State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
2801 Progress Rd.
Madison WI 53716

Scott Walker, Governor
Cathy Stepp, Secretary

October 29, 2015

Dear Mr. Knope:

You requested information regarding an aquatic plant survey that staff from the Research Bureau of the Department of Natural Resources conducted on July 23, 2015 on Loon Lake in Shawano County, WI. The plant survey was conducted as part of a statewide Eurasian water milfoil monitoring project. This data will be used by the Department to understand the variation in milfoil growth among lakes across the state, how aquatic plant populations respond to management regimes, and how plant communities change over time. Loon Lake is one of the lakes chosen for this project because it meets certain criteria (size, region, nutrient levels, presence of milfoil, timing of milfoil establishment, etc.) for this study.

Importance of Aquatic Plants

Aquatic plants form the foundation of healthy lake ecosystems. They not only protect water quality, but also produce life-giving oxygen. Aquatic plants are a lake's own filtering system, helping to clarify the water by absorbing nutrients like phosphorus and nitrogen that could stimulate algal blooms. Plant beds stabilize soft lake bottoms and prevent shoreline erosion by reducing the effect of waves and currents. Healthy native aquatic plant communities help prevent the establishment of invasive non-native plants such as Eurasian water milfoil and curly-leaf pondweed. Native aquatic plants also provide important reproductive, food, and cover habitat for fish, invertebrates, and wildlife. By leaving or restoring a natural buffer area of emergent vegetation along the shoreline, property owners can reduce erosion, help maintain water quality, and provide habitat and travel corridors for wildlife.

Invasive Aquatic Plant Species

Invasive aquatic species are a huge threat to Wisconsin lakes both ecologically and economically. Ecological impacts of introduced invasive species can range in severity depending on differing ecosystem variables. Specific impacts are difficult to predict. Invasive plants are problematic because they can grow to nuisance levels. These dense populations of non-native plants often have a negative impact on native plant communities because they are able to out-compete them for available resources needed for survival. Changes in the native plant community have far-reaching effects on fish, birds and invertebrates that need native plants to survive. Nuisance levels of non-native aquatic plants may also inhibit recreational activities (such as fishing, swimming, boating, etc.), decrease aesthetic value, and negatively effect water quality. Some industries such as sport and commercial fishing and raw water users (power companies and utilities), are also negatively affected by invasive species. It is important that everyone utilizing Wisconsin's lake resources do their part to help prevent and stop the spread of aquatic invasive species.

Point-Intercept Sampling Method

Based on area and depth specific to Loon Lake, we mapped a 365-point sampling grid over the entire lake surface. Using a GPS, we navigated by boat to each of the pre-determined grid points. At each point we used a two-sided rake to sample approximately 1 foot along the bottom. After pulling the plants to the surface, the overall rake as well as individual species on the rake were assigned a fullness rating of 1, 2 or 3 to estimate density of plant growth (see Figure 1 for descriptions of rake fullness ratings). We also recorded visual sightings of species within six feet of the sample point, as well as any additional species seen in the lake during a general boat survey. For more detailed information on the point-intercept sampling method and how data were collected please visit: http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf

Species frequencies of occurrence reflect the percentage of times a species was found out of the total number of points sampled. Littoral frequency of occurrence (given in Table 1) indicates how often a species was found considering only areas of the lake that are capable of supporting plant growth (known as the "littoral area"). The maximum depth of plant growth is the deepest depth at which plants were found in the lake. Species richness is a count of the total number of different plant species found in a lake. The Floristic Quality Index (FQI) is a metric that evaluates the closeness of the flora in a lake to that of an undisturbed condition. The higher a FQI value, the closer that plant community is to an undisturbed ecosystem. Statewide and ecoregion averages are calculated from a subset of approximately 250 lakes across Wisconsin.

Table 1: Species Present

% Frequency of Occurrence (Littoral): This estimation of frequency of occurrence is calculated by taking the total number of times a species is detected in a lake divided by the total number of points in a lake at which the growth of plants is possible. Voucher specimens have been sent to the UW-Stevens Point Herbarium, therefore all species identifications are subject to change pending verification.

Common Name	Scientific Name	Growth Form (Floating, free floating, submerged, emergent)	% Frequency of Occurrence
Wild celery	*Vallisneria americana*	Submerged	31.80
Muskgrasses	*Chara* sp.	Submerged	28.45
Slender naiad	*Najas flexilis*	Submerged	27.20
Nitella	*Nitella* sp.	Submerged	9.62
Large-leaf pondweed	*Potamogeton amplifolius*	Submerged	5.86
Clasping-leaf pondweed	*Potamogeton richardsonii*	Submerged	5.44
Small pondweed	*Potamogeton pusillus*	Submerged	5.02
Spatterdock	*Nuphar variegata*	Floating	4.60
Watershield	*Brasenia schreberi*	Floating	3.77
Common bladderwort	*Utricularia vulgaris*	Submerged	3.35
Variable pondweed	*Potamogeton gramineus*	Submerged	3.35
Coontail	*Ceratophyllum demersum*	Submerged	2.93
White water lily	*Nymphaea odorata*	Floating	2.51
Common waterweed	*Elodea canadensis*	Submerged	2.09
Illinois pondweed	*Potamogeton illinoensis*	Submerged	2.09
Water star-grass	*Heteranthera dubia*	Submerged	2.09
Southern naiad	*Najas guadalupensis*	Submerged	1.67
Small bladderwort	*Utricularia minor*	Submerged	1.26

Eurasian water milfoil*****	*Myriophyllum spicatum******	Submerged	0.84
Arrowhead	*Sagittaria* sp.	Emergent	0.42
Creeping bladderwort	*Utricularia gibba*	Submerged	0.42
Forked duckweed	*Lemna trisulca*	Free floating	0.42
Ribbon-leaf pondweed	*Potamogeton epihydrus*	Submerged	Visual
Floating-leaf bur-reed	*Sparganium fluctuans*	Floating	Boat survey
Robbins' spikerush	*Eleocharis robbinsii*	Emergent	Boat survey
Filamentous algae			2.51
Aquatic moss			0.84
Freshwater sponge			0.42

***** = species non-native and potentially invasive in WI

Survey Summary

	LAKE	**STATEWIDE AVERAGE**	**ECOREGION AVERAGE**
Littoral Frequency of Occurrence (%)	**56.49**	**74.3**	**76.0**
Maximum Depth of Plant Growth (ft)	**10.5**	**15.3**	**15.9**
Species Richness	**21**	**16.8**	**16.2**
Floristic Quality Index (FQI)	**28.62**	**24.1**	**23.3**

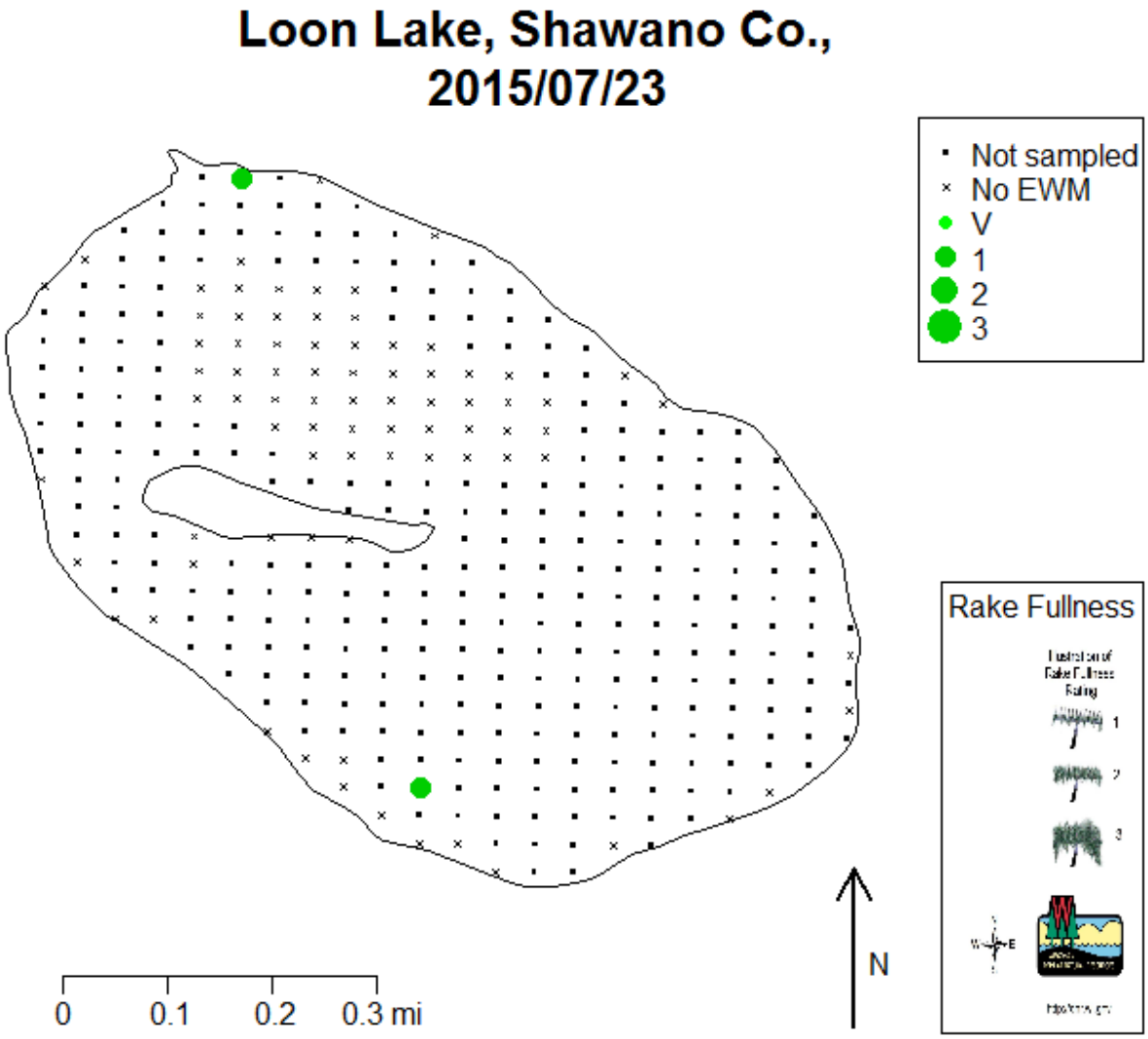

Figure 1: A map of the approximate location of Eurasian water milfoil.

Additional Resources:

Wisconsin State Herbarium and Plant Identification
http://www.botany.wisc.edu/wisflora/

Invasive Species in Wisconsin
http://dnr.wi.gov/topic/Invasives/

Wisconsin's Lakes
http://dnr.wi.gov/lakes/

Aquatic Plant Management in Wisconsin
http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/ecology/aquaticplants/default.aspx

Please note that while this study conforms to statewide protocol and standards for baseline data collection, it may not be suitable for management purposes. For information as to whether this survey meets requirements for management plans or permitting requirements, please contact your local DNR lake coordinator (copied below).

If you have any additional questions regarding the DNR Research Bureau's survey or study, please feel free to contact us.

Sincerely,

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