Town of Manitowish Waters

Aquatic Plant Point Intercept Report: Rice Creek

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Prepared By: North Lakeland Discovery Center

NORTH LAKELAND DISCOVERY CENTER
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INTRODUCTION

The following report provides the results and analysis of the aquatic vegetation found in Rice Creek through a point-intercept survey conducted by the North Lakeland Discovery Center (NLDC) in Manitowish Waters. This survey was funded by the Town of Manitowish Waters and Wisconsin Department of Natural Resources (WDNR) Surface water grant #AEPP70023. The point-intercept survey was conducted in July and August of 2023 during peak aquatic vegetation growth. The purpose of the aquatic plant point-intercept survey is to provide data regarding the species present, abundance, and species richness on each waterbody.

Aquatic plants are vital to the well-being of a lake ecosystem. They provide functions and services to ecosystems such as breeding habitat, water purification, and soil stabilization. Rice Creek's vegetation creates a special ecosystem that supports an abundance of wildlife. Additionally, the aquatic plants provide food and shelter for a variety of animals. Rice Creek specifically is an important habitat for waterfowl and is a very popular area for waterfowl hunting. During the survey, mallards and wood ducks were commonly seen. Surveyors once observed a bald eagle, a ruby-throated hummingbird, a snapping turtle, and a beaver skeleton within a few feet of their canoe, all within a single breath.

Despite aquatic plants' many contributions, some people still view them as a nuisance. Although there are aquatic invasive species which can cause damage, most aquatic plants are essential for maintaining a healthy ecosystem (Skawinski 2022).

Aquatic invasive species are organisms which have spread beyond their natural range. The presence of aquatic invasive species in Northern Wisconsin, such as curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*), has had a negative impact on the quality of many water bodies. Point-intercept surveys are an effective way to

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detect aquatic invasive species and to understand the aquatic plant communities of each lake. Curly-leaf pondweed was first detected in Rice Creek by NLDC staff and volunteers in 2010. Single strands of curly-leaf pondweed were raked up at three different waypoints in Rice Creek during the 2023 point-intercept survey. NLDC will continue to survey these waypoints for curly-leaf pondweed, monitoring distribution and abundance for future management recommendations. No major populations or colonies were found.

In Rice Creek, 48 different species of aquatic plants and algae were found (Table 1). The following report provides information on the point-intercept methods, vegetation found, and summary of the results found.

METHODS

The point-intercept method used on Rice Creek was developed by the WDNR named as the "Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications" document. The point-intercept survey was conducted using a geo-referenced sampling grid, developed by the WDNR, input into GPS devices. Using a canoe or small boat and a GPS, each point was sampled. At each site, the plant community is surveyed with a pole rake sampler to determine species presence and rake fullness rating. The rake is dropped until it touches the lake bottom, spun around 3 times then is pulled up and given a rake fullness rating. This rating is an estimate of the total coverage of plants on the rake from 1-3. One is a few total plants, two is moderate total plants, and three is abundant total plants. When no plants were on the rake, the rake fullness rating was recorded as zero. Each aquatic plant species on the rake was identified and given a rake fullness rating based on its prevalence on the rake. The overall rake fullness and individual plant rake fullness were both recorded on the data sheet. Aquatic plant species that were not

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pulled up on the rake but were visible within six feet of the point were recorded as visual sightings (V) on the data sheet. Boat observations (BO) were species observed that were not raked or visually recorded within six feet of a point. The depth at each point was determined by a depth finder or by foot markings on the rake or rope and recorded on the data sheet. The sediment type (mucky, sandy, or rocky) of the lake bottom was determined by the feel of the rake or when sediment was pulled up and was recorded. The three rakes used were a 7-foot pole rake, an extendable 8-foot pole rake, and a 25-foot rope rake. The pole rakes were used at depths of about 12 feet or less and the rope rake was used at depths that were unable to be reached by the pole rake. Sites that were inaccessible due to various reasons were recorded in categories labeled unnavigable, terrestrial, shallow, rocks, dock, swim area, temporary obstacle, or no information. Sites skipped due to depths greater than maximum depth of plants were labeled as too deep on the data sheet. Visual observations of species within the six feet range were recorded (Hauxwell et al., 2010). Samples that were unidentifiable in the field were bagged and identified later using a microscope. Species that were found to be state endangered, threatened, or of special concern were collected and pressed to create an herbarium collection. Species of special concern are those that are becoming less common throughout their native range and may soon become a threatened species. Threatened species are protected by law and are at risk of becoming endangered.

The WDNR provides an Excel spreadsheet called “The Aquatic Plant Survey Data Workbook” with formulas to generate statistics about the species found. All data collected from the survey on the field sheet is entered into the entry sheet on the Excel spreadsheet. Any boat surveys are input into the boat survey tab on the Excel sheet. Once all data is entered, the statistics are automatically generated. The statistics worksheet is broken down into individual

species statistics and summary statistics. Individual species statistics include the frequency of occurrence of plants, relative frequency, number of sites with vegetation, average rake fullness, and number of visual sightings. The summary statistics include the total number of sites visited, total number of sites with vegetation, sites shallower than the maximum depth of plants, frequency of occurrence, Simpson's Diversity Index, maximum depth of plants, sites sampled using pole or rope rake, average number of species per site, and species richness, including visuals. A maximum depth of plant colonization graph is automatically generated from the maximum depth data (Hauxwell et al., 2010). The Simpson's Diversity Index is an estimator of community diversity. It is based on the relative frequency of plants on the lake, and it is not impacted by the visual plant data. Simpson's Diversity Index is based on a scale of 0-1. The closer to 1, the more diverse the plant community is (Hauxwell et al., 2010).

Finally, the worksheet calculates the Floristic Quality Index (FQI). The FQI metric is used to evaluate sampled plant communities' closeness to an undisturbed plant community. In Wisconsin, there is a demand by the WDNR, local governments, and lakeshore riparian for considering the quality of lake plant communities in a variety of planning, zoning, sensitive area designation, and aquatic plant management decisions. Floristic quality provides a standardized analysis technique, which aids in the development of regional and temporal trends of plant community "health". The floristic quality (I) = the average coefficient of conservatism (C) multiplied by the square root of the number of species in the lake ($\sqrt{N}$). All native species are included in the number of species. Conservatism (C) is the likelihood of a plant occurring in a landscape that is not relatively impacted by settlement. The collection of values ranges from 0-10, 10 being the species that are most sensitive to disturbance. Plants are assigned a C value

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based on substrate preference, tolerance to turbidity, rooting strength, reproductive means, and water drawdown tolerance (Nichols 1999).

To understand the results, the *I*, *C,* and N are compared to state and regional values. Statewide, the median number of species per lake is 13, with ranges from 1-44 species. The *C* value had a median of six, with ranges from 2-9.5. Finally, the *I* value had a median value of 22.2, with ranges from 3-44.6. *As C* values can vary region to region, the state is broken up into eight different ecoregions. The three lakes surveyed are all in the Northern Lakes and Forests Ecoregion. The median number of species in this ecoregion is 13. The median *C* value is 6.7 and the median *I* is 24.3 (Nichols 1999). Each lake surveyed will be compared to these values in the following sections of the report.

RESULTS: Rice Creek Aquatic Vegetation

Rice Creek had 509 total points plotted and of those points, 448 were accessible. 61 points were considered non-navigable due to a high abundance of plants or due to points being on shore. All sites visited were sampled with a pole rake. The maximum depth of plants on Rice Creek was 10 feet, and the overall maximum depth was also 10 feet. The total number of sites with vegetation was 430. The average rake fullness rating was 1.68. The distribution total rake fullness is shown on Map 1. The frequency of occurrence of plants at sites shallower than maximum depth of plants was 95.98%. The average number of species per site shallower than maximum depth was 2.91. The average number of species per site for all vegetated sites was 3.04. The overall species richness including plants collected on rake was 42 species. The species richness of Rice Creek, including both plants collected on rake and visual sightings, was 48 species.

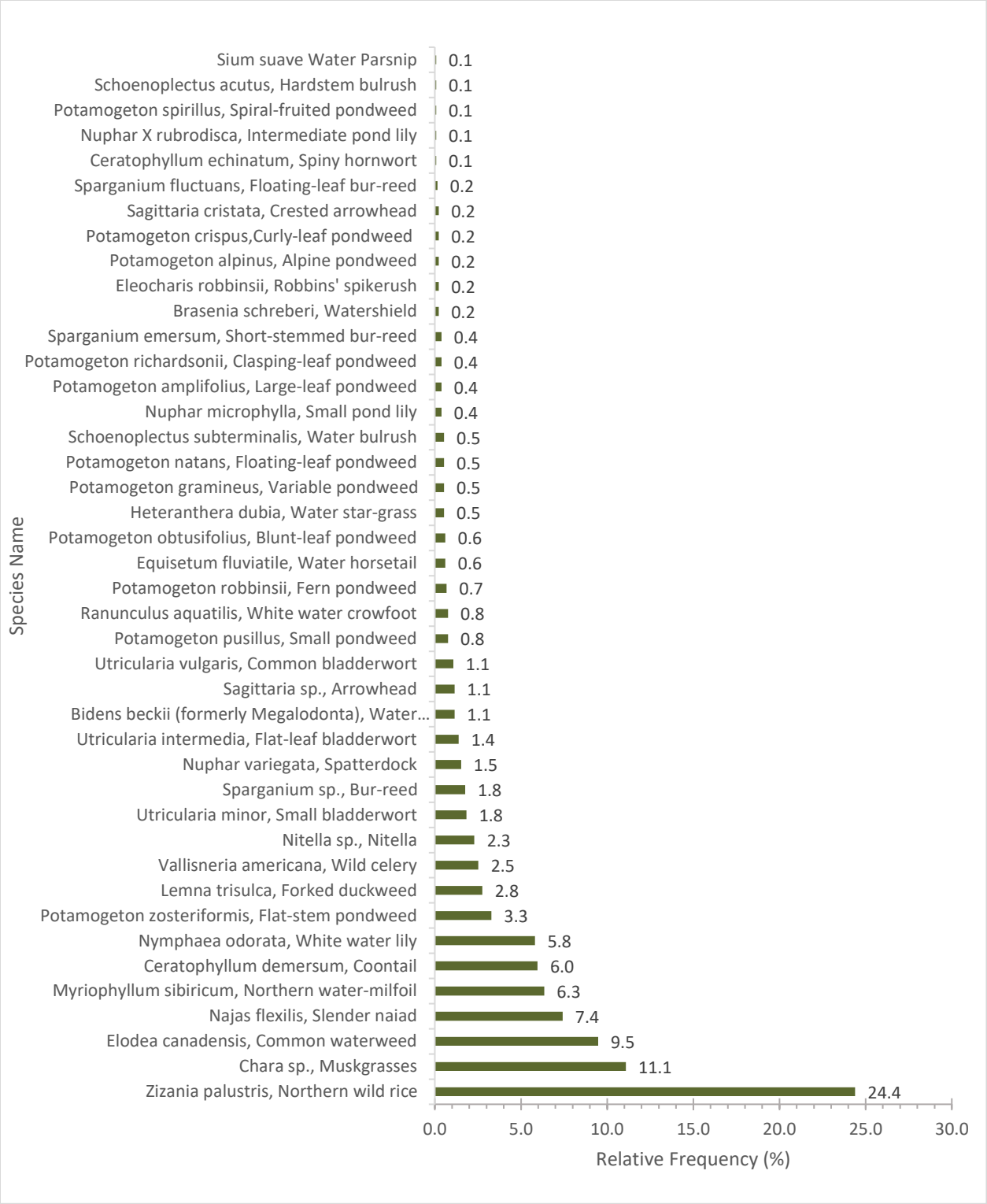

Figure 1. Rice Creek 2023 relative frequency (%) of occurrence of aquatic plant species collected on rake during the 2023 point-intercept survey.

The three most relatively frequent macrophyte species on Rice Creek were northern wild rice (*Zizania palustris*), muskgrasses (*Chara* sp.), and common waterweed (*Elodea canadensis*). Northern wild rice had a relative frequency of 24.4% (Figure 1) and its distribution is shown on Map 2. Muskgrasses had a relative frequency of 11.1% (Figure 1) and its distribution is shown on Map 3. Common waterweed had a relative frequency of 9.5% (Figure 1) and its distribution is shown on Map 4.

Northern wild rice (*Zizania palustris*) was the species raked the most frequently during this survey (Map 2). Northern wild rice is a grass that produces leaves that float on the surface during the early growing season and later growing emerged out of the water. Leaves are long, alternate, and ascending, growing 3 to 9 feet tall. The seed head once mature is a large spreading cluster of spikelets with distinct pistalate (female) flowers above the staminate (male) flowers. This plant often forms dense colonies in shallow mucky waters. This plant is not only important for wildlife like waterfowl, but also holds great cultural significance. The Ojibwe word for wild rice is Manoomin, a staple food that has sustained them for generations. It is important to recognize the longstanding history of the land and the peoples who lived there before. During the survey, wild rice was treated with respect and sampled with minimal disturbance out of respect to its cultural significance.

Figure 2. Lake Technicians Rylee and Zack row through Northern wild rice to minimize disturbance.

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Muskgrasses (*Chara* sp.) were the next most frequent species raked (Map 3). There are many species of Chara, but per the PI survey protocol, non-vascular plants such as Chara or Nitella were identified to genus only. Chara is a genus of charophyte green algae in the family Characeae. Uncharacteristically for an alga, Chara resembles vascular aquatic plants as it can grow tall in some instances and has stem-like and leaf-like structures.

Common waterweed (*Elodea canadensis*) is a submergent species that has flat, lance-shaped leaves that are pointed, with no leaf stalk (Map 4). The leaves whorl in sets of three. It is often bushier near the top of each branch. Tiny white or pink flowers are produced on a long, thread-like stalk that reaches the water's surface. This species prefers soft substrates and is found in shallow and deep water (Skawinski 2022).

Two species of special concern were found on Rice Creek, one of them being dwarf yellow pond lily (*Nuphar microphylla*), which was found at 60 sites. It was located at 47 sites visually and pulled up at 13 sites on the rake. Dwarf yellow pond lily is a floating leaved plant that is usually less than 10 cm long. It is oval shaped with a notch that reaches from the center to the leaf edge. The leaf ranges in color from green to purple. The veins are parallel and converge at the midvein. A yellow flower is produced with a red center; it is usually less than 3 cm wide. The stem is flattened on one side, with no wings. Dwarf yellow pond lily is found in mucky soils and soft water lakes (Skawinski 2022).

Figure 3. Dwarf yellow pond lily (*Nuphar microphylla*), a species of special concern found on Rice Creek.

Another species of special concern identified was Robins spikerush, (*Eleocharis robbinsii*). It was recorded visually 5 times and collected on the rake 3 times. Robins spikerush has 2 main forms, a vegetative submergent form of long thin hair-like basal leaves that are sheathed at the base, and a flowering structure that is emergent. The emergent flowering structure is a long culm that is triangular in cross section. The tip of the culm has a small spikelet cluster that contains the small nutlets when mature. It grows 20 to 70 cm out of the water. Often, this plant produces small bean-like tubers under the sediment. This plant prefers to grow in low-alkalinity, muck bottom lakes and is often found in open bog lakes (Skawinski 2022).

Figure 4. (Left) A pressed herbarium sample of Robins spikerush (*Eleocharis robbinsi*) found on Rice Creek.

Figure 5. (Right) Canoes were the best option to efficiently survey Rice Creek, as the wild rice grew too dense to navigate with a larger vessel.

CONCLUSION

The Floristic Quality Index for Rice Creek is 42.8; this is much higher than both the state and ecoregional median values of 22.2 and 24.3 respectively. The mean conservatism is 7.1, which is higher than the state median value of six and the ecoregional value of 6.7. This indicates that the species on Rice Creek have an average sensitivity to disturbance. The number of native species found on Rice Creek is 44 (not including moss or algae), which is three times the state and ecoregional medians of 13 (Figure 2). The Simpson Diversity Index for Rice Creek is .90. This value indicates a high diversity for the waterbody, which is reflected by the aquatic species list provided.

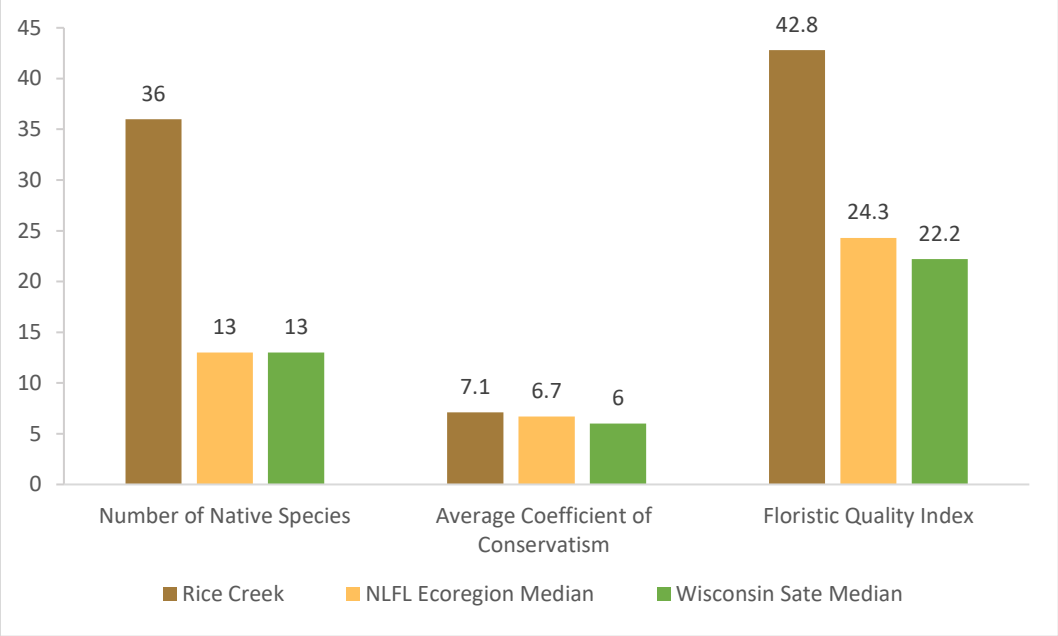

Figure 6. Floristic Quality Assessment of Rice Creek. Created using data collected during the 2023 point intercept survey. Analysis follows Nichols (1999).

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Table 1. Aquatic species list recorded during the 2023 point intercept on Rice Creek, Vilas County, WI.

Growth	Species	Common Name	Presence
Submergent	*Bidens beckii (formerly Megalodonta)*	Water marigold	X
Floating	*Brasenia schreberi*	Watershield	X
Submergent	*Ceratophyllum demersum*	Coontail	X
Submergent	*Ceratophyllum echinatum*	Spiny hornwort	X
Submergent	*Chara* sp.	Muskgrasses	X
Emergent	*Eleocharis palustris*	Creeping spikerush	V
Submergent/ Emergent	*Eleocharis robbinsii**	Robbins' spikerush	X
Submergent	*Elodea canadensis*	Common waterweed	X
Emergent	*Equisetum fluviatile*	Water horsetail	V
Submergent	*Heteranthera dubia*	Water star-grass	X
Floating	*Lemna minor*	Small duckweed	V
Submergent	*Lemna trisulca*	Forked duckweed	X
Submergent	*Ludwigia palustris*	Marsh purslane	V
Submergent	*Myriophyllum sibiricum*	Northern water-milfoil	X
Submergent	*Najas flexilis*	Slender naiad	X
Submergent	*Nitella* sp.	Nitella	X
Floating	*Nuphar microphylla**	Small pond lily	X
Floating	*Nuphar variegata*	Spatterdock	X
Floating	*Nuphar X rubrodisca*	Intermediate pond lily	X
Floating	*Nymphaea odorata*	White water lily	X
Submergent	*Potamogeton alpinus*	Alpine pondweed	X
Submergent	*Potamogeton amplifolius*	Large-leaf pondweed	X
Submergent	*Potamogeton crispus*	Curly-leaf pondweed	X
Submergent	*Potamogeton gramineus*	Variable pondweed	X
Floating	*Potamogeton natans*	Floating-leaf pondweed	X
Submergent	*Potamogeton obtusifolius*	Blunt-leaf pondweed	X
Submergent	*Potamogeton pusillus*	Small pondweed	X
Submergent	*Potamogeton richardsonii*	Clasping-leaf pondweed	X
Submergent	*Potamogeton robbinsii*	Fern pondweed	X
Submergent	*Potamogeton spirillus*	Spiral-fruited pondweed	X
Submergent	*Potamogeton zosteriformis*	Flat-stem pondweed	X
Submergent	*Ranunculus aquatilis*	White water crowfoot	X

X = LOCATED ON RAKE DURING POINT INTERCEPT SURVEY
V = VISUAL; SEEN DURING SURVEY, BUT NEVER PICKED UP ON RAKE
BO = BOAT OBSERVATIONS; LOCALIZED OCCURANCES OF SPECIES OUTSIDE THE POINT-INTERCEPT GRID OR IN BETWEEN SAMPLING SITES
*= SPECIES OF SPECIAL CONCERN
**= THREATENED SPECIES
***= ENDANGERED SPECIES

Table 1 Continued.

Growth	Species	Common Name	Presence
Submergent/Emergent	*Sagittaria latifolia*	Common arrowhead	V
Submergent	*Sagittaria* sp.	Arrowhead	X
Emergent	*Schoenoplectus acutus*	Hardstem bulrush	X
Submergent	*Schoenoplectus subterminalis*	Water bulrush	X
Submergent/Emergent	*Sium suave*	Water Parsnip	X
Emergent	*Sparganium emersum*	Short-stemmed bur-reed	X
Emergent	*Sparganium fluctuans*	Floating-leaf bur-reed	X
Submergent	*Sparganium* sp.	Bur-reed	X
Emergent	*Typha angustifolia*	Narrow-leaved cattail	V
Emergent	*Typha latifolia*	Broad-leaved cattail	V
Submergent	*Utricularia intermedia*	Flat-leaf bladderwort	X
Submergent	*Utricularia minor*	Small bladderwort	X
Submergent	*Utricularia vulgaris*	Common bladderwort	X
Submergent	*Vallisneria americana*	Wild celery	X
Emergent	*Zizania palustris*	Northern wild rice	X

X = LOCATED ON RAKE DURING POINT INTERCEPT SURVEY
V = VISUAL; SEEN DURING SURVEY, BUT NEVER PICKED UP ON RAKE
BO = BOAT OBSERVATIONS; LOCALIZED OCCURANCES OF SPECIES OUTSIDE THE POINT-INTERCEPT GRID OR IN BETWEEN SAMPLING SITES
*= SPECIES OF SPECIAL CONCERN
**= THREATENED SPECIES
***= ENDANGERED SPECIES

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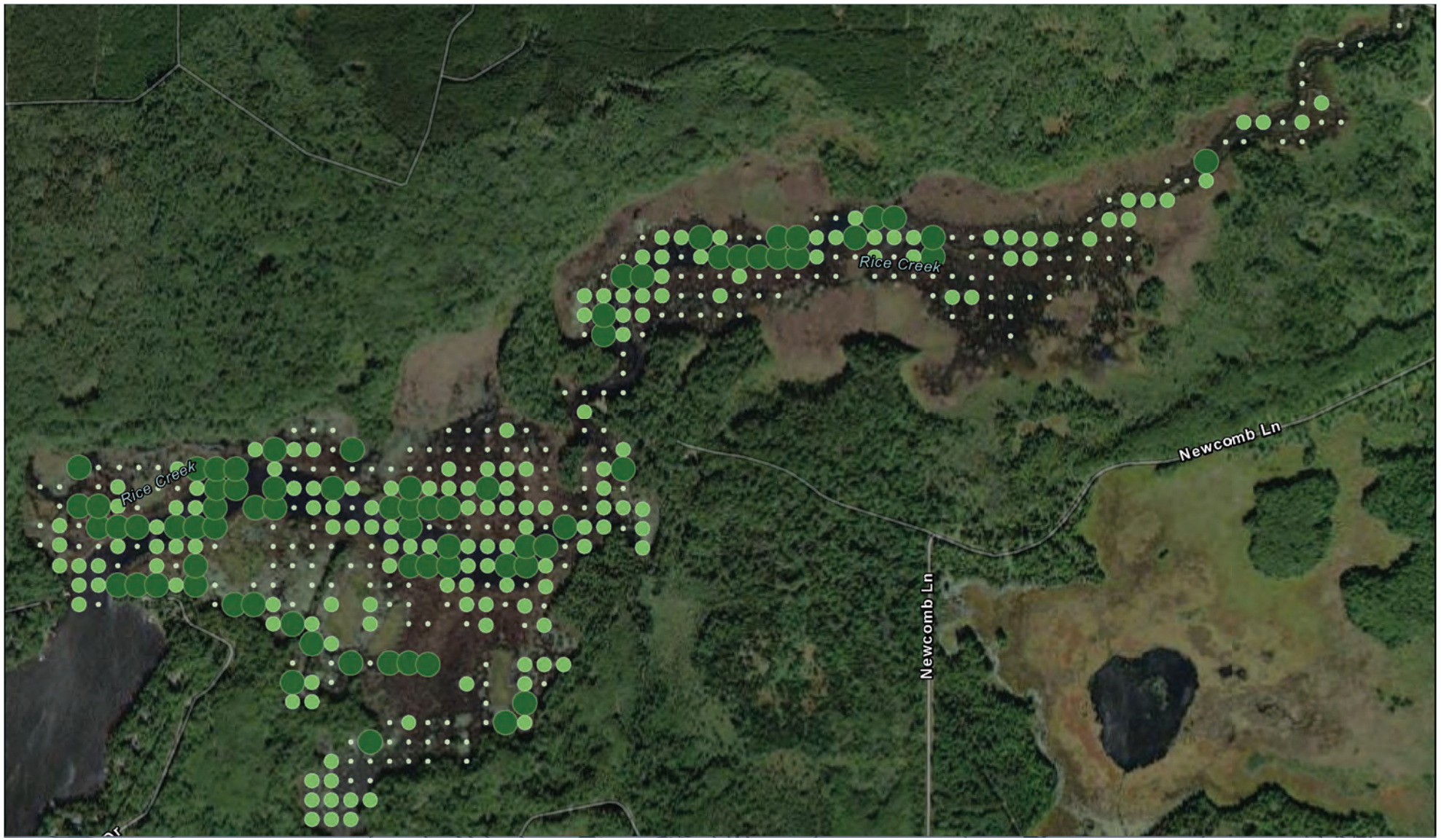

Rice Creek - Map 1

Town of Manitowish Waters
Vilas County, Wisconsin

Total Rake Fullness Rating

LEGEND

Total Rake Fullness

- 3
- 2
- 1

N
W
E
S

0 0.1 0.2 0.4 mi
0 0.15 0.3 0.6 km

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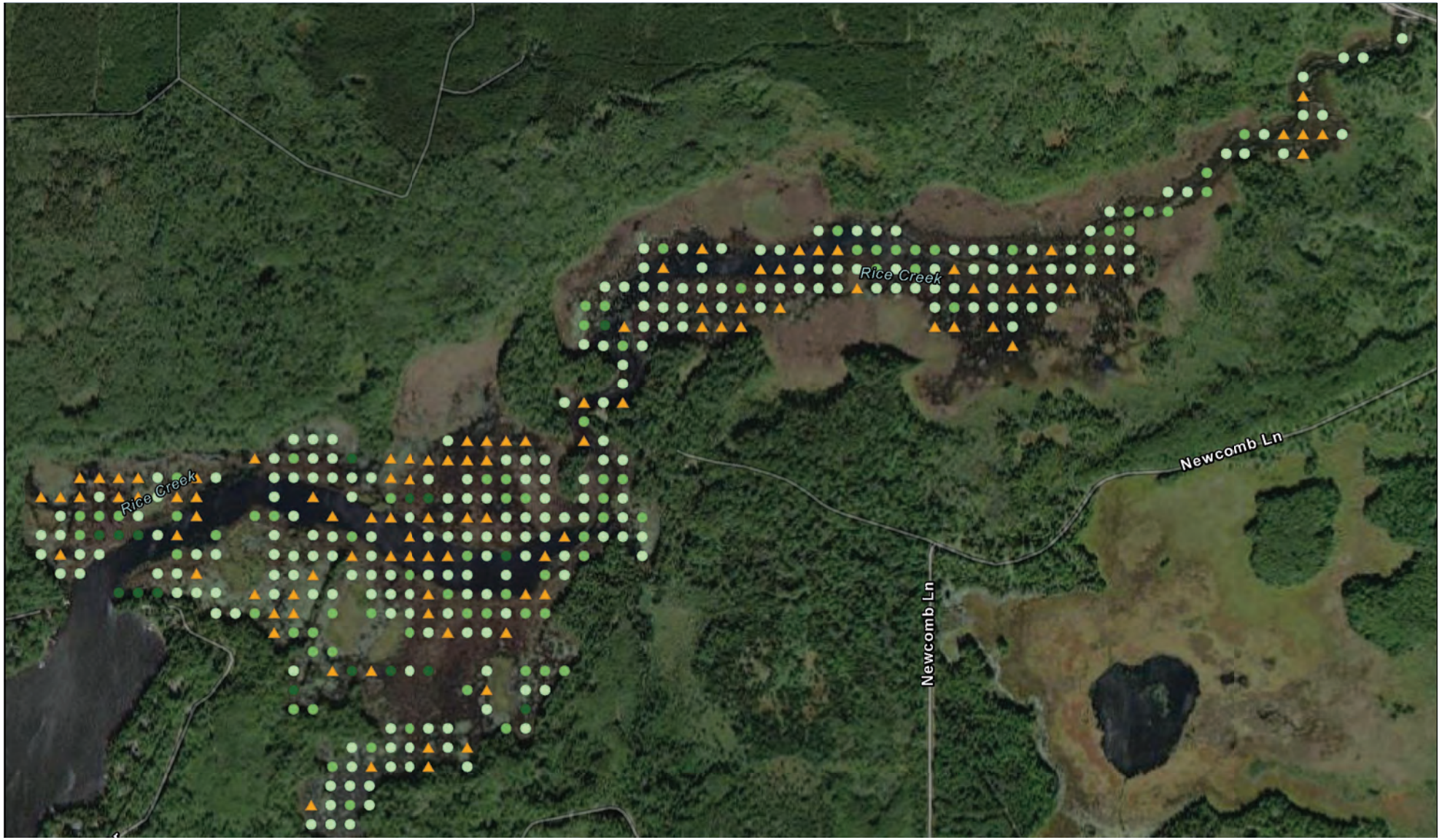

Rice Creek - Map 2

Town of Manitowish Waters
Vilas County, Wisconsin

Relative Frequency and Rake Fullness
Northern wild rice
(Zizania palustris)

LEGEND
Distribution of Plant Species

- Visual
- 3
- 2
- 1

N
W
E
S

0 0.1 0.2 0.4 mi
0 0.15 0.3 0.6 km

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Rice Creek - Map 3

Town of Manitowish Waters
Vilas County, Wisconsin

Relative Frequency and Rake Fullness
Chara
(Chara sp.)

LEGEND
Distribution of Plant Species

- Visual
- 3
- 2
- 1

N
W
E
S

0 0.1 0.2 0.4 mi
0 0.15 0.3 0.6 km

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Rice Creek - Map 4

Town of Manitowish Waters
Vilas County, Wisconsin

Relative Frequency and Rake Fullness
Common waterweed
(Elodea canadensis)

LEGEND
Distribution of Plant Species

- Visual
- 3
- 2
- 1

N
W
E
S

0 0.1 0.2 0.4 mi
0 0.15 0.3 0.6 km

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