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a 501(c)3 non-profit conservation organization
Conservation That Works!

Pearl Lake, Waushara County WBIC #195400
Point Intercept Aquatic Plant Survey
July 26 & 27, 2022

Pearl Lake Protection & Rehabilitation District,

Golden Sands Resource Conservation & Development Council, Inc (RC&D) completed a Point Intercept Aquatic Plant Survey (PI Survey) on Pearl Lake on July 26 & 27, 2022. The survey was completed by Golden Sands RC&D staff Chris Hamerla and Kendra Kundinger to update the aquatic plant community data for lake management planning purposes.

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.

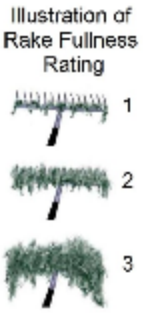
Aquatic Invasive Species

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.

No new AIS were observed during the 2022 survey. Curly leaf pondweed is known to be in Pearl Lake but was not observed. This is likely due to the plant's tendency to die back as the water warms. Surface water temperatures during the survey averaged 74 degrees fahrenheit.

Zebra mussels were not observed on collected plants or through casual observation.

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. Pearl Lake contains 423 sample points. 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 (see illustration to the left). 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". Other plants seen on the lake are recorded as a "boat survey".(Figure 1 shows a map with the survey points and EWM locations. Figure 2 shows 2019 EWM locations) To learn more about PI sampling methods and how data is collected please visit:
https://dnr.wi.gov/lakes/plants/research/project.aspx?project=96832337

Frequency of occurrence is the percentage of time a species is found on the rake 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. 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. 2022 species are in the fourth column while 2019 species are in the final column.

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 Occurrence 2022	% Littoral Frequency Occurrence 2019
Nitella	*Nitella sp.*	submergent	18.97	50.00

Muskgrasses	*Chara sp.*	submergent	43.89	39.53
Slender naiad	*Najas flexilis*	submergent	7.91	23.84
Southern naiad	*Najas guadalupensis*	submergent	16.6	Not observed
Aquatic moss	----------	submergent	17.79	17.44
Common Name	**Scientific Name**	**Plant type: floating leaf, free floating, submergent, emergent**	**% Littoral Frequency Occurrence 2022**	**% Littoral Frequency Occurrence 2019**
Wild celery	*Vallisneria americana*	submergent	7.51	8.72
Filamentous algae	----------	free floating	.40	3.49
Sago pondweed	*Stuckenia pectinata*	submergent	.40	3.49
*Eurasian water-milfoil	*Myriophyllum spicatum*	submergent	6.32	2.91
Stiff pondweed	*Stuckenia strictifolius*	submergent	6.72	2.91
Common waterweed	*Elodea canadensis*	submergent	3.56	2.33
Flat-stem pondweed	*Potamogeton zosteriformis*	submergent	1.98	2.33
Small pondweed	*Potamogeton pusillus*	submergent	.40	2.33
Coontail	*Ceratophyllum demersum*	free floating	Not observed	1.16
Floating-leaf pondweed	*Potamogeton natans*	submergent	.79	1.16
Large leaf pondweed	*Potamogeton amplifolius*	submergent	2.77	Not observed
Leafy pondweed	*Potamogeton foliosus*	submergent	Not observed	1.16
Nothern water-milfoil	*Myriophyllum sibiricum*	submergent	3.56	0.58
Fries pondweed	*Potamogeton friesii*	submergent	.40	0.58
Water stargrass	*Heteranthera dubia*	submergent	.40	Not observed
Variable pondweed	*Potamogeton gramineus*	submergent	11.46	11.05
Three square rush	*Schoenoplectus pungens*	emergent	Visual	Not observed

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

	Lake	**Statewide Average**	**North Central Hardwoods Forests Ecoregion Average**
Littoral Frequency of Occurrence (%)	**71.94**	**74.3**	**76.0**
Maximum Depth of Plant Growth	**32**	**15.3**	**15.9**
Species Richness	**17**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**25**	**24.1**	**23.3**

Figure 1: **2022 EWM Sites and Densities**
* PI points on Pearl Lake are 31 meters or 101 feet apart. More locations of EWM are likely present than the map shows. EWM surveying and mapping are needed to show a more accurate assessment of locations and total area.

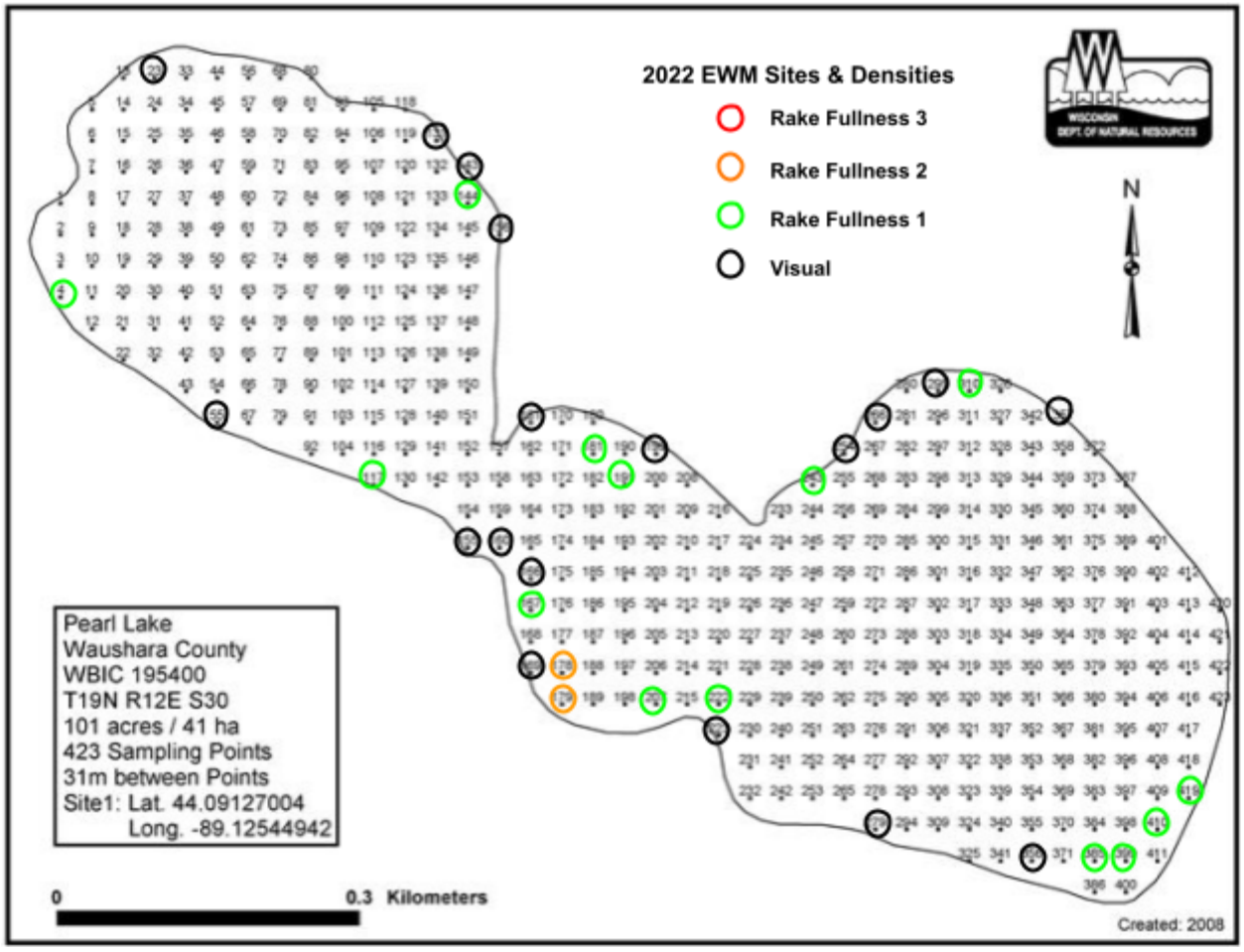
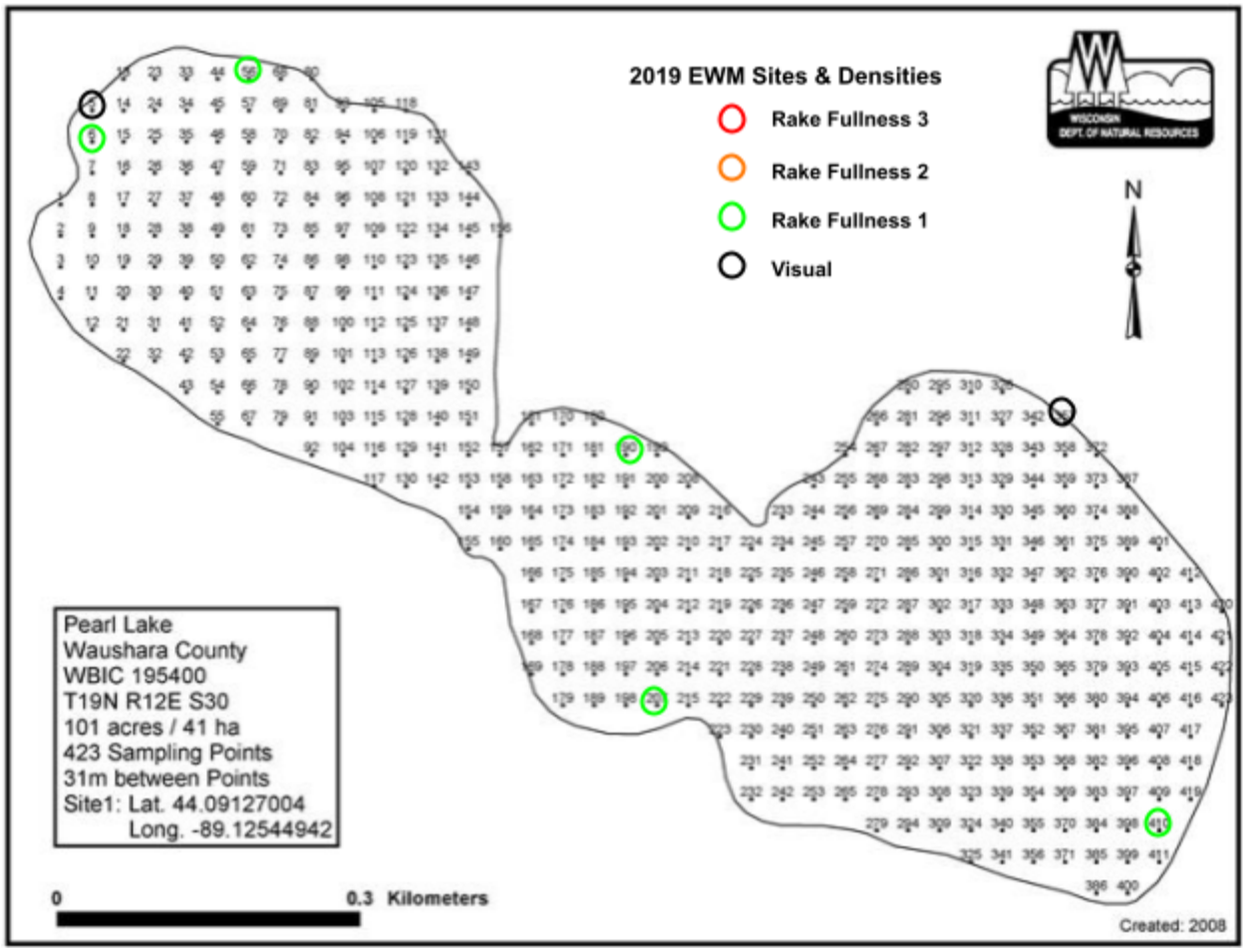


Figure 2: **2019 EWM Sites and Densities**



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