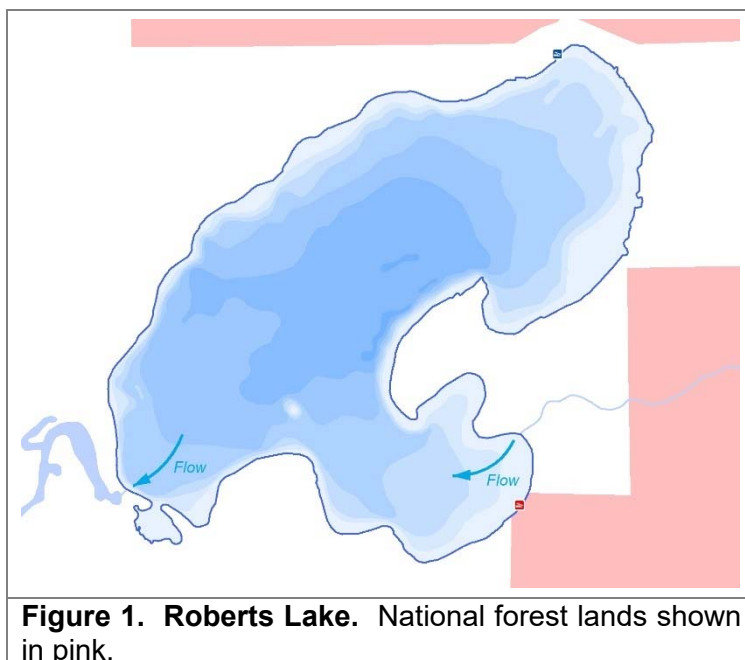


## INTRODUCTION

Roberts Lake, Forest County, is a 435-acre drainage lake with an average depth of 17 feet and a maximum depth of 32 feet (Figure 1). 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.



**Figure 1. Roberts Lake.** National forest lands shown in pink.

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 2015-2017 (Table 1). These efforts have contributed to a sustained low EWM population within Roberts Lake since detection.

**Table 1. Roberts Lake 2015-2017 professional hand-harvesting activities.**

	Dive Time (hr)	EWM Removed (cubic feet)
2015	12.75	37.00
2016	9.25	22.00
2017	13.00	23.25

The RLA elected to continue this management strategy by successfully applying for a Phase II AIS-EDR Grant which provides funding for EWM monitoring and management from 2018-2020. While eradication is not likely, keeping the population contained to low occurrences will reduce the potential of the EWM population rapidly increasing to levels that could cause ecosystem impacts and user conflicts (i.e. recreation, navigation, aesthetics). At the end of the project, the goal would be to maintain the low EWM population documented in 2017, including no colonized areas of EWM (i.e. mapped with polygon-based methods). The project budget includes \$4,000 of professional hand-harvesting each year, but may require a revised distribution of these funds depending on the results of the annual monitoring. This report discusses the monitoring and hand-harvesting control activities that were completed during the first year (2018) of this three-year project.

## MONITORING METHODOLOGIES

A set of EWM mapping surveys were used within this project to coordinate and qualitatively monitor the hand-harvesting efforts (Figure 2). The first monitoring event on Roberts Lake in 2018 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.

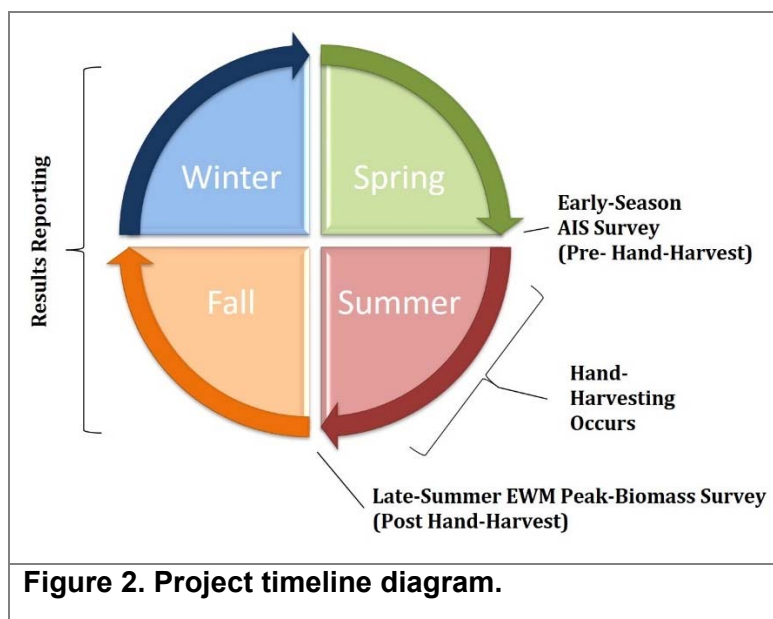


Figure 2. Project timeline diagram.

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

Onterra ecologists completed the Early-Season AIS Survey on June 14, 2018. 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.

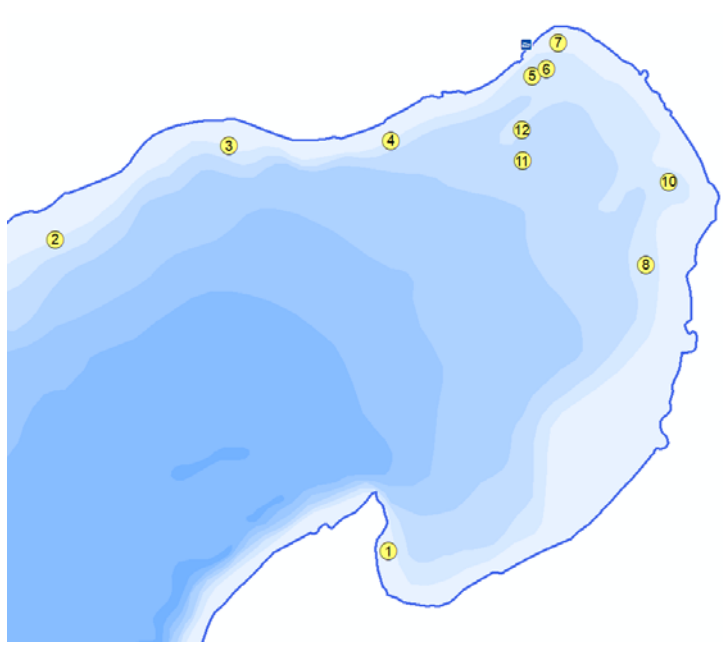
During the ESAIS survey, the field crews noted favorable conditions with partial sun and light winds. Only low-density occurrences of EWM were located during the June survey, and no large continuous colonies were found in the lake (Map 1). The majority of plants were localized within the northeastern part of the lake. Two isolated *clumps of plants* and a *single or few plants* occurrence were 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. Highest priority for removal by professional hand-harvesting were given to the occurrences described as either a *small plant colony* or *clumps of plants*.

## HAND-HARVESTING MANAGEMENT ACTIONS

The RLA contracted with Aquatic Plant Management, LLC (APM) to conduct professional hand-harvesting of EWM in 2018. Aquatic Plant Management conducted hand-harvesting activities on June 22 and July 20, 2018, spending a total of 48.33 combined diver hours (approx. 7 crew hours) actively hand-harvesting EWM within Roberts Lake and removing approximately 25.5 cubic feet of EWM (Table 2). 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 2018 as reported by APM are included with this report as Appendix A.

**Table 2. Roberts Lake 2018 professional hand-harvesting activities.**

Location	Crew Dive Time (hr)	EWM Removed (cubic feet)
1	0.33	0.25
2	0.67	1.50
3	0.33	1.00
4	0.25	1.00
5	0.42	2.75
6	0.58	2.00
7	0.75	2.00
8	1.25	4.00
9	0.83	1.75
10	0.33	2.00
11	0.50	3.50
12	0.33	1.50
13	0.42	2.25
<b>Total</b>	<b>6.99</b>	<b>25.50</b>



## RLA SURVEILLANCE MONITORING

Members of the RLA have been trained in AIS identification and conducted AIS surveillance monitoring. During 2018, RLA volunteers reported spending 50 hours of surveillance from boats or by wading and snorkeling searching for EWM. Additional volunteer time was spent on communication and educational activities in 2018. 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 17, 2018 to qualitatively assess the hand harvesting efforts as well as to understand the peak growth (peak-biomass) of the EWM population throughout the lake. These populations were mapped by using the same methodology described above during the ESAIS survey. During the survey, the field crew noted favorable conditions with mostly sunny skies and light winds.

The results of the late-summer survey are displayed on Map 2. The survey found an increase in the EWM population compared to past surveys. The area near the Wild Rose Pub & Grill access was found to have the largest increase in EWM with the formation of a colonized population totaling approximately 1.8 acres that consists of *highly scattered* and *scattered* density EWM plants. A number of *single or few plants* and *clumps of plants* were also located in the northeast portion of the lake. Additionally, a few isolated *single plants* were located along the north shore and a *clump* and *single plant* were marked near shore on the west side of the lake.

## CONCLUSIONS AND DISCUSSION

Surveys conducted in 2018 showed the EWM population had expanded somewhat compared to previous years. The main increase in EWM population was in the northeast end of the lake in an area that has historically harbored low-density EWM populations (Map 3). The late-summer of 2018 marks the first time that EWM populations on Roberts Lake were mapped using area-based methods (i.e. polygons). EWM was also found growing deeper in 2018 than in previous years, with EWM being located out to 13 feet deep.

The 2018 hand-harvesting efforts removed a similar amount of EWM as past years, but that quantity was unable to surpass the population expansion that occurred in 2018. Onterra's experience was that many northern Wisconsin lakes had increases in EWM populations in 2018, potentially in response to favorable hot and sunny days for growth.

Field distinction between EWM and native watermilfoils in Roberts Lake has always been difficult. However, in 2018, the issues seemed to have intensified. During the autumn of 2018, a few plant samples were collected from Roberts Lake. Onterra is currently processing the samples (drying) to later be sent to Montana State University for positive identification. These tests will help confirm field identification as well as determine if the invasive milfoil in Roberts Lake may actually be a hybrid cross between EWM and northern watermilfoil.

### **2019 EWM Management Strategy**

While the EWM population has increased in size compared with previous years, the areas are too small for herbicide management to be effective option even if the RLA wanted to pursue that option. The RLA has expressed desire to avoid herbicide management based upon the potential known and unknown impacts their use could have to the Roberts Lake ecosystem.

At this time, the most appropriate method for EWM management continues to be through a coordinated hand-harvesting program. If the RLA wishes to target all EWM occurrences with hand-harvesting in 2019, a much greater amount of effort will be required in 2019. Within Phase II AIS-EDR Grant Budget, a total of \$12,585 was included for professional hand-harvesting costs (\$4,195 x 3 years). The RLA could discuss with the local WDNR lakes biologist if it would be prudent to use a greater proportion of the remaining grant funds in 2019 understanding that this would diminish available funds for 2020.

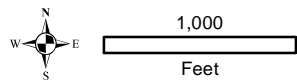
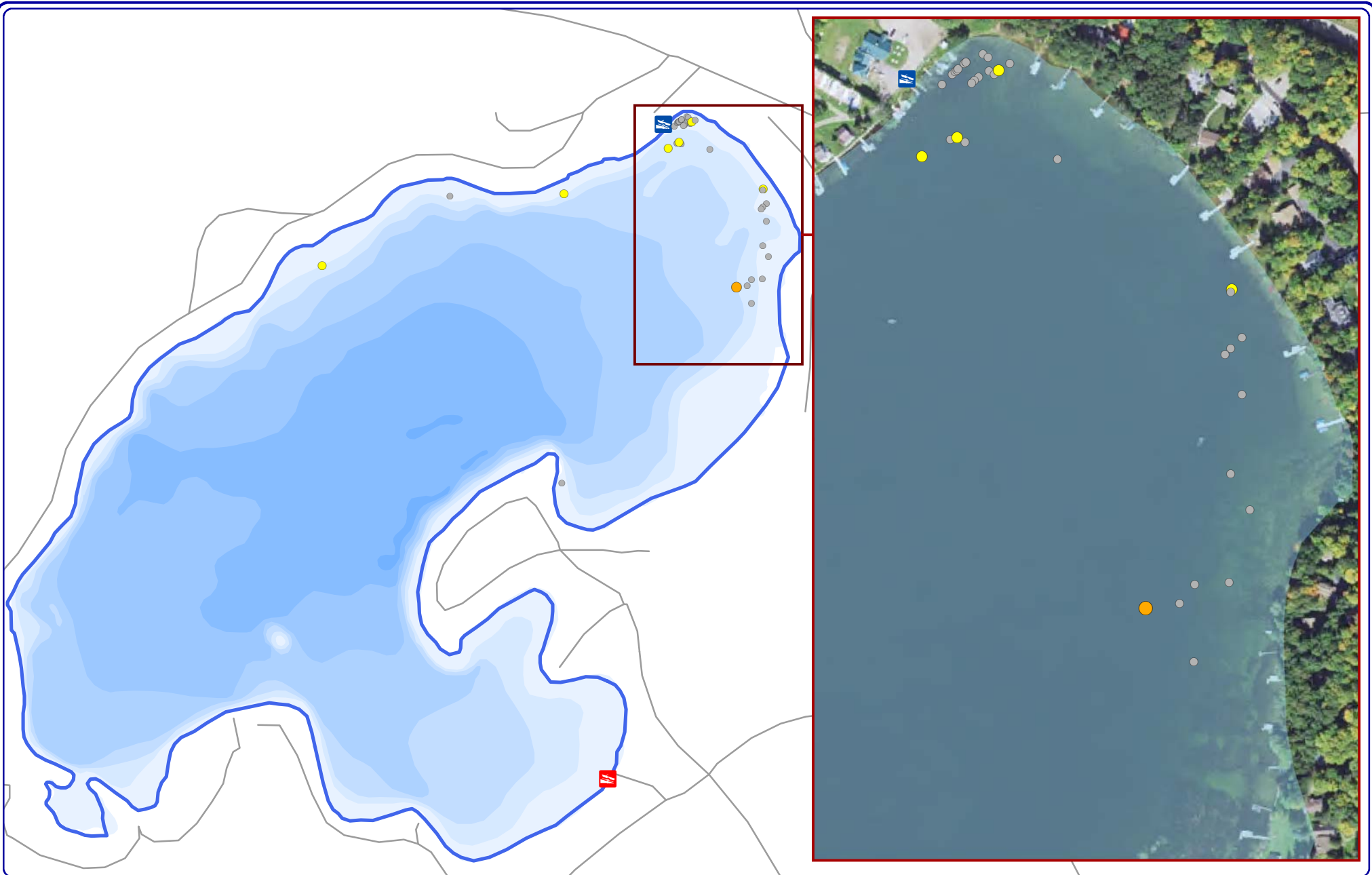
Particularly for the colonized area in front of the Wild Rose landing, the RLA should consider contracting with a professional harvesting firm that offers Diver Assisted Suction Harvesting (DASH). The DASH methodology allows divers to extract the target plants and feed them into a suction hose for

delivery on board the harvesting vessel. DASH is thought to be more efficient in removing target plants than divers alone and is believed to limit fragmentation during the harvesting process. While the DASH system can be beneficial in some situations, it is often thought to be too cumbersome for use when EWM is loosely scattered over large areas. In this situation, the DASH boat needs to be continually repositioned and it may simply be easier for a non-tethered diver to remove these occurrences. DASH is considered a form of mechanical harvesting and requires a permit from the WNDR.

Map 2 outlines two preliminary sites that may be candidates for implementing DASH in 2019. Site B-19 targets an isolated *clump of plants* and a *single plant* that is outside of the main EWM population in the lake. This occurrence marks the only *clump of plants* located outside of the northeast bay and should be first priority for removal.

A-19 targets the largest known EWM colony in the lake. If the RLA intends to target this EWM population, it would likely require multiple days of DASH. As discussed with APM, LLC's 2018 report (Appendix A), high density native aquatic plant growth in this area hindered removal efforts in 2018. Therefore, the RLA should consider contracting divers for as early as logistically possible in 2019 before native vegetation reaches its full biomass. 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.

All other known EWM occurrences on Roberts Lake should be considered for hand-harvesting using traditional methods. These activities do not require a permit and can be accomplished through paid or volunteer methods. It is important that all efforts are properly recorded and tracked to allow proper assessment of the overall effort.



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Sources:  
 Roads and hydro: WDNR  
 Aquatic Plants: Onterra, 2018  
 Orthophotography: NAIP, 2017  
 Map Date: June 15, 2018 TWH  
 File Name: RobertsForest\_EWM\_June18.mxd

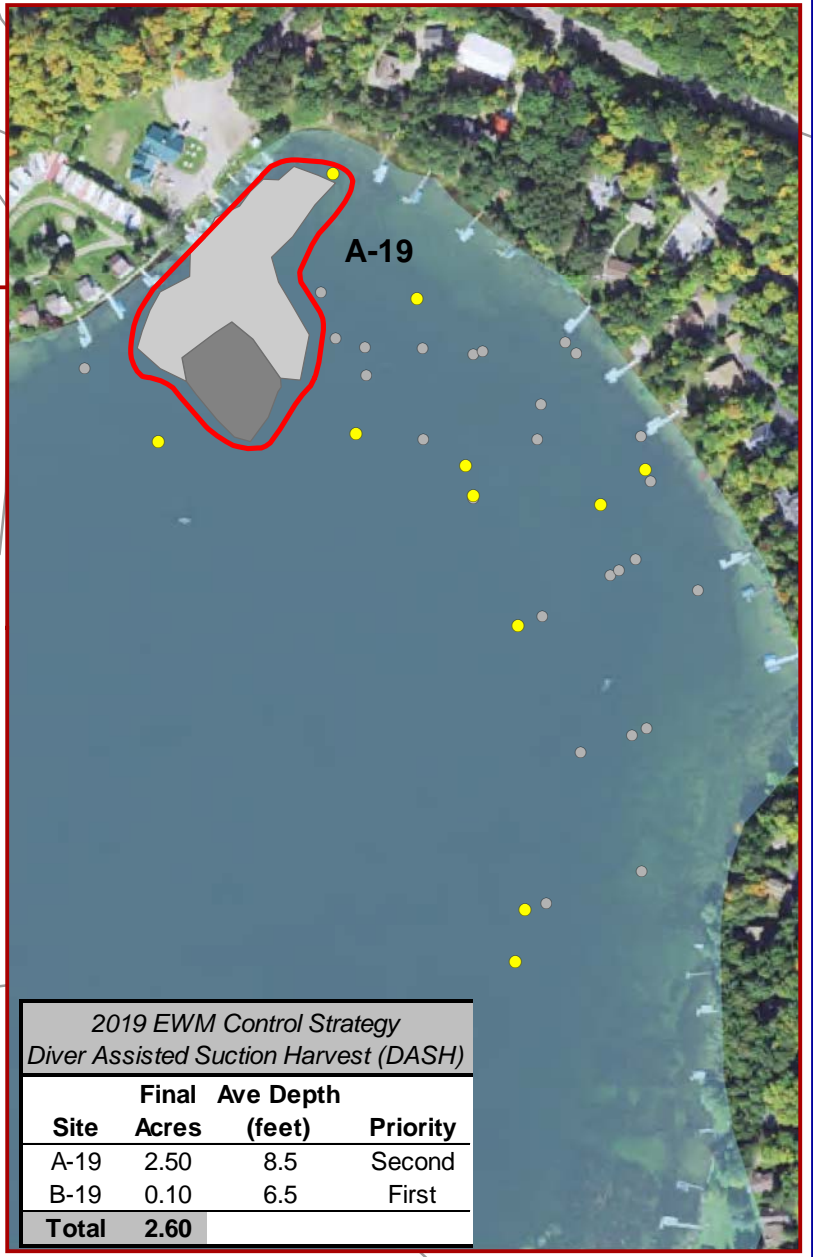
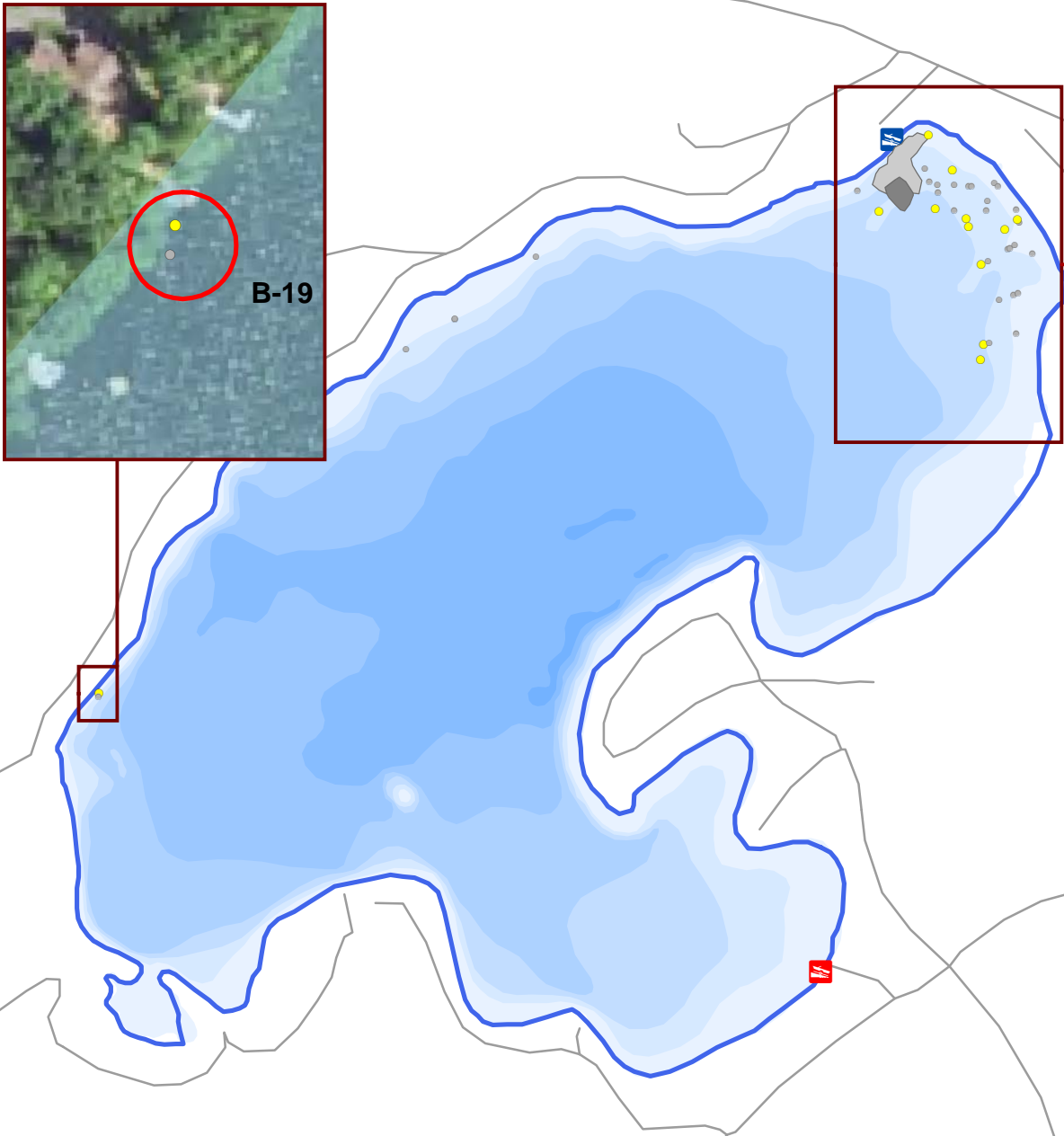


Project Location in Wisconsin

**Legend**

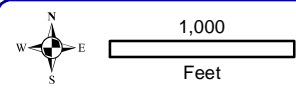
- Single or Few Plants
- Clump of Plants
- Small Plant Colony

Map 1  
 Roberts Lake  
 Forest County, Wisconsin  
**June 2018 ESAIS**  
**Survey Results: EWM**



*2019 EWM Control Strategy  
Diver Assisted Suction Harvest (DASH)*

Site	Final Acres	Ave Depth (feet)	Priority
A-19	2.50	8.5	Second
B-19	0.10	6.5	First
<b>Total</b>	<b>2.60</b>		



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Sources:  
Roads and hydro: WDNR  
Aquatic Plants: Onterra, 2018  
Orthophotography: NAIP, 2017  
Map Date: December 5, 2018 AMS  
File Name: RobertsForest\_Treatment\_Prelim19.mxd

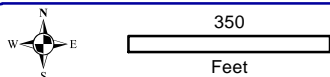
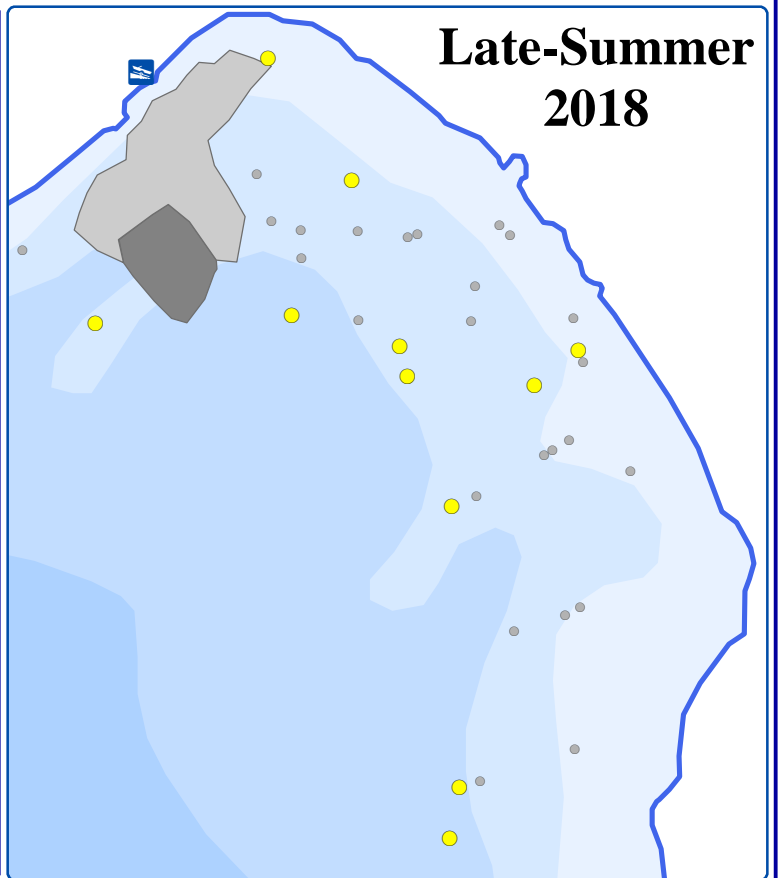
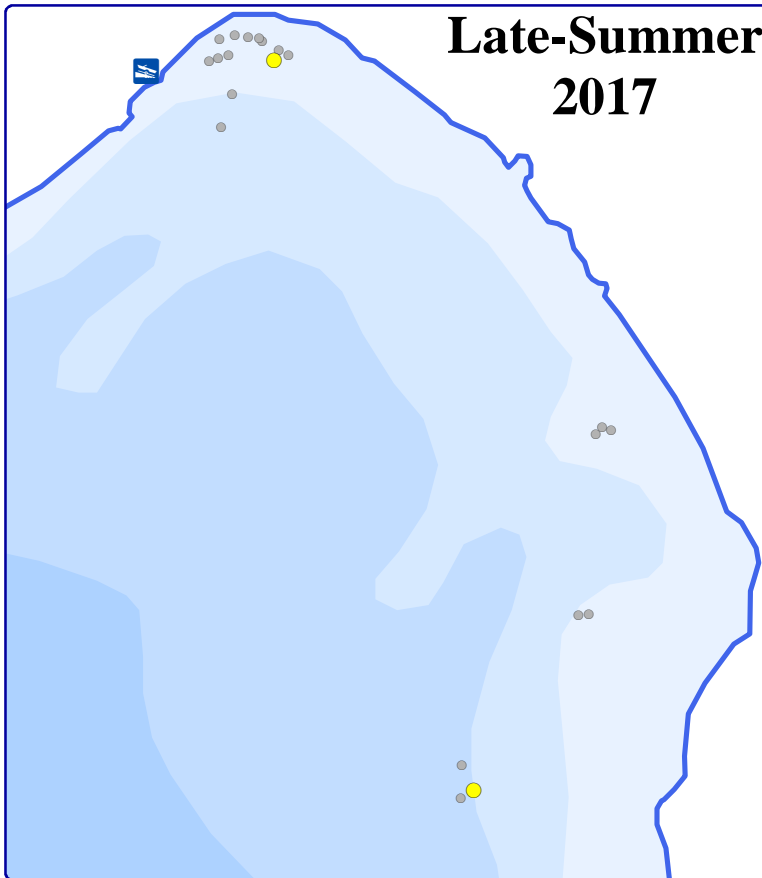
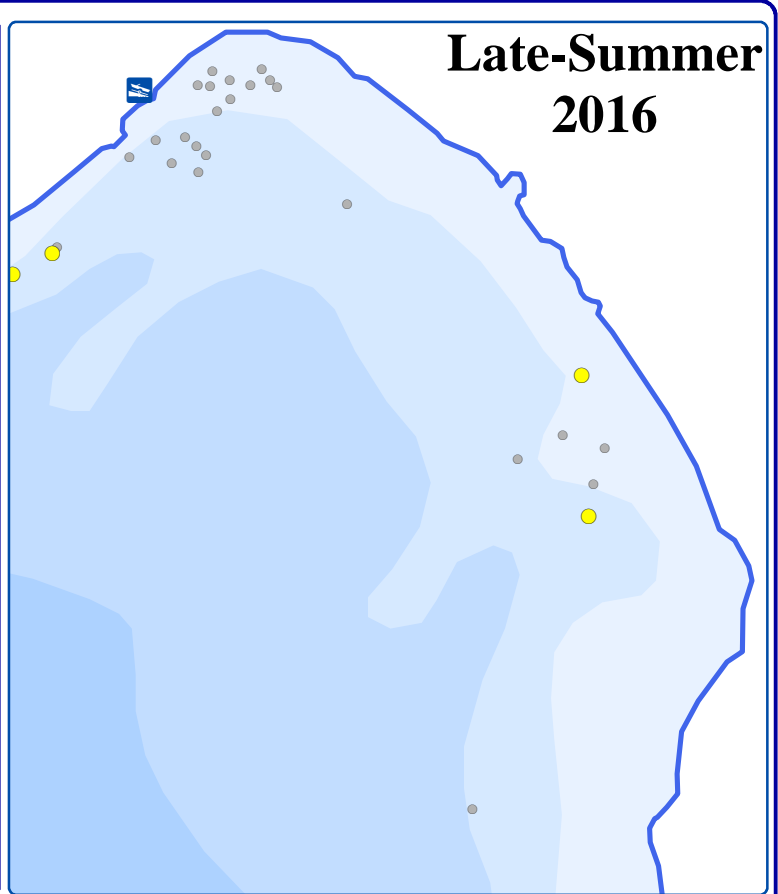
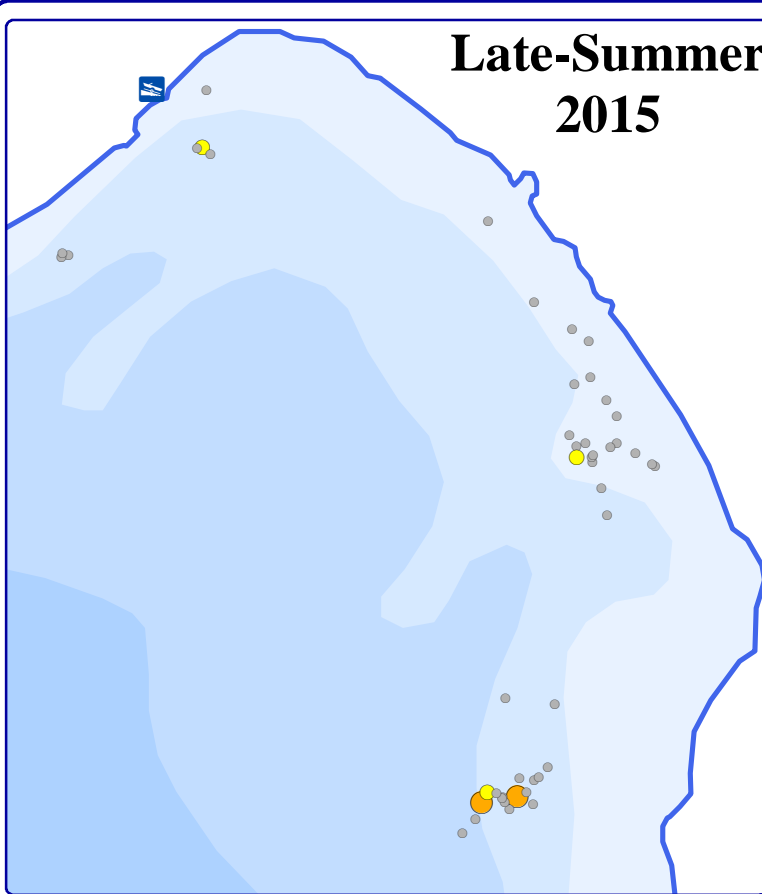


Project Location in Wisconsin

**Legend**

- Highly Scattered
- Scattered
- Dominant (none found)
- Highly Dominant (none found)
- Surface Matting (none found)
- Single or Few Plants
- Clump of Plants
- Small Plant Colony
- 2019 Preliminary DASH Site

Map 2  
Roberts Lake  
Forest County, Wisconsin  
**September 2018 EWM  
Survey Results & Prelim  
2019 Hand Harvest Strategy**



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Sources:  
 Roads and Hydro: WDNR  
 Bathymetry: WDNR, Digitized by Onterra  
 Plant Survey: Onterra, 2015-2018  
 Map Date: December 19, 2018 - EJH



- #### Legend
- |                  |                      |
|------------------|----------------------|
| Highly Scattered | Single or Few Plants |
| Scattered        | Clumps of Plants     |
| Dominant         | Small Plant Colony   |
| Highly Dominant  |                      |
| Surface Matting  |                      |

Map 3  
**Roberts Lake**  
 Forest County, Wisconsin  
**2015 - 2018 EWMPB**  
**Survey Results**





# **Roberts Lake EWM Removal Report 2018**

PO Box 1134 Minocqua, WI 54548



# Roberts Lake EWM Removal Summary 2018

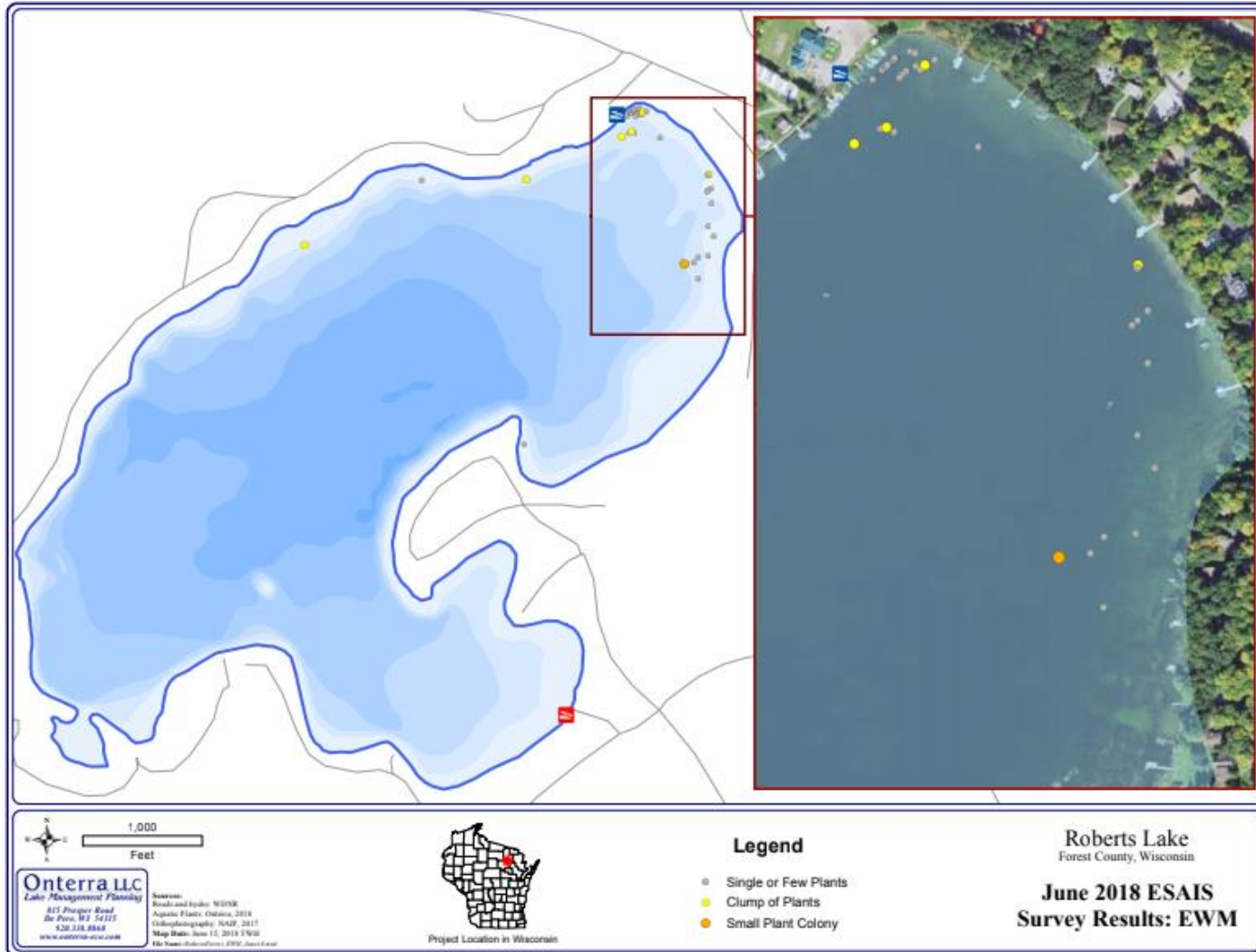
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**Summary:** On 6/22/18 and 7/20/18, Aquatic Plant Management LLC (APM) Conducted hand-harvesting services of Eurasian Watermilfoil (EWM) on Roberts Lake in Forest County, WI. Our divers spent a combined total of 48.33 hours on the water and were able to successfully remove 25.5 cubic feet of EWM from the lake. On 6/22/18, utilizing coordinates provided by Onterra LLC, our dive team worked their way clockwise around the northeastern portion of the lake, ending the day at the small plant colony at the southern edge of the EWM control area. Upon our return on 7/20/18, our dive team started at the small plant colony where we left off, before working their way counter-clockwise around the lake to check for any new growth since our initial visit.

**Conditions:** Conditions on 6/22/18 were ideal for hand-harvesting, with partly cloudy skies and mild winds persisting throughout the day. An air temperature of 78 degrees was recorded, while the water temperature was recorded at 73 degrees. Conditions on 7/20/18 were acceptable for hand-harvesting, with periods of rain and mild winds. An air temperature of 68 degrees was recorded, while the water temperature was recorded at 74 degrees.

**Recommendations:** While we were able to remove all visible EWM from the target areas, the shoreline immediately in front of the Wild Rose Pub & Grill had a high density of native plant growth which may be obscuring small EWM plants. Due to this fact, continued monitoring and management efforts are vital to preventing proliferation of EWM throughout Roberts Lake.

# Map Created by Onterra LLC





# Detailed Diving Activities

Date	Dive Location	Latitude	Longitude	Time Underwater (Hrs)	Estimated EWM Removed (Cubic Feet)	Substrate Type	Plant Condition	Native Growth
6/22/2018	Single	45.45642	-88.78413	0.33	0.25	Sandy	Healthy	Abundant
6/22/2018	Clumps	45.46124	-88.79124	0.67	1.5	Sandy	Healthy	Abundant
6/22/2018	Single	45.46263	-88.78745	0.33	1	Sandy	Intermediate	Sparse
6/22/2018	Clumps	45.46267	-88.78394	0.25	1	Organic	Brittle	Abundant
6/22/2018	Clumps	48.46362	-88.78086	0.42	2.75	Organic	Brittle	Abundant
6/22/2018	Clumps	45.46372	-88.78056	0.58	2	Organic	Brittle	Abundant
6/22/2018	Clumps	45.46412	-88.78030	0.75	2	Organic	Brittle	Abundant
7/20/2018	N/A	45.46072	88.77846	1.25	4	Organic	Healthy	Abundant
7/20/2018	N/A	33.91111	88.77811	0.83	1.75	Gravel	Healthy	Abundant
7/20/2018	N/A	44.46198	88.77795	0.33	2	Organic	Healthy	Abundant
7/20/2018	N/A	45.46233	88.77811	0.50	3.5	Organic	Healthy	Abundant
7/20/2018	N/A	45.46280	88.77811	0.33	1.5	Organic	Healthy	Abundant
7/20/2018	N/A	45.49339	88.77925	0.42	2.25	Organic	Healthy	Abundant