

Project Name | Lake Emily Point-Intercept Survey – 2022

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To / Contact info | Ben Elfelt, CLLID Administrator

Cc / Contact info | Greg Graske, PE

From / Contact info | Jimmy Marty

Regarding | Lake Emily Aquatic Plant Community

Lake Emily Survey Results

A point-intercept aquatic plant survey of Lake Emily (Public Water ID13004600) was completed on August 17, 2022. The point-intercept method is considered the standard protocol by MNDNR for sampling macrophytes because it offers a methodology that is quantitative (e.g., frequency of occurrence), repeatable (can be used to track trends in aquatic plant communities over time), and georeferenced (can be used to compare plant communities within different areas of a lake). Point spacing of 50-meters was used for the Lake Emily survey and totaled 32 sampling points. At each point, a vegetation sampling rake was used to collect plants and assign a species density rating of 1 (sparse), 2 (common), or 3 (abundant). From this data, a Floristic Quality Index (FQI) was calculated that measures the diversity and health of the aquatic plant community.

The FQI calculation is based on both the quantity of species observed (species richness) as well as the quality of each individual species. Aquatic plants in Minnesota have been assigned a coefficient of conservatism value (c-value) ranging from 0 to 10. The c-value of all aquatic plants sampled from a lake is used to determine the FQI for a given lake. Species with a c-value of 0 include non-native species such as curly-leaf pondweed (*Potamogeton crispus*) that are indicative of a highly disturbed environment. In comparison, the native species Oakes pondweed (*Potamogeton oakesainus*) has a c-value of 10 because this species is extremely rare and only found in undisturbed, pristine waterbodies.

The average FQI score for Minnesota Lakes in the North Central Hardwood Forest (NCHF) ecoregion is 23.7 ± 8 with a median of 22.5 (Radomski and Perleberg, 2012). A study of 41 Minnesota lakes surveyed across the state, as part of the EPA's National Lakes Assessment Project, yielded a maximum FQI score of 30. In 2016, the MNDNR developed a robust geodatabase of aquatic plant surveys and associated FQI scores from more than 3,600 lakes across the state. FQI scores ranged from 0 to 49 with a median of 25.1 ± 9 .

Lake Emily is a shallow lake and entirely littoral. The FQI score for Lake Emily (6.4) was far below the median and average FQI scores for assessed lakes in the DNR geodatabase and the NCHF ecoregion. The FQI score is the lowest recorded for a lake in the Lake Improvement District. Sampling points located at Lake Emily contained an average of 0.33 species per sample site. Only one submerged aquatic plant was observed (Canada waterweed) and was observed at 10% of sampling points.

Water clarity was poor at the time of the survey with a Secchi depth of less than 2 feet. The lake is in an algae-dominated state and little vegetation was observed beyond the immediate shoreline. No aquatic invasive plant species were observed, but abundant shells of Chinese mystery snails were noted along the shoreline.

The results of the survey for Lake Emily and associated FQI scores are summarized in Table 1. Included in Table 1 is a list of all native aquatic species sampled and their associated c-values and Frequency of Occurrence (FOO) values. Shoreline species associated with wetland habitats that bordered the lake (e.g., reed canary grass) were excluded from the FQI calculation.

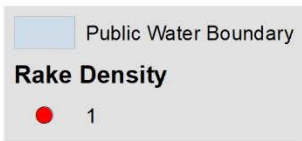
The distribution and density ranking for each individual species observed is mapped for Lake Emily within Appendix A. For each data point mapped, a density ranking of 1 indicates only a few individual plants were observed while a ranking of 3 indicates an abundance of plants.

Table 1. Lake Emily Point-Intercept Survey Results.

Common Name	Scientific Name	C-Value	Frequency of Occurrence
Canada waterweed	<i>Elodea canadensis</i>	4	10.0%
Needle spikerush	<i>Eleocharis acicularis</i>	4	3.0%
Broad-leaved arrowhead	<i>Sagittaria latifolia</i>	3	19.0%
Summary Table			
FQI = C*VS	Average C-Value	3.7	
C= Mean coefficient of conservatism value	Number of species	3	
S= Number of species in sample	FQI	6.4	

Appendix A

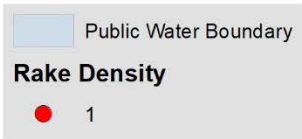
Lake Emily Aquatic Plant Species Distribution



Lake Emily
2022 Point Intercept Survey
Canada Waterweed Distribution



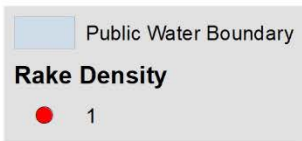
Figure 1. Lake Emily Canada waterweed distribution – August 2022.



Lake Emily
2022 Point Intercept Survey
Needle Spikerush Distribution



Figure 2. Lake Emily needle spikerush distribution - August 2022.



Lake Emily
2022 Point Intercept Survey
Broad-leaved Arrowhead Distribution



Figure 3. Lake Emily broad-leaved arrowhead distribution – August 2022.