

Project Name | Little Comfort Lake Point-Intercept Survey – 2019

Date | 11/14/2019

To / Contact info | Susanna Wilson, Jerry Spetzman

Cc / Contact info | Greg Graske, PE

From / Contact info | Jimmy Marty, Joe Pallardy, Mike Majeski

Regarding | Little Comfort Lake Aquatic Plant Community

Little Comfort Lake Survey Results

A point-intercept aquatic plant survey was completed on August 29th, 2019 on Little Comfort Lake. 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). 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. Every aquatic plant in Minnesota has 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.

The FQI score of 18.0 for Little Comfort Lake was less than the median FQI score for assessed lakes in the DNR geodatabase and the NCHF ecoregion average. The low FQI score for Little Comfort Lake is likely a result of the very narrow littoral zone. Despite having a total surface area of only 36 acres, Little Comfort Lake quickly drops off to depths exceeding 15 feet and has a maximum depth of 56 feet. Within the narrow littoral zone, the aquatic plant community is comprised primarily of coontail, duckweed, white water lily, and yellow pond lily. Sampling points located in the littoral zone contained an average of 3.95 species/ sample site.

Eurasian watermilfoil and curly-leaf pondweed were **not** observed during the 2019 survey. A [2015 survey](#) conducted on Little Comfort Lake found curly-leaf pondweed at 4 locations, and the population was described as very scarce. It is likely that curly-leaf pondweed had senesced prior to the August 2019 survey. Eurasian watermilfoil was not found in either the 2015 or 2019 surveys.

The results of the survey for Little Comfort Lake 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 values. Table 2 includes native species and **non-native** species which have assigned c-values of 0. FQI scores from the MNDNR geodatabase exclude non-native species from their FQI calculation; therefore, Table 1 provides the best means of comparison with the MNDNR geodatabase. Table 2 is useful in that non-native species are both an indication of anthropogenic stress and a stressor themselves in terms of their direct impacts to the surrounding plant community. Shoreline species associated with wetland habitats that bordered the lake (*e.g.*, jewelweed) were excluded from the FQI calculation.

The distribution and density ranking for each individual species with a frequency of occurrence \geq 10% is mapped 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 4 indicates an abundance of plants.

The June 2017 discovery of zebra mussels in Comfort Lake has significant implications for the aquatic plant community of Little Comfort Lake. In 2018, EOR developed a table outlining zebra mussel growth potential for all lakes in Chisago County based on Table 3.7 in Mackie & Claudi's 2010 book titled: "Monitoring and Control of Macrofouling Mollusks in Fresh Water Systems". Comfort Lake was identified as having a high potential for zebra mussel infestation based on observed water quality parameters. Based on data collected to date on Lake Minnetonka, zebra mussels appear to proliferate in bays with moderate amounts of algae like Comfort Lake while struggling to take hold in bays with too low or too high levels of algae. While Little Comfort Lake has slightly higher algae levels in comparison with Comfort Lake, it is likely that zebra mussels will take hold in Little Comfort Lake given the direct hydrologic connection between the two lakes. The impact of increased water clarity may be an expansion of the littoral zone to deeper areas of the lake which would result in a greater proportion of the lake with aquatic plants. Given the history of curly-leaf pondweed and Eurasian watermilfoil in Little Comfort Lake, there is a potential for either of these species to form nuisance conditions over a greater proportion of the lake. As an example of what could happen in terms of increased water clarity on Little Comfort Lake, the 2012 discovery of zebra mussels in Lake Winnibigoshish resulted in a 200% increase in water clarity from an average of 6-7 feet before the zebra mussels arrived to an average of more than 14 feet in 2018.

Table 1. Little Comfort Lake Point-Intercept Survey Results- Native Species Only.

Common Name	Scientific Name	C- Value	Frequency of Occurrence
Blue flag Iris	<i>Iris versicolor</i>	4	5.1%
Bristly sedge	<i>Carex comosa</i>	4	2.6%
Broad-leaved cattail	<i>Typha latifolia</i>	2	2.6%
Coontail	<i>Ceratophyllum demersum</i>	2	94.9%
Flatstem pondweed	<i>Potamogeton zosteriformis</i>	6	10.3%
Greater duckweed	<i>Spirodela polyrhiza</i>	5	12.8%
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	7	5.1%
Sago pondweed	<i>Stuckenia pectinatus</i>	3	2.6%
Star duckweed	<i>Lemna trisulca</i>	5	12.8%
Watermeal	<i>Wolffia columbiana</i>	5	5.1%
White-stem pondweed	<i>Potamogeton praelongus</i>	7	23.1%
White water lily	<i>Nymphaea odorata</i>	6	53.8%
Yellow pond lily	<i>Nuphar lutea ssp. pumila</i>	9	25.6%
Summary Table			
FQI = C*VS		Average C-Value	5.0
C= Mean coefficient of conservatism value		Number of species	13
S= Number of species in sample		FQI	18.0

Table 2. Little Comfort Lake Point-Intercept Survey Results- Native and Non-Native Species.

Common Name	Scientific Name	C- Value	Frequency of Occurrence
Blue flag Iris	<i>Iris versicolor</i>	4	5.1%
Bristly sedge	<i>Carex comosa</i>	4	2.6%
Broad-leaved cattail	<i>Typha latifolia</i>	2	2.6%
Coontail	<i>Ceratophyllum demersum</i>	2	94.9%
Flatstem pondweed	<i>Potamogeton zosteriformis</i>	6	10.3%
Greater duckweed	<i>Spirodela polyrhiza</i>	5	12.8%
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	7	5.1%
Narrow-leaf/Hybrid cattail	<i>Typha x glauca</i>	0	56.4%
Purple loosestrife	<i>Lythrum salicaria</i>	0	17.9%
Sago pondweed	<i>Stuckenia pectinatus</i>	3	2.6%
Star duckweed	<i>Lemna trisulca</i>	5	12.8%
Watermeal	<i>Wolffia columbiana</i>	5	5.1%
White-stem pondweed	<i>Potamogeton praelongus</i>	7	23.1%
White water lily	<i>Nymphaea odorata</i>	6	53.8%
Yellow pond lily	<i>Nuphar lutea ssp. pumila</i>	9	25.6%
Summary Table			
FQI = C*VS		Average C-Value	4.3
C= Mean coefficient of conservatism value		Number of species	15
S= Number of species in sample		FQI	16.8

Appendix A

Little Comfort Lake 2019 Aquatic Plant Species Distribution

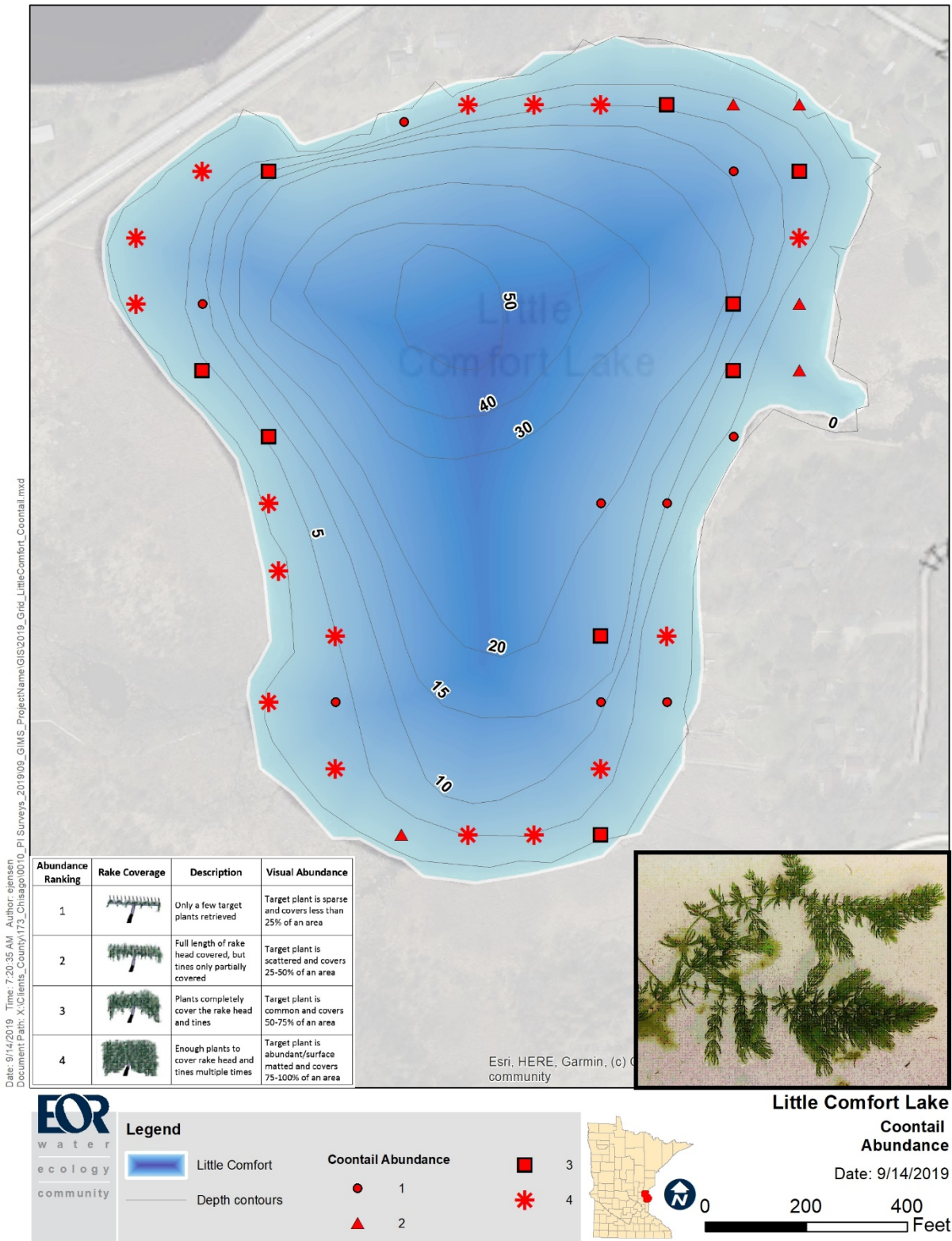


Figure 1. Little Comfort Lake Coontail distribution and abundance – August 2019.

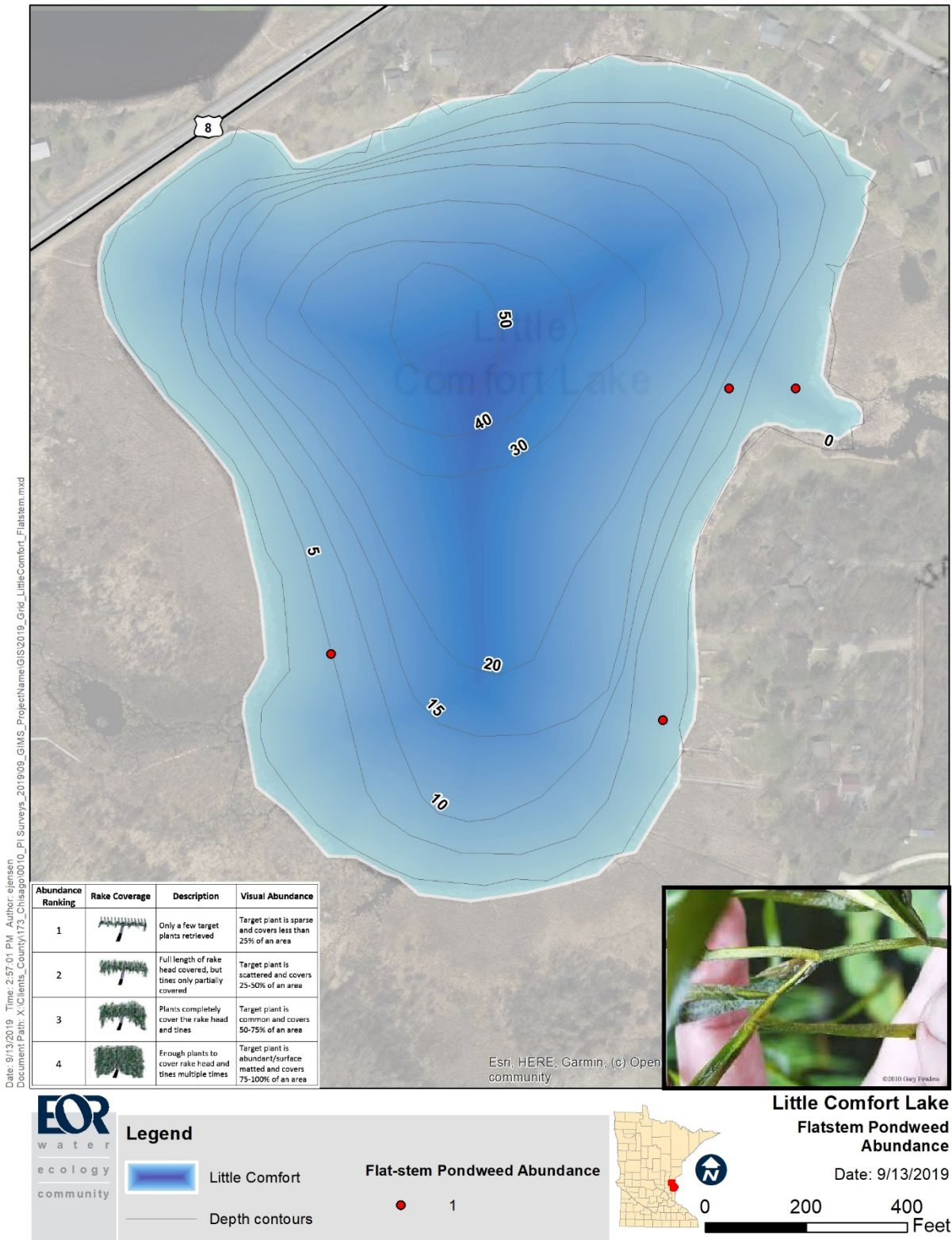


Figure 2. Little Comfort Lake Flatstem Pondweed distribution and abundance – August 2019.

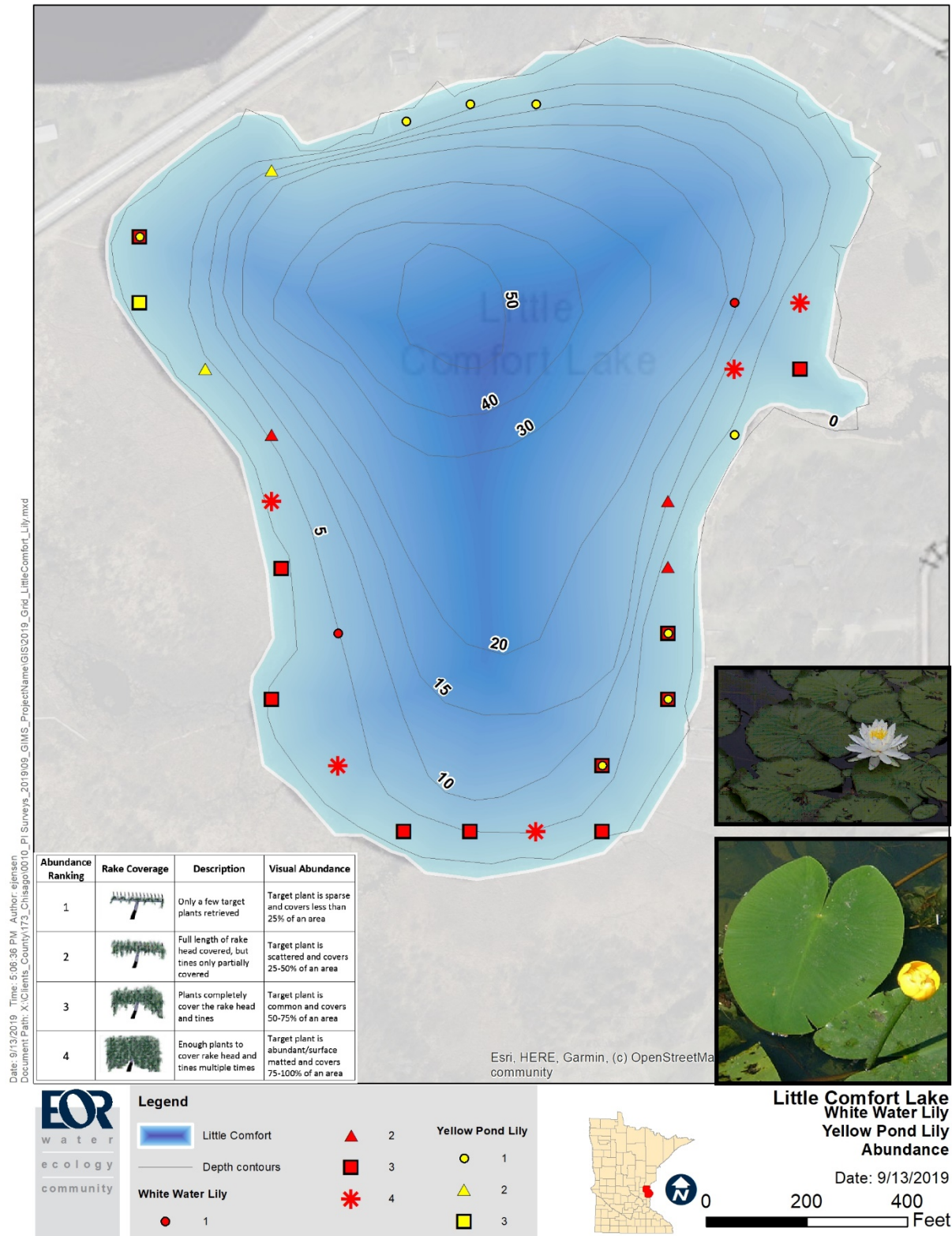


Figure 3. Little Comfort Lake White Water Lily, Yellow Pond Lily distribution and abundance – August 2019.

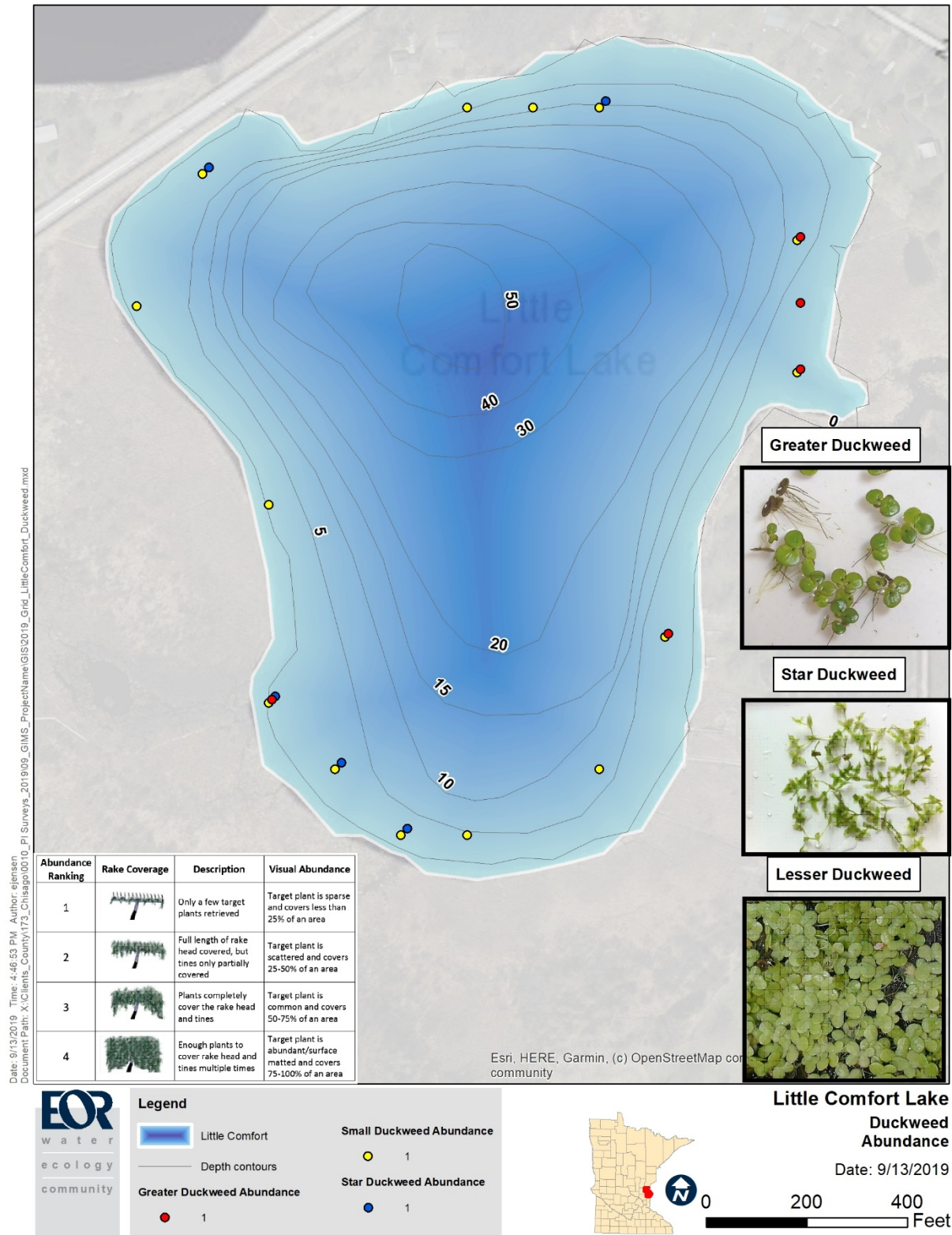


Figure 4. Little Comfort Lake duckweed species distribution and abundance – August 2019.

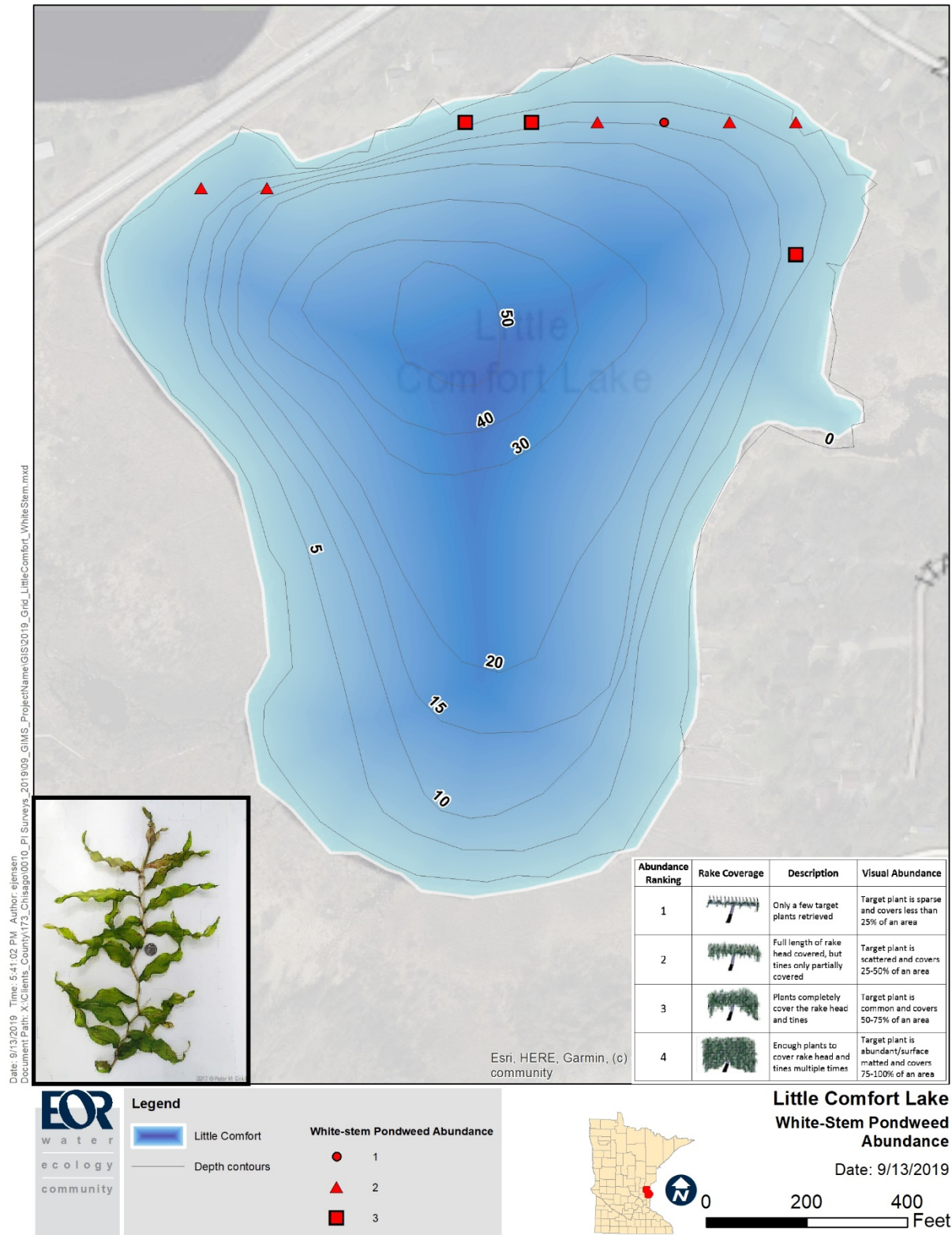


Figure 5. Little Comfort Lake White-Stem Pondweed distribution and abundance – August 2019.

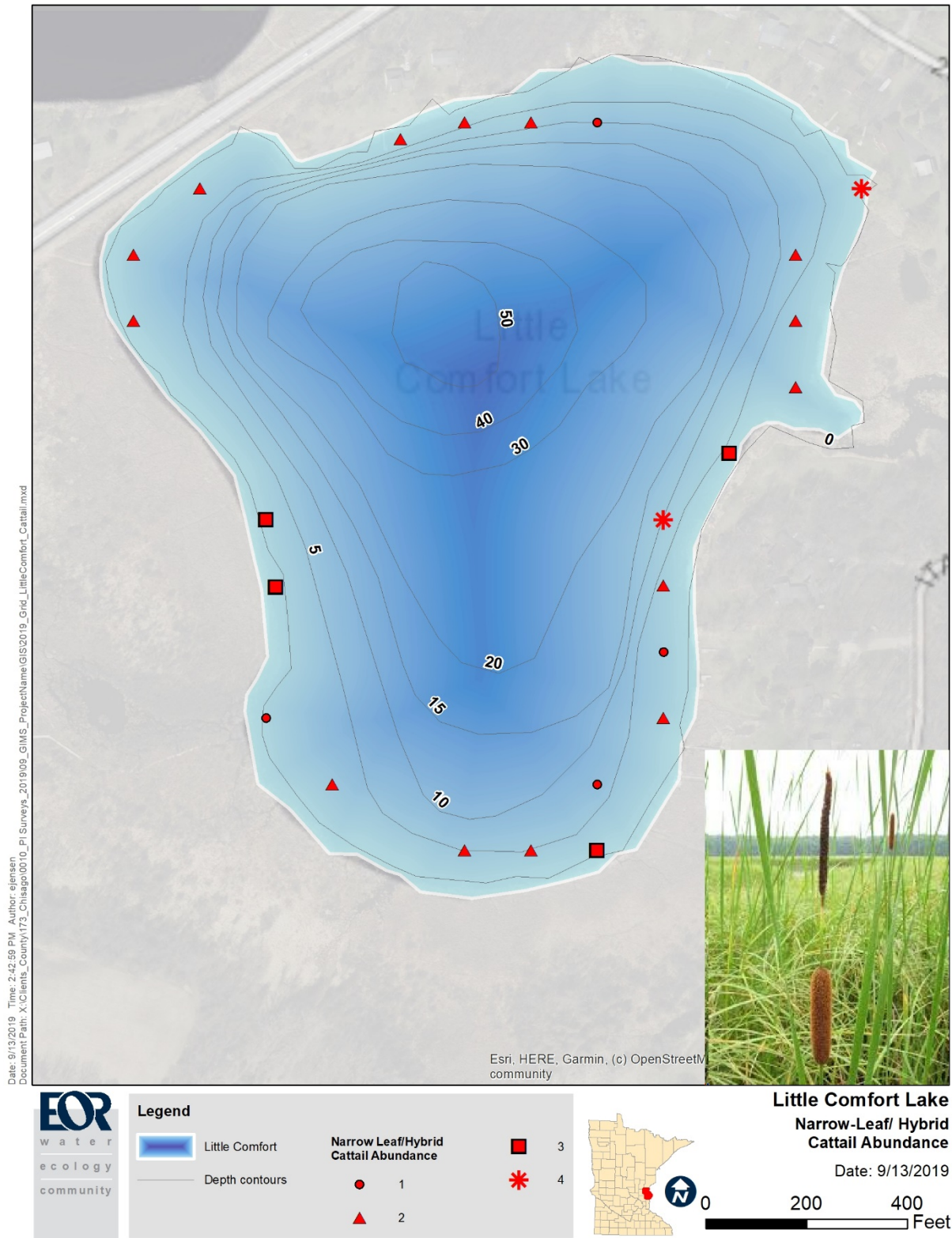


Figure 6. Little Comfort Lake Narrow-leaf /Hybrid Cattail distribution and abundance – August 2019.