

## Technical Memorandum

**To:** Commissioners, Black Dog Watershed Management Organization (BDWMO)  
**From:** Barr Engineering Co.  
**Subject:** 2021 Kingsley Lake Habitat Monitoring  
**Date:** April 13, 2022  
**Project:** 23190457

This memorandum presents the results of the BDWMO's 2021 habitat monitoring of Kingsley Lake.

### 1.0 Introduction and Background to the BDWMO Habitat Monitoring Program and Executive Summary

The BDWMO lies south of the Minnesota River in the northwest portion of Dakota County. **Figure 1** shows the subwatersheds to the BDWMO's strategic water bodies. From 2003-2009 Barr staff annually evaluated the habitat quality of all of the strategic water bodies. Beginning in 2011, the BDWMO revised the program to monitor the habitat quality at one strategic water body per year, such that the BDWMO monitors all five strategic water bodies over a five-year cycle. The 2011 through 2015 reports provided a new baseline for the strategic water bodies. The lakes and their monitoring dates are listed below:

1. **Kingsley Lake: 2011, 2016, and 2021**
2. Orchard Lake: 2012 and 2017
3. Crystal Lake: 2013 and 2018
4. Lac Lavon: 2014 and 2019
5. Keller Lake: 2015 and 2020

This report provides the results of the Kingsley Lake 2021 habitat monitoring.

Habitat quality was evaluated within three vegetation zones:

- Submergent zone refers to the areas of the water body where water depths are typically 2 to 20 feet and the vegetation is typically submerged or has floating leaves.
- Emergent zone typically refers to the areas of the water body where water depths are less than 2 feet and vegetation grows out of the water.
- Upland buffer is characterized as the upland area immediately surrounding the water body.

Wildlife habitat characteristics were evaluated based on diversity of native plant communities present within each vegetation zone and an assessment of wetland functions and values. The lake was also evaluated for sedimentation and shoreline erosion problems. **Table 1** shows the 2012, 2016 and 2021 habitat quality ratings for Kingsley Lake. **Table 2** provides a summary of identified problems,

recommended management activities, and past actions. Section 3.2 of this memorandum describes five recommendations which include:

1. Continue to monitor for curly-leaf pondweed and consider control measures if densities and locations increase to an extent of concern.
2. Continue to control and manage non-native and invasive vegetation along the shoreline and in the upland buffer including, but not limited to purple loosestrife, hybrid cattail, yellow iris, common buckthorn, Russian olive, Chinese silver grass, and Siberian elm. Based on increases of purple loosestrife observed in 2021, we recommend requesting a status update from the MN DNR.
3. Install a pre-treatment system such as a rain garden, pervious pavement, or sediment trap to collect sediment from the restaurant parking lot prior to discharge into the lake.
4. Improve the shoreline by increasing the width and continuity of naturalized upland buffer.
5. Re-vegetate bare areas to prevent soil erosion into Kingsley Lake.

Additional detail describing the habitat assessment is provided in the technical reference section following this memorandum, which includes

- Kingsley Lake aquatic plant survey results and assessments (**Appendix A**),
- floristic quality assessment data and methods (**Appendix B**),
- previous habitat assessment monitoring results from 2003 through 2020 (**Appendix C**),
- previous recommended and completed management actions from 2003 through 2020 (**Appendix D**),
- 2016 Kingsley Lake Minnesota Routine Assessment Method (MNRAM 3.4) wetland functional assessment results (**Appendix E**),
- descriptions of the MNRAM wetland functions (**Appendix F**),
- examples of shoreline and buffer restoration projects (**Appendix G**),
- buckthorn management guidelines (**Appendix H**), and
- example pollinator brochure (**Appendix I**).

## 2.0 Kingsley Lake Habitat Monitoring

Kingsley Lake is a 51-acre lake with an additional 33-acres of deep and shallow marsh backwater located in Lakeville. The lake is used primarily as an aesthetic resource. There is no public beach or boat access on Kingsley Lake, but the lake provides boating, kayaking, and canoeing opportunities. A YMCA camp uses the lake for recreational activities. Kingsley Lake flows to Orchard Lake, which discharges to the Credit River and ultimately to the Minnesota River. The outlet from Kingsley Lake that was installed in 1993 had become damaged and in Fall 2020, the City of Lakeville replaced the damaged outlet with a new outlet of the same size and at the same elevation. The city also cleared downstream outlets to alleviate flooding issues. **Figure 2** shows the 2020 aerial imagery of Kingsley Lake.

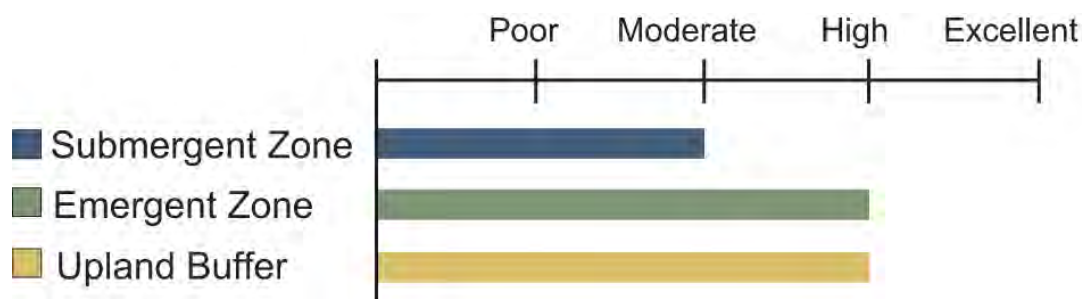
## 2.1 Kingsley Lake 2021 Habitat Monitoring Results

Habitat monitoring for Kingsley Lake was conducted from 2003 through 2009, 2011, 2016, and 2021. The 2021 field monitoring of Kingsley Lake was performed on June 3, and July 29, 2021. Vegetation data were collected in, within, and along the fringe of Kingsley Lake's three vegetation zones: (1) submergent, (2) emergent, and (3) upland.

The 2021 Kingsley Lake monitoring included plot and meandering surveys. Plot locations were designated in 2003 based on representative characteristics for each vegetation zone. Returning to the same plot locations allows for consistent comparisons over time. In addition, the 2011 revised program provides evaluation and documentation of vegetation zones along the entire shoreline. Photographs were taken to document conditions and are included at the end of this memorandum. Analysis and reporting of the monitoring data includes a floristic quality assessment and a four-tiered rating system (poor, moderate, high, and excellent). The current rating system is detailed in footnotes on **Table 1**. Private versus public ownership was identified along the entire shoreline. The survey results, along with parcel data, were used to identify possible locations for restoration and preservation.

On June 3, Barr conducted an aquatic vegetation survey within the submergent and emergent zones (**Appendix A**). On July 29, Barr staff and City of Lakeville Environmental Resource Specialist Ann Messerschmidt, conducted emergent vegetation and upland buffer zone surveys by kayaking in the lake and walking along the shoreline. In addition, the discrete plots (shown in **Figure 2**) were monitored in the emergent zone and upland buffer, as done in 2003-2009, 2011, and 2016. **Figure 3** shows the shoreline parcels identifying private versus public ownership. An overall quality rating for each vegetation zone was computed using the field variables evaluated in each zone. **Table 1** shows the 2011, 2016 and 2021 habitat quality ratings for Kingsley Lake and **Table 2** shows the recommended management action items. (Note: previous monitoring reports provide the sampling methodology for monitoring conducted before 2011.)

The following schematic diagram shows the overall ratings in 2021 for each vegetation zone within and adjacent to Kingsley Lake:



### 2.1.1 Kingsley Lake Overall Vegetation Zone Ratings

Table 1 shows the 2011, 2016 and 2021 Kingsley Lake habitat monitoring results. **Appendix C** provides habitat ratings for the Kingsley Lake monitoring conducted prior to 2011.

#### Submergent Zone

The total number of native species in the submergent zone is **excellent** (19), the average native plant density rating is **moderate** (1.7), the average exotic species density is rated **moderate** (1.5) and the Mean Coefficient of Conservatism Value (C-Value) Rating is **moderate** (5.5). Averaging these four criteria results in a **moderate** rating overall for the submergent zone of Kingsley Lake. This has decreased from the overall rating (high) in 2016 primarily due to a slight increase in both native and exotic species aquatic vegetation density ratings. The overall submergent zone rating changed from 0.69 (at the low end of the high rating) in 2016 to 0.63 (at the high end of the moderate rating) in 2021. The overall submergent zone rating fluctuated between moderate and high (previously identified as excellent) over the years from 2003 to 2021 (**Appendix C**). Therefore, the 2021 moderate rating does not necessarily indicate a decrease in quality.

Curly-leaf pondweed (*Potamogeton crispus*) was found in Kingsley Lake in 2003, 2005, 2006, 2007, 2009, 2016, and 2021. However, only one plant was documented in 2003, 2005, and 2016, while numerous plants were found in 2006 and 2007 in the western portion of Kingsley Lake. The extent of curly-leaf pondweed expanded in 2007. Yet, curly-leaf pondweed was not found during 2008 or 2011. In 2016 and 2021, it was present only in one specific location in the western portion of the lake. Both the density and the area of growth slightly increased from 2016 to 2021. This invasive plant often out-competes native vegetation early in the growing season and dies off in early to mid-summer, which creates a sudden loss of habitat and releases nutrients into the water that can produce algal blooms and create turbid water conditions. On March 6, 2008, ten soil sediment samples were collected on Kingsley Lake by Blue Water Science and City of Lakeville staff. The samples were later analyzed. Based on the results of the analysis, the Blue Water Science report stated that "Curly-leaf pondweed is not expected to produce heavy growth conditions (where plants top out in a solid canopy) in Kingsley Lake."

Dense coverage of native submergent vegetation in Kingsley Lake helps prevent the spread of non-native curly-leaf pondweed. The dominant native species present in the submergent zone include Robbin's pondweed (*Potamogeton robbinsi*), largeleaf pondweed (*Potamogeton amplifolius*), coontail (*Ceratophyllum demersum*), water stargrass (*Heteranthera dubia*), and Canadian waterweed (*Elodea canadensis*). Filamentous and nostoc algae were also present on the lake in 2021 with dense growth in the southeast lobe. A full list of submergent species is provided in **Appendix B**.

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The Mean C-Value Rating was added to the analysis in 2011 to provide an additional assessment of floristic quality. The C-value is a numerical rating of an individual species' conservatism and habitat fidelity in relation to disturbance. C-values range from 0 to 10. Species that are least conservative, or show the least fidelity to specific natural habitats are often opportunistic invaders of natural communities, or are native species typical of disturbed communities, and are assigned a low value. For example, coontail (*Ceratophyllum demersum*) has a C-value of 2 and curly-leaf pondweed has a C-value of 0. High values indicate the species is found in undisturbed communities and has a narrow range of ecological tolerances. For example, humped bladderwort (*Utricularia gibba*), has a C-value of 9 and Robbin's pondweed has a C-value of 8. The mean C-value for vegetation found in the submergent zone of Kingsley Lake in 2021 was 5.5. For purposes of this habitat assessment, the mean C-value and the number of species are given separate ratings, and are averaged along with the density ratings to provide an overall rating for the submergent zone. The ratings used in this assessment are based on Minnesota Pollution Control Agency (MPCA) C-value guidelines (Floristic Quality Assessment for Minnesota Wetlands, MPCA, May 2007, [Floristic quality assessment/evaluating wetland vegetation | Minnesota Pollution Control Agency \(state.mn.us\)](https://www.mn.gov/Portals/0/Minnesota%20Pollution%20Control%20Agency/2007%20Floristic%20Quality%20Assessment%20for%20Minnesota%20Wetlands.pdf)).

Another method for assessing vegetation quality is the Floristic Quality Index (FQI). The Minnesota Department of Natural Resources (MNDNR) uses the FQI, along with the number of plant species to calculate the Lake Plant Eutrophication Index of Biological Integrity (IBI). Currently, the MPCA uses this IBI as supporting information in assessing the lake fish IBI. The number of plant species must be at least 11 and the FQI must be at least 17.8 to meet the IBI standard. The FQI is calculated by multiplying the mean C-value by the square root of the number of species; the FQI for Kingsley Lake is 24.48 (see **Appendix B** for more details).

In December of 2012, the MPCA published the Rapid Floristic Quality Assessment (Rapid FQA) Method, which is another method that can be used to evaluate and rate vegetation quality. The Rapid FQA method also uses the C-value, though the rating is weighted based on percent coverage and percent of each community type. However, the Rapid FQA method uses only select species in the rating. This means that many of the species found during a plant survey will not be included in the rating calculation. Because of this significant drawback, we do not recommend changing the BDWMO's assessment method to use the Rapid FQA. For information purposes only, we calculated the Rapid FQA for Kingsley Lake in 2021; the results are provided in **Appendix B**.

The mean C-value was rated as **moderate** in the submergent zone, and the Rapid Floristic Quality Assessment rating was **good** condition for floristic quality in the shallow open water community.

## Emergent Zone

The overall emergent vegetation zone quality is rated **high** for Kingsley Lake; this is the same as the overall 2016 rating. The emergent zone includes 45 native wetland plant species resulting in an **excellent** rating and percent cover of exotic species (26-50%), which is a **high** rating. The approximate percent cover of vegetation (51-75%) is a **high** rating. The emergent zone represents thirty percent total areal coverage. The mean C-value rating is **moderate** (4.0) and the Rapid Floristic Quality assessment calculation rates the deep marsh community as **good** condition (**Appendix B**).

Non-native species, such as hybrid cattail (*Typha glauca*) and narrowleaf cattail (*Typha angustifolia*), are present within the vegetated emergent zone, however they are growing with many native species primarily in floating mats. These floating mats contain diverse native vegetation including sundew (*Drosera rotundifolia*), sedges (*Carex spp.*, *Dulichium*), rushes (*Juncus spp.*), burr-reed (*Scirpus* and *Schoenoplectus spp.*), purple marshlocks (*Comarum palustre*), iris (*Iris versicolor*), and marsh fern (*Thelypteris palustris*). The mats are also substantial enough to support native shrubs including bog birch (*Betula pumila*) and willow (*Salix spp.*). See **Appendix B** for a full vegetation list. Green frog calls were heard during the monitoring event. Painted turtles were seen on the water lilies and logs. Egrets, green herons, geese, wood ducks, loons, and great blue herons were observed on the water and there is documentation of nesting loons on the lake.

Purple loosestrife (*Lythrum salicaria*) was found in several locations along the shoreline in 2011 through 2021 (**Appendix A** and **Figure 4**). Purple loosestrife is an invasive non-native species that has been managed for years through the release of beetles which eat the purple loosestrife plants. This management strategy has been relatively successful within the Twin Cities metropolitan area. MN DNR monitoring of the purple loosestrife beetles previously indicated that populations are sufficient within the Twin Cities metropolitan area to keep purple loosestrife from becoming a significant problem. However, based on increases observed in 2021, we recommend requesting a status update from the MNDNR.

Non-native invasive yellow iris (*Iris pseudacorus*) is also present in several locations along the shoreline (**Appendix A**). Though treatment of yellow iris has been conducted in some areas, it should be eliminated to prevent further spread. The MNDNR may require a permit for treatment or removal of non-native species that are below the Ordinary High Water (OHW) elevation.

## Upland Buffer

The overall upland buffer quality is rated **high** for Kingsley Lake. A total of 67 native species and 28 exotic plant species were observed in the upland buffer area in 2021. Exotic plants make up greater than 15 to 40 percent of the vegetative cover. The mean C-value rating (2.1) in the upland buffer is poor (**Appendix B**).

Common buckthorn (*Rhamnus cathartica*) is an extremely aggressive exotic shrub that dominates the shrub layer in portions of the wooded upland buffer areas around the lake and on islands. This shrub can form dense thickets that shade out native species. Buckthorn is growing back into areas where it was previously cut, increasing the density of buckthorn in portions of the upland buffer. Without the continuation of control measures, common buckthorn could quickly invade more of the upland buffer, further degrading the woodland understory. Additional non-native invasive species documented in the upland buffer include Russian olive (*Elaeagnus angustifolia*), Chinese silver grass (*Miscanthus sinensis*), and Siberian elm (*Ulmus pumila*). We recommend controlling these species.

Native trees within the forested upland buffer areas include red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), black walnut (*Juglans nigra*), white spruce (*Picea glauca*), pin cherry (*Prunus pensylvanica*), several oak species (*Quercus spp.*), basswood (*Tilia americana*), quaking aspen (*Populus tremuloides*), and cottonwood (*Populus deltoides*). See **Appendix B** for a full vegetation list.

No significant erosion or sedimentation problems were noted within the lake or on the shoreline, but some areas with direct stormwater drainage from impervious surfaces into wetland and bare soil areas could be improved.

Buffer width recommendations vary according to the intended goal, such as bank stabilization, water quality protection (e.g., sediment and nutrient removal), and wildlife habitat. Even within these categories, an adequate buffer width can depend on shoreline slopes, species of wildlife to be protected, and publicized study results. For this report, the Kingsley Lake shoreline buffers were evaluated against the following buffer width criteria:

- 50-foot average buffer width to protect water quality and prevent erosion
- 25-foot average buffer width (i.e., 50% of the recommended buffer width) to identify areas providing some level of benefit
- 100-foot average buffer width to protect wildlife habitat

The shoreline property ownership around Kingsley Lake is about 30% residential, 20% YMCA, 30% commercial, and 20% city ownership.

For Kingsley Lake residential shoreline properties:

- The average buffer width is approximately 100 feet.
- Approximately 63% have an adequate buffer width to protect water quality and prevent erosion ( $\geq 50$  feet).
- Approximately 81% have at least half of the recommended buffer width to protect water quality and prevent erosion ( $\geq 25$  feet).
- One residential property along the shoreline of Kingsley Lake has a 500-foot wide naturalized buffer, which is adequate for wildlife protection ( $\geq 100$  feet).

All but one of the residential shoreline properties on Kingsley Lake have the potential for at least a 50-foot naturalized buffer without altering any structures.

For Kingsley Lake city-owned public property:

- The average buffer width is approximately 40 feet.
- The buffers on portions of the city-owned property cannot be expanded due to the location of Klamath Trail Road.

For the YMCA-owned property:

- The average buffer width is approximately 100 feet.
- The YMCA property has adequate buffer width to protect water quality and prevent erosion (≥50 feet).

For the commercially owned property:

- The average buffer width is approximately 10 feet.
- The property does not have adequate buffer width to protect water quality or prevent erosion.

#### **Minnesota Routine Assessment Method (MNRAM) for Wetlands**

In 2016, based on the MNRAM, Kingsley Lake rated **high** for overall vegetative diversity and integrity. The Kingsley Lake shoreline wetland community rated **moderate** for shoreline protection. Maintenance of characteristic wildlife habitat was rated **high**, amphibian habitat was rated **low**, and fish habitat was rated as **high**. According to City of Lakeville staff, the high fish habitat rating is inaccurate, given the low dissolved oxygen levels typical each winter. The low winter oxygen level contributes to fish winterkill. Aesthetics/recreation/education rated **moderate**. The MNRAM assessment also indicates that many of the integral hydrologic and land use processes that affect the lake are intact and in relatively good condition with a **high** rating for maintenance of hydrologic regime, a **moderate** rating for downstream water quality, a **moderate** rating for flood stormwater attenuation, a **high** rating for maintenance of wetland water quality, and a **high** rating for wetland sensitivity to stormwater and urban development. The wetland management classification is **Preserve** due to the **high** ratings for maintenance of wetland water quality and vegetative diversity. The 2016 Kingsley Lake MNRAM summary is provided in **Appendix E**. The MNRAM assessment was not repeated in 2021, as it would likely not result in significant changes from the 2016 assessment.

## **3.0 Kingsley Lake Management Recommendations**

### **3.1 Past and Current Actions**

During 2005 through 2008, the City of Lakeville and members of the Kingsley Lake Association removed purple loosestrife plants and common buckthorn from portions of the lake and the surrounding upland buffer. As noted earlier, buckthorn is growing back into these previously cut areas. Continued



management of the vegetation communities will help prevent common buckthorn from invading and further degrading the woodland understory, and will help to maintain and improve wildlife habitat, vegetation diversity, aesthetics, and recreation.

The City of Lakeville has provided lakeshore owners with shoreline restoration information since 2004 and continually promotes and encourages lakeshore property owners each year to take advantage of the Dakota County SWCD Landscaping for Clean Water shoreline restoration program. The City of Lakeville has invited residents to attend educational workshops and view demonstration projects to show how a native upland buffer can improve functions and values of the lake and improve aesthetics. In 2008, because of these programs, one resident began a shoreline stabilization project that included adding native plants. Future shoreline restoration projects (especially contiguous) on residential properties will help improve upland buffer habitat.

### 3.2 Recommendations

The 2021 habitat assessment results suggest several recommended management activities that could help maintain and improve the overall wildlife habitat, vegetation diversity, aesthetics, and water quality of the lake. **Table 2** provides a summary of identified problems, recommended management activities, and past actions. The management recommendations are presented below:

1. Continue to monitor for curly-leaf pondweed to document changes in density and locations and consider control measures if densities and locations increase to an extent of concern. See **Appendix A** for the location of this species found in 2016 and 2021.
2. Continue to control and manage non-native invasive vegetation along the shoreline and in the upland buffer including, but not limited to purple loosestrife, hybrid cattail, yellow iris, common buckthorn, Russian olive, Chinese silver grass, and Siberian elm. This work could be organized by the YMCA, City of Lakeville, Kingsley Lake Association, Chart House Restaurant and/or volunteers involved in programs such as the Minnesota Water Stewards, Minnesota Master Naturalists, or Master Gardeners and could recruit student assistance through schools, 4H, JROTC, National Honor Society, or scouting programs (see **Potential Restoration Areas #1, 3, 5, 8, and 9, as shown in Figure 4, Appendix A, and photos**). Remove non-native invasive yellow iris (see **Appendix A** for yellow iris and purple loosestrife locations). Based on increases of purple loosestrife observed in 2021, we recommend requesting a status update from the MN DNR. Remove common buckthorn (see **Potential Restoration Areas #1**). Remove Russian olive and Siberian elm (see **Potential Restoration Area #9**). Remove Chinese silver grass (**Potential Restoration Area #3**). Consider control of non-native invasive cattail (see **Potential Restoration Area #8**) and reed canary grass (see **Potential Restoration Area #5**).

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3. Install a pre-treatment system such as a rain garden, pervious pavement, or sediment trap to collect sediment from the Chart House Restaurant parking lot prior to discharge into the lake. A pre-treatment system combined with routine maintenance of sediment clean-out could help to improve lake water quality and prevent algae blooms and degradation of the vegetation community in this area. This project could potentially receive funding assistance from the Dakota County SWCD's Community Conservation Partnership Incentives program (see **Potential Restoration Area #2, as shown in Figure 4 and photos**).
4. Improve the shoreline by increasing the width and continuity of the naturalized upland buffer. Rather than manicured turf grass, gravel, and managed plantings with bare soil, the shoreline and adjacent upland buffer could be vegetated with native grasses and wildflowers. Adjust mowing distance further away from the shoreline on the City of Lakeville properties next to Klamath Trail and Kenwood Trail. Providing a wider buffer of native vegetation could help protect water quality, prevent erosion, and improve wildlife habitat, vegetative diversity, and aesthetics, potentially through funding assistance from the Dakota County SWCD Conservation Initiative Funding Program Guidance, assistance and potential funding may be available through the Xerces Society ([Pollinator Conservation Program | Xerces Society](#)) and the Minnesota Board of Water and Soil Resources Pollinator Initiative and Lawns to Legumes Program ([Pollinator Habitat | MN Board of Water, Soil Resources \(state.mn.us\)](#)) (see **Figure 4, Potential Restoration Areas #4, 6, 8, and 9 and site photos**. See **Appendix G** for examples of improvements.
5. Re-vegetate bare areas by establishing native vegetation to prevent soil erosion on steep slopes and to protect water quality, prevent erosion, and improve wildlife habitat, vegetative diversity, and aesthetics. Commercial property owners could potentially receive assistance for erosion and slope stabilization through funding from the Dakota County SWCD's Community Conservation Partnership Incentives program. See **Figure 4, Potential Restoration Areas #3, 7, 10, 11, and 12 (YMCA islands), and site photos (restaurant property)**.

## Tables

**Table 1: Kingsley Lake 2011 - 2021 Habitat Assessment Monitoring Results Black Dog Watershed Management Organization**

Monitoring Year	Submergent Zone								
	Approximate Proportion of the Water Body Which is Deep Water Habitat (~ > 20 ft. depth)	Overall Submergent Zone Quality <sup>1</sup>	Approximate Proportion of Water Body Typically Dominated By Submergent Vegetation (~ 2 - 20 ft. depth)	Native Species		Mean Coefficient of Conservatism Value	Exotic Species		
				Average Native Plant Density Rating <sup>2,3</sup>	Total Number of Native Species <sup>5</sup>		Total Number of Species	Average Exotic Plant Density Rating <sup>2,3</sup>	Maximum Exotic Plant Density Rating <sup>4</sup>
2011	0%	High	70%	1.4 (Moderate)	18 (Excellent)	5.8 (Moderate)	0	0.0 (Excellent)	0.0 (Excellent)
2016	0%	High	70%	1.4 (Moderate)	20 (Excellent)	5.7 (Moderate)	1	<1.0 (High)	<1.0 (High)
2021	0%	Moderate	70%	1.7 (Moderate)	19 (Excellent)	5.5 (Moderate)	1	1.5 (Moderate)	1.5 (Moderate)

Monitoring Year	Emergent Zone						
	Overall Emergent Zone Quality <sup>6</sup>	Approximate Proportion of Emergent Zone (0 - 2 ft. depth) Within The Water Body	Approximate Total Percent Vegetative Cover Within The Entire Emergent Zone <sup>7</sup>	Total Number of Native Wetland Plant Species <sup>8</sup>	Mean Coefficient of Conservatism Value	Exotic Species	
						Number of Species	Total Exotic Emergent Percent Coverage <sup>9</sup>
2011	High	30%	51-75% (High)	22 (Excellent)	3.3 (Moderate)	4	26-50% (High)
2016	High	30%	51-75% (High)	31 (Excellent)	3.8 (Moderate)	4	26-50% (High)
2021	High	30%	51-75% (High)	45 (Excellent)	4.0 (Moderate)	6	26-50% (High)

Monitoring Year	Upland Buffer								Erosion/Sedimentation	
	Overall Upland Buffer Quality <sup>10</sup>	Unmanicured Buffer Width <sup>11</sup>	Estimated Total Vegetative Cover (Percent Range) <sup>12</sup>	Total Number of Native Plant Species <sup>13</sup>	Mean Coefficient of Conservatism Value	Buffer Continuity (Percent Surrounding Water Body) <sup>14</sup>	Exotic Species		Shoreline Erosion (Percent of Shoreline) <sup>16</sup>	Sediment Deltas (Yes/No)
							Number of Species	Percent of Total Coverage <sup>15</sup>		
2011	High	25-50 ft. (High)	>95% (High)	45 (Excellent)	2.2 (Poor)	76-100% (Excellent)	25	15-40% (Moderate)	0-10%	No
2016	High	25-50 ft. (High)	>95% (High)	59 (Excellent)	2.2 (Poor)	76-100% (Excellent)	26	15-40% (Moderate)	0-10%	No
2021	High	25-50 ft. (High)	>95% (High)	67 (Excellent)	2.1 (Poor)	76-100% (Excellent)	28	15-40% (Moderate)	0-10%	No

**Table 1: Kingsley Lake 2021 Habitat Assessment Monitoring Results Black Dog Watershed Management Organization**

**The following changes were made to the 2011 - 2021 monitoring and analysis:**

- Monitor one water body per year. Kingsley Lake in 2011, 2016, and 2021, Orchard Lake in 2012 and 2017, Crystal Lake in 2013 and 2018, Lac Lavon in 2014 and 2019, Keller Lake in 2015 and 2020 - Conduct a meandering survey of submergent, emergent, and upland buffer zones. In addition, the emergent and upland buffer plot locations were evaluated.
- Changes were made in 2011 through 2021 to the calculations to include floristic quality as part of the assessment. These changes include adding a rating of "High" to the categories to accommodate MPCA ratings for floristic quality. These changes included adding a Rating Code:

Poor	Moderate	High or Excellent
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**The following footnotes pertain to 2011 through 2021 data:**

<sup>1</sup>**Overall Submergent Zone Quality** rating is the average of the rating scores for the following parameters: average exotic plant density, average native plant density, total number of native species, and C-value rating: >0.80 = Excellent, 0.67-0.80 = High, 0.33-0.66 = Moderate, <0.33 = Poor.

Overall Submergent Zone Quality	Avg. Exotic Plant Density	Exotic Plant Density Rating Score	Avg. Native Plant Density	Avg. Native Plant Density Rating Score	Total Number of Native Species In Submergent Zone	Species Richness Rating Score	Mean Coefficient of Conservatism Value (C-Value)	C-Value Rating (using MPCA values, 2007)	Total Overall Submergent Zone Quality Score
Poor	>2.0	0.1	> 1.75	0.1	<7	0.1	0 - <3	0.10	< 0.33
Moderate	>1.0 - 2.0	0.5	1.25 - 1.75	0.5	>7 - <9	0.5	>3 - <6	0.50	0.33 - 0.66
High	>0 - 1.0	0.75			>9 - <14	0.75	>6 - <9	0.75	0.67 - 0.80
Excellent	0	1.0	1.0 to 1.25	1.0	>14	1.0	>9 - 10	1.00	> 0.80

<sup>2</sup>Plant density ratings are a relative measure of the total amount of submergent vegetation covering the submergent zone, with a scale from 1 to 3.

<sup>3</sup>Density data for Kingsley Lake were collected by Barr using a meander survey throughout the lake.

<sup>4</sup>Maximum exotic plant density ratings represent the worst case scenario of curlyleaf pondweed density early in the growing season and/or Eurasian watermilfoil when it is most prolific later in the growing season.

<sup>5</sup>The Total Number of Native Species within the submergent zone for Kingsley Lake was collected by Barr using a meander survey.

The additional category of "High" was added in 2011 through 2021 and values were adjusted to: <7 = Poor, 7-9 = Moderate, 9-14 = High, >14 = Excellent.

<sup>6</sup>**Overall Emergent Zone Quality** is the average of the rating scores for the following parameters within the emergent zone: the total percent coverage, the total number of native wetland plant species, the percent coverage of exotic species, and the C-Value Rating: >0.80 = Excellent, 0.67-0.80 = High, 0.33-0.66 = Moderate, <0.33 = Poor.

Overall Emergent Zone Quality	Percent Cover	Percent Cover Rating Score	Total Number of Native Wetland Plant Species	Number of Native Wetland Plant Species Rating Score	Percent Cover of Exotics	Percent Cover of Exotics Rating Score	Mean Coefficient of Conservatism Value (C-Value)	C-Value Rating (using MPCA values, 2007)	Overall Emergent Zone Quality Score
Poor	0-25%	0.1	< or= 5	0.1	76-100%	0.1	0 - <3	0.10	< 0.33
Moderate	76-100% or 26-50%	0.5	6 - 10	0.33	51-75%	0.33	>3 - <6	0.50	0.33 - 0.66
High	51-75%	1.0	11 - 15	0.66	26-50%	0.66	>6 - <9	0.75	0.67 - 0.80
Excellent	51-75%	1.0	> 15	1.0	0-25%	1.0	>9 - 10	1.00	> 0.80

**Table 1: Kingsley Lake 2021 Habitat Assessment Monitoring Results Black Dog Watershed Management Organization**

<sup>7</sup>Approximate Total Percent Vegetative Cover Within the Entire Emergent Zone (0-2 ft. depth) is estimated based on the two plot locations and a visual survey walking and kayaking along the shoreline. Estimates are broken into the following categories: 0-25%=Poor, 26-50%=Moderate, 51-75%=High and Excellent, 76-100%=Moderate.

<sup>8</sup>The Total Number of Native Wetland Plant Species within the emergent zone is based on 2 plot locations and a visual survey walking along the shoreline: 0-5 = Poor, 6-10 = Moderate, 11-15 = High, and >15 = Excellent.

<sup>9</sup>Total Exotic Emergent Percent Coverage, out of the entire emergent zone area, is estimated based on two plot locations, a visual survey walking along the shoreline. Estimates are broken into four categories: 0-25%=Excellent (1.0), 26-50%=High (0.66), 51-75%=Moderate (0.33), 76-100%=Poor (0.1)

<sup>10</sup>**Overall Upland Buffer Quality** is determined based on the average of the six upland buffer quality parameter rating scores: >0.80 = Excellent, 0.67-0.80 = High, 0.33-0.66 = Moderate, <0.33 = Poor.

Overall Upland Buffer Quality	Percent Cover	Percent Cover Rating Score	Exotics Percent Cover Range	Exotics Percent Cover Rating Score	Buffer Width Range	Buffer Width Rating Score	Buffer Continuity Percent Range	Buffer Continuity Rating Score	Mean Coefficient of Conservatism Value (C-Value)	C-Value Rating (using MPCA values, 2007)	Number of Native Species	Number of Native Species Rating Score	Overall Upland Buffer Quality Score
Poor	<75%	0.1	>40%	0.1	<10 ft.	0.1	0-25%	0.1	0 - <3	0.10	<5	0.1	< 0.33
Moderate	75-95%	0.5	15-40%	0.5	10-25 ft.	0.4	25-50%	0.4	>3 - <6	0.50	5-20	0.33	0.33 - 0.66
High	>95%	1.0	<15%	1.0	25-50 ft.	0.7	51-75%	0.7	>6 - <9	0.75	20-30	0.66	0.67 - 0.80
Excellent	>95%	1.0	<15%	1.0	>50 ft.	1.0	76-100%	1.0	>9 - 10	1.00	>30	1.0	> 0.80

<sup>11</sup>Unmanicured (upland) Buffer Width is divided into four categories: Excellent (1.0) = >50 ft, High (0.7) = 25-50 ft, Moderate (0.4) = 10-25 ft, and Low (0.1) = <10 ft.

<sup>12</sup>Estimated Total Vegetative Cover (Percent Range) for upland buffer is the proportion of the ground covered by vegetation within 50 feet of the wetland/upland transition zone. The percent cover is divided into three categories: High and Excellent (1.0) = >95%, Moderate (0.5) = 75 - 95%, and Poor (0.1) = <75%.

<sup>13</sup>The Total Number of Native Plant Species within the unmanicured upland buffer zone is based on two plot locations and a meandering visual survey along the shoreline.

<sup>14</sup>(Upland) Buffer Continuity is a measure of the proportion of the water body surrounded by the unmanicured, native upland buffer. This measure is divided into four categories: Excellent (1.0) = 76 - 100%, High (0.7) = 51 - 75%, Medium (0.4) = 26 - 50%, and Low (0.1) = 0 - 25%.

<sup>15</sup>Upland buffer exotic species "Percent of Total Coverage" is the percent cover of exotic species within the unmanicured upland buffer, which is divided into three categories: High and Excellent (1.0) = <15%, Moderate (0.5) = 15 - 40%, and Poor (0.1) = >40%.

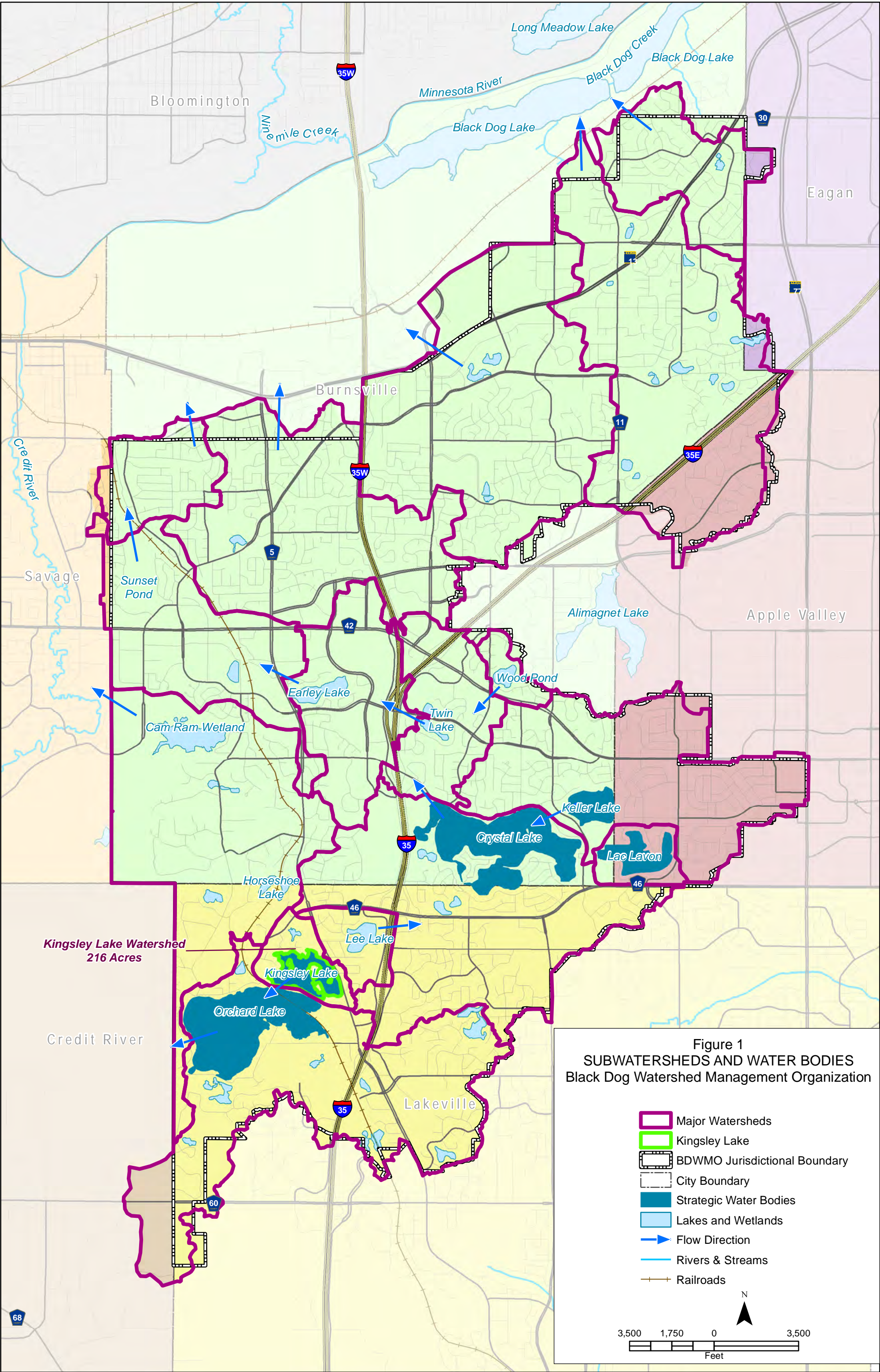
<sup>16</sup>The presence of shoreline erosion is determined by the approximate percentage of the shoreline affected and is divided into the following three categories: 0 - 10%, 11 - 25%, 26 - 100%.

Table 2            2021 Recommended and Completed Management Actions for Kingsley Lake – Black Dog Watershed Management Organization Habitat Monitoring

Problem Identified	Recommendation	Proposed Action	Benefits	Implementation Period	Completed Actions Which May Improve Wildlife Habitat and/or Water Quality
Curly-leaf pondweed is present in in some years at one location of the lake.	Continue to monitor the extent and density of curly-leaf pondweed.	Consider control measures if densities and locations increase to an extent of concern.  See <b>Appendix A</b> for location of curly-leaf pondweed.	Increase wildlife habitat, improve water quality, vegetative diversity, aesthetics, and recreation.	Late Spring - Early summer	On March 6, 2008, soil sediment samples were collected on Kingsley Lake by Blue Water Science (BWS) and the City of Lakeville. Based on the results of the soil analysis, the BWS report stated that “curly-leaf pondweed is not expected to produce heavy growth conditions (where plants top out in a solid canopy) in Kingsley Lake.”.
Emergent zone and upland buffer areas contain non-native and invasive vegetation.	Continue to control and manage non-native and invasive vegetation, including, but not limited to purple loosestrife, reed canary grass, hybrid cattail, yellow iris, common buckthorn, Russian olive, Chinese silver grass, and Siberian elm.	Continue to control and manage non-native and invasive vegetation. Remove buckthorn. Volunteer groups and contractors can effectively remove buckthorn by pulling, cutting, and treating stumps with herbicide. <b>See Figure 4, Potential Restoration Area #1.</b>  Small colonies of purple loosestrife can be hand pulled or dug before plants go to seed. <b>See Figure 4 and Appendix A for purple loosestrife locations.</b>  Remove yellow iris ( <b>See Appendix A for locations of yellow iris</b> ). The MN DNR may require a permit for cattail treatment, purple loosestrife, and yellow iris removal if below the OHW. Dense reed canary grass is located <b>Potential Restoration Area #5</b> . Dense invasive cattail is located at <b>Potential Restoration Area #8</b> .  Treat or remove non-native invasive vegetation and then seed with an appropriate native seed mix. <b>See Figure 4, Potential Restoration Areas #8 and 9.</b>	Increase wildlife habitat, improve vegetative diversity and aesthetics.	Spring-Fall	  From 2005-2008, the City of Lakeville and members of the Kingsley Lake Association removed common buckthorn from portions of the lake and the upland buffer surrounding the lake.  From 2005-2008, the City of Lakeville and members of the Kingsley Lake Association removed purple loosestrife plants from portions of the lake and the upland buffer surrounding the lake. Purple loosestrife beetles were released by the MnDNR prior to 2002. Follow up with MnDNR to verify whether beetles are still present at a population that the MnDNR feels is appropriate for biological control.  The City of Lakeville continues to monitor for invasive species.
Stormwater drainage from impervious surfaces is directed into the lake.	Pre-treat or redirect stormwater for infiltration prior to discharge.	Install a rainwater garden, pervious pavement, or other suitable method for infiltration. <b>See Figure 4, Potential Restoration Area #2.</b>	Improve water quality	Open	
Upland buffer areas lacking naturalized vegetation.	Increase width and continuity of native upland buffer.	Rather than manicured turf grass, gravel, and managed plantings with bare soil, the shoreline could be vegetated with native grasses and wildflowers. <b>See Figure 4, Potential Restoration Areas #4, 6, and 7.</b>  Adjust mowing distance further away from shoreline on City properties ( <b>See Figure 4, Potential Restoration Areas #8 and 9</b> and photos).  See Appendix G for examples of improvements.	Improve water quality, increase wildlife habitat. Improve vegetative diversity and aesthetics.	Spring – Fall	In 2008, a Kingsley Lake lakeshore resident, inspired by the Blue Thumb program, commenced shoreline stabilization utilizing native plants.
Bare soil on steep slope could cause erosion and sedimentation into lake.	Re-vegetate bare areas to prevent soil erosion and sedimentation into Kingsley Lake.	Plant vegetation suited for steep slopes along hillside to prevent erosion.  <b>See Figure 4, Potential Restoration Area #3</b> on restaurant property.  See also island and shoreline areas becoming bare from YMCA camper overuse ( <b>Figure 4, Potential Restoration Areas 10, 11, and 12</b> ).	Improve water quality	Spring - Fall	

## Figures









2020 Dakota County Imagery

- Plot Location
- Kingsley Lake

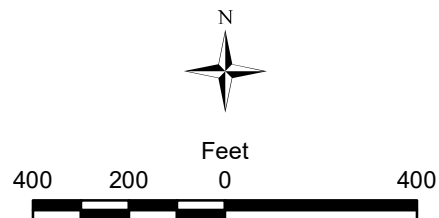
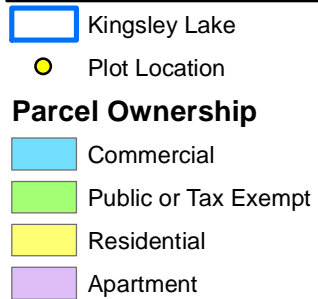


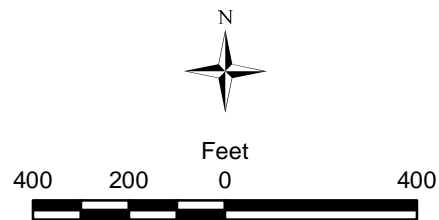
Figure 2

**KINGSLEY LAKE  
Black Dog WMO  
Lakeville, MN**





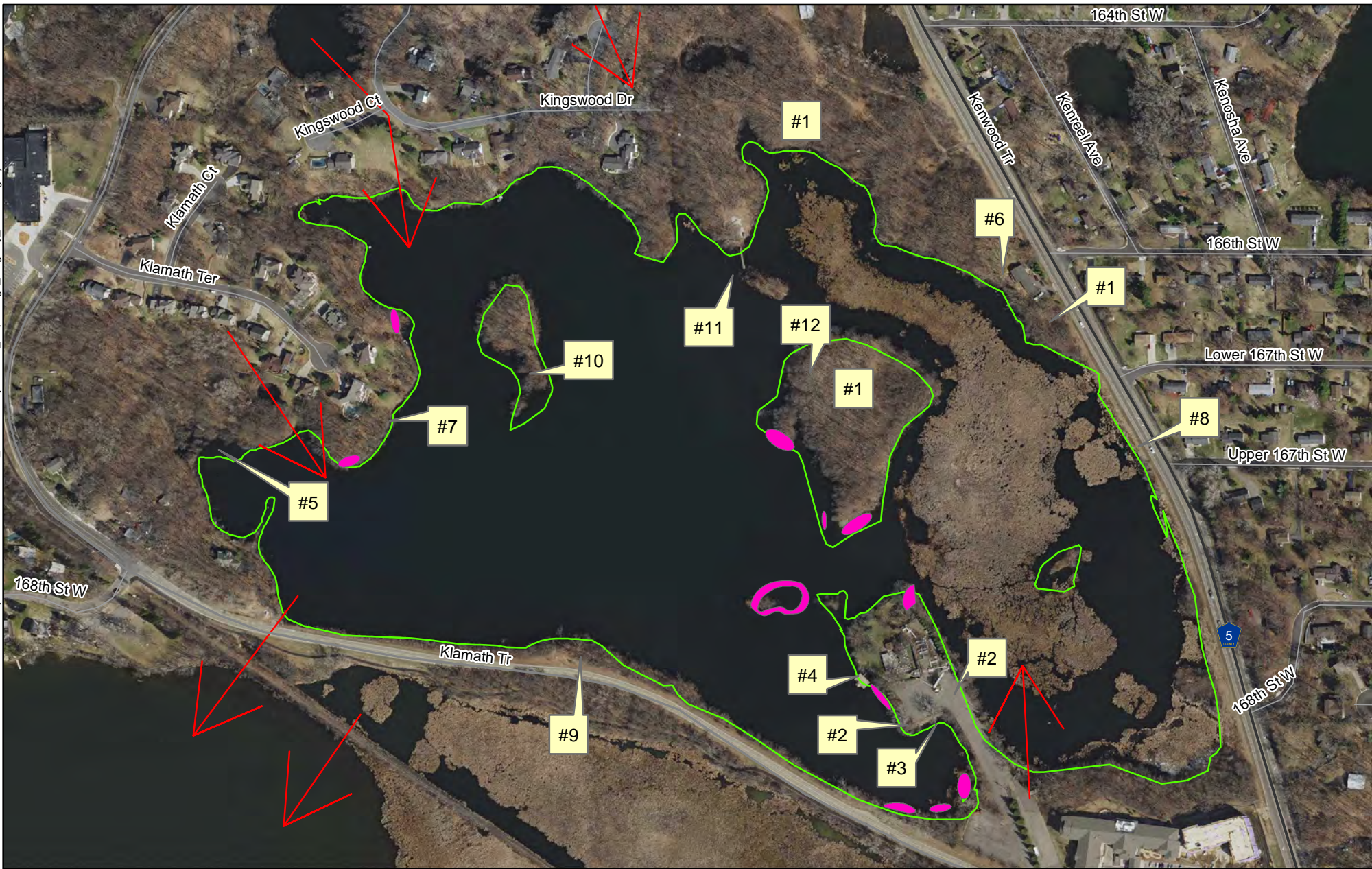
2020 7-county Imagery



**Figure 3**

**PLOT LOCATIONS AND PARCEL OWNERSHIP**  
**KINGSLEY LAKE**  
**Black Dog WMO**  
**Lakeville, MN**

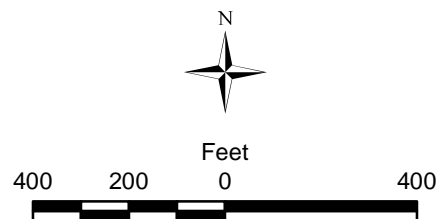




2020 7-county Imagery

- Flow Direction
- Purple loosestrife Location
- Kingsley Lake

Potential Restoration Areas



**Figure 4**  
**RESTORATION POTENTIAL**  
**KINGSLEY LAKE**  
**Black Dog WMO**  
**Lakeville, MN**

## Photos

Kingsley Lake and Shoreline June 3 and July 29, 2021



Site Photos June 3, 2021





Site Photos July 29, 2021



Deep marsh northeast area with floating mats, which support diverse native vegetation





Floating mats in northeast portion of lake supporting diverse native vegetation including sundew



Loons observed during monitoring event, known to nest on Kingsley Lake





Floating leaved vegetation in northwest portion of the lake



Submergent vegetation and algae in southeast bay





Submergent vegetation in western portion of lake

Recommendation #1 – Continue to monitor for curly-leaf pondweed and consider control measures if densities and locations increase to an extent of concern. See Appendix A for curly-leaf pondweed location and locations of other submergent vegetation.





Plot 1B – emergent zone



Plot 1C – upland buffer





Plot 2B – emergent zone



Plot 2C – upland buffer





Upland buffer adjacent to Kenwood Trail dominated by non-native and invasive species and invasive cattail in emergent zone. Consider control of invasive cattail to prevent degradation of deep marsh floating mat areas with diverse native emergent species (Figure 4 Potential Restoration Area #8). Additional areas with non-native and invasive species in the emergent zone and upland buffer include purple loosestrife and yellow iris (locations shown in Appendix A), Figure 4 Potential Restoration Areas #1 (common buckthorn), #3 (Chinese silver grass), #5 (reed canary grass), #9 (Russian olive and Siberian elm).

Recommendation #2 – Continue to control and manage non-native invasive vegetation along the shoreline and in the upland buffer.





Potential Restoration Area #2 – Prevent direct drainage from impervious surfaces into the lake  
Recommendation #3 – Install a pre-treatment system such as a rain garden, pervious pavement, or sediment trap to collect sediment from the restaurant parking lot prior to discharge into the lake.





Recommendation #4 - Adjust mowing distance further away from the shoreline in the City of Lakeville properties next to Klamath Trail and Kenwood Trail to increase the width of the naturalized upland buffer (Potential Restoration Areas #8 and 9). Note of caution that the upland buffer along Klamath Trail includes poison ivy.

A wider naturalized upland buffer is also recommended on restaurant property (Potential Restoration Area #4).





Recommendation #5 – Re-vegetate bare areas to prevent soil erosion on steep slopes (Photo shows Potential Restoration Area #3. Additional bare areas identified at Potential Restoration Areas #7, 10, 11, and 12).



**Technical Reference**  
**(Provided in separate report)**

## Technical Reference

# Black Dog Watershed Management Organization Habitat Monitoring Background Summary

In 2002, the Black Dog Watershed Management Organization (BDWMO) created a program for monitoring the habitat quality of strategic water resources in the watershed. The BDWMO lies south of the Minnesota River in the northwest portion of Dakota County. **Figure 1** shows the subwatersheds to the BDWMO's strategic water bodies. The BDWMO began implementing the habitat monitoring program in 2003 and continued the program through 2009. In 2004, based on feedback from the participating cities and to better define the vegetative quality, several improvements were made to the rating system. The BDWMO used this system for the annual habitat monitoring of each strategic water body through 2009. From 2003-2009 Barr staff annually evaluated the habitat quality of each of the following strategic water bodies:

- Crystal Lake (Burnsville)
- Keller Lake (Burnsville)
- Kingsley Lake (Lakeville)
- Lac Lavon (Apple Valley and Burnsville)
- Orchard Lake (Lakeville)
- Sunset Pond (Burnsville)

In 2010, the BDWMO suspended the habitat monitoring program and re-evaluated the program for its effectiveness. Based on feedback obtained from city staff, the BDWMO revised the habitat monitoring program to provide more effective monitoring, more useful and holistic results, and to reduce the monitoring costs. The BDWMO began implementing the revised habitat monitoring program in 2011. Also in 2011, the BDWMO removed Sunset Pond from its list of strategic water bodies.

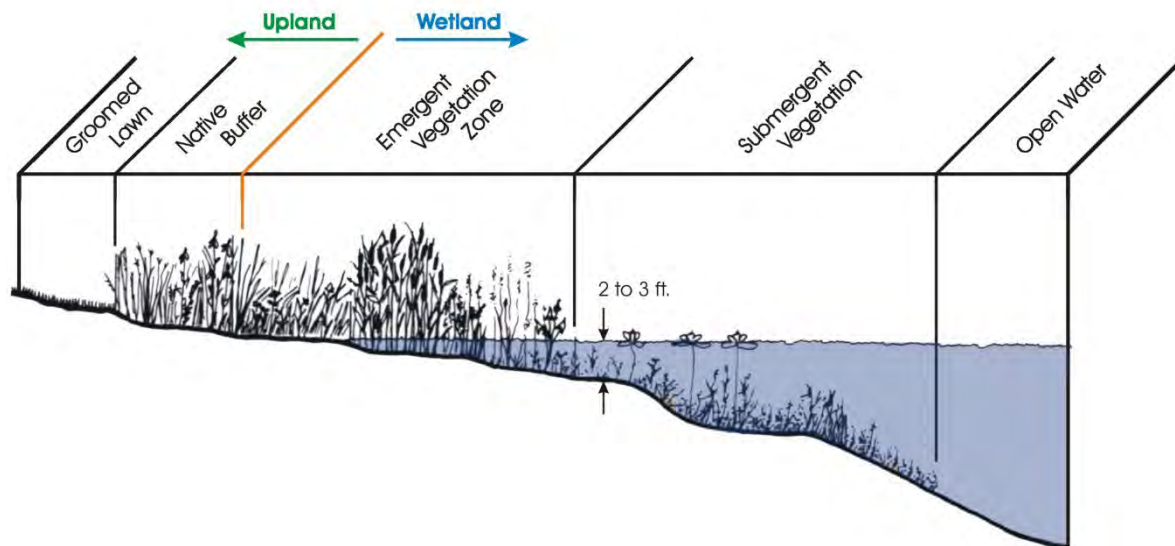
The revised program includes monitoring habitat quality at one strategic water body per year, such that the BDWMO monitors all five strategic water bodies over a five-year cycle. The 2011 through 2015 reports provided a new baseline for the strategic water bodies—Kingsley Lake (2011), Orchard Lake (2012), Crystal Lake (2013), Lac Lavon (2014), and Keller Lake (2015). This report provides the results of the Kingsley Lake 2021 habitat monitoring.

The 2021 Keller Lake monitoring included plot and meandering surveys. Supplemental photographs were taken to document conditions. Private versus public ownership was identified along the entire shoreline. The survey results, along with parcel data, were used to identify possible locations for restoration and preservation. Table 1 of the Technical Memo summarizes the 2021 Kingsley Lake monitoring results.

## Habitat Quality

The BDWMO's assessment of the BDWMO strategic water bodies provides baseline and ongoing information regarding the habitat quality of the water bodies and a method for detecting change. Habitat quality was evaluated within the following four general zones:

1. **Submergent vegetation zone**—The submergent zone refers to the areas of the water body where water depths are typically 2 to 20 feet (normal maximum rooting depth) and the vegetation is typically submerged or has floating leaves. The vegetation quality within the submergent zone is normally rated as "excellent" when there are: (a) a diverse assemblage of native plant species (more than 14), (b) a moderate plant density or plant occurrence rating, and (c) no exotic species present.
2. **Emergent vegetation zone**—The emergent zone typically refers to the areas of the water body where water depths are less than 2 feet and vegetation grows out of the water. The vegetation quality within the emergent zone is typically rated as "excellent" when there are more than 15 species of native and non-invasive plants present, with few exotic plants present.
3. **Condition of the upland buffer area**—The upland buffer is characterized as the upland area immediately surrounding the water body. An excellent quality buffer should extend upslope at least 25 feet from the wetland edge, consist of native vegetation that is not routinely mowed, and be present continuously around the perimeter of the water body.
4. **Sedimentation and shoreline erosion problems**—The presence of sedimentation may come from erosion on slopes, from storm sewer outfalls, or from other sources. The presence of a regular sediment load to the water body can cause a significant reduction in water quality. Shoreline erosion can be caused by natural forces such as ice and wave action, but can also be human induced (e.g., vegetation removal, grading, runoff, structures, etc.). Identifying and correcting these problems early can prevent habitat degradation.




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## Vegetation Zones

**Appendix C** summarizes the overall ratings from 2003 through 2020. **Appendix D** includes the previous management recommendations for water bodies assessed from 2009 through 2020. **Table 2 of the Technical Memo** provides the 2021 management recommendations for Kingsley Lake.

## Wildlife Habitat Characteristics

The strategic water bodies within the BDWMO range from shallow wetland systems to deeper lake systems. Some of them support sustainable fisheries, while others may only periodically support fish. All of the water bodies appear to have some potential for supporting waterfowl and shorebirds. To evaluate the wildlife value of these water bodies, it is important to understand the characteristics that will benefit wildlife.

In general, a more diverse assemblage of native plant species will provide a source of food and protective cover for a wider range of wildlife species. Typically, although not always, native plant species do not become established as monocultures to the detriment of other species, as is often the case with many exotic species. As vegetation diversity increases, so does the likelihood that the water body will support a more diverse assemblage of wildlife.

A diverse interspersed of various plant communities also leads to the potential for attracting a wider range of wildlife. For instance, some waterfowl prefer deeper, open water areas while others tend to inhabit the shallow emergent zones. Some furbearers rely heavily on the shallow, emergent zone and upland areas around the water body while others spend most of their time in the deep marsh areas. Amphibians will typically need a permanently inundated water body but rely on diverse vegetative structure in the upland areas surrounding the water body for critical components of their life cycle. Fish also require permanent inundation to a depth that will not result in freeze-out and where oxygen will not become depleted. A diverse habitat structure is also important for fish.

The upland buffer surrounding these water bodies is important for several reasons. A high-quality upland buffer will have a diverse vegetative structure dominated by self-sustaining native vegetation. A high-quality upland buffer is used by wildlife for shelter, feeding, resting, nesting, and reproduction. In contrast, adjacent upland areas that are maintained in turf grass or paved trails provide little value to wildlife or water quality improvement. Turf grass and trails typically provide feeding and resting grounds only for geese and some species of ducks. Wide and contiguous natural buffers are important as they provide feeding, nesting and safe travel corridors. Upland buffers also help protect the water quality of the water body. Diverse native vegetation helps maintain an open soil structure that promotes infiltration, reduces surface runoff, and increases nutrient uptake.

## Wetland Functions and Values Assessment—MNRAM

In addition to the specific habitat parameters described above, the Minnesota Routine Assessment Method for Evaluating Wetland Functions (MNRAM) Version 3.0 was used to evaluate the hydrologic system and ecosystem making up each water resource, first in 2003 and then again in 2006. The results of the 2003 and 2006 MNRAM 3.0 assessments were provided in previous year's reports. Orchard Lake was re-assessed in 2012, Crystal Lake was re-assessed in 2013, Lac Lavon was re-assessed in 2014, Keller Lake was re-assessed in 2015, and Kinsley was re-assessed in 2016 with the more updated MNRAM version 3.4. The results of the 2016 Kingsley Lake MNRAM are provided in **Appendix E**. Evaluating each ecosystem with MNRAM is a way to get a detailed picture of the overall health of the watershed and the water resource itself. Instead of just looking at specific parameters that are direct indicators of habitat quality, the MNRAM evaluates many different parameters of the water body and its watershed that contribute to sustaining the wetland functions, which are described in **Appendix F**. In general, the MNRAM assessments compare favorably with the BDWMO habitat vegetation assessment results. This method identifies land use or ecological changes, which might affect the water body in the long term. In addition, the MNRAM assessment provides an independent evaluation of the overall wildlife habitat of the water body.

## Appendices

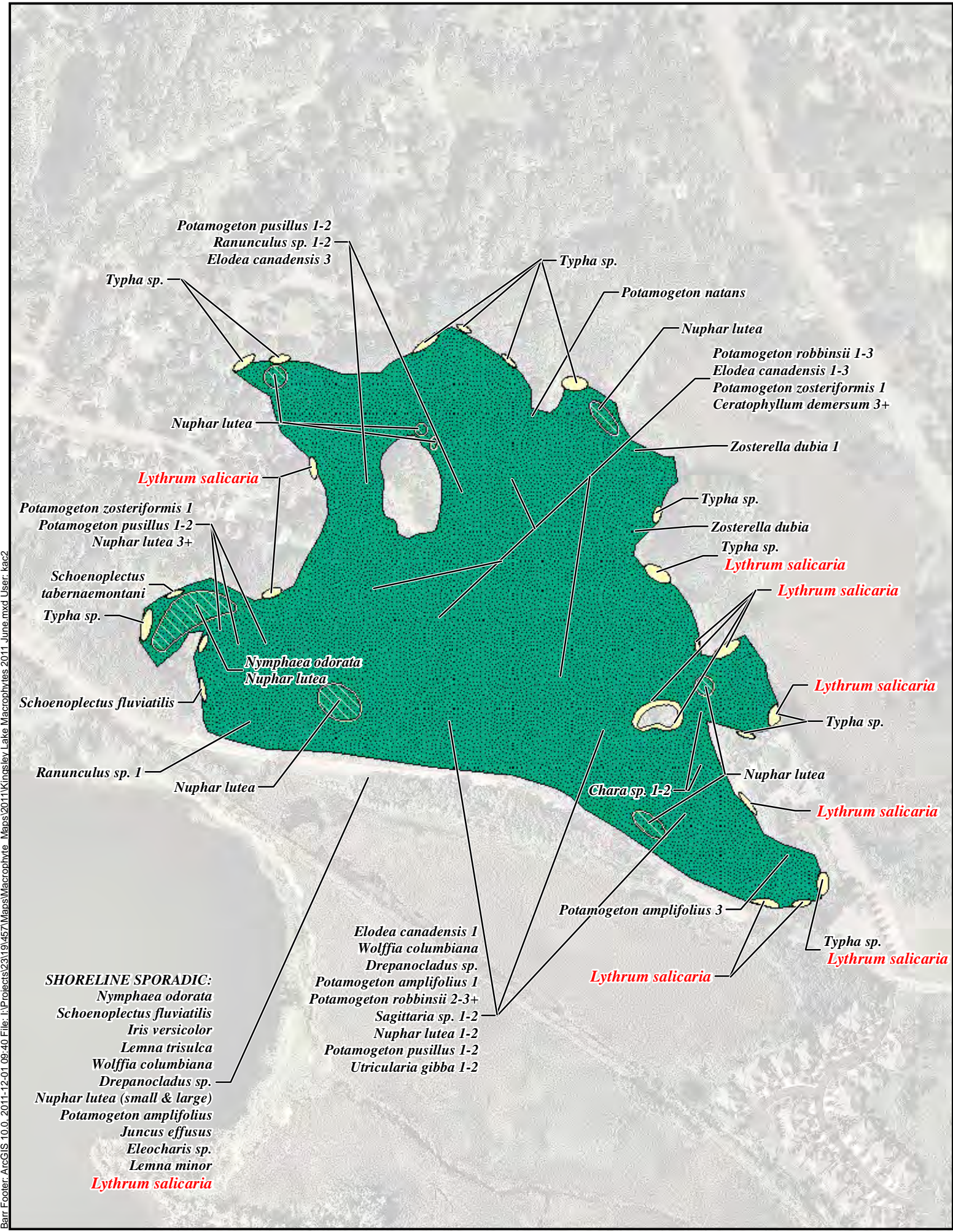
- Kingsley Lake aquatic plant survey results (**Appendix A**),
- floristic quality assessment data and methods (**Appendix B**),
- previous habitat assessment monitoring results from 2003 through 2020 (**Appendix C**),
- previous recommended and completed management actions from 2003 through 2020 (**Appendix D**),
- 2016 Kingsley Lake Minnesota Routine Assessment Method (MNRAM 3.4) wetland functional assessment results (**Appendix E**),
- descriptions of the MNRAM wetland functions (**Appendix F**),
- examples of shoreline and buffer restoration projects (**Appendix G**),
- buckthorn management guidelines (**Appendix H**), and
- example pollinator brochure (**Appendix I**).

## **Appendix A**

### **Kingsley Lake Aquatic Plant Survey Results**



Bar Footer: ArcGIS 10.0, 2011-12-01 09:40 File: I:\Projects\23191457\Maps\Macrophyte Maps\2011\Kingsley Lake Macrophytes 2011 June.mxd User: kac2



Submerged Aquatic Plants	
Common Name	Scientific Name
Coon's tail	<i>Ceratophyllum demersum</i>
Muskgrass	<i>Chara sp.</i>
Canadian waterweed	<i>Elodea canadensis</i>
Slender waterweed	<i>Elodea nuttallii</i>
Largeleaf pondweed	<i>Potamogeton amplifolius</i>
Floating leaf pondweed	<i>Potamogeton natans</i>
Slender pondweed	<i>Potamogeton pusillus</i>
Robbins' pondweed	<i>Potamogeton robbinsii</i>
Flatstem pondweed	<i>Potamogeton zosteriformis</i>
Buttercup	<i>Ranunculus sp.</i>
Creeping bladderwort	<i>Utricularia gibba</i>

Floating Leaf Plants	
Common Name	Scientific Name
Common duckweed	<i>Lemna minor</i>
Star duckweed	<i>Lemna trisulca</i>
Yellow pond-lily	<i>Nuphar lutea</i>
American white waterlily	<i>Nymphaea odorata</i>
Water knotweed	<i>Polygonum amphibium</i>
Columbian watermeal	<i>Wolffia columbiana</i>
Water stargrass	<i>Zosterella dubia</i>

Emergent Plants	
Common Name	Scientific Name
Water moss	<i>Drepanocladus sp.</i>
Spike rush	<i>Eleocharis sp.</i>
Harlequin blueflag	<i>Iris versicolor</i>
Soft rush	<i>Juncus effusus</i>
<b>Purple loosestrife</b>	<b><i>Lythrum salicaria</i></b>
River bulrush	<i>Schoenoplectus fluviatilis</i>
Softstem bulrush	<i>Schoenoplectus tabernaemontani</i>
Cattail	<i>Typha sp.</i>
Arrowhead	<i>Sagittaria sp.</i>

\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

FIELD NOTES:  
- Macrophyte densities estimated as follows:  
1=light; 2=moderate; 3=heavy  
- Densities generally not noted for emergent and floating leaf plants  
- *Elodea nuttallii* (slender waterweed) was observed, usually mixed in with *Elodea canadensis*  
- Water lilies will fill in later during growing season, most likely around the entire lake perimeter and around islands  
- No ***Potamogeton crispus*** observed or sampled

**Legend**

- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation

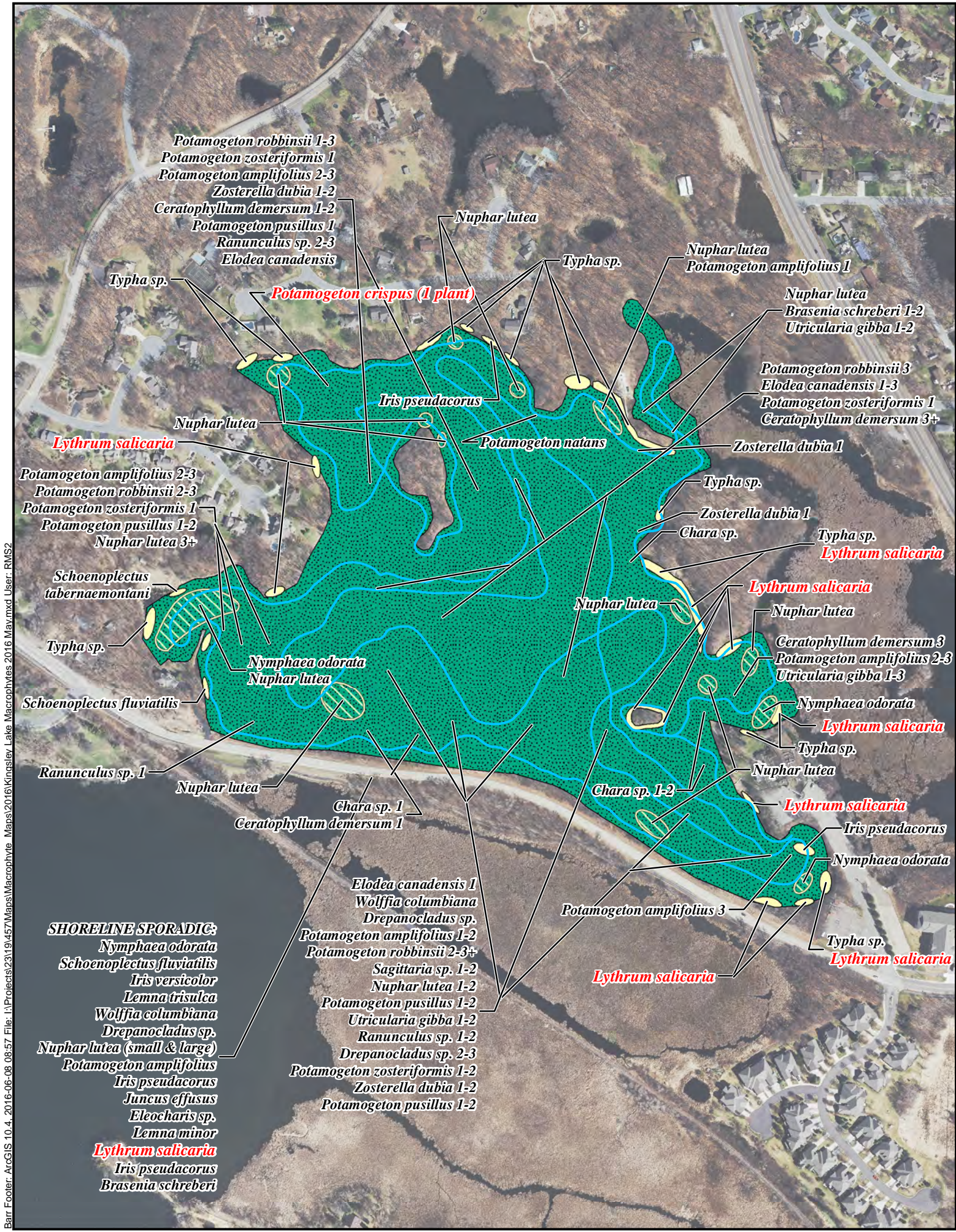
0 400 800  
Feet

0 100 200  
Meters

Imagery Source: 2009 AE

Figure 3  
KINGSLEY LAKE MACROPHYTE SURVEY  
June 2, 2011  
Black Dog Watershed Management Organization





Submerged Aquatic Plants

Common Name	Scientific Name
<b>Curlyleaf Pondweed</b>	<b>Potamogeton crispus</b>
Coontail	Ceratophyllum demersum
Muskgrass	Chara sp.
Canadian waterweed	Elodea canadensis
Slender waterweed	Elodea nuttallii
Largeleaf pondweed	Potamogeton amplifolius
Floating leaf pondweed	Potamogeton natans
Slender pondweed	Potamogeton pusillus
Robbins' pondweed	Potamogeton robbinsii
Flatstem pondweed	Potamogeton zosteriformis
Buttercup	Ranunculus sp.
Creeping bladderwort	Utricularia gibba
Watershield	Brasenia schreberi

Floating Leaf Plants

Common Name	Scientific Name
Common duckweed	Lemna minor
Star duckweed	Lemna trisulca
Yellow pond-lily	Nuphar lutea
American white waterlily	Nymphaea odorata
Water knotweed	Polygonum amphibium
Columbian watermeal	Wolffia columbiana
Water stargrass	Zosterella dubia

Emergent Plants

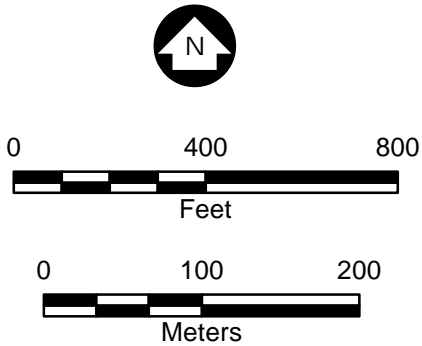
Common Name	Scientific Name
Yellow iris	Iris pseudacorus
Water moss	Drepanocladus sp.
Spike rush	Elecharis sp.
Harlequin blueflag	Iris versicolor
Soft rush	Juncus effusus
<b>Purple loosestrife</b>	<b>Lythrum salicaria</b>
River bulrush	Schoenoplectus fluviatilis
Softstem bulrush	Schoenoplectus tabernaemontani
Cattail	Typha sp
Arrowhead	Sagittaria sp.

\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

FIELD NOTES:

- Macrophyte densities estimated as follows:  
1=light; 2=moderate; 3=heavy
- Densities and species are very similar to 2011 survey with the exception of **Potamogeton crispus**
- Densities generally not noted for emergent and floating leaf plants
- Elodea nuttallii (slender waterweed) was observed, usually mixed in with Elodea canadensis
- Water lilies will fill in later during growing season, most likely around the entire lake perimeter and around islands
- **Potamogeton crispus** observed: 1 plant observed northwest side of lake (see map)

- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation
- GPS Survey Location Path

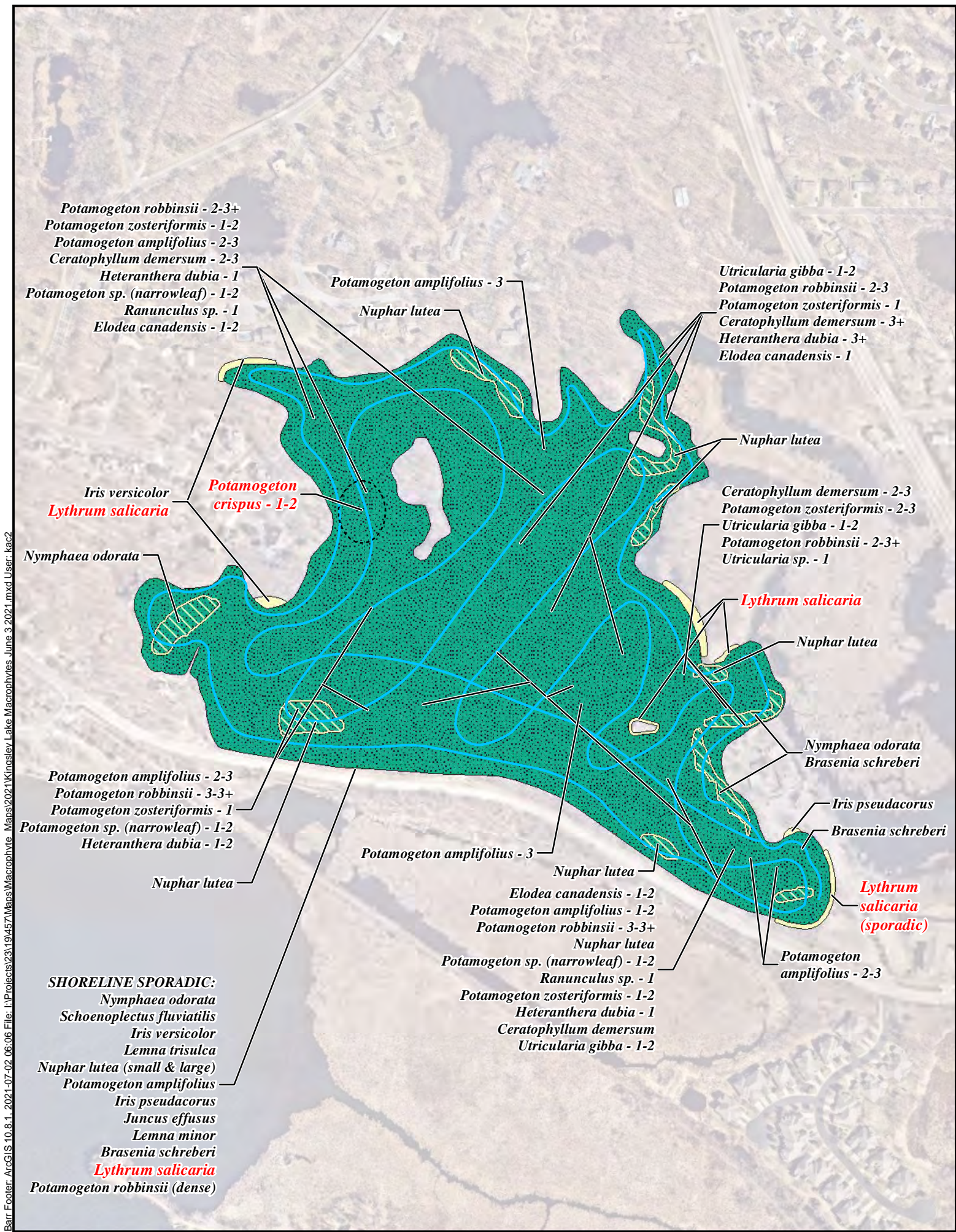


KINGSLEY LAKE MACROPHYTE SURVEY

May 27, 2016  
Black Dog Watershed  
Management Organization



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#### Submerged Aquatic Plants

Common Name	Scientific Name
Bladderwort	<i>Utricularia sp.</i>
Buttercup	<i>Ranunculus sp.</i>
Canadian waterweed	<i>Elodea canadensis</i>
Coontail	<i>Ceratophyllum demersum</i>
Creeping bladderwort	<i>Utricularia gibba</i>
<b>Curlyleaf Pondweed</b>	<b><i>Potamogeton crispus</i></b>
Flatstem pondweed	<i>Potamogeton zosteriformis</i>
Largeleaf pondweed	<i>Potamogeton amplifolius</i>
Narrowleaf pondweed	<i>Potamogeton sp.</i>
Robbins' pondweed	<i>Potamogeton robbinsii</i>
Slender waterweed	<i>Elodea nuttallii</i>
Water stargrass	<i>Heteranthera dubia</i>

#### Floating Leaf Plants

Common Name	Scientific Name
Common duckweed	<i>Lemna minor</i>
Star duckweed	<i>Lemna trisulca</i>
Yellow pond-lily	<i>Nuphar lutea</i>
American white waterlily	<i>Nymphaea odorata</i>
Watershield	<i>Brasenia schreberi</i>

#### Emergent Plants

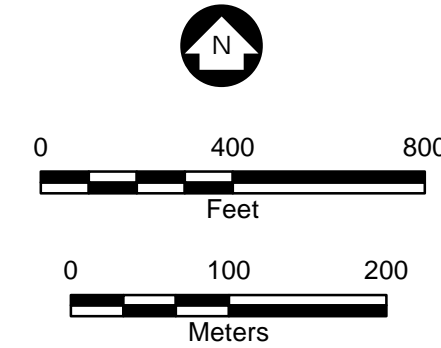
Common Name	Scientific Name
Yellow iris	<i>Iris pseudacorus</i>
Harlequin blueflag	<i>Iris versicolor</i>
Soft rush	<i>Juncus effusus</i>
<b>Purple loosestrife</b>	<b><i>Lythrum salicaria</i></b>
River bulrush	<i>Schoenoplectus fluviatilis</i>

\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

FIELD NOTES:

- Macrophyte densities estimated as follows:  
1=light; 2=moderate; 3=heavy
- Densities and species are very similar to 2011, 2016 survey with the exception of **Potamogeton crispus** (slightly larger area of growth)
- Algal bloom present
- Fibrous algal growth at plants is shallow
- Densities generally not noted for emergent and floating leaf plants
- *Elodea nuttallii* (slender waterweed) was observed, usually mixed in with *Elodea canadensis*
- Water lilies will fill in later during growing season, most likely around the entire lake perimeter and around islands
- **Potamogeton crispus** observed: multiple plants observed northwest side of lake (see map)
- Low water level observed
- *Potamogeton robbinsii* - dense - entire lake perimeter

- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation
- GPS Survey Location Path



## KINGSLEY LAKE MACROPHYTE SURVEY

June 3, 2021  
Black Dog Watershed  
Management Organization



## Appendix B

### Kingsley Lake Floristic Quality Assessment Data

## 2004 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Lemna minor</i>	common duckweed	5
<i>Nuphar lutea</i>	yellow pond-lily	6
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.3
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		7
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		13.98

## 2005 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Lemna minor</i>	common duckweed	5
<i>Nuphar lutea ssp. variegata</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	American white waterlily	6
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton crispus</i>	curly pondweed	0
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.0
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		10
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		15.81

## 2006 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Nuphar lutea ssp. variegata</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	American white waterlily	6
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton crispus</i>	curly pondweed	0
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Ranunculus sp.</i>	crowfoot	5
<i>Sagittaria cristata</i>	crested arrowhead	8
<i>Utricularia macrorhiza</i>	common bladderwort	5
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.2
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		14
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		19.51

## 2007 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Nuphar lutea ssp. variegata</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	American white waterlily	6
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton crispus</i>	curly pondweed	0
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Ranunculus sp.</i>	crowfoot	5
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.1
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		11
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		16.88



## 2008 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Potamogeton pusillus</i>	leafy pondweed	7
Mean C-value		6.2
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		5
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		13.86

## 2009 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coon's tail	2
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Nuphar lutea ssp. variegata</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	American white waterlily	6
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton crispus</i>	curly pondweed	0
<i>Potamogeton foliosus ssp. Foliosus</i>	leafy pondweed	6
<i>Potamogeton pusillus</i>	leafy pondweed	7
<i>Potamogeton robbinsii</i>	Robbins' pondweed	8
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.3
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		12
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		18.48

## 2011 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Ceratophyllum demersum</i>	coontail	2
<i>Chara sp.</i>	muskgrass	7
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Elodea nuttallii</i>	western waterweed	7
<i>Heteranthera dubia</i>	water stargrass	6
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Nuphar lutea</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	white waterlily	6
<i>Polygonum amphibium</i>	water knotweed	4
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton natans</i>	floating pondweed	5
<i>Potamogeton pusillus</i>	leafy pondweed	7
<i>Potamogeton robbinsii</i>	Robbins pondweed	8
<i>Potamogeton zosteriformis</i>	flatstem pondweed	6
<i>Ranunculus sp.</i>	buttercup	5.5
<i>Utricularia gibba</i>	humped bladderwort	9
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.8
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		18
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		24.63

## 2016 Kingsley Lake Submergent Vegetation Floristic Quality Index

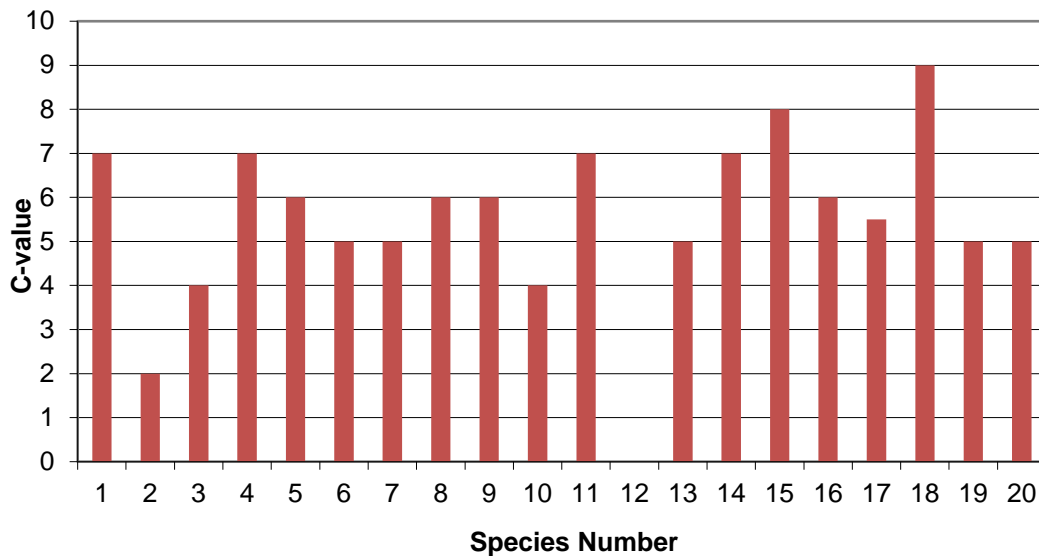
Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coontail	2
<i>Chara sp.</i>	muskgrass	7
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Heteranthera dubia</i>	water stargrass	6
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Najas flexilis</i>	wavy waternymph	5
<i>Nuphar lutea</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	white waterlily	6
<i>Persicaria amphibia</i>	water knotweed	4
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton natans</i>	floating pondweed	5
<i>Potamogeton pusillus</i>	leafy pondweed	7
<i>Potamogeton robbinsii</i>	Robbins pondweed	8
<i>Potamogeton zosteriformis</i>	flatstem pondweed	6
<i>Ranunculus sp.</i>	buttercup	5.5
<i>Utricularia gibba</i>	humped bladderwort	9
<i>Utricularia macrorhiza</i>	greater bladderwort	5
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.7
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		19
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		24.95

## 2021 Kingsley Lake Submergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Brasenia schreberi</i>	watershield	7
<i>Ceratophyllum demersum</i>	coontail	2
<i>Elodea canadensis</i>	Canadian waterweed	4
<i>Elodea nuttallii</i>	slender waterweed	7
<i>Heteranthera dubia</i>	water stargrass	6
<i>Lemna minor</i>	common duckweed	5
<i>Lemna trisulca</i>	star duckweed	5
<i>Nuphar lutea</i>	yellow pond-lily	6
<i>Nymphaea odorata</i>	white waterlily	6
<i>Persicaria amphibia</i>	water knotweed	4
<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
<i>Potamogeton crispus</i>	curly pondweed	0
<i>Potamogeton natans</i>	floating pondweed	5
<i>Potamogeton pusillus</i>	leafy pondweed	7
<i>Potamogeton robbinsii</i>	Robbins pondweed	8
<i>Potamogeton zosteriformis</i>	flatstem pondweed	6
<i>Ranunculus sp. *</i>	buttercup	5.5
<i>Utricularia gibba</i>	humped bladderwort	9
<i>Utricularia macrorhiza</i>	greater bladderwort	5
<i>Wolffia columbiana</i>	Columbian watermeal	5
Mean C-value		5.5
S (Number of Species of Submergent/Floating-leaf Plants in the Lake)		20
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		24.48

\* An average C-value was used for this genus, since the species was not verified.

**2021 Kingsley Lake Submergent Vegetation Survey**  
**C-value for each Species**



Species Number	Scientific Name	Common Name	C-value
1	<i>Brasenia schreberi</i>	watershield	7
2	<i>Ceratophyllum demersum</i>	coontail	2
3	<i>Elodea canadensis</i>	elodea	4
4	<i>Elodea nuttallii</i>	slender waterweed	7
5	<i>Heteranthera dubia</i>	water stargrass	6
6	<i>Lemna minor</i>	common duckweed	5
7	<i>Lemna trisulca</i>	star duckweed	5
8	<i>Nuphar lutea</i>	yellow pond-lily	6
9	<i>Nymphaea odorata</i>	white waterlily	6
10	<i>Persicaria amphibia</i>	water knotweed	4
11	<i>Potamogeton amplifolius</i>	largeleaf pondweed	7
12	<i>Potamogeton crispus</i>	curly pondweed	0
13	<i>Potamogeton natans</i>	floating pondweed	5
14	<i>Potamogeton pusillus</i>	leafy pondweed	7
15	<i>Potamogeton robbinsii</i>	Robbins pondweed	8
16	<i>Potamogeton zosteriformis</i>	flatstem pondweed	6
17	<i>Ranunculus sp. *</i>	buttercup	5.5

## 2011 Kingsley Lake Emergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Asclepias incarnata</i> ssp. <i>Incarnata</i>	swamp milkweed	4
<i>Carex scoparia</i> var. <i>scoparia</i>	broom sedge	4
<i>Eleocharis obtusa</i>	blunt spikerush	3
<i>Eleocharis</i> sp.	spikerush	3
<i>Eupatoriadelphus maculatus</i>	Spotted Joe pye weed	4
<i>Impatiens capensis</i>	jewelweed	2
<i>Iris versicolor</i>	harlequin blueflag	4
<i>Juncus effusus</i>	common rush	4
<i>Lemna minor</i>	common duckweed	5
<i>Lycopus uniflorus</i>	northern bugleweed	5
<i>Lythrum salicaria</i>	purple loosestrife	0
<i>Mentha arvensis</i>	wild mint	3
<i>Phalaris arundinacea</i>	reed canarygrass	0
<i>Pilea pumila</i>	Canadian clearweed	3
<i>Polygonum amphibium</i>	water knotweed	4
<i>Polygonum lapathifolium</i>	curlytop knotweed	2
<i>Sagittaria</i> sp.	arrowhead	3
<i>Schoenoplectus fluviatilis</i>	river bulrush	4
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	4
<i>Scirpus atrovirens</i>	green bulrush	4
<i>Sium suave</i>	hemlock waterparsnip	5
<i>Sparganium eurycarpum</i>	broadfruit bur-reed	5
<i>Thelypteris palustris</i> var. <i>pubescens</i>	marsh fern	7
<i>Typha angustifolia</i>	narrowleaf cattail	0
<i>Typha X glauca</i>	hybrid cattail	0
Mean C-value		3.3
S (Number of Species of Emergent Plants in the Lake)		25
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		16.40

## 2016 Kingsley Lake Emergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Asclepias incarnata</i>	swamp milkweed	4
<i>Betula pumila</i>	bog birch	7
<i>Bidens tripartita</i>	three-lobed beggarticks	4
<i>Carex scoparia</i>	broom sedge	4
<i>Carex comosa</i>	bearded sedge	4
<i>Carex stricta</i>	tussock sedge	5
<i>Comarum palustre</i>	purple marshlocks	7
<i>Eleocharis palustris</i>	common spikerush	3
<i>Eutrochium maculatum</i>	spotted Joe pye weed	4
<i>Impatiens capensis</i>	jewelweed	2
<i>Iris versicolor</i>	harlequin blueflag	4
<i>Iris pseudacorus</i>	yellow iris	0
<i>Juncus effusus</i>	common rush	4
<i>Lemna minor</i>	common duckweed	5
<i>Lycopus uniflorus</i>	northern bugleweed	5
<i>Lythrum salicaria</i>	purple loosestrife	0
<i>Mentha arvensis</i>	wild mint	3
<i>Phalaris arundinacea</i>	reed canarygrass	0
<i>Pilea pumila</i>	Canadian clearweed	3
<i>Persicaria amphibia</i>	water knotweed	4
<i>Persicaria lapathifolium</i>	curlytop knotweed	2
<i>Nymphaea odorata</i>	white waterlily	6
<i>Salix interior</i>	sandbar willow	2
<i>Salix amygdaloides</i>	peach-leaf willow	5
<i>Sagittaria graminea</i> *	grass-leave arrowhead	9
<i>Sagittaria latifolia</i>	broad-leave arrowhead	3
<i>Schoenoplectus fluviatilis</i>	river bulrush	4
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	4
<i>Scutellaria galericulata</i>	marsh skullcap	5
<i>Scirpus atrovirens</i>	green bulrush	4
<i>Scirpus cyperinus</i>	woolgrass	3
<i>Solidago gigantea</i>	giant goldenrod	3
<i>Sparganium emersum</i> *	European burr-reed	8
<i>Thelypteris palustris</i>	marsh fern	7
<i>Typha angustifolia</i>	narrowleaf cattail	0
<i>Typha X glauca</i>	hybrid cattail	0
Mean C-value		3.8
S (Number of Species of Emergent Plants in the Lake)		36
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		22.83

\* A C-value for this species has not been determined in Minnesota.

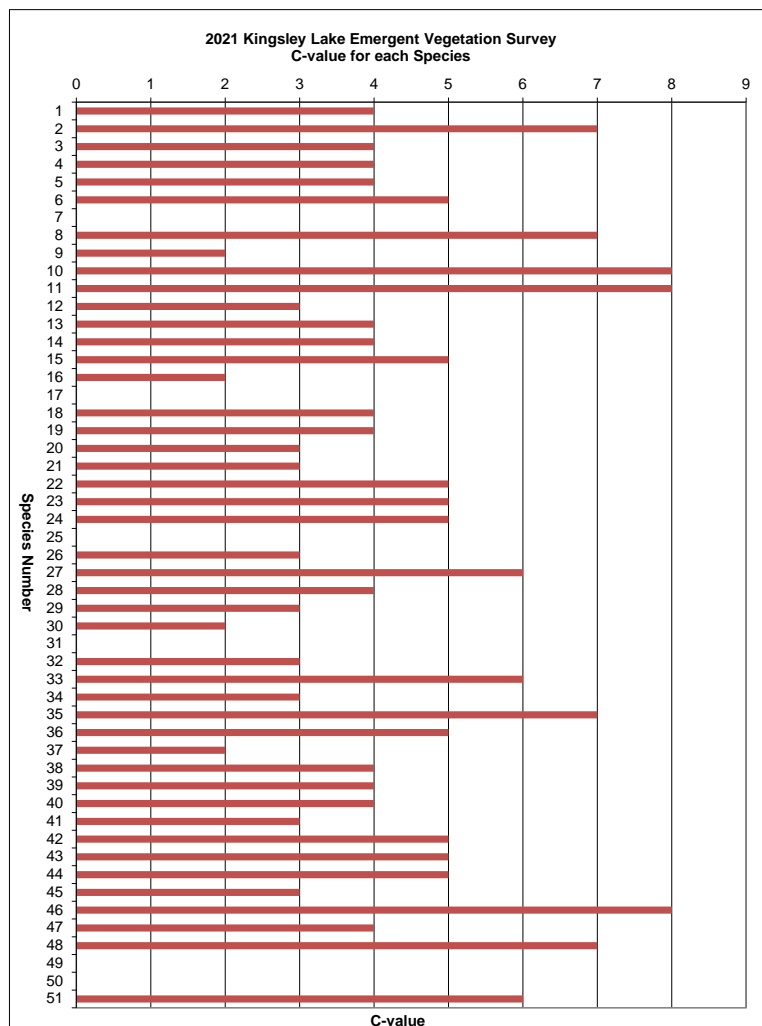


## 2021 Kingsley Lake Emergent Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Asclepias incarnata</i>	swamp milkweed	4
<i>Betula pumila</i>	bog birch	7
<i>Bidens tripartita</i>	three-lobed beggarticks	4
<i>Carex comosa</i>	bearded sedge	4
<i>Carex scoparia</i>	broom sedge	4
<i>Carex stricta</i>	tussock sedge	5
<i>Cirsium arvense</i>	Canada thistle	0
<i>Comarum palustre</i>	purple marshlocks	7
<i>Cyperus erythrorhizos</i>	red-rooted cyperus	2
<i>Drosera rotundifolia</i>	Round-leaved sundew	8
<i>Dulichium arundinaceum</i>	three-way sedge	8
<i>Eleocharis palustris</i>	common spikerush	3
<i>Eupatorium perfoliatum</i>	common boneset	4
<i>Eutrochium maculatum</i>	spotted Joe pye weed	4
<i>Hypericum majus</i>	large St. John's wort	5
<i>Impatiens capensis</i>	jewelweed	2
<i>Iris pseudacorus</i>	yellow iris	0
<i>Iris versicolor</i>	harlequin blueflag	4
<i>Juncus effusus</i>	common rush	4
<i>Laportea canadensis</i>	wood nettle	3
<i>Leersia oryzoides</i>	rice cut grass	3
<i>Lemna minor</i>	common duckweed	5
<i>Lycopus uniflorus</i>	northern bugleweed	5
<i>Lycopus virginicus</i>	Virginia bugleweed	5
<i>Lythrum salicaria</i>	purple loosestrife	0
<i>Mentha arvensis</i>	wild mint	3
<i>Nymphaea odorata</i>	white waterlily	6
<i>Persicaria amphibia</i>	water knotweed	4
<i>Persicaria hydropiperoides</i>	mild water pepper	3
<i>Persicaria lapathifolium</i>	curlytop knotweed	2
<i>Phalaris arundinacea</i>	reed canarygrass	0
<i>Pilea pumila</i>	Canadian clearweed	3
<i>Ranunculus hispidus</i>	hispid buttercup	6
<i>Sagittaria latifolia</i>	broad-leave arrowhead	3
<i>Sagittaria rigida</i>	sessile fruited arrowhead	7
<i>Salix amygdaloides</i>	peach-leaf willow	5
<i>Salix interior</i>	sandbar willow	2
<i>Schoenoplectus fluviatilis</i>	river bulrush	4
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	4
<i>Scirpus atrovirens</i>	green bulrush	4
<i>Scirpus cyperinus</i>	woolgrass	3
<i>Scutellaria galericulata</i>	marsh skullcap	5
<i>Scutellaria galericulata</i>	marsh skullcap	5
<i>Sium suave</i>	water parsnip	5

<i>Solidago gigantea</i>	giant goldenrod	3
<i>Sparganium emersum</i> *	European burr-reed	8
<i>Stachys palustris</i>	woundwort	4
<i>Thelypteris palustris</i>	marsh fern	7
<i>Typha angustifolia</i>	narrowleaf cattail	0
<i>Typha X glauca</i>	hybrid cattail	0
<i>Verbena hastata</i>	blue vervain	6
Mean C-value		4.0
S (Number of Species of Emergent Plants in the Lake)		51
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		28.29

\* A C-value for this species has not been determined in Minnesota.



Species Number	Scientific Name	Common Name	C-value
1	<i>Asclepias incarnata</i>	swamp milkweed	4
2	<i>Betula pumila</i>	bog birch	7
3	<i>Bidens tripartita</i>	three-lobed beggarticks	4
4	<i>Carex comosa</i>	bearded sedge	4
5	<i>Carex scoparia</i>	broom sedge	4
6	<i>Carex stricta</i>	tussock sedge	5
7	<i>Cirsium arvense</i>	Canada thistle	0
8	<i>Comarum palustre</i>	purple marshlocks	7
9	<i>Cyperus erythrorhizos</i>	red-rooted cyperus	2
10	<i>Drosera rotundifolia</i>	Round-leaved sundew	8
11	<i>Dulichium arundinaceum</i>	three-way sedge	8
12	<i>Eleocharis palustris</i>	common spikerush	3
13	<i>Eupatorium perfoliatum</i>	common boneset	4
14	<i>Eutrochium maculatum</i>	spotted Joe pye weed	4
15	<i>Hypericum majus</i>	large St. John's wort	5
16	<i>Impatiens capensis</i>	jewelweed	2
17	<i>Iris pseudacorus</i>	yellow iris	0
18	<i>Iris versicolor</i>	harlequin blueflag	4
19	<i>Juncus effusus</i>	common rush	4
20	<i>Laportea canadensis</i>	wood nettle	3
21	<i>Leersia oryzoides</i>	rice cut grass	3
22	<i>Lemna minor</i>	common duckweed	5
23	<i>Lycopus uniflorus</i>	northern bugleweed	5
24	<i>Lycopus virginicus</i>	Virginia bugleweed	5
25	<i>Lythrum salicaria</i>	purple loosestrife	0
26	<i>Mentha arvensis</i>	wild mint	3
27	<i>Nymphaea odorata</i>	white waterlily	6
28	<i>Persicaria amphibia</i>	water knotweed	4
29	<i>Persicaria hydropiperoides</i>	mild water pepper	3
30	<i>Persicaria lapathifolium</i>	curlytop knotweed	2
31	<i>Phalaris arundinacea</i>	reed canarygrass	0
32	<i>Pilea pumila</i>	Canadian clearweed	3
33	<i>Ranunculus hispidus</i>	hispid buttercup	6
34	<i>Sagittaria latifolia</i>	broad-leave arrowhead	3
35	<i>Sagittaria rigida</i>	sessile fruited arrowhead	7
36	<i>Salix amygdaloides</i>	peach-leaf willow	5
37	<i>Salix interior</i>	sandbar willow	2
38	<i>Schoenoplectus fluviatilis</i>	river bulrush	4
39	<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	4
40	<i>Scirpus atrovirens</i>	green bulrush	4
41	<i>Scirpus cyperinus</i>	woolgrass	3
42	<i>Scutellaria galericulata</i>	marsh skullcap	5
43	<i>Scutellaria galericulata</i>	marsh skullcap	5
44	<i>Stium suave</i>	water parsnip	5
45	<i>Solidago gigantea</i>	giant goldenrod	3
46	<i>Sparganium emersum</i> *	European burr-reed	8
47	<i>Stachys palustris</i>	woundwort	4
48	<i>Thelypteris palustris</i>	marsh fern	7
49	<i>Typha angustifolia</i>	narrowleaf cattail	0
50	<i>Typha X glauca</i>	hybrid cattail	0
51	<i>Verbena hastata</i>	blue vervain	6

## 2011 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Acer negundo</i>	boxelder	1
<i>Acer rubrum</i> var. <i>rubrum</i>	red maple	3
<i>Achillea millefolium</i>	common yarrow	1
<i>Ambrosia artemisiifolia</i>	annual ragweed	0
<i>Ambrosia trifida</i> var. <i>trifida</i>	great ragweed	0
<i>Amphicarpaea bracteata</i>	American hogpeanut	2
<i>Anemone canadensis</i>	Canadian anemone	3
<i>Aralia nudicaulis</i>	wild sarsaparilla	4
<i>Arctium minus</i>	burdock	0
<i>Asclepias syriaca</i>	common milkweed	0
<i>Boehmeria cylindrica</i>	smallspike false nettle	5
<i>Bromus inermis</i>	smooth brome	0
<i>Carex pensylvanica</i> *	Pennsylvania sedge	3
<i>Cirsium arvense</i>	Canada thistle	0
<i>Cornus racemosa</i>	gray dogwood	2
<i>Cornus sericea</i> ssp. <i>sericea</i>	redosier dogwood	3
<i>Elaeagnus angustifolia</i>	Russian olive	0
<i>Equisetum hyemale</i> var. <i>affine</i>	scouringrush horsetail	2
<i>Euphorbia esula</i>	leafy spurge	0
<i>Fraxinus pennsylvanica</i>	green ash	2
<i>Galium</i> spp. **	bedstraw	5
<i>Geum canadense</i>	white avens	2
<i>Hemerocallis</i> sp.	day lily	0
<i>Hydrophyllum virginianum</i>	eastern waterleaf	3
<i>Lactuca serriola</i>	prickly lettuce	0
<i>Lonicera canadensis</i>	American fly honeysuckle	6
<i>Lonicera tatarica</i>	Tatarian honeysuckle	0
<i>Lotus corniculatus</i>	bird's-foot trefoil	0
<i>Maianthemum canadense</i>	Canada mayflower	5
<i>Medicago lupulina</i>	black medick	0
<i>Melilotus officinalis</i>	yellow sweetclover	0
<i>Nepeta cataria</i>	catnip	0
<i>Parthenocissus vitacea</i>	woodbine	2
<i>Plantago major</i>	common plantain	0
<i>Poa palustris</i>	fowl bluegrass	5
<i>Poa pratensis</i> ssp. <i>Pratensis</i>	Kentucky bluegrass	0
<i>Polygonatum biflorum</i>	Solomon's seal	4
<i>Populus deltoides</i> ssp. <i>Monilifera</i>	eastern cottonwood	1
<i>Populus tremuloides</i>	quaking aspen	2
<i>Quercus alba</i>	white oak	7
<i>Quercus ellipsoidalis</i> *	pin oak	5
<i>Quercus rubra</i>	northern red oak	5
<i>Rhamnus cathartica</i>	common buckthorn	0
<i>Rhus</i> spp. * **	sumac	4

## 2011 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Ribes spp.</i>	gooseberry	5
<i>Rosa multiflora</i>	rose	0
<i>Rubus idaeus ssp. strigosus</i>	American red raspberry	3
<i>Rubus spp. **</i>	dewberry	3
<i>Rudbeckia hirta var. pulcherrima</i>	blackeyed Susan	3
<i>Rumex crispus ssp. Crispus</i>	curly dock	0
<i>Salix exigua</i>	narrowleaf willow	2
<i>Salix nigra</i>	black willow	4
<i>Salix serissima</i>	autumn willow	7
<i>Securigera varia (L.) Lassen</i>	crownvetch	0
<i>Sedum sp.</i>	stonecrop	0
<i>Silene cucubalus</i>	bladder campion	0
<i>Solanum dulcamara</i>	climbing nightshade	0
<i>Solidago canadensis</i>	Canada goldenrod	1
<i>Symphyotrichum ericoides</i>	white heath aster	4
<i>Syringa sp.</i>	lilac	0
<i>Taraxacum officinale</i>	common dandelion	0
<i>Thalictrum dioicum</i>	early meadow-rue	5
<i>Thelypteris palustris var. pubescens</i>	marsh fern	7
<i>Tilia americana</i>	American basswood	5
<i>Toxicodendron radicans</i>	eastern poison ivy	7
<i>Trifolium pratense</i>	red clover	0
<i>Ulmus americana</i>	American elm	3
<i>Verbascum thapsus</i>	common mullein	0
<i>Viburnum lentago</i>	nannyberry	4
<i>Vitis riparia</i>	riverbank grape	2
Mean C-value		2.2
S (Number of Species of Upland Buffer Plants)		70
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		18.17

\* A C-value for this species has not been determined in Minnesota.

The C-value used is from the Wisconsin Floristic Quality Assessment.

\*\* An average C-value was used for this genus, since the species were not verified.

## 2016 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Acer negundo</i>	boxelder	1
<i>Acer rubrum</i>	red maple	3
<i>Achillea millefolium</i>	common yarrow	1
<i>Ambrosia artemisiifolia</i>	annual ragweed	0
<i>Ambrosia trifida</i>	great ragweed	0
<i>Amphicarpaea bracteata</i>	American hogpeanut	2
<i>Anemone canadensis</i>	Canadian anemone	3
<i>Aralia nudicaulis</i>	wild sarsaparilla	4
<i>Arctium minus</i>	burdock	0
<i>Asclepias syriaca</i>	common milkweed	0
<i>Boehmeria cylindrica</i>	smallspike false nettle	5
<i>Bromus inermis</i>	smooth brome	0
<i>Carex pensylvanica</i> *	Pennsylvania sedge	3
<i>Cirsium arvense</i>	Canada thistle	0
<i>Cornus alba</i>	redosier dogwood	3
<i>Cornus racemosa</i>	gray dogwood	2
<i>Crataegus</i> sp. **	hawthorn	3
<i>Elaeagnus angustifolia</i>	Russian olive	0
<i>Equisetum hyemale</i>	scouringrush horsetail	2
<i>Erigeron strigosus</i>	daisy fleabane	2
<i>Euphorbia esula</i>	leafy spurge	0
<i>Fragaria virginiana</i>	common strawberry	2
<i>Fraxinus pennsylvanica</i>	green ash	2
<i>Galium</i> sp. **	bedstraw	5.3
<i>Galium triflorum</i>	sweet scented bedstraw	4
<i>Geum canadense</i>	white avens	2
<i>Glechoma hederacea</i>	ground ivy	0
<i>Hemerocallis</i> sp.	day lily	0
<i>Hydrophyllum virginianum</i>	eastern waterleaf	3
<i>Impatiens capensis</i>	jewelweed	2
<i>Juglans nigra</i>	black walnut	4
<i>Lactuca serriola</i>	prickly lettuce	0
<i>Laportea canadensis</i>	wood nettle	3
<i>Lonicera canadensis</i>	American fly honeysuckle	6
<i>Lonicera tatarica</i>	Tatarian honeysuckle	0
<i>Lotus corniculatus</i>	bird's-foot trefoil	0
<i>Maianthemum canadense</i>	Canada mayflower	5
<i>Medicago lupulina</i>	black medick	0
<i>Melilotus officinalis</i>	yellow sweetclover	0
<i>Nepeta cataria</i>	catnip	0
<i>Parthenocissus vitacea</i>	woodbine	2
<i>Pilea pumila</i>	Canadian clearweed	3
<i>Plantago major</i>	common plantain	0
<i>Poa palustris</i>	fowl bluegrass	5

## 2016 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Poa pratensis</i>	Kentucky bluegrass	0
<i>Polygonatum biflorum</i>	Solomon's seal	4
<i>Populus deltoides</i>	eastern cottonwood	1
<i>Populus tremuloides</i>	quaking aspen	2
<i>Prunus pensylvanica</i>	pin cherry	4
<i>Quercus alba</i>	white oak	7
<i>Quercus ellipsoidalis</i> *	pin oak	5
<i>Quercus rubra</i>	northern red oak	5
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	1
<i>Rhamnus cathartica</i>	common buckthorn	0
<i>Rhus</i> spp. * **	sumac	4
<i>Ribes</i> spp. **	gooseberry	6
<i>Rosa multiflora</i>	rose	0
<i>Rubus flagellaris</i>	northern dewberry	3
<i>Rubus idaeus</i>	American red raspberry	3
<i>Rubus</i> spp. **	dewberry	3
<i>Rudbeckia hirta</i>	blackeyed Susan	3
<i>Rumex crispus</i>	curly dock	0
<i>Salix interior</i>	sandbar willow	2
<i>Salix nigra</i>	black willow	4
<i>Salix serissima</i>	autumn willow	7
<i>Sambucus</i> sp. **	elderberry	4
<i>Securigera varia</i>	crownvetch	0
<i>Sedum</i> sp.	stonecrop	0
<i>Silene cucubalus</i>	bladder campion	0
<i>Solanum dulcamara</i>	climbing nightshade	0
<i>Solidago canadensis</i>	Canada goldenrod	1
<i>Solidago gigantea</i>	giant goldenrod	3
<i>Solidago</i> sp. **	goldenrod	4.5
<i>Symphyotrichum ericoides</i>	white heath aster	4
<i>Syringa</i> sp.	lilac	0
<i>Taraxacum officinale</i>	common dandelion	0
<i>Thalictrum dioicum</i>	early meadow-rue	5
<i>Thelypteris palustris</i>	marsh fern	7
<i>Tilia americana</i>	American basswood	5
<i>Toxicodendron rydbergii</i>	western poison ivy	1
<i>Trifolium pratense</i>	red clover	0
<i>Ulmus americana</i>	American elm	3
<i>Verbascum thapsus</i>	common mullein	0
<i>Viburnum lentago</i>	nannyberry	4
<i>Vitis riparia</i>	riverbank grape	2
Mean C-value		2.2
S (Number of Species of Upland Buffer Plants)		85

## 2016 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		20.59

\* A C-value for this species has not been determined in Minnesota.

The C-value used is from the Wisconsin Floristic Quality Assessment.

\*\* An average C-value was used for this genus, since the species were not verified.



## 2021 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Acer negundo</i>	boxelder	1
<i>Acer rubrum</i>	red maple	3
<i>Achillea millefolium</i>	common yarrow	1
<i>Ambrosia artemisiifolia</i>	annual ragweed	0
<i>Ambrosia trifida</i>	great ragweed	0
<i>Amphicarpaea bracteata</i>	American hogpeanut	2
<i>Anemone canadensis</i>	Canadian anemone	3
<i>Aralia nudicaulis</i>	wild sarsaparilla	4
<i>Arctium minus</i>	burdock	0
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	4
<i>Asclepias syriaca</i>	common milkweed	0
<i>Boehmeria cylindrica</i>	smallspike false nettle	5
<i>Bromus inermis</i>	smooth brome	0
<i>Carex pensylvanica</i> *	Pennsylvania sedge	3
<i>Circaea lutetiana</i>	broadleaf nightshade	2
<i>Cirsium arvense</i>	Canada thistle	0
<i>Cirsium vulgare</i>	bull thistle	0
<i>Convolvulus arvensis</i>	field bindweed	0
<i>Cornus alba</i>	redosier dogwood	3
<i>Cornus racemosa</i>	gray dogwood	2
<i>Crataegus</i> sp. **	hawthorn	3
<i>Elaeagnus angustifolia</i>	Russian olive	0
<i>Equisetum hyemale</i>	scouringrush horsetail	2
<i>Erigeron strigosus</i>	daisy fleabane	2
<i>Euphorbia esula</i>	leafy spurge	0
<i>Fragaria virginiana</i>	common strawberry	2
<i>Fraxinus pennsylvanica</i>	green ash	2
<i>Galium</i> sp. **	bedstraw	5.3
<i>Galium triflorum</i>	sweet scented bedstraw	4
<i>Geum canadense</i>	white avens	2
<i>Glechoma hederacea</i>	ground ivy	0
<i>Hackelia virginiana</i>	sticktight	1
<i>Hemerocallis</i> sp.	day lily	0
<i>Hydrophyllum virginianum</i>	eastern waterleaf	3
<i>Impatiens capensis</i>	jewelweed	2
<i>Juglans nigra</i>	black walnut	4
<i>Lactuca serriola</i>	prickly lettuce	0
<i>Laportea canadensis</i>	wood nettle	3
<i>Lonicera canadensis</i>	American fly honeysuckle	6
<i>Lonicera tatarica</i>	Tatarian honeysuckle	0
<i>Lotus corniculatus</i>	bird's-foot trefoil	0
<i>Maianthemum canadense</i>	Canada mayflower	5
<i>Medicago lupulina</i>	black medick	0
<i>Melilotus officinalis</i>	yellow sweetclover	0

## 2021 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Miscanthus sinensis</i>	Chinese silvergrass	0
<i>Nepeta cataria</i>	catnip	0
<i>Panicum virgatum</i>	switchgrass	2
<i>Parthenocissus vitacea</i>	woodbine	2
<i>Picea glauca</i>	white spruce	5
<i>Pilea pumila</i>	Canadian clearweed	3
<i>Plantago major</i>	common plantain	0
<i>Poa palustris</i>	fowl bluegrass	5
<i>Poa pratensis</i>	Kentucky bluegrass	0
<i>Polygonatum biflorum</i>	Solomon's seal	4
<i>Populus deltoides</i>	eastern cottonwood	1
<i>Populus tremuloides</i>	quaking aspen	2
<i>Prunus pensylvanica</i>	pin cherry	4
<i>Quercus alba</i>	white oak	7
<i>Quercus ellipsoidalis</i> *	pin oak	5
<i>Quercus rubra</i>	northern red oak	5
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	1
<i>Rhamnus cathartica</i>	common buckthorn	0
<i>Rhus</i> spp. * **	sumac	4
<i>Ribes</i> spp. **	gooseberry	6
<i>Rosa multiflora</i>	rose	0
<i>Rubus flagellaris</i>	northern dewberry	3
<i>Rubus idaeus</i>	American red raspberry	3
<i>Rubus</i> spp. **	dewberry	3
<i>Rudbeckia hirta</i>	blackeyed Susan	3
<i>Rumex crispus</i>	curly dock	0
<i>Salix interior</i>	sandbar willow	2
<i>Salix nigra</i>	black willow	4
<i>Salix serissima</i>	autumn willow	7
<i>Sambucus</i> sp. **	elderberry	4
<i>Securigera varia</i>	crownvetch	0
<i>Sedum</i> sp.	stonecrop	0
<i>Silene cucubalus</i>	bladder campion	0
<i>Solanum dulcamara</i>	climbing nightshade	0
<i>Solidago canadensis</i>	Canada goldenrod	1
<i>Solidago gigantea</i>	giant goldenrod	3
<i>Solidago</i> sp. **	goldenrod	4.5
<i>Sonchus arvensis</i>	sow thistle	0
<i>Symphyotrichum ericoides</i>	white heath aster	4
<i>Syringa</i> sp.	lilac	0
<i>Taraxacum officinale</i>	common dandelion	0
<i>Thalictrum dioicum</i>	early meadow-rue	5
<i>Thelypteris palustris</i>	marsh fern	7
<i>Tilia americana</i>	American basswood	5

## 2021 Kingsley Lake Upland Buffer Vegetation Floristic Quality Index

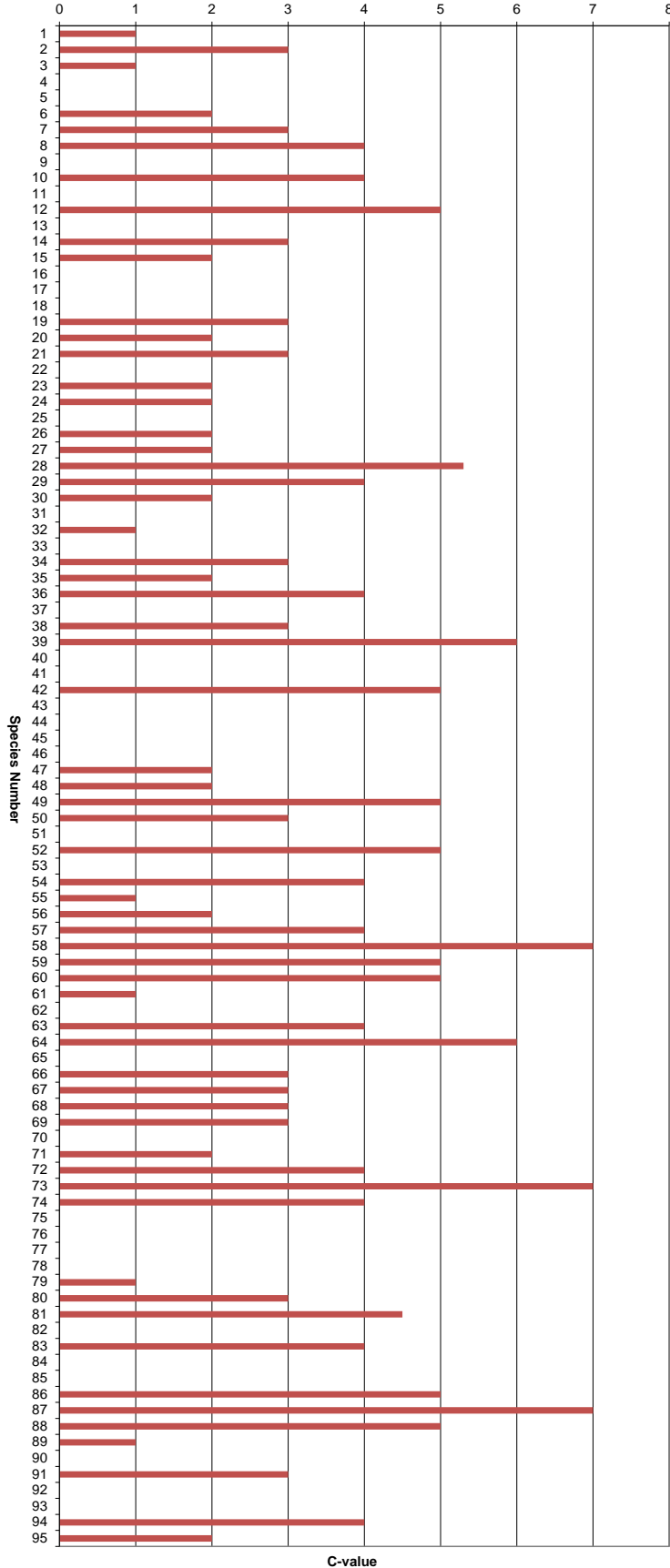
Species	Common Name	Coefficient of Conservatism Value (C-value)
<i>Toxicodendron rydbergii</i>	western poison ivy	1
<i>Trifolium pratense</i>	red clover	0
<i>Ulmus americana</i>	American elm	3
<i>Ulmus pumila</i>	Siberian elm	0
<i>Verbascum thapsus</i>	common mullein	0
<i>Viburnum lentago</i>	nannyberry	4
<i>Vitis riparia</i>	riverbank grape	2
Mean C-value		2.1
S (Number of Species of Upland Buffer Plants)		95
Floristic Quality Index (FQI) = (Mean C-value)* (Square Root of S)		20.91

\* A C-value for this species has not been determined in Minnesota.

The C-value used is from the Wisconsin Floristic Quality Assessment.

\*\* An average C-value was used for this genus, since the species were not verified.

2021 Kingsley Lake Upland Buffer Vegetation Survey  
C-value for each Species



Species Number	Scientific Name	Common Name	C-value
1	<i>Acer negundo</i>	boxelder	1
2	<i>Acer rubrum</i>	red maple	3
3	<i>Achillea millefolium</i>	common yarrow	1
4	<i>Ambrosia artemisiifolia</i>	annual ragweed	0
5	<i>Ambrosia trifida</i>	great ragweed	0
6	<i>Amphicarpaea bracteata</i>	American hogweed	2
7	<i>Anemone canadensis</i>	Canadian anemone	3
8	<i>Aralia nudicaulis</i>	wild sarsaparilla	4
9	<i>Arctium minus</i>	burdock	0
10	<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	4
11	<i>Asclepias syriaca</i>	common milkweed	0
12	<i>Boehmeria cylindrica</i>	smallsipke false nettle	5
13	<i>Bromus inermis</i>	smooth brome	0
14	<i>Carex pensylvanica</i> *	Pennsylvania sedge	3
15	<i>Circaea lutetiana</i>	broadleaf nightshade	2
16	<i>Cirsium arvense</i>	Canada thistle	0
17	<i>Cirsium vulgare</i>	bull thistle	0
18	<i>Convolvulus arvensis</i>	field bindweed	0
19	<i>Cornus alba</i>	redosier dogwood	3
20	<i>Cornus racemosa</i>	gray dogwood	2
21	<i>Crataegus</i> sp. **	hawthorn	3
22	<i>Eleagnus angustifolia</i>	Russian olive	0
23	<i>Equisetum hyemale</i>	scouringrush horsetail	2
24	<i>Erigeron strigosus</i>	daisy fleabane	2
25	<i>Euphorbia esula</i>	leafy spurge	0
26	<i>Fragaria virginiana</i>	common strawberry	2
27	<i>Fraxinus pennsylvanica</i>	green ash	2
28	<i>Galium</i> sp. **	bedstraw	5.3
29	<i>Galium triflorum</i>	sweet scented bedstraw	4
30	<i>Geum canadense</i>	white avens	2
31	<i>Glechoma hederacea</i>	ground ivy	0
32	<i>Hackelia virginiana</i>	sticktight	1
33	<i>Hemerocallis</i> sp.	day lily	0
34	<i>Hydrophyllum virginianum</i>	eastern waterleaf	3
35	<i>Impatiens capensis</i>	jewelweed	2
36	<i>Juglans nigra</i>	black walnut	4
37	<i>Lactuca serriola</i>	prickly lettuce	0
38	<i>Laportea canadensis</i>	wood nettle	3
39	<i>Lonicera canadensis</i>	American fly honeysuckle	6
40	<i>Lonicera tatarica</i>	Tatarian honeysuckle	0
41	<i>Lotus corniculatus</i>	bird's-foot trefoil	0
42	<i>Maianthemum canadense</i>	Canada mayflower	5
43	<i>Medicago lupulina</i>	black medick	0
44	<i>Melilotus officinalis</i>	yellow sweetclover	0
45	<i>Miscanthus sinensis</i>	Chinese silvergrass	0
46	<i>Nepeta cataria</i>	catnip	0
47	<i>Panicum virgatum</i>	switchgrass	2
48	<i>Parthenocissus vitacea</i>	woodbine	2
49	<i>Picea glauca</i>	white spruce	5
50	<i>Pilea pumila</i>	Canadian cleaverweed	3
51	<i>Plantago major</i>	common plantain	0
52	<i>Poa palustris</i>	fowl bluegrass	5
53	<i>Poa pratensis</i>	Kentucky bluegrass	0
54	<i>Polygonatum biflorum</i>	Solomon's seal	4
55	<i>Populus deltoides</i>	eastern cottonwood	1
56	<i>Populus tremuloides</i>	quaking aspen	2
57	<i>Prunus pensylvanica</i>	pin cherry	4
58	<i>Quercus alba</i>	white oak	7
59	<i>Quercus ellipsoidalis</i> *	pin oak	5
60	<i>Quercus rubra</i>	northern red oak	5
61	<i>Ranunculus abortivus</i>	kidney-leaved buttercup	1
62	<i>Rhamnus cathartica</i>	common buckthorn	0
63	<i>Rhus</i> spp. * **	sumac	4
64	<i>Ribes</i> spp. **	gooseberry	6
65	<i>Rosa multiflora</i>	rose	0
66	<i>Rubus flagellaris</i>	northern dewberry	3
67	<i>Rubus idaeus</i>	American red raspberry	3
68	<i>Rubus</i> spp. **	dewberry	3
69	<i>Rudbeckia hirta</i>	blackeyed Susan	3
70	<i>Rumex crispus</i>	curly dock	0
71	<i>Salix interior</i>	sandbar willow	2
72	<i>Salix nigra</i>	black willow	4
73	<i>Salix serissima</i>	autumn willow	7
74	<i>Sambucus</i> sp. **	elderberry	4
75	<i>Securigera varia</i>	crownvetch	0
76	<i>Sedum</i> sp.	stonecrop	0
77	<i>Silene cucubalus</i>	bladder campion	0
78	<i>Solanum dulcamara</i>	climbing nightshade	0
79	<i>Solidago canadensis</i>	Canada goldenrod	1
80	<i>Solidago gigantea</i>	giant goldenrod	3
81	<i>Solidago</i> sp. **	goldenrod	4.5
82	<i>Sonchus arvensis</i>	sow thistle	0
83	<i>Symphotrichum ericoides</i>	white heath aster	4
84	<i>Syringa</i> sp.	lilac	0
85	<i>Taraxacum officinale</i>	common dandelion	0
86	<i>Thalictrum dioicum</i>	early meadow-rue	5
87	<i>Thelypteris palustris</i>	marsh fern	7
88	<i>Tilia americana</i>	American basswood	5
89	<i>Toxicodendron rydbergii</i>	western poison ivy	1
90	<i>Trifolium pratense</i>	red clover	0
91	<i>Ulmus americana</i>	American elm	3
92	<i>Ulmus pumila</i>	Siberian elm	0
93	<i>Verbascum thapsus</i>	common mullein	0
94	<i>Viburnum lentago</i>	nannyberry	4
95	<i>Vitis riparia</i>	riverbank grape	2

# Community #1

Eggers & Reed Plant Community Type: **Shallow Open Water**

Percent of AA Occupied by Type: **70**

Spp. #	Scientific Name	Common Name	Cover Class	CC Range	Midpoint CC	Native Status	Rapid FQA Stratum	NWI-GP	NWI-MW	NWI-NCNE	C	p	pC
1	Ceratophyllum demersum	Coon's-Tail	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		2	0.0455 0.0909
2	Elodea canadensis	Canadian Waterweed	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		4	0.0455 0.1818
3	Potamogeton crispus	Curly Pondweed	1	> 0 - 1%	0.5	Introduced	Aquatic	OBL	OBL	OBL		0	0.0076 0
4	Lemna minor	Common Duckweed	1	> 0 - 1%	0.5	Native	Aquatic	OBL	OBL	OBL		5	0.0076 0.0379
5	Lemna trisulca	Ivy-Leaf Duckweed	1	> 0 - 1%	0.5	Native	Aquatic	OBL	OBL	OBL		5	0.0076 0.0379
6	Najas flexilis	Wavy Waternymph	1	> 0 - 1%	0.5	Native	Aquatic	OBL	OBL	OBL		5	0.0076 0.0379
7	Nymphaea odorata	American White Water-Lily	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		6	0.0455 0.2727
8	Persicaria amphibia	Water Smartweed	3	> 5 - 25%	15	Native	Aquatic, Herb	OBL	OBL	OBL		4	0.2273 0.9091
9	Potamogeton amplifolius	Large-Leaf Pondweed	3	> 5 - 25%	15	Native	Aquatic	OBL	OBL	OBL		7	0.2273 1.5909
10	Potamogeton natans	Broad-Leaf Pondweed	1	> 0 - 1%	0.5	Native	Aquatic	OBL	OBL	OBL		5	0.0076 0.0379
11	Potamogeton zosteriformis	Flat-Stem Pondweed	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		6	0.0455 0.2727
12	Ranunculus flabellaris	Greater Yellow Water Buttercup	1	> 0 - 1%	0.5	Native	Aquatic	OBL	OBL	OBL		6	0.0076 0.0455
13	Utricularia macrorhiza	Greater Bladderwort	3	> 5 - 25%	15	Native	Aquatic	OBL	OBL	OBL		5	0.2273 1.1364
14	Brasenia schreberi	Watershield	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		7	0.0455 0.3182
15	Wolffia columbiana	Columbian Watermeal	2	> 1 - 5%	3	Native	Aquatic	OBL	OBL	OBL		5	0.0455 0.2273
16		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
17		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
18		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
19		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
21		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
29		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
30		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
33		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
34		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
35		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
36		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
37		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
38		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
51		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
52		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
53		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
54		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
55		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
56		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
57		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
58		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
59		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60		#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A



## Community #2

Eggers & Reed Plant Community Type: Deep Marsh

Percent of AA Occupied by Type: 30

Spp.	Scientific Name	Common Name	Cover	CC Range	Midpoint	CC	Native Status	Rapid FQA	Stratum	NWI-GP	NWI-MW	NWI-NCNE	C	p	pC
1	Asclepias incarnata	Swamp Milkweed	1	> 0 - 1%			0.5 Native	Herb		FACW	OBL	OBL		4	0.0047 0.019
2	Betula pumila	Bog Birch	1	> 0 - 1%			0.5 Native	Shrub		OBL	OBL	OBL		7	0.0047 0.0332
3	Carex comosa	Bearded Sedge	3	> 5 - 25%			15 Native	Herb		OBL	OBL	OBL		4	0.1422 0.5687
4	Carex stricta	Upright Sedge	3	> 5 - 25%			15 Native	Herb		OBL	OBL	OBL		5	0.1422 0.7109
5	Comarum palustre	Purple Marshlocks	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		7	0.0047 0.0332
6	Eleocharis palustris	Common Spike-Rush	3	> 5 - 25%			15 Native	Herb		OBL	OBL	OBL		5	0.1422 0.7109
7	Eutrochium maculatum	Spotted Trumpetweed	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		4	0.0047 0.019
8	Impatiens capensis	Spotted Touch-Me-Not	2	> 1 - 5%			3 Native	Herb		FACW	FACW	FACW		2	0.0284 0.0569
9	Iris versicolor	Harlequin Blueflag	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		4	0.0047 0.019
10	Lemna minor	Common Duckweed	1	> 0 - 1%			0.5 Native	Aquatic		OBL	OBL	OBL		5	0.0047 0.0237
11	Lycopus uniflorus	Northern Water-Horehound	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		5	0.0047 0.0237
12	Lythrum salicaria	Purple Loosestrife	1	> 0 - 1%			0.5 Introduced	Herb		OBL	OBL	OBL		0	0.0047 0
13	Mentha arvensis	American Wild Mint	1	> 0 - 1%			0.5 Native	Herb		FACW	FACW	FACW		3	0.0047 0.0142
14	Phalaris arundinacea	Reed Canary Grass	1	> 0 - 1%			0.5 Introduced	Herb		FACW	FACW	FACW		0	0.0047 0
15	Pilea pumila	Canadian Clearweed	1	> 0 - 1%			0.5 Native	Herb		FAC	FACW	FACW		3	0.0047 0.0142
16	Persicaria amphibia	Water Smartweed	1	> 0 - 1%			0.5 Native	Aquatic, Herb		OBL	OBL	OBL		4	0.0047 0.019
17	Nymphaea odorata	American White Water-Lily	3	> 5 - 25%			15 Native	Aquatic		OBL	OBL	OBL		6	0.1422 0.8531
18	Salix interior	Sandbar Willow	1	> 0 - 1%			0.5 Native	Shrub		FACW	FACW	FACW		2	0.0047 0.0095
19	Salix amygdaloides	Peach-Leaf Willow	1	> 0 - 1%			0.5 Native	Tree		FACW	FACW	FACW		5	0.0047 0.0237
20	Sagittaria latifolia	Duck-Potato	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		3	0.0047 0.0142
21	Schoenoplectus fluviatilis	River Club-Rush	2	> 1 - 5%			3 Native	Herb		OBL	OBL	OBL		4	0.0284 0.1137
22	Schoenoplectus tabernaemontani	Soft-Stem Club-Rush	2	> 1 - 5%			3 Native	Herb		OBL	OBL	OBL		4	0.0284 0.1137
23	Scutellaria galericulata	Hooded Skullcap	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		5	0.0047 0.0237
24	Scirpus cyperinus	Cottongrass Bulrush	2	> 1 - 5%			3 Native	Herb		OBL	OBL	OBL		3	0.0284 0.0853
25	Solidago gigantea	Late Goldenrod	1	> 0 - 1%			0.5 Native	Herb		FAC	FACW	FACW		3	0.0047 0.0142
26	Thelypteris palustris	Eastern Marsh Fern	3	> 5 - 25%			15 Native	Herb		OBL	OBL	FACW		7	0.1422 0.9953
27	Typha angustifolia	Narrow-Leaf Cat-Tail	2	> 1 - 5%			3 Introduced	Herb		OBL	OBL	OBL		0	0.0284 0
28	Typha X glauca		0	> 1 - 5%			3 Introduced	Herb		OBL	OBL	OBL		0	0.0284 0
29	Drosera rotundifolia	Round-Leaf Sundew	1	> 0 - 1%			0.5 Native	Herb		OBL	OBL	OBL		8	0.0047 0.0379
30	Dulichium arundinaceum	Three-Way Sedge	2	> 1 - 5%			3 Native	Herb		OBL	OBL	OBL		8	0.0284 0.2275
31	Eupatorium perfoliatum	Common Boneset	1	> 0 - 1%			0.5 Native	Herb		FACW	OBL	FACW		4	0.0047 0.019
32		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
33		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
34		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
35		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
36		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
37		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
38		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
51		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
52		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
53		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
54		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
55		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
56		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
57		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
58		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
59		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60		#N/A		#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

# Metric Summary & Community Assessments

	Community #1	Community #2	Community #3
Community Type	Shallow Open Water	Deep Marsh	#REF!
wC	5.2	4.8	#REF!
Numerical Condition Category	2	2	#REF!
Condition Category	Good	Good	#REF!
Additional Metrics			
Native Species Richness	14	27	#REF!
Introduced Species Richness	1	4	#REF!
Mean C	4.8	4.0	#REF!
FQI	18.0	20.8	#REF!
Total Midpoint % Cover	66	105.5	#REF!
Total Introduced Spp. Cover	0.5	7	#REF!
Proportion of Introduced Cover	0.01	0.07	#REF!

## Overall Assessment

Community #	Community Type	wC	Condition Category	Numerical Category	Proportion of AA	Proportion x Numerical Category
1	Shallow Open Water	5.2	Good	2	0.7	1.4
2	Deep Marsh	4.8	Good	2	0.3	0.6
3	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!

**Weighted Average Numerical Category for AA**      **2**  
**Overall AA Condition**   **Good**