



Looking Out from the Public Access on Bone Lake, April 7, 2025

Curlyleaf Pondweed and Eurasian Watermilfoil Meander Surveys for Bone Lake, Washington County, Minnesota, 2025

	Delineation	Treatment	Assessment
CLP	April 7, 2025	3.66 acres were treated	May 23, 2025
EWM	May 23, 2025	No EWM treatment	July 28, 2025

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



December 3, 2025

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Curlyleaf Pondweed and Eurasian Watermilfoil Meander Surveys for Bone Lake, Washington County, Minnesota, 2025

Summary

Curlyleaf Pondweed Delineation and Assessment: Bone Lake (MnDNR ID #82-0054) is a 221 acre lake located in Washington County, Minnesota. On April 7, 2025 the curlyleaf pondweed (CLP) delineation survey sampled 163 sites. Curlyleaf pondweed growth was light and sparse and was found at 28 sample sites (Figure 1). One area of 3.66 acres was delineated for treatment in 2025.

Treatment was conducted in 2025.

A CLP assessment was conducted on May 23, 2025, during the peak growth of CLP. Curlyleaf was sampled at 66 sites at light to heavy growth conditions on May 23, 2025 (Figure 1). It appears some curlyleaf sprouted after the April 7, 2025 delineation.

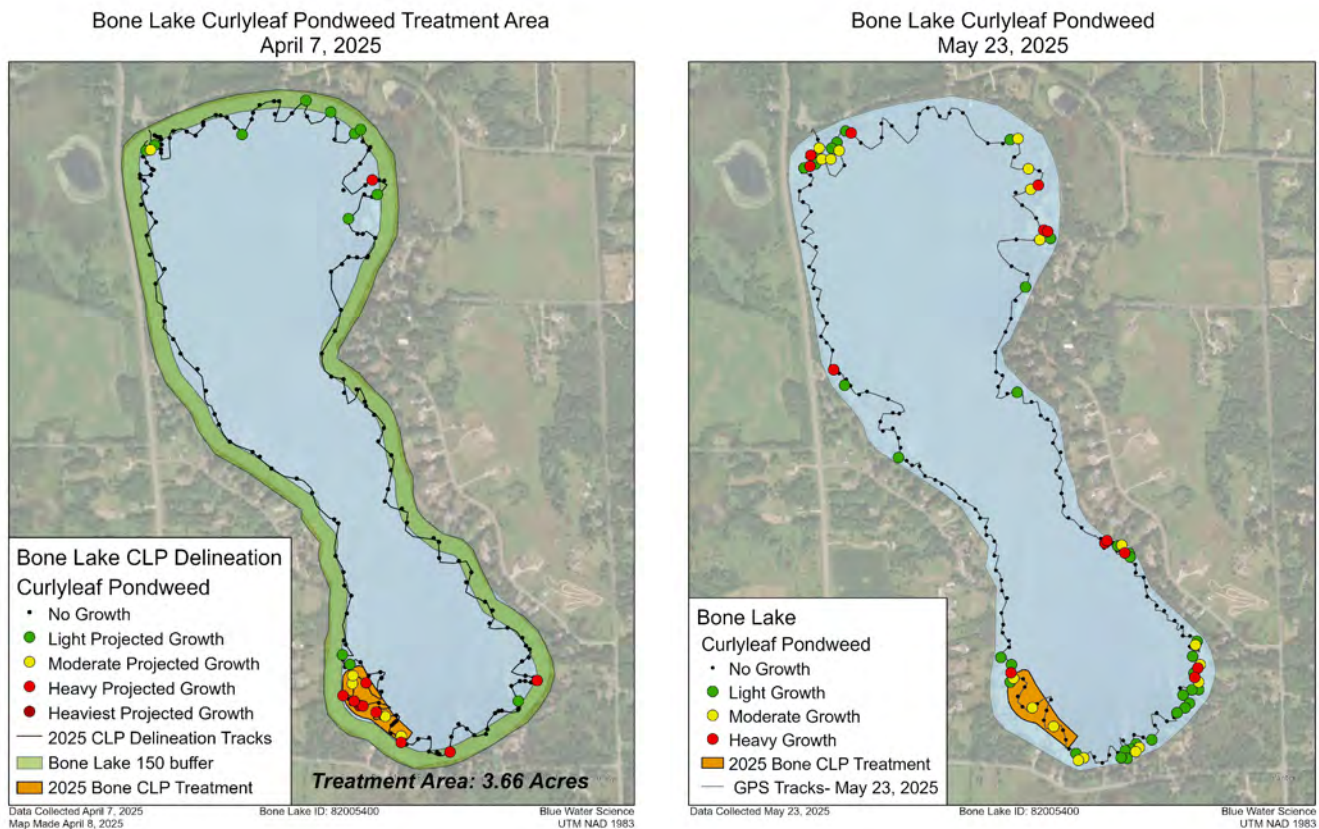


Figure 1. [left] CLP was found at 28 out of 163 sample sites in Bone Lake on April 7, 2025.

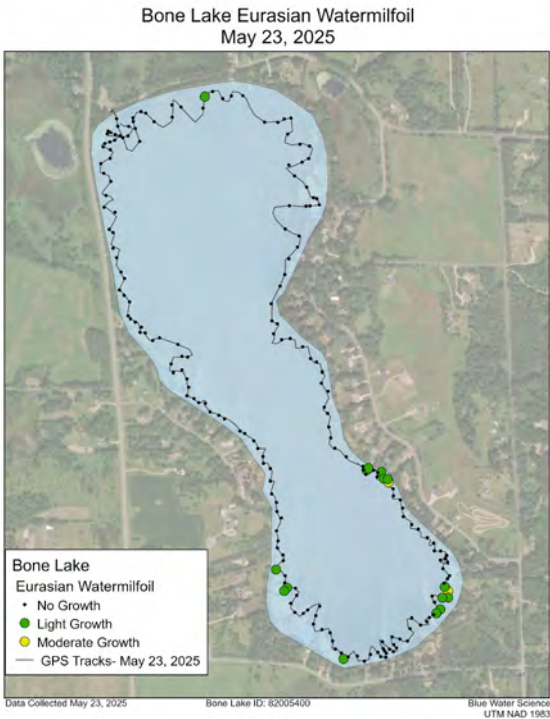
[right] CLP was found at 66 out of 212 sample sites on May 23, 2025.

Key: green = light growth potential, yellow = moderate growth potential, and red = heavy growth potential.

Eurasian Watermilfoil Delineation and Assessment: Eurasian watermilfoil was verified in Bone Lake in 2006. On May 23, 2025, Eurasian watermilfoil (EWM) was found at 17 sites out of 212 sites sampled. Eurasian watermilfoil growth was light and sparse (Figure 2).

No EWM treatment was conducted in 2025.

An assessment conducted with a meander survey occurred on July 28, 2025. Eurasian watermilfoil was sampled at 25 sites out of 252 sample locations out to 7 feet (depth of plant growth). EWM density was mostly light in 2025 (Figure 2).



Summary of CLP and EWM Observations in 2025

Table 1. Number of observations of CLP and EWM for the meander surveys. The number of parentheses is the total number of samples.

	Curlyleaf Pondweed	Eurasian Watermilfoil
April 7, 2025	28 (n=163)	0 (n=163)
May 23, 2025	66 (n=212)	17 (n=212)
July 28, 2025	17 (n=252)	25 (n=252)

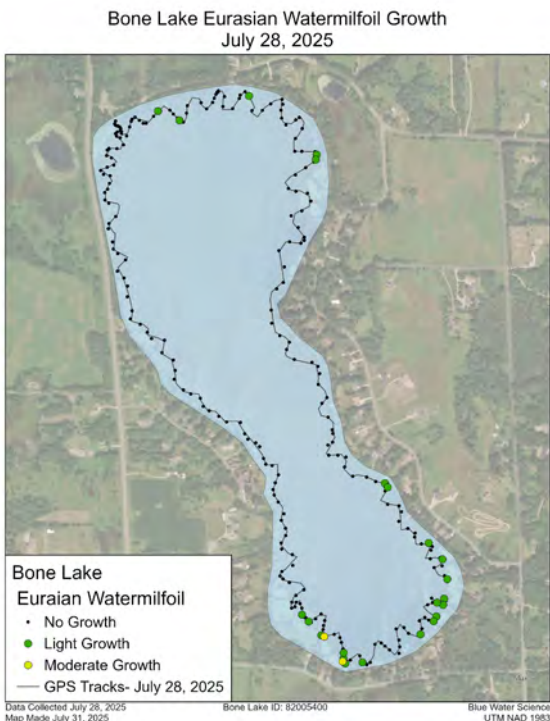


Figure 2. [top-left] EWM coverage for Bone Lake on May 23, 2025. [bottom] EWM coverage on for Bone Lake on July 28, 2025.

Summary of CLP and EWM Bone Lake Treatments from 2014 through 2025: CLP has been treated in 6 out of the last 12 years. EWM has been treated in 3 out of the last 12 years. In 2025, 3.66 acres of CLP was treated. EWM was not treated in 2025 (Figure 3).

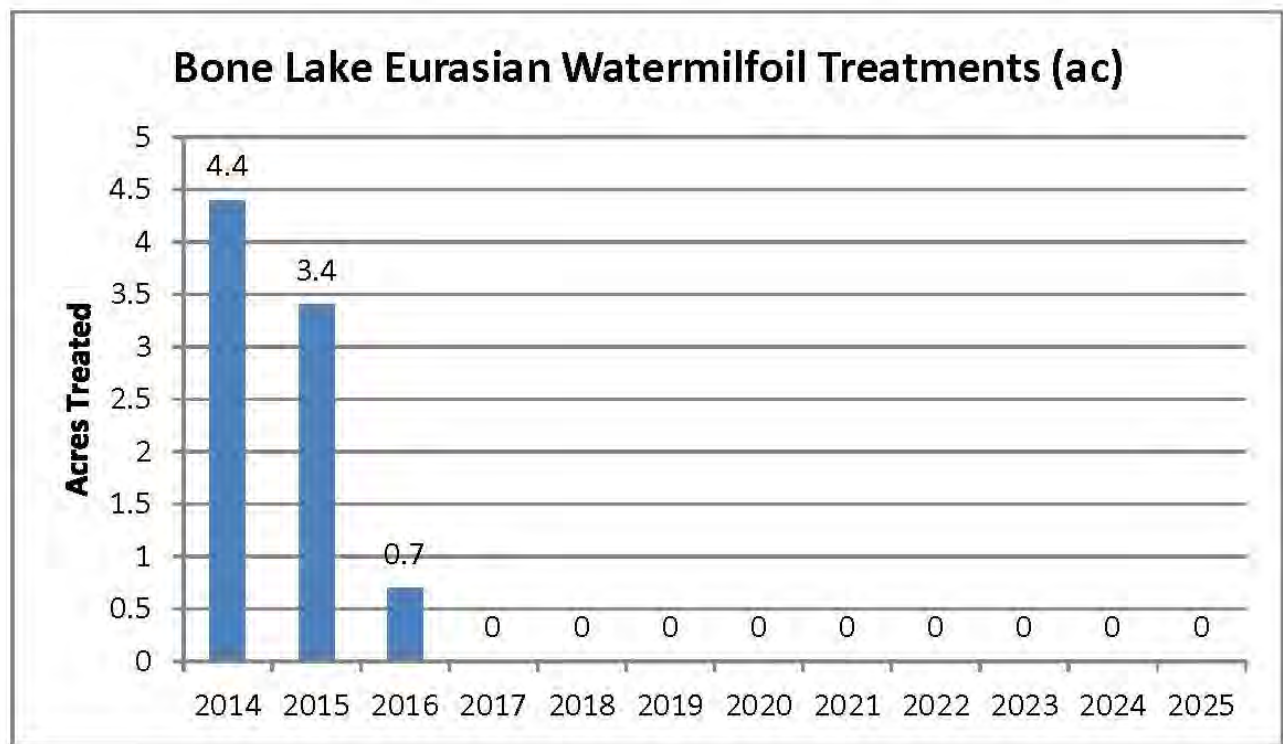
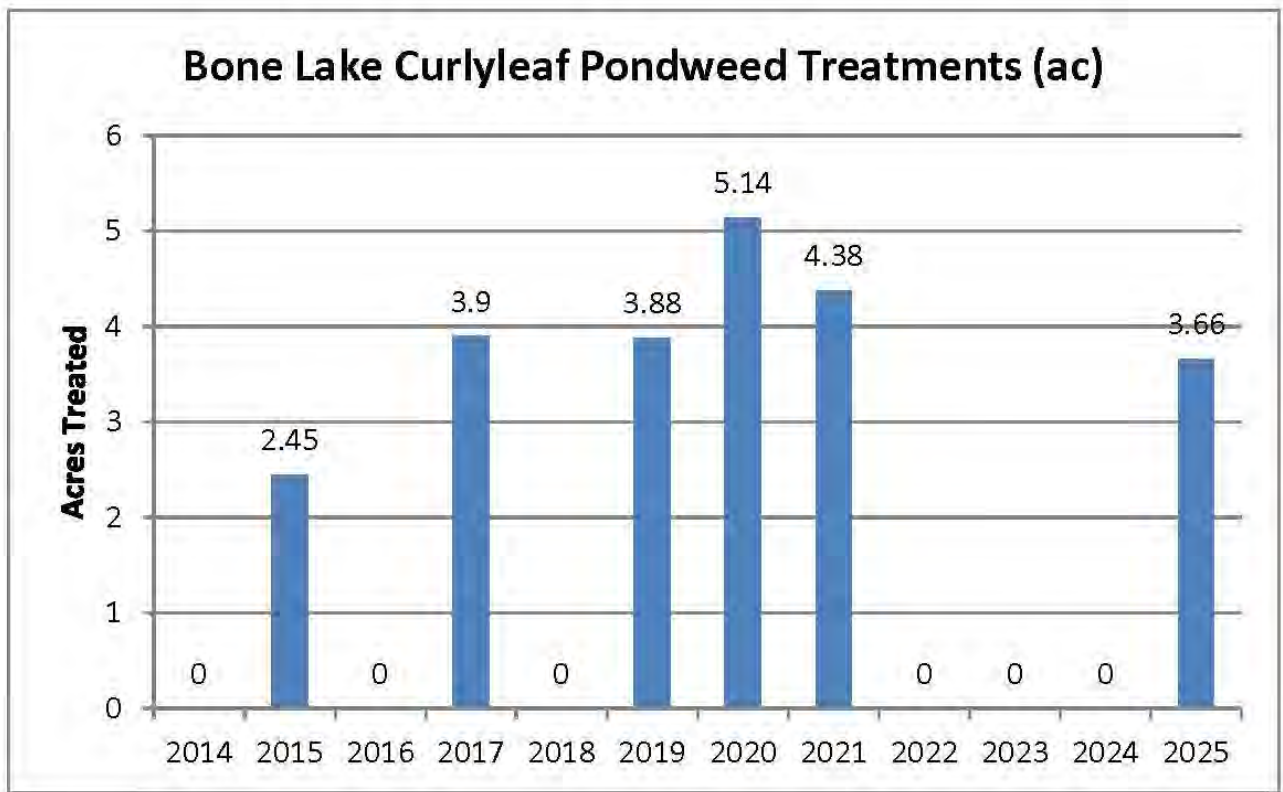


Figure 3. Summary of CLP and EWM treatment acreage for 2014-2025.

Curlyleaf and Milfoil Treatments from 2015-2025: A summary of CLP and EWM treatments from 2015 through 2025 is shown in Figure 4. Curlyleaf pondweed growth has fluctuated over the years. No treatment was conducted in 2022 through 2024. EWM treatment areas have decreased since 2014 with no treatment occurring 2017 through 2025 in Bone Lake.

A hotspot map of sites of CLP and EWM that show moderate and heavy growth for 2015 through 2025 is shown in Figure 4. CLP and EWM have typically grown to a water depth of 7 feet or less.

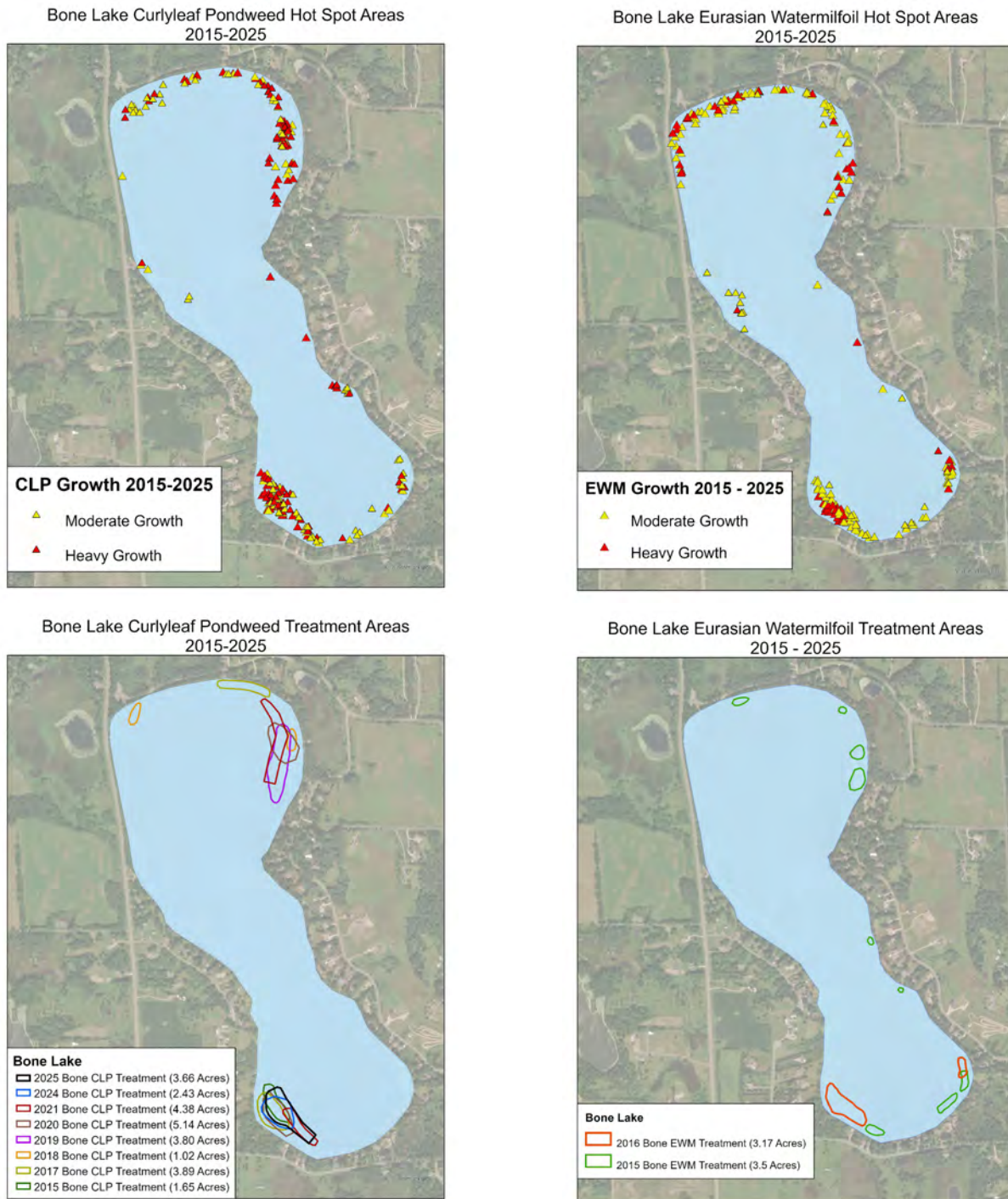


Figure 4. [top-left] Hot spot map of CLP growth over the years of 2015-2025 placed on a single map. [top-right] Hot spot map of EWM growth over the years of 2015-2025 placed on a single map. [bottom-left] CLP treatment map over the years of 2015-2025. [bottom-right] EWM treatment map over the years of 2015-2025.

Curlyleaf Pondweed and Eurasian Watermilfoil Meandering Surveys for Bone Lake, Washington County, Minnesota, 2025

Bone Lake, Washington County (ID: 82-0054)

Size: 221 acres (MnDNR)

Littoral area: 124 acres (MnDNR)

Maximum depth: 30 ft (MnDNR)

Introduction

Curlyleaf pondweed (CLP) and Eurasian watermilfoil (EWM) are non-native species and both are present in Bone Lake. Curlyleaf pondweed and Eurasian watermilfoil delineations and assessments were conducted in Bone Lake in 2025. The objectives of the delineations were to locate areas of nuisance invasive species and recommend areas for potential treatments. The purpose of the assessments were to determine if any nuisance growth of CLP or EWM were missed during the delineations.

Methods

Curlyleaf Pondweed Delineation Method for Projected Growth: At the time of the spring curlyleaf delineation on April 7 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 m²), if one or two stems (10-20 stems/m²) 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/m²) were collected per rake sample future potential growth was considered to be moderate. However if 4 curlyleaf stems (40 stems/m²) 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.org/10.1080/10402381.2015.1014583>

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 5).

Curlyleaf Assessment and Eurasian Watermilfoil Delineation and Assessment Sampling: An initial EWM delineation along with a CLP assessment were conducted on May 23 and 212 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

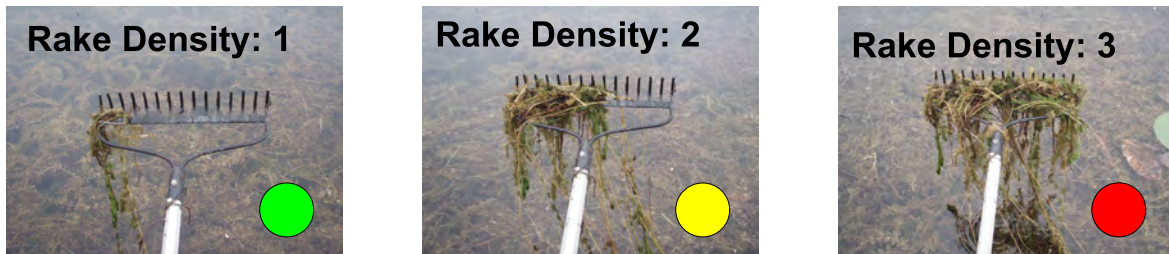


Figure 5. Aquatic plant density ratings from 1 to 3.

Curlyleaf Pondweed Delineation on April 7, 2025

A CLP delineation was conducted on April 7, 2025 and found CLP present at 28 sample sites out of a total of 163 sites. Curlyleaf pondweed growth was light to heavy. In a few locations CLP was present but nuisance conditions were minimal. A CLP treatment of 3.66 acres was recommend in 2025 (Figure 6).

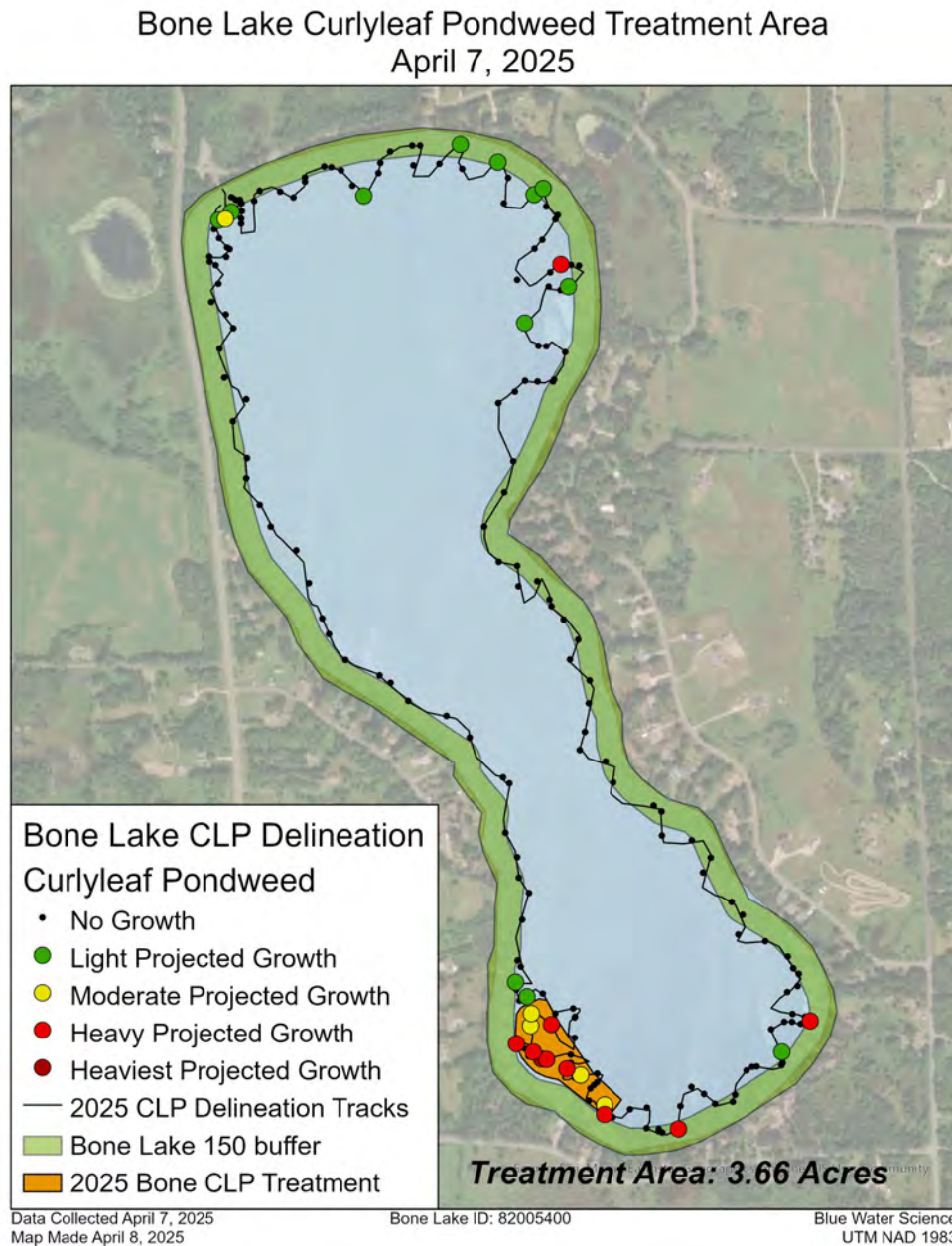


Figure 6. Curlyleaf coverage for Bone Lake on April 7, 2025. Key: black dot = no growth, green dots = light growth, yellow dot = moderate growth, red dot = heavy growth, light green = 150 ft buffer, and orange = treatment area.

Curlyleaf Pondweed Assessment on May 23, 2025

A curlyleaf pondweed assessment was conducted on May 23, 2025 and found CLP was present at 66 sites out of the 212 sample sites (Figure 7). Curlyleaf growth in the treated area was good. However, new curlyleaf growth had sprouted since April 7, 2025. Curlyleaf was growing in a number of locations, producing heavy growth at 13 individual sites and moderate growth at an additional 19 sites.

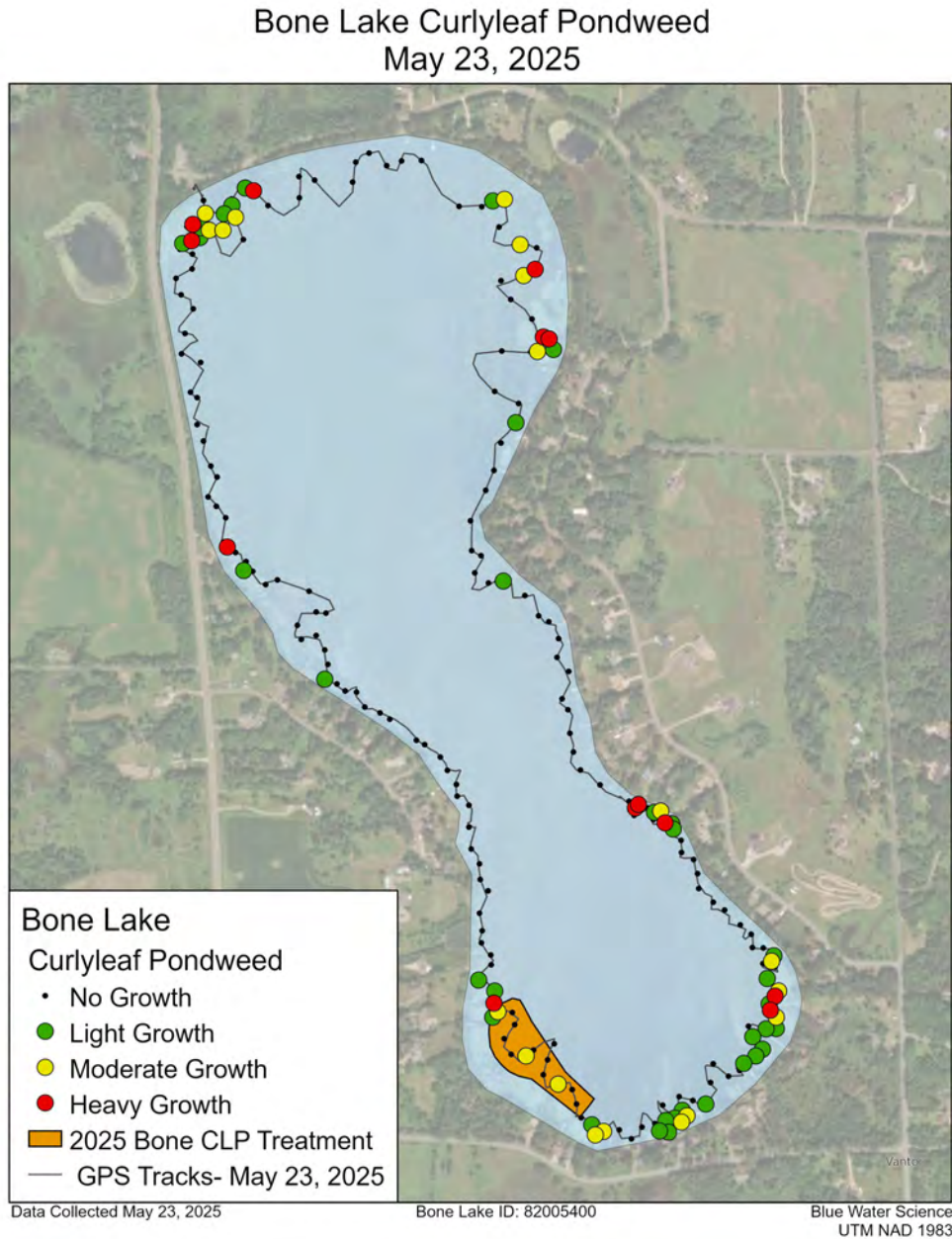


Figure 7. Curlyleaf growth in Bone Lake on May 23, 2025.

Key: black dot = no curlyleaf growth, green dot = light growth, yellow dot = moderate growth, and red dot = heavy growth.

Eurasian Watermilfoil Delineation on May 23, 2025

An EWM delineation was conducted on May 23, 2025. Eurasian watermilfoil was sampled at 17 sites out of 212 sites sampled and had mostly light growth (Figure 8).

No treatment areas were delineated for 2025.

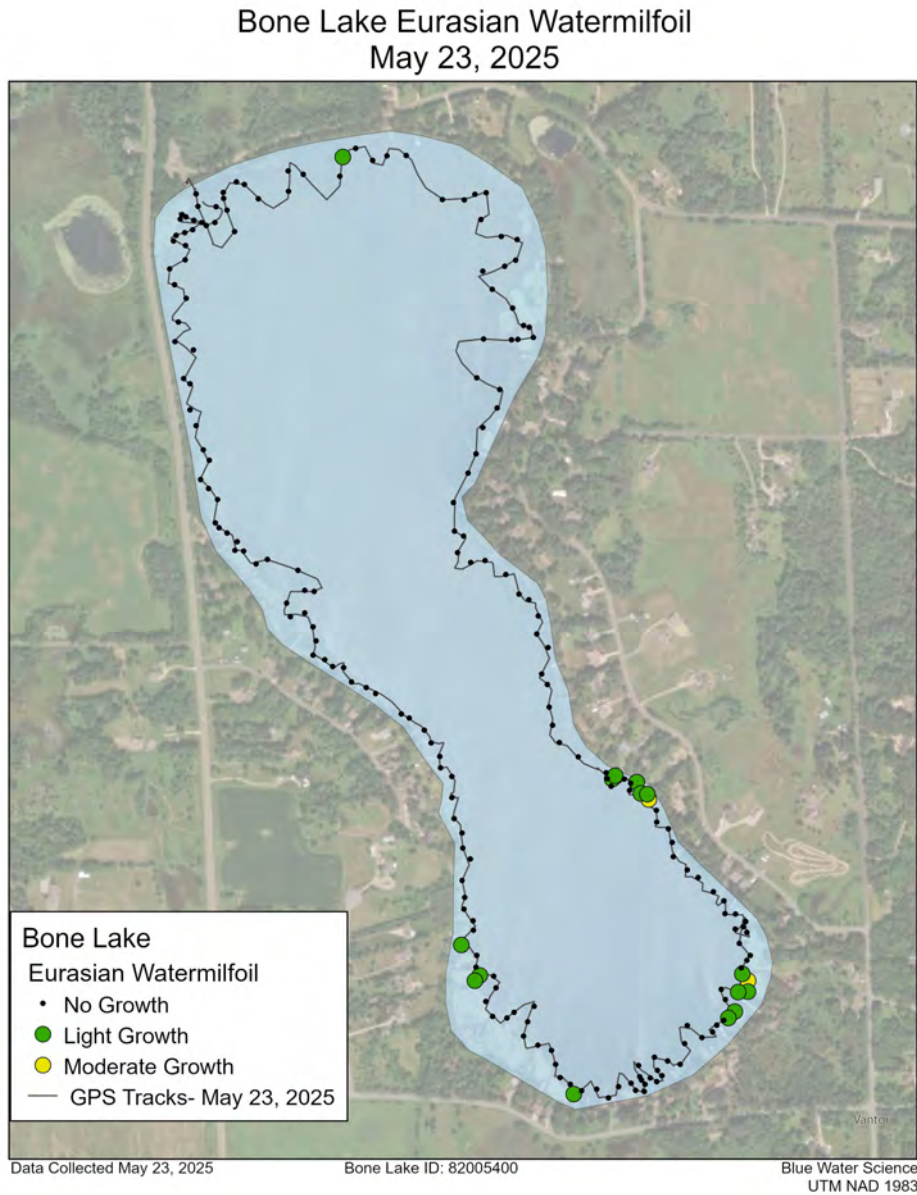


Figure 8. Eurasian watermilfoil coverage for Bone Lake on May 23, 2025.
Key: black dot = no growth, green dots = light growth, and yellow dots = moderate growth.

Late Summer Meandering Survey July 28, 2025

The late summer GPS meander survey found EWM growth at 25 sites producing light growth. Eurasian watermilfoil was sparse and scattered and growing at single stem densities. Several other aquatic plant species were noted in the survey including coontail, naiad, sago, and stringy pondweed.

Bone Lake Eurasian Watermilfoil Growth
July 28, 2025

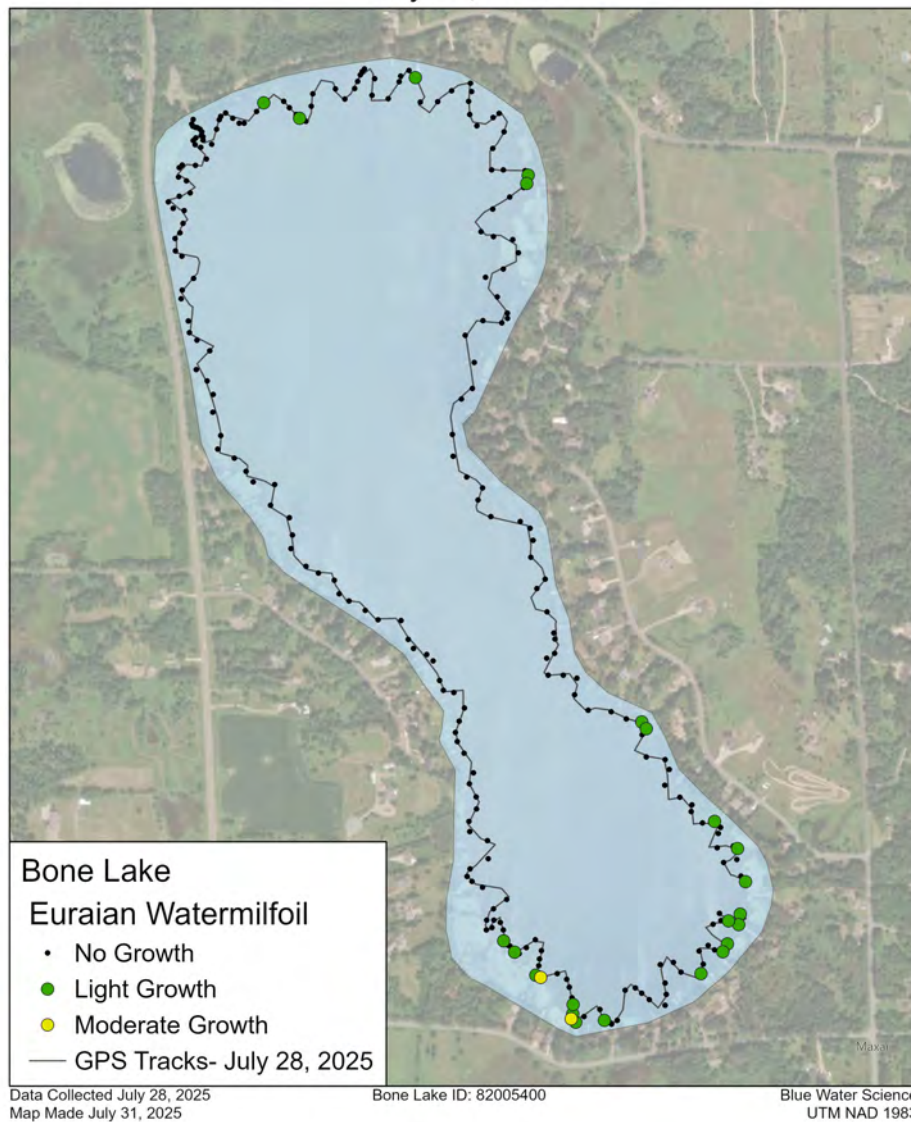


Figure 9. Eurasian watermilfoil coverage for Bone Lake on July 28, 2025.
Key: black dot = no growth, green dots = light growth, and yellow dots = moderate growth.

APPENDIX

Curlyleaf Pondweed and Eurasian Watermilfoil Assessments From 2014 - 2025

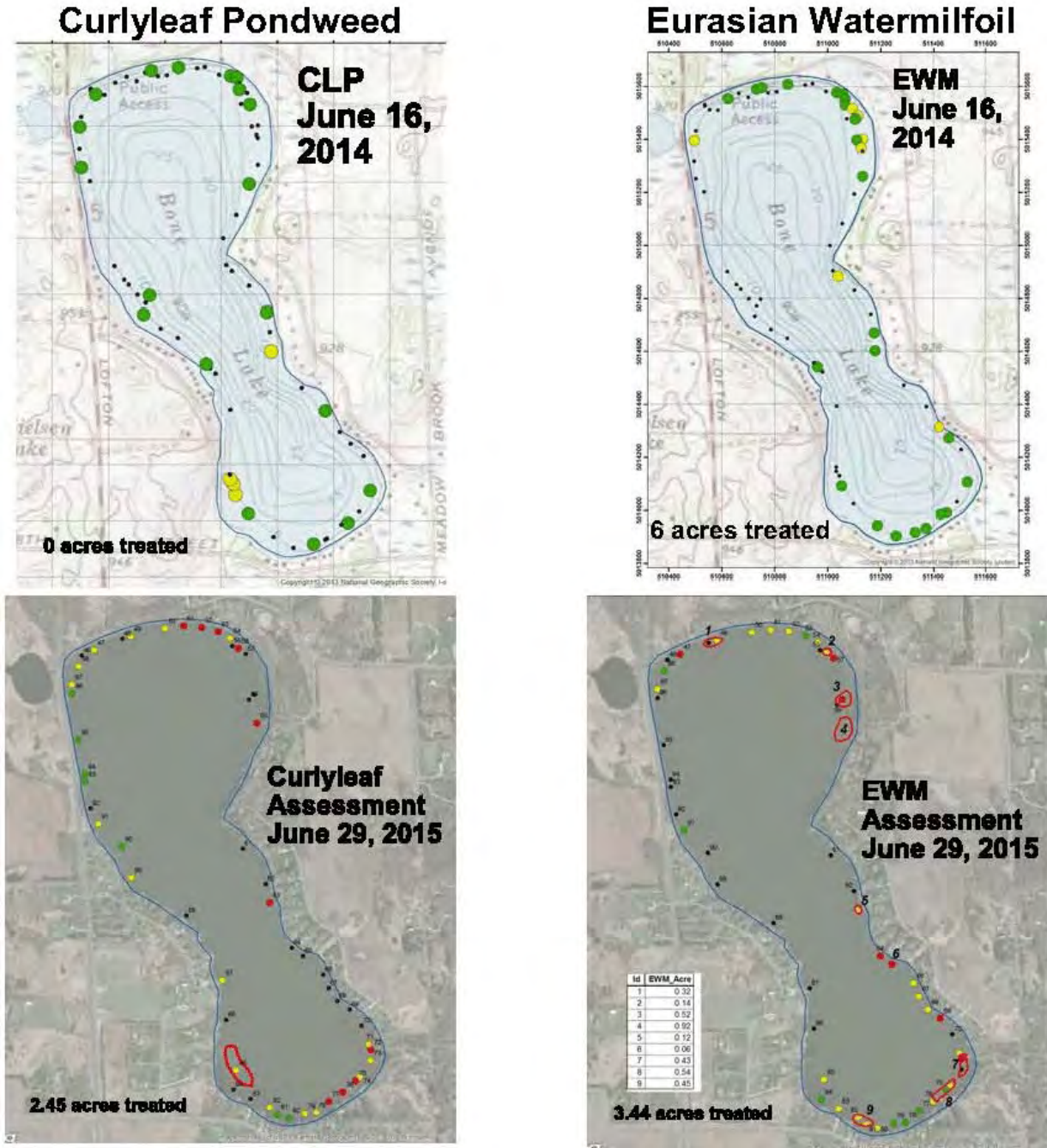
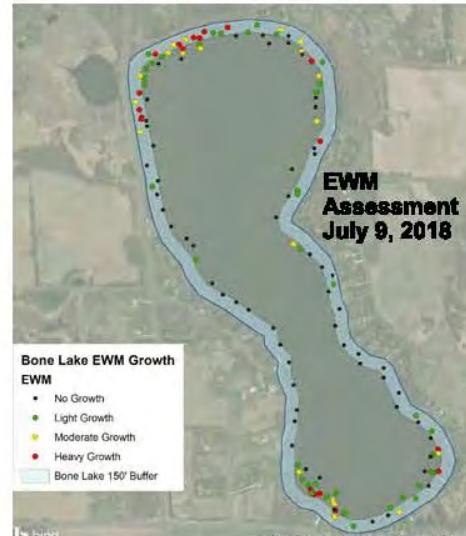
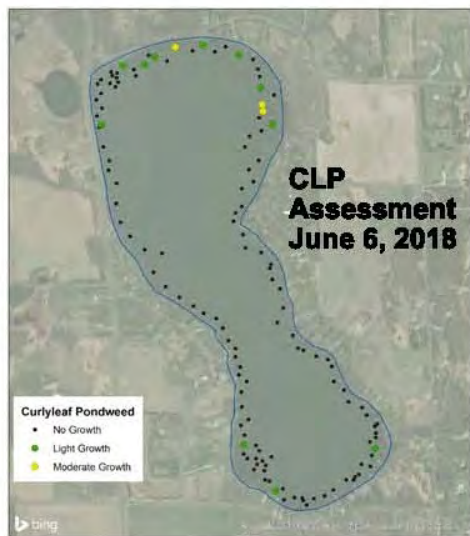
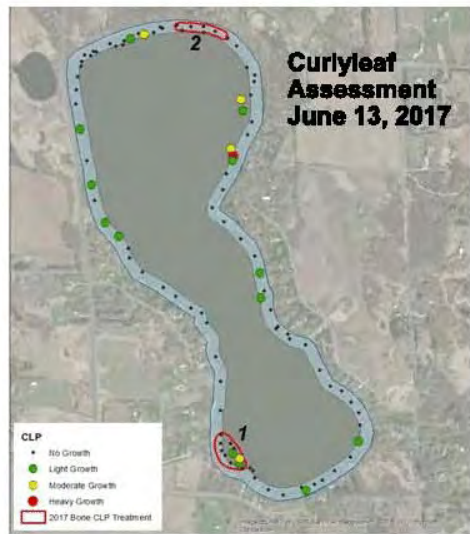
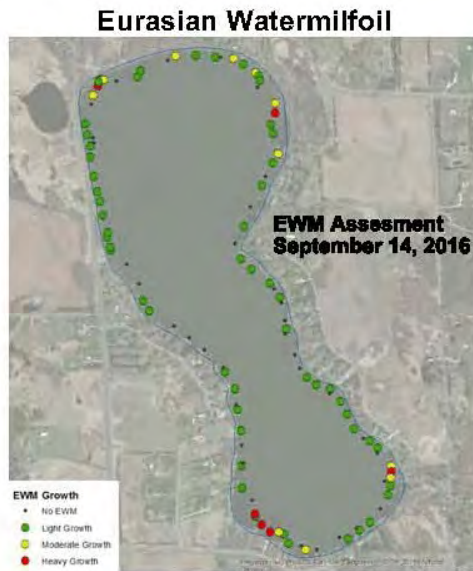
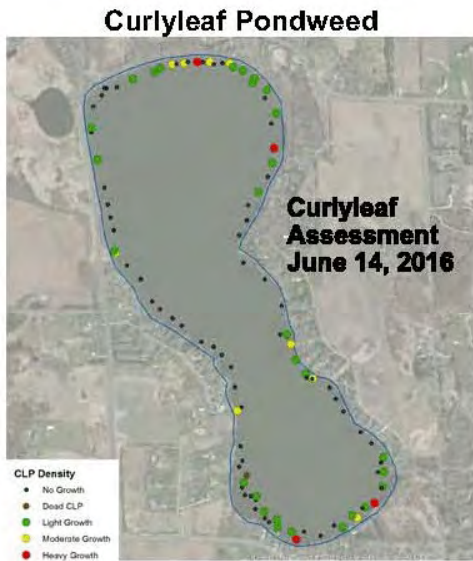
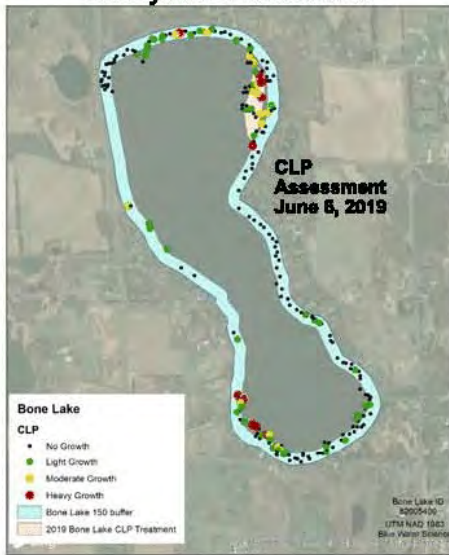


Figure 10. CLP and EWM maps for 2014 through 2024 (continued on the next few pages).



CLP and EWM maps for 2014 through 2024.

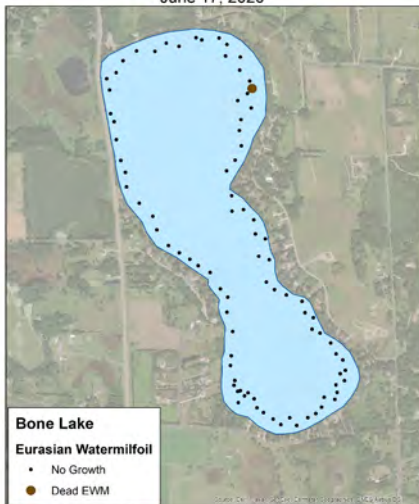
Curlyleaf Pondweed



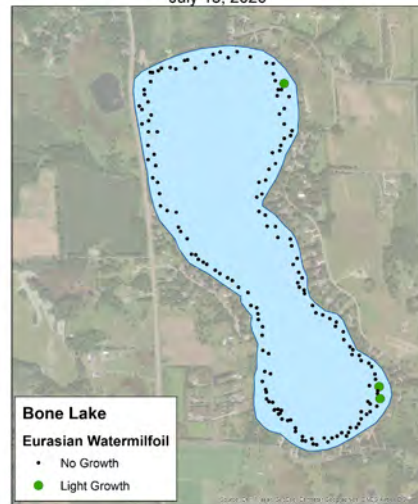
Eurasian Watermilfoil



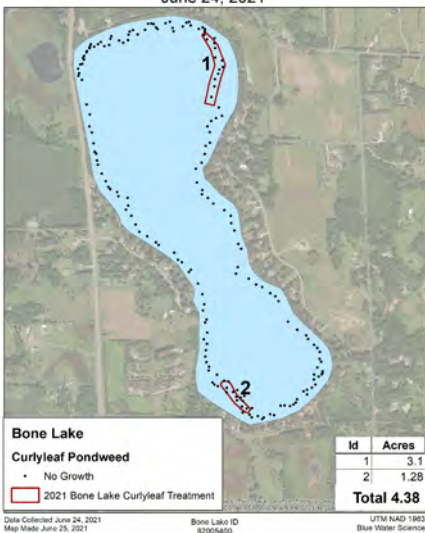
Bone Lake Eurasian Watermilfoil June 17, 2020



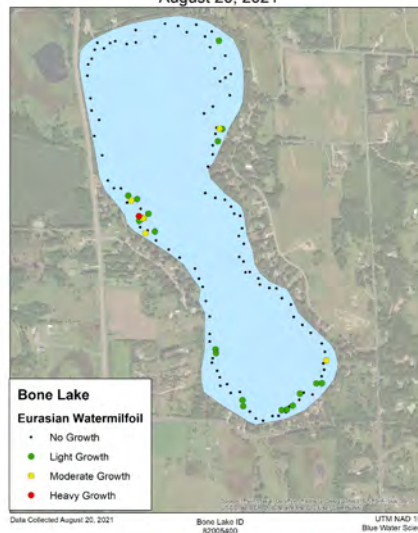
Bone Lake Eurasian Watermilfoil July 15, 2020



Bone Lake Curlyleaf Pondweed Assessment June 24, 2021

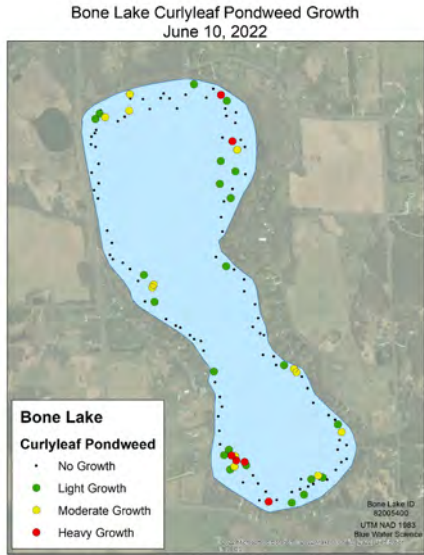


Bone Lake Eurasian Watermilfoil August 20, 2021



CLP and EWM maps for 2014 through 2024.

Curlyleaf Pondweed



Eurasian Watermilfoil

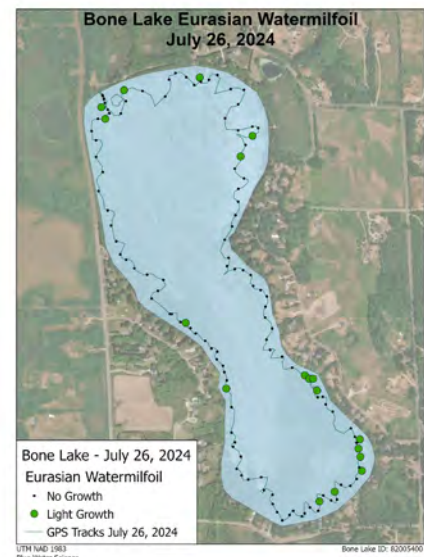
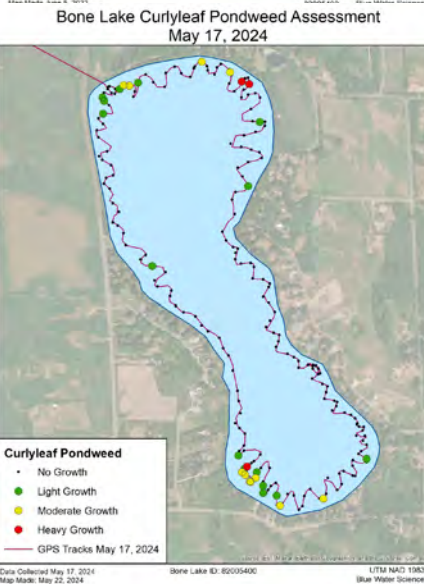
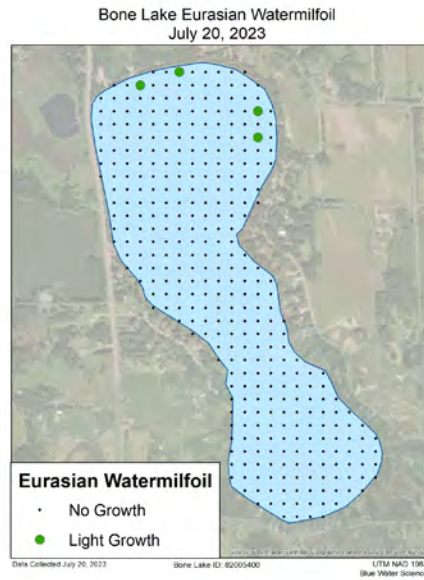
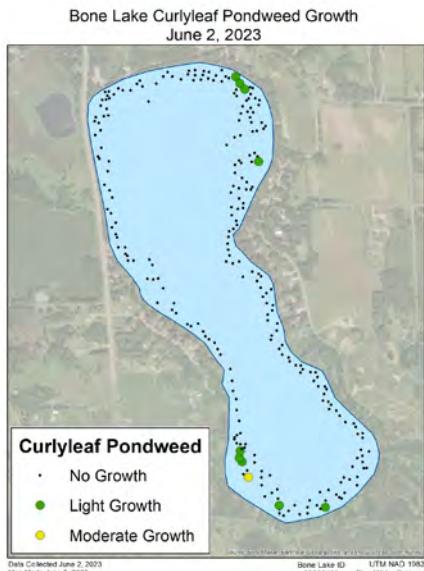
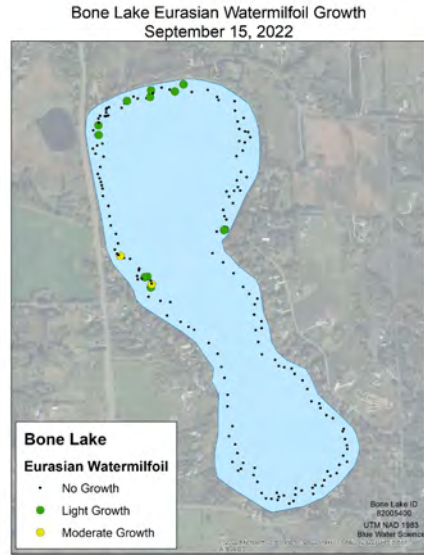


Figure 10. CLP and EWM maps for 2014 through 2024.

Curlyleaf Pondweed from 2015 - 2024

A summary of CLP hotspots from 2015 through 2024 is shown below (Figure 11). CLP growth has been variable for the last couple of years. Lake ice, snow cover, and even cloudy days can limit curlyleaf growth. A hotspot map of sites of CLP moderate and heavy growth from 2020-2024 show CLP still present in the hotspot areas, but not expanding. In the last 5 years CLP growth has been most evident in the northern and southern ends of Bone Lake where growing conditions are conducive to moderate plant growth. CLP has typically grown to a water depth of 6 feet or less.

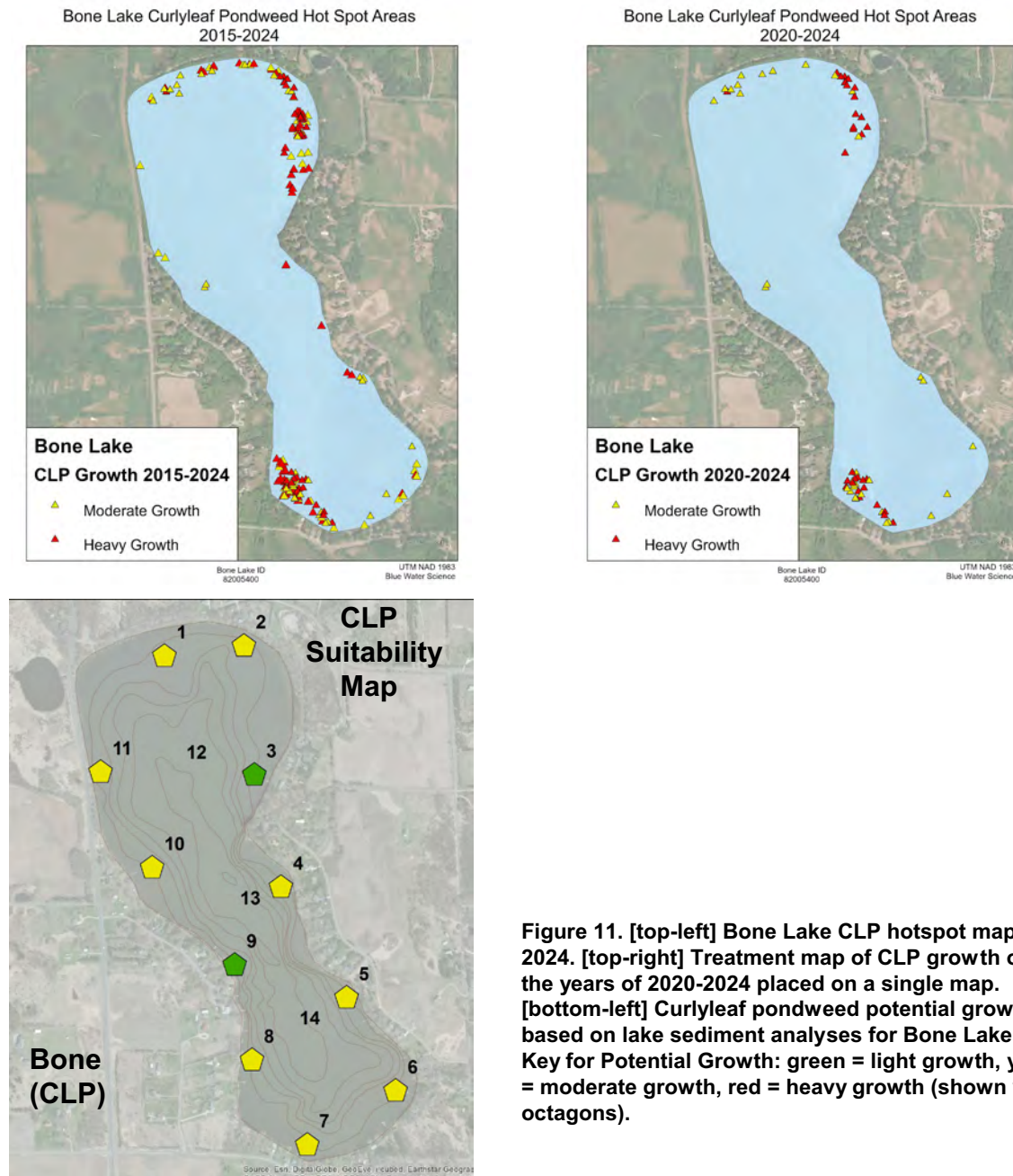


Figure 11. [top-left] Bone Lake CLP hotspot map 2015-2024. [top-right] Treatment map of CLP growth over the years of 2020-2024 placed on a single map. [bottom-left] Curlyleaf pondweed potential growth based on lake sediment analyses for Bone Lake. Key for Potential Growth: green = light growth, yellow = moderate growth, red = heavy growth (shown with octagons).

Eurasian Watermilfoil from 2015 - 2024

EWM has been in Bone Lake since 2006. Although control of EWM has been ongoing since 2006, EWM continued to expand around the lake. A map showing the occurrence of moderate to heavy growth of EWM in Bone Lake from 2015 through 2024 is shown below (Figure 12). Some nearshore areas in the north and south ends of Bone Lake support consistently significant growth. However, EWM growth has been less abundant from 2020-2024 (Figure 12).

Heavy milfoil growth has been correlated with high sediment nitrogen conditions and from a soils survey conducted in 2014, Bone Lake has at least 1 area with high lake sediment nitrogen conditions. The potential for long term milfoil growth, based on lake sediment sampling, predicts mostly moderate growth with the potential for annual heavy growth limited to the northwest side of Bone Lake.

For Bone Lake, it is estimated the plants have the potential to grow down to at least 7 feet of water depth based on low Secchi transparencies, restricting milfoil growth to nearshore areas. Results of the sediment survey indicate growth would be primarily light on a long term basis.

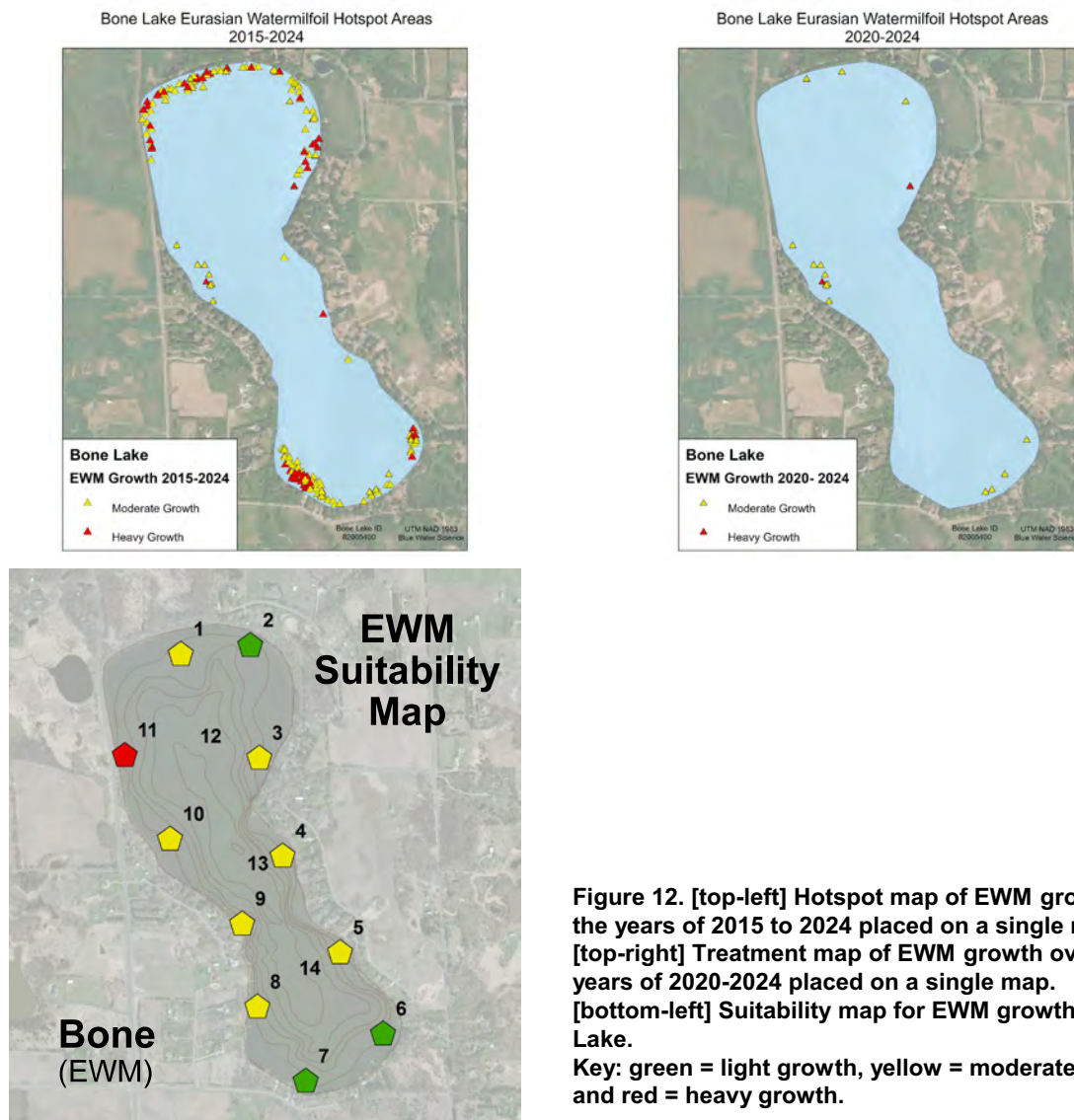


Figure 12. [top-left] Hotspot map of EWM growth over the years of 2015 to 2024 placed on a single map. [top-right] Treatment map of EWM growth over the years of 2020-2024 placed on a single map. [bottom-left] Suitability map for EWM growth in Bone Lake. Key: green = light growth, yellow = moderate growth, and red = heavy growth.