Water Lilies in Comfort Lake, July 28, 2025

Curlyleaf Pondweed and Eurasian Watermilfoil Management for Comfort Lake, Chisago Co, 2025

	Delineation	Treatment	Assessment
CLP	April 8, 2025	No CLP Treatment	May 23, 2025
EWM	May 23, 2025	No EWM Treatment	July 28, 2025

Prepared for:
Comfort Lake/Forest Lake Watershed District
Forest Lake, Minnesota

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Curlyleaf Pondweed and Eurasian Watermilfoil Management for Comfort Lake, Chisago County, 2025

Summary

Three GPS meander surveys were conducted in Comfort Lake in 2025 to delineate and assess curlyleaf pondweed (CLP) and Eurasian watermilfoil (EWM). On April 8, 2025 the spring survey to delineated CLP, then on May 23, 2025 the second survey was used to assessment CLP and to delineate EWM. The final survey on July 28, 2025 was to assess EWM.

Curlyleaf Pondweed Delineation and Assessment Surveys: A meander CLP survey was conducted on April 8, 2025 to characterize the status of CLP. A total of 198 sites were sampled and CLP was observed in 4 sites out to 6 feet of water depth (Figure 1). No treatment was recommended for 2025.

On May 23, 2025, a follow-up CLP assessment was conducted using a meander survey. Curlyleaf was found at a total of 68 sites in the assessment. Curlyleaf had sprouted in a number of sites since the April 8 survey. However, curlyleaf pondweed growth was mostly light and with scattered growth (Figure 1).

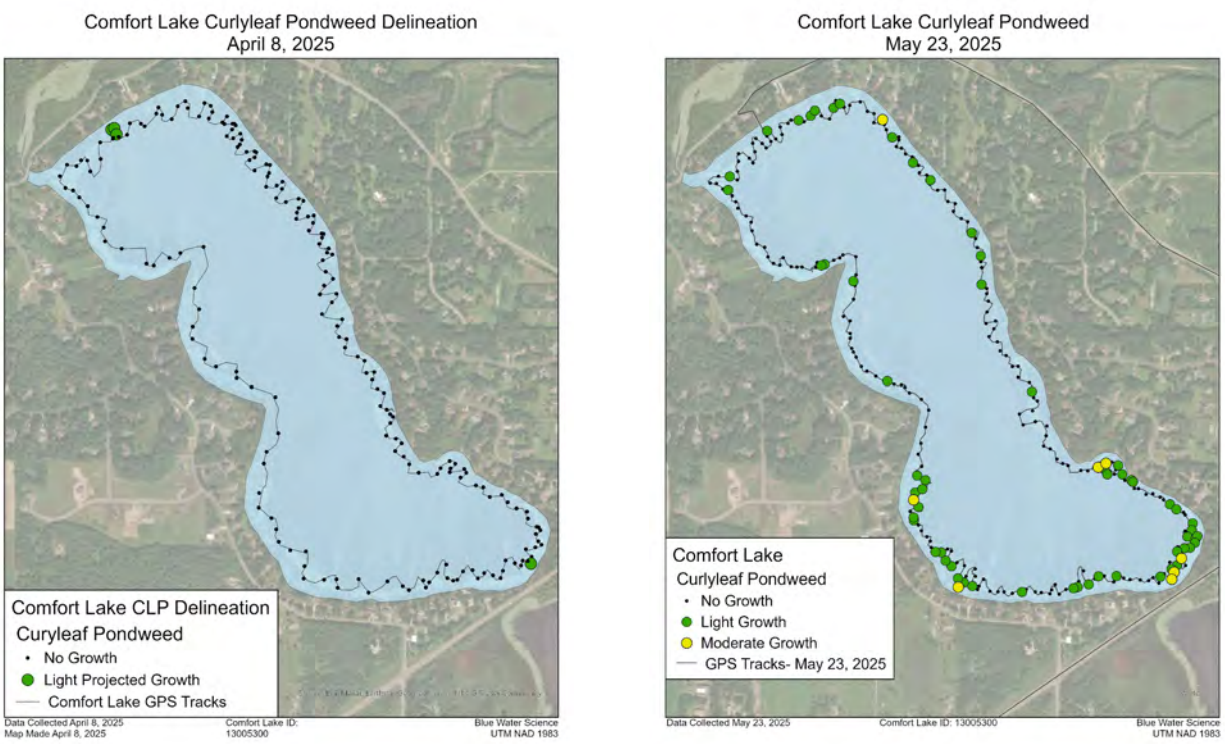


Figure 1. [left] DELINEATION: Map of curlyleaf pondweed distribution from the April 8, 2025 meander survey. [right] ASSESSMENT: Map of curlyleaf pondweed assessment sites for the May 23, 2025 meander survey. Key: black dots = no curlyleaf growth, green dots = light growth, and yellow dots = moderate growth.

Eurasian Watermilfoil Delineation and Assessment Surveys: A whole lake EWM treatment using Fluridone was conducted on June 22, 2022. In 2023, one EWM spot-treatment was conducted on 2.77 acres of EWM in August on Comfort Lake. Surveys in 2024 did not find enough EWM to treat.

In 2025, a Eurasian watermilfoil delineation was conducted on May 23, 2025. A total of 42 sites out of 268 sites sampled had EWM. However, the EWM was found at light to moderate growth and did not pose a recreational nor ecological problem (Figure 2). No open water treatment was conducted.

On July 24, 2025, an assessment survey was conducted and EWM was present at 46 sites with mostly light to moderate growth. The EWM was not a recreational nor an ecological problem and very little surface matting was observed.

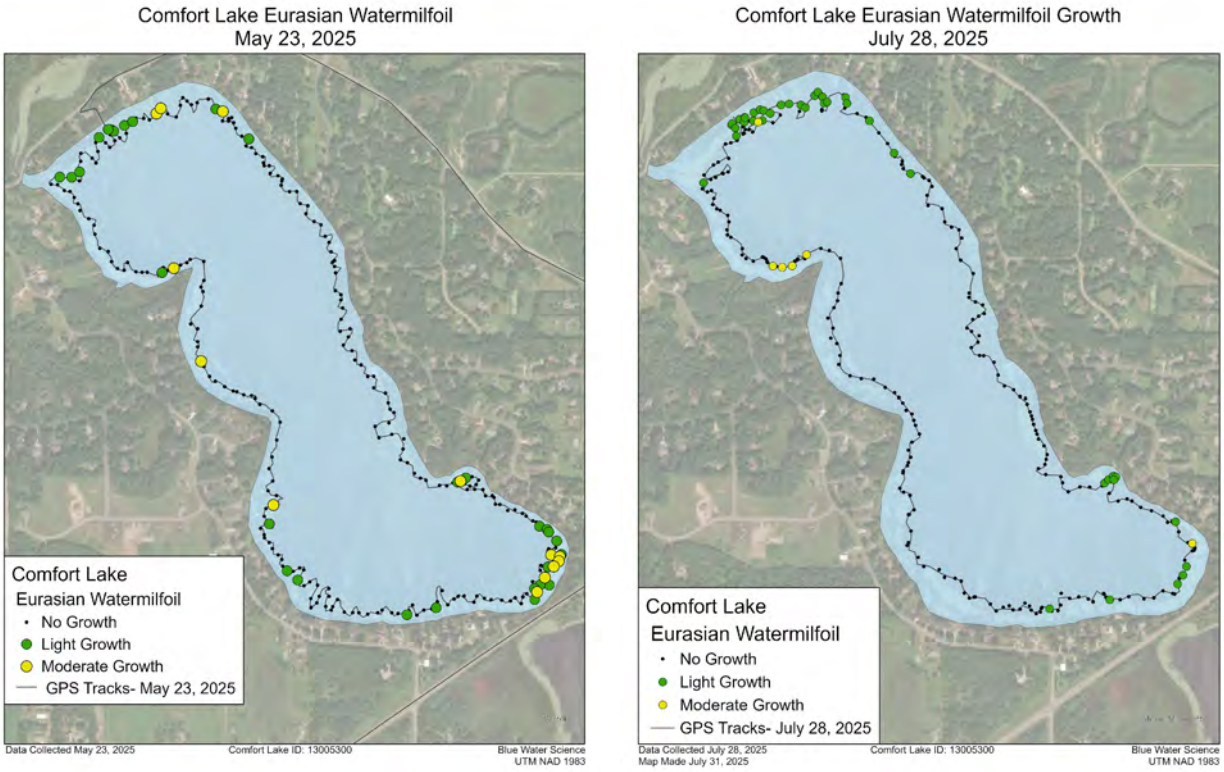


Figure 2. [left] DELINEATION: Map of EWM distribution from the May 23, 2025 survey. EWM was found at 42 sites.
[right] ASSESSMENT: Map of a meander survey on July 28, 2025. EWM was found at 46 sites.

Summary of CLP and EWM Observations.
Number of CLP and EWM observations for the meander surveys. The number in parenthesis is the total number of samples.

	Curlyleaf Pondweed	Eurasian Watermilfoil
April 8, 2025	4 (198)	0 (198)
May 23, 2025	68 (268)	42 (268)
July 28, 2025	5 (269)	46 (269)

Curlyleaf Pondweed and Eurasian Watermilfoil Treatments from 2014 Through 2025: A summary of CLP and EWM treatments from 2014-2025 is shown in Figure 3. Curlyleaf was only treated at 1 acre in 2015 and at 9.45 ac in 2024. EWM was first observed in 2014 and it has spread around the lake in the last few years. A total of 7.5 acres was treated in 2016 and 3.2 acres were treated in 2017. Spot herbicide treatments were conducted from 2018 to 2021 in nearshore areas by the Comfort Lake Association. On June 22, 2022 a whole lake fluridone treatment of 218 acres was conducted and on September 19, 2023 two areas totaling 2.77 acres were treated. There was no EWM treatment in 2024 and 2025.

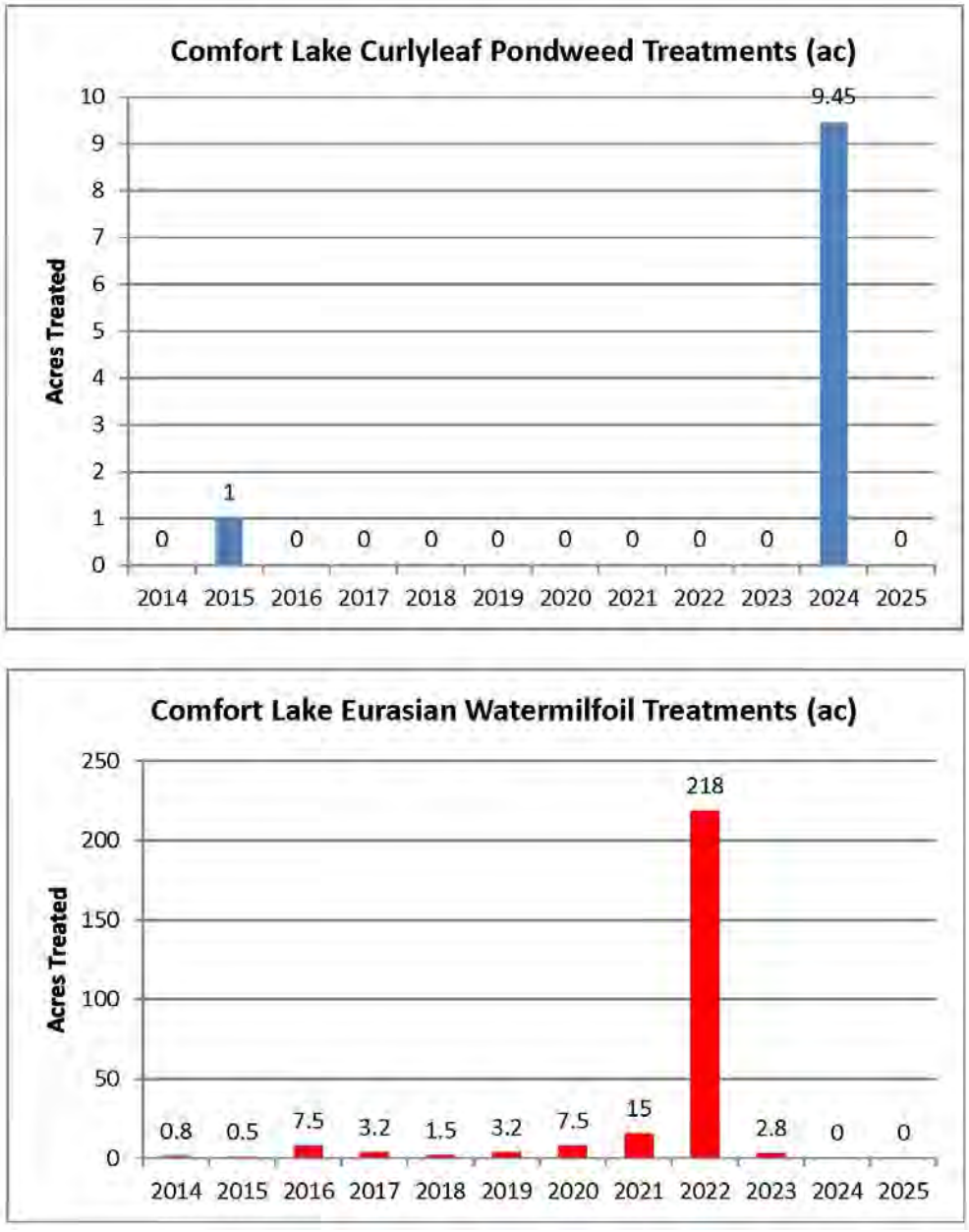


Figure 3. CLFLWD Sponsored Treatments with blue bars and Comfort Lake Association sponsored treatments with red bars: [top] Curlyleaf pondweed treated in 2014-2025. [bottom] Eurasian watermilfoil treated in 2014-2025 (2018 is estimated based on individual permits and 2019, 2020, and 2021 treatments were by the Comfort Lake Association). A full lake fluridone treatment was conducted in 2022. An EWM treatment of 2.77 acres occurred in 2023.

Curlyleaf Pondweed and Eurasian Watermilfoil Management for Comfort Lake, Chisago Co, 2025

ID: 13005300
Size: 217.82 acres (MnDNR)
Littoral Area: 90 acres (MnDNR)
Mean depth: 21 feet (MnDNR)
Maximum depth: 47 feet (MnDNR)

Introduction

Curlyleaf pondweed (CLP) and Eurasian watermilfoil (EWM) have been managed in Comfort Lake since at least 2014. The objectives of the curlyleaf surveys were to delineate the acreage of curlyleaf pondweed to treat and then treat is necessary and then after treatment, assess the effectiveness of the treatment. The objectives of the Eurasian watermilfoil (EWM) surveys were to delineate the acreage of EWM to treat and then chemically treat if necessary and then after treatment, assess the effectiveness of the treatment.

Methods

Curlyleaf Pondweed Delineation Method for Projected Growth: At the time of the spring curlyleaf delineation on April 8 only a fraction of the peak curlyleaf biomass is present compared to what could be present in June, at its peak. For spot treatments, the areas to be treated are delineated prior to curlyleaf developing peak biomass. The CLP delineation survey is conducted using a meandering path around the nearshore area of the entire lake. Curlyleaf is sampled using a fixed 14 tine rakehead on a pole. Curlyleaf stem counts on a rake sampler were used to identify areas that had a potential to produce curlyleaf growth at its June peak. After a short sweep of about 1-foot (which samples about 0.1 m^2), if one or two stems (10-20 stems/m^2) were collected on the rake sweep, it was predicted that this area would produce only future light growth at its peak and was not delineated for treatment. Alternatively, sites where 3 stems (30 stems/m^2) were collected per rake sample future potential growth was considered to be moderate. However if 4 curlyleaf stems (40 stems/m^2) or more per rake sample generally indicated some plants had developed runners and would likely produce heavy growth in the next few weeks and this site would be marked for potential treatment. This survey method used for determining curlyleaf pondweed spot herbicide treatments was similar to the methodology published in a peer reviewed journal (McComas et al, 2015)*.

*McComas, S.R., Y.E. Christianson, and U. Singh. 2015. *Effects of curlyleaf pondweed control on water quality and coontail abundance in Gleason Lake, Minnesota. Lake and Reservoir Management, 31:109–114.* https://doi.org10.1080/10402381.2015.1014583

Aquatic Plant Density Rating: Aquatic plant densities were evaluated based on rake fullness with a scale of 1, 2, or 3 for light, moderate, or heavy density (Figure 4).

Curlyleaf Assessment and Eurasian Watermilfoil Delineation and Assessment Sampling: An initial EWM delineation along with a CLP assessment were conducted on May 23 and 268 sites were sampled. On July 28 an EWM assessment was conducted and the entire perimeter of the lake was checked for CLP and EWM.

Chart of Aquatic Plant Density Ratings

Figure 4. Aquatic plant density ratings from 1 to 3.

Curlyleaf Pondweed Delineation, April 8, 2025

A curlyleaf delineation was conducted using a meander rake sampling survey on April 8, 2025 and 198 sites were examined. Curlyleaf was found at 4 sites in Comfort Lake (Figure 5). No treatment was recommended.

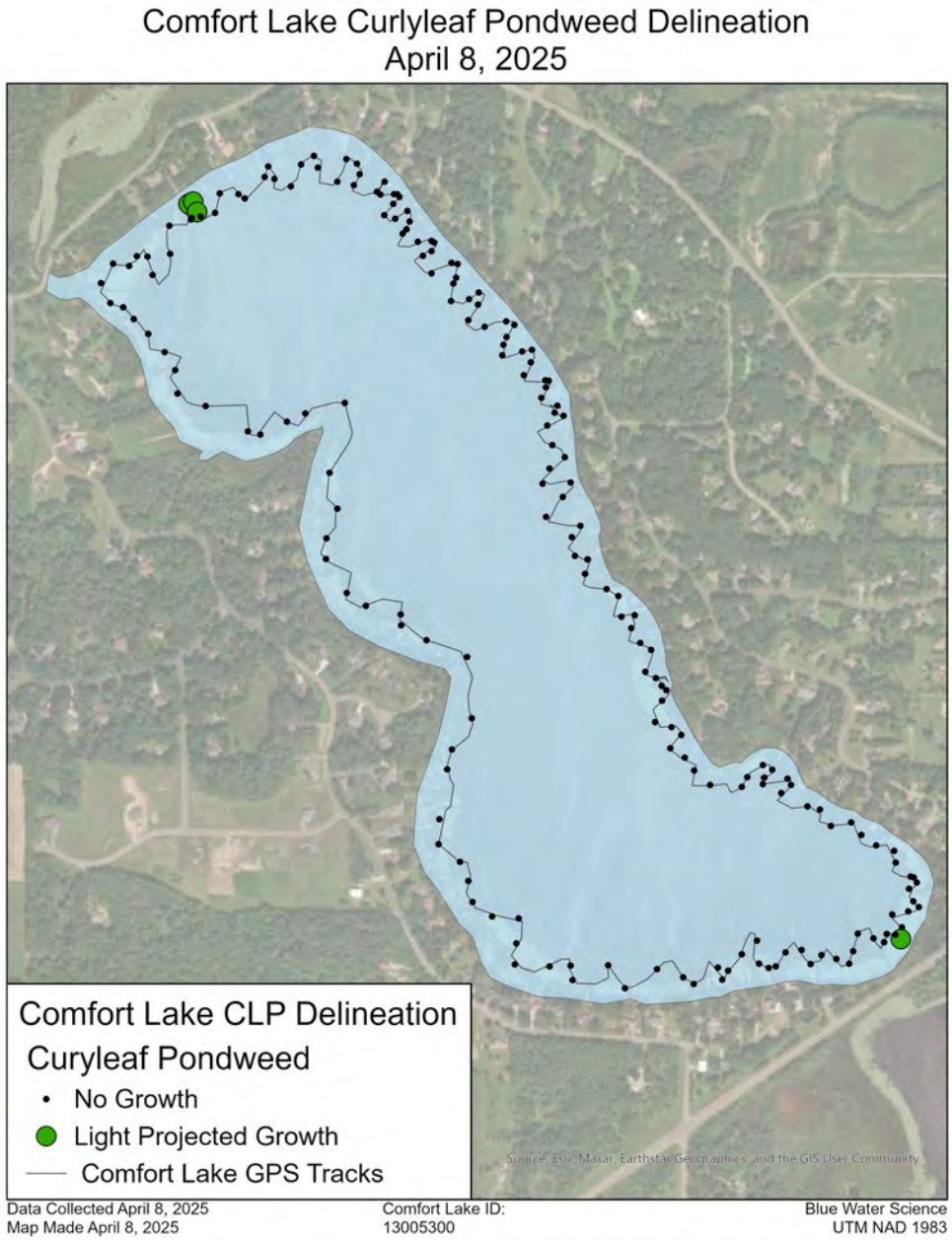


Figure 5. DELINEATION: Map of curlyleaf pondweed distribution from the April 8, 2025 meander survey. Key: black dots = sample locations and green dot = light growth potential.

Curlyleaf Pondweed Assessment, May 23, 2025

A curlyleaf assessment occurred on May 23, 2025 using a GPS meander survey. A total of 268 sites were sampled and curlyleaf was found at 68 sample sites. Curlyleaf growth was mostly light and scattered (Figure 6). It appears CLP sprouted in a number of sites after the April 8, 2025 delineation. The CLP growth did not produce a navigational nor ecological problem.

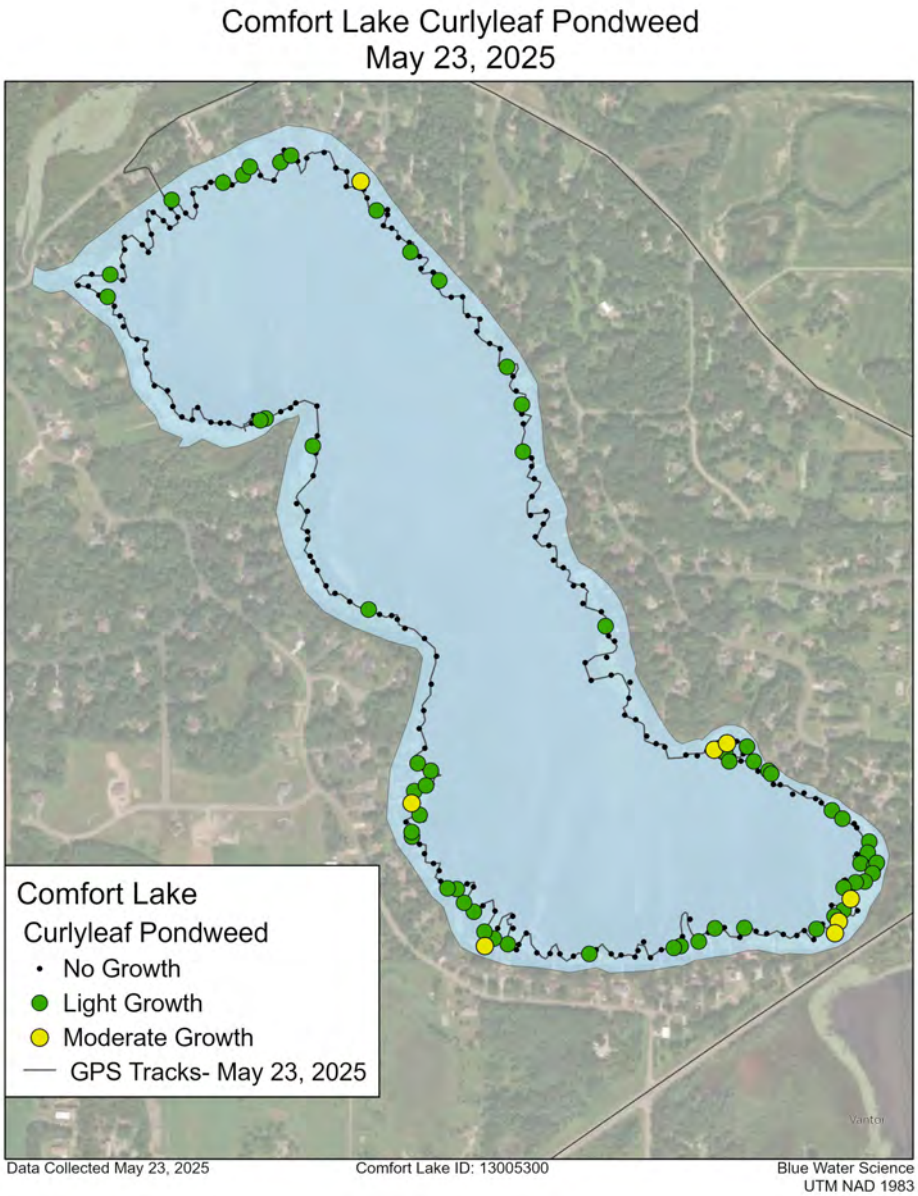


Figure 6. ASSESSMENT: Map of curlyleaf pondweed assessment sites for May 23, 2025. Key: black dots = no curlyleaf growth, green dots = light growth, and yellow dots = moderate growth.

Eurasian Watermilfoil Delineation, May 23, 2025

An initial EWM delineation was conducted using a GPS meander rake sampling survey on April 8, 2025 and 198 sites were examined. EWM was not found in Comfort Lake on April 8, 2025.

On May 23, 2025, an EWM delineation survey using a GPS meander survey found EWM at 42 sample sites out of the 268 sites (Figure 7). Although EWM was common, EWM growth was found to be light and producing single stems when present. No lake-wide EWM treatment was conducted in 2025.

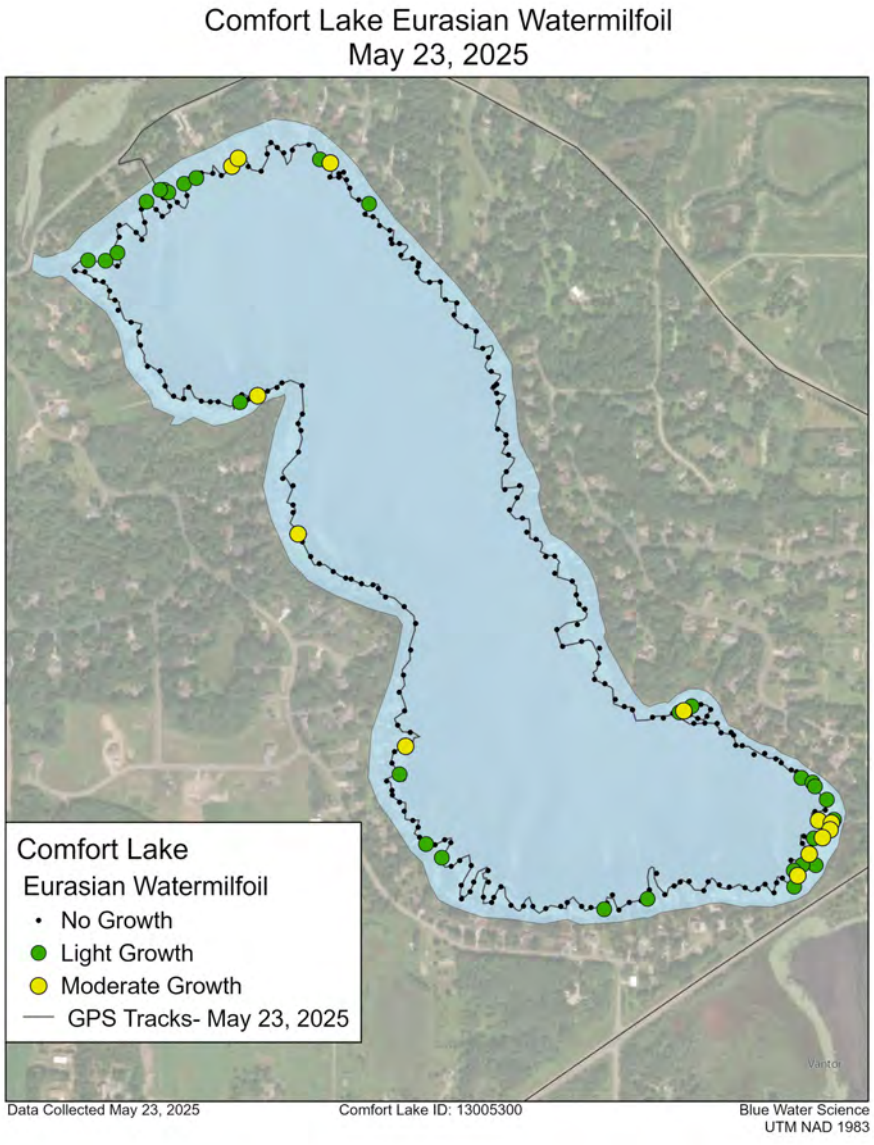


Figure 7. ASSESSMENT: Map of EWM distribution from the May 23, 2025 (left) survey. EWM was sampled at 42 sites.

Eurasian Watermilfoil Assessment, July 28, 2025

On July 28, 2025, an EWM assessment survey using a meander survey found mostly light growth of EWM at 46 sample sites out of the 269 sites (Figure 8). The EWM growth was typically single, unbranched stems, with very little surface matting.

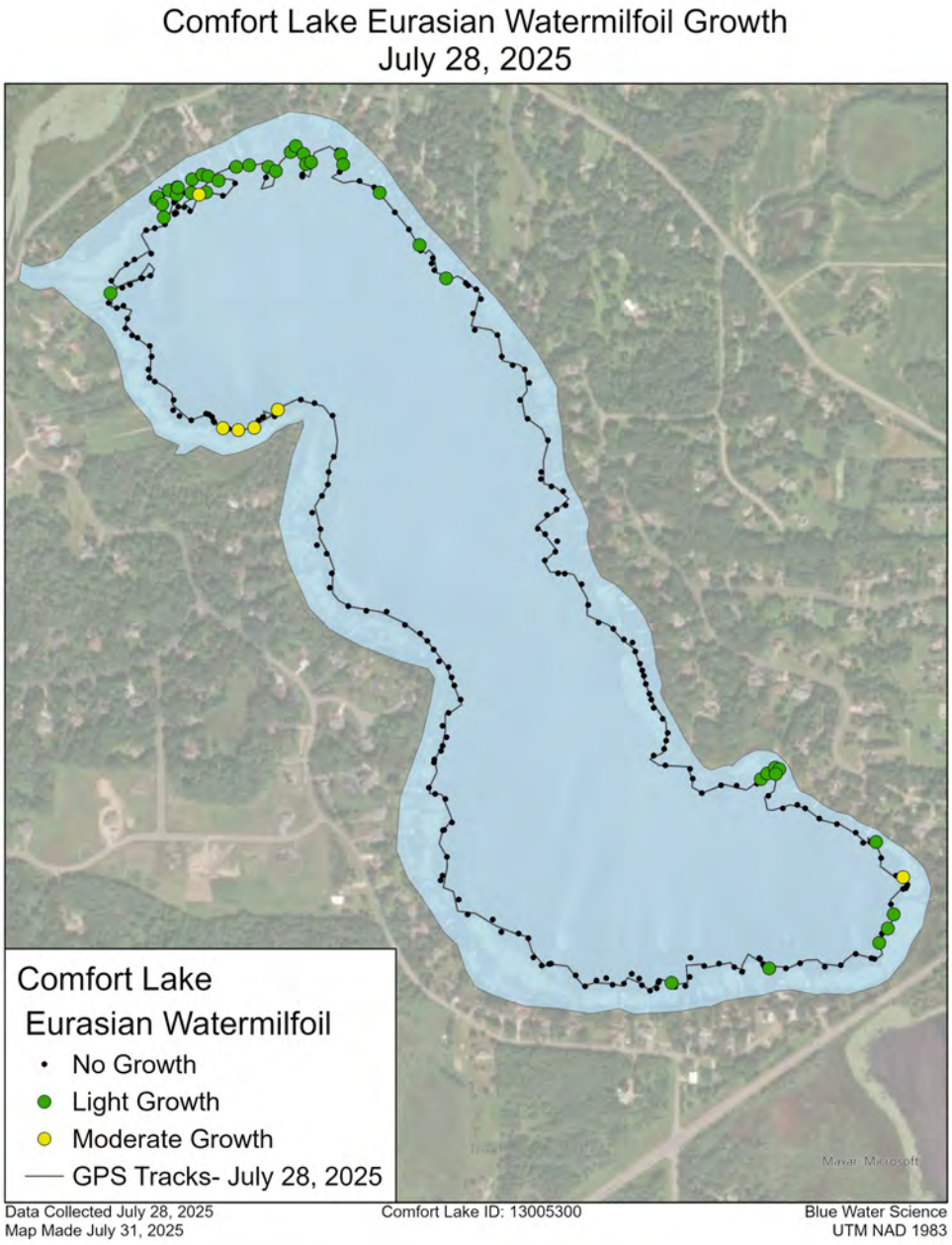


Figure 8. ASSESSMENT: Map of EWM distribution from the July 28, 2025 survey. EWM was sampled at 46 sites at light growth.

Summary of Plant Surveys from 2019-2025

Results of aquatic plant occurrence for surveys from 2019-2025 are shown in Table 1. A whole lake fluridone herbicide treatment was conduced on June 22, 2022. The results of the September 2022 point intercept survey which reflects the impact of the fluridone treatment showed a significant decrease in EWM. Several other aquatic plant species also decreased in occurrence in September of 2022 compared to the June 10, 2022 point intercept survey.

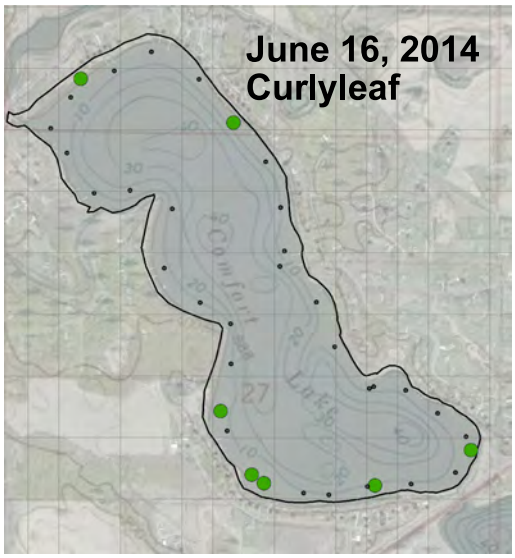
However, a point intercept survey conducted on June 2, 2023 showed a decrease in EWM compared to June 10, 2022 and found an increase in submerged aquatic plants compared to the September 15, 2022 survey. Eurasian watermilfoil was found in 1 sample site on June 2, 2023 point intercept survey growing at light conditions. The fluridone treatment reduced EWM in 2022 and through July of 2024. However, the distribution of EWM increased in 2025. Future surveys will track EWM occurrences. Table 1 shows both point intercept data as well as GPS meander survey data targeting non-native aquatic plant species.

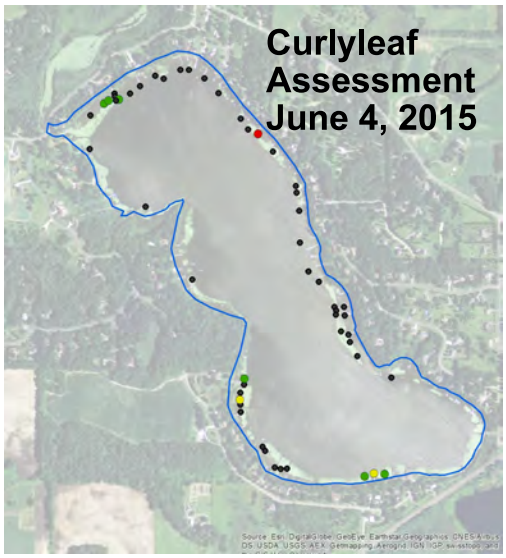
Table 1. Comfort Lake aquatic plant occurrences for point intercept surveys in 2019, 2021, 2022, and 2023 based on 180 sample sites for each of the surveys (blue shading). Meander surveys are shown with yellow shading. No point intercept surveys were conducted in 2024 or 2025. Meander surveys are typically used to track aquatic invasive species and only recorded CLP or EWM occurrences while the point-intercept surveys track all aquatic plant species on an established grid.

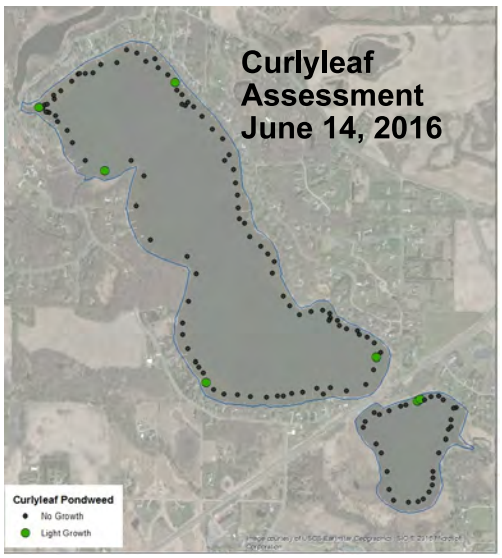
	Aug 28, 2019 PI	June 17, 2020 Meander	June 24, 2021 Meander	Aug 20, 2021 PI	June 10, 2022 PI	Sept 15, 2022 PI	June 2, 2023 PI	May 17, 2024 Meander	July 26, 2024 Meander	May 23, 2025 Meander	July 28, 2025 Meander
Bulrush (*Typha sp*)				4	2	1	2				
Spatterdock (*Nuphar advena*)	38	27	79	71	25	51	11				
White lilies (*Nymphaea odorata*)	21	7	8	8	36	19	50				
Cabbage (*Potamogeton amplifolius*)	4	2		8	3	2	13				
Chara (*Chara sp*)					18		5				
Coontail (*Ceratophyllum demersum*)	32	8		22	26	3	6				
Curlyleaf (*P. crispus*)		2	3	20	26		32	38		68	5
Elodea (*Elodea canadensis*)				2	16						
EWM (*Myriophyllum spicatum*)	36	58	50	118	35		1	1	11	42	46
Flatstem (*P. zosteriformis*)	7			3	9	1	7				
Illinois (*P. illinoensis*)	10			12	2						
Naiad (*Najas sp*)	1			2	7						
Narrowleaf (*P. sp*)							1				
NWM (*M. sibiricum*)					1						
Sago (*Stuckenia pectinata*)	1			2		2	7				
Stringy (*P. sp*)	1			7	10		29				
Water celery (*Vallisneria americana*)					1						
Water stargrass (*Heteranthera dubia*)	1						1				
Total number of species	11			13	15	7	13				

Previous CLP and EWM Delineation or Assessments

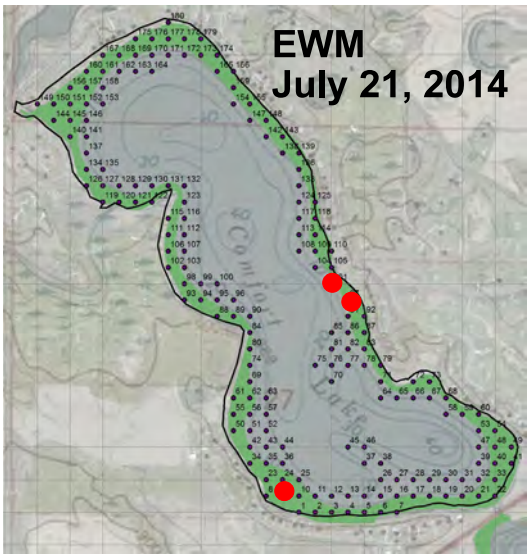
Curlyleaf Pondweed 2014-2025

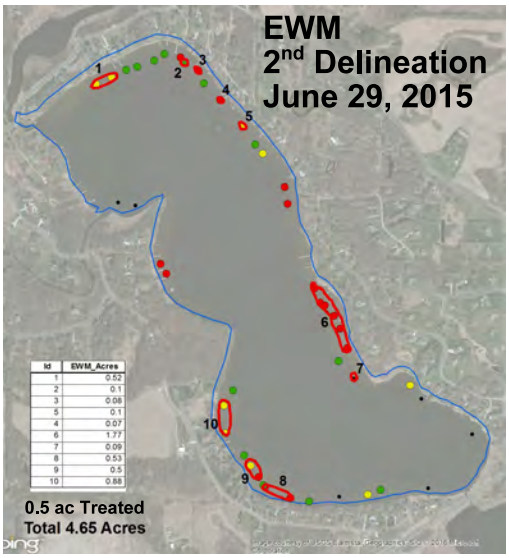


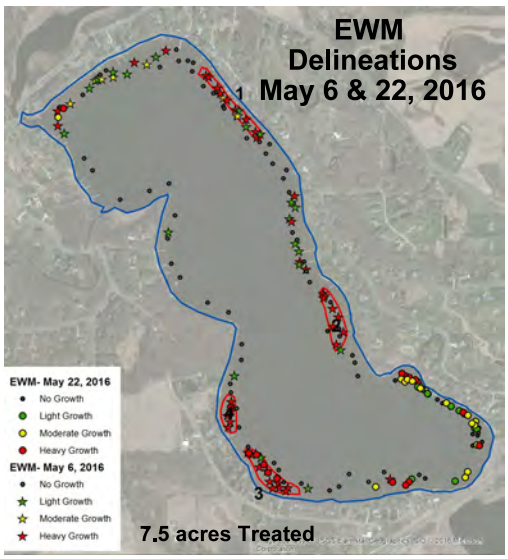




Eurasian Watermilfoil 2014-2025



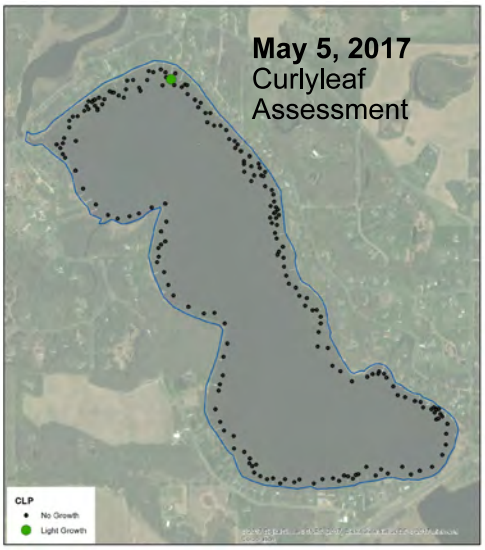


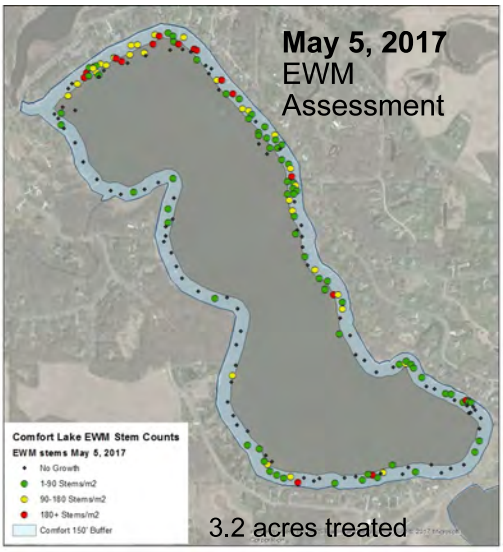


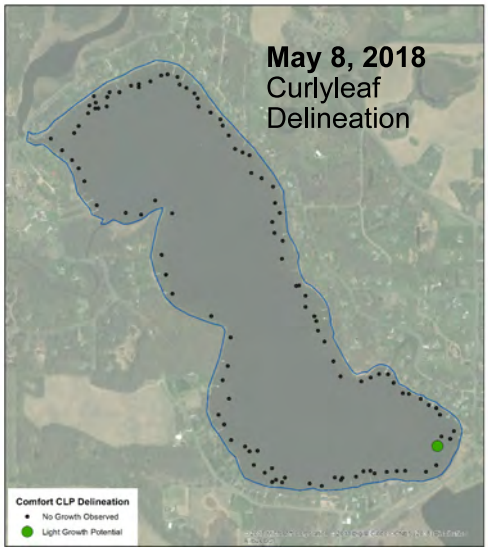
Curlyleaf pondweed and Eurasian watermilfoil maps for 2014 through 2025

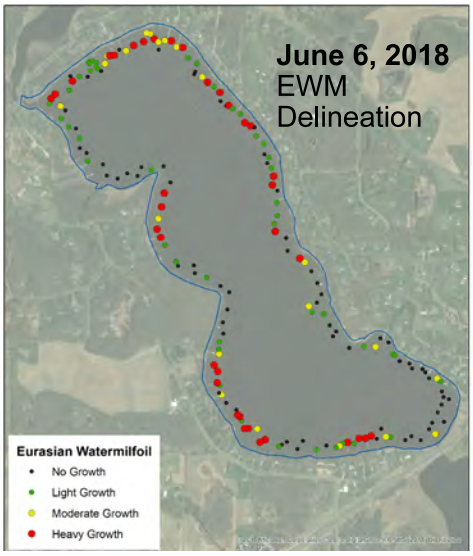
Curlyleaf Pondweed 2014-2025

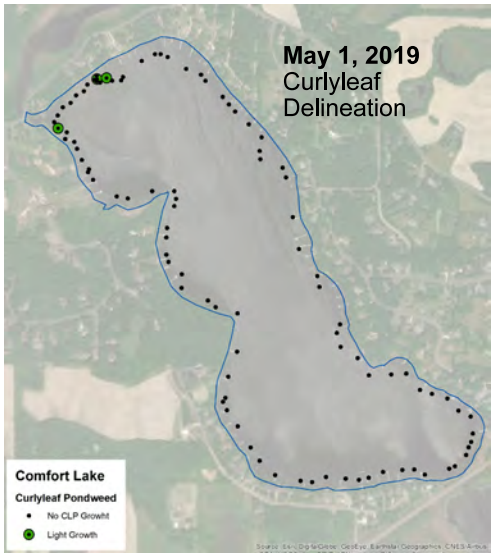
Eurasian Watermilfoil 2014-2025

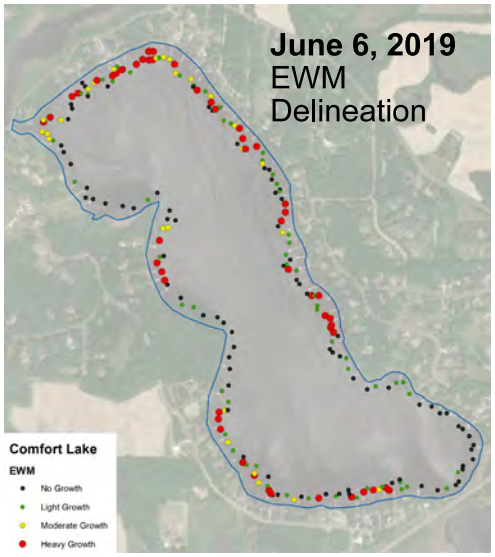








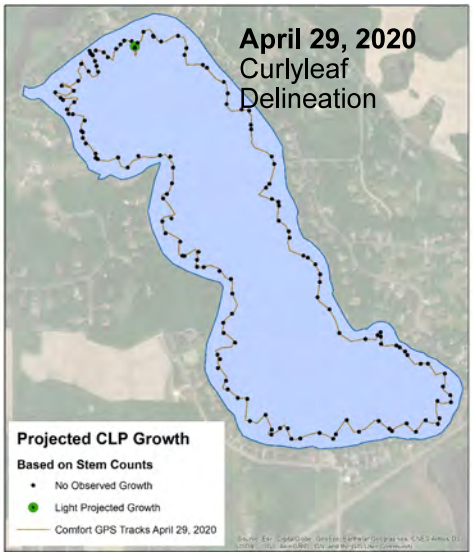


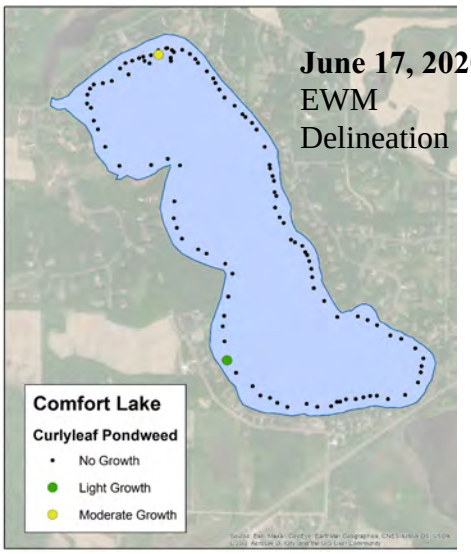


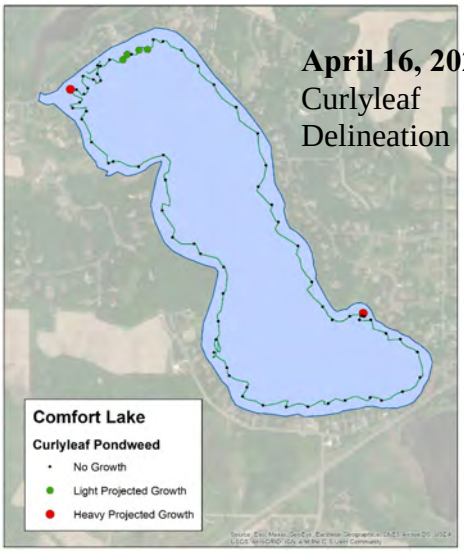
Curlyleaf pondweed and Eurasian watermilfoil maps for 2014 through 2025.

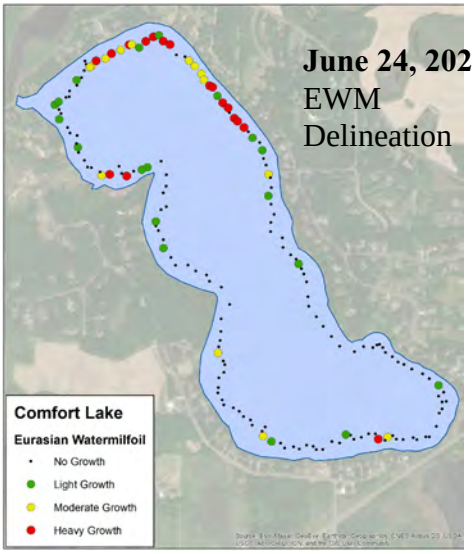
Curlyleaf Pondweed 2014-2025

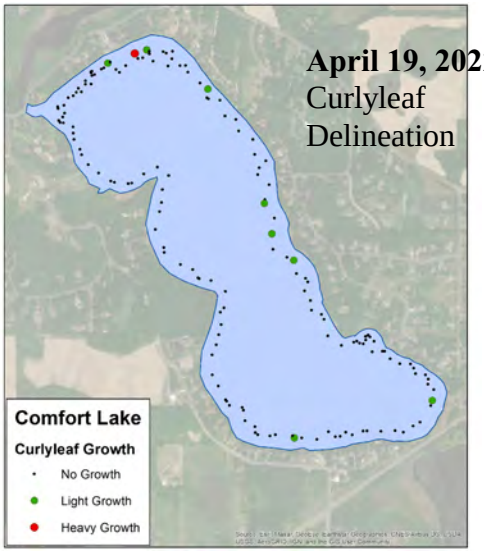
Eurasian Watermilfoil 2014-2025

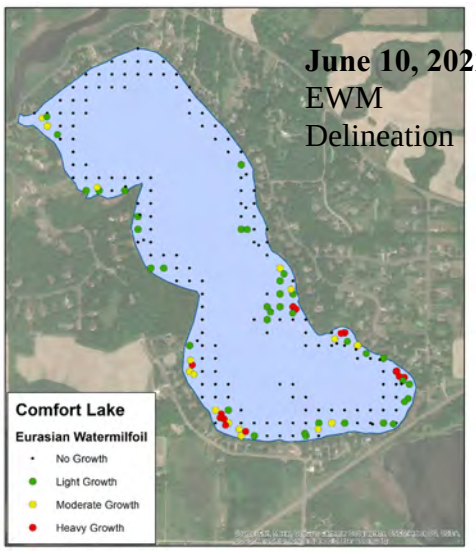










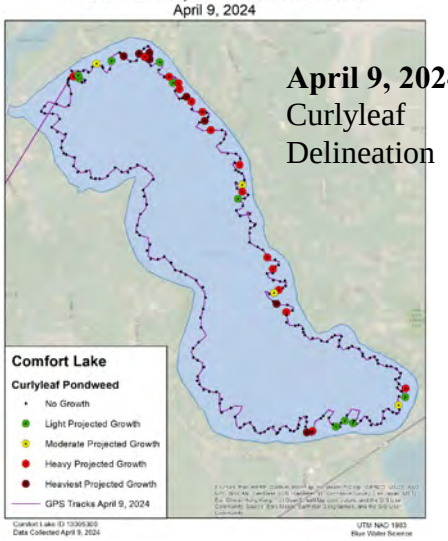


Curlyleaf pondweed and Eurasian watermilfoil maps for 2014 through 2025.

Curlyleaf Pondweed 2014-2025

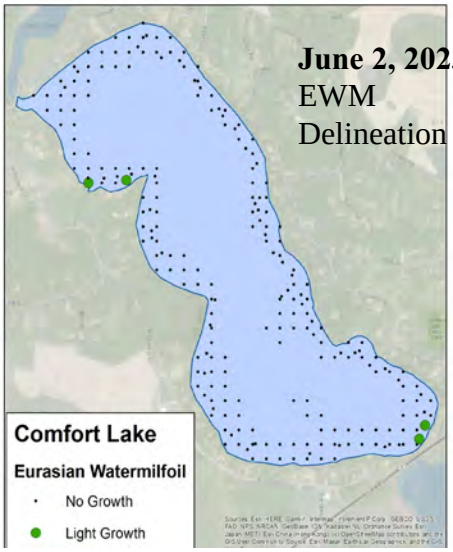
April 24, 2023
Curlyleaf
Delineation

Comfort Lake Curlyleaf Pondweed Delineation
April 9, 2024



April 9, 2024
Curlyleaf
Delineation

Eurasian Watermilfoil 2014-2025



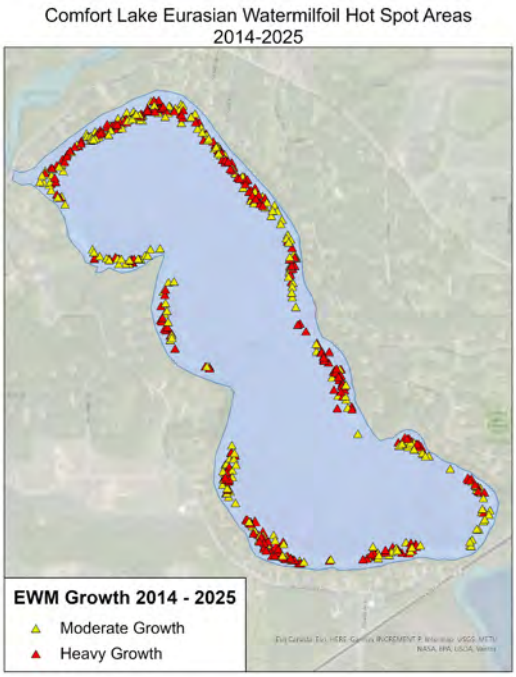
June 2, 2023
EWM
Delineation

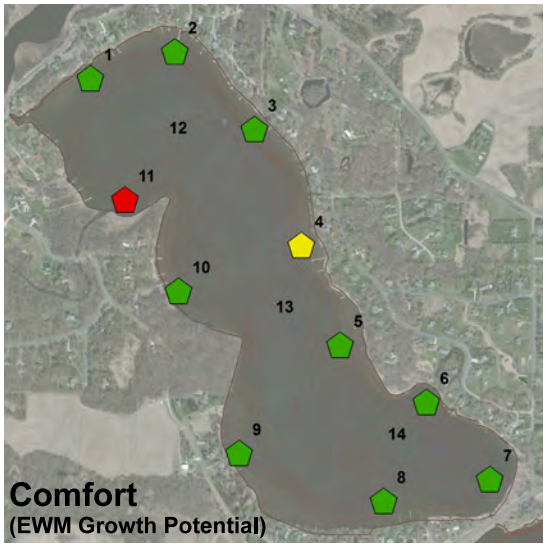
Comfort Lake Eurasian Watermilfoil Growth
May 17, 2024

May 17, 2025
EWM
Delineation

Curlyleaf pondweed and Eurasian watermilfoil maps for 2014 through 2025.

Milfoil Hotspots and Growth Potential in Comfort Lake: Eurasian watermilfoil was first observed in Comfort Lake in 2014. Areas of moderate and heavy growth of EWM for 2015 through 2025 are shown on the hotspot map in Figure 9. In the last couple of years EWM has nearly ringed the lake with growth (Figure 9). However lake sediment nitrogen concentrations collected in 2014 found mostly low nitrogen, except for 1 location near the Comfort Lake inlet (Figure 9). High nitrogen is correlated with heavy milfoil growth. EWM is still in a heavy growth mode that is typical of new invasive species. EWM growth will likely be reduced in the future but is difficult to pin down a year.





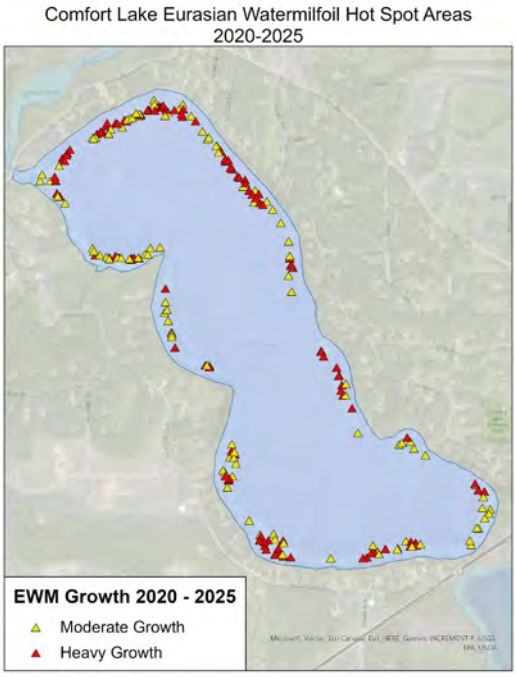


Figure 9. [top-left] EWM growth distribution and density for 2014-2025.
[top-right] EWM potential growth based on lake sediment analyses for Comfort Lake.
[bottom-left] EWM growth distribution and density for 2020-2025.
Key: green = light growth, yellow = moderate growth, and red = heavy growth.