

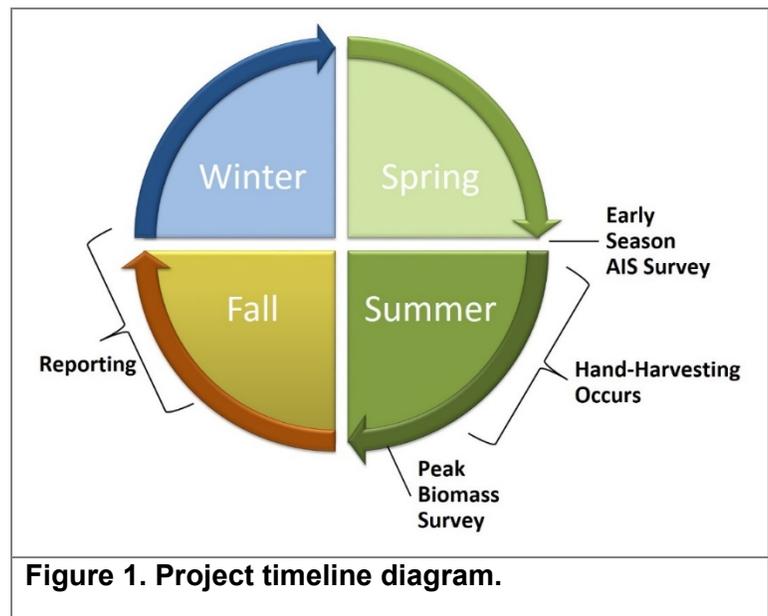
INTRODUCTION

Roberts Lake, Forest County, is a 435-acre spring lake with an average depth of 17 feet and a maximum depth of 32 feet. Eurasian water milfoil (*Myriophyllum spicatum*; EWM) was first discovered in Roberts Lake in 2015 by the Great Lakes Indian Fish and Wildlife Commission (GLIFWC). Upon this discovery, Roberts Lake Association, Inc. (RLA) contacted Onterra, LLC to conduct studies aimed at understanding the extent of the EWM population in the lake and form an appropriate course of action going forward. The RLA, with assistance from Onterra, successfully applied for an Aquatic Invasive Species Early Detection Response Grant (AIS-EDR) through the Wisconsin Department of Natural Resources (WDNR) in December 2015.

Surveys conducted during 2015 resulted in a full understanding of the EWM population within Roberts Lake. The EWM population in Roberts Lake was found to be relatively low during the August 2015 survey and professional hand-harvesting efforts were determined to be the most appropriate method for control. Professional hand-harvesting efforts were conducted in the late summer of 2015 with divers removing approximately 550 pounds or 36.8 cubic feet of EWM from the lake. Professional hand-harvesting was once again recommended for 2016 and 9.25 hours of effort yielded approximately 22 cubic feet of EWM. This report discusses the third and final year (2017) of this project aimed to manage the EWM population in Roberts Lake through a coordinated hand-harvesting effort.

MONITORING METHODOLOGIES

A set of EWM mapping surveys were used within this project to coordinate and qualitatively monitor the hand-harvesting efforts (Figure 1). The first monitoring event on Roberts Lake in 2017 was the Early Season Aquatic Invasive Species Survey (ESAIS). This late-spring/early-summer survey provides an early look at the lake to help guide the hand-harvesting management to occur on the system. Following the hand-harvesting, Onterra ecologists completed the Late-Summer EWM Peak-Biomass Survey, the results of which serve as a post-harvesting assessment of the hand-removal efforts. The hand-removal program would be considered successful if the density of EWM within the targeted areas was found to have remained approximately the same or decreased from the ESAIS Survey to the Late-Summer Peak-Biomass Survey.



EARLY SEASON AQUATIC INVASIVE SPECIES SURVEY (ESAIS) (PRE-HAND HARVESTING)

Onterra ecologists completed the Early-Season AIS Survey on June 13, 2017. The EWM population was mapped by using either 1) point-based or 2) area-based methodologies. Large colonies >40 feet in diameter are mapped using polygons (areas) and were qualitatively attributed a density rating based upon a five-tiered scale from *Highly Scattered* to *Surface Matting*. Point-based techniques were applied to EWM locations that were considered as *Small Plant Colonies* (<40 feet in diameter), *Clumps of Plants*, or *Single or Few Plants*.

While EWM is usually not at its peak growth at this time of year, the water is typically clearer during the early summer allowing for more effective viewing of submersed plants, and EWM is often growing higher in the water column than many of the native aquatic plants at that time of year. The locations of EWM occurrences located during early summer are provided to professionals or volunteers to aid in their hand-removal efforts. Additionally, two other exotic plants commonly found in Wisconsin, Curly-leaf pondweed (CLP, *Potamogeton crispus*) and Pale Yellow Iris (*Iris pseudacorus*), are usually at their peak growth stage (or bloom) in early summer.

During the ESAIS survey, the field crews noted favorable conditions with partial sun, light winds and a Secchi disk reading of 10.2 feet indicating good water clarity. Only low density occurrences of EWM were located during the June survey, and no large continuous colonies were found in the lake (Map 1). The majority of plants were localized within the northeastern part of the lake. One isolated individual plant was located along the northern shore of the lake. Onterra provided the spatial data from this survey to the professional hand-harvesting firm to aid the control efforts. The highest density areas were given first priority for removal by professional hand-harvesting. Curly-leaf pondweed and Pale Yellow Iris were not located anywhere in the lake during the June survey.

HAND-HARVESTING MANAGEMENT ACTIONS

The RLA contracted with Aquatic Plant Management, LLC (APM) to conduct professional hand-harvesting of EWM in 2017. Aquatic Plant Management conducted hand-harvesting activities on June 22nd, 23rd & 26th 2017, spending a total of 72 combined diver hours actively hand-harvesting EWM within Roberts Lake and removing approximately 23.25 cubic feet of EWM. Removal efforts were initially directed at the largest known EWM populations consisting of *small plant colonies* or *clumps of plants* before moving on to the additional *single or few plant* occurrences. Details of the professional hand-harvesting conducted in 2017 as reported by APM are included with this report as Appendix A.

RLA SURVEILLANCE MONITORING

Members of the RLA have been trained in AIS identification and conducted AIS surveillance monitoring during 2017, searching particularly for EWM in parts of the lake not currently known to contain EWM. Volunteer surveillance conducted by RLA members in 2017 totaled approximately 77.5 combined hours surveying the lake and shoreline for EWM. Should the RLA discover a new EWM, or suspected EWM occurrence in the course of the monitoring, a GPS point would be taken and the spatial data would be relayed to Onterra prior to completing the late-summer peak biomass survey.

LATE-SUMMER EWM PEAK-BIOMASS SURVEY RESULTS (POST HAND HARVESTING)

The Late-Summer EWM Peak-Biomass Survey was conducted on September 8, 2017 to qualitatively assess the hand harvesting efforts as well as to understand the peak growth (peak-biomass) of the EWM population throughout the lake and to determine an appropriate control strategy for the following year. These populations were mapped by using the same methodology described above during the ESAIS survey.

During the survey, the EWM population was found to be relatively low and consisted of either *clumps of plants* or *single or few plant* occurrences (Map 2). No large colonies that required area-based mapping were located anywhere in the lake. The majority of the plants were once again located in the northeast part of the lake.

The professional hand-harvesting efforts conducted on Roberts Lake in 2017 were focused at two main areas of the lake where the largest known concentrations of EWM were located and are displayed on Figure 2. The area near the private access at the Wild Rose Supper Club location on the northeast corner of the lake contained three *clumps of plants* as well as several *single or few plant* occurrences during the June 2017 survey (Figure 2, Top left frame). Following the hand-harvesting efforts, the EWM population was reduced such that one *clump of plants* remained along with several *single or few* EWM plants in the vicinity (Figure 2, Top right frame).

Another concentration of EWM occurrences including a *small plant colony*, a *clump of plants* and several *single or few plants* was located in the northeast corner of the lake in approximately the same area as in past surveys (Figure 2, Bottom left frame). Following the professional hand-harvesting efforts, the EWM population in this area was found to have been reduced. A *clump of plants* was located approximately where the *small plant colony* had been previously and a few *single or few plants* remain present in this area of the lake (Figure 2, Bottom right frame).

With the observed overall reductions in the EWM population within the targeted areas, the 2017 professional hand-harvesting efforts met control expectations.

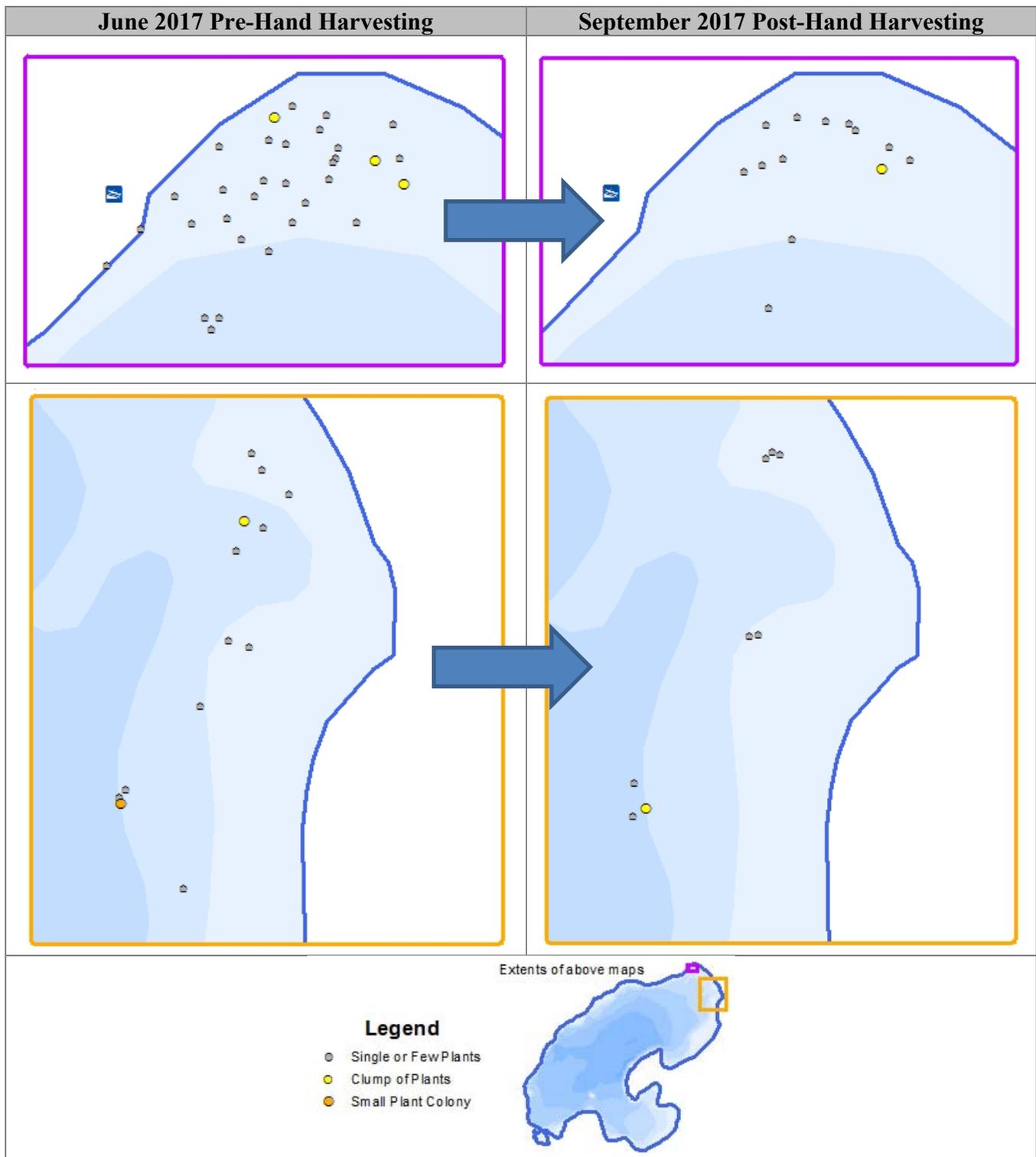


Figure 2. June 2017 pre- and September 2017 Post- Professional Hand-Harvesting EWM Survey Results-in Roberts Lake.

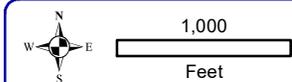
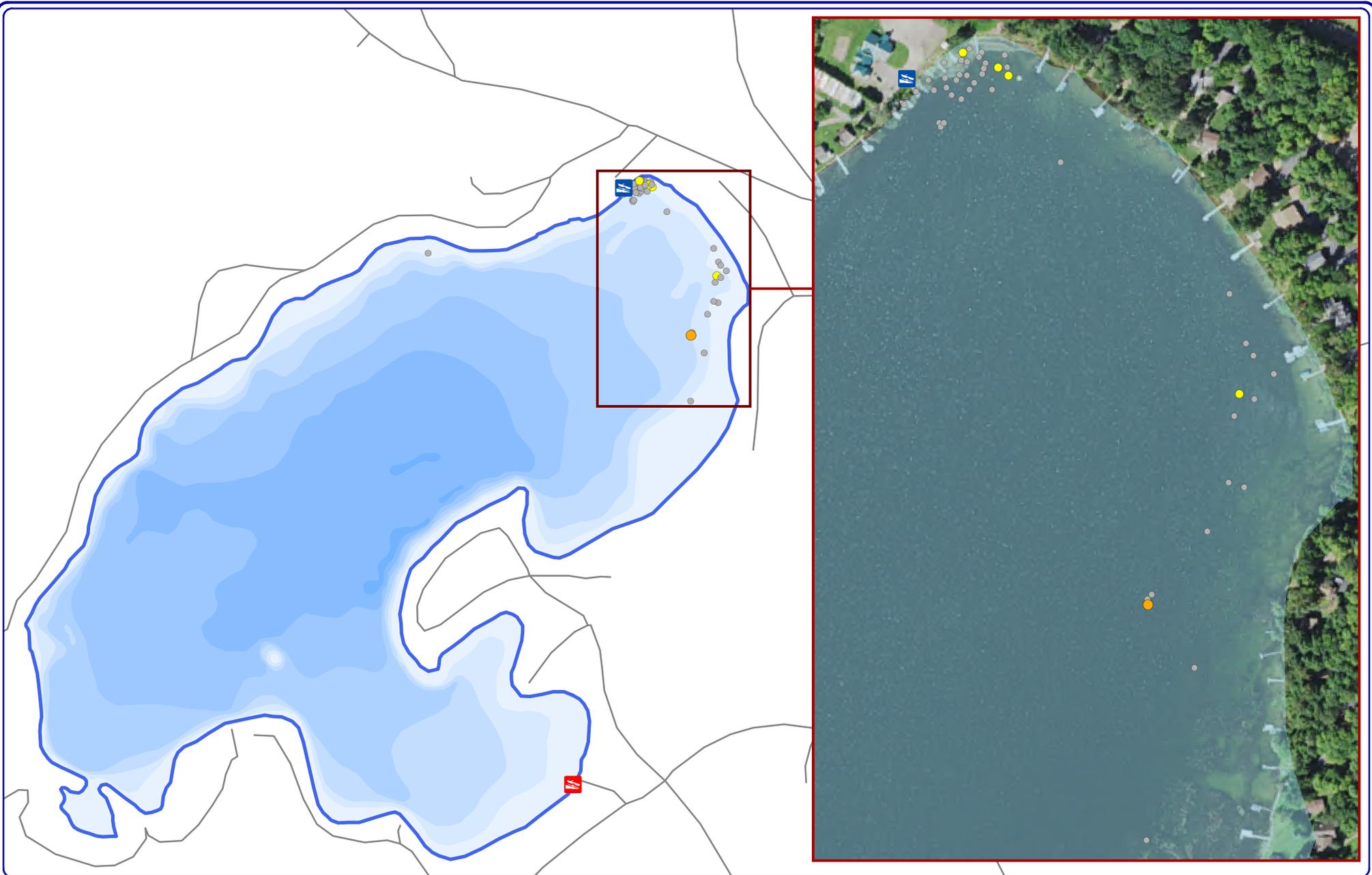
CONCLUSIONS AND DISCUSSION

The professional hand-harvesting actions undertaken during 2017 in Roberts Lake were effective in controlling the EWM population at the targeted sites with an overall reduction in EWM observed between the June ESAIS survey and the late-summer survey. It will be important to monitor these sites to determine if re-growth or re-colonization is occurring. The lake-wide EWM population remains low and mostly localized following surveys conducted in 2017. Professional harvesting has shown promise in limiting the expansion of EWM in Roberts Lake. Over the course of this project, the EWM population has been contained to approximately the same areas of the lake and no new locations in the lake have become established with EWM. The population of EWM within the known areas has been limited to point-based occurrences and the control actions have likely helped to inhibit the EWM from forming colonies of greater size that would be mapped with area-based mapping methodologies.

The RLA is seeking a Phase II AIS-EDR Grant to cover the continuation of EWM monitoring and control costs 2018-2020. The WDNR AIS-EDR Grant program is designed to help lake groups move swiftly upon discovery of a non-native species within their lake. A Comprehensive Lake Management Planning project is being considered by the RLA for initiation in 2019 (following a December 2018 grant application) that utilizes the data collected and lessons learned during the proposed project. The RLA will pose the question of commencing with the management planning project to its membership during the summer of 2018. The management planning process would result in a holistic understanding of the Roberts Lake ecosystem that includes assessments of the water quality, watershed, shoreline condition, fisheries, native aquatic plant communities, and stakeholder perceptions. An important component of this process would allow the RLA to objectively review their ongoing EWM management activities, outline appropriate thresholds (triggers) of when specific control strategies warrant implementation, and establish measurable success criteria standards to monitor future control strategies.

Should the AIS-EDR grant application be successfully funded, an Early-Season AIS (ESAIS) survey will be conducted during June of 2018 and produce the mapping data needed to guide professional and volunteer hand-harvesting strategies during the summer. A map of the results and a brief email-report would be provided to the RLA following the ESAIS Survey as well as the compatible files for uploading onto the association's GPS unit. Roberts Lake contains a high abundance of native plants and it is recommended that a large portion of the EWM hand-harvesting occur a little earlier in the growing season before the native plant population makes it difficult to maneuver in these areas. Onterra also recommends that professional hand-harvesting occurs again at a second time, later in the summer. This follow-up visit will allow the harvesters to remove any EWM that rebounds following the first pulling event and lead to more complete control at the targeted sites.

The RLA has been trained on AIS identification and how to collect data on an association-owned Garmin GPS unit. The RLA is advised to continue to conduct AIS surveillance monitoring, particularly looking for EWM in parts of the lake not currently known to contain EWM. These areas can be forwarded to Onterra prior to the Late Season EWM Peak-Biomass Mapping Survey for verification and refinement. RLA led volunteer-based hand-harvesting may be considered to supplement professional harvesting efforts and should be approximately tracked in the same fashion as the professional activities; where volunteers record where, when, and how much effort (time) that is spent conducting these activities.



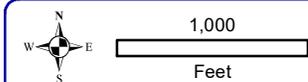
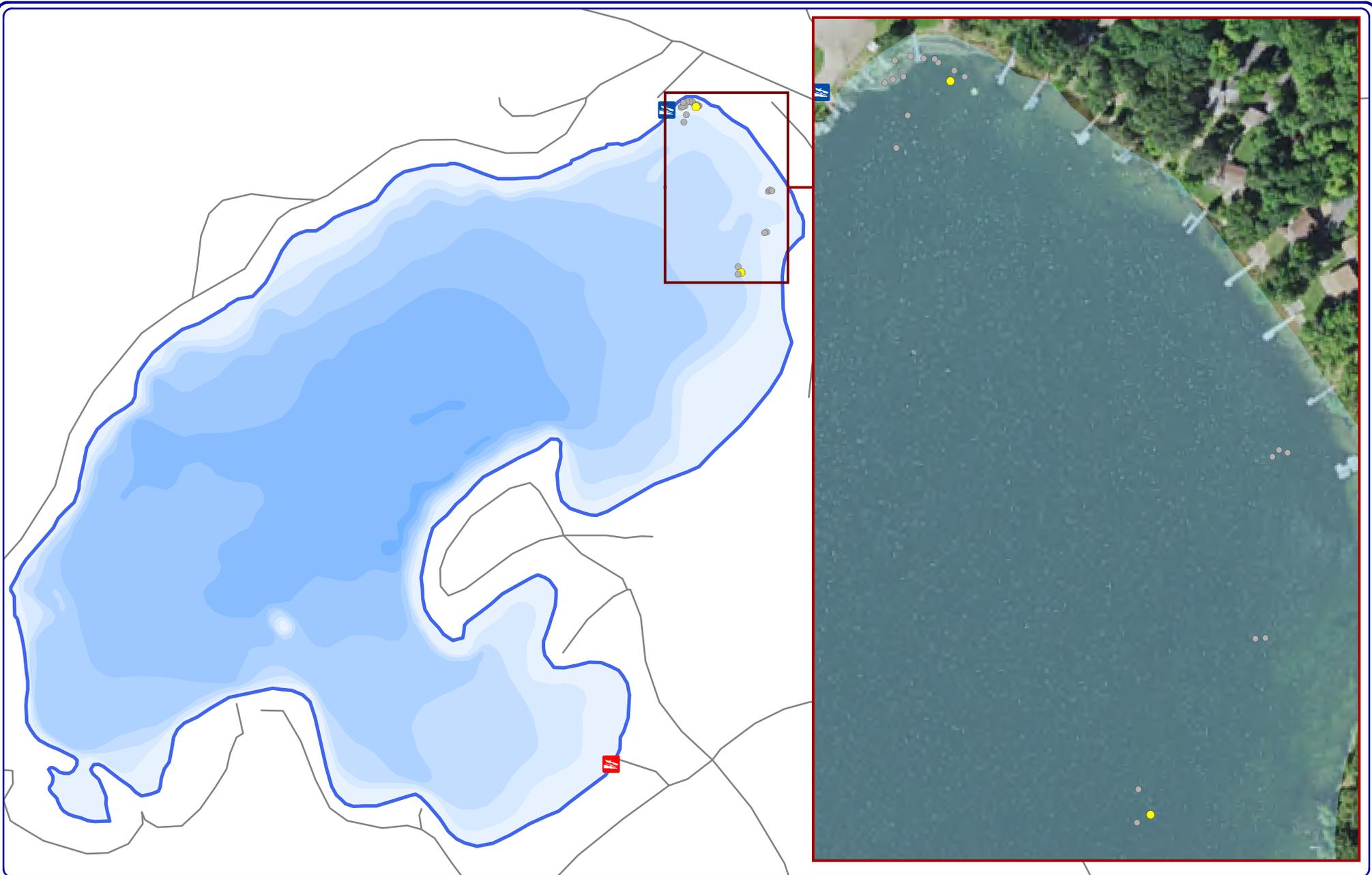
Onterra LLC
 Lake Management Planning
 815 Prosper Road
 De Pere, WI 54115
 920.338.8860
 www.onterra-eco.com

Sources:
 Roads and hydro: WDNR
 Aquatic Plants: Onterra, 2017
 Orthophotography: NAIP, 2015
 Map Date: June 20, 2017
 File Name: RobertsForest_EWM_June17.mxd



- Legend**
- Highly Scattered (*none found*)
 - Scattered (*none found*)
 - Dominant (*none found*)
 - Highly Dominant (*none found*)
 - Surface Matting (*none found*)
 - Single or Few Plants
 - Clump of Plants
 - Small Plant Colony

Map 1
 Roberts Lake
 Forest County, Wisconsin
2017 June ESAIS
Survey Results: EWM



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 Lake Management Planning
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 De Pere, WI 54115
 920.338.8860
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Sources:
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 Aquatic Plants: Onterra, 2017
 Orthophotography: NAIP, 2015
 Map Date: September 12, 2017
 File Name: RobertsForest_EWM_Sept17.mxd



- Legend**
- Highly Scattered (none found)
 - Scattered (none found)
 - Dominant (none found)
 - Highly Dominant (none found)
 - Surface Matting (none found)
 - Single or Few Plants
 - Clump of Plants
 - Small Plant Colony (none found)

Map 2
 Roberts Lake
 Forest County, Wisconsin
 September 2017
 EWM Survey Results