

George J. Stengel, *The Lobsterman*, 1927

Aquatic Plant Surveys for Schmidt Lake, Plymouth, Minnesota, 2008

Early Summer Survey: June 2, 2008
Late Summer Survey: August 14, 2008

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Summary

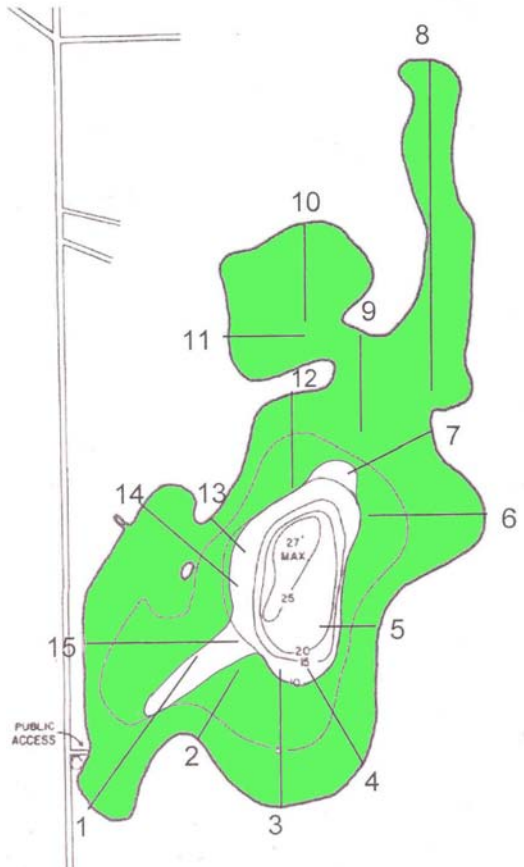
Two aquatic plant surveys were conducted on Schmidt Lake (37 acres) in 2008 on June 2 and August 14. The objectives of the surveys were to characterize the aquatic plant community with the early summer survey emphasizing curlyleaf pondweed distribution and the late summer survey emphasizing the distribution and density of Eurasian watermilfoil (EWM) as well as native aquatic plants.

Six species of submerged aquatic plants were found in Schmidt Lake in the early summer of 2008. Curlyleaf pondweed and Eurasian watermilfoil were the dominant plants. Water celery increased significantly in occurrence from June to August, while curlyleaf pondweed and Eurasian watermilfoil declined (Table 1). The milfoil decline was primarily due to herbicide applications and to harvesting efforts.

Coontail was found at nearly all the sampling stations in both June and August of 2008.

Table 1. Schmidt Lake aquatic plant occurrences and densities for the June 2 and August 14, 2008.

	June 2, 2008 (Secchi disc: 15.1 ft) (41 stations)		August 14, 2008 (Secchi disc: 7.5 ft) (42 stations)	
	% Occur	Density	% Occur	Density
White Waterlily (<i>Nymphaea</i> sp)	17	1.7	10	1.8
Coontail (<i>Ceratophyllum demersum</i>)	98	3.0	98	3.0
Chara (<i>Chara</i> sp)	2	3.0	5	1.8
Elodea (<i>Elodea canadensis</i>)	10	0.9	10	0.8
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	80	3.2	0	--
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	17	1.5	0	--
Flatstem pondweed (<i>P. zosteriformis</i>)	--	--	2	0.5
Water celery (<i>Vallisneria americana</i>)	5	1.0	40	2.4
Filamentous algae	5	1.5	0	--
Number of Submerged Aquatic Plants	6		5	



Overview: In early summer, aquatic plants covered about 32 acres of the lake bottom.

Later in the summer, the area of submerged aquatic plants remained about the same as the early season. Coverage was about 33 acres of the lake bottom.

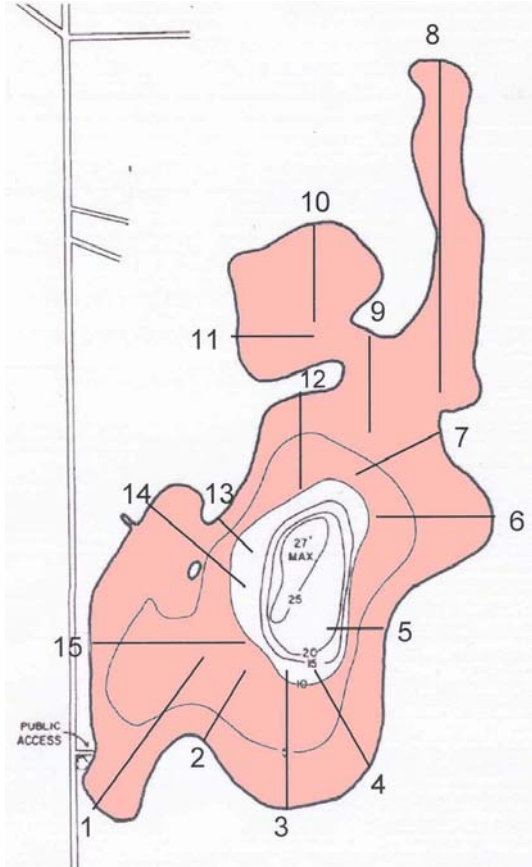


Figure 1. [top] Aquatic plant coverage on June 2, 2008 is shown in green. Total plant coverage was 32 acres out of 37 acres. **[bottom]** Aquatic plant coverage for August 14, 2008 consisted of all native plants covering about 33 acres out of 37 acres of lake area.

Summary of Aquatic Plant Surveys from 2004 to 2008

Summer plant diversity has been fair in Schmidt Lake from 2004 through 2008. The plant community, has been dominated by coontail, but curlyleaf pondweed and Eurasian watermilfoil have been present as well. Curlyleaf was reported to be present in 1987, but it is unknown when it first invaded Schmidt Lake. In 2004, 2006 and 2007, curlyleaf distribution was widespread but not a nuisance. The distribution of curlyleaf was less in 2008 compared to 2006 and 2007. Eurasian watermilfoil was first reported in 1990 (based on MnDNR records). Eurasian watermilfoil has produced nuisance growth conditions in the last few years. The native northern watermilfoil was not found in Schmidt Lake in 2007 and 2008.

Plants grew out to a water depth of 10 feet in both early and late summer surveys in most years.

Table 1. Comparison of Schmidt Lake aquatic plant occurrences and densities for the two summer plant surveys of 2004 through 2008. Percent occurrence is the top number and densities are the bottom numbers shown in parenthesis. Density ratings are 1 - 5 with 1 being low and 5 being most dense.

	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
	Jun 2	Jun 14	May 19	May 16	Jun 9	Sept 13	Sept 6	Aug 9	July 16	Aug 14
Spatterdock (<i>Nuphar variegatum</i>)	0	0	0	0	0	3 (0.5)	0	0	0	0
White waterlily (<i>Nymphaea sp</i>)	18 (1.2)	24 (1.2)	10 (1.5)	12 (0.8)	17 (1.7)	23 (1.9)	17 (2.1)	21 (1.9)	21 (1.8)	10 (1.8)
Coontail (<i>Ceratophyllum demersum</i>)	74 (1.3)	74 (1.7)	82 (2.2)	76 (1.9)	98 (3.0)	82 (1.7)	95 (1.7)	93 (2.0)	98 (2.5)	98 (3.0)
Chara (<i>Chara sp</i>)	5 (0.5)	8 (2.3)	18 (2.1)	12 (1.7)	2 (3.0)	10 (1.3)	15 (1.6)	5 (0.8)	7 (2.0)	5 (1.8)
Needle spikerush (<i>Eleocharis palustris</i>)	0	0	0	0	0	3 (0.5)	0	0	0	0
Elodea (<i>Elodea canadensis</i>)	64 (1.0)	53 (1.3)	28 (1.2)	0	10 (0.9)	36 (1.3)	37 (1.0)	17 (1.1)	19 (1.2)	10 (0.8)
Star duckweed (<i>Lemna trisulca</i>)	0	0	0	0	0	0	2 (2.0)	0	0	0
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	5 (0.5)	5 (0.8)	3 (1.0)	0	0	0	0	0	0	0
Milfoil (<i>M. sp</i>)	13 (1.1)	0	0	0	0	0	0	0	0	0
Eurasian watermilfoil (<i>M. spicatum</i>)	8 (0.8)	68 (2.5)	56 (1.7)	63 (2.3)	80 (3.2)	54 (1.0)	20 (1.0)	17 (1.5)	5 (0.5)	0
Naiads (<i>Najas flexilis</i>)	0	0	0	0	0	3 (0.5)	0	5 (1.0)	0	0
Nitella (<i>Nitella sp</i>)	13 (1.1)	0	0	0	0	0	0	0	0	0
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	77 (1.8)	11 (0.4)	67 (1.7)	63 (1.4)	17 (1.5)	0	0	0	0	0
Stringy pondweed (<i>P. pusillus</i>)	3 (1.0)	0	0	0	0	8 (1.2)	0	0	0	0
Flatstem pondweed (<i>P. zosteriformis</i>)	41 (1.1)	18 (0.7)	0	2 (0.5)	0	74 (1.5)	0	0	0	2 (0.5)
Sago pondweed (<i>Stuckenia pectinata</i>)	0	0	0	0	0	3 (1.0)	0	2 (0.5)	2 (0.5)	0
Water celery (<i>Vallisneria americana</i>)	21 (0.6)	16 (0.9)	0	0	5 (1.0)	51 (2.6)	56 (2.4)	50 (2.6)	40 (1.9)	40 (2.4)
Water stargrass (<i>Zosterella dubia</i>)	0	3 (1.0)	0	0	0	3 (0.5)	0	0	0	0
Filamentous algae	21 (0.7)	16 (2.0)	0	46 (2.2)	5 (1.5)	3 (1.0)	2 (2.0)	2 (2.0)	2 (2.5)	0
Acres Covered by Plants (acres)	24	24	31	32		24	24	24	32	33
Percent Area Covered (%)	66	66	85	86		66	66	60	86	89
NUMBER OF SUBMERGED AQUATIC PLANTS	11	9	6	5	6	11	6	6	6	5

Schmidt Lake, Plymouth, Minnesota

Lake ID: 27-0102

Lake size: 37 acres (MnDNR)

Littoral area: 34 acres (MnDNR)

Introduction

Aquatic plants play a vital role in the water quality dynamics of moderately fertile lakes in the North Central Hardwood Forest Ecoregion like Schmidt Lake. Managing aquatic plants is a challenge that is multifold. The first challenge is to maintain a diverse native aquatic plant community. In the case of Schmidt Lake where native aquatic plants are present, a major emphasis will be on maintaining diversity of the native aquatic plant community. Another challenge is to maintain adequate active recreational opportunities which means managing excessive aquatic plant growth so it doesn't significantly hinder navigation. Lastly, the challenge is to manage non-native plants so they have a low impact on adversely effecting water quality or recreational lake use.

Aquatic plant surveys were conducted on Schmidt Lake on June 2 and August 14, 2008. The objectives of the surveys were to evaluate the distribution of curlyleaf pondweed and Eurasian watermilfoil as well as other native plant species in Schmidt Lake.



Figure 1. Schmidt Lake, June 2, 2008, looking north on Transect 8.

Aquatic Plant Survey Methods

Several techniques were used to conduct the aquatic plant surveys. For Schmidt Lake, 15 transects and three depths per transect were used in both early summer and late summer (Figure 2). 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.

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 Schmidt Lake, so the three depth zones were used and they were: 0-4 feet, 5-8 feet, and 9-12 feet.

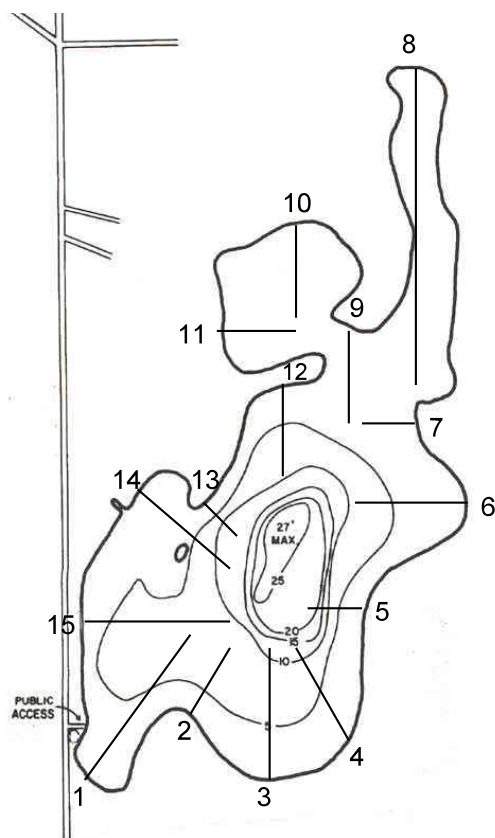


Figure 2. Transect locations for 2008 plant surveys on Schmidt Lake.

Aquatic Plant Survey Results for 2008

Early Summer Survey - June 2, 2008: Schmidt Lake was dominated by coontail and Eurasian watermilfoil in the early summer of 2008 (Table 1). Coontail was the most abundant native plant, showing up in 40 of 41 sample locations (Table 1). A plant distribution map is shown in Figure 3. Approximately 87% (about 32 acres) of the lake was colonized by plants. Plants did not grow past 12 feet of water depth in June. Curlyleaf pondweed was found at 7 out of 41 stations and no heavy, matted growth was observed. Plant data for individual stations on transects are shown in Table 2.

Table 1. Schmidt Lake aquatic plant occurrences and densities for the June 2, 2008 survey based on 15 transects and 3 depths, for a total of 41 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 11)			All Stations (n= 41)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	7	47	1.7	--	--	--	--	--	--	7	17	1.7
Coontail (<i>Ceratophyllum demersum</i>)	15	100	3.1	15	100	3.1	10	91	2.8	40	98	3.0
Chara (<i>Chara sp</i>)	1	7	3.0	--	--	--	--	--	--	1	2	3.0
Elodea (<i>Elodea canadensis</i>)	3	20	0.8	1	7	1.0	--	--	--	4	10	0.9
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	11	73	2.3	12	80	3.5	10	91	3.8	33	80	3.2
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	1	7	0.5	4	27	2.0	2	18	1.0	7	17	1.5
Water celery (<i>Vallisneria americana</i>)	2	13	1.0	--	--	--	--	--	--	2	5	1.0
Filamentous algae	2	13	1.5	--	--	--	--	--	--	2	5	1.5



Figure 3. Coontail was widespread in Schmidt Lake on June 2, 2008.

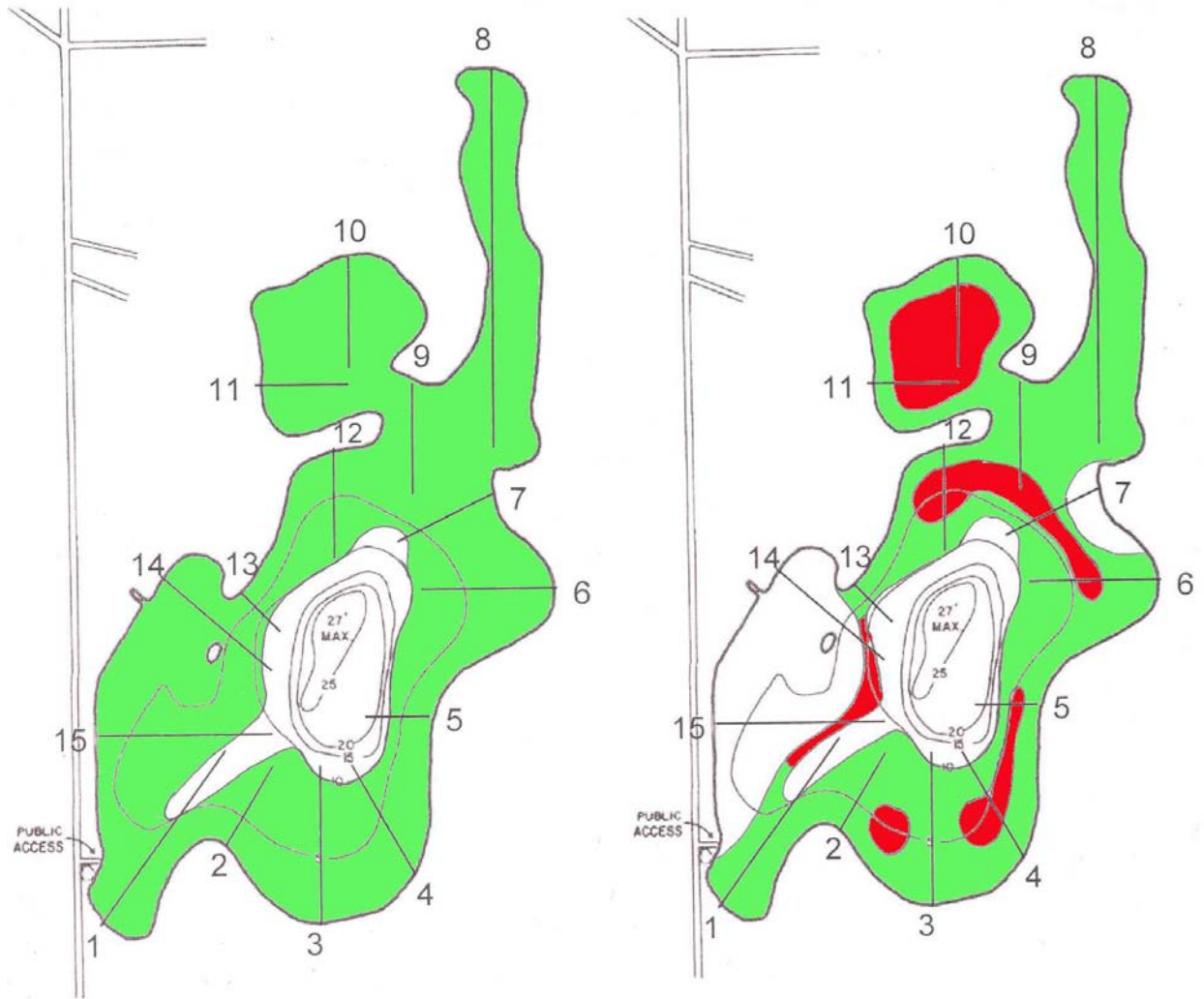


Figure 4. (left) Aquatic plant distribution on Schmidt Lake in June is shown with green and represents about 32 acres (87%). (right) Eurasian watermilfoil grew to the surface in several areas in June 2008. Non-nuisance coverage of Eurasian watermilfoil is shown in green and nuisance coverage is shown in red (7 acres). There was a total of about 23 acres of milfoil.

Table 2. Aquatic plant densities for individual transect data for Schmidt Lake for June 2, 2008.

	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
White waterlily	2						2								
Coontail	4	3	2	2	2	2	4	2	2	1	3		2	3	4
Chara															
Elodea							1								
Eurasian watermilfoil			4.5	2	2	4.5	1	2	2	2	5	2	4.5	4	4
Curlyleaf pondweed		2							1						
Water celery										1					
Filamentous algae	2														

	T6			T7			T8		T9		T10		T11	
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8
White waterlily							2				1		1	
Coontail	4	4	3	3	3	2	4	3	4	3	4	2	4	2
Chara														
Elodea	0.5			1						1				
Eurasian watermilfoil	2	4.5	3		4.5	4.5	2	1	1	4.5	1	4.5	4.5	4.5
Curlyleaf pondweed	0.5													
Water celery				1										
Filamentous algae											1			

	T12			T13			T14			T15		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily							2			2		
Coontail	3	4	3	2	4	2	2	4	4	3	4	4
Chara				3								
Elodea												
Eurasian watermilfoil	4.5	4.5	4.5	1	1				4.5			4.5
Curlyleaf pondweed					2			2	1		2	
Water celery												
Filamentous algae												



Figure 5. [top] Eurasian watermilfoil was growing to the surface at a number of locations on June 2, 2008. This area here is Transect 11. [bottom] Herbicides were being applied for milfoil control on June 2, 2008.

Late Summer Survey - August 14, 2008: In the late summer plant survey, conditions changed in Schmidt Lake. Eurasian watermilfoil was not observed in the August 14, 2008 survey. A combination of herbicide treatments and harvesting was effective at control milfoil. Curlyleaf pondweed had died back and had not resprouted. Coontail occurrence increased and was found at 98% of the sampling stations. A plant coverage map is shown in Figure 7. Submerged plant colonization covered approximately 32 acres or about 88% of the lake bottom. Plants grew out to a water depth of 12 feet. In all water depths, coontail was a dominant plant. Plant data for individual plant transects is shown in Table 4.

Table 3. Schmidt Lake aquatic plant occurrences and densities for the August 14, 2008 survey based on 15 transects and 3 depths, for a total of 42 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 12)			All Stations (n= 42)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	4	27	1.8	--	--	--	--	--	--	4	10	1.8
Chara (<i>Chara sp</i>)	2	13	1.8	--	--	--	--	--	--	2	5	1.8
Coontail (<i>Ceratophyllum demersum</i>)	15	100	2.6	14	93	3.4	12	100	3.2	41	98	3.0
Elodea (<i>Elodea canadensis</i>)	1	7	0.5	3	20	0.8	--	--	--	4	10	0.8
Flatstem pondweed (<i>P. zosteriformis</i>)	1	7	0.5	--	--	--	--	--	--	1	2	0.5
Water celery (<i>Vallisneria americana</i>)	13	87	3.0	4	27	0.8	--	--	--	17	40	2.4
Filamentous algae	--	--	--	--	--	--	--	--	--	0	0	0

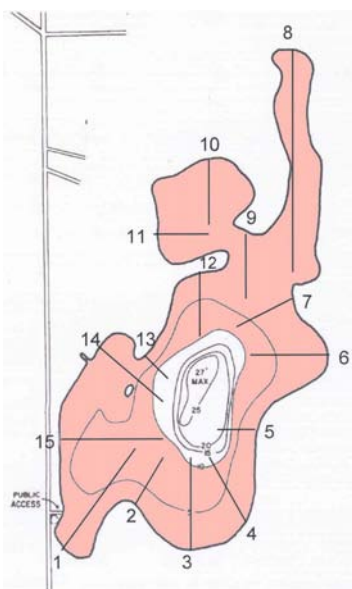


Figure 6. Aquatic plant coverage for August 14, 2008 consisted of all native plants covering about 33 acres out of 37 acres of lake area.

Table 4. Aquatic plant densities for individual transect data for Schmidt Lake for August 14, 2008.

	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
White waterlily	1														
Chara							0.5			3					
Coontail	2	4	4	2	3	3	3	3.5	3	2	3.8	3	2	3	3
Elodea															
Flatstem pondweed	0.5														
Water celery	0.5			3			4.5			4.5	0.5		2		
Filamentous algae															

	T6			T7			T8		T9			T10	
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8
White waterlily							1						
Chara													
Coontail	4	3.5	3.5	3	4	3	2.3		4	3.5	3	3	3
Elodea													1
Flatstem pondweed													
Water celery	3			4					4				
Filamentous algae													

	T11		T12			T13			T14			T15		
	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily	1											4		
Chara														
Coontail	2	3	3	3	3	2	3.5	3	2	3.5	3	2	3	4
Elodea	0.5	1								0.5				
Flatstem pondweed														
Water celery	1		2	0.5		4	1		4			2	1	
Filamentous algae														



Figure 7. [top] Coontail was the dominant aquatic plant in Schmidt Lake in 2008. [bottom] Aquatic plants were under control in 2008. Very little matting was observed in August in 2008.

Comparison of 2008 Aquatic Plant Surveys

Six species of submerged aquatic plants were found in Schmidt Lake in the early summer of 2008. Water celery increased significantly in occurrence from June to August, while curlyleaf pondweed and Eurasian watermilfoil declined (Table 5). The milfoil decline was primarily due to herbicide applications and to harvesting efforts.

Coontail was found at nearly all the sampling stations in both June and August of 2008.

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Chara (<i>Chara</i> sp)	2	3.0	5	1.8
Elodea (<i>Elodea canadensis</i>)	10	0.9	10	0.8
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	80	3.2	0	--
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	17	1.5	0	--
Flatstem pondweed (<i>P. zosteriformis</i>)	--	--	2	0.5
Water celery (<i>Vallisneria americana</i>)	5	1.0	40	2.4
Filamentous algae	5	1.5	0	--
Number of Submerged Aquatic Plants	6		5	

Summary of Aquatic Plant Surveys from 2004 to 2008

Summer plant diversity has been fair in Schmidt Lake from 2004 through 2008 (Table 6). The plant community, has been dominated by coontail, but curlyleaf pondweed and Eurasian watermilfoil have been present as well. Curlyleaf was reported to be present in 1987, but it is unknown when it first invaded Schmidt Lake. In 2004, 2006 and 2007, curlyleaf distribution was widespread but not a nuisance. The distribution of curlyleaf was less in 2008 compared to 2006 and 2007. Eurasian watermilfoil was first reported in 1990 (based on MnDNR records). Eurasian watermilfoil has produced nuisance growth conditions in the last few years. The native northern watermilfoil was not found in Schmidt Lake in 2007 and 2008.

Plants grew out to a water depth of 10 feet in both early and late summer surveys in most years.

Table 6. Comparison of Schmidt Lake aquatic plant occurrences and densities for the two summer plant surveys of 2004 through 2008. Percent occurrence is the top number and densities are the bottom numbers shown in parenthesis. Density ratings are 1 - 5 with 1 being low and 5 being most dense.

	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
	Jun 2	Jun 14	May 19	May 16	Jun 9	Sept 13	Sept 6	Aug 9	July 16	Aug 14
Spatterdock (<i>Nuphar variegatum</i>)	0	0	0	0	0	3 (0.5)	0	0	0	0
White waterlily (<i>Nymphaea sp</i>)	18 (1.2)	24 (1.2)	10 (1.5)	12 (0.8)	17 (1.7)	23 (1.9)	17 (2.1)	21 (1.9)	21 (1.8)	10 (1.8)
Coontail (<i>Ceratophyllum demersum</i>)	74 (1.3)	74 (1.7)	82 (2.2)	76 (1.9)	98 (3.0)	82 (1.7)	95 (1.7)	93 (2.0)	98 (2.5)	98 (3.0)
Chara (<i>Chara sp</i>)	5 (0.5)	8 (2.3)	18 (2.1)	12 (1.7)	2 (3.0)	10 (1.3)	15 (1.6)	5 (0.8)	7 (2.0)	5 (1.8)
Needle spikerush (<i>Eleocharis palustris</i>)	0	0	0	0	0	3 (0.5)	0	0	0	0
Elodea (<i>Elodea canadensis</i>)	64 (1.0)	53 (1.3)	28 (1.2)	0	10 (0.9)	36 (1.3)	37 (1.0)	17 (1.1)	19 (1.2)	10 (0.8)
Star duckweed (<i>Lemna trisulca</i>)	0	0	0	0	0	0	2 (2.0)	0	0	0
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	5 (0.5)	5 (0.8)	3 (1.0)	0	0	0	0	0	0	0
Milfoil (<i>M. sp</i>)	13 (1.1)	0	0	0	0	0	0	0	0	0
Eurasian watermilfoil (<i>M. spicatum</i>)	8 (0.8)	68 (2.5)	56 (1.7)	63 (2.3)	80 (3.2)	54 (1.0)	20 (1.0)	17 (1.5)	5 (0.5)	0
Naiads (<i>Najas flexilis</i>)	0	0	0	0	0	3 (0.5)	0	5 (1.0)	0	0
Nitella (<i>Nitella sp</i>)	13 (1.1)	0	0	0	0	0	0	0	0	0
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	77 (1.8)	11 (0.4)	67 (1.7)	63 (1.4)	17 (1.5)	0	0	0	0	0
Stringy pondweed (<i>P. pusillus</i>)	3 (1.0)	0	0	0	0	8 (1.2)	0	0	0	0
Flatstem pondweed (<i>P. zosteriformis</i>)	41 (1.1)	18 (0.7)	0	2 (0.5)	0	74 (1.5)	0	0	0	2 (0.5)
Sago pondweed (<i>Stuckenia pectinata</i>)	0	0	0	0	0	3 (1.0)	0	2 (0.5)	2 (0.5)	0
Water celery (<i>Vallisneria americana</i>)	21 (0.6)	16 (0.9)	0	0	5 (1.0)	51 (2.6)	56 (2.4)	50 (2.6)	40 (1.9)	40 (2.4)
Water stargrass (<i>Zosterella dubia</i>)	0	3 (1.0)	0	0	0	3 (0.5)	0	0	0	0
Filamentous algae	21 (0.7)	16 (2.0)	0	46 (2.2)	5 (1.5)	3 (1.0)	2 (2.0)	2 (2.0)	2 (2.5)	0
Acres Covered by Plants (acres)	24	24	31	32		24	24	24	32	33
Percent Area Covered (%)	66	66	85	86		66	66	60	86	89
NUMBER OF SUBMERGED AQUATIC PLANTS	11	9	6	5	6	11	6	6	6	5

Summary of Aquatic Plants from 1987 and 2004 Through 2008 Based on Percent Occurrence on Transects: It appears there have been changes in the aquatic plant community in Schmidt Lake from 1987 to 2007. Several species have increased in Schmidt Lake since 1987 and include coontail, Eurasian watermilfoil, and water celery. It also appears several species have declined and include curlyleaf pondweed, flatstem pondweed, northern watermilfoil, and filamentous algae.

Table 7. Comparison of submerged aquatic plant occurrence between 1987 and 2004 through 2008 data.

Species	Percent Occurrence Based on 15 Transects					
	1987 (Aug)	2004 (Sept 13)	2005 (Sept 6)	2006 (Aug 9)	2007 (July 16)	2008 (Aug 14)
Chara	33	27	15	5	7	13
Coontail	60	100	95	93	98	100
Curlyleaf pondweed	47	0	0	0	0	0
Elodea	87	67	37	17	19	20
Eurasian watermilfoil	0	93	20	17	5	0
Flatstem pondweed*	87	100	0	0	0	7
Naiads	0	7	0	5	0	0
Needle spikerush	0	7	0	0	0	0
Northern watermilfoil	80	0	0	0	0	0
Sago pondweed	0	7	0	2	2	0
Stringy pondweed	0	20	0	0	0	0
Water celery	33	93	56	50	40	87
Water stargrass	0	7	0	0	0	0
Filamentous algae	93	7	2	2	2	0
Number of species	6	12	5	7	6	5

* Flatstem pondweed was identified in 2004 and assume it is referred to as narrowleaf pondweed in 1987.

(Note: data on percent occurrence of plant species for the 1987 survey were estimated based on a plant map produced from a 1987 survey. In 1987, plant species occurrences were written on the map. Plants at these locations were assigned to the 15 transects used in the 2004 survey and from that, the percent occurrence was calculated.)

Lake Water Quality Data Summary

Water quality data through 2007 are summarized in Table 8.

Schmidt Lake is moderately fertile and is classified as a meso-eutrophic lake based on lake phosphorus concentrations. Schmidt Lake had an average summer phosphorus concentration of 58 $\mu\text{g-P/l}$ recorded in 2001 and has had lower summer phosphorus averages since with a phosphorus concentration of 34 ppb in 2007 (Table 8).

Transparency has been relatively poor in the summer growing season in the past. In 2003, water clarity averaged 4.4 feet (1.3 m) over the summer growing season (June - September). However, it was better in 2004 averaging 5.8 feet and improved slightly in 2005 to 6.5 feet and improved again in 2007 to 9.7 feet (Table 8).

Table 8. Water quality data summer averages for June - September (source: CAMP and MPCA).

Year	Secchi Disc (ft)	Total Phosphorus (top) ($\mu\text{g/l}$)	Chlorophyll <u>a</u> ($\mu\text{g/l}$)
1994	5.0	--	--
1995	5.2	48	11
1996	5.1	--	--
1997	6.1	--	--
1998	4.5	70	28
1999	3.1	--	--
2000	3.4	55	28
2001	3.4	58	30
2003	4.4	--	--
2004	5.8	39	14
2005	6.5	42	16
2006	7.8	44	12
2007	9.7	34	9



Figure 8. Water clarity was above average in Schmidt Lake in 2004 - 2007 compared to water clarity from 1998-2003. However, submerged plant growth has increased as well.

Secchi Disc Data: Summer growing season water clarity going back to 1994 is shown in Figure 10 and individual measurements taken through the summer months are shown in Table 9. Growing season water clarity was better in 2007 compared to averages going back to 1994.

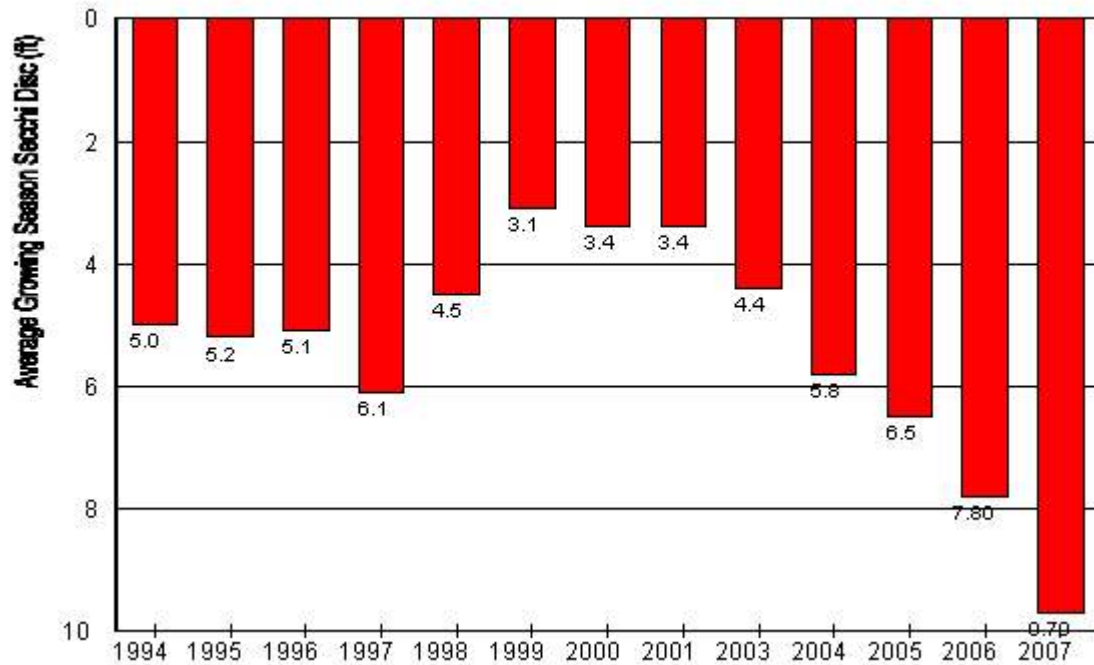


Figure 9. Summer average (June-September) Secchi disc data for Schmidt Lake from 1994-2007 (source: MPCA and CAMP).

Table 9. Compilation of previously collected Secchi disk data for Schmidt Lake. Data are shown in feet. Data are from the MPCA water quality web site (CLMP) and from Met Council CAMP data. When May Secchi disc transparencies are included in the summer average, the averages increase slightly.

	1994	1995		1996	1997	1998	1999	2000		2001		2003	2004	2005	2006	2007	Number of years with better clarity than 2007
	CLMP	CAMP	CLMP	CLMP	CLMP	CAMP	CLMP	CAMP	CLMP	CAMP	CLMP	CLMP	CAMP	CAMP	CAMP	CAMP	
May																	
1	6.5			11.5	4.5	8.5						6.0	19.7		9.2		
2	5.5	10.5	10.5	11.0	4.5			4.6	4.6			7.0				10.9	
3		11.5	11.5	7.5	4.5	8.5						7.0	6.6		8.3		
4	9.0 /9.0		10.0	6.0	4.5	8.5	5.0	4.9	4.9	6.6	6.5	6.0		12.2	11.6	13.5	
Average	7.5	11.0	10.7	9.0	4.5	8.5	5.0	4.8	4.8	6.6	6.5	6.5	13.2	12.2	9.7	12.2	0 out of 12
June																	
1	9.0	9.5	9.5	5.5 /5.5	7.0		5.0					6.0	6.6	9.6		11.9	
2	6.5		4.5		11.5	5.9	4.5	3.3	3.3			6.0			8.3		
3	7.0	5.2 /4.9	5.0	5.5	8.5		4.0			4.3	6.0	6.0	7.3	9.6		10.6	
4			5.0	6.0 /5.0	14.0 /6.0	7.5	5.0	2.0	2.0			7.0 /5.0			7.9		
Average	7.5	6.5	6.0	5.5	9.4	6.7	4.6	2.7	2.7	4.3	6.0	6.0	7.0	9.6	8.1	11.3	0 out of 12
July																	
1	4.5	4.9	5.0	4.5	6.5		3.5 /3.0			6.6	4.0	3.0	3.3	6.6		8.9	
2			5.0	4.0	6.5	10.5		3.0	3.0	2.0	2.0	3.0			7.9		
3	3.0 /4.0	4.6	4.5	4.5	9.5		3.0					3.5	4.0	3.3		5.3	
4	4.5	3.6	3.5	4.0	7.0	2.3	2.5	3.3	3.3	2.6	2.0	4.0		3.3 /3.3	4.6	5.6	
Average	4.0	4.4	4.5	4.3	7.4	6.4	3.0	3.2	3.2	3.7	2.7	3.4	3.7	4.3	6.3	6.6	1 out of 12
August																	
1	3.5		5.5	4.0	5.0		2.5 /2.5	3.6	3.6			2.2	5.0		5.6		
2	4.5			4.0	3.5	2.0	2.0			2.6	2.0	3.0	5.3				
3		3.6	4.5 /4.0	4.0	3.0			3.6	3.6			3.5	6.3		7.6	7.3	
4	4.5		4.0	4.0	3.0 /4.5	2.6	2.5			3.3	3.0	3.0		5.6		16.5	
Average	4.2	3.6	4.5	4.1	3.7	2.3	2.4	3.6	3.6	3.0	2.5	2.9	5.5	5.6	6.6	11.9	0 out of 12
September																	
1		3.9	4.0	6.5	4.0	2.6						3.5	5.3 /5.6		10.6		
2	4.0			7.0	4.0	2.6	2.0	4.3	4.3	3.3	3.0	5.0				12.2	
3	4.5	4.6	4.5	8.0			2.0	4.3	4.3			6.0					
4		7.9	8.0				2.0			2.6	2.0		8.6	6.9	9.6	8.9	
Average	4.3	5.5	5.5	7.2	4.0	2.6	2.0	4.3	4.3	3.0	2.5	4.8	7.0	6.9	10.1	10.6	0 out of 12
Average Jun-Sep	5.0	5.3	5.1	5.1	6.1	4.5	3.1	3.4	3.4	3.8	3.0	4.4	5.8	6.5	7.8	9.7	0 out of 12
number of samples	12	9	15	17	16	8	15	8	8	8	8	16	12	9	8	9	

Total Phosphorus data: Lake phosphorus samples have been collected occasionally from 1995-2007 and results are shown in Table 10. The average lake phosphorus concentration from June through September was the lowest on record in 2007 going back to 1995.

Table 10. Total phosphorus data ($\mu\text{g/l}$) for Schmidt Lake.

	1995	1998	2000	2001	2004	2005	2006	2007	Number of years with lower phosphorus than 2007
	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	
May									
1		30			42		38		3 out of 7
2	10		80					24	
3	10	30			46		43		
4		50	60	20		27	33	32	
Average	10	37	70	20	44	27	38	28	
June									
1	30				36	33		37	0 out of 7
2		50	60				48		
3	60/70			50	48	55		21	
4		50	90				46		
Average	48	50	75	50	42	44	47	29	
July									
1	50			50	38	56		47	0 out of 7
2		50	70	60			32		
3	70				44	71		42	
4	70	90	50	60		46/60	70	21	
Average	63	70	60	57	41	58	51	37	
August									
1			40		52		49		0 out of 7
2				60	44				
3	60	100	50		41		43	43	
4		80		40		39		30	
Average	60	90	45	50	46	39	46	37	
September									
1	40	70			28/32		29		0 out of 7
2		70	40	60				37	
3	20		40						
4	30			80	23	27	50	34	
Average	30	70	40	70	27	27	40	26	
Average Jun-Sep	48	70	55	58	39	42	46	35	
number of samples	9	8	8	8	10	9	8	9	

Chlorophyll a data (µg/l): Lake chlorophyll concentrations have been taken occasionally from 1995-2007 and results are shown in Table 11. Summer chlorophyll levels were lower in 2007 compared to previous sampled years.

Table 11. Chlorophyll a data (µg/l) for Schmidt Lake.

	1995	1998	2000	2001	2004	2005	2006	2007	Number of years with lower chlorophyll than 2007
	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	CAMP	
May									
1		4.5			2.1		6.2		
2	2.7		8.9					2.8	
3	1.3	4.7			5.4	1.6	2.8		
4		6.8	11.0	3.6			3.4	0.9	
Average	2.0	5.3	10.0	3.6	3.8	1.6	4.1	1.9	1 out of 7
June									
1	1.7				4.3	3.1		5.0	
2		6.4	18.0				7.2		
3	4.7/2.9			7.6	10.0	3.4		9.7	
4		5.0	54.0				14.4		
Average	3.1	5.7	36.0	7.6	7.2	3.0	10.8	7.4	4 out of 7
July									
1	10.0			18.0	33.0	26.0		7.8	
2		21.0	35.0	45.0			8.0		
3	16.0				19.0	30.0		22.6	
4	37.0	47.0	19.0	44.0		27/25	36.7	10.6	
Average	21.0	34.0	27.0	35.7	26.0	27.0	22.4	13.7	0 out of 7
August									
1			24.0		15.0		23.6		
2				19.0	13.0				
3	9.6	52.0	28.0		12.0		12.5	10.6	
4		27.0		26.0		13.0		4.7	
Average	9.6	39.5	26.0	22.5	13.0	13.0	18.1	7.7	0 out of 7
September									
1	10.0	29.0			11/13		9.1		
2		34.0	23.0	41.0				4.8	
3	3.2								
4	5.6		19.0	35.0	7.3	22.0	4.1	16.7	
Average	6.3	31.5	21.0	38.0	9.7	22.0	6.6	10.8	3 out of 7
Average Jun-Sep	11	28	28	30	14	16	14	10	0 out of 7
number of samples	9	8	8	8	10	9	8	9	

Appendix

- A. Watershed and Lake Sediment Conditions**
- B. 2004 Aquatic Plant Data**
- C. 2005 Aquatic Plant Data**
- D. 2006 Aquatic Plant Data**
- E. 2007 Aquatic Plant Data**

Appendix A. Watershed and Lake Sediment Conditions

Watershed Size

Schmidt Lake is listed by the MnDNR as 37 acres in size. The watershed area draining to Schmidt is a total of 212.94 acres (includes the lake area) based on Shingle Creek Watershed Management Commission data. Subwatershed areas are listed in Table A-1 and a subwatershed map is shown in Figure A-1.

Table A-1. Subwatershed areas in the Schmidt Lake subwatershed (source: Wenck 2003).

ID	ACRES
1	24.58
2	17.98
3	8.81
4	60.75
5	31.05
6	9.32
7	7.18
8	11.77
9	40.61
TOTAL SCHMIDT LAKE WATERSHED	212.94

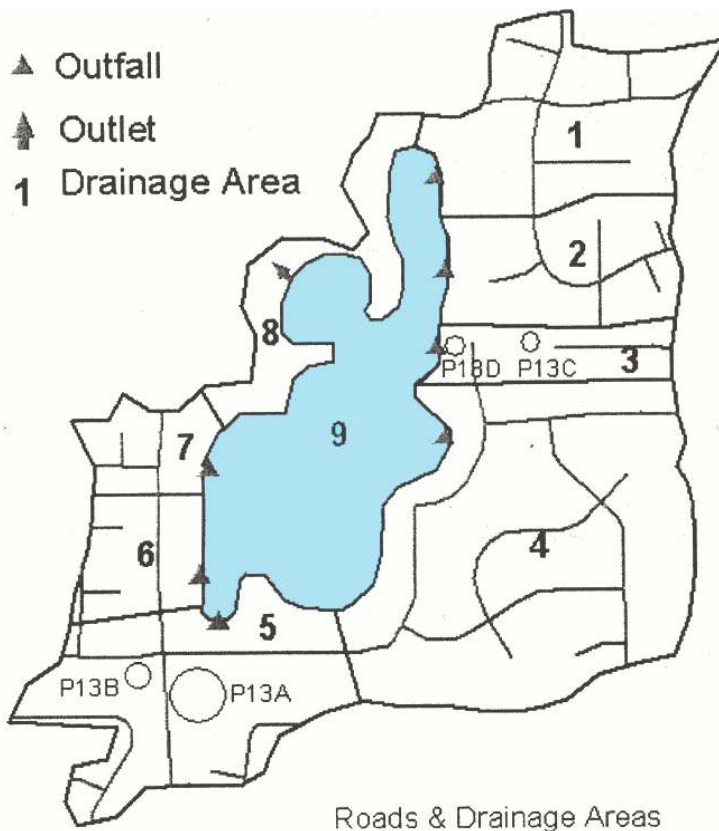


Figure A-1. Subwatersheds in the Schmidt Lake watershed (source: Wenck, 2003).

Lake Sediment Survey Results for 2004

Lake Areas that Could Support Nuisance Curlyleaf Growth Based on Lake Sediment Characteristics: Lake sediment sampling results from 2004 have been used to predict lake bottom areas that have the potential to support nuisance curlyleaf pondweed plant growth. Based on the key sediment parameters of sediment bulk density, organic matter, pH, and the Mn:Fe ratio, a table and map were prepared to indicate what type of curlyleaf pondweed growth could be expected in the future (Table A-2, Figure A-2).

Curlyleaf pondweed growth is predicted to produce widespread light to moderate growth in the future. Soil data indicate that nuisance growth, where plants top out in a solid canopy, is not expected.

Table A-2. Schmidt Lake sediment data and ratings for potential nuisance curlyleaf pondweed growth.

Site	Bulk Density (g/cm ³ dry)	Organic Matter (%)	pH (su)	Mn:Fe Ratio	Potential for Nuisance Curlyleaf Pondweed Growth
Non-Nuisance	1.04	5	6.8	0.22	Low (green)
Light Nuisance	0.94	11	6.2	0.17	Medium (yellow)
Heavy Nuisance	<0.51	>20	>7.7	>0.64	High (red)
1	0.87	7.6	6.6	0.06	Low
2	0.67	33.4	6.2	0.06	Medium
3	0.68	35.8	6.3	0.07	Medium
4	0.74	17.2	6.7	0.06	Low
5	0.90	4.4	6.8	0.08	Low
6	0.93	5.6	7.1	0.10	Low
7	0.75	18.6	7.1	0.10	Medium
8	0.62	18.6	5.9	0.09	Medium
9	0.52	25.4	6.3	0.09	Medium
10	0.81	8.4	5.7	0.20	Medium
11	0.77	9.6	5.8	0.12	Medium
12	0.70	19.1	6.1	0.06	Medium
13	0.80	17.3	6.7	0.09	Low
14	0.80	12.1	6.8	0.08	Low
15	0.85	7.9	6.5	0.06	Low
1D	0.84	10.5	6.0	0.07	Medium

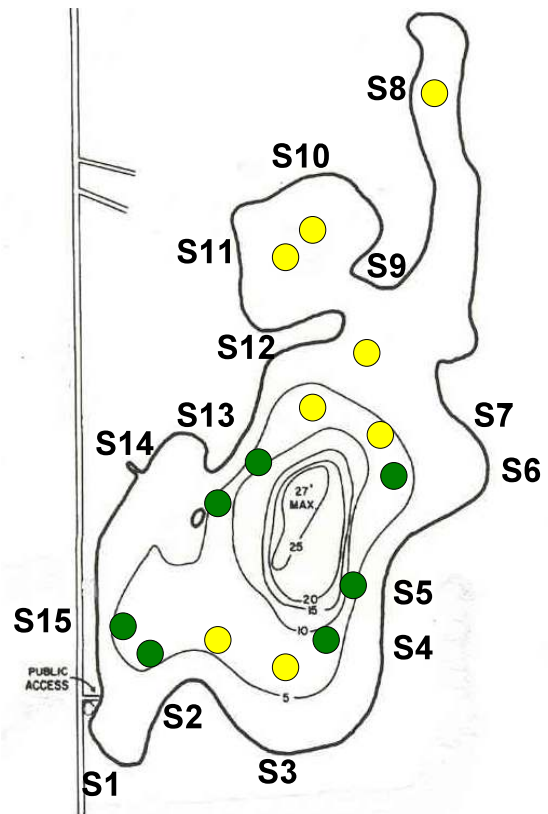


Figure A-2. Sediment sample locations are shown with dots. The dot color indicates the potential for nuisance curlyleaf pondweed to occur at that site. Key: green dot = low; yellow dot = medium; red dot = high potential.

Lake Areas that Could Support Nuisance Eurasian Watermilfoil Growth Based on Lake Sediment Characteristics: Lake sediment sampling results from 2004 have been used to predict lake bottom areas that have the potential to support nuisance EWM growth. Based on the key sediment parameters of NH_4 and organic matter, a table and map were prepared to indicate what type of growth could be expected in the future (Table A-3 and Figure A-3).

Except for Station 3, the sediment nitrogen conditions in Schmidt Lake are low to moderate. Although Eurasian watermilfoil will grow widely through Schmidt Lake, it is predicted that it will not produce perennial nuisance matting conditions (which are defined as heavy nuisance condition).

Table A-3. Schmidt Lake sediment data and ratings for potential nuisance EWM growth.

Site	NH_4 Conc (ppm)	Organic Matter (%)	Potential for Nuisance EWM Growth
Non-Nuisance or Light Nuisance	<10	>20	Low (green) to Medium (yellow)
Heavy Nuisance	>10	<20	High (red)
1	7.5	7.6	Medium
2	3.7	33.4	Medium
3	33.9	35.8	Medium
4	3.5	17.2	Medium
5	3.1	4.4	Medium
6	7.1	5.6	Medium
7	6.5	18.6	Medium
8	4.4	18.6	Medium
9	2.8	25.4	Medium
10	7.7	8.4	Medium
11	6.3	9.6	Medium
12	3.9	19.1	Medium
13	6.0	17.3	Medium
14	6.8	12.1	Medium
15	8.1	7.9	Medium
1D	6.1	10.5	Medium

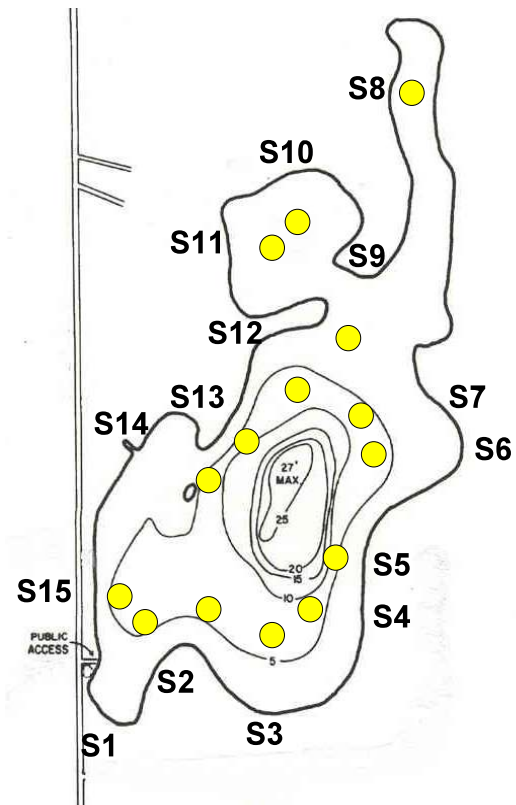


Figure A-3. Sediment sample locations are shown with dots. The dot color indicates the potential for nuisance Eurasian milfoil to occur at that site. Key: green dot = low; yellow dot = medium; red dot = high potential.

Appendix B: 2004 Data

Table B-1. Schmidt Lake aquatic plant occurrences and densities for the June 2, 2004 survey based on 15 transects and 3 depths, for a total of 39 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 9)			All Stations (n= 39)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	6	40	1.1	1	7	2.0	--	--	--	7	18	1.2
Chara (<i>Chara sp</i>)	2	13	0.5	--	--	--	--	--	--	2	5	0.5
Coontail (<i>Ceratophyllum demersum</i>)	11	73	0.7	14	93	1.5	4	44	1.8	29	74	1.3
Curlyleaf (<i>Potamogeton crispus</i>)	8	53	1.4	13	87	1.6	9	100	2.2	30	77	1.8
Elodea (<i>Elodea canadensis</i>)	11	73	1.0	9	60	1.2	5	56	0.7	25	64	1.0
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	--	--	--	2	13	0.8	1	11	1.0	3	8	0.8
Flatstem pondweed (<i>P. zosteriformis</i>)	7	47	0.9	8	53	1.4	1	11	0.5	16	41	1.1
Milfoil (<i>Myriophyllum so</i>)	2	13	1.0	2	13	0.8	1	11	2.0	5	13	1.1
Nitella (<i>Nitella sp</i>)	2	13	1.3	3	20	1.0	--	--	--	5	13	1.1
Northern watermilfoil (<i>M. sibiricum</i>)	2	13	0.5	--	--	--	--	--	--	2	5	0.5
Stringy pondweed (<i>P. pusillus</i>)	--	--	--	1	7	1.0	--	--	--	1	3	1.0
Water celery (<i>Vallisneria americana</i>)	7	47	0.6	1	7	0.5	--	--	--	8	21	0.6
Filamentous algae	7	47	0.7	1	7	0.5	--	--	--	8	21	0.7

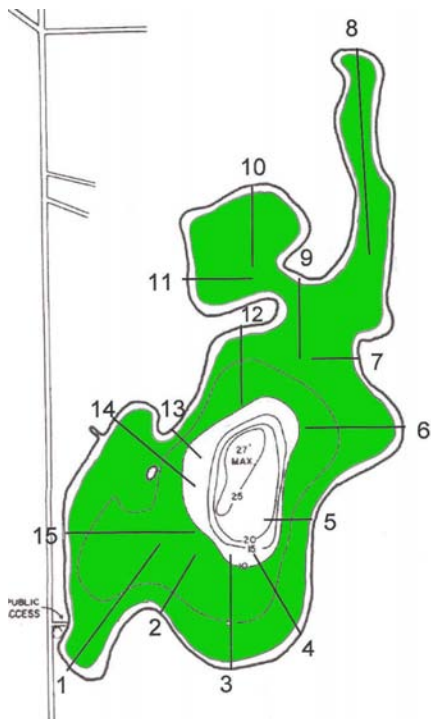


Figure B-1. Aquatic plant coverage in Schmidt Lake on June 2, 2004. Plants covered approximately 24 acres, or about 66% of the lake bottom, and grew out to a depth of 12 feet.

Table B-3. Schmidt Lake aquatic plant occurrences and densities for the September 13, 2004 survey based on 15 transects and 3 depths (where possible), for a total of 39 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 14)			Depth 9 - 12 feet (n=10)			All Stations (n= 39)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Spatterdock (<i>Nuphar variegatum</i>)	1	7	0.5	--	--	--	--	--	--	1	3	0.5
White waterlily (<i>Nymphaea sp</i>)	7	47	2.0	2	14	1.5	--	--	--	9	23	1.9
Chara (<i>Chara sp</i>)	4	27	1.3	--	--	--	--	--	--	4	10	1.3
Coontail (<i>Ceratophyllum demersum</i>)	13	87	1.5	13	93	2.1	6	60	1.3	32	82	1.7
Elodea (<i>Elodea canadensis</i>)	8	53	1.3	5	36	1.1	2	20	1.0	14	36	1.3
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	10	67	1.0	9	4	1.1	2	20	1.0	21	54	1.0
Flatstem pondweed (<i>P. zosteriformis</i>)	12	80	1.5	12	86	1.6	5	50	1.3	29	74	1.5
Naiads (<i>Najas flexilis</i>)	1	7	0.5	--	--	--	--	--	--	1	3	0.5
Needle spikerush (<i>Eleocharis palustris</i>)	1	7	0.5	--	--	--	--	--	--	1	3	0.5
Sago pondweed (<i>Stuckenia pectinata</i>)	--	--	--	1	7	1.0	--	--	--	1	3	1.0
Stringy pondweed (<i>P. pusillus</i>)	2	13	0.8	1	7	2.0	--	--	--	3	8	1.2
Water celery (<i>Vallisneria americana</i>)	14	93	2.8	6	43	2.2	--	--	--	20	51	2.6
Water stargrass (<i>Zosterella dubia</i>)	1	7	0.5	--	--	--	--	--	--	1	3	0.5
Filamentous algae	1	7	1.0	--	--	--	--	--	--	1	3	1.0

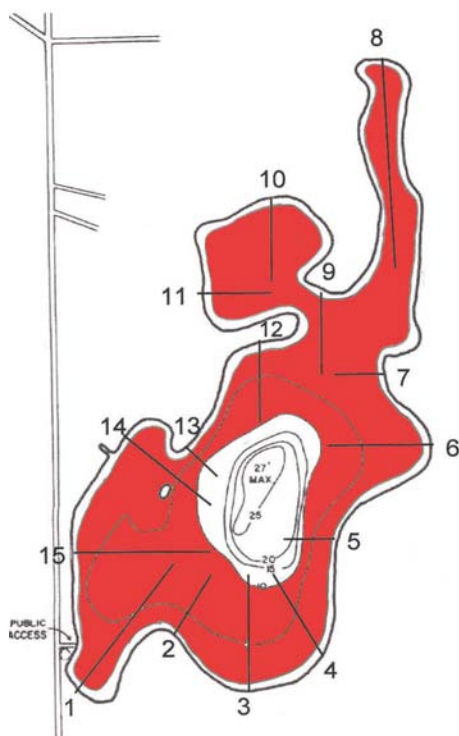


Figure B-2. Aquatic plant coverage in Schmidt Lake on September 13, 2004. Plants covered approximately 24 acres, or about 66% of the lake bottom, and grew out to a depth of 12 feet.

Appendix C: 2005 Data

Table C-1. Schmidt Lake aquatic plant occurrences and densities for the June 14, 2005 survey based on 15 transects and 3 depths, for a total of 38 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 8)			All Stations (n= 38)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	8	53	1.3	1	7	0.5	--	--	--	9	24	1.2
Chara (<i>Chara sp</i>)	3	20	2.3	--	--	--	--	--	--	3	8	2.3
Coontail (<i>Ceratophyllum demersum</i>)	14	93	1.8	11	73	1.8	3	38	0.7	28	74	1.7
Elodea (<i>Elodea canadensis</i>)	9	60	1.3	9	60	1.5	2	25	0.5	20	53	1.3
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	1	7	1.0	--	--	--	1	13	0.5	2	5	0.8
Eurasian watermilfoil (<i>M. spicatum</i>)	6	40	0.4	12	80	2.5	8	100	3.5	26	68	2.5
Curlyleaf (<i>Potamogeton crispus</i>)	--	--	--	2	13	0.3	2	25	0.5	4	11	0.4
Flatstem pondweed (<i>P. zosteriformis</i>)	3	20	0.8	3	20	0.7	1	13	0.5	7	18	0.7
Water celery (<i>Vallisneria americana</i>)	5	33	0.9	1	7	1.0	--	--	--	6	16	0.9
Water stargrass (<i>Zosterella dubia</i>)	1	7	1.0	--	--	--	--	--	--	1	3	1.0
Filamentous algae	5	33	1.9	1	7	2.0	--	--	--	6	16	2.0

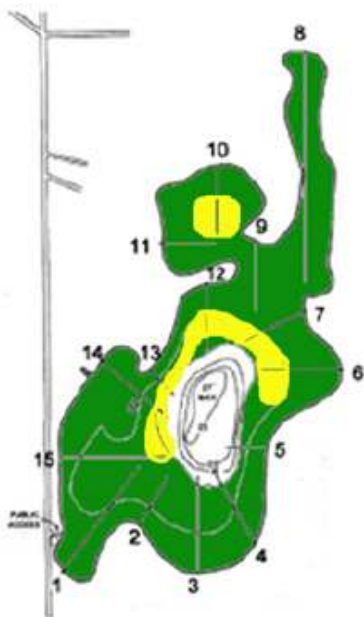


Figure C-1. Aquatic plant distribution on Schmidt Lake in June is shown with green and yellow shading. Yellow shading indicates areas where EWM was growing up to the surface or was matting on the surface. Both Aquathol K and 2, 4-D herbicides were used in early summer.

Table C-2. Individual transect data for Schmidt Lake for June 14, 2005.

	T1		T2		T3			T4		T5			T6		
	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily	1				1								1		
Chara			2							2					
Coontail	1	1.7	3		1			2	1	1			1	0.7	
Elodea	2	0.7		1.5		2		1	2		1	0.5	2.5	2	
Northern watermilfoil															
Eurasian watermilfoil	3	0.7		2.8	2	2.8	1		2.3		2	2.5			4.3
Curlyleaf							0.5					0.5			
Flatstem pondweed	1	0.5				1		2	2.5				0.5		
Water celery										1			0.5		
Water stargrass															
Filamentous algae	2									1					

	T7			T8		T9		T10		T11		T12		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12
White waterlily				2		1		1						
Chara														
Coontail		1		0.3	4	1	3	4	1.5	1	3	2		0.5
Elodea		1	0.5	1.3	2			1	1.5		2	1		
Northern watermilfoil									0.5					
Eurasian watermilfoil	1	2	3.5				0.5		4.5		3	1	4	2.8
Curlyleaf														
Flatstem pondweed	1	0.5				2	1.5	1						
Water celery	1									1				
Water stargrass										1				
Filamentous algae				2.7	2									

	T13			T14			T15		
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily				1			2	0.5	
Chara	3								
Coontail	2	1	1	3	2		3	1	0.5
Elodea	1			1			1		
Northern watermilfoil							1		
Eurasian watermilfoil		2	4.5	1	2.8	4.5	1		4.5
Curlyleaf					0.3			0.3	
Flatstem pondweed		1	0.5		0.5			0.5	
Water celery					1		1		
Water stargrass									
Filamentous algae	2			2					

bold numbers = plants that were dead, not used in statistics

Table C-3. Schmidt Lake aquatic plant occurrences and densities for the September 6, 2005 survey based on 15 transects and 3 depths, for a total of 38 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 8)			All Stations (n= 38)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Star duckweed (<i>Lemna trisulca</i>)	1	7	2.0	--	--	--	--	--	--	1	2	2.0
White waterlily (<i>Nymphaea sp</i>)	6	40	2.3	1	7	1.0	--	--	--	7	17	2.1
Chara (<i>Chara sp</i>)	5	33	1.8	1	7	0.7	--	--	--	6	15	1.6
Coontail (<i>Ceratophyllum demersum</i>)	13	87	1.6	15	100	2.0	8	100	1.4	36	95	1.7
Elodea (<i>Elodea canadensis</i>)	7	47	1.4	6	40	0.7	2	18	0.5	15	37	1.0
Eurasian watermilfoil (<i>M. spicatum</i>)	1	7	0.5	6	40	0.1	1	9	2.0	8	20	1.0
Water celery (<i>Vallisneria americana</i>)	13	87	3.2	10	67	1.3	--	--	--	23	56	2.4
Filamentous algae	1	7	2.0	--	--	--	--	--	--	1	2	2.0

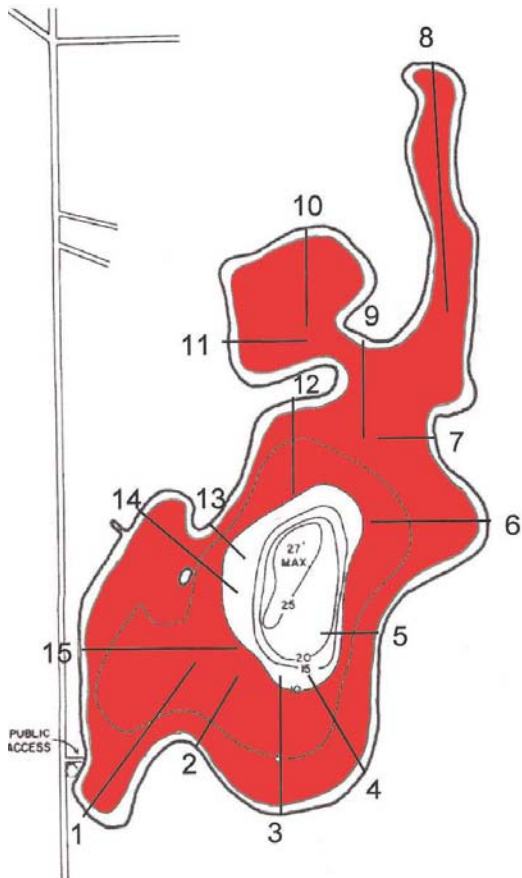


Figure C-2. Aquatic plant coverage in September, 2005 went out to about 10 - 12 feet. No nuisance growth of EWM was observed.

Appendix D: 2006 Data

Table D-1. Schmidt Lake aquatic plant occurrences and densities for the May 19, 2006 survey based on 15 transects and 3 depths, for a total of 39 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 9)			All Stations (n= 39)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	4	27	1.5	--	--	--	--	--	--	4	10	1.5
Chara (<i>Chara sp</i>)	6	40	4.7	1	7	1.0	--	--	--	7	18	2.1
Coontail (<i>Ceratophyllum demersum</i>)	12	80	2.5	15	100	2.1	5	56	1.9	32	82	2.2
Elodea (<i>Elodea canadensis</i>)	5	33	1.3	6	40	1.1	--	--	--	11	28	1.2
Northern watermilfoil (<i>Myriophyllum sibiricum</i>)	1	7	1.0	--	--	--	--	--	--	1	3	1.0
Eurasian watermilfoil (<i>M. spicatum</i>)	7	47	1.1	10	67	2.3	5	56	1.4	22	56	1.7
Curlyleaf (<i>Potamogeton crispus</i>)	8	53	2.0	10	67	1.4	8	89	1.8	26	67	1.7
Filamentous algae	--	--	--	--	--	--	--	--	--	--	--	--

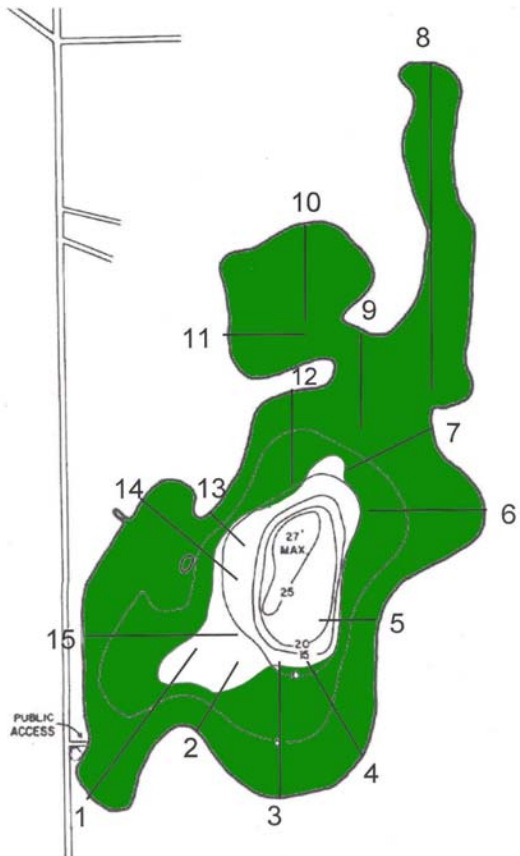


Figure D-1. Aquatic plant distribution on Schmidt Lake in May is shown with green. EWM grew to the surface in several areas in May, 2006.

Table D-3. Schmidt Lake aquatic plant occurrences and densities for the August 9, 2006 survey based on 15 transects and 3 depths, for a total of 42 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 12)			All Stations (n= 42)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea</i> sp)	7	47	2.2	2	13	1.0	--	--	--	9	21	1.9
Chara (<i>Chara</i> sp)	2	13	0.8	--	--	--	--	--	--	2	5	0.8
Coontail (<i>Ceratophyllum demersum</i>)	14	93	1.9	14	93	2.5	11	92	1.5	39	93	2.0
Elodea (<i>Elodea canadensis</i>)	4	27	1.5	2	13	0.8	1	8	0.5	7	17	1.1
Eurasian watermilfoil (<i>M. spicatum</i>)	1	7	1.0	5	33	0.5	1	8	1.0	7	17	1.5
Naiads (<i>Najas flexilis</i>)	2	13	1.0	--	--	--	--	--	--	2	5	1.0
Sago pondweed (<i>Stuckenia pectinata</i>)	1	7	0.5	--	--	--	--	--	--	1	2	0.5
Water celery (<i>Vallisneria americana</i>)	14	93	3.3	7	47	1.2	--	--	--	21	50	2.6
Filamentous algae	1	7	2.0	--	--	--	--	--	--	1	2	2.0

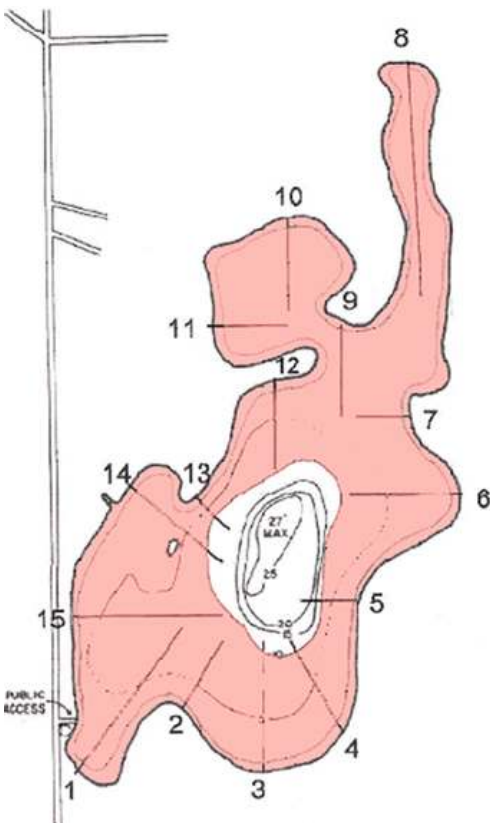


Figure D-2. Aquatic plant coverage in August, 2006 went out to about 10 - 12 feet. No nuisance growth of EWM was observed.

Appendix E: 2007 Data

Table E-1. Schmidt Lake aquatic plant occurrences and densities for the May 16, 2007 survey based on 15 transects and 3 depths, for a total of 41 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 11)			All Stations (n= 41)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	4	27	0.9	1	7	0.5	--	--	--	5	12	0.8
Coontail (<i>Ceratophyllum demersum</i>)	12	80	1.8	15	100	1.9	4	36	2.0	31	76	1.9
Chara (<i>Chara sp</i>)	5	33	1.7	--	--	--	--	--	--	5	12	1.7
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	8	53	1.4	10	67	3.1	8	73	2.9	26	63	2.3
Curlyleaf pondweed (<i>P. crispus</i>)	9	60	1.4	8	53	0.8	9	82	1.8	26	63	1.4
Flatstem pondweed (<i>P. zosteriformis</i>)	1	7	0.5	--	--	--	--	--	--	1	2	0.5
Filamentous algae	10	67	2.2	6	40	2.7	3	27	1.0	19	46	2.2

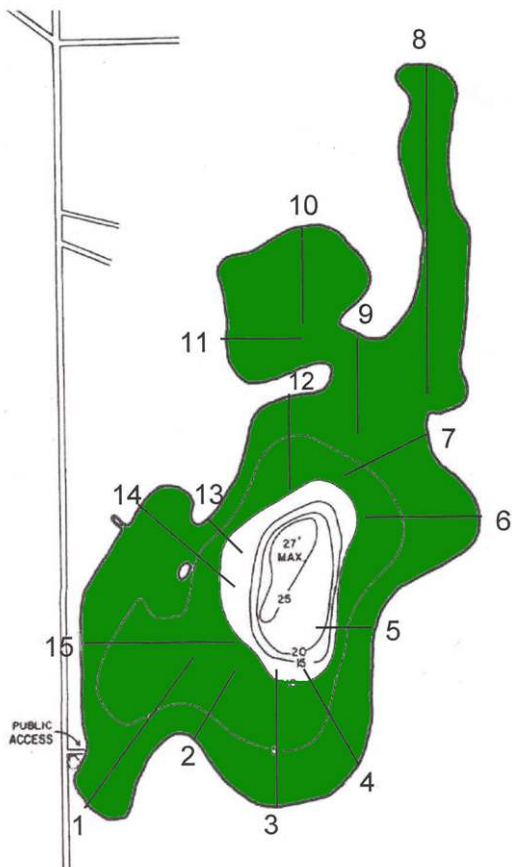


Figure E-1. Aquatic plant distribution on Schmidt Lake in May is shown with green and represents about 32 acres (86%).

Table E-2. Individual transect data for Schmidt Lake for May 16, 2007.

	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
White waterlily															
Coontail	2	3.5		2	3		1	1		2	2		2	0.5	
Chara				1			2			3					
Eurasian watermilfoil			4	1	0.5	4	1	3	4	1	4	2.3	1.5	4	2
Curlyleaf pondweed		0.5			1		1		2		1	1.3		0.5	3
Flatstem pondweed															
Filamentous algae	5	3.3			2.5					1					

	T6			T7			T8		T9		T10	
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8
White waterlily	1						1	0.5	1		0.5	
Coontail		1			1		2	2	3	1	2	3
Chara												
Eurasian watermilfoil	3	1.8	4		4.5	2				4	1	1.5
Curlyleaf pondweed	1	1.7	3	3		3	2	0.5	1			
Flatstem pondweed									0.5			
Filamentous algae	0.7			2			1		1	2	3	2

	T11		T12			T13			T14			T15		
	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily														
Coontail	2	1		2.5	2	1	2	2	0.5	2	2	2	3.3	2
Chara						1.5			1					
Eurasian watermilfoil		3.5	2	4	1				1					
Curlyleaf pondweed		1	1		1	0.5		1	1	0.5	1	2		1
Flatstem pondweed														
Filamentous algae	3							1	1	3.5	1	4	3	1

Table E-3. Schmidt Lake aquatic plant occurrences and densities for the July 16, 2007 survey based on 15 transects and 3 depths, for a total of 41 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 4 feet (n= 15)			Depth 5 - 8 feet (n= 15)			Depth 9 - 12 feet (n= 11)			All Stations (n= 41)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily (<i>Nymphaea sp</i>)	7	47	2.0	2	13	1.1	--	--	--	9	22	1.8
Coontail (<i>Ceratophyllum demersum</i>)	15	100	2.4	15	100	2.9	11	100	2.2	41	100	2.5
Chara (<i>Chara sp</i>)	3	30	2.0	--	--	--	--	--	--	3	7	2.0
Elodea (<i>Elodea canadensis</i>)	3	20	1.2	5	33	1.2	--	--	--	8	20	1.2
Eurasian watermilfoil (<i>M. spicatum</i>)	1	7	0.5	1	7	0.5	--	--	--	2	5	0.5
Sago pondweed (<i>Stuckenia pectinata</i>)	1	7	0.5	--	--	--	--	--	--	1	2	0.5
Water celery (<i>Vallisneria americana</i>)	13	87	2.2	4	27	1.0	--	--	--	17	41	1.9
Filamentous algae	--	--	--	1	7	2.5	--	--	--	1	2	2.5

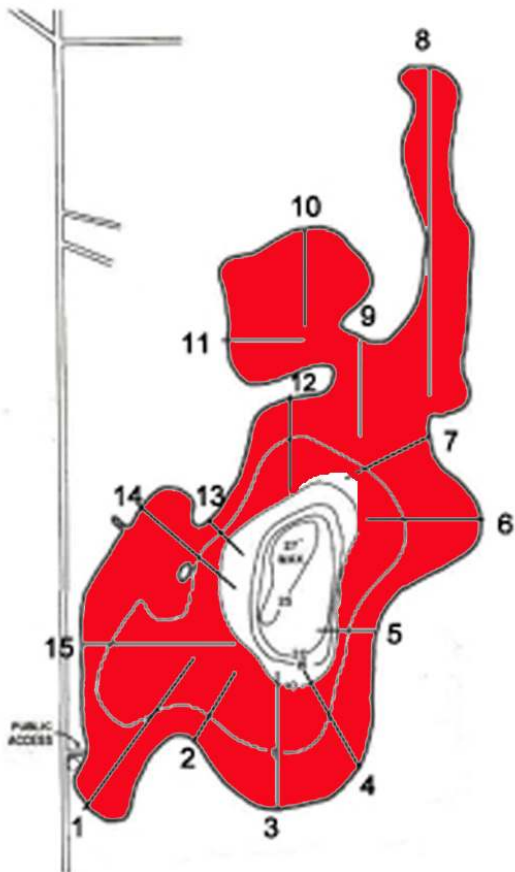


Figure E-2. Aquatic plant coverage on July 16, 2007 went out to about 12 feet. Plants covered about 32 acres (86%)

Table E-4. Individual transect data for Schmidt Lake for July 16, 2007.

	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
White waterlily	3	0.7								1					
Coontail	3	2.3	2	2	2.5	1	2	2.5	1.8	1	3	1	1	3	2
Chara										1			3		
Elodea		0.2		1						0.5				0.5	
Eurasian watermilfoil			0.5D												
Sago pondweed															
Water celery	2			1	0.5		1			2			1	1	
Filamentous algae															

	T6			T7			T8		T9		T10	
	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	0 - 4	5 - 8	0 - 4	5 - 8
White waterlily	1						2		2			
Coontail	1	3	2.5	3	3.5	3	1.5	4	4	3	3	1
Chara												
Elodea								0.5				3
Eurasian watermilfoil		0.5										
Sago pondweed												
Water celery	3			3					3		2	
Filamentous algae												

	T11		T12			T13			T14			T15		
	0 - 4	5 - 8	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12	0 - 4	5 - 8	9 - 12
White waterlily	2											3	1.5	
Coontail	2	3	2	2.3	1.5	3	2.5	4	4.5	4	3	3	4.5	2
Chara	2													
Elodea	2	2												
Eurasian watermilfoil									0.5					
Sago pondweed									0.5					
Water celery	2		2	1.3		3	1		3					
Filamentous algae													2.5	

D = dead plants, not in statistics