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!

Crystal Lake, Marquette County, WBIC 157300
Point Intercept Aquatic Plant Survey
August 15, 2022

Golden Sands Resource Conservation & Development Council, Inc (RC&D) staff Chris Hamerla and Kendra Kundinger completed a Point Intercept Aquatic Plant Survey (PI Survey) on Crystal Lake on August 15, 2022. The survey was completed to continue data as part of a Statewide Eurasian watermilfoil (EWM) monitoring project. This data has historically been used by the Wisconsin Department of Natural Resources staff to understand the variation in EWM growth on lakes across WI, how aquatic plant populations respond to different management efforts, and how these plant communities change over time. Crystal Lake had been one of the lakes chosen for this project because it met various criteria (size, region, nutrient levels, presence of EWM, timing of EWM establishment and the fact that the EWM was not being managed).

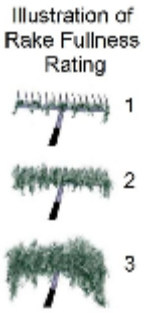
Benefits of Aquatic Plants

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. Crystal Lake contains 302 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 (see illustration to the right). 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 the 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. Only species which were found on the rake during the PI survey are used to calculate FQI and species richness. This helps to standardize surveyor efforts across the entire state and is why visual observations are not included. Table 2 summarizes the lake's littoral frequency of occurrence, maximum depth of plant growth, species richness and FQI. It should be noted that a lake falling below the statewide average for that ecoregion isn't necessarily "disturbed". Many influences play a role in determining the species and abundance of plants in a lake. Water chemistry, acidity, hardness, clarity and bottom sediment are examples of natural influences. Increased nutrient runoff, use of chemicals, development and water control structures are examples of human influences.

It should also be noted that plant species may differ from year to year on the following Table 1. GPS coordinates are accurate only within twenty feet and plant communities can shift. Table 1 represents species which were detected on the rake with a numerical value. Species observed but not collected on the rake are listed as visuals.

Table 1: Species Present: While the 2022 lake numbers are lower, the species observed has not changed significantly.

Common Name	Scientific Name	Plant type: floating leaf, free floating, submergent, emergent	2020 % Littoral Frequency of Occurrence	2022 % Littoral Frequency of Occurrence
Muskgrasses	*Chara sp.*	submersed	84.04	70.54
*Eurasian water milfoil	**Myriophyllum spicatum*	submersed	18.09	11.61
Slender naiad	*Najas flexilis*	submersed	14.89	16.07
Wild celery	*Vallisneria americana*	submersed	12.77	12.5

Variable pondweed	*Potamogeton gramineus*	submersed	7.45	2.68
Illinois pondweed	*Potamogeton illinoensis*	submersed	7.45	5.36
Fries' pondweed	*Potamogeton friesii*	submersed	6.38	2.68
Sago pondweed	*Stuckenia pectinata*	submersed	5.32	6.25
White waterlily	*Nymphaea odorata*	floating leaf	2.13	.89
Coontail	*Ceratophyllum demersum*	submersed	1.06	1.79
Northern water milfoil	*Myriophyllum sibiricum*	submersed	1.06	visual only
Stonewort	*Nitella sp*	submersed	1.06	not observed
Needle spikerush	*Eleocharis acicularis*	submersed	1.06	not observed
Common bladderwort	*Utricularia vulgaris*	free floating	visual only	visual only
Spatterdock	*Nuphar variegata*	floating leaf	visual only	visual only
Floating leaf pondweed	*Potamogeton natans*	floating leaf	visual only	.89
Small duckweed	*Lemna minor*	free floating	not observed	.89

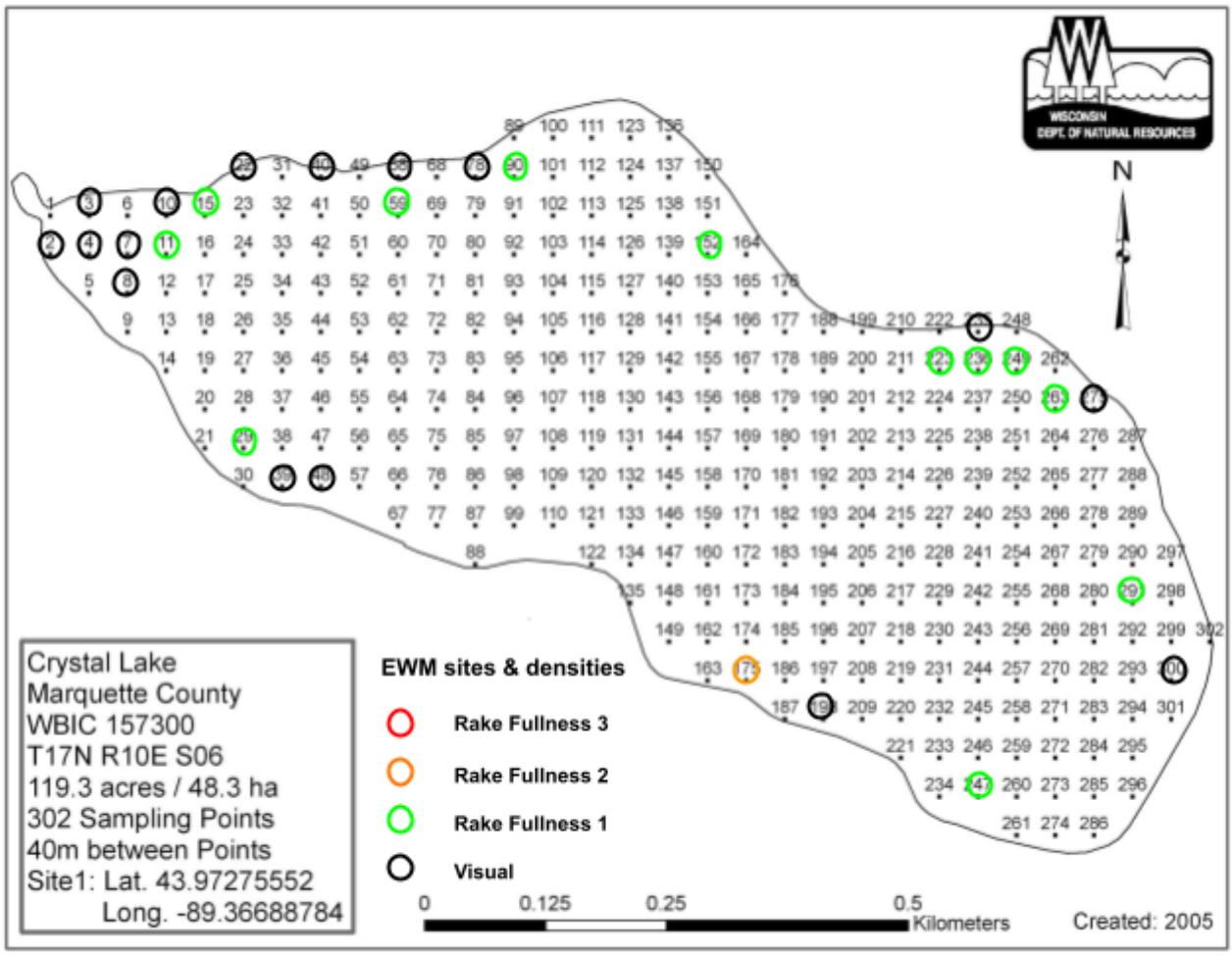
% Littoral frequency of occurrence: This is calculated by taking the total number of times a species is recorded divided by the total number of points in the lake where plant growth is possible.

* *means a non-native species, potentially invasive.*

Table 2: Lake Survey Summary (filamentous algae and visuals are not included in species richness)

	Lake 2020	**Lake 2022**	**Statewide Average**	**North Central Hardwoods Forests Ecoregion Average**
Littoral Frequency of Occurrence (%)	**93.6**	**81.25**	**74.3**	**76.0**
Maximum Depth of Plant Growth	**23**	**29**	**15.3**	**15.9**
Species Richness	**13**	**12**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**20.2**	**18.39**	**24.1**	**23.3**

Figure 1: 2022 EWM sites and densities



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