



Chisago Lake, 2005

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# Aquatic Plant Surveys for Chisago Lake, Chisago County, Minnesota in 2005

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Early Summer Survey: June 9, 2005  
Late Summer Survey: August 30, 2005

Prepared for:  
Chisago Lakes  
Lake Improvement District  
Chisago County, MN

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March 2006

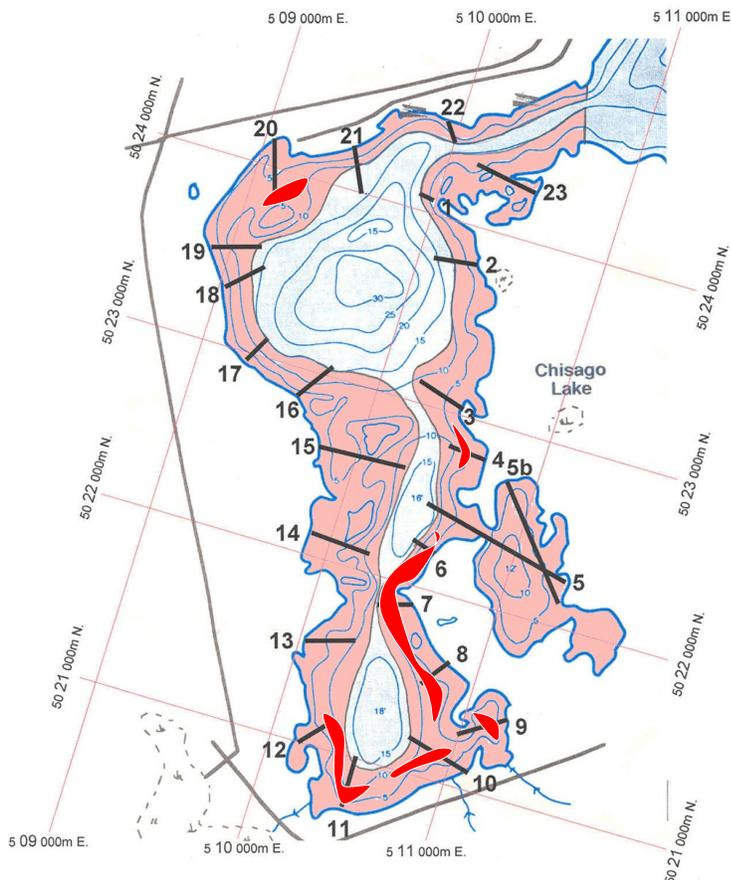
# Aquatic Plant Surveys for Chisago Lake, Chisago County, Minnesota in 2005

## Summary

Two aquatic plant surveys were conducted on Chisago Lake (873 acres) in 2005. The early summer survey of June 9 emphasized the distribution and abundance of curlyleaf pondweed. The late summer survey of August 30 was to characterize changes in the plant community and to scout for Eurasian watermilfoil. For each survey, 24 transects and 3 depths were checked.

Curlyleaf pondweed was the most common plant in Chisago Lake in early summer and showed up at 89% of the stations (Table 1). Curlyleaf pondweed is an exotic plant that dies back in mid-summer. In the early summer of 2005, curlyleaf pondweed was found throughout a large portion of Chisago Lake (Figure 1). It covered approximately 627 acres out of the 873 acre lake with nuisance coverage of about 45 acres. Dense beds of curlyleaf can be a recreational nuisance but there is another problem as well. When curlyleaf dies back in early summer, it releases significant amounts of phosphorus. This can add to algae blooms in late summer.

In August, the curlyleaf pondweed had died back. The acreage of aquatic submerged plants in Chisago Lake in late summer was about 361 acres with northern watermilfoil the most common aquatic plant showing up at 29% of the sample stations (Table 1). Plant density was low except for a couple of shallow bays. Eurasian watermilfoil was not found in Chisago Lake in 2005.



**Figure 1. The coverage of aquatic plants in June of 2005 is shown in pink and nuisance curlyleaf pondweed is shown in red. Curlyleaf pondweed was the dominant plant and the area of distribution was about 627 acres with nuisance growth covering about 45 acres.**

**Conclusions and Recommendations for Aquatic Plant Management in Chisago Lake:** The aquatic plant community has nine species of submerged plants in early summer and eleven species in late summer. This is a fair plant diversity condition.

If native plant distribution could increase, water clarity could improve as well. If curlyleaf pondweed could be controlled, native plants might increase.

Curlyleaf pondweed is a non-native aquatic plant that grows to nuisance conditions in early summer in Chisago Lake and then dies off by the end of June. As the curlyleaf plant beds decompose in the lake, phosphorus is released and feeds into algae blooms. Nuisance curlyleaf growth was delineated to be roughly 45 acres in 2005.

Curlyleaf pondweed control could help improve water quality in Chisago Lake. Mechanical harvesting is an effective control technique and herbicides can be effective as well. Other control techniques should be explored as well as including the use of iron filings. Research has indicated there is a potential for iron filings added to lake sediments to inhibit nuisance growth of curlyleaf pondweed.

**Table 1. The percent occurrence of aquatic plants for Chisago Lake in 2005. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if milfoil was found in 25 out of 50 stations, its percent occurrence would be 50%.**

	June 9, 2005 % Occurrence (72 stations)	August 30, 2005 % Occurrence (76 stations)	Changes from June to August
Bulrush ( <i>Scripus sp</i> )	1	3	0
Duckweed ( <i>Lemna sp</i> )	1	--	0
Spatterdock ( <i>Nuphar variegatum</i> )	--	1	0
White waterlilies ( <i>Nymphaea sp</i> )	4	3	0
Coontail ( <i>Ceratophyllum demersum</i> )	7	8	0
Needle spike rush ( <i>Eleocharis sp</i> )	--	1	0
Northern watermilfoil ( <i>Myriophyllum sibiricum</i> )	3	29	+
Cabbage ( <i>Potamogeton amplifolius</i> )	10	4	-
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	89	--	-
Nuttall's pondweed ( <i>P. epiphydrus</i> )	13	4	-
Stringy pondweed ( <i>P. pusillus</i> )	13	1	-
Claspingleaf pondweed ( <i>P. Richardsonii</i> )	10	4	-
Fern pondweed ( <i>P. Robbinsii</i> )	3	11	+
Flatstem pondweed ( <i>P. zosteriformis</i> )	8	13	+
Sago pondweed ( <i>Vallisneria americana</i> )	--	8	+
Water stargrass ( <i>Zosterella dubia</i> )	--	9	+
Filamentous algae	3	1	0
Aquatic Plant Coverage (acres)	627	361	-
Secchi disc (feet)	15.3	3.0	-

# Chisago Lake, Chisago County

Lake ID: 13-0012

Size: 873 acres (source: MnDNR)

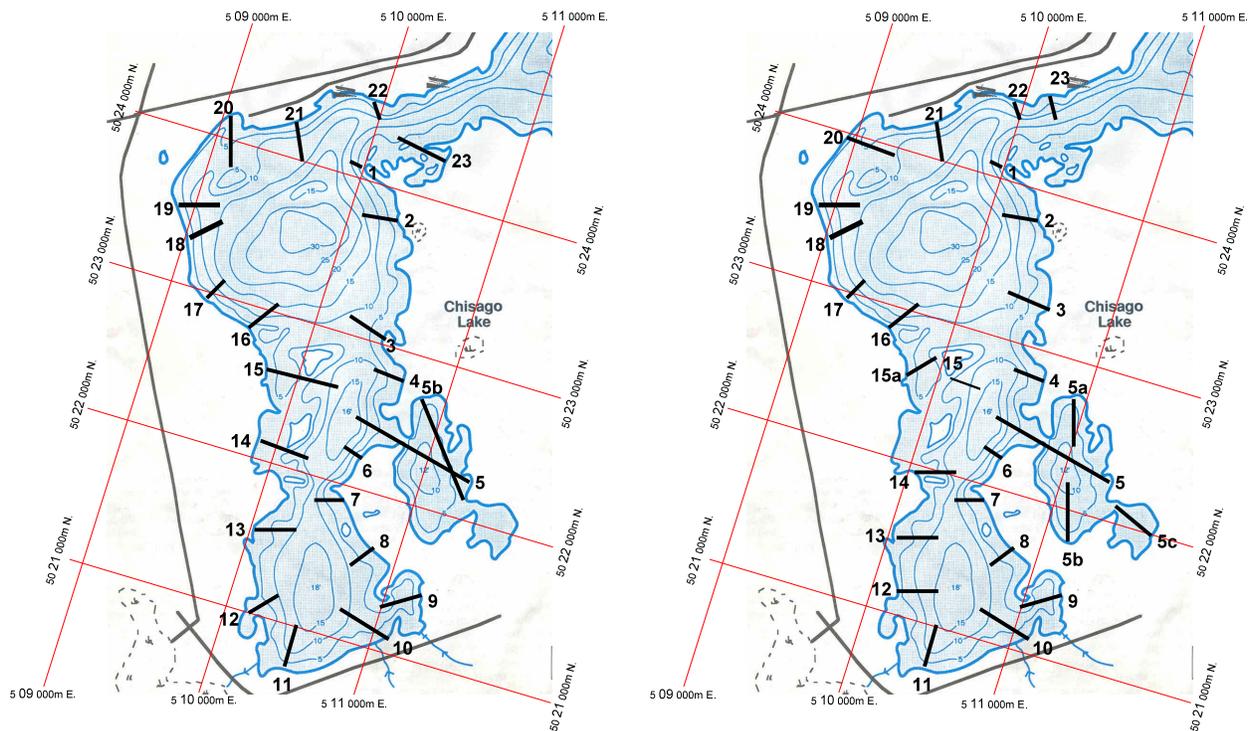
Littoral area: 694.5 acres (source: MnDNR)

Maximum depth: 34 ft (source: MnDNR lake map)

## Introduction

Chisago Lake is a 873 acre moderately fertile lake in Chisago County, Minnesota.

The aquatic plants of Chisago Lake were sampled to evaluate curlyleaf pondweed and to look for Eurasian watermilfoil and to document the extent of native plant coverage. Steve McComas, Blue Water Science, conducted two aquatic plant surveys on Chisago Lake on June 9 and August 30, 2005.



**Figure 1. Transects for plant surveys on June 9 and August 30, 2005. Transect locations changed slightly from June 9 to August 30. The August 30 survey covered areas around Transects 5 and 15 slightly more effectively than the June 9 survey.**

## Methods

Several techniques were used to characterize aquatic plants in Chisago Lake. We used 24 line transects with several passing through known curlyleaf areas in June and 25 line transects in August (Figure 1). A recording sonar (Lowrance X-16) was used to delineate the depths of weed colonization. Three depths (0-4 feet, 5-8 feet, and 9-12 feet) on a transect were sampled with a rake to characterize species presence and density.

Aquatic plant density was estimated based on a scale from 1-5 with 1 being the less dense and 5 representing plants matting at the surface. Plant density ratings were based on the amount of plants collected on a rake head. A single stem or a trace of an identifiable plant was rated at a density of "1". If plants were collected up to at least one half of the rake head (7 out of 14 tines) it was rated at a density of "2". If plants covered all of the rake tines, the density was a "3". If plants covered all 14 tines and was dense on all tines (even obscuring them) the density was a "4". A density of "5" was only assigned to plants matting at the surface. An example of a plant density of a 2 is shown in Figure 2.

Two to four rake samples were collected at each depth interval. A density for each plant species was determined for each rake sample and the species density was averaged based on the number of rake samples for a depth interval.

For plant surveys of this type, depth intervals are determined based on the maximum depth of plants found in the lake. Two depth intervals are used if plant growth is 10 feet or less and three depth intervals are used if plant growth is 12 feet or greater. Aquatic plants colonized out to 12 feet in Chisago Lake, so the three depth zones were used and they were: 0-4 feet, 5-8 feet, and 9-12 feet.

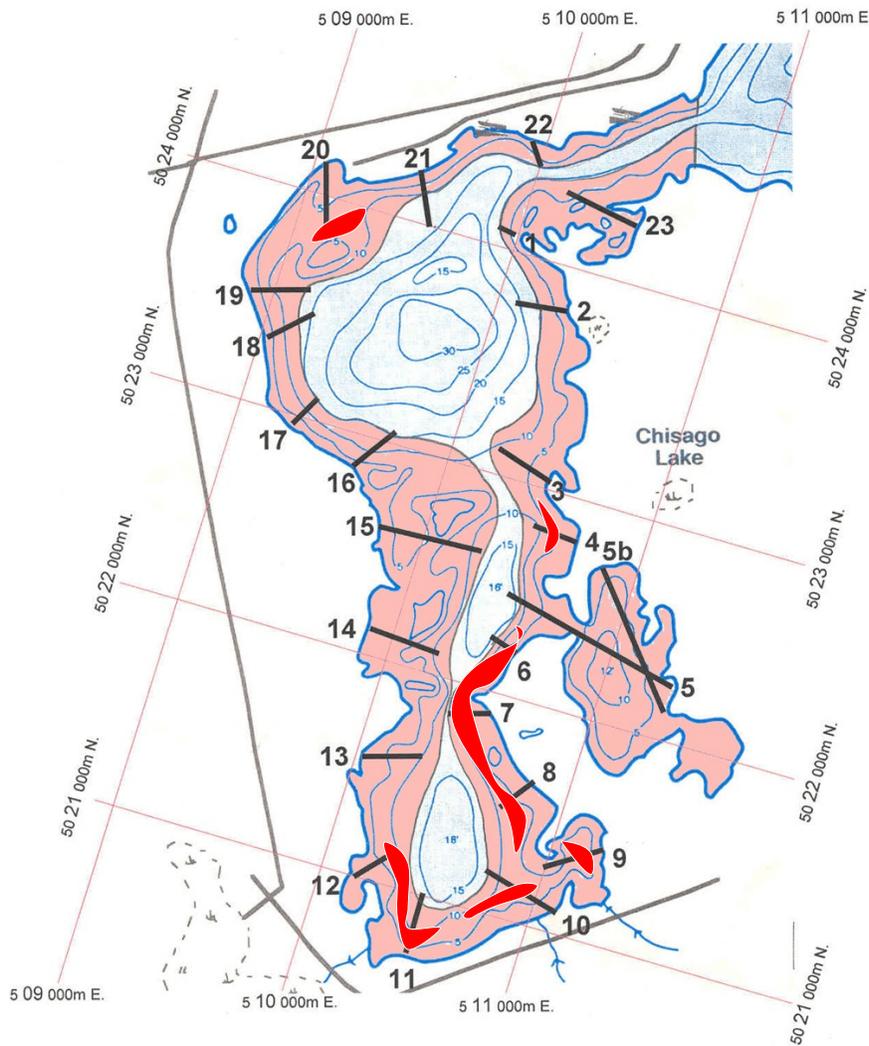


**Figure 2. Aquatic plants were sampled with a rake. Here is a sample of stringy pondweed at a density of a "2".**

## Results of the Early Summer Survey -- June 9

The most abundant plant in early summer in Chisago Lake was curlyleaf pondweed, a non-native plant, and it was estimated to cover 627 acres of the 873 acre lake, roughly 72% of the lake. Within the 627 acres of coverage, there was an estimated 45 acres of nuisance curlyleaf growth (Figure 3). Curlyleaf pondweed was found at 64 of the 72 stations and was by far the most common plant in Chisago Lake (Table 1). Curlyleaf grew out to a depth of 12 feet. The next most common plant was Nuttall and stringy pondweed and they occurred at 9 out of 72 stations. Native plants were scarce in Chisago Lake in June, although there are several beds of water lilies on Transects 10 and 11.

An inventory of plant occurrence and density is shown in Table 2.



**Figure 3. Aquatic plant coverage and curlyleaf coverage on June 9, 2005. Pink shading represents non- nuisance curlyleaf growth along with other plants and covers about 627 acres. Within the 627 acres are about 45 acres of nuisance curlyleaf pondweed growth, shown in red.**

**Table 1. Chisago Lake aquatic plant occurrences and densities for the June 9, 2005 survey based on 24 transects and 3 depths, for a total of 72 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 4 feet (n=24)			Depth 5 - 8 feet (n=24)			Depth 9 - 12 feet (n=24)			All Stations (n=72)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Bulrush ( <i>Scripus sp</i> )	1	4	1.0	--	--	--	--	--	--	1	1	1.0
Duckweed ( <i>Lemna sp</i> )	1	4	1.0	--	--	--	--	--	--	1	1	1.0
White waterlily ( <i>Nymphaea sp</i> )	2	8	0.8	1	4	1.0	--	--	--	3	4	0.8
Coontail ( <i>Ceratophyllum demersum</i> )	2	8	1.8	2	8	0.9	1	4	0.5	5	7	1.2
Northern watermilfoil ( <i>Myriophyllum sibiricum</i> )	1	4	1.0	1	4	0.3	--	--	--	2	3	0.7
Cabbage ( <i>Potamogeton amplifolius</i> )	3	13	1.3	1	4	0.3	--	--	--	4	10	1.1
Curlyleaf pondweed ( <i>P. crispus</i> )	17	71	3.1	24	100	3.1	23	96	2.4	64	89	2.8
Nuttall's pondweed ( <i>P. epiphydrus</i> )	4	17	1.0	3	13	1.2	2	8	1.5	9	13	1.2
Stringy pondweed ( <i>P. pusillus</i> )	3	13	1.7	5	21	1.6	1	4	0.3	9	13	1.5
Claspingleaf pondweed ( <i>P. Richardsonii</i> )	3	13	0.7	1	4	0.2	--	--	--	4	10	0.6
Fern pondweed ( <i>P. Robbinsii</i> )	1	4	1.0	1	4	0.5	--	--	--	2	3	0.8
Flatstem pondweed ( <i>P. zosteriformis</i> )	2	8	1.0	3	13	0.6	1	4	0.1	6	8	0.7
Filamentous algae	2	8	1.0	--	--	--	--	--	--	2	3	1.0



**Figure 4. On June 9, 2005 curlyleaf pondweed on the rakehead is shown here with a density of "3.5".**

**Table 2. Individual transect data for Chisago Lake for June 9, 2005.**

	T1			T2			T3			T4			T5		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush				1											
Duckweed															
White waterlily															
Coontail															
Northern watermilfoil								0.3							
Cabbage	3														
Curlyleaf pondweed		1.5	2	3	3.8	3		2	3.3	5	4	3.5	3.5	3.5	2
Nuttall's pondweed															
Stringy pondweed	2	1.5		1				2	0.3						
Claspingleaf pondweed							1								
Fern pondweed															
Flatstem pondweed	1														
Filamentous algae										1					

	T5a			T5b			T6			T7			T8		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Duckweed				1											
White waterlily				1	1										
Coontail	1	0.8	0.5	2.5	1										
Northern watermilfoil															
Cabbage	0.5	0.3		0.5											
Curlyleaf pondweed	4	2.3	3	2	1		2	5	2.3	5	4.3	3.5	5	4.7	2.8
Nuttall's pondweed		0.3		1											
Stringy pondweed															
Claspingleaf pondweed	0.5	0.2		0.5											
Fern pondweed															
Flatstem pondweed		0.3			1										
Filamentous algae															

	T9			T10			T11			T12			T13		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Duckweed															
White waterlily															
Coontail															
Northern watermilfoil															
Cabbage															
Curlyleaf pondweed	3	4.2	3.8	2	4.2	2.7	5	4.3	2.8	0.5	5	2.5	4	3.5	2
Nuttall's pondweed															
Stringy pondweed															
Claspingleaf pondweed															
Fern pondweed															
Flatstem pondweed															
Filamentous algae	1														

**Table 2. Individual transect data for Chisago Lake for June 9, 2005.**

	T14			T15			T16			T17			T18		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Duckweed															
White waterlily	0.5														
Coontail															
Northern watermilfoil	1														
Cabbage															
Curlyleaf pondweed	3.5	3.8	2.3		1.8	2		1.3	1.3		2	2	0.5	1.5	1
Nuttall's pondweed													1	2	1
Stringy pondweed	2				1.3			1			2				
Claspingleaf pondweed															
Fern pondweed	1	0.5													
Flatstem pondweed	1					0.1		0.5							
Filamentous algae															

	T19			T20			T21			T22		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush												
Duckweed												
White waterlily												
Coontail												
Northern watermilfoil												
Cabbage												
Curlyleaf pondweed	1	1.8	1.5	4	4	1		1	1.5		3.5	3.5
Nuttall's pondweed	1	1.2	2	1								
Stringy pondweed												
Claspingleaf pondweed												
Fern pondweed												
Flatstem pondweed												
Filamentous algae												



**Figure 5. Chisago Lake has abundant natural shoreline conditions in the southern half of the lake.**

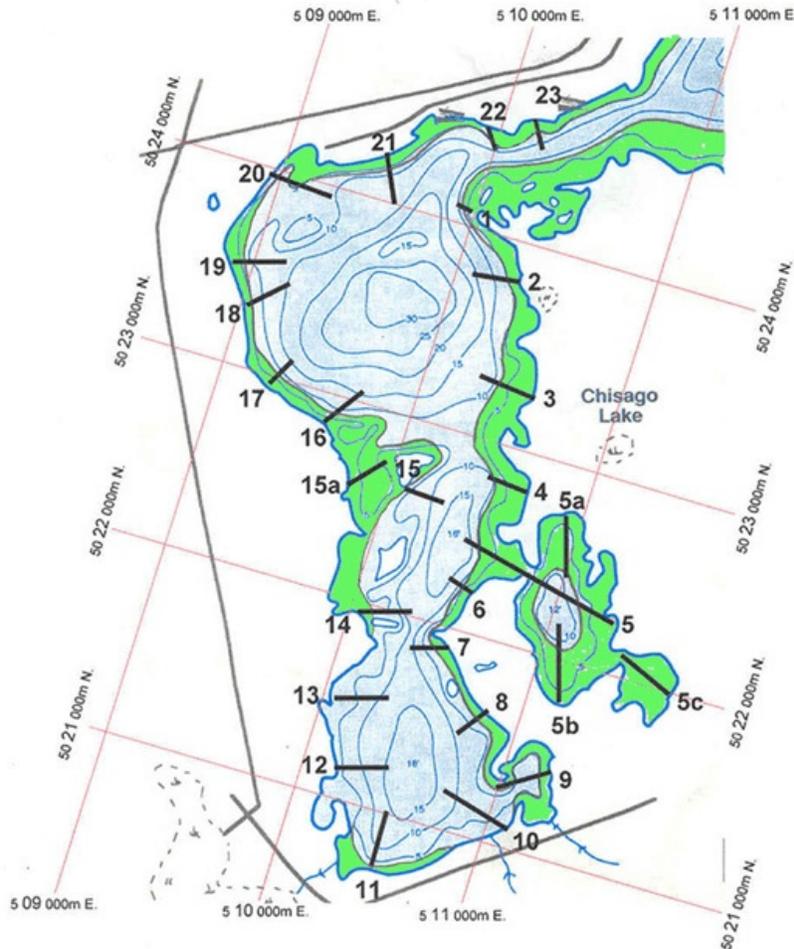
## Results of the Late Summer Survey -- August 30

A significant change in the plant community was found in the August survey compared to the June survey. The widespread growth of curlyleaf pondweed found in June had died back and the no new curlyleaf growth was observed in August. Northern watermilfoil was the most common native plant found in Chisago Lake in August (Table 3).

A map of aquatic plant coverage is shown in Figure 6. Aquatic plants covered about 41% of the bottom or roughly 361 acres. No Eurasian watermilfoil was found in this survey.

Typical water lily conditions for shallow water areas in August are shown in Figure 7.

The occurrence and density of plants for individual transects are listed in Table 4.



**Figure 6. Aquatic plant coverage map for Chisago Lake on August 30, 2005. The green area shows coverage of aquatic plants. Plants covered about 361 acres.**

**Table 3. Chisago Lake aquatic plant occurrences and densities for the August 30, 2005 survey based on 26 transects and 3 depths, for a total of 76 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 4 feet (n=25)			Depth 5 - 8 feet (n=25)			Depth 9 - 12 feet (n=25)			All Stations (n=76)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Bulrush ( <i>Scripus</i> sp)	2	8	3.5	--	--	--	--	--	--	2	3	3.5
Spatterdock ( <i>Nuphar variegatum</i> )	--	--	--	1	4	0.3	--	--	--	1	1	0.3
White waterlily ( <i>Nymphaea</i> sp)	2	8	1.8	--	--	--	--	--	--	2	3	1.8
Coontail ( <i>Ceratophyllum demersum</i> )	2	8	1.3	2	8	0.7	2	8	1.5	6	8	1.1
Isotees - Needle spikerush ( <i>Eleocharis</i> sp)	1	4	0.3	--	--	--	--	--	--	1	1	0.3
Northern watermilfoil ( <i>Myriophyllum sibiricum</i> )	14	54	0.9	8	32	0.7	--	--	--	22	29	0.8
Cabbage ( <i>Potamogeton amplifolius</i> )	3	12	2.2	--	--	--	--	--	--	3	4	2.2
Nuttall's pondweed ( <i>P. epiphydrus</i> )	2	8	0.8	1	4	0.3	--	--	--	3	4	0.6
Stringy pondweed ( <i>P. pusillus</i> )	1	4	0.5	--	--	--	--	--	--	1	1	0.5
Claspingleaf pondweed ( <i>P. Richardsonii</i> )	3	12	0.5	--	--	--	--	--	--	3	4	0.5
Fern pondweed ( <i>P. Robbinsii</i> )	2	8	2.5	4	16	1.3	2	8	2.0	8	11	1.8
Flatstem pondweed ( <i>P. zosteriformis</i> )	6	23	1.0	3	12	0.8	1	4	1.0	10	13	0.9
Sago pondweed ( <i>Stuckenia pectinata</i> )	5	19	0.7	1	4	0.5	--	--	--	6	8	0.6
Water stargrass ( <i>Zosterella dubia</i> )	4	15	0.8	3	12	0.4	--	--	--	7	9	0.6
Filamentous algae	1	4	1.5	--	--	--	--	--	--	1	1	1.5



**Figure 7. White lilies were abundant in several shallow bays especially in Transect 5c.**

**Table 4. Individual transect data for Chisago Lake for August 30, 2005.**

	T1			T2			T3			T4			T5		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush				4			3								
Spatterdock															
White waterlily															
Coontail													1	0.3	1
Needle spikerush															
Northern watermilfoil	1						2	1		1	0.5			0.3	
Cabbage													3		
Nuttall's pondweed															
Stringy pondweed															
Claspingleaf															
Fern pondweed														2	1
Flatstem pondweed	0.5			0.5			2	0.7		0.3			2	0.7	
Sago pondweed	1.5	0.5													
Water stargrass		0.5													
Filamentous algae															

	T5b			T5c	T6			T7			T8		
	0 - 4	5 - 8	9 - 12	0 - 4	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush													
Spatterdock													
White waterlily				3									
Coontail		1	2	1.5									
Needle spikerush													
Northern watermilfoil				0.3								0.3	
Cabbage	2			1.5									
Nuttall's pondweed								0.5					
Stringy pondweed													
Claspingleaf													
Fern pondweed	2	2	3	3									
Flatstem pondweed		1	1										
Sago pondweed					0.5								
Water stargrass								0.5					
Filamentous algae				1.5									

**Table 4. Continued.**

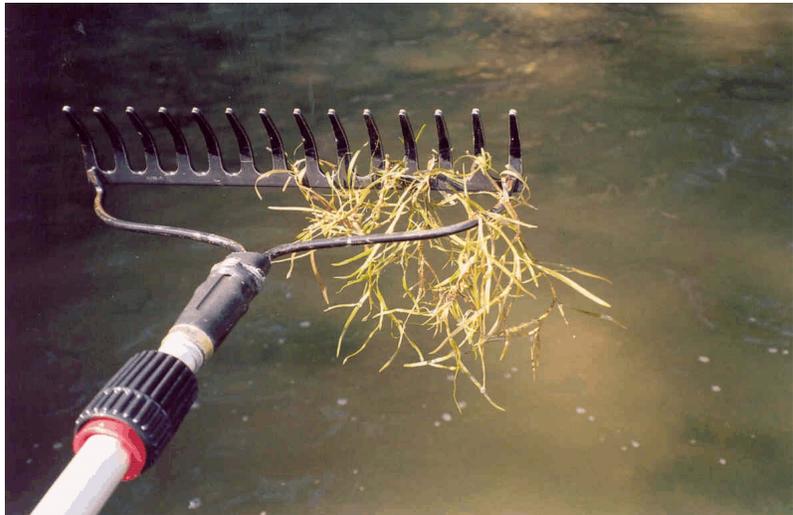
	T9			T10			T11			T12			T13		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Spatterdock															
White waterlily															
Coontail															
Needle spikerush															
Northern watermilfoil	1						1								
Cabbage															
Nuttall's pondweed															
Stringy pondweed															
Claspingleaf															
Fern pondweed															
Flatstem pondweed							0.5								
Sago pondweed															
Water stargrass															
Filamentous algae															

	T14			T15			T15b			T16			T17		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Spatterdock											0.3				
White waterlily	0.5														
Coontail															
Needle spikerush															
Northern watermilfoil	0.3			0.5				0.3		2	1.3		0.5	1	
Cabbage															
Nuttall's pondweed							1	0.3							
Stringy pondweed															
Claspingleaf				0.5											
Fern pondweed								0.3			1				
Flatstem pondweed															
Sago pondweed															
Water stargrass							1	0.3		1	0.3				
Filamentous algae															

**Table 4. Concluded.**

	T18			T19			T20			T21			T22		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
Bulrush															
Spatterdock															
White waterlily															
Coontail															
Needle spikerush															
Northern watermilfoil				1	1		0.3						0.5		
Cabbage															
Nuttall's pondweed															
Stringy pondweed											0.5				
Claspingleaf	0.5										0.5				
Fern pondweed															
Flatstem pondweed															
Sago pondweed	0.5			0.3									0.5		
Water stargrass											0.5				
Filamentous algae															

	T23		
	0 - 4	5 - 8	9 - 12
Bulrush			
Spatterdock			
White waterlily			
Coontail			
Needle spikerush	0.3		
Northern watermilfoil	1		
Cabbage			
Nuttall's pondweed			
Stringy pondweed			
Claspingleaf			
Fern pondweed			
Flatstem pondweed			
Sago pondweed			
Water stargrass			
Filamentous algae			



**Figure 8. Water stargrass at a density of a "2".**

## Comparison of Early and Late Summer Aquatic Plant Surveys in 2005

In the early summer of 2005, Curlyleaf pondweed was widespread in Chisago Lake. Curlyleaf grew out to about 12 feet of water, although it was a nuisance in water depths of under 8 feet.

By the late part of August, curlyleaf pondweed was not found. Northern watermilfoil was the most common plant followed by flatstem pondweed (Table 5).

The acreage of aquatic submerged plants in Chisago Lake declined from early to late summer primarily because of the curlyleaf pondweed die-back.

Sago pondweed and water stargrass were found in August, but not in June. No Eurasian watermilfoil was found in Chisago Lake in 2005.

**Table 5. The percent occurrence of aquatic plants for Chisago Lake in 2005. Percent occurrence is calculated based on the number of times a plant species occurs at a sampling station divided into the total number of stations for the survey. For example, if milfoil was found in 25 out of 50 stations, its percent occurrence would be 50%.**

	June 9, 2005 % Occurrence (72 stations)	August 30, 2005 % Occurrence (76 stations)	Changes from June to August
Bulrush ( <i>Scripus sp</i> )	1	3	0
Duckweed ( <i>Lemna sp</i> )	1	--	0
Spatterdock ( <i>Nuphar variegatum</i> )	--	1	0
White waterlilies ( <i>Nymphaea sp</i> )	4	3	0
Coontail ( <i>Ceratophyllum demersum</i> )	7	8	0
Needle spike rush ( <i>Eleocharis sp</i> )	--	1	0
Northern watermilfoil ( <i>Myriophyllum sibiricum</i> )	3	29	+
Cabbage ( <i>Potamogeton amplifolius</i> )	10	4	-
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	89	--	-
Nuttall's pondweed ( <i>P. epihydrus</i> )	13	4	-
Stringy pondweed ( <i>P. pusillus</i> )	13	1	-
Claspingleaf pondweed ( <i>P. Richardsonii</i> )	10	4	-
Fern pondweed ( <i>P. Robbinsii</i> )	3	11	+
Flatstem pondweed ( <i>P. zosteriformis</i> )	8	13	+
Sago pondweed ( <i>Vallisneria americana</i> )	--	8	+
Water stargrass ( <i>Zosterella dubia</i> )	--	9	+
Filamentous algae	3	1	0
Aquatic Plant Coverage (acres)	627	361	-
Secchi disc (feet)	15.3	3.0	-

# Conclusions and Recommendations for Aquatic Plant Management in Chisago Lake

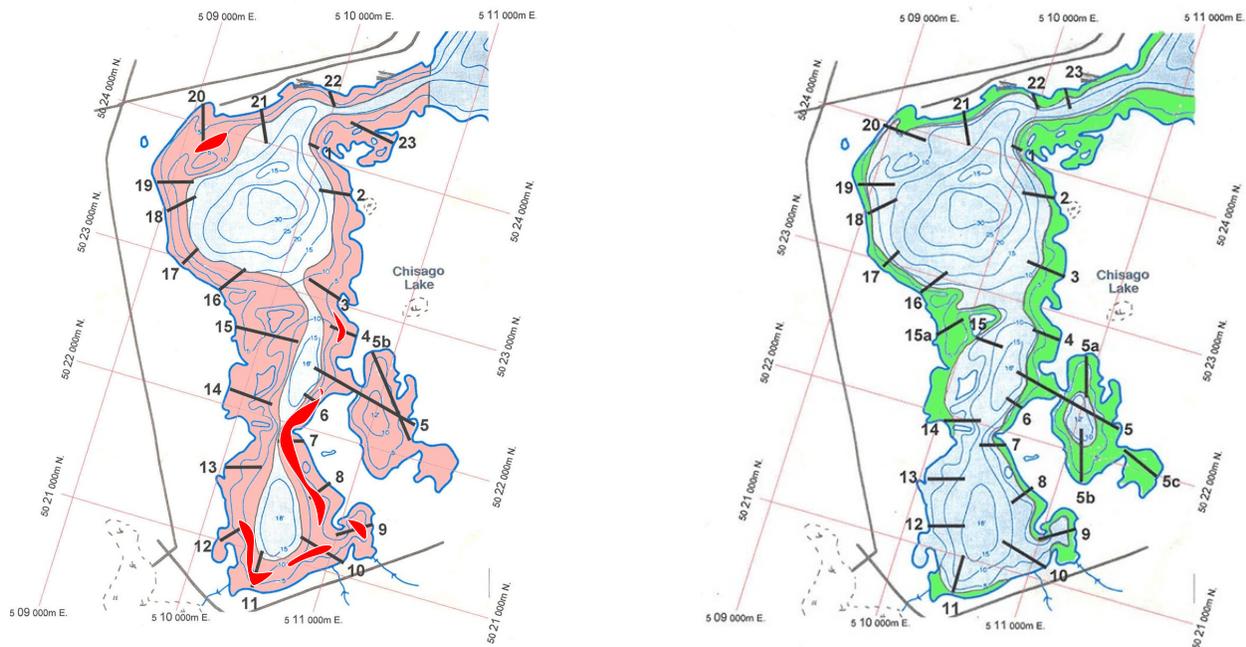
The aquatic plant community has nine species of submerged plants in early summer and eleven species in late summer. This is a fair plant diversity condition.

Curlyleaf pondweed covers 627 acres in early summer and then dies back. In late summer, aquatic plants cover about 361 acres and grow out to about 9-feet of water depth. No Eurasian watermilfoil was found in 2005.

If native plant distribution could increase, water clarity could improve as well. If curlyleaf pondweed could be controlled, native plants might increase.

Curlyleaf pondweed is a non-native aquatic plant that grows to nuisance conditions in early summer in Chisago Lake and then dies off by the end of June. As the curlyleaf plant beds decompose in the lake, phosphorus is released and feeds into algae blooms. Nuisance curlyleaf growth was delineated to be roughly 45 acres in 2005.

Curlyleaf pondweed control could help improve water quality in Chisago Lake. Mechanical harvesting is an effective control technique and herbicides can be effective as well. Other control techniques should be explored as well as including the use of iron filings. Research has indicated there is a potential for iron filings added to lake sediments to inhibit nuisance growth of curlyleaf pondweed.



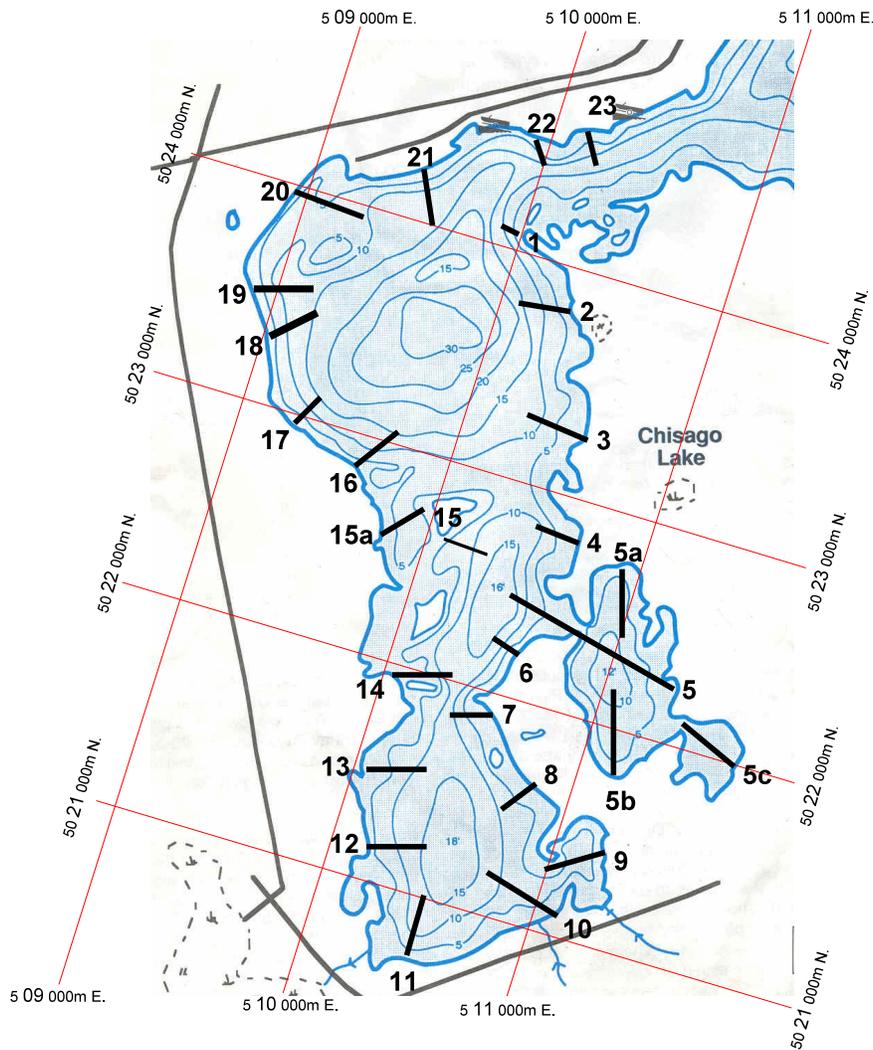
**Figure 9. (left) Early summer aquatic plant coverage in 2005. Nuisance curlyleaf pondweed is shown in red and covers about 45 acres out of a total of 627 acres (shown in pink). (right) Late summer aquatic plant coverage in 2005 was about 361 (shown in green).**

# Appendix

## Transect Descriptions



**Abandoned corn picker in the area of Transect 5c.**



Transect Number	GPS Coordinates		Transect Description
	East	North	
T1	05 09 867	50 24 170	Dead stumps.
T2	05 10 136	50 23 755	Large fallen tree, to the right of a shed.
T3	05 10 295	50 23 308	Left of point, on two door garage.
T4	05 10 428	50 22 832	Left of opening, 2 <sup>nd</sup> dock from opening.
T5	05 10 647	50 22 456	Middle of opening to brown house.
T5b	05 11 003	50 22 180	End of south bay.
T5c	05 11 318	50 22 171	Second story tan house
T6	05 10 397	50 22 240	Right of deadfall.
T7	05 10 430	50 21 827	Right of stumps, left of bulrushes.
T8	05 10 790	50 21 581	Left of point
T9	05 11 100	50 21 437	Tan house, white fence, willow tree.
T10	05 10 846	50 21 166	Left of white shoreline house next to natural shoreline.
T11	05 10 562	50 20 845	Beach next to road.
T12	05 10 203	50 21 163	House with wood steps left of willows and wood retaining wall.
T13	05 10 063	50 21 480	Middle of bay, narrow two story, porch, right of windmill.
T14	05 10 072	50 21 884	Left of island, on gazebo on the hill.
T15	05 10 001	50 22 636	Gap between islands, on rock bar, going in on island.
T15b	05 09 792	50 22 541	First dock, right of dead standing tree stumps going to shore.
T16	05 09 632	50 22 840	First house on hill.
T17	05 09 299	50 22 958	Right of marina.
T18	05 09 040	50 23 226	Shoreline house, left of wood retaining wall.
T19	05 08 852	50 23 555	Right of shoreline gazebo.
T20	05 08 940	50 23 976	Right of stucco house, left of cottonwood tree.
T21	05 09 592	50 24 244	Right of old boathouse.
T22	05 09 901	50 24 430	Grey house with power pole.
T23	05 10 199	50 24 630	Left of boat ramp.