2017 EWM Monitoring and Harvesting Assessment Report

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EOR
water
ecology
community

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1. INTRODUCTION

1.1. Background

Muskellunge Lake (Water ID: 128570), is a 270 acre lake located in Vilas County. Muskellunge Lake has a maximum depth of 19 feet and is classified as a shallow, lowland drainage lake. Visitors have access to the lake from a public boat landing off of Landing Road via Balsalm Lane and Highway G northeast of Eagle River, Wisconsin. The lake's water clarity is low. Muskellunge Lake was listed on the 303(d) impaired waters list in 2014 due to excess algae growth. A Total Maximum Daily Load (TMDL) study for the lake has not yet been completed, the source of the impairment is currently listed as an unknown pollutant. A review of water quality data collected over the past 10 years shows an increasing trend in in-lake phosphorus concentrations. Figure 1 compares in-lake TP concentrations on Muskellunge Lake from 2006 to 2017 in comparison to the Lowland drainage 40 ug/L Recreational threshold. The average TP concentrations in the last 2 years (2016-2017) is 63.5 ug/L (8 total samples), indicating a potential recreational TP impairment. Samples collected in April indicate a potential internal nutrient source coinciding with spring turnover. The United States Geological Survey (USGS) did a Water quality study on Muskellunge Lake in 2003 looking particularly at the phosphorus budget including an analysis of sediment cores. Results from this analysis suggested that nutrient and algal concentrations have changed only slightly over the past 100 years; however, the macrophyte community had increased over this time period.
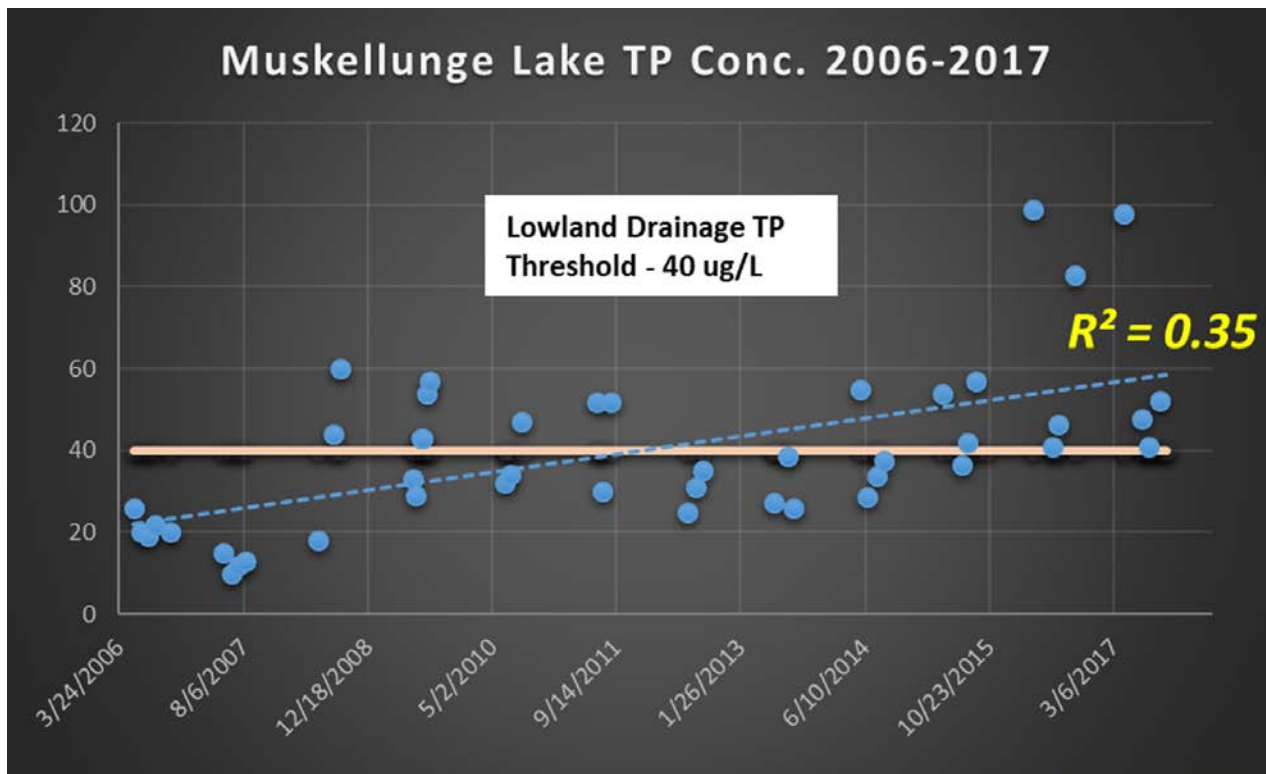

Figure 1. Muskellunge Lake Total Phosphorus (TP) concentrations 2006-2017.

1.2.   Problem Statement

Eurasian Watermilfoil (EWM) was found for the first time on Muskellunge Lake in 2016. Genetic testing through GenPass has confirmed the identified specimen as a pure strain Myriophyllum spicatum. The original extent of the EWM infestation was thought to be confined to a few key areas including near the boat launch and at a location in the middle of the lake near the buoy that marks the shallow area near the center of the lake. Professional and volunteer AIS monitoring conducted by trained members of the Muskellunge Lake Association led to the identification of additional areas.

1.3.   2017 Goals and Objectives

The initial goal/objective of 2017 work was to train Muskellunge Lake Association (MLA) volunteers on how to identify EWM and how to conduct volunteer AIS monitoring efforts so that any new infestations can be readily identified moving forward. A secondary, related objective was to train MLA volunteers on identification of other native aquatic plants with an emphasis on distinguishing between native northern watermilfoil and the invasive EWM.

Additional goals for 2017 work included the development of an Annual Report which summarized monitoring strategies, treatments completed in 2017, and management actions for 20108. Development of the Annual Report included time spent by Emmons and Olivier Resources (EOR) staff reviewing findings from the DNR survey findings and preparing data driven maps in ArcGIS. Additional maps were created depicting results from volunteer monitoring efforts conducted by the MLA as well as maps depicting results from professional monitoring conducted by EOR.

1.4.   Purpose

The purpose of this report is to document recommended monitoring strategies and prioritized management actions for 2018 based on monitoring efforts and management actions conducted in 2017. This document will also serve as a reference point for all stakeholders (MLA, the DNR, Vilas County, EOR) for future communication regarding the 2018 management approach.

2. 2017 AIS MONITORING

2.1. 2017 DNR Point-Intercept Survey

A July 10th, 2017 point-intercept study conducted by the Wisconsin DNR identified EWM at 4 of 226 (0.017%) sampling points. In places where it was found, the average rake fullness was a 1, indicating the plant was sparse in areas where it was found (Figure 1). While EWM was sparsely distributed in 2017, the verification of EWM near the boat launch and near the center buoy provided reason for concern as these areas represent high-use areas that could potentially serve as vectors for dispersal to other areas of the lake. Overall floristic quality appeared to have decreased slightly from the 2009 Point-Intercept survey in which 26 aquatic plant species were found versus 21 in 2017. Northern watermilfoil was only visually observed (not sampled on the rake) at five locations in 2017 despite being a commonly found plant in 2009 (Figure 2). The scarcity of northern watermilfoil in 2017 provided evidence to suggest that the native milfoil weevil population would likely be low in Muskellunge Lake in 2017. The 2017 point-intercept survey was used as a baseline to guide further volunteer and professional AIS monitoring efforts.

2.2. 2017 Volunteer AIS Monitoring

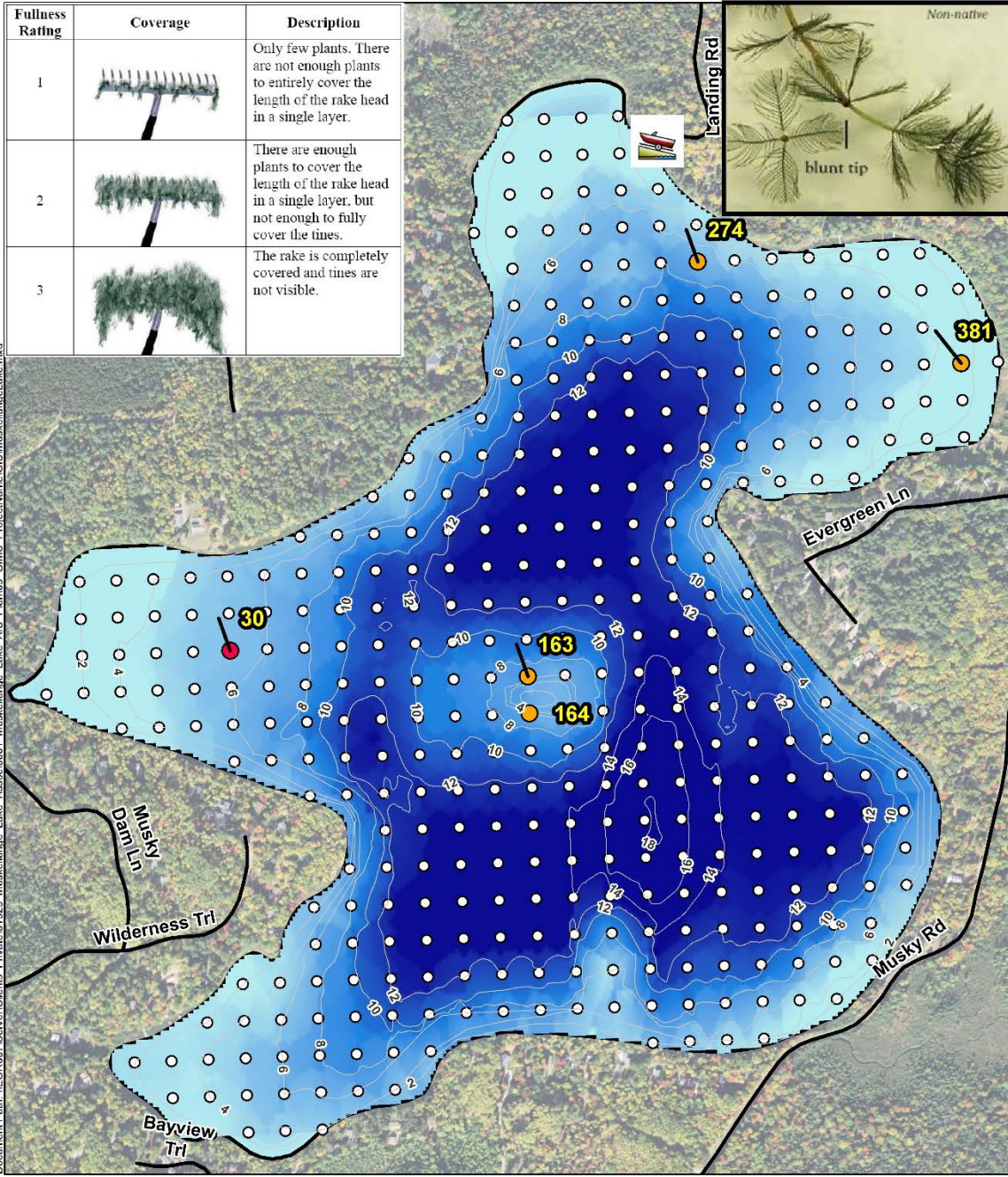#### 2.2.1. June 2014th, 2017 AIS Workshop

Ten members of the Muskellunge Lake Association (MLA) attended an AIS training and aquatic plant identification workshop hosted by Vilas County Lake Conservation Specialist Cathy Higley on June, 14th, 2017. The event was hosted on Muskellunge Lake by MLA president Mike Newmeister. The focus of the two hour workshop was on EWM identification as well as identification of other native aquatic plants, including northern watermilfoil. Following the workshop, the MLA volunteers divided Muskellunge Lake into 8 sections for the 10 participants to monitor. Volunteers sent voucher specimens of EWM to Cathy Higley for verification and collected GPS coordinates to document the location of any new EWM beds. The GPS coordinates were then sent to EOR who added the new locations to an existing ArcMap document which displayed the locations of all verified EWM infestations.

2.2.2. July 14th, 2017 Aquatic Plant and Weevil Identification Workshop

Nine members of the MLA attended an Aquatic Plant and Weevil identification workshop hosted by Cathy Higley on July 14th, 2017. The five hour workshop focused on collecting and analyzing EWM and northern watermilfoil specimens from Muskellunge Lake for evidence of weevil damage. Established weevil monitoring protocols were not followed because only 2 to 3 northern watermilfoil stems could be found in areas that had previously been identified as having supported northern watermilfoil. A large number of EWM stems were collected near the center buoy. While no adults, larvae, or pupae were found, several of the EWM stems contained blast holes which indicated that weevils may be present in the lake. Amy Thorstenson of Golden Sands RC&D subsequently verified that the blast holes observed were likely a result of damage caused by weevils. In August, Cathy

Figure 2. 2017 Muskellunge Lake Point-Intercept Survey Results: Eurasian Watermilfoil.
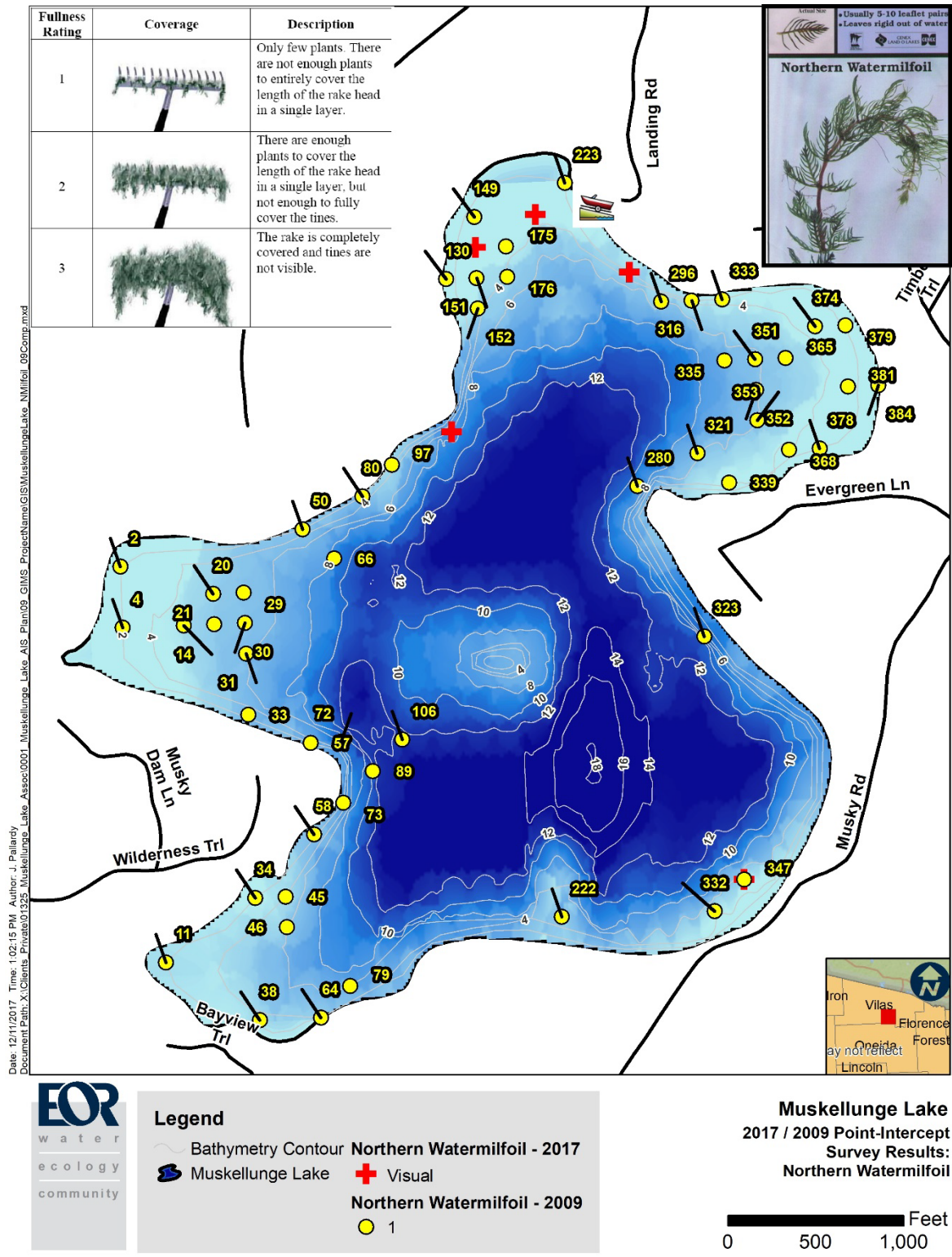
Figure 3. Northern watermilfoil was noticeably scarce in 2017 as compared with the 2009 point-intercept survey.

Higley looked at the EWM disposal pile from plants harvested during the professional hand harvesting conducted by Aquatic Plant Management; however, no evidence of blast holes or weevil

damage was identified at this time. Weevil monitoring efforts will be placed on hold in 2018 until if/when there are enough NWM and EWM locations to get 3 spatially separate locations to monitor.

Members of the MLA were further trained on aquatic plant identification during the workshop with a focus on differentiating northern watermilfoil vs. EWM. MLA member, Jeff Rappold successfully identified new stands of northern watermilfoil late in the 2017 growing season, these new areas represent potentially valuable locations for maintaining a viable weevil population if one exists.

2.2.3.   2017 MLA Volunteer AIS Monitoring

In 2017, members of the MLA members spent 85.25 man hours conducting volunteer AIS monitoring efforts. These 85.25 hours were spent on the lake, physically identifying and recording new EWM infestations and tracking the distribution of known EWM beds. Furthermore, members of the MLA conducted an additional 145.50 attending AIS and weevil training workshops, communicating EWM concerns to landowners through the MLA website as well as through social media, and attending lake association meetings and professional presentations regarding 2017 professional AIS monitoring and options for treatment. In 2017, the MLA demonstrated their proficiency at EWM identification by successfully identifying the presence of previously unmarked EWM beds. A map showing the location of all known EWM beds including new EWM locations found in October after the professional hand harvesting occurred (August, 2017) is provided in Figure 3.
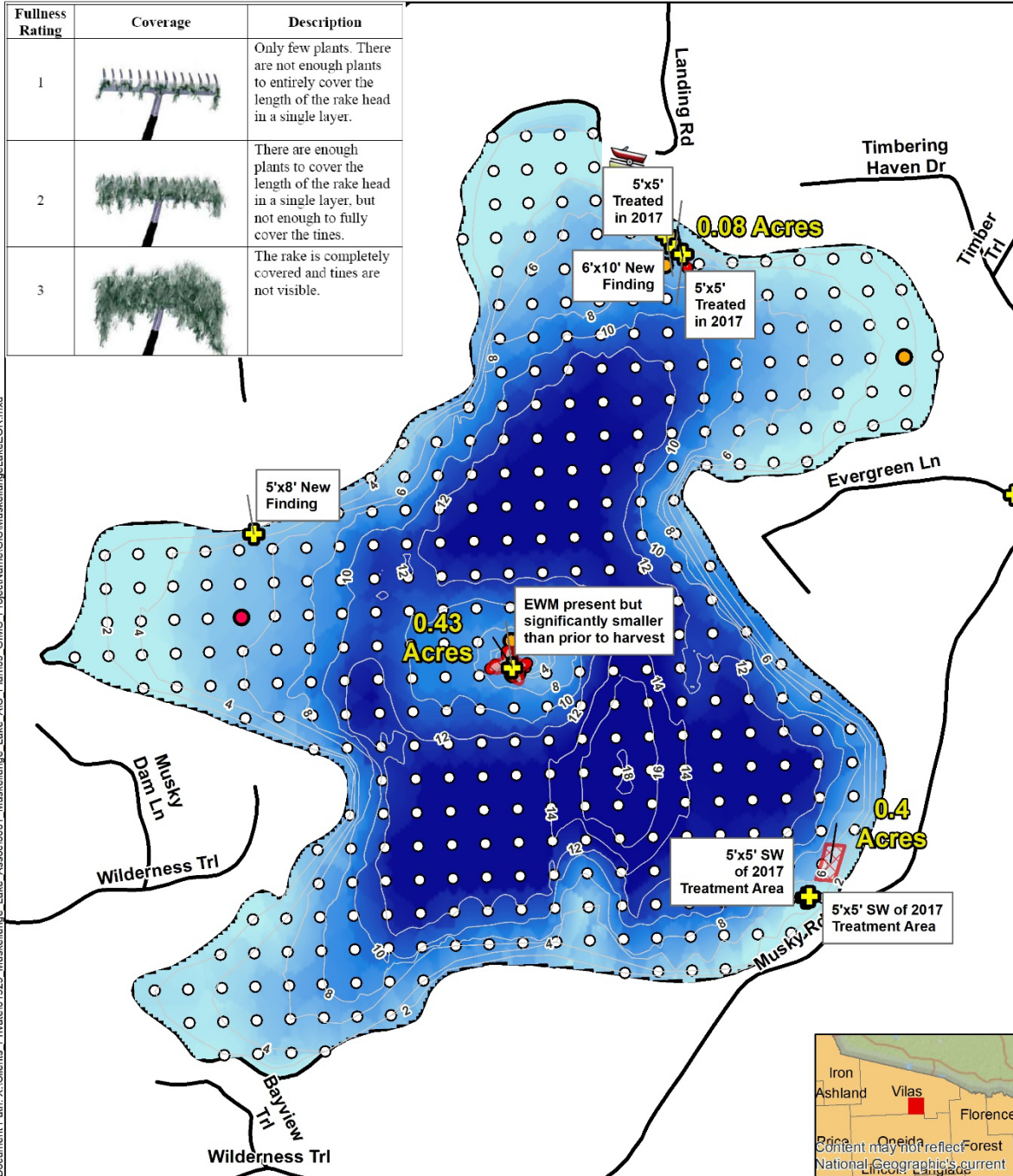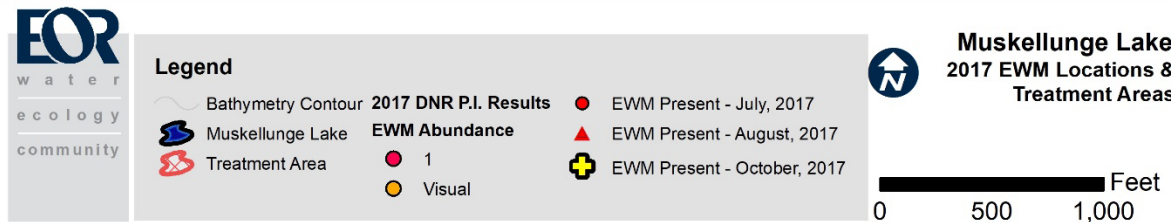
Figure 4. Muskellunge Lake 2017 Confirmed EWM Locations and Hand-Harvesting Treatment Areas.

2.3.   2017 Professional AIS Monitoring

2.3.1.   Delineating 2017 Treatment Polygons

EOR Water and Natural Resource Specialist Joe Pallardy worked with MLA member Jeff Rappold to delineate treatment areas around verified EWM locations on July 27th and 28th, 2017 using a sub-meter differential Global Positioning System (GPS). During the site visit, EOR staff conducted a focused meander survey around all locations where EWM had been identified during the 2017 DNR point-intercept survey and at all additional locations identified by members of the MLA. Polygons were mapped around all well-established colonies while point-based techniques were used to record locations that were considered pioneer colonies which contained only a few plants or a single plant.

All points and polygons collected in the field were transferred to ArcMap v. 10.3 Geographic Information System (GIS). Once in GIS, shapefiles of treatment polygons and points were created and subsequently converted to KML files that could be viewed using Google Earth. Two primary treatment areas were identified, a 0.43 acre area near the center buoy and a 0.08 acre area near the public boat access. These areas were identified as priority treatment areas because they represented high-use areas that could potentially serve as vectors for dispersal to other areas of the lake. The colony of EWM near the center buoy was canopied to the surface in several areas and was also very dense, thus representing the highest priority site for treatment. The EWM growth near the boat launch was scattered, and mixed in with other native submergent and emergent vegetation. A third, 0.40 acre treatment area was delineated along the southeastern corner of the lake using ArcMap v. 10.3 based on field data collected by Jeff Rappold, John Kurhajec, and Tom Cerull. The EWM growth in this area was again scattered and mixed in with other native vegetation.

2.3.2.   Bathymetry and Sediment Composition Maps

EOR Water and Natural Resource Specialist Joe Pallardy utilized the Kriging tool within ArcMap v. 10.3 to create updated bathymetry and sediment composition maps based on data collected during the DNR's 2017 point-intercept survey. The Kriging tool uses point data to create (interpolate) a connected surface of raster cells that estimate likely values for the space in between points. For Muskellunge Lake, the Kriging tool used the recorded depth from the 6 closest point-intercept points to estimate the likely depth in between the points, thus creating a depth grid for the entire lake basin from which bathymetry contours could be derived. A lake sediment composition grid was developed in the same manner (Figure 4). These maps were used to identify areas where future monitoring efforts should focus on. The deepest plant growth observed during the 2017 DNR survey was 9 feet, all EWM growth found in 2017 was in less than 6 feet of water. The dominant substrate composition observed in the areas where EWM was found was a sand/muck mix. EWM grows heaviest in sediments that have a lower organic matter (3-17%). Therefore, the areas of lake that are predominantly muck (higher organic matter) will likely not support EWM growth, especially those areas that are deeper than 6 feet.
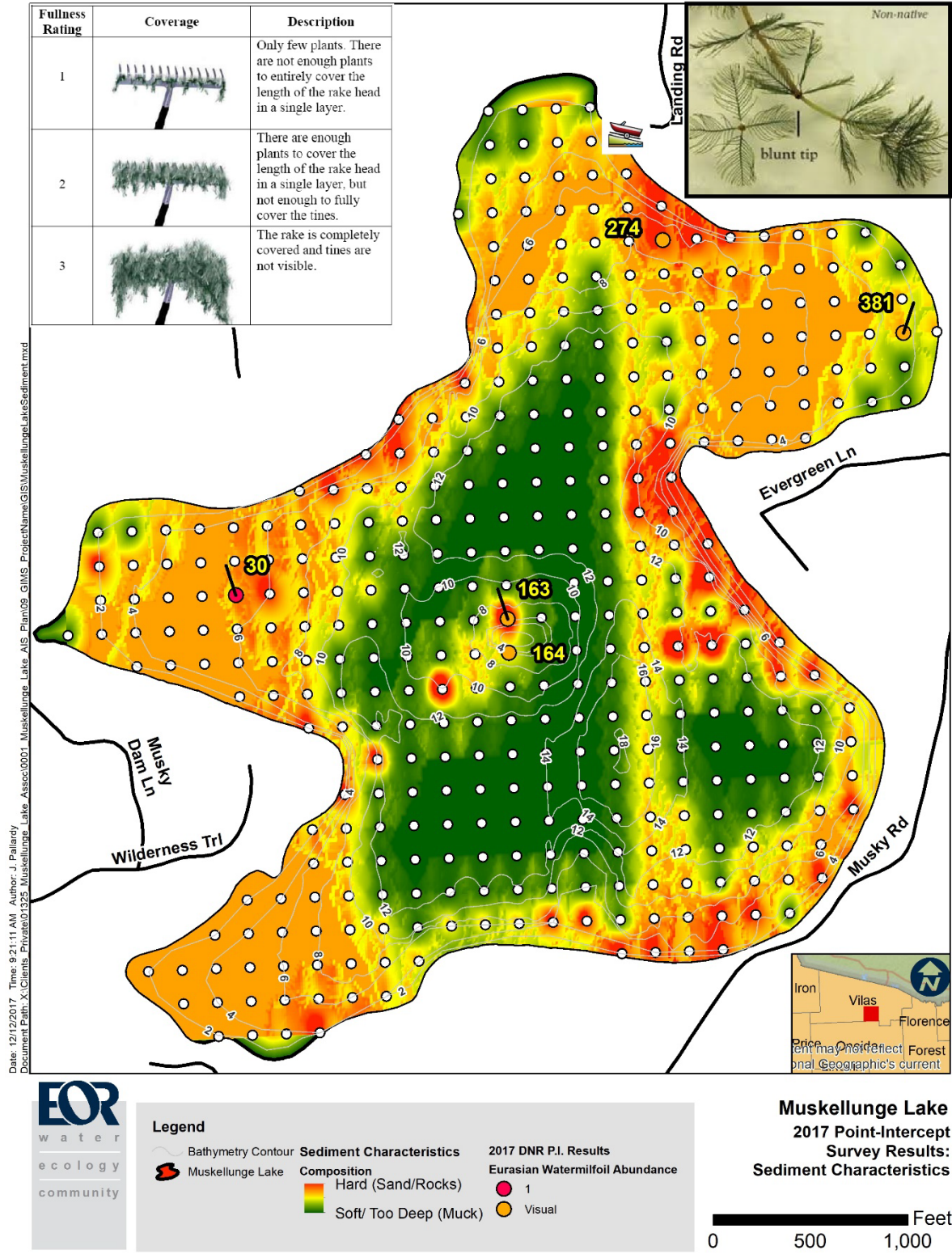
Figure 5. Muskellunge Lake sediment composition

3. 2017 PROFESSIONAL HAND-HARVESTING RESULTS

3.1.   2017 Recommendation

Results from professional and volunteer AIS monitoring efforts were used to prioritize three treatment areas with a total area of 0.91 acres. The average depth of water within the delineated treatment areas was less than 5.0 feet. Professional hand-removal was identified as the optimal treatment method because of the small size of the infestation, the shallow depth of water at the infestation, and the belief that professional hand harvesting could aggressively target the EWM beds with minimal impact on the surrounding native aquatic plant community. Aquatic Plant Management (APM), LLC of Minocqua, Wisconsin was hired to conduct the professional hand-harvesting on August 17th and 18th.

3.2.   2017 Results

Divers from APM spent a combined total of 47.65 hours on the water during which they successfully removed 31.1 cubic feet of EWM from the lake. Members of the MLA directed divers to the treatment areas and collected pictures to document progress. The majority of the time spent on 8/17/2017 was focused on targeting the areas near the rock bar at the center buoy where EWM was matted to the surface (Figure 5). Divers then moved off the rock bar, targeting single plants adjacent to the main bed within the 0.43 acre treatment area (Figure 6). The remainder of time spent on 8/17 was spent removing EWM within the 0.08 acre treatment area near the public access. The EWM was growing in approximately 3 feet of water in this area, however, most of the EWM was less than 2 feet tall. Dive conditions on 8/17 were ideal for hand-harvesting; however, secchi disk readings of 3.0 feet indicated water clarity was poor which may have obscured some smaller plants.

Professional hand removal efforts on 8/18 focused on the 0.40 acre treatment area on the south side of Muskellunge Lake. Plants within the treatment area were growing to the surface in 3.5 to 4.5 feet of water. Hand-removal efforts concluded with a revisit to the center buoy which focused on further removing individual plants from the deeper areas around the perimeter of the treatment area. Weather conditions on 8/18 were not as ideal with high winds and rain making diving more difficult. Water transparency remained the same.

Volunteer monitoring efforts conducted in the treatment areas following professional hand harvesting efforts found scattered EWM growth in all three treatment areas. Overall density and abundance of EWM within the treatment areas was significantly smaller than prior to the survey which suggests hand removal efforts met control expectations. Early-season professional AIS monitoring will be conducted in 2018 to further validate the impacts of the hand harvesting in comparison with untreated areas.

Figure 6. Aquatic Plant Management, LLC conducting professional hand-harvesting near center buoy.

Figure 7. Aquatic Plant Management, LLC conducting professional hand-harvesting adjacent to the center buoy.

4.   2018 MONITORING STRATEGIES

4.1.   2018 Monitoring Strategies

2018 Early Season Focused Meander AIS Survey

In 2018, EOR ecologists will complete an early-season focused meander AIS survey in the areas of Muskellunge Lake that are less than 9 feet deep (max depth for plant growth). The early-season survey will take place in mid to late May (dependent on the weather). The focus of this survey will be around those areas where EWM has already been found, including areas where it was treated in 2017. The survey will also include additional areas where EWM has not been found as results from volunteer AIS monitoring efforts conducted in the fall of 2017 have located additional plant beds outside of those found during previous monitoring efforts conducted earlier in 2017. EOR will map all incidences of EWM with our Trimble (sub-foot accuracy GPS) using points to map single plants or small colonies and polygons to map out any larger, or well-established colonies. EOR will also assign a density ranking to all mapped EWM colonies in accordance with DNR protocols at this time. Results from this survey will be used to prioritize areas for treatment.

2018 Post-Treatment, Peak Biomass Focused Meander AIS Survey

In 2018, EOR ecologists will complete a second, peak biomass, focused meander AIS survey in July following volunteer hand-removal efforts (or other treatment) to assess treatment effectiveness. EOR ecologists will collect biomass estimates of EWM in treated and non-treated areas to further evaluate volunteer hand-removal efforts as a viable management approach.

5. CONCLUSION AND 2018 MANAGEMENT APPROACH

Results from professional and volunteer AIS monitoring efforts conducted in 2017 on Muskellunge Lake suggest that the population of EWM in Muskellunge Lake is limited to a few key areas with a total area less than 1.0 acres (less than 1% of the total lake surface area). Based on these results, professional hand harvesting was determined to be the appropriate control mechanism. Post-treatment volunteer AIS monitoring efforts conducted within the treatment areas suggests that while professional hand harvesting efforts successfully reduced the abundance and density of EWM growth, it did not completely eradicate it. Furthermore, volunteer monitoring efforts have identified additional beds of EWM outside of those originally found in the summer of 2017.

5.1. 2018 Recommended Management Approach

EOR proposes to conduct early season professional monitoring efforts in May of 2018 (weather dependent) to fully document the extent of the infestation. Volunteer monitoring efforts will also be required in 2018 to complement the early-season survey. Volunteer hand removal efforts will be employed if the extent of delineated EWM growth remains under 2 acres and the average depth of water in delineated treatment areas is under 4.5 feet. Professional hand removal efforts will be employed if the extent of the delineated EWM growth exceeds 2 acres or the average depth of water in delineated treatment areas exceeds 4.5 feet. In some areas, a combination of professional and volunteer hand removal may be employed.

5.1.1. 2018 Volunteer Hand Removal Program

Members of the MLA have expressed their interest in conducting volunteer hand removal efforts in 2018 after observing the hand removal techniques used by Aquatic Plant Management in 2017. The MLA has confidence that they have the capacity to employ similar techniques used by Aquatic Plant Management and believes they will also do a better (or at least comparable) job at enforcing techniques that prevent fragmentation and redistribution of harvested EWM. Goals for 2018 include the development of a volunteer EWM hand removal program. The MLA will work with the DNR to add Citizen Lake Monitoring Network (CLMN) and decontamination components to the program. Stephanie Boismenue (Oneida County Aquatic Invasive Species Coordinator), Cathy Higley of Vilas County, and Paul Skawinski (University of Wisconsin – Stevens Point) are in the planning stages of developing a volunteer hand removal workshop to be held at Kemp Station. One workshop will be held in early spring, with a second workshop in early summer for those individuals who are not year round residents. Members of the MLA will attend one of the two workshops in 2018. After attending the workshop, members of the MLA will work with EOR to determine the feasibility of establishing a volunteer-led hand removal program for Muskellunge Lake. Data collected during the early season professional monitoring will ultimately be used to determine the feasibility of a volunteer-led hand removal program.