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Aquatic Vegetation Survey Report
Rice Lake – June 2009

Prepared for the Rice Lake Area Association
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Introduction

Curlyleaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*) have dramatically reduced the recreational and ecological quality of many freshwater lakes in Minnesota. As of 2008, over 750 Minnesota lakes had documented curlyleaf infestations, and nearly 200 had infestations of milfoil. Large areas of dense curlyleaf or milfoil growth can inhibit water recreation, reduce aesthetic quality of lake views, and have the potential to impair summer water quality (Bolduan et al. 1994; James et al. 2001; Smith and Adams 1986). These invasive non-native species are often lumped together as "bad plants", but there are some important differences in how they grow and the nature of the problems they cause.

Milfoil sprouts in the early spring from rootstock and stem fragments from the previous year's growth. It grows rapidly and reaches the surface faster than most native plants, quickly forming dense surface mats. These mats tend to persist for the rest of the summer, shading out other plants and clogging the motors of boaters who try to pass through them. Curlyleaf, on the other hand, sprouts from reproductive buds (turions) in the fall and then grows very slowly throughout the winter and early spring. As the ice disappears from lakes and water temperatures warm, the curlyleaf begins to grow more rapidly, often reaching the water surface by late May. This propensity for rapid early-season growth and the ability to form dense canopy mats gives curlyleaf a competitive advantage over most native aquatic plants. Unlike milfoil, curlyleaf naturally dies off by mid to late June. Although this means that dense surface mats of curlyleaf are usually gone by the 4th of July, rapid die-off of large areas of curlyleaf may result in a pulse of nutrients as the plants decay (Barko and Smart 1980; Carpenter 1980; Landers 1982; Barko and James 1998). This early summer spike in nutrients from decaying curlyleaf biomass may lead to additional recreational and ecological impairment through increased algae growth, decreased water clarity, and further reductions in native plant growth due to light limitation (Madsen and Crowell 2002). Collectively, curlyleaf pondweed and Eurasian watermilfoil have the potential to impair water recreation, degrade the ecological quality of waters, and reduce lakeshore property values (Krysel et al. 2003).

June 2009 Aquatic Plant Survey

Freshwater Scientific Services, LLC conducted a point-intercept aquatic vegetation survey of Rice Lake on June 1, 2009 to assess the distribution and density of curlyleaf pondweed growth and early summer native plants (Madsen 1999). An additional survey will be conducted in August to further assess Eurasian watermilfoil and native aquatic plants at their expected peak biomass. The June survey incorporated assessment of aquatic plants at 207 sample points spread across the entire lake, with 178 located in the main lake basin (DOW# 27-0116-01), eleven in the channel leading from the main lake basin to the outlet dam, and 18 in the newly designated western basin (DOW# 27-0116-02) (Figure 1). At each designated sample point, a double-headed rake was used to retrieve plants from approximately 11 ft^2 of lake bottom (1.1 ft-wide rake head dragged for 10 ft before retrieving). Upon retrieval, plant species on the rake head were identified and recorded along with plant density ratings, plant height, and water depth readings.

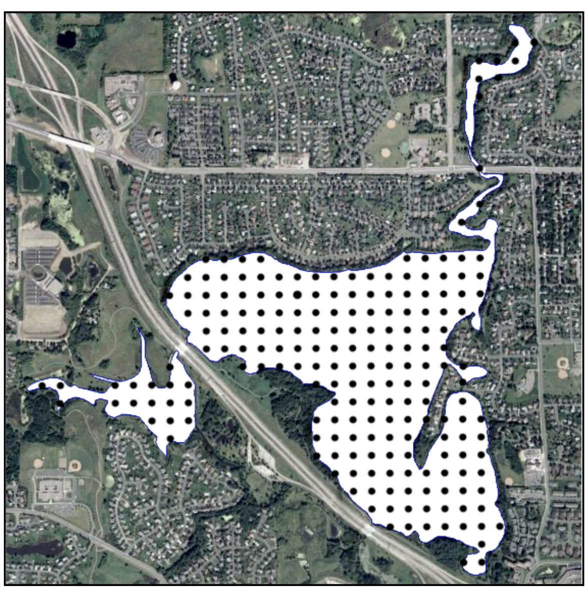
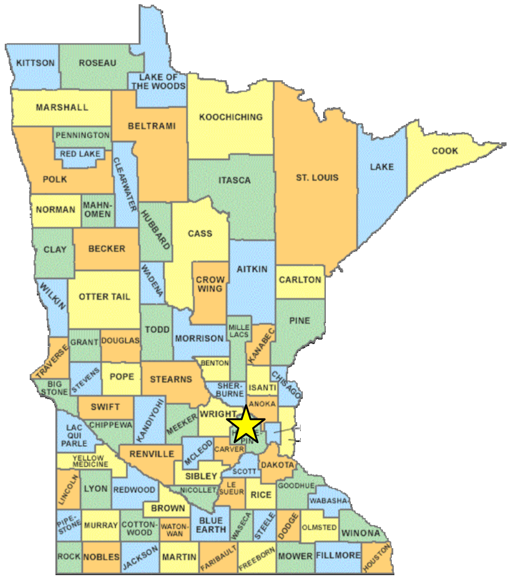


Figure 1. (Left) Map of Rice Lake showing sample point locations used for the June 2009 point-intercept plant survey. (Above) James A. Johnson, *Aquatic Ecologist - Freshwater Scientific Services,* evaluating a retrieved rake sample.



	Main Basin	***Northern Channel***	***West Basin***
Surface Area	315 acres	17 acres	34 acres
Maximum Depth	12 ft	10 ft	6 ft
Average Depth	5 ft	-	-
% Littoral (<15ft)	100%	100%	100%
Watershed Area	16,900 acres	-	-

Table 1. Characteristics of Rice Lake and its surrounding watershed

Overall Assessment of Plant Community

Due to the poor water clarity in the main basin of Rice Lake (Secchi depth was 2.3 ft at time of survey), plant growth in that basin was generally limited to areas shallower than 5 ft, with only a few instances of small fragments of coontail encountered in deeper areas up to 7.5 ft. Curlyleaf pondweed and Eurasian watermilfoil were observed growing to the surface in areas between 1.0 and 4.5 ft deep, but were not observed to form expansive areas of dense nuisance growth at any location. Curlyleaf in particular was widespread within this narrow depth range, but was still relatively uncommon lake-wide, occurring at only 7% of the sampled sites in the main lake basin. This confinement of plant growth to shallow areas was also observed in the northern channel of the lake leading to the outlet dam. The newly designated western bay showed dramatically different patterns of plant growth, with higher diversity, widespread dense growth, and a higher incidence of surface growth than the main basin or northern channel (Table 2). In sampling all of these areas, I found a total of 10 native plant species (Table 3), but only Coontail (*Ceratophyllum demersum*) and sago pondweed (*Stuckenia pectinata*) were found at more than 5% of the sampled locations, and 40% of the total observed occurrences of native plants were found within the western bay.

Table 2. Summary of results from the Rice Lake point-intercept vegetation survey conducted on June 1, 2009. Percentages were calculated as the number of sites with the vegetation or surface growth present, divided by the total number of samples sites within each section of the lake.

	Main Basin	**Northern Channel**	**Western Bay**
# Sample Points	178	11	18
Max Depth Growth	7.5 ft	7.5 ft	6.3 ft
% Vegetated	13%	36%	100%
% Surface Growth	10%	9%	72%
# Native Plant Species	5	2	7
Avg Curlyleaf Density (0-5)	0.1	0.2	0.6
Avg Milfoil Density (0-5)	<0.1	<0.1	0.0

Table 3. Summary of % occurrence for plant species encountered during the Rice Lake point-intercept vegetation survey (conducted on June 1, 2009). % occurrence values were calculated as the number of sampled sited where a given species was found divided by the total number of sites sampled in each section of the lake as indicated.

	Main Basin	Northern Channel	Western Bay
Coontail *Ceratophyllum demersum*	9	36	100
Elodea *Elodea canadensis*	1		39
Lesser duckweed *Lemna minor*			39
Star duckweed *Lemna trisulca*			17
Eurasian watermilfoil *Myriophyllum spicatum*	2	9	
White waterlily *Nymphaea odorata*	P	P	P
Curlyleaf pondweed *Potamogeton crispus*	7	18	28
Flat-stem pondweed *Potamogeton zosteriformis*			39
Hardstem bulrush *Scirpus acutus*		P	
Sago pondweed *Stuckenia pectinata*	6		39
Water stargrass *Zosterella dubia*			22
Horned Pondweed *Zannichellia palustris*	3		

Curlyleaf Pondweed

Although curlyleaf pondweed was widespread in near-shore areas between 1.0 and 4.5 ft deep, it was not observed to form severe nuisance growth to the degree observed in other area lakes. The observed level of curlyleaf surface matting represented less than 15% of the lake, meaning that all of the curlyleaf growth could be managed with harvesting or herbicide treatment without having to apply for a permit variance from the Minnesota DNR. Alternatively, the confinement of curlyleaf growth to shallow areas suggests that a partial lake drawdown to expose areas shallower than 5 feet may still be the best alternative for controlling curlyleaf in the future. The final 2009 report will discuss these management options in greater detail.

Eurasian Watermilfoil

Despite fairly frequent observations of milfoil reaching the surface of the lake in shallow near-shore areas, it was not observed to form dense nuisance growth in any areas of the lake. Like curlyleaf, milfoil in Rice Lake is confined to shallow near-shore areas. A more detailed discussion of milfoil and potential management strategies will be provided in the final 2009 report after data from the August survey are analyzed.

Native Aquatic Plants

Rice Lake currently supports a low abundance and a low diversity of native plant growth. Turbidity-tolerant plants, such as sago pondweed, horned pondweed, and coontail are currently widespread but sparse in the main basin and northern channel. The western bay currently supports a somewhat richer assemblage of native plants and at much higher densities than in the rest of the lake. Considering that the western bay is upstream from the main basin, the it may serve as a natural source of seeds and viable plant fragments for reestablishing native plant growth in the rest of Rice Lake. This idea is supported by the existence of higher species diversity in the area of the main basin directly adjacent to the channel entering from the western bay. If water clarity in the main basin is improved, and the growth of curlyleaf and Eurasian milfoil can me managed, native plants may quickly reestablish in some areas.

This report is being provided to RLAA as a preliminary summary of results from the June aquatic vegetation survey conducted on Rice Lake in 2009. These results will be discussed more fully in the final 2009 report, which will also include results from the August 2009 vegetation survey and management recommendations.

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