

INTRODUCTION

Kentuck Lake, Vilas and Forest Counties, is an approximate 1,008-acre spring lake with a maximum depth of 40 feet and a mean depth of 13 feet. Lying within the Great Lakes drainage basin, water from Kentuck Lake flows out through Kentuck Creek into Brule Creek, and ultimately through the Brule and Menominee Rivers into Lake Michigan.



Photo 1. Kentuck Lake, Vilas-Forest Counties.

In 2011, Eurasian water milfoil (EWM; *Myriophyllum spicatum*) was discovered in Kentuck Lake. During the summer of 2012, Onterra was contracted by the Kentuck Lake Protection and Rehabilitation District (KLPRD) to conduct EWM mapping surveys on the lake later that summer. GPS coordinates relating to suspected EWM locations were provided to Onterra to aid in the August 2012 AIS survey. Unfortunately, Onterra field crews located more EWM on Kentuck Lake than was likely believed to exist by the-district. In February 2013, with Onterra's guidance, the KLPRD received a Wisconsin Department of Natural Resources (WDNR) Aquatic Invasive Species (AIS) Early Detection and Response (EDR) Grant to cover the costs of a two-year monitoring and herbicide control project on Kentuck Lake. As a result of the EWM findings in 2012, an herbicide treatment strategy targeting 18.6 acres of colonized EWM with liquid or granular 2,4-D at 3.0-4.0 ppm ae was conducted in the spring of 2013. Post treatment surveys conducted in the summer of 2013 indicated the spring treatment was successful in reducing EWM at all targeted locations (Map 1).

Following the successful herbicide treatment in 2013, the level of EWM in Kentuck Lake was reduced to the point such that no herbicide treatment was warranted in 2014. Instead, EWM was monitored in 2014 through a late summer survey. This report details the monitoring activities conducted during the second year of the grant funded project (2014).

2014 EWM PEAK-BIOMASS SURVEY RESULTS

On August 26, 2014, Onterra ecologists visited Kentuck Lake to complete the Late-Summer EWM Peak-Biomass Survey and to assess any EWM rebound within the 2013 herbicide treatment areas. This meander-based survey of the lake's littoral zone indicated that the EWM population had expanded somewhat since 2013. Colonies consisting of *highly scattered*, *scattered*, and *surface matted* EWM were found in 2014 along with numerous additional point-based occurrences consisting of *single or few plants*, *clumps of plants*, and *small plant colonies* (Map 2).

In total, approximately 3.7 acres of colonized EWM were located in Kentuck Lake in 2014 (Figure 1). This represents a slight increase from 2013 where approximately 0.3 acres of EWM were located; however, the 2014 acreage is still significantly lower than the 13.4 acres located in

2012 prior to the 2013 spring herbicide treatment. The majority of the colonized EWM located in Kentuck Lake in 2014 was comprised of the lowest density rating *highly scattered*.

CURLY-LEAF PONDWEED

Curly-leaf pondweed (CLP; *Potamogeton crispus*) was first documented in Kentuck Lake in 1999, but according to the Kentuck Lake Protection and Rehabilitation District (KLPRD), had not been located within the lake again until July of 2012. During the early-summer of 2012, the KLPRD observed a few CLP occurrences within Kentuck Lake, but an accurate understanding of where in the lake the CLP was located did not exist.

An Early-Season AIS Survey was conducted by Onterra ecologists in 2013 with an objective to map the CLP population at its peak growth in Kentuck Lake. A small number of CLP *Single or Few Plants* and *Clumps of Plants* were observed during this survey (Map 3). Particularly in northern Wisconsin, not all established CLP populations become problematic to the lake ecosystem. While the CLP may not be currently causing significant impacts to Kentuck Lake, that may not hold true for other nearby lakes that may inherit CLP that originated in Kentuck Lake from hitch-hiking on transient watercraft. Within Kentuck Lake’s current management planning project, it will be important to develop strategies to continually monitor the CLP population within Kentuck Lake as well as implement strategies to limit its spread to other area waterbodies. The CLP population was not assessed as a part of the 2014 monitoring on Kentuck Lake, but as will be discussed in the next section, a combination of professional- and volunteer-based surveys focused on the CLP population are proposed to occur in 2015 and 2016.

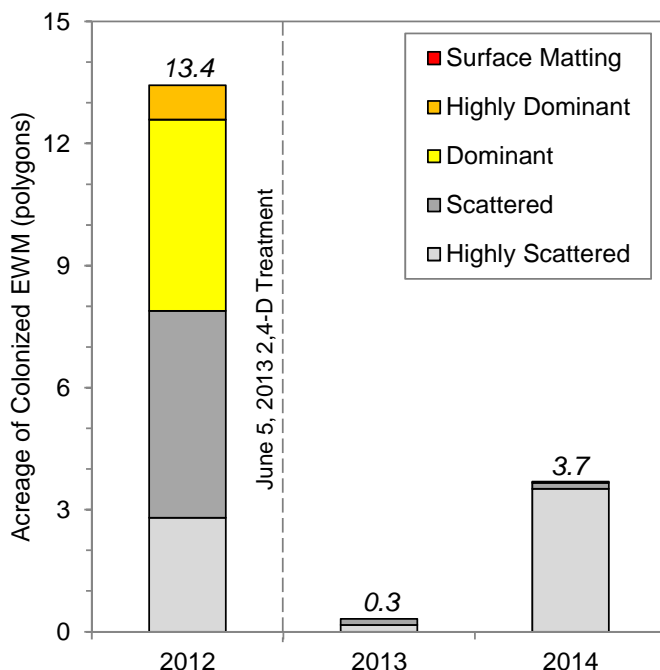


Figure 1. Acreage of mapped EWM colonies on Kentuck Lake from 2012-2014.

CONCLUSIONS AND DISCUSSION

From the results of the 2014 survey, it is not believed that Kentuck Lake’s EWM population is at a level which is significantly impacting the lake’s ecology or recreation. While the EWM mapping data indicate that EWM has increased since 2013, it is still at a very low level within the lake with only 3.7 acres containing colonized EWM, the majority of which is *highly scattered*. Because of this, no herbicide control strategy targeting EWM is proposed to occur in Kentuck Lake in 2015. Within a the first draft of Kentuck Lake’s Implementation Plan that was submitted to the WDNR in November 2014, the Implementation Plan outlined an EWM control and monitoring strategy that was developed by Onterra ecologists and KLPRD Planning Committee members. While the management plan has not yet been approved by the WDNR, the plan developed “triggers” or thresholds that once met or exceeded would initiate a potential

EWM control strategy utilizing herbicides. The trigger level would be areas of colonized EWM and encompassing approximately 3.0 acres or greater with the majority of that areas being at a density level of *dominant* or greater. No areas of EWM met or exceeded this threshold in 2014, and thus, no treatment is proposed to occur in 2015.

While Kentuck Lake does contain small areas of colonized EWM, conducting an effective herbicide control project on these small sites can be extremely challenging and the results are often unpredictable. Conducting herbicide control strategies on individual plants or even small colonies will not prove effective unless grouped into a much larger treatment site where sufficient herbicide concentrations and exposure times are more likely to be achieved. The EWM population within Kentuck Lake is currently at levels which are too low for herbicide control methods to be effective.

While no herbicide control strategies are proposed to occur in Kentuck Lake in 2015, it is proposed that continued monitoring of both EWM and CLP occur. Monitoring these populations over time is essential for effective management and lets resource managers know when either of these populations has reached levels which trigger control actions. In February of 2015, the KLPRD submitted a WDNR Lake Protection Grant to aid in funding a two-year advanced water quality study. This grant also included funds to conduct professional and volunteer-based monitoring of CLP and EWM in 2015 and 2016.

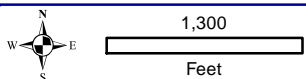
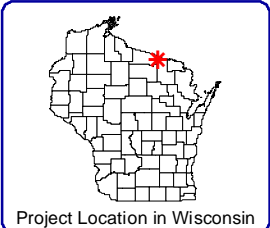
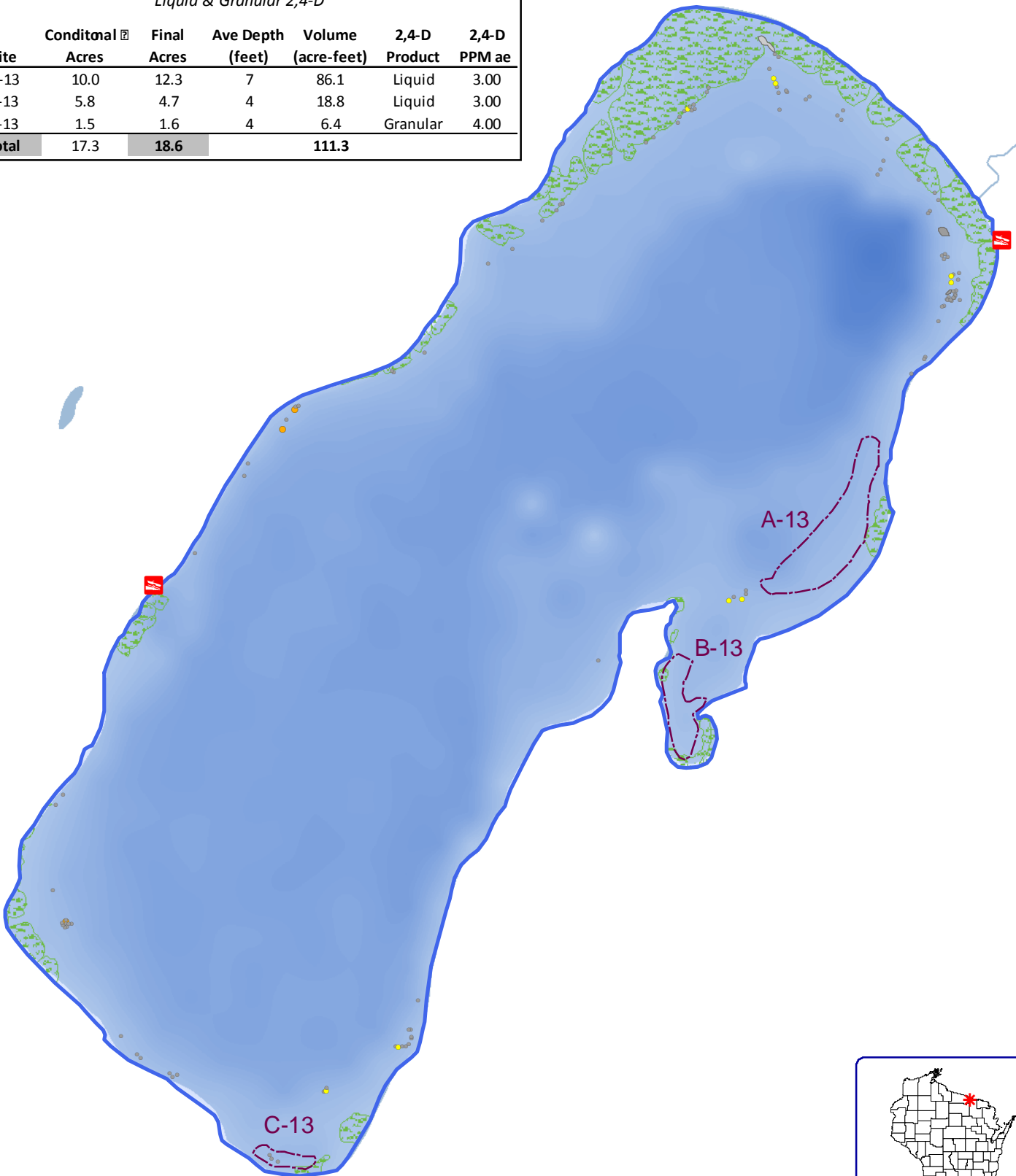
While the grant has not yet been awarded, the following paragraphs describe the AIS monitoring that is proposed to occur. In the first year of the project (2015), professional surveys would be conducted to map and locate occurrences of both CLP and EWM in Kentuck Lake. During the Early-Season AIS Survey, a June survey focused on locating curly-leaf pondweed while at its peak growth and EWM while it is higher in the water column than most emerging native plants, KLPRD volunteers would join the professional ecologists during the survey and receive training on survey methodology including invasive species identification and how to use a GPS to accurately map and categorize findings. In July of 2015, KLPRD volunteers would survey the lake and mark locations of Eurasian water milfoil. Following their survey, they would send their GPS and data to professional ecologists. Professional ecologists would use the volunteer data in a late-summer EWM Peak-Biomass Survey and refine the areas of EWM located by the volunteers.

If the CLP population in Kentuck Lake remains at low levels, KLPRD volunteers would be responsible for locating and mapping areas of CLP in June of 2016 and report their findings to professional ecologists. As in 2015, KLPRD volunteers would also locate and map areas of EWM in July and then send their GPS and data to professional ecologists. Because the EWM population is more widespread in Kentuck Lake and has shown it has the capacity to create large, monotypic stands, a professional-based Late-Summer EWM Peak-Biomass Survey would be conducted in 2016 to refine the volunteer data. At the end of each year, electronic maps would be created displaying areas of CLP and EWM. In addition, their GPS would be updated with the most current information regarding CLP and EWM locations for their use during their surveys.

2013 Final EWM Treatment Strategy

Liquid & Granular 2,4-D

Site	Conditonal ² Acres	Final Acres	Ave Depth (feet)	Volume (acre-feet)	2,4-D Product	2,4-D PPM ae
A-13	10.0	12.3	7	86.1	Liquid	3.00
B-13	5.8	4.7	4	18.8	Liquid	3.00
C-13	1.5	1.6	4	6.4	Granular	4.00
Total	17.3	18.6		111.3		



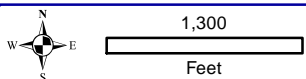
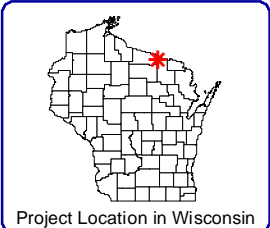
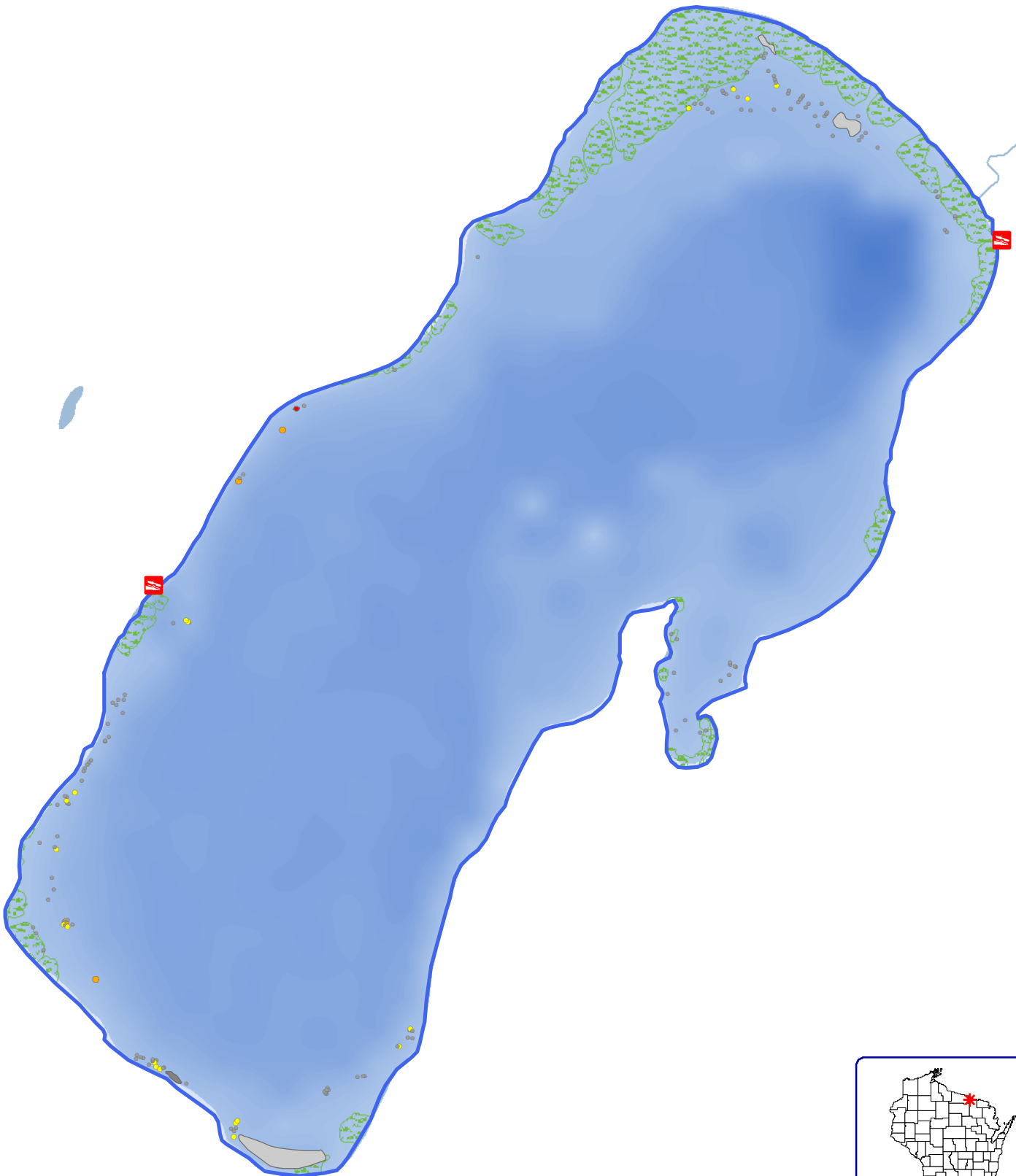
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Sources:
Roads and Hydro: WDNR
Bathymetry: WDNR 1971; digitized by Onterra
Map Date: March 26, 2014
Filename: Map1_Kentuck_EWM_Aug13.mxd

Legend

- Eurasian water milfoil (August 2013)**
- Highly Scattered
 - Scattered
 - Dominant
 - Highly Dominant
 - Surface Matting
 - Single or Few Plants
 - Clumps of Plants
 - Small Plant Colony
 - 2013 Final EWM Treatment Area
 - Emergent and/or Floating-Leaf Community
 - Public Access

Map 1
Kentuck Lake
Forest & Vilas Counties, Wisconsin
2013 EWM Locations & 2013 Treatment Areas

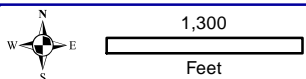


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Sources:
 Roads and Hydro: WDNR
 Bathymetry: WDNR 1971; digitized by Onterra
 Map Date: September 23, 2014
 Filename: Map2_Kentuck_EWM_August14.mxd

- Legend**
- | | | |
|------------------|----------------------|---|
| Highly Scattered | Single or Few Plants | Emergent and/or Floating-Leaf Community |
| Scattered | Clumps of Plants | Public Access |
| Dominant | Small Plant Colony | |
| Highly Dominant | | |
| Surface Matting | | |

Map 2
Kentuck Lake
 Forest & Vilas Counties, Wisconsin
2014 EWM Locations



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Sources:
 Roads and Hydro: WDNR
 Bathymetry: WDNR 1971; digitized by Onterra
 Map Date: September 23, 2014
 Filename: Map3_Kentuck_CLP_July13.mxd

- Legend**
- | | | |
|------------------|----------------------|---|
| Highly Scattered | Single or Few Plants | Emergent and/or Floating-Leaf Community |
| Scattered | Clumps of Plants | Public Access |
| Dominant | Small Plant Colony | |
| Highly Dominant | | |
| Surface Matting | | |

Map 3
Kentuck Lake
 Forest & Vilas Counties, Wisconsin
2013 CLP Locations