Bone Lake Inlet from Moody Lake, Washington County, Minnesota, August 2, 2018

# Point Intercept Survey for Bone Lake, Washington County, Minnesota, 2018

**Point Intercept Survey: August 2, 2018**


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

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**February 15, 2019**

# Point Intercept Survey for Bone Lake, Washington County, Minnesota, 2018

## Summary

Bone Lake (MnDNR ID #82005400) is a 221 acre lake located in Washington County, Minnesota. Water clarity had a summer average of 1.77 meters in 2017 (source: Comfort Lake/Forest Lake Watershed District).

On August 2, 2018 an aquatic plant point-intercept survey using 50 m spacing between sites was conducted on Bone Lake. The survey looked for non-native species such as curlyleaf pondweed and Eurasian watermilfoil and characterized all aquatic plants. Eleven submerged aquatic plant species and 2 water lily species were sampled on August 2, 2018 in Bone Lake.

In August, curlyleaf pondweed was found at 4 out of 126 sites (3%) and Eurasian watermilfoil was found at 55 out of 126 sites (44%). Eurasian watermilfoil was the dominant plant in Bone Lake. The most abundant native aquatic plant species were naiads (found at 42% of the sites) followed by white water lilies (found at 33% of the sites)(Table S1). Plants were found at 101 sites and grew out to 7 feet of water depth. Aquatic plants covered about 62 acres or 28% of the lake area.

**Table S1. The percent occurrence of aquatic plants for Bone Lake. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if coontail was found in 25 out of 50 stations, its percent occurrence would be 50%.**

| | August 2, 2018 % Occur (0-10 feet, 126 sites) |
|---|---|
| Purple loosestrife (*Lythrum salicaria*) | 1 |
| Spatterdock (*Nuphar variegatum*) | 13 |
| White water lily (*Nymphaea odorata*) | 33 |
| Coontail (*Ceratophyllum demersum*) | 21 |
| Chara (*Chara spp*) | 5 |
| Elodea (*Elodea canadensis*) | 3 |
| Eurasian watermilfoil (*Myriophyllum spicatum*) | 44 |
| Naiads (*Najas flexilis*) | 42 |
| Curlyleaf pondweed (*Potamogeton crispus*) | 3 |
| Floatingleaf pondweed (*P. natans*) | 1 |
| Stringy pondweed (*P. sp*) | 26 |
| Flatstem pondweed (*P. zosteriformis*) | 1 |
| Sago pondweed (*Stuckenia pectinata*) | 6 |
| Water stargrass (*Zosterella dubia*) | 2 |
| Filamentous algae | 6 |
| Number of submerged aquatic plant species | 11 |

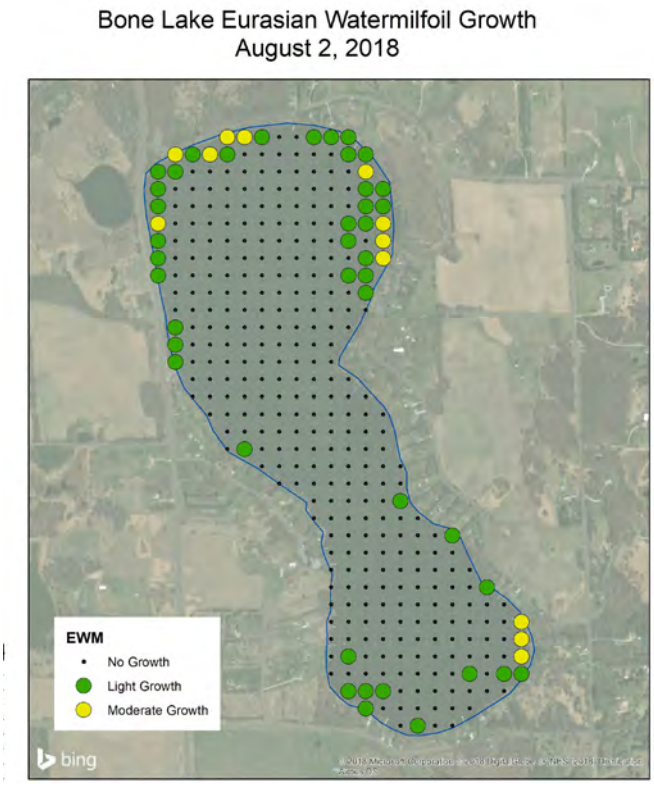



**Figure S1. Eurasian watermilfoil coverage on August 2, 2018.**
**Key: Green shading = light growth and yellow shading = moderate growth.**

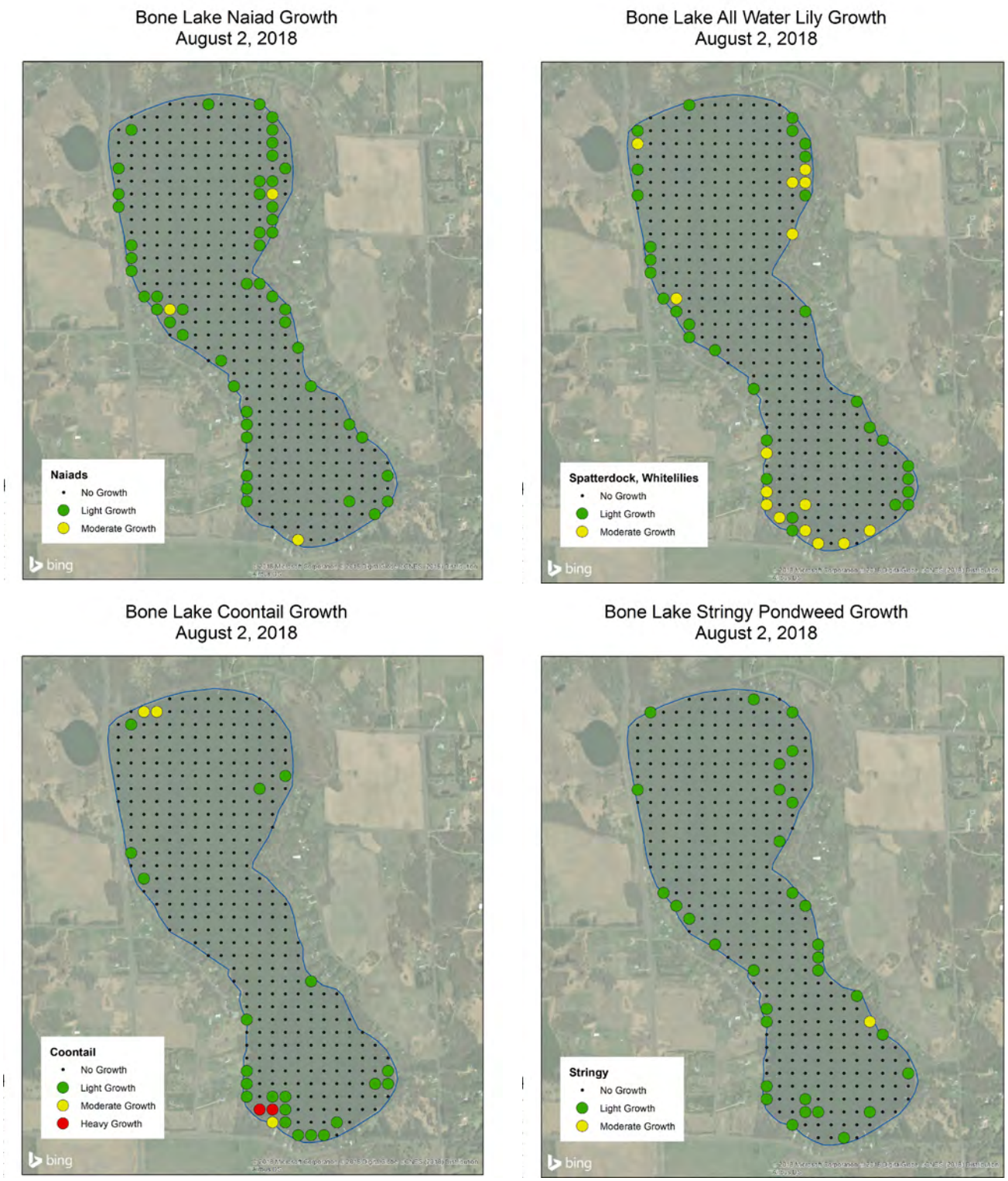



**Figure S2. Coverage maps for selected aquatic plants on Bone Lake on August 2, 2018. [top-left] Naiads. [top-right] Water lilies. [bottom-left] Coontail. [bottom-right] Stringy pondweed.**

**Conclusions:** The aquatic plant community in 2018 had 11 species of submerged plants. This is a good plant diversity condition. Aquatic plant coverage was estimated at 28% (62 acres) of Bone Lake. Lake research studies have shown if plant coverage is 40% or more, clear water conditions are sustainable. For Bone Lake, 40% coverage goal would be 88 acres in Bone Lake.

# Point Intercept Survey for Bone Lake, Washington County, Minnesota, 2018

**Bone Lake, Washington County (ID: 82005400)**
**Size: 221 acres (MnDNR)**
**Littoral area: 124 acres (MnDNR)**
**Maximum depth: 32 ft (CLFLWD)**

## Introduction

A point intercept survey was conducted on August 2, 2018 on 221 acre Bone Lake, Washington County, to characterize the aquatic plant conditions and to check for non-natives including curlyleaf pondweed and Eurasian watermilfoil.

## Methods

An aquatic plant survey of Bone Lake using a point intercept sampling method was conducted by Blue Water Science on August 2, 2018. A map and sampling grid were prepared by Blue Water Science and a consisted of a total of 368 points that were distributed throughout the lake (Figure 1). Points were spaced 50 meters apart. Each point represented about 0.6 acres. At each sample point, plants were sampled with a rake sampler. A plant density rating was assigned to each plant species on a scale from 1 to 3 (Figure 2). A density of a "1" indicated sparse growth with one or two stems present on the rake sampler. A 3 rating indicated matting surface plant growth.

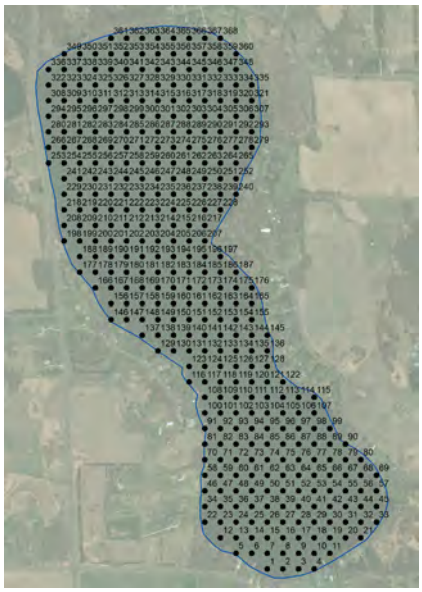


**Figure 1. Point locations for the aquatic plant surveys.**

### Chart of Aquatic Plant Density Ratings


**Figure 2. Aquatic plant density ratings from 1 to 3. A density rating of 3 is used for heavy growth.**

# Bone Lake Point Intercept Survey Statistics

A summary of plant statistics from the point intercept survey is shown in Tables 1 and 2 and Figure 3. A total of 126 points were sampled in the growing zone, from 0 to 10 feet. Plants were common in depths up to 6 feet and no plants were observed growing deeper than 7 feet (Table 2). The mean number of native plant species identified at each sample point was 1.1 species per point (Table 1).

**Table 1. MnDNR Template Statistics**

| | |
|---|---|
| **Total # Points Sampled** | 126 |
| **Depth Range of Vegetation** | 1-7 feet |
| **Maximum Depth of Growth (95%) in feet** | 6.0 |
| **# Points in Max Depth Range** | 107 |
| **# Points in Littoral Zone (0-15 feet)** | 126 |
| **% Points w/ Native Submersed Taxa** | 66 |
| **Mean Native Submersed Taxa/Point** | 1.1 |
| **Mean Density of Native Submersed Taxa** | 1.2 |
| **# Submersed Native Taxa** | 9 |
| **# Submersed Non-Native Taxa** | 2 |

**Table 2. Aquatic plants sampled by depth.**

| Depth (feet) | Number of Points Sampled | Percent of Sampling Points with Submerged Species Observed |
|---|---|---|
| 1 | 3 | 100 |
| 2 | 24 | 100 |
| 3 | 23 | 78 |
| 4 | 26 | 96 |
| 5 | 24 | 96 |
| 6 | 7 | 71 |
| 7 | 7 | 14 |
| 8 | 9 | 0 |
| 9 | 2 | 0 |
| 10 | 1 | 0 |
| All sites | 126 | |

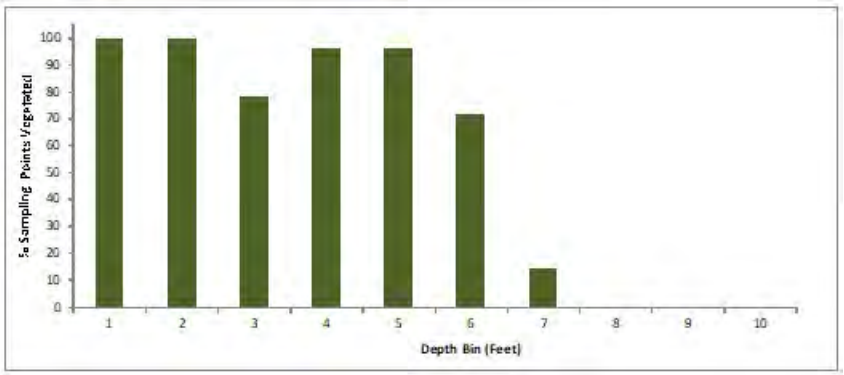



**Figure 3. Depth of plant colonization (in feet).**

# Aquatic Plant Occurrence and Density

The most common plant in the survey was Eurasian watermilfoil (Table 3 and Figure 4) followed by naiads (Table 3 and Figure 5). A total of 11 submerged species were observed.

**Table 3. The percent occurrence and density of aquatic plants for Bone Lake. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station div ided into the total number of stations for the survey. For example, if coontail was found in 25 out of 50 stations, its percent occurrence would be 50%. Density is a rating scale from 1 to 3 with 3 being the densest.**

| | August 2, 2018 | |
|---|---|---|
| | % Occur (126 sites) | Density |
| Purple loosestrife (*Lythrum salicaria*) | 1 | 1.0 |
| Spatterdock (*Nuphar variegatum*) | 13 | 1.6 |
| White water lily (*Nymphaea odorata*) | 33 | 1.2 |
| Coontail (*Ceratophyllum demersum*) | 21 | 1.3 |
| Chara (*Chara spp*) | 5 | 1.0 |
| Elodea (*Elodea canadensis*) | 3 | 1.0 |
| Eurasian watermilfoil (*Myriophyllum spicatum*) | 44 | 1.2 |
| Naiads (*Najas flexilis*) | 42 | 1.1 |
| Curlyleaf pondweed (*Potamogeton crispus*) | 3 | 1.0 |
| Floatingleaf pondweed (*P. natans*) | 1 | 2.0 |
| Stringy pondweed (*P. sp*) | 26 | 1.0 |
| Flatstem pondweed (*P. zosteriformis*) | 1 | 1.0 |
| Sago pondweed (*Stuckenia pectinata*) | 6 | 1.1 |
| Water stargrass (*Zosterella dubia*) | 2 | 1.5 |
| Filamentous algae | 6 | 1.0 |
| Number of submerged aquatic plant species | 11 | |

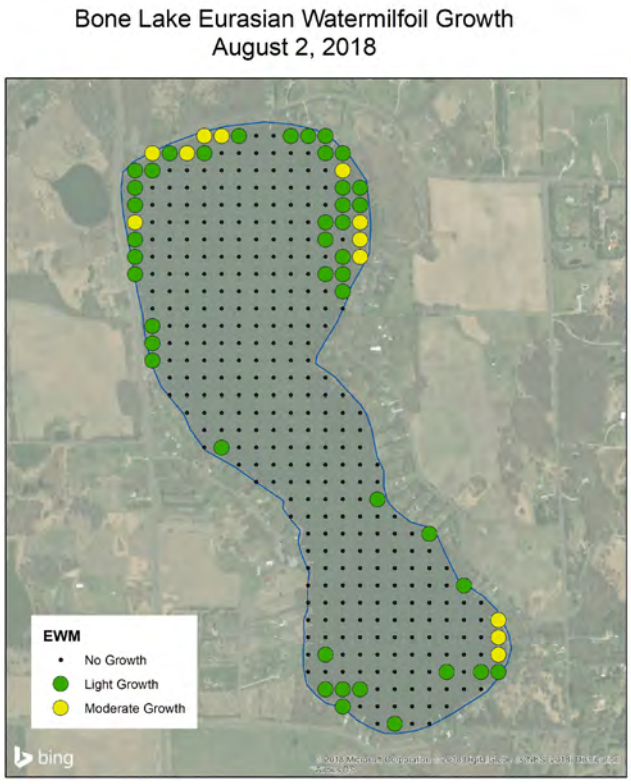



**Figure 4. Eurasian watermilfoil coverage on August 2, 2018. Key: Green shading = light growth and yellow shading = moderate growth.**

# Aquatic Plant Maps

The most abundant native plant on the August 2, 2018 point-intercept plant survey for Bone Lake was naiads, found at 53 out of 126 sites (42%) but at light growth (Figure 5). The other submerged plants observed were also found to be growing at light to moderate conditions (Figure 5).

A summary of plant density and occurrence at each sample site is shown in Table 4.

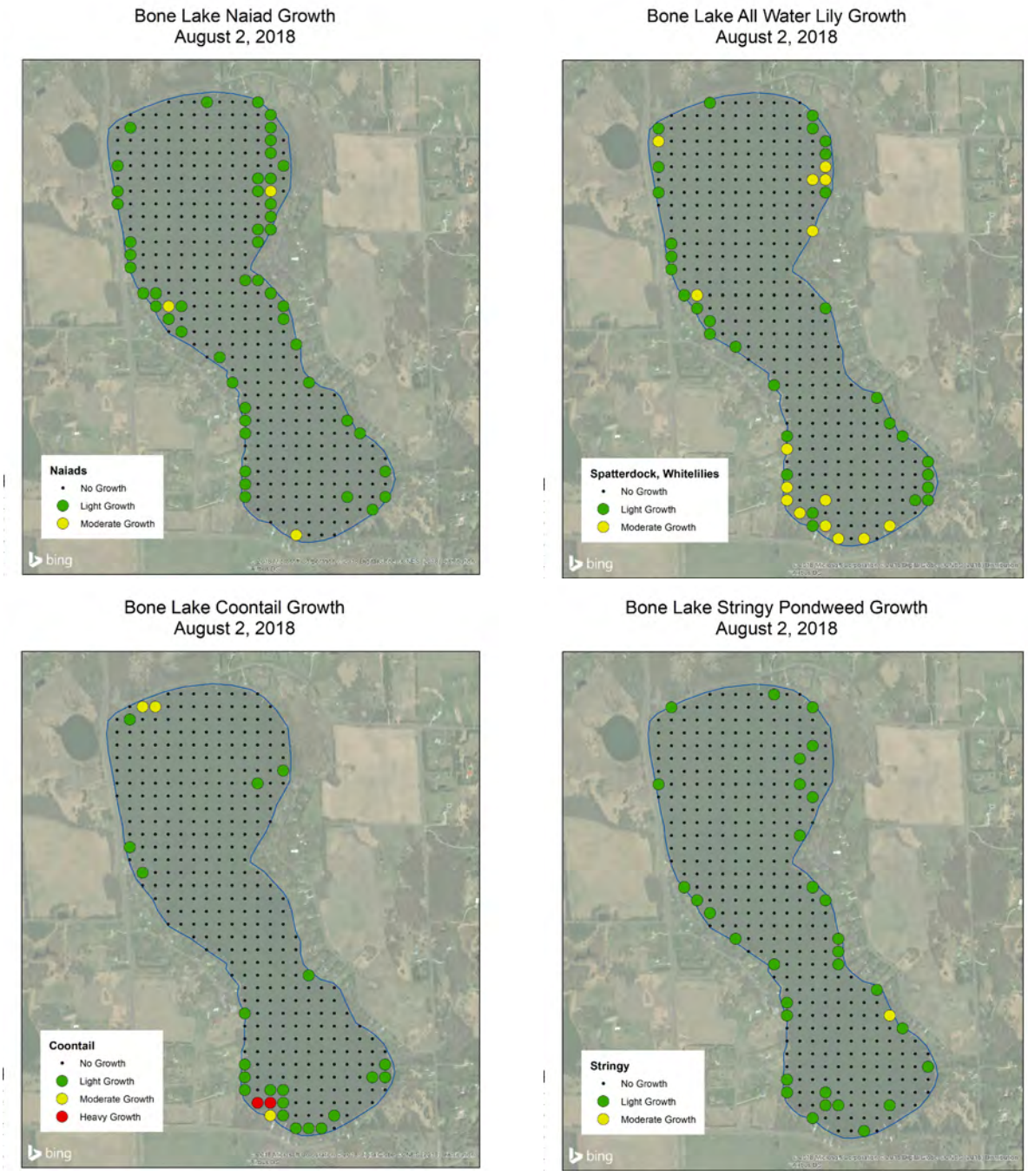



**Figure 5. Coverage maps for selected aquatic plants on Bone Lake on August 2, 2018. [top-left] Naiads. [top-right] Water lilies. [bottom-left] Coontail. [bottom-right] Stringy pondweed.**

**Table 4. Individual site data for August 2, 2018. Numbers indicate plant density.**

| Site | Depth (ft) | Purple loose-strife | Spatter-dock | White lilies | Chara | Coon-tail | CLP | Elodea | EWM | Flat-stem | Floating-leaf | Naiads | Sago | Stringy | Water star-grass | Fila algae | No plants |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | | 2 | 1 | | 1 | | 1 | | | | 2 | | | | | |
| 2 | 5 | | | | | 1 | | | 1 | | | | | | | | |
| 3 | 3 | | 2 | 1 | | 1 | | | | | | | | 1 | | | |
| 4 | 3 | | | | | | | | | | | | | | | | 1 |
| 5 | 2 | | | 1 | | 2 | | | 1 | | | | | 1 | | | |
| 5 | 2 | | 1 | 2 | | 2 | | | 1 | | | 1 | | | | 1 | |
| 6 | 3 | | | 2 | | 1 | | | | | | | | | | | |
| 7 | 6 | | | | | | | | | | | | | | | | 1 |
| 10 | 5 | | | | | 1 | | | | | | | | | | | |
| 11 | 3 | | 2 | | | | | | | | | | | | | | |
| 12 | 3 | | | 2 | | 3 | | | 1 | | | | | | | | |
| 13 | 4 | | | 1 | | 3 | | | 1 | | | | | | | | |
| 14 | 3 | | | | | 1 | | | 1 | | | | | 1 | | | |
| 15 | 6 | | | | | | | | | | | | | 1 | | | |
| 19 | 7 | | | | | | | | | | | | | 1 | | | |
| 21 | 1 | | | | 1 | | | | | | | 1 | | | | | |
| 22 | 2 | | | 2 | | 1 | | | | | | 1 | | 1 | | | |
| 23 | 3 | | | | | | | | | | | | | | | | 1 |
| 24 | 5 | | | | | 1 | | | | | | | | | | | |
| 25 | 6 | | | 2 | | 1 | | | | | | | | 1 | | | |
| 30 | 4 | | | | | | | | 1 | | | 1 | | | | | |
| 31 | 8 | | | | | | | | | | | | | | | | 1 |
| 32 | 4 | | 1 | | | | | | 1 | | | | | | | | |
| 33 | 1 | | | 1 | | | | | 1 | | | 1 | | | | | |
| 34 | 2 | | | 2 | | 1 | | | | | | 1 | | 1 | | | |
| 35 | 5 | | | | | | | | 1 | | | | | | | | |
| 44 | 6 | | | | | 1 | | | | | | | | | | | |
| 45 | 4 | | | 1 | | 1 | | | 2 | | | | | | | | |
| 46 | 3 | | | 1 | | 1 | | | | | | 1 | | | | | |
| 47 | 8 | | | | | | | | | | | | | | | | 1 |
| 57 | 3 | 1 | | 1 | | 1 | | | 2 | | | 1 | 1 | 1 | | 1 | |
| 58 | 3 | | | | | | | | | | | | | | | | 1 |
| 59 | 9 | | | | | | | | | | | | | | | | 1 |
| 69 | 3 | | | 1 | | | | | 2 | | | | | | | | |
| 70 | 3 | | 2 | 1 | | | | | | | | | | | | | |
| 80 | 4 | | | | | | | | | | | | | | | | 1 |
| 81 | 1 | | 1 | 1 | 1 | | | | | | | 1 | | | | | |
| 90 | 2 | | | 1 | | | | | 1 | | | 1 | | 1 | 1 | | |
| 91 | 2 | | | | | 1 | | | | | | 1 | | 1 | | | |
| 99 | 4 | | | 1 | | | | | | | | 1 | | 2 | | | |
| 100 | 4 | | | | 1 | | | | | | | 1 | | 1 | | | |
| 107 | 8 | | | | | | | | | | | | | | | | 1 |
| 108 | 4 | | | | 1 | | | | | | | | | | 2 | | |
| 115 | 3 | | | 1 | | | 1 | | 1 | | | | | 1 | | | |
| 116 | 2 | | | 1 | | | | | | | 2 | 1 | | | | | |
| 122 | 5 | | | | | 1 | | | | | | 1 | | | | | |
| 123 | 6 | | | | | | | | | | | | | 1 | | | |
| 128 | 3 | | | | | | | | 1 | | | | | 1 | | | |
| 130 | 5 | | | | | | | | | | | 1 | | | | | |
| 136 | 2 | | | | | | | | | | | | 1 | 1 | | | |
| 137 | 3 | | | 1 | | | | | | | | | | 1 | | | |
| 138 | 9 | | | | | | | | | | | | | | | | 1 |
| 144 | 7 | | | | | | | | | | | | | | | | 1 |
| 145 | 2 | | | | | | | | | | | 1 | 1.5 | 1 | | | |
| 146 | 2 | | | 1 | | | | | | 1 | | | 1 | | | | |
| 147 | 4 | | | | | | | | 1 | | | 1 | | | | | |
| 148 | 7 | | | | | | | | | | | | | | | | 1 |
| 155 | 7 | | | | | | | | | | | | | | | | 1 |
| 156 | 2 | | | 1 | | | | | | | | 1 | | 1 | | | |
| 165 | 5 | | | | | | | | | | | 1 | | | | | |
| 166 | 2 | | | 1 | | | | | | | | 1 | | 1 | | | |
| 167 | 3 | | | | | | | | | | | 2 | | | | | |
| 168 | 5 | | | | | | | | | | | 1 | | | | | |
| 175 | 8 | | | | | | | | | | | | | | | | 1 |
| 176 | 4 | | | 1 | | | | | | | | 1 | 1 | 1 | | | |
| 177 | 2 | | 1 | | | | | | | | | 1 | | 1 | | | |
| 178 | 4 | | 2 | | | | | | | | | 1 | | | | | |
| 179 | 8 | | | | | | | | | | | | | | | | 1 |
| 186 | 7 | | | | | | | | | | | | | | | | 1 |
| 187 | 4 | | | | | | | | | | | 1 | | 1 | | | |

**Table 4. Individual site data for August 2, 2018. Numbers indicate plant density.**

| Site | Depth (ft) | Purple loose-strife | Spatter-dock | White lilies | Chara | Coon-tail | CLP | Elodea | EWM | Flat-stem | Floating-leaf | Naiads | Sago | Stringy | Water star-grass | Fila algae | No plants |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 188 | 5 | | | | | 1 | | | | | | | | | | | |
| 196 | 4 | | | | | | | | | | | 1 | | | | | |
| 197 | 2 | | | | | | | | | | | 1 | | | | | |
| 198 | 4 | | | 1 | | | 1 | | 1 | | | 1 | | | | | |
| 208 | 4 | | 1 | | | 1 | | | 1 | | | 1 | | | | | |
| 218 | 4 | | 1 | 1 | | | | | 1 | | | 1 | | | | | |
| 228 | 3 | | | | | | | | | | | 1 | | 1 | | | |
| 239 | 6 | | | | | | | | | | | 1 | | | | | |
| 240 | 2 | | 2 | 1 | | | | | | | | 1 | | | | | |
| 251 | 7 | | | | | | | | | | | | | | | | 1 |
| 252 | 2 | | | | | | | | 1 | | | 1 | | | | | |
| 253 | 2 | | | | | | | | 1 | | | 1 | | | | | |
| 264 | 5 | | | | | | | | 1 | | | | | | | | |
| 265 | 3 | | | | | | | | 1 | | | 1 | | 1 | | | |
| 266 | 3 | | | 1 | | | | | 1 | | | 1 | 1 | 1 | | | |
| 277 | 5 | | | | 1 | 1 | | | | | | 1 | | 1 | | | |
| 278 | 4 | | | | 1 | | | | 1 | | | 2 | | | | | |
| 279 | 2 | | 1 | 1 | | | | | 2 | | | | | | | | |
| 280 | 5 | | | | | | | | 1 | | | | | | | | |
| 291 | 5 | | | | | | | | 1 | | | 1 | | | | | |
| 292 | 4 | | 2 | 1 | | | | | | | | 1 | | | | | |
| 293 | 4 | | 2 | 1 | | 1 | | | 2 | | | | | | | | |
| 294 | 5 | | | 1 | | | | | 2 | | | 1 | | | | | |
| 305 | 5 | | | | | | | | 1 | | | | | 1 | | | |
| 306 | 5 | | | | | | | | 1 | | | | | | | | |
| 307 | 2 | | | 2 | | | | | 2 | | | 1 | | | | 1 | |
| 308 | 4 | | | | | | | | 1 | | | | | | | | |
| 319 | 6 | | | | | | | | | | | | | | | | 1 |
| 320 | 4 | | | | | | | | 1 | | | 1 | | 1 | | | |
| 321 | 2 | | | 1 | | | | | 1 | | | | | | | | |
| 322 | 5 | | 2 | 2 | | | | | 1 | | | | | | | | |
| 323 | 7 | | | | | | | | | | | | | | | | 1 |
| 333 | 8 | | | | | | | | | | | | | | | | 1 |
| 334 | 5 | | | | | | | | 1 | | | 1 | | | | | |
| 335 | 2 | | | 1 | | | | | 1 | | | | 1 | | | | |
| 336 | 3 | | | 1 | | | | | 1 | | | | | | | | |
| 337 | 5 | | | | | 1 | | | 1 | | | 1 | | | | | |
| 347 | 8 | | | | | | | | | | | | | | | | 1 |
| 348 | 4 | | | 1 | | | | | 2 | | | 1 | | | | | |
| 349 | 2 | | | | | | | | 2 | | | | | 1 | | 1 | |
| 350 | 3 | | | | | 2 | | 1 | 1 | | | | | | | 1 | |
| 351 | 4 | | | | | 2 | | 1 | 2 | | | | | | | 1 | |
| 352 | 5 | | | | | | | | 1 | | | | | | | | |
| 353 | 8 | | | | | | | | | | | | | | | | 1 |
| 357 | 10 | | | | | | | | | | | | | | | | 1 |
| 358 | 8 | | | | | | | | | | | | | | | | 1 |
| 359 | 5 | | | | | | 1 | | 1 | | | | | | | | |
| 360 | 2 | | | 1 | | | | | 1 | | | 1 | | 1 | | | |
| 361 | 3 | | | 1 | | | | 1 | 2 | | | | | | | 1 | |
| 362 | 4 | | | | | | | | 2 | | | | | | | 1 | |
| 363 | 4 | | | | | | 1 | | 1 | | | | | | | | |
| 364 | 5 | | | | | | | | | | | 1 | | | | | |
| 365 | 5 | | | | | | | | | | | | | | | | 1 |
| 366 | 5 | | | | | | | | 1 | | | | | 1 | | | |
| 367 | 4 | | | | | | | | 1 | | | | | | | | |
| 368 | 2 | | | | | | | | 1 | | | 1 | | | | | |
| Average | | 1.0 | 1.6 | 1.2 | 1.0 | 1.3 | 1.0 | 1.0 | 1.2 | 1.0 | 2.0 | 1.1 | 1.1 | 1.0 | 1.5 | 1.0 | |
| Occur (126 sites) | | 1 | 16 | 42 | 6 | 27 | 4 | 4 | 55 | 1 | 1 | 53 | 7 | 33 | 2 | 8 | 25 |
| % Occur | | 1 | 13 | 33 | 5 | 21 | 3 | 3 | 44 | 1 | 1 | 42 | 6 | 26 | 2 | 6 | |

# Conclusions

Bone Lake (MnDNR ID #18005400) is a 221 acre lake located in Washington County, Minnesota. Water clarity had a summer average of 1.77 meters in 2017 (source: Comfort Lake/Forest Lake Watershed District).

On August 2, 2018 an aquatic plant point-intercept survey using 50 m spacing between sites was conducted on Bone Lake. The survey looked for non-native species such as curlyleaf pondweed and Eurasian watermilfoil and characterized all aquatic plants. Eleven submerged aquatic plant species and 2 water lily species were sampled on August 2, 2018 in Bone Lake.

In August, curlyleaf pondweed was found at 4 out of 126 sites (3%) and Eurasian watermilfoil was found at 55 out of 126 sites (44%). Eurasian watermilfoil was the dominant plant in Bone Lake. The most abundant native aquatic plants species were naiads (found at 42% of the sites) followed by stringy pondweed (found at 26% of the sites). Plants were found at 101 sites and grew out to 7 feet of water depth. Aquatic plants covered about 62 acres or 28% of the lake area.

In the middle of the summer, plant growth is light limited and restricted to about 7 feet of water depth. If clarity increases, plant coverage should increase. Based on lake research, a goal for aquatic plant coverage is typically 40% or more which is correlated with clear water conditions. Currently Bone Lake has coverage of 28%.

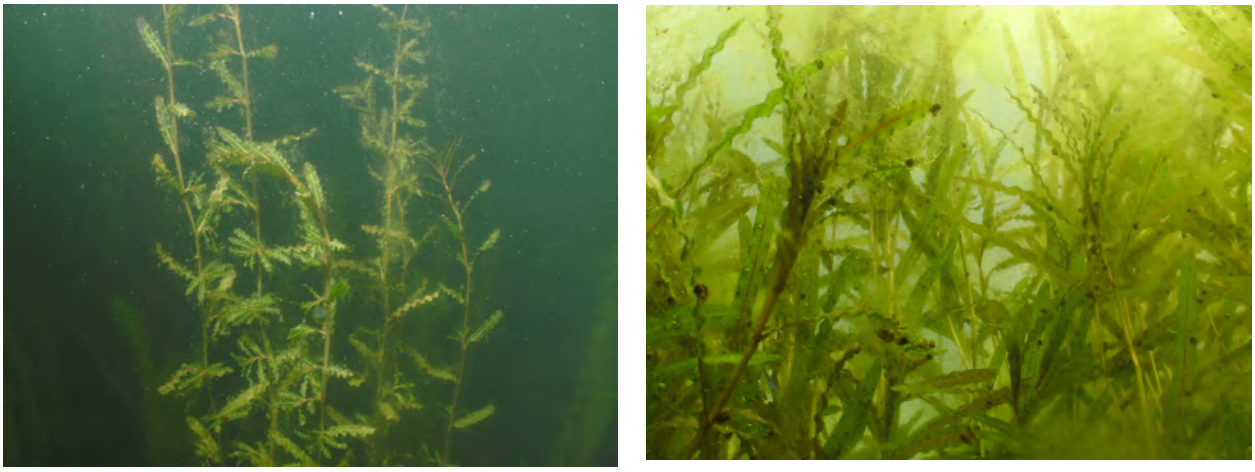
# Appendix

# Curlyleaf Pondweed (non-native aquatic plant) Potential Future Growth in Bone Lake

***Potential for Curlyleaf Pondweed Growth in Bone Lake:*** Mostly moderate growth potential with scattered areas of light growth potential.

Lake sediment sampling results from 2014 have been used to predict lake bottom areas that have the potential to support light, moderate, or heavy curlyleaf pondweed plant growth. Various types of curlyleaf growth patterns are shown in Figures 5 and 6. Based on the key sediment parameters of pH, sediment bulk density, organic matter, and the Fe:Mn ratio (McComas, unpublished), the predicted growth characteristics of curlyleaf pondweed in Bone Lake are shown on the next page.

Curlyleaf pondweed growth is predicted to produce mostly moderate growth.



**Underwater views of curlyleaf pondweed. Light growth (left) and moderate growth (right).**

## Examples of Curlyleaf Pondweed Growth Characteristics

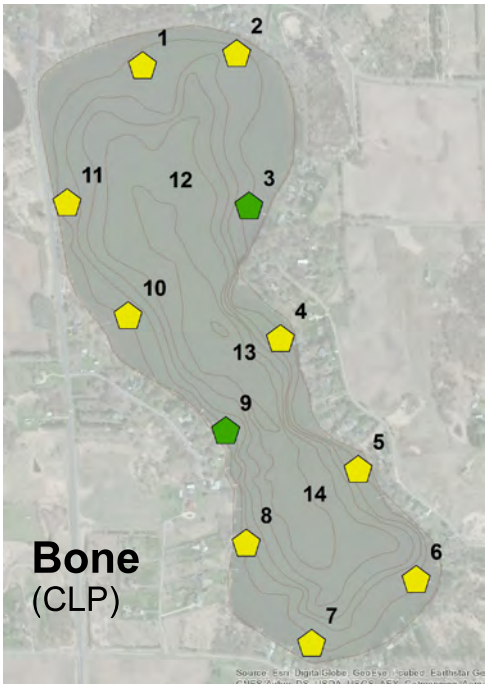

**Light growth (left) refers to non-nuisance growth that is mostly below the surface and is not a recreational or ecological problem. Moderate growth (middle) refers to growth that is just below the water surface. Heavy growth (right) refers to nuisance matting curlyleaf pondweed. This is the kind of nuisance growth predicted by high sediment pH and a sediment bulk density less than 0.51.**

**Curlyleaf Pondweed Growth Potential Based on Lake Sediments:** Curlyleaf pondweed is present in Bone Lake. Research has found curlyleaf is limited or enhanced based on lake sediment characteristics. Based on lake sediment characteristics, curlyleaf has the potential to produce light, moderate, or heavy growth on an annual basis.

In Bone Lake it is predicted that curlyleaf will grow at mostly light or moderate densities. Bulk density and organic matter were generally low enough to limit curlyleaf pondweed in a majority of the sediment sites, to low to moderate potential.

**Bone Lake sediment data and ratings for potential growth of curlyleaf pondweed growth.**

| Site | Depth (ft) | pH (su) | Bulk Density (g/cm3 dry) | Organic Matter (%) | Fe:Mn Ratio | Potential for Curlyleaf Pondweed Growth |
|---|---|---|---|---|---|---|
| **Light Growth** | | **<7.4** | **>1.04** | **0.1-5** | **>4.5** | **Light (green)** |
| **Moderate Growth** | | **7.4 - 7.7** | **0.52 - 1.03** | **6-20** | **1.6 - 4.5** | **Moderate (yellow)** |
| **Heavy Growth** | | **>7.7** | **<0.51** | **>20** | **<1.6** | **Heavy (red)** |
| Bone 1 | 8 | 7.7 | 0.50 | 21.2 | 3.6 | Moderate |
| Bon 2 | 6 | 7.8 | 1.09 | 3.0 | 2.8 | Moderate |
| Bon 3 | 7 | 7.7 | 1.46 | 0.5 | 1.9 | Light |
| Bon 4 | 7 | 7.9 | 1.47 | 0.5 | 1.3 | Moderate |
| Bon 5 | 5 | 7.8 | 1.34 | 0.9 | 1.8 | Moderate |
| Bon 6 | 6 | 7.7 | 0.76 | 5.7 | 9.0 | Moderate |
| Bon 7 | 6 | 7.5 | 0.36 | 35.6 | 8.2 | Moderate |
| Bon 8 | 7 | 7.5 | 0.77 | 9.4 | 6.6 | Moderate |
| Bon 9 | 8 | 7.7 | 1.29 | 0.8 | 4.4 | Light |
| Bon 10 | 6 | 7.9 | 1.44 | 0.5 | 1.9 | Moderate |
| Bon 11 | 8 | 8.1 | 1.44 | 0.5 | 1.7 | Moderate |
| Bon 12 | 26 | 7.4 | 0.69 | 25.7 | 4.6 | |
| Bon 13 | 29 | 7.4 | 0.68 | 25.8 | 4.7 | |
| Bon 14 | 28 | 7.2 | 0.60 | 25.8 | 5.4 | |




**The color indicates the potential growth of curlyleaf pondweed. Key: green = light growth and yellow = moderate growth.**

# Potential Eurasian Watermilfoil (non-native aquatic plant) Growth in the Future

***Potential for Eurasian Watermilfoil Growth in Bone Lake:*** Mostly moderate to heavy potential.

Lake sediment sampling results from 2014 have been used to predict lake areas that have the potential to support light, moderate, or heavy Eurasian watermilfoil growth. Examples of milfoil growth characteristics are shown below. Based on the key sediment parameters of $NH_4$ and organic matter (McComas, unpublished), a table and map were prepared that predict the type of growth that could be expected in the future if milfoil becomes established in Bone Lake.

In Bone Lake a majority of sites had moderate nitrogen and low to moderate organic matter and most areas are predicted to have the potential to produce moderate growth of milfoil on an annual basis unless water clarity is limiting.

**Underwater views of Eurasian watermilfoil.**

## Examples of Eurasian Watermilfoil Growth Characteristics



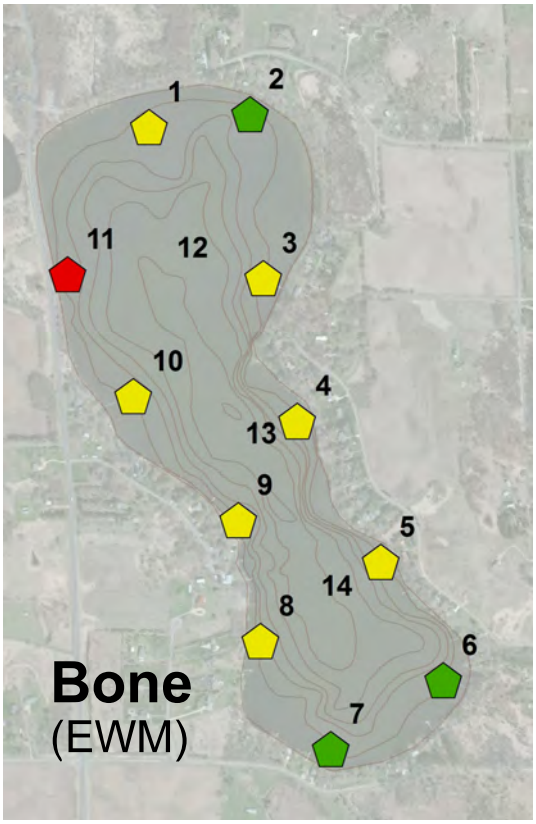

**Light growth (left) refers to non-nuisance growth that is mostly below the surface and is not a recreational or ecological problem. Heavy growth (right) refers to nuisance matting Eurasian watermilfoil. This is the kind of nuisance growth predicted by high sediment nitrogen values and a sediment organic matter content less than 20%.**

**Eurasian Watermilfoil (EWM) Growth Potential Based on Lake Sediments:** Lake sediment sampling results from 2014 have been used to predict lake bottom areas that have the potential to support various types of EWM growth. The potential for milfoil growth, based on lake sediment sampling, would be primarily moderate growth. Heavy milfoil growth has been correlated with high sediment nitrogen condition, but Bone Lake has mostly moderate nitrogen conditions.

For Bone Lake, it is estimated the plants have the potential to grow down to about 7 feet of water depth based on existing water clarity conditions and that could limit EWM distribution.

**Bone Lake sediment data and ratings for potential growth of Eurasian watermilfoil.**

| Site | Depth (ft) | $NH_4$ Conc (ppm) | Organic Matter (%) | Potential for Eurasian Watermilfoil Growth |
|---|---|---|---|---|
| **Light Growth** | | **<4** | **<0.5 and >20** | **Light (green)** |
| **Moderate Growth** | | **4 - 10** | **0.6 - 2 and 18 - 20** | **Moderate (yellow)** |
| **Heavy Growth** | | **>10** | **3 - 17** | **Heavy (red)** |
| Bone 1 | 8 | 6.7 | 0.50 | Moderate |
| Bon 2 | 6 | 3.9 | 1.09 | Light |
| Bon 3 | 7 | 5.3 | 1.46 | Moderate |
| Bon 4 | 7 | 8.8 | 1.47 | Moderate |
| Bon 5 | 5 | 4.9 | 1.34 | Moderate |
| Bon 6 | 6 | 1.5 | 0.76 | Light |
| Bon 7 | 6 | 1.5 | 0.36 | Light |
| Bon 8 | 7 | 5.7 | 0.77 | Moderate |
| Bon 9 | 8 | 6.4 | 1.29 | Moderate |
| Bon 10 | 6 | 9.0 | 1.44 | Moderate |
| Bon 11 | 8 | 17.0 | 1.44 | Heavy |
| Bon 12 | 26 | 48.3 | 0.69 | |
| Bon 13 | 29 | 28.2 | 0.68 | |
| Bon 14 | 28 | 36.2 | 0.60 | |




**The color indicates the potential growth of Eurasian watermilfoil.**
**Key: green = light growth , yellow = moderate growth, and red = heavy growth.**