Controlling *Myriophyllum spicatum* in Springville Pond, Portage County, Wisconsin

John Mumm

Faculty Mentor: Nancy Turyk

Aquatic Macrophyte Survey 2007 Background

The invasive aquatic macrophyte *Myriophyllum spicatum*, (Eurasian Water Milfoil, *M. spicatum*) was identified in 2003 in Springville Pond (located in the Village of Plover). Since then, aquatic macrophyte surveys have been performed annually. All surveys evaluated the aquatic macrophyte community and the density of *M. spicatum* using the WDNR Aquatic Macrophyte Survey Point Intercept Methodology (Hauxwell, J., et al. 2004). In 2005 *M. spicatum* populations exploded resulting in the Springville Pond Management committee to developed a treatment plan to guide the management actions in 2007. The plan recommended using different techniques to control the invasive species in the Pond. The management plan used multiple techniques to treat the Pond with a goal of minimizing the use of chemicals. In August 2007, an aquatic macrophyte survey was performed by UWSP. The survey showed the increase of native species and the decrease in density of the invasive species. In the winter of 2007, a new management plan was developed for summer 2008. The 2008 plan continues focus on the control of aquatic invasive species. Treatments are restricted to an area of less than 50% of the pond.

GOALS OF 2008

1) Perform aquatic macrophyte surveys to update the status of *M. spicatum* in the pond.
2) Help the Village of Plover through the process of deciding on reasonable treatments for the 2008 management plan.

An aquatic macrophyte survey was performed by UWSP in 2007 which provided data to update the Springville Pond Aquatic Plant Management (APM) plan. *M. spicatum* is still spread through out the lake, but it is obvious that the APM of 2007 worked (Figure 2).

Springville Pond Background

- Springville Pond is located on the east side of Business 51 in the Village of Plover, Wisconsin. It is an 18 acre impoundment that was created by a dam on the Little Plover River, a Class 1 trout stream. Springville Pond has a maximum depth of 3 m. The majority of the water in the Pond comes from the Little Plover River. (Figure 1)
- The three dominant land uses in the surface watershed are residential, agriculture, and forest. The most prominent land use within 305 m of the shoreline of Springville Pond is residential (Figure 1).
- Residential land use has significantly increased around the pond in the last fifty years.
- Shoreline buffer zones were studied in 2006 and 2007. The amount of effective shoreline buffers increased between 2006 and 2007. Buffers have an important role in filtering pollutants in runoff.

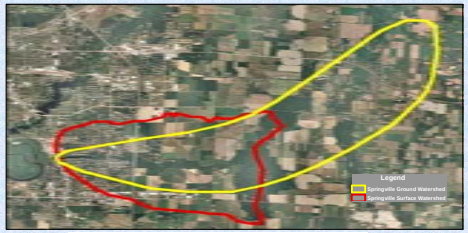

Figure 1- Springville Pond's surface watershed and ground watershed.

2007 Aquatic Macrophyte Survey Methods

- 83 survey points were evenly distributed across the lake plus "visual points" (Figure 2 and 3).
- A GPS unit and canoes were used to locate the points.
- The depth was measured at each station using a depth finder.
- Dominant sediment type was evaluated; three primary classes of sediment: muck, sand, and rock.
- Aquatic plants were sampled using a rake which was tossed out from the canoe to the bottom of the lake.
- The plants on the rake were identified and assigned a class of density of 1 (few), 2 (moderate), or 3 (abundant).
- The grid system may under-sample very shallow sites where the vegetation is different. To compensate, additional observations were made between stations and near the shoreline (observed-v, Figures 2 and 3).

Aquatic Macrophyte Treatments

- Milfoil weevils (*Eurhrychliopsis lecontei*), were released during 2006 summer.
- A 1 m winter drawdown, 2006/07 winter.
- Application of chemical herbicide (Weedar 64) in approved areas May 2007.
- Mechanical harvesting in approved areas in July 2007 .
- Hand harvesting around docks by lakeshore residents in July 2007.
- Monitoring of treatments was conducted during summer 2007.

Aquatic Invasive Species Results

- *M. spicatum* was present at many sites in Springville Pond however, there has been a decline from 2006, being located at 75% of the points in 2006 and 73.4% of the points in 2007, mainly on the west side of the lake (Figure 2).
- In 2007 the densest *M. spicatum* occurred on the east side of the pond.
- The majority of the sites (57.8%) had a sparse level of density in 2007.
- In the 2006 survey *Potomogetan crispus* (Curly leaf-pondweed, *P. crispus*) was only identified on the west side of the impoundment but during the 2007 survey *P. crispus* was also present on the east side of the impoundment (Figure 3).
- One percent of the sampling sites had *P. crispus* in 2006, 23% of the sampling sites had *P. crispus* in 2007.
- The majority of the sites in 2007 (68.4%) had few or sparse density.

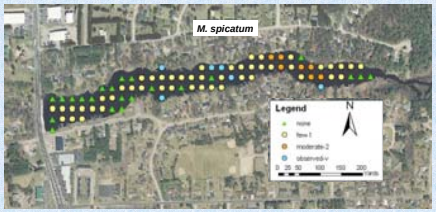

Figure 2- *Myriophyllum spicatum* in August 2007 aquatic macrophyte survey done by UWSP.

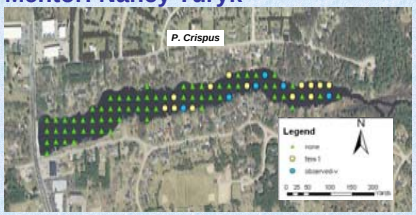

Figure 3- Potamogeton crispus in Springville Pond, August 2007.

Aquatic Community Explanations of FQI, Dominance, and SDI

- The floristic quality index (FQI) is a standardized method of evaluating natural plant communities.
- FQI is calculated using the coefficient of conservatism ("c value") which is assigned to each species of plant.
- C value (a scale of 0 to 10) indicates the degree to which a species can tolerate disturbance to a native plant community, 10 is found in undisturbed areas and 1 is tolerant of disturbed conditions. 0 is assigned to alien species.
- FQI is produced by multiplying the average c value for all species by the square root of the total number of species found at that lake; and additional points are added to the index for each state-listed special concern species, threatened species, or an endangered species.
- A higher FQI indicates a higher floristic quality and biological integrity and a lower level of disturbance impacts.
- A lower FQI indicates a lower floristic quality and biological integrity and a higher level of disturbance impacts.

- The most prominent species of aquatic plants in a lake is considered the most dominant species.
- Dominance calculations include measures of density and frequency; the highest dominance value is 2.

- The Simpson diversity index (SDI) quantifies biodiversity as a percent using a formula containing the number of species surveyed and the number of individuals found per species. The closer the SDI is to one, the more diverse the plant community.
- Greater diversity of species helps to stabilize the aquatic plant community and provide more food and habitat niches within the Pond.

FQI, Dominance, FO, and SDI Results

- The c values for Springville Pond in the 2007 survey ranged from 0 to 7, with an average of 4 (Tables 1 and 2).
- The FQI for Springville Pond was 18.8 in 2007, quite similar to the 16 assigned to the Pond in 2003 (Table 2). The range of FQI for impoundments in Portage County in 2003 was 16 – 40.8 (2003, Freckmann).
- In 2007 Springville Pond remains within but on the low end of the County's range indicating that it has one of the highest amounts of disturbance in Portage County.
- In Springville Pond is *M. spicatum* is the most dominant, which has a dominance value of 0.80 (Table 1).
- In 2007 the SDI was 0.88 which was a significant increase from 0.15 in 2006. This increase is higher than the previous study because of the inclusion of visual observations on the east end of the pond.
- The frequency of occurrence (FO) percentage compares vegetated sites and sites shallower than the maximum water depth that plants were found (3 m). Approximately half (46%) of surveyed sites shallower then 3 m had native plants. Figure 4 shows a fairly consistent ratio between the two frequency classes for each species.

Scientific Name	Common Name	2003 Survey	2006 Survey	2007 Survey	C Value	Dominance Value
Bidens cernuus	Nodding bur-marigold	X		X	4	0
Bidens comosus	Swamp marigold			X	5	0
Butomus umbellatus	Flowering rush			X	0	0
Carex comosa	Bristly sedge	X		X	5	0
Carex stricta	Hummuck sedge			X	7	0
Chara spp.	Muskgrasses	X		X	7	0
Chelone glabra	Turtlehead			X	7	0
Cicutra bulbifera	Bublet water hemlock			X	7	0
Eleocharis acicularis	Needle spikerush			X	5	0
Eleocharis palustris	Creeping spikerush	X		X	6	0
Elodea nuttallii	Narrow leaved waterweed	X			7	0
Epilobium coloratum	Cinnamon willow-herb	X			3	0
Impatiens capensis	Orange jewelweed	X		X	2	0
Juncus effusus	Soft rush	X		X	4	0
Lemna minor	Small duckweed	X	X	X	5	0.10
Myriophyllum sibiricum	Northern water milfoil	X			6	0
**Myriophyllum spicatum*	Eurasian water milfoil	X	X	X	0	0.80
Nymphaea odorata	White water lily			X	6	0
**Phalaris arundinacea*	Reed Canary grass	X		X	0	0
Polygonum amphibium	Water smartweed			X	5	0
Polygonum hydropiperoides	Swamp smartweed	X			6	0
**Potamogeton crispus*	Curly leaf pondweed	X	X	X	0	0.17
Potamogeton pectinatus	Sago pondweed	X	X	X	3	0.45
Rumex verticillatus	Swamp dock	X			6	0
Schoenoplectus tabernaemontani	Softstem bulrush	X		X	4	0
Scutellaria lateriflola	Mad-dog skullcap			X	5	0
Solanum dulcamara	Bittersweet nightshade	X			0	0
Typha latifolia	Broad-leaved cattail	X		X	1	0
Zannichellia palustris	Horned pondweed	X			7	0
	Filamentous algae	X	X	X	N/A	0.47

Table 1- List of aquatic vascular plants and macro-algae identified in Springville Pond in recent aquatic plant surveys, C Values, and 2007 Dominance Values.

Survey Year	Median number of species	Average C value	Max C Value	FQI
2003	22	3.5	7	16
2006	4	2	4	8
2007	22	4	7	18.8

Table 2- Median number of species, average and Max c values, and FQI for recent aquatic macrophyte surveys in Springville Pond.

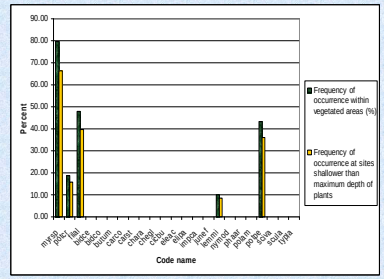

Figure 4- Frequency of occurrence for aquatic plants collected on rake samples in Springville Pond during the August 2007 survey.

Flowering Rush

- Flowering Rush *(Butomus umbellatus)* is a newly identified macrophyte in the Springville Pond.
- It is native to Eurasia and grows on the banks of still and slowly moving water down to a depth of around 3 m. It has pink flowers and long green rushes.
- It was introduced into North America as an ornamental plant but is now becoming an invasive species in the Great Lakes region.
- It has not been found in Portage County until now and because of the connection with the Wisconsin River it is particularly important to monitor the area it was found and destroy any plants.
- This rush is difficult to identify when it is not flowering, so efforts will be most fruitful while it is flowering in spring/early summer.

Figure 6- *Butomus umbellatus* (Flowering rush)

Figure 5- Location of *Butomus umbellatus* at Springville Pond.

2008 Aquatic Plant Management Treatments

- Total treatment area should not exceed 50% of the lake.
- Spring 2008 DNR will monitor *M. spicatum* to evaluate and approve chemical applications, Weedar 64 can be applied in the west end (water depths greater than 2.5 m) in early spring. (Figure 7)
- Harvesting can continue as a control for *M. spicatum* and nuisance level native plants in water depths greater than 1 m (Figure 7). Harvesting is to be done on an as needed basis.
- To gain control of *M. spicatum* in the middle of the Pond, hand pulling of it should take place in mid-June and mid-July.
- Remove invasive Flowering Rush in Spring 2008 when flowering.
- Weevils not to be stocked.
- UWSP will map *P. crispus* beds in June to track abundance in the Pond. UWSP will conduct annual aquatic plant surveys in August.
- Springville Pond subcommittee members, UWSP, and WDNR should meet in fall to review the 2008 data and develop strategies for 2009.

Figure 7- Treatment map set with updated surveyed depths.

Treatment	Surface Area (acres)	% Lake Effected
Harvest (area greater than 1 m deep)	10.6	56.7
Chemical Application (area greater than 2.5 m deep)	1.4	7.5

Table 3- Treatment area and percentage of lake effected.

Acknowledgements:
-Wisconsin Department of Natural Resources, to make the survey possible with their funding and help.
-Village of Plover, and Plover Residents, to make the survey possible with their funding and help.
-Kyle Homan, Darrin Hoverson, Adam Skadsen, and Brian Swenson for their assistance with the 2007 survey.
-Dr. Robert Freckmann, Professor Emeritus of Biology at UW-Stevens Point, for plant identification assistance.
-Amy Thorstenson, Director of Golden Sands RC&D, for monitoring assistance.
-Nancy Turyk, Water Resource Scientist, Center for Watershed Science and Education

Literature Cited:

Hauxwell, J., et al. 2004. Recommended Baseline Monitoring of Aquatic Macrophytes in Wisconsin - Point-Intercept Sampling Method, Collection Protocol, and Data Analysis. Wisconsin Department of Natural Resources, Madison WI. Pp. 1-10.

Mumm, K. and N. Turyk. 2007. Aquatic plant management for Springville Pond, Portage County, Wisconsin. UWSP Center for Watershed Science and Management.

Mumm, J. and N. Turyk. 2007. Springville Pond Portage County Aquatic Macrophyte Survey- August 2007. UWSP Center for Watershed Science and Management.

Mumm, J. and N. Turyk. 2008. 2008 Springville Pond Aquatic Plant Management Strategies. UWSP Center for Watershed Science and Management.

Thorstenson, A. 2007. 2007 Milfoil Weevil Population Survey. Golden Sands RC&D Council, Inc.