Golden Sands
Resource Conservation & Development Council, Inc
1100 Main Street, Suite 150
Stevens Point, WI 54481
(715) 343-6215
www.goldensandsrcd.org

Helen Lake, Portage County
July 31st & August 2nd 2018

To Whom it may concern,

Golden Sands Resource Conservation & Development Council, Inc (RC&D) completed a Point Intercept Aquatic Plant Survey (PI Survey) on Helen Lake on July 31st & August 2nd, 2018. The survey consisted of 229 points. Golden Sands RC&D staff Chris Hamerla and Jennifer Fjelsted completed the PI. The survey was completed to continue data following a 2013 Eurasian watermilfoil (EWM) treatment. Figure 3 shows 2013 EWM locations before the treatment. The 2017 and 2018 surveys were completed at the request of Scott Provost, DNR Lakes Biologist in Wisconsin Rapids. Figure 2 shows the 2017 EWM locations. Results of the 2018 PI survey did find that EWM was scattered in multiple locations of the lake, Figure 1. A follow up meander survey was completed on August 30th and observed EWM was marked using a handheld GPS unit. These general areas are included on Figure 1 and more specifically on a separate map, Figure 1.a. Spiny naiad is known to exist in Helen lake and was detected during the 2018 PI. Spiny naiad is listed as a restricted invasive species in Wisconsin but has not been problematic in Helen Lake. The locations are indicated in Figure 1.

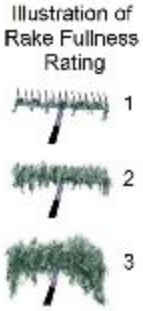
Benefits of Aquatic Plants

Aquatic plants are an important part of the state's wet ecosystems. They produce oxygen and help protect water quality. They help clarify water in wetlands, lakes and rivers by using nutrients like phosphorus and nitrogen that might otherwise be used to produce algal blooms. Aquatic plants help reduce wave action and current flow which reduces shoreland erosion and helps stabilize sediments in the waterbody. Perhaps most apparent, plants provide, food, shelter and habitat for fish, invertebrates and all sorts of wildlife. Finally, diverse, healthy plant communities can help prevent invasive species from establishing. Invasive species are more likely to become established in disturbed areas.

Aquatic Invasive Species

Aquatic invasive species (AIS) are plants or animals that are not native to a particular area and dominate an area where they are introduced. They can be very successful because they fill a niche that isn't occupied, are able to tolerate a wider range of living conditions, they don't have any natural predators or diseases or perhaps they begin growing earlier. EWM, curly leaf pondweed and purple loosestrife are common examples of AIS. AIS can threaten an area both ecologically and economically. They can disrupt food chains and degrade habitat which negatively impacts fish, invertebrates and wildlife. Nuisance levels of AIS can reduce or even prevent recreational opportunities like fishing, boating, wildlife watching, etc... These reduced recreational opportunities have negative impacts to the local and statewide economy. AIS such as zebra mussels can negatively impact water quality, food chains, aquatic habitat, recreation and industry. Unfortunately the effects of AIS are difficult to foresee since the degree of impact can vary greatly from one place to another. One system may be completely taken over by AIS while AIS in another nearby system may become a part of the community and have little to no negative effects.

Point Intercept Aquatic Plant Surveys



Point intercept (PI) surveys are completed by traveling to predetermined GPS points across the lake. Each PI lake map is based on the area and depth specific to that lake. The maps with GPS coordinates are obtained through the WDNR. Helen Lake contains 229 sample points. Each GPS point is 40 meters/43.74 yards apart. Using a GPS, staff traveled by boat to each of the GPS points. At each point a two-sided rake was used to sample roughly a one foot area of the lake bottom. Sediment type (sand, rock or muck), water depth in half foot increments and the aquatic plant community was recorded. Once the rake is brought to the surface the amount of plant material on the rake is assessed and recorded. The overall fullness of plants on the rake is rated a one, two or three. Then the individual species are ranked using a one, two or three. All data is recorded on the PI worksheet. Plants seen within six feet of the sample point are recorded as a "visual". (Figure 1 shows map with survey points and EWM locations.) Other plants seen on the lake are recorded as a "boat survey". To learn more about PI sampling methods and how data is collected please visit:
http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PL-Protocol-2010.pdf

Frequency of of occurrence is the percentage of time a species is found out of the total number of points sampled. Not all sample points are capable of supporting plant growth. *Littoral frequency of occurrence* is how often a species is found out of the total number of points that support plant growth. (Shown in Table 1) The deepest depth where plant growth is found is called *maximum depth of plant growth*. *Species richness* is the the total number of different species found on the rake while sampling points. *Floristic Quality Index (FQI)* is the ranking of the plants in the lake that compares to an undisturbed lake. The higher the FQI the closer the plant community is to that of an undisturbed system. Approximately 250 lakes across Wisconsin are used to calculate the statewide and ecoregion averages for comparison. Table 2 summarizes the lake's littoral frequency of occurrence, maximum depth of plant growth, species richness and FQI.

Table 1: **Species Present**
% Littoral frequency of occurrence: This is calculated by taking the total number of times a species is recorded divided by the total number of points in the lake where plant growth is possible.
* means a non-native species, potentially invasive.

Common Name	Scientific Name	Plant type: floating leaf, free floating, submergent, emergent	% Littoral Frequency of Occurrence
Spatterdock	*Nuphar variegata*	submersed	Not observed 2018
Whitewater crowfoot	*Ranunculus aquatilis*	submersed	Not observed 2018
Turion duckweed	*Lemna turionifora*	free floating	Not observed 2018
Muskgrasses	*Chara sp*	submersed	62.23
Sago pondweed	*Stuckenia pectinata*	submersed	13.45
Variable pondweed	*Potamogeton gramineus*	submersed	9.87

Illinois pondweed	*Potamogeton illinoensis*	floating leaf	8.97
***Spiny naiad**	***Najas marina***	**submersed**	**6.73**
Slender naiad	*Najas flexilis*	submersed	4.04
***Eurasian water milfoil**	****Myriophyllum spicatum***	**submersed**	**3.59**
Flat-stem pondweed	*Potamogeton zosteriformis*	submersed	3.14
Small pondweed	*Potamogeton pusillus*	submersed	2.24
Fries' pondweed	*Potamogeton friesii*	submersed	.9
Common waterweed	*Elodea Canadensis*	submersed	.45
Northern watermilfoil	*Myriophyllum sibiricum*	submersed	.45
Southern naiad	*Najas guadalupensis*	submerged	.45
Leafy pondweed	*Potamageton foliosus*	submersed	.45
White-stem pondweed	*Potamogeton praelongus*	submersed	.45
Creeping spikerush	*Eleocharis palustris*	emergent	Visual
Small duckweed	*Lemna minor*	free floating	Visual
Hardstem bulrush	*Schoenoplectus acutus*	emergent	Visual
Large duckweed	*Spirodeia polyrhiza*	free floating	Visual

Table 2**: Lake Survey Summary**

	Lake	**Statewide Average**	**North Central Hardwoods Forests Ecoregion Average**
Littoral Frequency of Occurrence (%)	**77.58**	**74.3**	**76.0**
Maximum Depth of Plant Growth	**17**	**15.3**	**15.9**

Species Richness	**15**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**22.47**	**24.1**	**23.3**

Figure 1: **EWM and spiny naiad sites and densities**

EWM was observed at the locations show on the map in **black** during the 2017 PI and purple in 2018. EWM was collected on rake drops during the 2018 PI survey. Two new areas were observed along the northern shoreline in approximately six to ten feet of water. They consisted of randomly scattered EWM plants with the exception of the purple filled in square near point 20. This location was a dense colony of EWM approximately 10' x 10'. These locations were observed while traveling between PI points and were more accurately mapped on August 30th using a meander survey that focused specifically on EWM.

While PI surveys give a good baseline of the aquatic plant community it is important to understand that each survey point on Helen Lake is 40 meters/43.74 yards away from the next point. Plant species may be more abundant than the survey depicts because the plants may be growing between survey points. This is where visual surveys and follow up meander surveys can help fill in the gaps. As mentioned in the paragraph above, a more comprehensive mapping will need to be complete in the new EWM locations.

In 2018 spiny naiad was collected in fourteen locations during rake drops. Moderate portions of plants were collected during the rake drops. Point 165 had a rake fullness of three, meaning covering the rake. Spiny naiad was collected in two location locations in 2017. Each time only a small portion of a plant was collected. Subsequent rake drops at the same point did not produce any other specimens. Speaking with DNR Scott Provost he mentioned that it is not uncommon for the spiny naiad to fluctuate like this in Helen Lake. Spiny naiad is an annual plant which grows from seed.

Figure 1: **EWM and spiny naiad sites and densities**

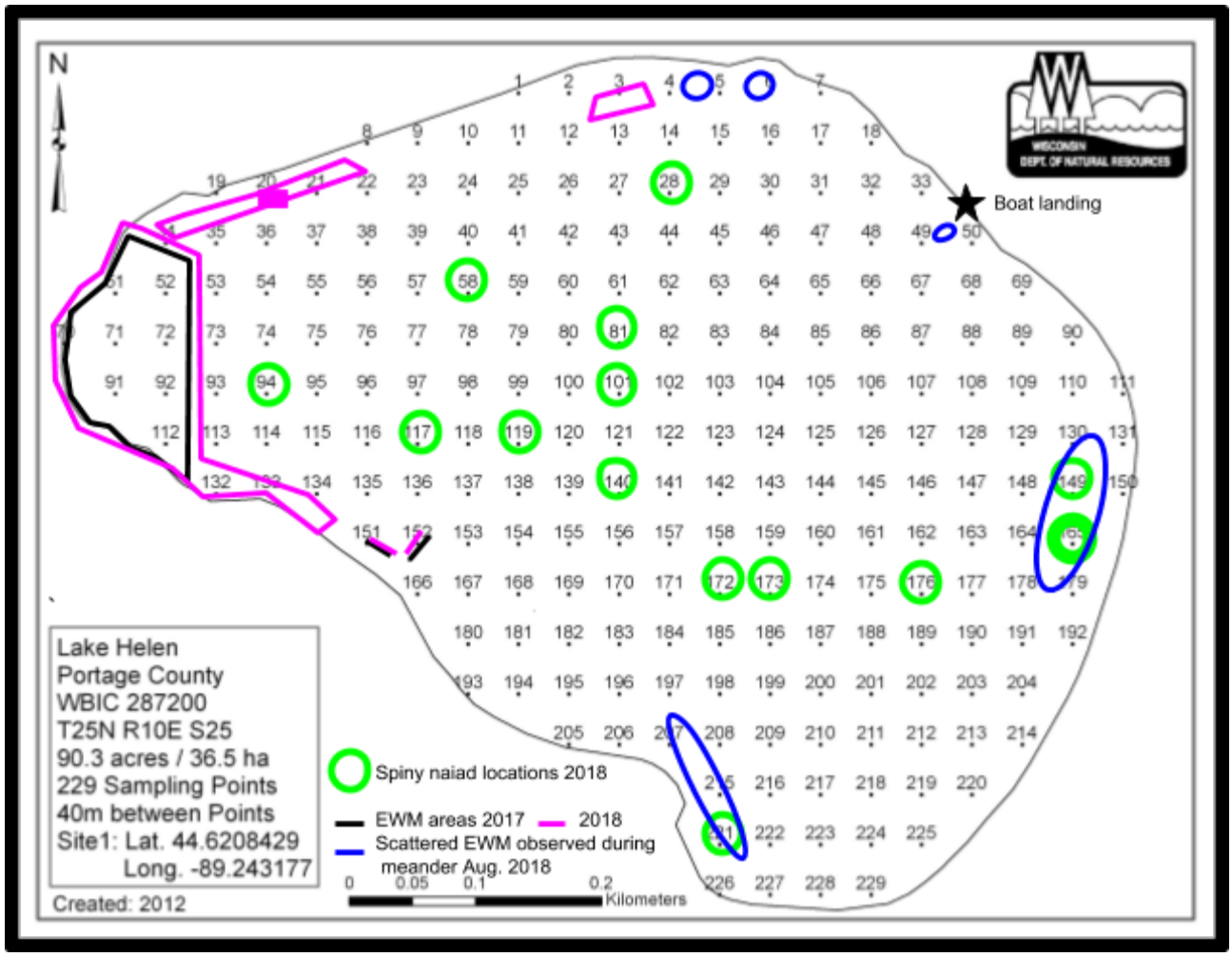


Figure 1.a.: **EWM sites and densities recorded during the 8/28/18 followup meander survey.**

Figure 2: **2017, June 10th EWM Locations**

Following the PI survey, a more focused EWM visual meander survey was completed to more accurately map the EWM locations. The EWM locations are shown as yellow dots on the map.

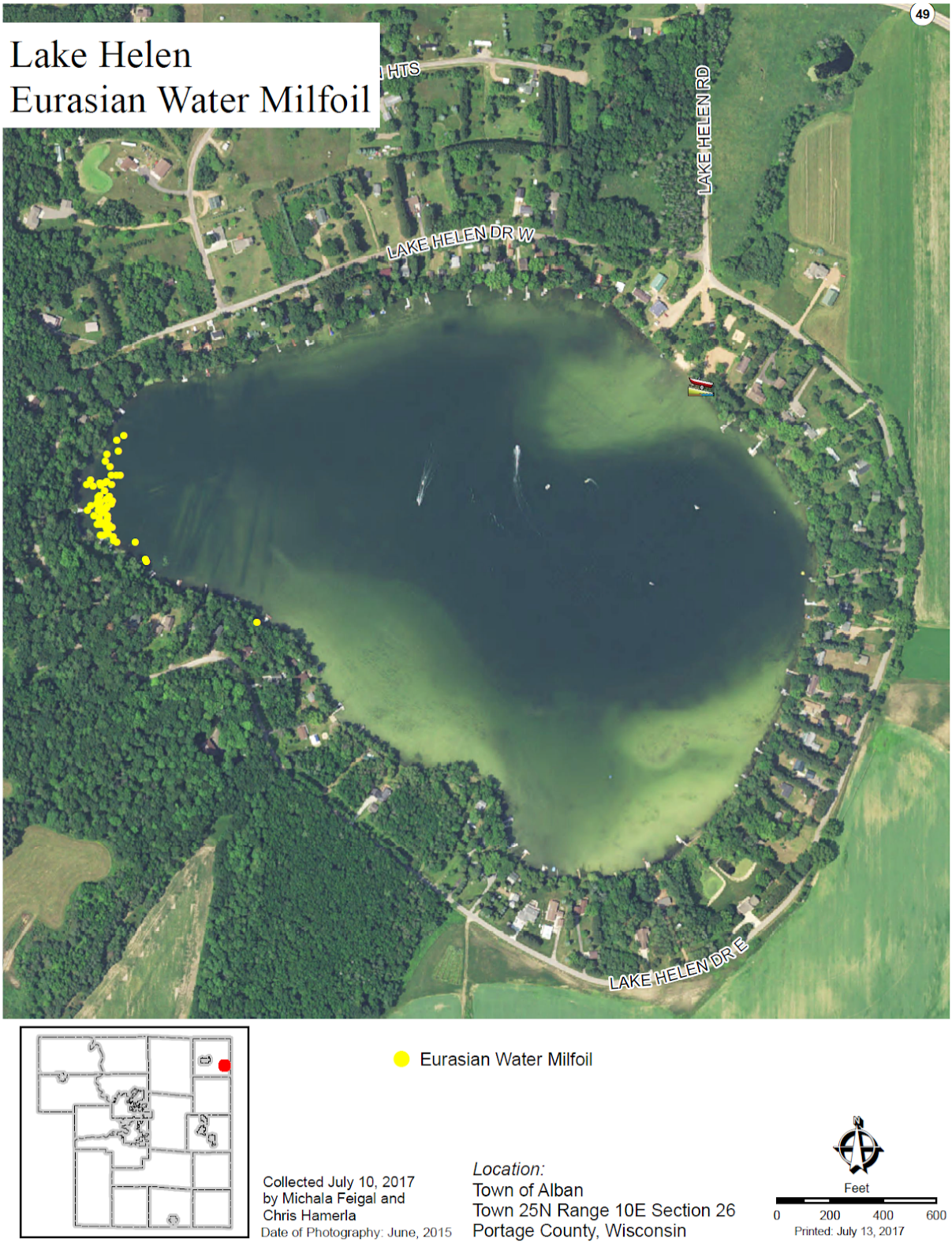
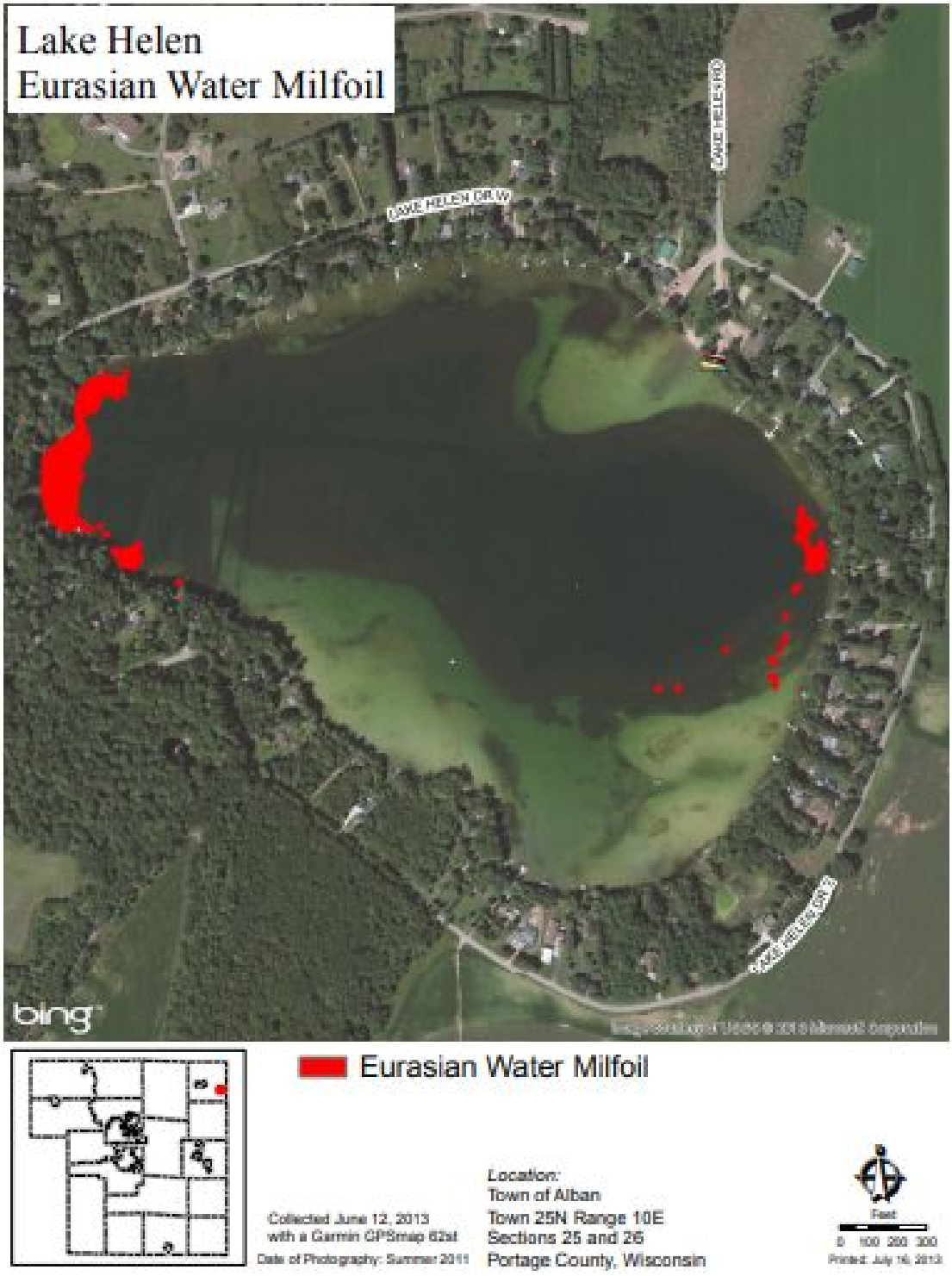


Figure 3: **2013, June 12th EWM Locations**

The red locations on the map are EWM populations prior to the 2013 herbicide treatment.



If there are any questions regarding the PI survey or results please contact Golden Sands RC&D, Chris Hamerla, chris.hamerla@goldensandsrcd.org (715) 343-6215