Aquatic Plants and Management in Valley Branch Watershed District (VBWD) Lakes

DNR-VBWD Meeting

February 13, 2017
Goals

• Goals

  — Gain consensus whether there is a problem with aquatic plants (particularly Eurasian watermilfoil and native plants) in the Tri-Lakes (Lake DeMontreville, Lake Olson, and Lake Jane) and Lake Elmo

  — If there is a problem, obtain management recommendations from the DNR
Presentation Overview

• Background
• 2014-2016 Eurasian watermilfoil (EWM) Management Efforts in Tri-Lakes and Lake Elmo
  – Acreage Changes of EWM
  – Frequency Changes in Native Plant Species in Tri-Lakes
  – Water Quality
  – Fisheries
• Discussion and Recommendations
Tri-Lakes – Lake DeMontreville, Lake Olson, and Lake Jane
Lake Elmo
Background

- 2012-2014 – VBWD plant surveys documented rapid expansion of EWM in the Tri-Lakes and dense EWM beds in Lake Elmo
- VBWD supported lake associations in managing EWM
EWM Management Efforts: Mechanical/Manual EWM Removal

- Lake Elmo (lake area 284 acres, littoral area 66.38 acres)
  - 2015: <1 acre – manual removal by Scuba divers
  - 2016: 10 acres – mechanical harvesting and removal
EWM Management Efforts: Herbicide Treatment with 2,4-D

- Lake DeMontreville (lake area 160 acres, littoral area 142.6 acres)
  - 2014 – 4.3 acres
  - 2015 – 14.3 acres
  - 2016 – 14.3 acres

- Lake Olson (lake area 89 acres, littoral area 87.4 acres)
  - 2014 – 4.7 acres
  - 2015 – 7.0 acres
  - 2016 – 6.85 acres

- Lake Jane (lake area 155 acres, littoral area 109.71 acres)
  - 2015 – 7.9 acres
DNR permits:
Treat identified areas at 2,4-D label rate

2,4-D Concentration/Exposure Time

Recommended 2,4-D label rate: 2.0 – 4.0 ppm

1.0 ppm = 1.0 mg/L = 1000 ppb
DNR permits:
Treat identified areas at 2,4-D label rate

2,4-D Concentration/Exposure Time

Recommended label rate: 2.0 – 4.0 ppm
1.0 mg/L = 1.0 ppm = 1000 ppb

Nault, Michelle and John Skogerboe. 2012. *Evaluation of Herbicide Applications for Control of Aquatic Invasive Species*. Presentation at Workshop Aquatic Plant Management in the Ceded Territories at LCO Convention Center on December 5, 2012.
Changes in EWM Extent:
Lake DeMontreville

<table>
<thead>
<tr>
<th>Date</th>
<th>EWM Extent (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/18/2012</td>
<td>5</td>
</tr>
<tr>
<td>6/24/2013</td>
<td>51</td>
</tr>
<tr>
<td>5/24/2014</td>
<td>53</td>
</tr>
<tr>
<td>6/28/2014</td>
<td>27</td>
</tr>
<tr>
<td>5/10/2015</td>
<td>58</td>
</tr>
<tr>
<td>6/21/2015</td>
<td>21</td>
</tr>
<tr>
<td>5/1/2016</td>
<td>38</td>
</tr>
<tr>
<td>6/26/2016</td>
<td>19</td>
</tr>
</tbody>
</table>
Changes in EWM Extent: Lake Olson

<table>
<thead>
<tr>
<th>Date</th>
<th>EWM Extent (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/18/2012</td>
<td>2</td>
</tr>
<tr>
<td>6/24/2013</td>
<td>4</td>
</tr>
<tr>
<td>5/24/2014</td>
<td>23</td>
</tr>
<tr>
<td>6/28/2014</td>
<td>24</td>
</tr>
<tr>
<td>5/9/2015</td>
<td>32</td>
</tr>
<tr>
<td>6/21/2015</td>
<td>28</td>
</tr>
<tr>
<td>5/1/2016</td>
<td>53</td>
</tr>
<tr>
<td>6/26/2016</td>
<td>18</td>
</tr>
</tbody>
</table>
Changes in EWM Extent:
Lake Jane

<table>
<thead>
<tr>
<th>Date</th>
<th>EWM Extent (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/18/2012</td>
<td>0.1</td>
</tr>
<tr>
<td>6/28/2013</td>
<td>1.7</td>
</tr>
<tr>
<td>6/27/2014</td>
<td>24.1</td>
</tr>
<tr>
<td>5/9/2015</td>
<td>44.2</td>
</tr>
<tr>
<td>6/21/2015</td>
<td>31.0</td>
</tr>
<tr>
<td>6/27/2016</td>
<td>68.7</td>
</tr>
</tbody>
</table>
Changes in EWM Extent: Lake Elmo

<table>
<thead>
<tr>
<th>Date</th>
<th>EWM Extent (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/18-19/2012</td>
<td>71</td>
</tr>
<tr>
<td>6/28/2013</td>
<td>53</td>
</tr>
<tr>
<td>6/27/2014</td>
<td>51</td>
</tr>
<tr>
<td>6/21/2015</td>
<td>68</td>
</tr>
<tr>
<td>4/30/2016</td>
<td>59</td>
</tr>
<tr>
<td>6/27/2016</td>
<td>79</td>
</tr>
<tr>
<td>7/29/2016</td>
<td>80</td>
</tr>
</tbody>
</table>
In general, Aquatic Invasive Species rapidly increase in extent and displace native species in the process.

During 2012-2016, EWM extent increased rapidly in Tri-Lakes.

VBWD Data: Documented significant declines in the frequency of several native species in Tri-Lakes.

EWM has been prevalent in Lake Elmo for many years. Although EWM extent increased during 2014-2016, the native plant community has remained relatively stable.
Potamogeton pusillus (Small Pondweed)

- Significant decline between 2012 and 2016 in Tri-Lakes
- Value – food source and cover for fish; food source for waterfowl and other animals
Potamogeton pusillus (Small Pondweed)
Frequency in Tri-Lakes and Lake Elmo

<table>
<thead>
<tr>
<th>Location</th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>41</td>
<td>5</td>
</tr>
<tr>
<td>Olson</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>Jane</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Elmo</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

* Significant Change
Potamogeton amplifolius (Large-leaf Pondweed)

- Significant decline between 2012 and 2016 in Tri-Lakes
- Value – Provides foraging opportunities for fish, provides invertebrate habitat, and the foliage and fruit may be grazed by waterfowl.
Potamogeton amplifolius (Large-leaf Pondweed) Frequency in Tri-Lakes and Lake Elmo

- **DeMontreville**: 4 (0*)
- **Olson**: 10 (0*)
- **Jane**: 21

* Significant Change

**P = Present**

- **2012**
- **2016**

P P

**Significant Change**
Potamogeton zosteriformis (Flat-stem Pondweed)

- Significant decline between 2012 and 2016 in Tri-Lakes
- Value – Food source and cover for fish and invertebrates; food for waterfowl and other animals.
Potamogeton zosteriformis (Flat-stem Pondweed) Frequency in Tri-Lakes and Lake Elmo

<table>
<thead>
<tr>
<th>Location</th>
<th>2012 Frequency</th>
<th>2016 Frequency</th>
<th>Significant Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>50</td>
<td>12*</td>
<td></td>
</tr>
<tr>
<td>Olson</td>
<td>19</td>
<td>6*</td>
<td></td>
</tr>
<tr>
<td>Jane</td>
<td>16</td>
<td>5*</td>
<td></td>
</tr>
<tr>
<td>Elmo</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

*Significant Change
Myriophyllum sibiricum (Northern watermilfoil)

- Significant decline between 2012 and 2016 in Tri-Lakes
- Value – Provide shade, shelter, and foraging opportunities for fish; invertebrate habitat; food for waterfowl
Myriophyllum sibiricum (Northern watermilfoil) Frequency in Tri-Lakes and Lake Elmo

- **DeMontreville**: 5 in 2012, 0* in 2016
- **Olson**: 12 in 2012, 0* in 2016
- **Jane**: 22 in 2012, 3* in 2016
- **Elmo**: 1 in 2012, 0 in 2016

*Significant Change
Potamogeton robbinsii (Fern pondweed)

- Significant decline between 2012 and 2016 in Lake DeMontreville
- Value – Good cover and foraging opportunities for fish; habitat for invertebrates; grazed by waterfowl
Potamogeton robbinsii (Fern Pondweed) Frequency in Tri-Lakes (Not Observed in Elmo)

<table>
<thead>
<tr>
<th>Location</th>
<th>2012</th>
<th>2016</th>
<th>*Significant Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>12</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Olson</td>
<td>10</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Jane</td>
<td>62</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>

*Significant Change
Heteranthera dubia
(Water Star-grass)

• Significant decline between 2012 and 2016 in Lake Olson and Lake Jane
• Value – Good cover and foraging opportunities for fish; important source of food for geese and ducks.
Heteranthera dubia (Water Star-grass)
Frequency in Tri-Lakes and Lake Elmo

<table>
<thead>
<tr>
<th>Location</th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Olson</td>
<td>16</td>
<td>4*</td>
</tr>
<tr>
<td>Jane</td>
<td>7</td>
<td>0*</td>
</tr>
<tr>
<td>Elmo</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

*Significant Change

Significant change indicated by an asterisk (*)
Potamogeton illinoensis (Illinois Pondweed)

- Significant decline between 2012 and 2016 in Lake Olson
- Value – Excellent shade and cover for fish; good surface area for invertebrates; food for ducks, geese, and other animals
Potamogeton illinoensis (Illinois Pondweed) Frequency in Tri-Lakes and Lake Elmo

*Significant Change

Frequency (%)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Olson</td>
<td>23</td>
<td>8*</td>
</tr>
<tr>
<td>Jane</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Elmo</td>
<td>13</td>
<td>9</td>
</tr>
</tbody>
</table>
Ranunculus aquatilis (White Water Crowfoot)

- Significant decline between 2012 and 2016 in Lake Jane
- Value – Valuable invertebrate habitat; food for waterfowl
Ranunculus aquatilis (White Water Crowfoot)

Frequency in Tri-Lakes and Lake Elmo

*Significant Change

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeMontreville</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Olson</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Jane</td>
<td>15</td>
<td>1*</td>
</tr>
<tr>
<td>Elmo</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
Water Quality: Lake DeMontreville

Lake DeMontreville June-Sept. Average Total Phosphorus

Values above this line are worse than the MPCA Deep Lake Standard

Lake DeMontreville June-Sept. Average Chlorophyll a

Values above this line are worse than the MPCA Deep Lake Standard

Lake DeMontreville June-Sept. Average Secchi Disc Transparency

Values above this line are worse than the MPCA Deep Lake Standard
Water Quality: Lake Olson

Lake Olson June-Sept. Average Total Phosphorus

Values above this line are worse than the MPCA Shallow Lake Standard

Improving trend statistically significant for recent 10-year period

Lake Olson June-Sept. Average Chlorophyll a

Values above this line are worse than the MPCA Shallow Lake Standard

Lake Olson June-Sept. Average Secchi Disc Transparency

Values above this line are worse than the MPCA Shallow Lake Standard
Water Quality:
Lake Jane

Lake Jane June-Sept. Average Total Phosphorus

Lake Jane June-Sept. Average Chlorophyll a

Lake Jane June-Sept. Secchi Disc Transparency

Values above this line are worse than the MPCA Deep Lake Standard
Water Quality:
Lake Elmo

Lake Elmo June-Sept. Average Total Phosphorus

Lake Elmo June-Sept. Average Chlorophyll a

Lake Elmo June-Sept. Secchi Disc Transparency

Values above this line are worse than the MPCA Deep Lake Standard
Water Quality: Summary

- Tri-Lakes and Lake Elmo were meeting water quality goals prior to EWM management and continue to meet water quality goals.
Fisheries: Lake DeMontreville

- Two DNR fish surveys in 2011 and Fish IBI scores of 39 and 28; close to the shallow lakes impairment threshold of 36; next fish survey in 2019 to decide whether Lake DeMontreville is impaired for fish
- No reports that the EWM treatments have affected the fishery
Fisheries: Lakes Olson and Jane

- Olson: Most recent DNR fish survey in 2011
- Jane: Most recent DNR fish survey in 2013
- No IBI scores
- No reports that aquatic plant treatments have affected the fishery in either lake
Fisheries: Lake Elmo

- DNR fisheries survey in 2014; Fish IBI score of 53, which indicates the fishery is not impaired. The lake impairment threshold is 45; scores below this threshold suggest impairment.
- No reports that the EWM management affected the fishery
Summary

• Lake DeMontreville
  – 2014-2016 herbicide treatments provided EWM seasonal relief, but rapid expansion of EWM doubled extent between treatments
Summary

- Lake Olson
  - Rapid EWM expansion between 2015 and 2016 treatments nearly doubled extent
  - 2016 herbicide treatment provided EWM seasonal relief
Summary

• Lake Jane
  – Rapid EWM expansion increased extent from 0.1 acres in 2012 to 68.7 acres in 2016
  – 2015 herbicide treatment provided EWM seasonal relief, but rapid expansion of EWM more than doubled extent between 2015 and 2016
Summary

• Lake Elmo
  – EWM extent has increased annually during 2014-2016, from 51 acres in 2014 to 80 acres in 2016
Summary

• Since 2012, significant declines in *Potamogeton pusillus*, *P. amplifolius*, *P. zosteriformis*, and *Myriophyllum sibiricum* in Tri-Lakes

• Since 2012, significant decline in *Heteranthera dubia* in Lake Olson and Lake Jane
Summary

• Since 2012, significant decline in *Potamogeton robbinsii* in Lake DeMontreville
• Since 2012, significant decline in *Potamogeton illinoensis* in Lake Olson
• Since 2012, significant decline in *Ranunculus aquatilis* in Lake Jane
1. Is there a problem with aquatic plants (particularly Eurasian watermilfoil and native plants) in the Tri-Lakes (Lake DeMontreville, Lake Olson, and Lake Jane) and Lake Elmo?

2. If so, how should we:
   A. Curtail EWM expansion
   B. Stabilize native plant communities in the Tri-Lakes to prevent additional significant declines in native species