70.0	100.0	90.0	90.0	90.0
common waterweed	10.0		10.0	10.0							
CURLY-LEAF PONDWEED	20.0	11.1	10.0						10.0		
INVASIVE WATERMILFOIL	20.0	22.2	10.0	10.0		50.0	30.0	10.0	20.0	50.0	
humped bladderwort								20.0		80.0	
Illinois pondweed	50.0		10.0	40.0					30.0		
nitella sp.	10.0			10.0			20.0	10.0			
slender (common) naiad	20.0		60.0	20.0	20.0						
American pondweed					30.0						
purple bladderwort			10.0		20.0						
variable pondweed			30.0		20.0	30.0				20.0	
SPINY NAIAD	10.0		50.0	10.0	30.0	30.0	10.0	10.0		10.0	
northern watermilfoil					20.0	10.0					
eelgrass/tapegrass	10.0		40.0	20.0	10.0	10.0					
southern naiad					10.0					10.0	
large-leaved pondweed	10.0		50.0	20.0		20.0	20.0	10.0		10.0	10.0
whorled watermilfoil								20.0			

Table 14 Summary of Round Lake Tier II data 2012-2022, 0-5 and 5-10 ft. contours

Survey Period	Spring Surveys		Summer Surveys								
Date	AQRS	AQES	IDNR	AQRS	IDNR	IDNR	IDNR	IDNR	AQES	IDNR	AES
Surveyors	6/11/13	5/25/21	8/22/12	8/6/13	8/10/16	9/21/17	8/29/19	8/25/20	7/19/21	8/25/21	8/29/22
Species Frequency of Occurrence - 10 to 15 ft.											
common bladderwort					14.3	42.9		14.3			
chara			28.6		14.3	14.3	14.3				28.6
coontail	60.0	14.3	28.6	40.0							
variable watermilfoil			28.6								
STARRY STONEWORT		60.0			14.3	28.6	85.7	85.7	40.0	85.7	71.4
common waterweed	20.0										
CURLY-LEAF PONDWEED	80.0	20.0		20.0							
INVASIVE WATERMILFOIL		20.0				28.6		14.3		14.3	
humped bladderwort							14.3	14.3		28.6	
Illinois pondweed											
nitella sp.	20.0	20.0		40.0	57.1	14.3	28.6	14.3	40.0	14.3	
slender (common) naiad			28.6	20.0	14.3						
small pondweed		20.0									
SPINY NAIAD			57.1			28.6					
northern watermilfoil					14.3						
eelgrass/tapegrass							14.3				
southern naiad			14.3		14.3						
Species Frequency of Occurrence - 15 to 20 ft.											
chara									33.3		33.3
coontail	33.3	33.3	33.3								
STARRY STONEWORT		33.3					33.3		33.3		
common waterweed	33.3		33.3								
CURLY-LEAF PONDWEED	33.3										
INVASIVE WATERMILFOIL									33.3		
humped bladderwort									33.3		
nitella sp.	33.3	33.3	66.7	33.3	100.0	33.3	33.3		33.3		
large-leaved pondweed					33.3						

Table 15 Summary of Round Lake Tier II data 2012-2022, 10-15 and 15-20 ft. contours



Figure 9 Locations of sampling sites in the 8/26/22 Clear Lake Tier II plant survey where invasive plants occurred. The green star indicates the location of starry stonewort occurrence, red “x’s” indicate the occurrence of invasive watermilfoil, and yellow squares indicate the occurrence of curly-leaf pondweed.



Figure 10 Locations of sampling sites in the 8/29/22 Round Lake Tier II plant survey where invasive plants occurred. The green stars indicate the locations of starry stonewort occurrence. No other invasive plant species occurred in the survey.

6. Discussion

The 2021 AVMP set forth a management objective for Clear Lake of maintaining an occurrence for invasive watermilfoil of 20% or less in a summer Tier II plant survey and a coverage of less than 40 acres. This was met in 2022. The invasive watermilfoil occurrence was only 3% and the coverage noted on June 30 was only .9 acres. On October 5 the acreage was still only 21.7. The AVMP also set forth a Clear Lake management objective of maintaining an occurrence for curly-leaf pondweed of 10% or less in a summer Tier II plant survey and a coverage of less than 10 acres. This was also met. Curly-leaf occurrence was only 4% with no significant coverage noted. A third objective was set for Clear Lake of maintaining a summer Tier II occurrence of at least 12 native species. This was also met in 2022 with 12 native species occurring.

For Round Lake the AVMP set a management objective of maintaining a 10% or less occurrence of invasive watermilfoil and a coverage of less than 2 acres. This was met. No invasive watermilfoil occurred in the survey and no coverage was present in the post-treatment period in 2022. For Round Lake the curly-leaf pondweed objective is to maintain a summer Tier II occurrence of 5% or less and a coverage of 1 acre or less. These were both met. Curly-leaf pondweed did not occur in the survey and no coverage was noted in 2022. The AVMP diversity objective for Round Lake is to maintain an occurrence of 10 native species in a summer Tier II survey. This was not met in 2022. The number of native species occurring was only 6. Since 2012 the average number of native species in summer Tier II plant surveys at Round Lake is only 9 with a standard deviation of 3. We find that a reasonable objective to expect to maintain each year taking natural variation into consideration is the average minus one standard deviation. This would be 6 native species. This may be especially true for Round Lake where the data indicates diversity is dropping in response to colonization by starry stonewort, which is typical for colonized northern Indiana lakes. Unless a significant native diversity increase is noted in 2023, we advise that this objective be revised to 6 native species.

In 2022 the Tier II data indicates dramatic treatment results for invasive watermilfoil on both lakes with diversity remaining strong and in alignment with past surveys on Clear Lake. On Round Lake affects to certain non-target native species were expected as a result of the treatment for invasive watermilfoil, but the native plant community remained reasonably close in diversity to the figures from the previous season. Judging by the Tier II data, starry stonewort colonization at Round Lake may have stabilized. The peak Tier II occurrence was 80% in 2020 with it being slightly lower than that in the two seasons since. If that's the case it may be possible to maintain the native diversity noted in the last two seasons at Round Lake. It should be noted that starry stonewort appeared in the Tier II survey at Clear Lake for the first time in 2022. It occurred at a single sampling site. While it's been known to have been present prior to 2022 it was not abundant enough to have shown up in past Tier II surveys. At this point the trajectory of this colonization is unknown, but increased starry stonewort growth at Clear Lake is inevitable. The rate of colonization and any associated decline in native diversity that might result is difficult to predict as they can vary greatly from lake to lake. Discussing and planning for possible control options will be a recommendation of this update.

7. Action Plan

Recommended management actions for Clear and Round Lakes will focus primarily around the management of invasive watermilfoil since it's a source of significant impairment and prospects for its long-term management are feasible. Due to management efforts in 2022 Clear and Round Lakes are expected to show significantly less invasive watermilfoil colonization in 2023. It's likely to be quite feasible to continue to reduce colonization further in 2023 and thereafter maintain a relatively small program of annual management to keep growth in check. Starry

stonewort appears to have already caused significant ecological impairment to Round Lake and recreational impairment in certain near-shore areas. Unfortunately, no efficacious long-term controls are currently available. For starry stonewort it's recommended that the CLTLC keep the IDNR aquatic invasive species coordinator informed of the patterns of colonization of this invader and any areas of recreational impairment so they can direct their already-ongoing starry stonewort treatment program accordingly. We are not recommending that the CLTLC devote resources toward the treatment of starry stonewort at this time since, ultimately, we have found that this invasive plant often colonizes lakes at its own pace despite treatment efforts. IDNR has been funding the treatment of starry stonewort at Round Lake for several seasons and also arranged for a small treatment of starry stonewort at Clear Lake in 2022. The information in this update will be provided to the IDNR aquatic invasive species coordinator to help with ongoing management efforts. With 16.7 acres of curly-leaf pondweed coverage noted on Clear Lake in 2021, less than .5 acres on Round Lake in 2021, and no significant coverage on either lake noted in 2022, curly-leaf pondweed appears to be a relatively minor source of impairment at this time. We are recommending tracking it's annual growth and initiating treatment only if it becomes significantly more prominent or emerges as a possible source of impairment in 2023. A treatment option is provided, but we are recommending it as a lower priority than the management of invasive watermilfoil. Nevertheless, with invasive watermilfoil in decline due to treatment, it's possible that curly-leaf pondweed will utilize newly available resources to become more of a problem in 2022 or subsequent seasons.

In 2023 the CTLIC is advised to treat up to 52 acres of invasive watermilfoil on Clear Lake using ProcellaCOR herbicide at the rate of 2-5 PDU per acre-foot. On Round Lake the CTLIC is advised to treat up to 2 acres of invasive watermilfoil growth using ProcellaCOR herbicide at the rate of 2-5 PDU per acre-foot. Since exact carryover control from the 2022 treatment season are not known, the actual acreage and pattern of colonization to be treated will need to be determined in the spring of 2023 through GPS marking and mapping prior to treatment.

An update of the Clear and Round Lakes AVMP including a tier II survey is also recommended.

GLRI funding and IDNR administered starry stonewort treatments are likely to be available again in 2023 for assistance in funding treatments to reduce the impact of this invader on Both Lakes. It will be important to maintain contact with the IDNR aquatic invasive species coordinator about ongoing assistance in this regard, conveying up-to-date information about abundance and impairment noted by lake users.

Cost Estimates and Timeline

Month	Activity	Est. cost per ac.	Max. Cost Estimate
April through Aug.	Map invasive plant growth	-	900.00
May/June	Treat up to 54 acres of invasive watermilfoil growth on Clear and Round Lakes using ProcellaCOR herbicide at the rate of 2-5 PDU/acre-foot. 4-7 ft avg depths. Estimate based on 6 ft. avg. depth, 5 PDU/ac.-ft.	1338.00	72,252.00
April/May	Treat up to 18 acres of curly-leaf pondweed on both lakes, diquat 1.5 gal./ac. (low priority)	321.00	5,778.00
April through Oct.	Submit treatment reports to IDNR		200.00
July	Tier II Survey		1,800.00
As arranged	Public Meeting		400.00
November	Plan Update Document Due including permit app.		2,618.00
	Max. Total		\$83,948.00

Table 16 Timeline and maximum cost estimates for 2023

8. Community Involvement.

Aquatic Enhancement & Survey, Inc. will be leading a CLTLC hosted meeting at the Clear Lake Town Hall 111 Gecowets Drive, Fremont, Indiana to discuss ongoing plant management activities and collect feedback from lake residents and users. Online ZOOM access will also be available. A survey will be presented to attendees with survey results presented in the final draft of this update document. The CLTLC is encouraged to continue their ongoing community updates on the aquatic vegetation management being done on the lakes in their newsletters, on their website, in the eblasts, and through other outreach resources.

Literature Cited

Tier II Aquatic Vegetation Survey Protocol. 2018. Indiana Department of Natural Resources. Division of Fish and Wildlife. 402 W. Washington St. Rm W-273. Indianapolis, IN 46204.

AES, LLC. 2022. Clear and Round Lakes, Steuben County 2021 Aquatic Vegetation Management Five-Year Plan. Aquatic Ecosystem Services, LLC. 155 Coleman Street, Porter, Indiana 46304.

Appendix A
Tier II Vegetation Survey Field Data Sheets

POTFRI?

76.5°

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 1 of 4

WATERBODY NAME: Clear Lake		DATE: 8/26/22	
COUNTY: Steuben		SECCHI DEPTH (FT): 12' 4"	
SITE ID:		MAX PLANT DEPTH (FT):	
SURVEYING ORGANIZATION: AES Inc.		WEATHER:	
CREW LEADER: JDH		COMMENTS (Include voucher codes - V1, V2...): V1-#83	
RECORDER: JAC		NITOB = SSW	
CONTACT INFO: 260-668-5062		Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.	

Point #	Depth	CH	NITOB	MYRHET	VALAME	UTRMAC	Species Codes:										HETDUB	STUPEC
							POTILL	NAJMAR	NAJFLE	POTRIC	ELOCAN	CERDEM	MYRSPH	POTZOS				
1	1.5	5					1		3									
2	4	5					1		1									
3	3.5	3					1											
4	4.5	1																
5	5	5							1									
6	4				5					5	5	3				5		
7	3	5					1		1									
8	4.5		5		5										5	5		
9	4.5	5																
10	3.5	5					5		5									
11	3	3																
12	5	1																
13	5	5							1									
14	3.5	5					3											
15	5	1					1		1									
16	4	5					3		1									
17	4	5					3											
18	2	1																
19	5	5					1		1									
20	4	1					1											
21	4	5					5											
22	3.5	5					1		5									
23	5				5		5									5		
24	2.5	5					1		3									
25	3	1																
26	3.5	5			1		1											
27	5.5	5			1											5		
28	6.5	5			1											3		
29	5.5				5		1									1	5	
30	6.5				5													
31	5.5	5			1		1											
32	8	5																
33	5.5				5		1										5	

Other plant species observed at lake:

WPT 89, 78, 40
all at one location
and are showing on island. 11.11

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 2 of 4

WATERBODY NAME: Clear Lake		DATE: 8/26/22														
COUNTY: Steuben		SECCHI DEPTH (FT):														
SITE ID:		MAX PLANT DEPTH (FT):														
SURVEYING ORGANIZATION: AES Inc.		WEATHER:														
CREW LEADER: IDH		COMMENTS (Include voucher codes - V1, V2...): V2 # 56														
RECORDER: JAL		NITOB = SSW V3 # 51														
CONTACT INFO: 260-668-5062		Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.														
Species Codes:																
Point #	Depth	CH	NITOB	MYRHET	VALAME	UTRMAC	POTILL	NAJMAR	NAJFLE	POTRIC	ELOCAN	CERDEM	MYRSPH	POTZOS	HETDUB	STUPEC
34	6.5	3			1											
35	9				1		1									
36	6	1			1		1						5			
37	6				5											
38	6.5	5														
39	7	5					1									
40	7				1		5									
41	9	5										3				
42	6.5	5														
43	5.5	5			5		5						1			
44	6	1			1		5		5							
45	5.5				5		1									
46	5.5	1					5									
47	9															
48	6	5					3									
49	13.5															
50	10.5				5											
51	13.5															
52	14.5				5				3			1				
53	13.5															
54	15.5	1										1				
55	13				1							5				
56	11				1		1									
57	13															
58	15															
59	14.5															
60	17															
61	13.5															
62	12.5											1				
63	12.5											3				
64	14.5											1				
65	13															
66	12.5															

Other plant species observed at lake:

Submersed Aquatic Vegetation Survey (Tier II) Datasheet

Page 3 of 4

WATERBODY NAME: Clear Lake										DATE: 8/26/22									
COUNTY: Steuben										SECCHI DEPTH (FT):									
SITE ID:										MAX PLANT DEPTH (FT):									
SURVEYING ORGANIZATION: AES Inc.										WEATHER:									
CREW LEADER:										COMMENTS (Include voucher codes - V1, V2...):									
RECORDER:										NITOB = SSW									
CONTACT INFO: 260-668-5062										Rake score (1, 3, 5). 9 = algae, emergent or species observed but not sampled.									
Species Codes:																			
Point #	Depth	CH	NITOB	MYRHET	VALAME	UTRMAC	POTILL	NAJMAR	NAJFLE	POTRIC	ELOCAN	CERDEM	MYRSPUHB	POTZOS	HETDUB	STUPEC			
67	13.5																		
68	10.5	1					1												
69	12.5											3							
70	10.5	1																	
71	10	1										1							
72	16.5																		
73	17.5																		
74	17.5																		
75	17.5																		
76	19.5																		
77	20																		
78	16																		
79	16																		
80	19.5																		
81	15.5				1														
82	18.5	1																	
83	18.5																		
84	17.5																		
85	11.5											1							
86	15.5																		
87	16																		
88	16																		
89	19.9																		
90	18.5											1							
91	24.5																		
92	23																		
93	23																		
94	24																		
95	21																		
96	23.5																		
97	21.5																		
98	23	3									1	1							
99	24.5																		

Other plant species observed at lake:

Page 4 of 4FA

Depth	Ch	SSW	For ill	Pat amp	Sto rec	Var one	Att mod
1 3.5		5					
2 6		5					
3 5		1					
4 12.5		5					
5 20							
6 6		5					
7 5		5					
8 9 9							
9 15		1					
10 4 9		5	1				
11 5.5		5	5				
12 2.5		5	1				
13 10.5	9	5					
14 6.5		5					
15 2.5				3			
16 16		1					
17 7		5					
18 12		5					
19 1.5	9	5	5				
20 6	9	5	5				
21 3	9	3	1		1	1	
22 14		5					
23 19							
24 13		5					
25 3	9	3	1				
26 9.5		5					
27 7		5					
28 3.5		5	1	5	5		
29 8		5					
30 13		5					

Secchi - 10' 2" water temp - 77.5

Round Lake
8/29/22
700 Clear

Appendix B
Tier II Survey Waypoint Coordinates for Clear Lake

1	41.744490,-84.833920	41	41.744480,-84.838070	81	41.739370,-84.838990
2	41.733050,-84.847960	42	41.746750,-84.839770	82	41.735630,-84.841620
3	41.738820,-84.835920	43	41.736390,-84.840410	83	41.739290,-84.839510
4	41.734290,-84.846460	44	41.746960,-84.840680	84	41.735830,-84.825420
5	41.742040,-84.845220	45	41.736230,-84.838660	85	41.735480,-84.838940
6	41.730500,-84.847110	46	41.730590,-84.828470	86	41.730520,-84.842680
7	41.747040,-84.841470	47	41.731780,-84.825770	87	41.735470,-84.839670
8	41.741250,-84.847770	48	41.735250,-84.846060	88	41.741970,-84.837640
9	41.736510,-84.850460	49	41.731300,-84.833940	89	41.740070,-84.838270
10	41.734360,-84.844120	50	41.732910,-84.826040	90	41.740680,-84.837280
11	41.746550,-84.842320	51	41.742090,-84.833580	91	41.738490,-84.846490
12	41.736470,-84.854650	52	41.736880,-84.831080	92	41.746770,-84.837730
13	41.741650,-84.846230	53	41.739370,-84.846030	93	41.733140,-84.851610
14	41.739520,-84.836860	54	41.746160,-84.837050	94	41.746730,-84.838810
15	41.736180,-84.825150	55	41.730490,-84.827200	95	41.732640,-84.852300
16	41.733850,-84.843750	56	41.736190,-84.825580	96	41.733690,-84.846280
17	41.745280,-84.843000	57	41.741860,-84.834360	97	41.738400,-84.827960
18	41.747770,-84.840120	58	41.730450,-84.843960	98	41.744150,-84.839670
19	41.733250,-84.851140	59	41.730990,-84.826340	99	41.730420,-84.826580
20	41.742490,-84.845470	60	41.738640,-84.844970	100	41.746480,-84.837720
21	41.737760,-84.838220	61	41.738060,-84.846460		
22	41.745880,-84.843220	62	41.737850,-84.846750		
23	41.730300,-84.826070	63	41.735830,-84.846770		
24	41.733720,-84.844400	64	41.733850,-84.843750		
25	41.730450,-84.829980	65	41.745690,-84.837700		
26	41.738380,-84.848550	66	41.738460,-84.846880		
27	41.736920,-84.835320	67	41.738820,-84.839820		
28	41.737260,-84.844700	68	41.734000,-84.846650		
29	41.734024,-84.855786	69	41.738540,-84.842140		
30	41.740760,-84.836060	70	41.745820,-84.837010		
31	41.741530,-84.847070	71	41.746760,-84.837380		
32	41.745390,-84.835620	72	41.741450,-84.846290		
33	41.736630,-84.839360	73	41.736340,-84.846210		
34	41.735830,-84.837990	74	41.744140,-84.837820		
35	41.730500,-84.826490	75	41.734440,-84.841950		
36	41.736330,-84.848700	76	41.744360,-84.837480		
37	41.736420,-84.838720	77	41.730890,-84.826200		
38	41.735790,-84.838380	78	41.733120,-84.844600		
39	41.745140,-84.837390	79	41.739980,-84.838290		
40	41.731200,-84.836000	80	41.738090,-84.856610		

Appendix C
Tier II Survey Waypoint Coordinates for Round Lake

1	41.748070,-84.840920
2	41.748470,-84.841260
3	41.748030,-84.841770
4	41.748370,-84.841720
5	41.748970,-84.841980
6	41.747930,-84.842840
7	41.747450,-84.843240
8	41.747300,-84.844120
9	41.747690,-84.843950
10	41.746790,-84.844080
11	41.747480,-84.844480
12	41.747850,-84.844570
13	41.748340,-84.843970
14	41.749060,-84.843890
15	41.749790,-84.844390
16	41.749630,-84.843520
17	41.749950,-84.843350
18	41.750110,-84.842710
19	41.750350,-84.842770
20	41.750160,-84.842410
21	41.750380,-84.841320
22	41.749790,-84.841230
23	41.749550,-84.840900
24	41.749520,-84.840290
25	41.750120,-84.839940
26	41.749710,-84.840680
27	41.749370,-84.839670
28	41.748880,-84.839450
29	41.748680,-84.840250
30	41.748660,-84.840560

Appendix D
Common and Scientific Names of Plants Noted in Clear and Round Lakes Plant Surveys

Clear Lake	
Common Name	Scientific Name
chara	<i>Chara</i> sp.
nitella	<i>Nitella</i> sp.
coontail	<i>Ceratophyllum demersum</i>
large-leaved pondweed	<i>Potamogeton amplifolius</i>
clasping leaf pondweed	<i>Potamogeton perfoliatus</i>
variable pondweed	<i>Potamogeton gramineus</i>
small pondweed	<i>Potamogeton pusillus</i>
white-stemmed pondweed	<i>Potamogeton praelongus</i>
Canada waterweed	<i>Elodea Canadensis</i>
Fries' pondweed	<i>Potamogeton friesii</i>
northern watermilfoil	<i>Myriophyllum sibiricum</i>
variable watermilfoil	<i>Myriophyllum heterophyllum</i>
whorled watermilfoil	<i>Myriophyllum verticillatum</i>
SPINY NAIAD	<i>NAJAS MARINA</i>
common bladderwort	<i>Utricularia macrorhiza</i>
flat-stemmed pondweed	<i>Potamogeton zosteriformis</i>
leafy pondweed	<i>Potamogeton foliosus</i>
Illinois pondweed	<i>Potamogeton Illinoensis</i>
CURLY-LEAF PONDWEED	<i>POTAMOGETON CRISPUS</i>
EURASIAN WATERMILFOIL	<i>MYRIOPHYLLUM SPICATUM</i>
HYBRID WATERMILFOIL	<i>MYRIOPHYLLUM XSPICATUM</i>
sago pondweed	<i>Stuckenia pectinata</i>
slender (common) naiad	<i>Najas flexilis</i>
American (longleaf) pondweed	<i>Potamogeton nodosus</i>
southern naiad	<i>Najas guadalupensis</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
purple bladderwort	<i>Utricularia purpurea</i>
humped bladderwort	<i>Utricularia gibba</i>
STARRY STONEWORT	<i>NITELLOPSIS OBTUSA</i>
wild celery or eel grass	<i>Vallisneria americana</i>
water stargrass	<i>Heteranthera dubia</i>
*Note, capitalized species are non-native	

Round Lake	
Common Name	Scientific Name
chara	<i>Chara</i> sp.
nitella	<i>Nitella</i> sp.
coontail	<i>Ceratophyllum demersum</i>
large-leaved pondweed	<i>Potamogeton amplifolius</i>
clasping leaf pondweed	<i>Potamogeton perfoliatus</i>
variable pondweed	<i>Potamogeton gramineus</i>
small pondweed	<i>Potamogeton pusillus</i>
Canada waterweed	<i>Elodea Canadensis</i>
northern watermilfoil	<i>Myriophyllum sibiricum</i>
variable watermilfoil	<i>Myriophyllum heterophyllum</i>
whorled watermilfoil	<i>Myriophyllum verticillatum</i>
SPINY NAIAD	<i>NAJAS MARINA</i>
common bladderwort	<i>Utricularia macrorhiza</i>
flat-stemmed pondweed	<i>Potamogeton zosteriformis</i>
Illinois pondweed	<i>Potamogeton Illinoensis</i>
CURLY-LEAF PONDWEED	<i>POTAMOGETON CRISPUS</i>
EURASIAN WATERMILFOIL	<i>MYRIOPHYLLUM SPICATUM</i>
HYBRID WATERMILFOIL	<i>MYRIOPHYLLUM XSPICATUM</i>
sago pondweed	<i>Stuckenia pectinata</i>
slender (common) naiad	<i>Najas flexilis</i>
American (longleaf) pondweed	<i>Potamogeton nodosus</i>
southern naiad	<i>Najas guadalupensis</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
purple bladderwort	<i>Utricularia purpurea</i>
humped bladderwort	<i>Utricularia gibba</i>
STARRY STONEWORT	<i>NITELLOPSIS OBTUSA</i>
wild celery or eel grass	<i>Vallisneria americana</i>
water stargrass	<i>Heteranthera dubia</i>
Water bulrush	<i>Schoenoplectus subterminalis</i>
*Note, capitalized species are non-native	