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Lake Emily, Portage County
August 25 & 26, 2020

Golden Sands Resource Conservation & Development Council, Inc (RC&D) staff Chris Hamerla, Amy Thorstenson and Selina Walters completed a Point Intercept Aquatic Plant Survey (PI Survey) on Lake Emily on August 25th and 26th. PI surveys were also completed by Golden Sands RC&D in 2018 and 2017. These surveys were completed as follow up to a 2012 Eurasian watermilfoil (EWM) herbicide treatment. Native plant communities and the EWM populations are being monitored. During the 2018 survey purple loosestrife (PLS) and flowering rush (FR) were also observed. These populations are continuing to be monitored. All observed flowering rush plants are removed annually through volunteer manual removal events.

EWM is established in Lake Emily and multiple locations were recorded. Due to high water levels some EWM locations have shifted to areas normally well above the high water mark. Because of this extreme condition EWM location for 2020 should not be seen as stable. See figure 2 for 2020 EWM locations and approximate abundance. Figure 1 shows the EWM locations from 2018 when water levels were more “normal”.

PLS was first recorded on Lake Emily in 2014 however DNR records list it as observed with no voucher or verification. During the 2018 survey two PLS plants were observed and removed. Voucher pictures were taken and sent to DNR staff Alex Selle and Jodi Lepsch.

The presence of FR was new in 2018 and the entire shoreline of the lake was re-surveyed to detect locations of FR at that time. Seven locations were found in one area directly north of the County boat launch on Lake Dr., east side of the lake. The seven locations (patches) of FR varied in size from one foot by one foot to fifteen by fifteen. Six of the locations were emergent in less than a foot and a half of water. One was submersed in approximately 4 feet of water. Four flowering stalks were observed and removed. An invasive plant incident report was completed and entered into SWIMS by Regional AIS Coordinator Chris Hamerla. The flower stalks were pressed for voucher specimens. DNR staff Alex Selle, Jodi Lepsch and Scott Provost were notified. Provost was on Lake Emily doing long term trends data collection the same day and also observed the FR. Removal events have been completed in 2018, 2019 and 2020. All observed emergent FR has been removed though plants continue to appear each year. The submerged location has not been addressed due to high water and lack of snorkel/SCUBA volunteers. See figures 1, 2 and maps 1 and 2 for FR locations.

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. Lake Emily contains 351 sample points. Using a GPS, staff traveled by kayak 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 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 a 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 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 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
Chara/Muskgrasses	*Chara sp.*	Submergent	50.63

Variable pondweed	*Potamogeton gramineus*	Submergent	15.19
Nitella	*Nitella sp*	Submergent	.63
Wild celery	*Vallisneria americana*	Submergent	13.29
White-stem pondweed	*Potamogeton praelongus*	Submergent	1.27
White water lily	*Nymphaea odorata*	Floating leaf	2.53
Flat-stem pondweed	*Potamogeton zosteriformis*	Submergent	5.06
Coontail	*Ceratophyllum demersum*	Submergent	8.86
Aquatic moss	----------	Submergent	6.33
Illinois pondweed	*Potamogeton illinoensis*	Submergent	6.96
Hardstem bulrush	*Schoenoplectus acutus*	Emergent	6.96
Slender naiad	*Najas flexilis*	Submergent	1.27
Small duckweed	*Lemna minor*	Submergent	1.27
Water smartweed	*Polygonum amphibium*	Floating leaf	1.9
Common bladderwort	*Utricularia vulgaris*	Submergent	Visual
Needle spikerush	*Eleocharis acicularis*	Emergent	.63
Water stargrass	*Heteranthera dubia*	Submergent	5.7
Sago pondweed	*Stuckenia pectinata*	Submergent	Visual
Common waterweed	*Elodea canadensis*	Submergent	.63
Large duckweed	*Spirodela polyrhiza*	Free Floating	1.27
Watermeal	*Wolffia spp.*	Free Floating	1.27
Forked duckweed	*Lemna trisulca*	Free floating	1.9
Northern watermilfoil	*Myriophyllum sibiricum*	Submergent	1.27
***Eurasian watermilfoil**	***Myriophyllum spicatum***	**Submergent**	**6.33**
Floating-leaf pondweed	*Potamogeton natans*	Submergent	.63
Small pondweed	*Potamogeton pusillus*	Submergent	.63
Cattail	*Typha sp.*	Emergent	Present/nt recorded

Table 2: **Lake Survey Summary**

	Lake	Statewide Average	North Central Hardwoods Forests Ecoregion Average
Littoral Frequency of Occurrence (%)	**71.52**	**74.3**	**76.0**
Maximum Depth of Plant Growth	**25.00**	**15.3**	**15.9**
Species Richness	**24**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**27.31**	**24.1**	**23.3**

Figure 1: **2018 EWM sites & densities** (Includes purple loosestrife and pioneer location of flowering rush.)

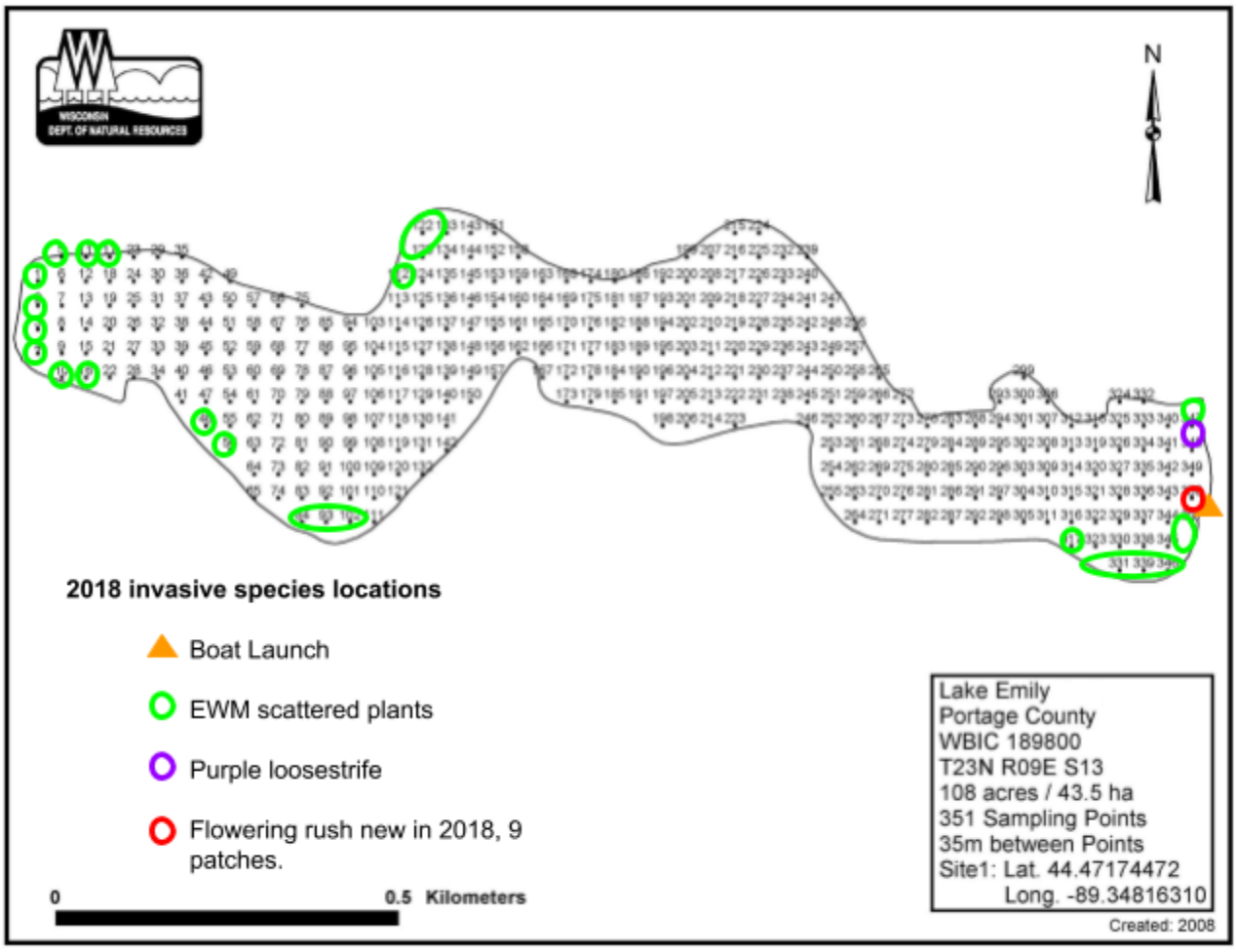
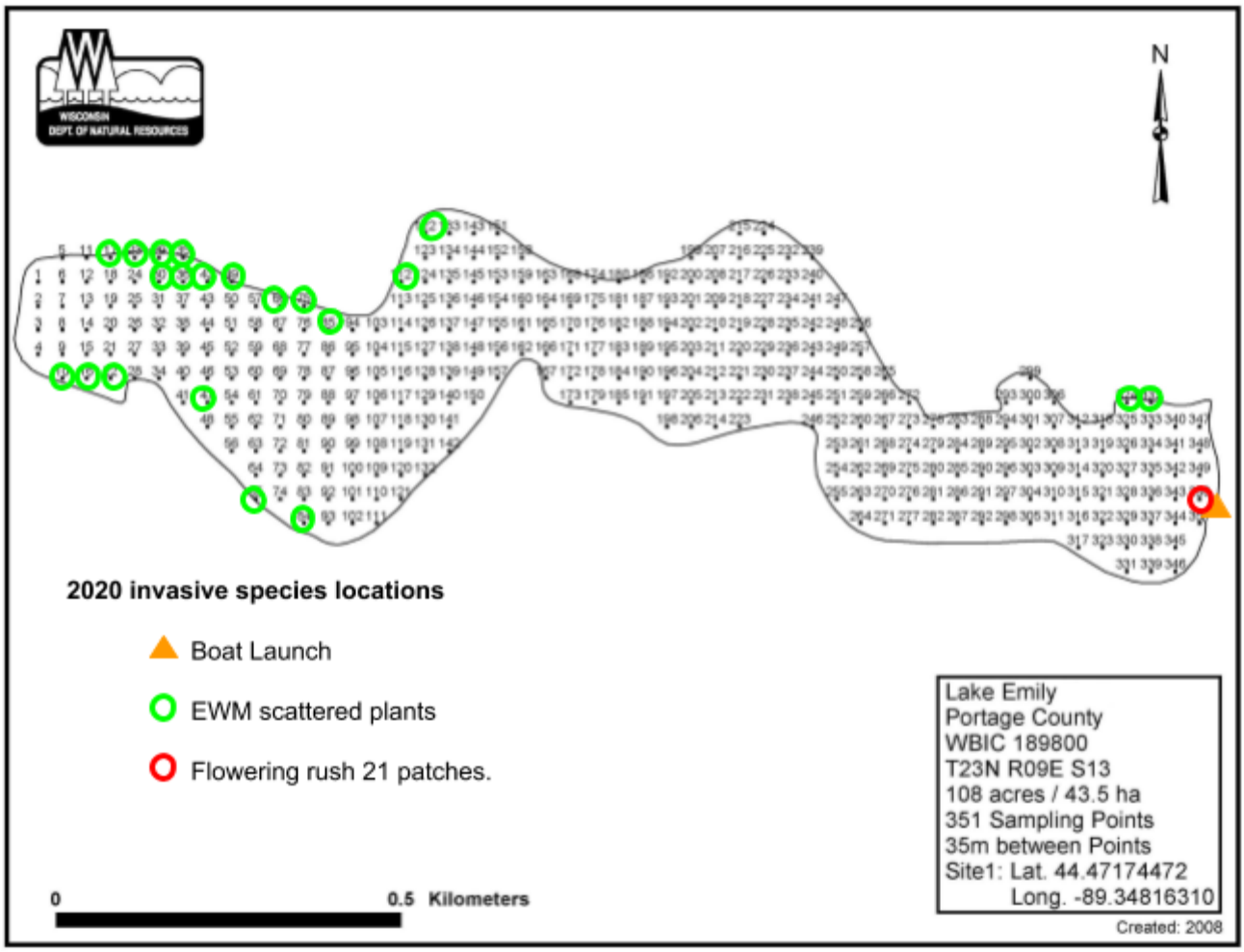


Figure 2: **2020 EWM sites & densities** (Includes flowering rush location.)



Map 1: **Flowering rush locations 2018.**

Map 2: **Flowering rush locations 2020.** Flowering rush locations in relation to increased water levels. 2018 approximate water levels (light blue), 2020 approximate water levels (bright blue).

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 ext. 704