GOLDEN SANDS
RESOURCE CONSERVATION & DEVELOPMENT COUNCIL, INC.
1100 Main Street, Suite #150
Stevens Point, WI 54481
Phone (715) 343-6215
www.goldensandsrcd.org
Conservation That Works!

Weyauwega Lake, Waupaca County
Point Intercept Survey
August 12th & 13th, 2019

Mr. Van Epps,

An Point Intercept Survey was completed on Weyauwega Lake on August 12 & 13, 2019. The survey was completed by Golden Sands Resource Conservation & Development Council, Inc (RC&D) staff Anna Cisar and Chris Hamerla. The survey was requested by Weyauwega Lake Restoration, Inc. PI surveys capture the health and diversity of the plant community, and the extent of any invasive species populations, like curly-leaf pondweed (CLP). This monitoring data can be used to show progress over time and used by the Wisconsin Department of Natural Resources staff to understand what type of management is needed for invasive species or nuisance plant growth.

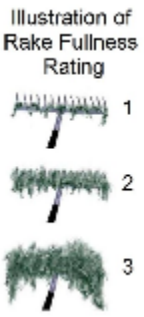
Benefits of Aquatic Plants

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. CLP, Eurasian watermilfoil 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. 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 (see illustration to the left). 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". 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.

It should be noted that plant species may differ from year to year. GPS coordinates are accurate only within twenty feet and plant communities can shift. Table 1 represents only those species which were detected on the rake during the survey.

Table 1: Species Present

Common Name	Scientific Name	Plant type: floating leaf, free floating, submergent, emergent	% Littoral Frequency of Occurrence
Coontail	*Ceratophyllum demersum*	free floating	87.07
Common waterweed	*Elodea canadensis*	submergent	63.12
Small duckweed	*Lemna minor*	free floating	34.22
Common watermeal	*Wolffia columbiana*	free floating	32.70
*Flowering rush	*Butomus umbellatus*	emergent	22.43
Filamentous algae	----------	free floating	16.73
*Curly-leaf pondweed	*Potamogeton crispus*	submergent	13.69
Flat-stem pondweed	*Potamogeton zosteriformis*	submergent	3.04
Small pondweed	*Potamogeton pusillus*	submergent	3.04
Muskgrasses	*Chara sp.*	submergent	2.66

Water star-grass	*Heteranthera dubia*	submergent	2.66
Long-leaf pondweed	*Potamogeton nodosus*	submergent	0.76
Large duckweed	*Spirodela polyrhiza*	free floating	0.76
Sago pondweed	*Stuckenia pectinata*	submergent	0.76
Freshwater sponge	----------	submergent	0.76
Slender naiad	*Najas flexilis*	submergent	0.38

% 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.

Table 2: Lake Survey Summary

	Weyauwega Lake	Statewide Average	North Central Hardwoods Forests Ecoregion Average
Littoral Frequency of Occurrence (%)	**89.76**	**74.3**	**76.0**
Maximum Depth of Plant Growth	**11**	**15.3**	**15.9**
Species Richness	**14**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**17.9**	**24.1**	**23.3**

Aquatic Invasive Species in Weyauwega Lake

There are two invasive species that were present during the PI survey. Those species are CLP and flowering rush (FR). Weyauwega Lake contains 423 sample points, of those 263 had vegetation. CLP was found at 36 points, and was a visual at another 27. FR was found at 59 points, and a visual at another 118.

CLP is unique in that it prefers cooler waters and dies off when waters warm, usually around July 4th. Golden Sands RC&D did a June PI survey earlier this season specifically to capture the CLP in its peak growing season. However, the cooler waters below the water's surface has kept a portion of the CLP population growing through the late summer season. It should be noted that while the CLP was still present the plants did not breach the water's surface like they do in May and June. The plants that still remained in August were also less robust than seen during the June CLP PI. See Figure 1 for a map of the survey points, and CLP locations and densities from the August PI. Please refer to the CLP Point Intercept Survey report to compare the CLP figure in this report to the CLP figure in the June CLP PI report.

The second invasive species present during the survey and reported is flowering rush (FR). Looking at Table 1, FR is the fifth most abundant plant in Weyauwega Lake (see Figure 2 for FR locations and densities). However, it is important to note that of the 293 points that were visited during the survey there were 56 points that were not accessible (or non-navigable) due to the thick growth of flowering rush (see Figure 2 and 3, non-navigable areas due to FR are denoted by a red polygon). While doing this August PI survey coontail, common waterweed and duckweed formed thick vegetation growth that allowed floating, unrooted FR plants to grow on top of the plants at the water's surface. Figure 3 illustrates all the areas on the Lake that had both rooting and floating FR plants. It is important to note that as plants naturally die

back at the end of the growing season these floating FR plants will float downstream and likely root in a new location of the Lake. While it is important to see the extent of the floating FR population, Figure 3 should not be used as a reference for FR locations for future years, as the floating plants will have relocated.

Figure 1: CLP Sites and Densities

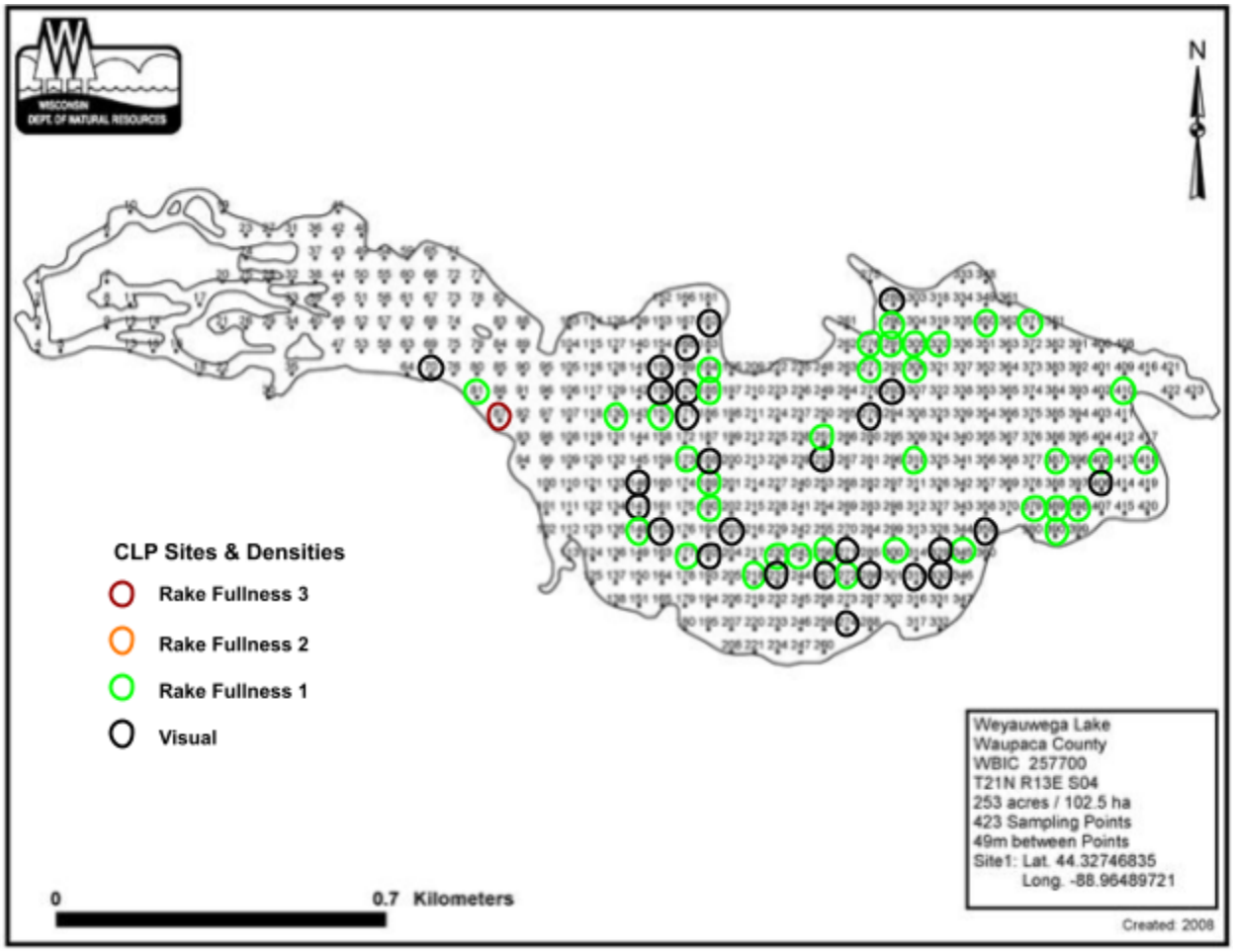


Figure 2: Rooted Flowering Rush Sites and Densities

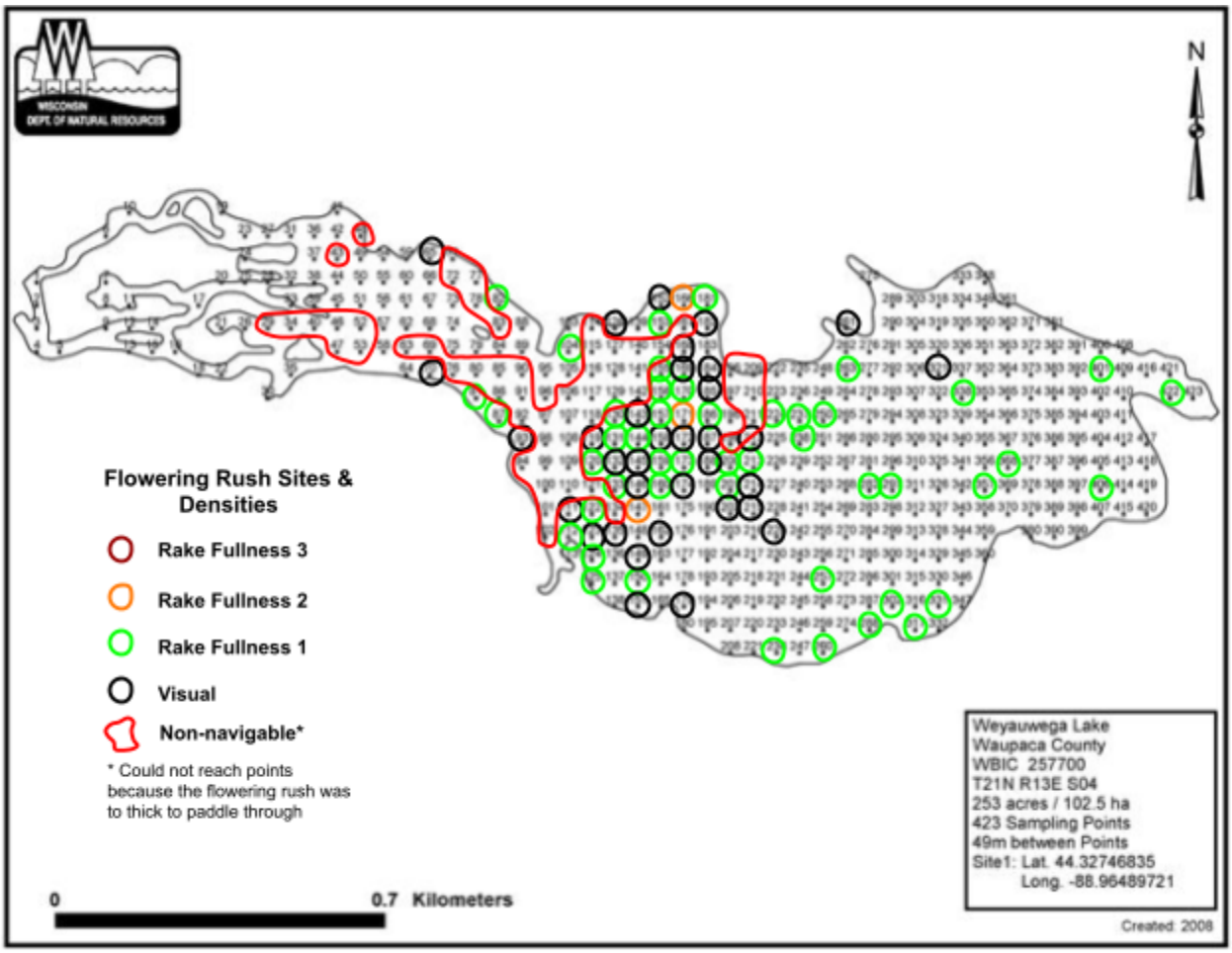
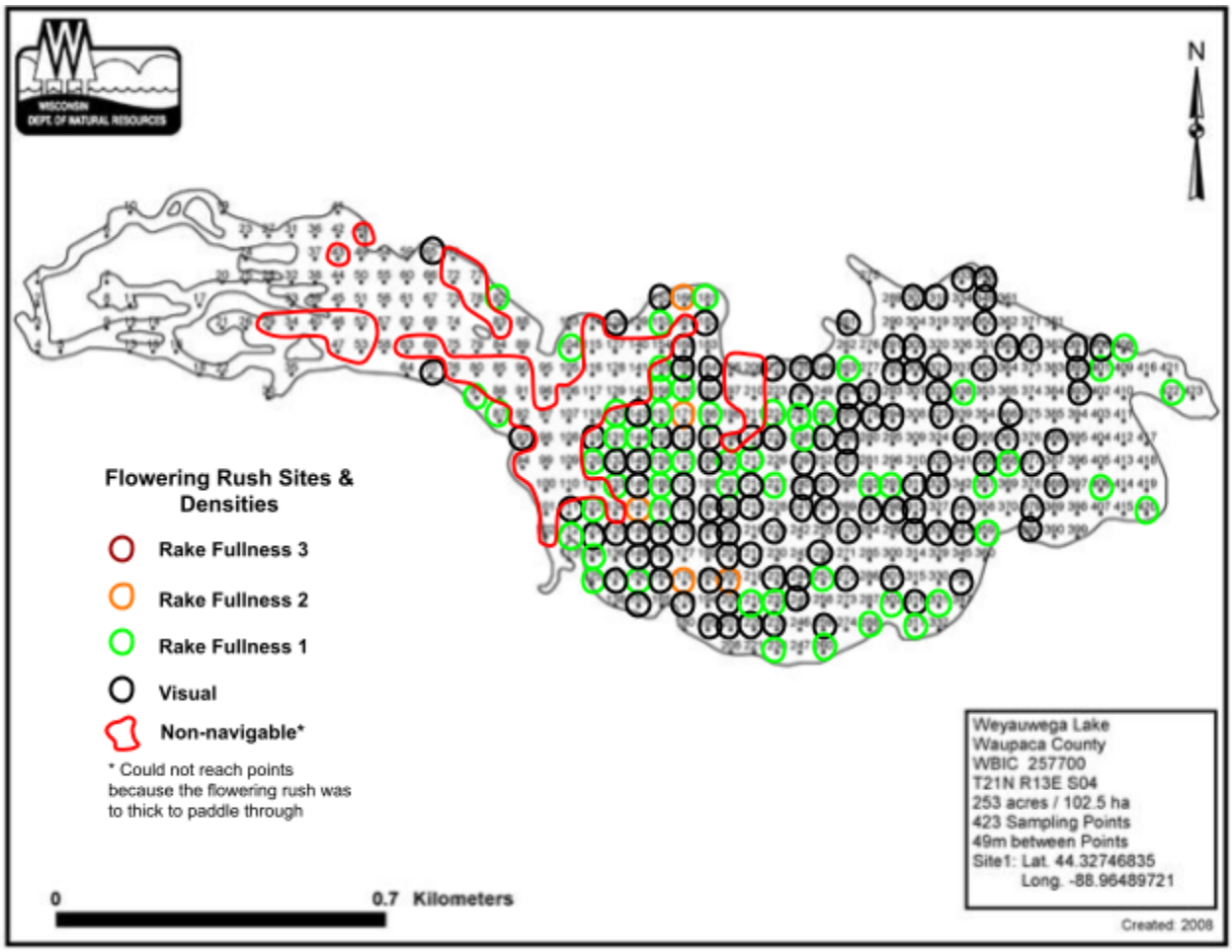


Figure 3: Flowering Rush Sites and Densities, Both Rooted & Floating Plants



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