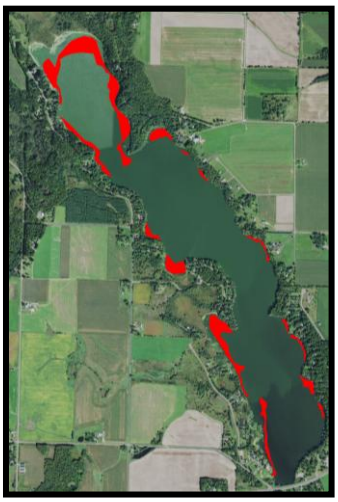
Curly-leaf Pondweed (*Potamogeton crispus*) Bed Mapping Survey
Upper Turtle Lake - WBIC: 2079800
Barron County, Wisconsin



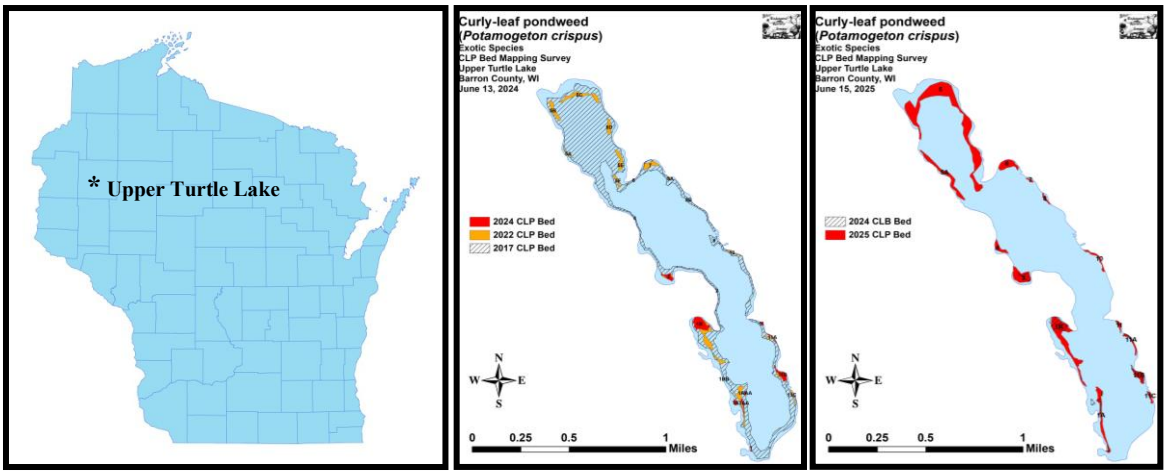
Upper Turtle Lake 2025 CLP beds

Canopied CLP in the "thumb bay" - 6/15/25

Dense canopied CLP bed in Bed 3 - 6/15/25

Project Initiated by:

The Upper Turtle Lake Management District, the Wisconsin Department of Natural Resources, and Harmony Environmental



2024 and 2025 Curly-leaf pondweed bed maps

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin
June 15, 2025

TABLE OF CONTENTS

	Page
LIST OF FIGURES……	ii
LIST OF TABLES……...……...…….	iii
INTRODUCTION……..	1
BACKGROUND AND STUDY RATIONALE……	1
METHODS…….	2
RESULTS AND DISCUSSION…….	4
Curly-leaf Pondweed Bed Mapping Survey…..…..…….……..	3
Descriptions of Past and Present Curly-leaf Pondweed Beds……..	5
LITERATURE CITED.…….	7
APPENDIX…..…….……...	8
I: 2010, 2017, 2022, 2024, and 2025 Early-season Curly-leaf Pondweed Bed Maps…...	8

LIST OF FIGURES AND TABLES

Page

Figure 1: Upper Turtle Lake Bathymetric Map……. 1

Figure 2: Rake Fullness Ratings…..……..…….……..... 2

Figure 3: 2010, 2017, 2022, 2024, and 2025 Early-season Curly-leaf Pondweed Bed Maps 4

Table 1: Curly-leaf Pondweed Bed Summary – Upper Turtle Lake – Barron County, Wisconsin – June 21, 2017, June 11, 2022, June 13, 2024, and June 15, 2025……..... 6

INTRODUCTION:

Upper Turtle Lake (WBIC 2079800) is a 427-acre stratified drainage lake located in the Town of Almena in west-central Barron County (T34N R14W S27 NE NW). It reaches a maximum depth of 25ft in the central basin and has an average depth of 14ft (Figure 1) WDNR 2024). The lake is eutrophic in nature with Secchi readings over the past ten years averaging 3.3ft (WDNR 2025). This very poor water clarity produced a littoral zone that reached approximately 11ft in the spring of 2025. The lake's bottom substrate is predominantly organic muck in the north, south, and western bays as well as the majority of the main basin with a narrow ring of sand/rock occurring along most of the eastern shore and on scattered exposed points (Bush et al. 1966).

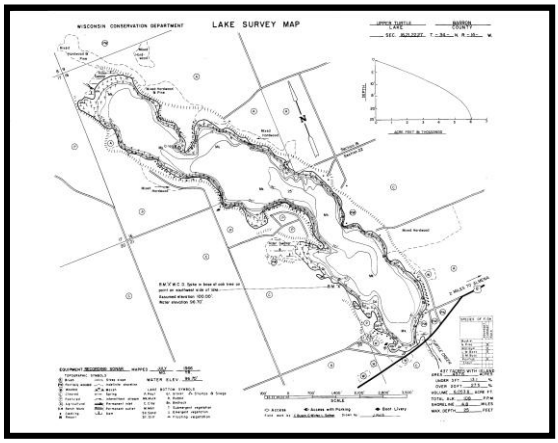


Figure 1: Upper Turtle Lake Bathymetric Map

BACKGROUND AND STUDY RATIONALE:

In 2010, the Upper Turtle Lake Management District (UTLMD) and the Wisconsin Department of Natural Resources (WDNR) authorized a series of full-lake plant surveys as a prerequisite to developing the lake's initial Aquatic Plant Management Plan (APMP). Although those surveys found that the exotic invasive species Curly-leaf pondweed (*Potamogeton crispus*) (CLP) occurred throughout the lake, it was decided that the generally low growth levels did not justify active management at that time. However, following several years of high CLP density on the lake that resulted in severe navigation impairment for many residents, mats of rotting vegetation, and poor summer water quality (UTLMD board, pers. comm.), the UTLMD decided to authorize follow-up plant surveys in 2017 and 2022 so they could update their APMP in 2018/2023 and revisit active management.

Using the information gained from the 2017 bed-mapping survey that quantified CLP's dramatic increase on the lake, the UTLMD, under the direction of Dave Blumer - Lake Education and Planning Services, LLC (LEAPS), embarked on a four-year chemical treatment program. In 2018, they treated 9.88 acres (approximately 2.31% of the lake's total surface area); in 2019, this expanded to seven areas totaling 74.07 acres (17.35% of the surface area); in 2020, six treatment areas covered 65.30 acres (15.23% of the surface area); and, in 2021, there were ten areas totaling 57.08 acres (13.37% of the surface area). Each of these treatments resulted in highly significant declines of CLP within the treatment areas, but there were also highly significant declines in several native species.

No active management occurred on the lake in 2022 so whole lake surveys could assess current levels of both CLP and native plants. However, when these surveys again found rising CLP levels, it was decided to treat two areas totaling 10.47 acres in 2023 (2.45% surface area). In 2024, the UTLMD, now under the direction of Cheryl Clemens - Harmony Environmental (HE), again scheduled chemical treatment in two areas totaling 16.90 acres (3.96% of the surface area).

No active management occurred in 2025, but, to allow the UTLMD and HE to plan for any potential future management, we were asked to return to the lake to delineate CLP beds on June 15, 2025. This report is the summary analysis of that field survey.

METHODS:

Curly-leaf Pondweed Bed Mapping Survey:

During the bed mapping survey, we searched the lake's visible littoral zone. By definition, a "bed" was determined to be any area where we visually estimated that CLP made up >50% of the area's plants, was generally continuous with clearly defined borders, and was canopied, or close enough to being canopied that it would likely interfere with boat traffic. After we located a bed, we motored around the perimeter of the area taking GPS coordinates at regular intervals. We also estimated the rake density range and mean rake fullness of the bed (Figure 2), the depth range and mean depth of the bed, whether it was canopied, and the impact it was likely to have on navigation (**none** – easily avoidable with a natural channel around or narrow enough to motor through/**minor** – one prop clear to get through or access open water/**moderate** – several prop clears needed to navigate through/**severe** – multiple prop clears and difficult to impossible to row through). These data were then mapped using ArcMap 9.3.1, and we used the WDNR's Forestry Tools Extension to determine the acreage of each bed to the nearest hundredth of an acre (Table 1).

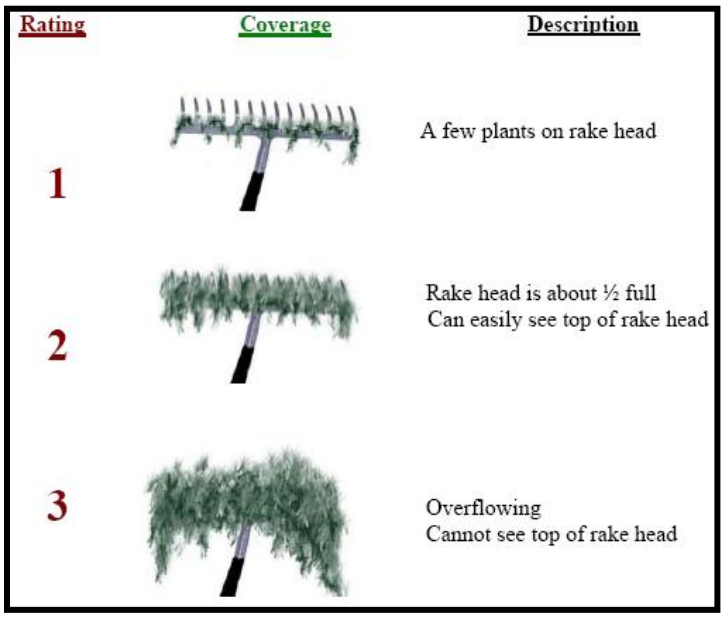


Figure 2: Rake Fullness Ratings

RESULTS AND DISCUSSION:

Curly-leaf Pondweed Bed Mapping Survey:

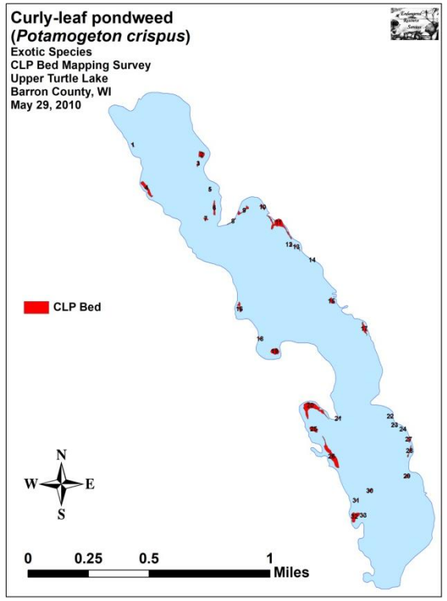
In 2010, we mapped 33 Curly-leaf pondweed beds scattered throughout the lake's littoral zone. Only four were greater than 0.50 acre, and, collectively, they covered 7.83 acres (1.83% of the lake's 427 acres) (Figure 3) (Appendix I).

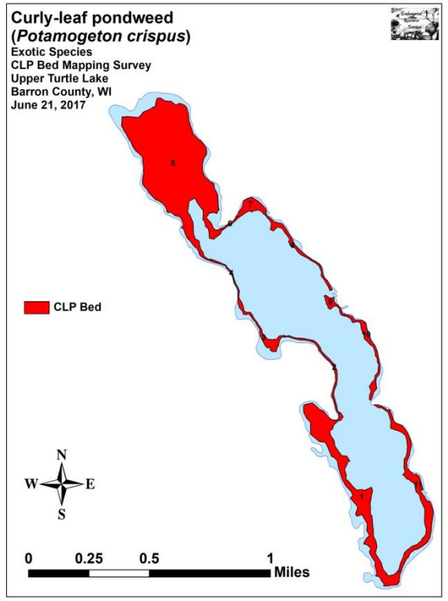
The 2017 survey showed a dramatic increase in coverage as CLP now dominated the entire littoral zone except for sandy and rocky areas next to the immediate shoreline and areas that were dominated by lilypads. Although the lake essentially contained one continuous bed, we chose to divide it into 11 separate areas based on density and potential navigation impairment. In total, canopied CLP covered 132.35 acres (31.0% of the lake's surface area) (Table 1). This represented a 124.52-acre increase (+1,590%) over our 2010 bed mapping survey (Figure 3) (Appendix I).

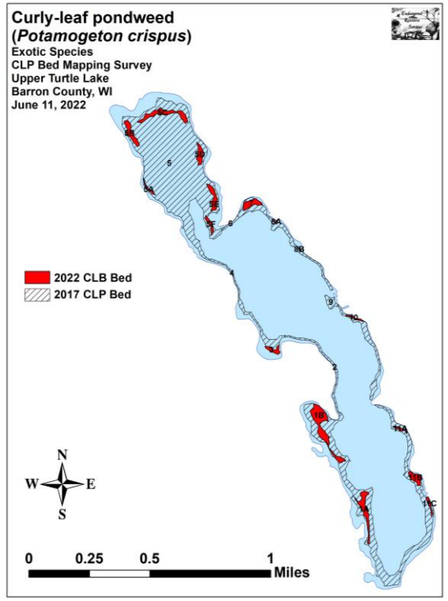
Following four years of active management, our 2022 survey delineated 16 beds covering 16.65 acres (3.90% of the lake's surface area) (Table 1). This was a 115.70-acre decline (-87.4%) compared to 2017, but it was still an 8.82-acre increase from 2010 (+112.6%) (Figure 3) (Appendix I). Despite the increase since 2010, during the 2022 survey, we noted that most mapped CLP areas were patchy and more of a collection of scattered high-density microbeds rather than the continuous mats we documented in 2017. Because of this, most beds in 2022 were not likely to be more than a minor impairment.

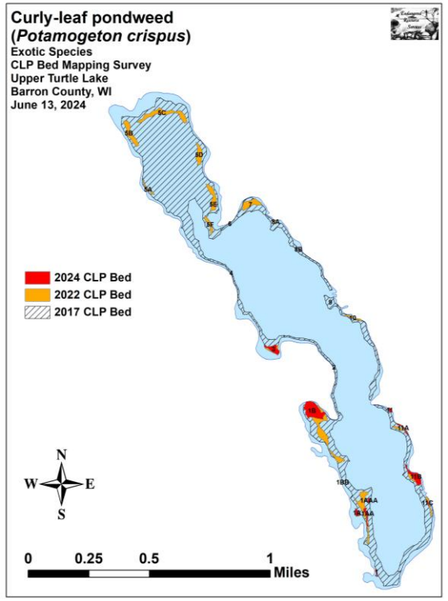
In 2024, we mapped 11 beds totaling 5.58 acres (1.31% of the lake's surface area) (Figure 3) (Appendix I). This was an 11.07-acre decline (-66.5%) compared to the 2022 survey (Table 1). We noted that, even in the south bays, CLP was seldom likely to cause more than a minor impairment, and, despite it being a great year for CLP on most area lakes, overall levels appeared to be down sharply since our last survey in 2022.

The 2025 survey documented 14 beds covering 45.88 acres (10.74% of the lake's surface area) (Figure 3) (Appendix I). Compared to 2024, the was an increase of 40.30 acres (+722.2%) (Table 1). Considering the late ice-on/early ice-off and prolonged cool spring coupled with a lack of management; these results were not surprising.









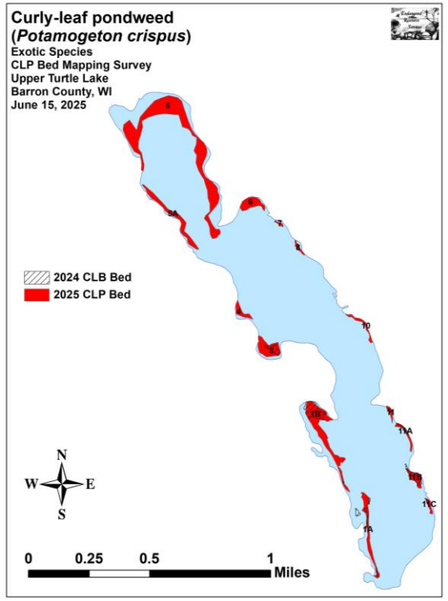


Figure 3: 2010, 2017, 2022, 2024, and 2025
Early-season Curly-leaf Pondweed Bed Maps

Descriptions of Past and Present Curly-leaf Pondweed Beds:

Bed 1 – The southwestern shoreline was ringed by native vegetation dominated by floating-leaf species. In areas beyond 3ft of water, Curly-leaf pondweed was again canopied into a nearly continuous bed. Bed 1A (the southwest corner) formed a narrow strip along the shoreline that, although dense, was likely too narrow to be more than a minor impairment. As in the past, the highest density areas occurred in Bed 1B in the northwest "thumb" bay where a few residents along the northeast shoreline of the bay likely experience at least moderate impairment (see front cover of the report). This bed represented the second largest area on the lake with continuous CLP.

Bed 2: We saw almost no CLP in this former bed.

Beds 3 and 4 – Both of these beds on the west-central shoreline had dense canopied CLP that were likely causing at least moderate impairments for residents as evidenced by prop-trails throughout. As most of Bed 3 occurred along a nearly uninhabited shoreline, it is likely a lower management priority.

Bed 5: Dense canopied CLP was again present in the north bay, and this 20+ acre bed was the largest on the lake. Bed 5A on the southwest end of the bay was patchier and likely not more than a minor impairment. However, in the rest of the bay, most residents were likely experiencing at least moderate impairment, and we noted prop-trails throughout as boats were forced to cut through the mat.

Bed 6: This bed was likely at least a moderate impairment for residents in the bay. It was also likely worse earlier in the season as repeat boat traffic had ripped up large numbers of plants and created prop-trails throughout the bed.

Beds 7 and 8: These beds primarily occurred along uninhabited shorelines. This, coupled with their narrowness, likely meant they weren't more than a minor impairment if at all.

Bed 9: We saw almost no CLP in this former bed.

Bed 10: Similar to Beds 7 and 8, this narrow area on the east-central shoreline wasn't likely to be more than a minor impairment. As most of it was established on an uninhabited shoreline, it is also unlikely to be a management priority.

Bed 11: This former giant bed was again fragmented into multiple small beds along the southeast shoreline. Beds 11, 11A , and 11C were very narrow strips and unlikely to be more than a minor impairment. Bed 11B was quite dense and less patchy than in the past. However, it was still likely too narrow to be more than a moderate impairment.

Table 1: Curly-leaf Pondweed Bed Summary
Upper Turtle Lake - Barron County, Wisconsin
June 21, 2017, June 11, 2022, June 13, 2024, and June 15, 2025

Bed Number	2025 Acreage	2024 Acreage	2022 Acreage	2017 Acreage	2024-2025 Difference	Rake Range/ Mean Rake Fullness	Depth Range/ Mean Depth	Canopied	Navigation Impairment	2025 Field Notes
Bed 1 (A-AAA)	10.19	3.40	6.20	24.62	6.79	<<<1-3; 3	3-10; 7	Yes	Moderate	Worst in the “thumb bay”.
Bed 2	0.00	0.00	0.00	2.12	0	<<<1	4-10; 8	Yes	None	Almost no CLP seen.
Bed 3	3.20	0.78	0.63	3.24	2.42	<<<1-3; 3	2-10; 6	Yes	Moderate	Canopied mat in bay.
Bed 4	1.09	0.00	0.00	0.69	1.09	<<<1-3; 3	2-9; 7	Yes	Moderate	Prop-trails throughout.
Bed 5 (A-F)	24.51	0.00	6.59	79.13	24.51	<<<1-3; 3	2-10; 7	Yes	Moderate	Canopied mat near residences.
Bed 6	2.28	0.00	0.00	0.40	2.28	1-3; 2	2-10; 6	Yes	Moderate	Prop-trails throughout.
Bed 7	0.21	0.00	1.18	3.17	0.21	<<<1-3; 1	3-8; 6	Yes	Minor	Narrow shoreline strip.
Bed 8 (A and B)	0.41	0.00	0.10	3.12	0.41	<1-3; 3	4-9; 7	Yes	Minor	Narrow shoreline strip.
Bed 9	0.00	0.00	0.00	1.06	0	<<<1	4-10; 8	Yes	None	Almost no CLP seen.
Bed 10	0.88	0.00	0.26	3.81	0.88	<<<1-3; 1	2-9; 6	Yes	Minor	Patchy and fragmented strips of plants.
Bed 11 (A-C)	3.11	1.40	1.69	11.00	1.71	<<<1-3; 2	2-8; 6	Yes	Minor	Denser than in the recent past; Area 11B worst.
Total	**45.88**	**5.58**	**16.65**	**132.35**	**+40.30**					

LITERATURE CITED

Busch, C., G. Winter, L. Sather, and J. Roth. 1966. Upper Turtle Lake Map. Available from https://apps.dnr.wi.gov/doclink/lakes_maps/2079800a.pdf (2025, June).

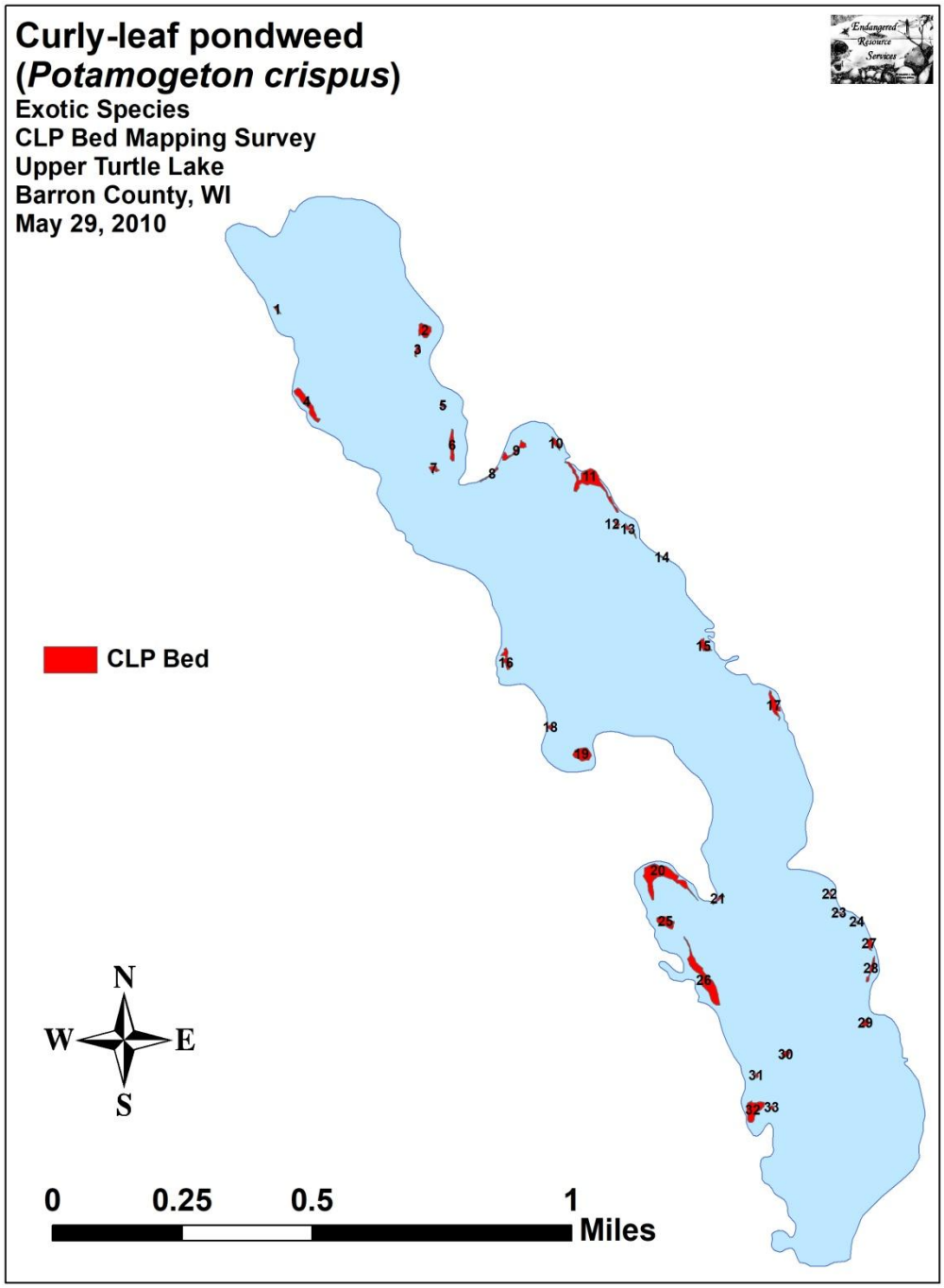
UWEX Lakes Program. [online]. 2010. Aquatic Plant Management in Wisconsin. Available from http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/ecology/aquaticplants/default.aspx (2024, June).

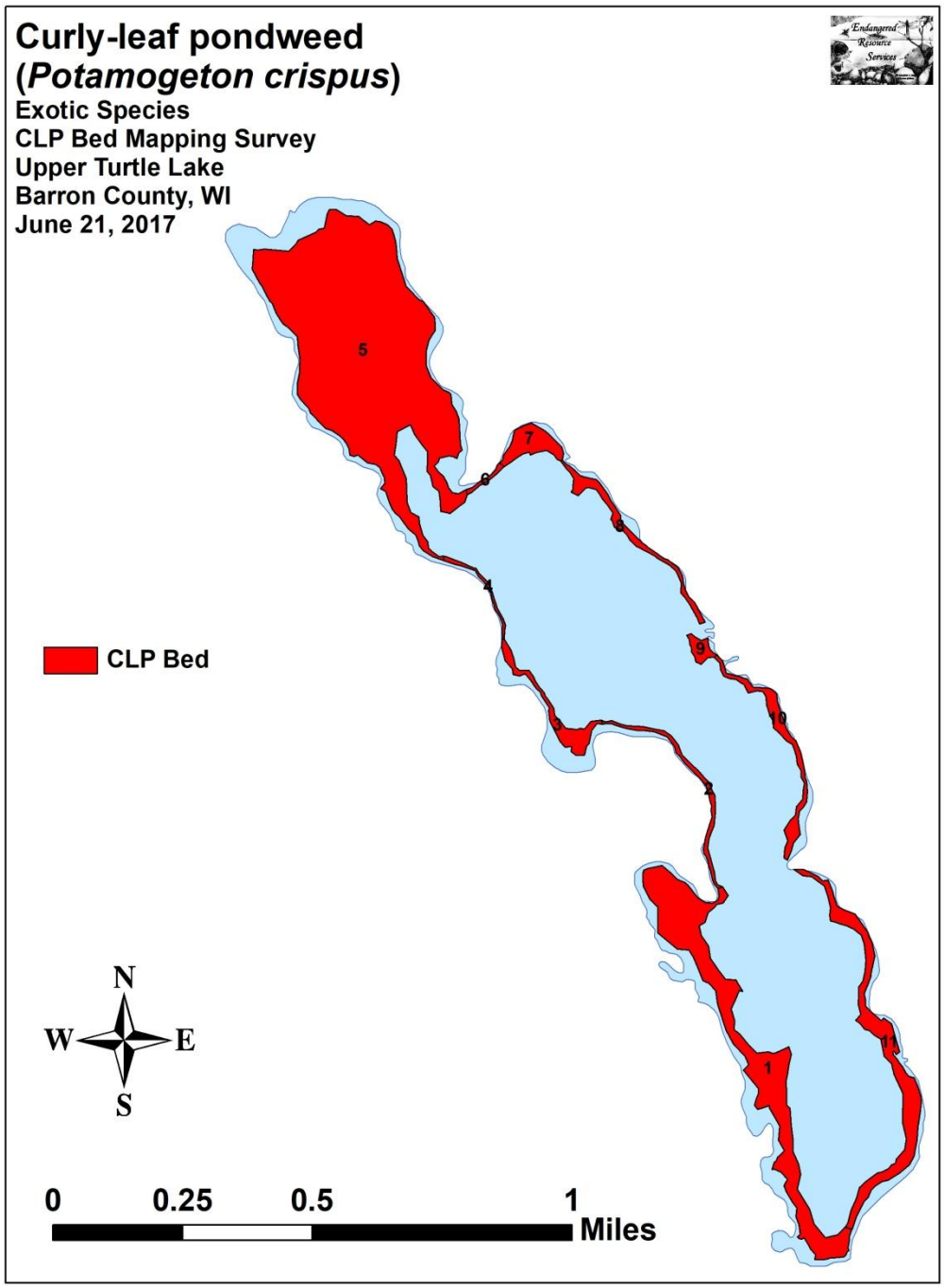
UWEX Lakes Program. [online]. 2010. Pre/Post Herbicide Comparison. Available from http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/Appendix-D.pdf (2025, June).

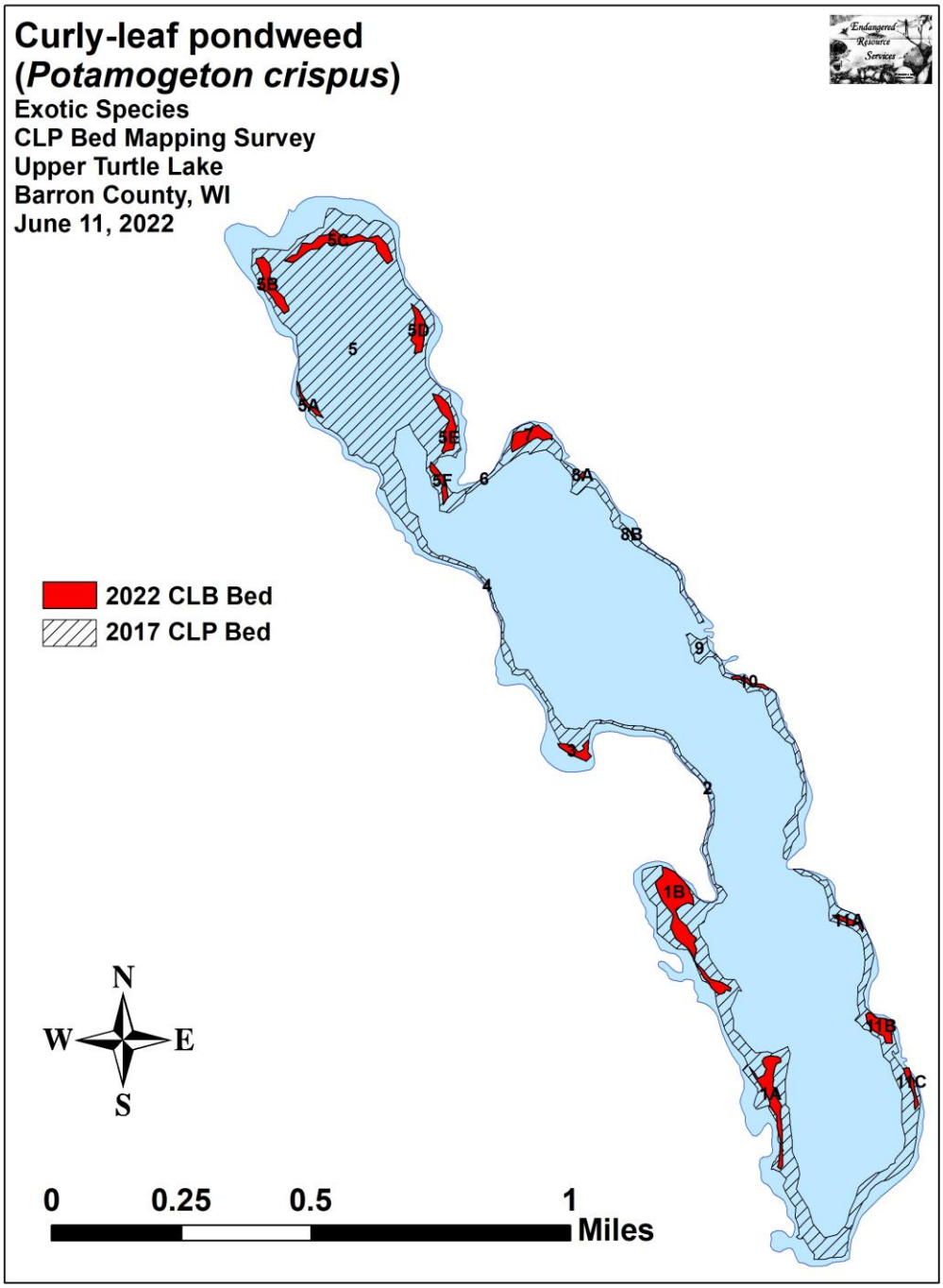
WDNR. [online]. 2025. Lake Information for Upper Turtle Lake. https://apps.dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2079800 (2025, June).

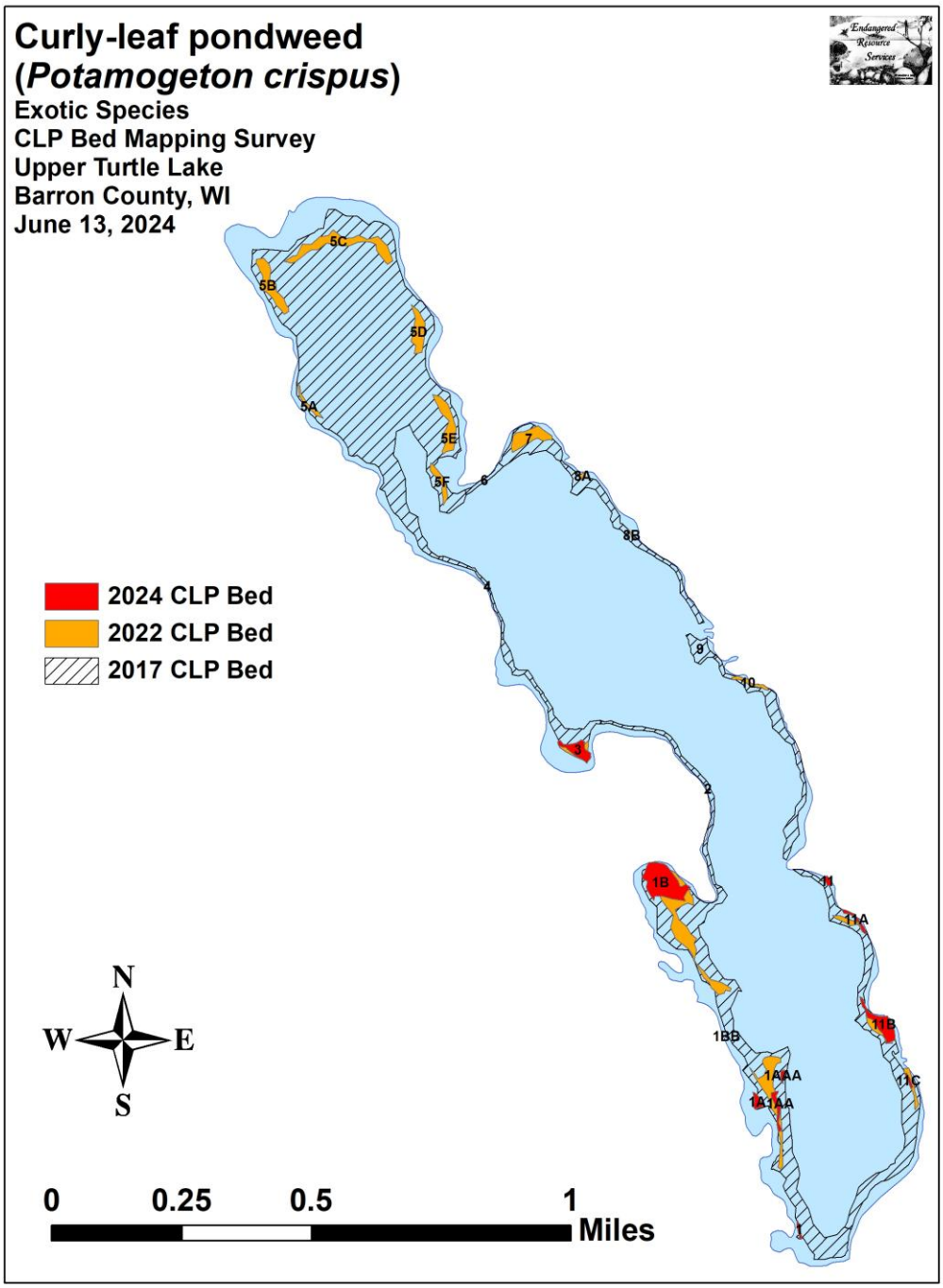
WDNR. [online]. 2025. Citizen Lake Monitoring Water Quality Data Report for Upper Turtle Lake. https://apps.dnr.wi.gov/lakes/waterquality/Station.aspx?id=033175 (2025, June).

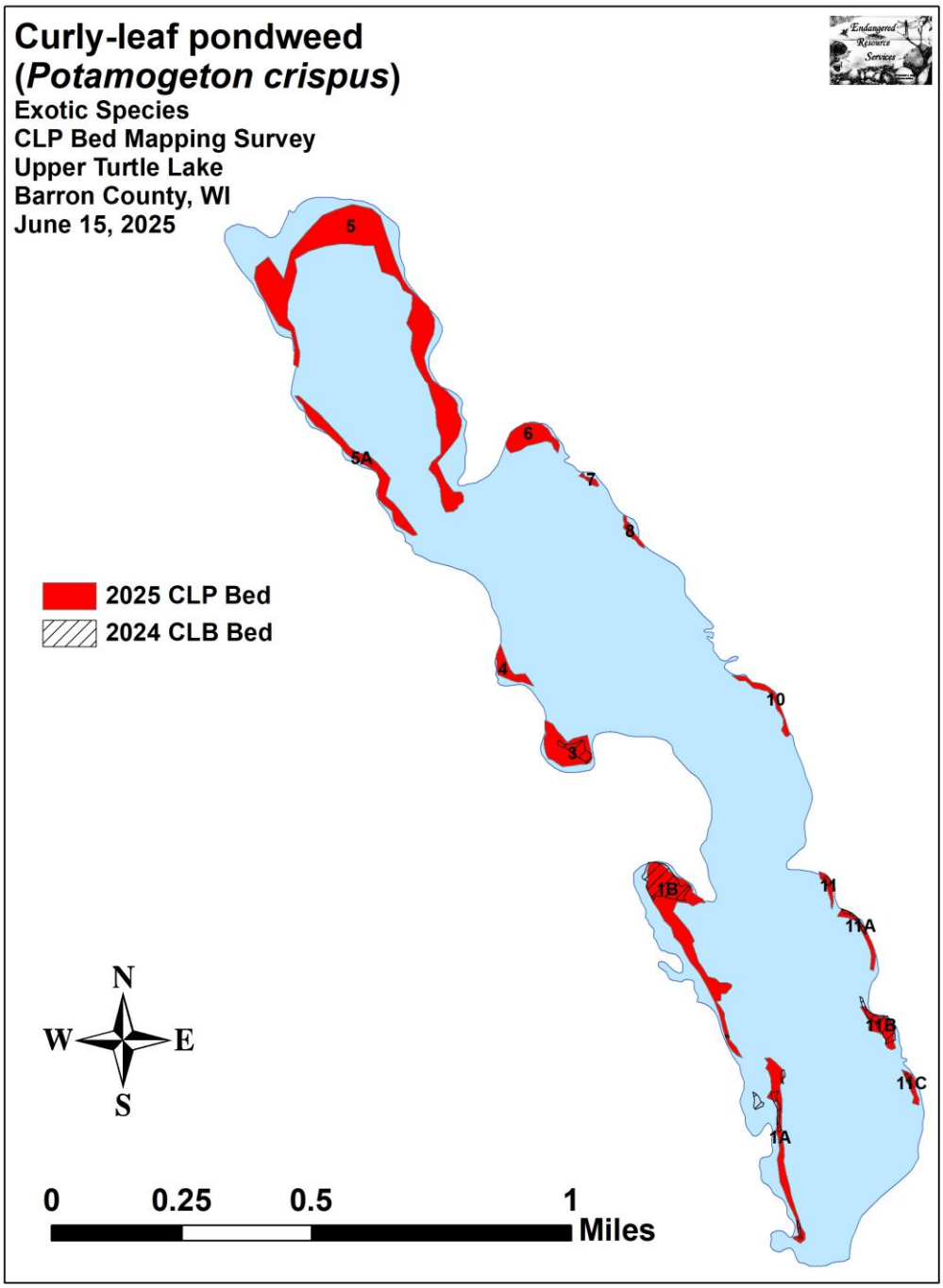
Appendix I: 2010, 2017, 2022, 2024, and 2025 Early-season Curly-leaf Pondweed Bed Maps


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
CLP Bed Mapping Survey
Upper Turtle Lake
Barron County, WI
May 29, 2010
Endangered Resource Services
CLP Bed
N
W
E
S
0
0.25
0.5
1
Miles


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
CLP Bed Mapping Survey
Upper Turtle Lake
Barron County, WI
June 21, 2017
Endangered Resource Services
CLP Bed
5
7
6
8
4
9
10
2
3
11
1
N
W
E
S
0
0.25
0.5
1
Miles


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
CLP Bed Mapping Survey
Upper Turtle Lake
Barron County, WI
June 11, 2022
Endangered Resource Services
2022 CLB Bed
2017 CLP Bed
N
W
E
S
0
0.25
0.5
1
Miles
5C
5B
5
5D
5A
5E
5F
6
8A
8B
4
9
10
3
2
1B
11A
1B
1A
1C


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
CLP Bed Mapping Survey
Upper Turtle Lake
Barron County, WI
June 13, 2024
Endangered Resource Services
2024 CLP Bed
2022 CLP Bed
2017 CLP Bed
N
W
E
S
0
0.25
0.5
1
Miles
5C
5B
5D
5A
5E
5F
6
7
8A
8B
4
9
10
3
2
1B
1
11A
11B
11C
1BB
1AAA
1A1AA


Curly-leaf pondweed
(Potamogeton crispus)
Exotic Species
CLP Bed Mapping Survey
Upper Turtle Lake
Barron County, WI
June 15, 2025
Endangered Resource Services
2025 CLP Bed
2024 CLB Bed
5
5A
6
7
8
4
3
10
1B
11
11A
11B
11C
1A
N
W
E
S
0
0.25
0.5
1
Miles