Zvonimar Mihanovic, *At Rest*, n.d.

Lake Sediment Survey for Schmidt Lake, Plymouth, Minnesota

January 2005, Updated April 2008

Prepared for:
Shane Missaghi and Derek Asche
City of Plymouth

Prepared by:
Steve McComas
Blue Water Science
St. Paul, Minnesota
651.690.9602

Lake Sediment Survey Methods

Lake Soil Collection: A total of 15 lake sediment samples were collected from depths ranging from 3 to 7 feet on September 13, 2004 by Steve McComas, Blue Water Science. Samples were collected using a modified soil auger, 5.2 inches in diameter (Figure 1). Soils were sampled to a depth of 6 inches. The lake soil from the sampler was transferred to 1-gallon zip-lock bags and delivered to a soil testing laboratory.

Lake sediment samples were collected in the littoral zone. At each sample location, within about a 5-foot radius we noted all aquatic plant species and rated their density on a scale from 1 to 5 with one representing a low density.

Lake Soil Analysis: At the lab, sediment samples were air dried at room temperature, crushed and sieved through a 2 mm mesh sieve. Sediment samples were analyzed using standard agricultural soil testing methods. Sixteen parameters were tested for each soil sample. A summary of extractants and procedures is shown in Table 1. Routine soil test results are given on a weight per volume basis.

Table 1. Soil testing extractants used by University of Minnesota Crop Research Laboratory. These are standard extractants used for routine soil tests by most Midwestern soil testing laboratories (reference: Western States Laboratory Proficiency Testing Program: Soil and Plant Analytical Methods, 1996-Version 3).

Parameter	Extractant
P-Bray	0.025M HCL in 0.03M NH_4F
P-Olsen	0.5M $NaHCO_3$
NH_4-N	2N KCL
K, Ca, Mg	1N NH_4OA_c (ammonium acetate)
Fe, Mn, Zn, Cu	DTPA (diethylenetriamine pentaacetic acid)
B	Hot water
SO_4-S	$Ca(H_2PO_4)_2$
pH	water
Organic matter	Loss on ignition at 360^{o}C

Figure 1. Soil auger used to collect lake sediments.

Reporting Lake Soil Analysis Results: Lake soils and terrestrial soils are similar from the standpoint that both provide a medium for rooting and supply nutrients to the plant.

However, lake soils are also different from terrestrial soils. Lake soils (or sediments) are water logged, generally anaerobic and their bulk density ranges from being very light to very dense compared to terrestrial soils.

There has been discussion for a long time on how to express analytical results from soil sampling. Lake sediment research results are often expressed as grams of a substance per kilogram of lake sediment, commonly referred to as a weight basis (mg/kg). However, in the terrestrial sector, to relate plant production and potential fertilizer applications to better crop yields, soil results typically are expressed as grams of a substance per cubic foot of soil, commonly referred to as a weight per volume basis. Because plants grow in a volume of soil and not a weight of soil, farmers and producers typically work with results on a weight per volume basis.

That is the approach used here for lake sediment results: they are reported on a weight per volume basis or $\mu g/cm^3$.

A bulk density adjustment was applied to lake sediment results as well. For agricultural purposes, in order to standardize soil test results throughout the Midwest, a standard scoop volume of soil has been used. The standard scoop is approximately a 10-gram soil sample. Assuming an average bulk density for an agricultural soil, a standard volume of a scoop has been a quick way to prepare soils for analysis, which is convenient when a farmer is waiting for results to prepare for a fertilizer program. It is assumed a typical silt loam and clay texture soil has a bulk density of 1.18 grams per cm^3. Therefore a scoop size of 8.51 cm^3 has been used to generate a 10-gram sample. It is assumed a sandy soil has a bulk density of 1.25 grams per cm^3 and therefore a 8.00 cm^3 scoop has been used to generate a 10-gram sample. Using this type of standard weight-volume measurement, the lab can use standard volumes of extractants and results are reported in ppm which is close to $\mu g/cm^3$. For all sediment results reported here a scoop volume of 8.51 cm^3 was used.

However lake sediment bulk density has wide variations but only a single scoop volume of 8.51 cm^3 was used for all lake sediment samples. This would not necessarily produce a consistent 10-gram sample. Therefore, for our reporting, we have used corrected weight volume measurements and results have been adjusted based on the actual lake sediment bulk density. We used a standard scoop volume of 8.51 cm^3, but sediment samples were weighed. Because test results are based on the premise of a 10 gram sample, if our sediment sample was less than 10 grams, then the reported concentrations were adjusted down to account for the less dense bulk density. If a scoop volume weighed greater than 10.0 grams than the reported concentrations were adjusted up. For example, if a 10-gram scoop of lake sediment weighed 4.0 grams, then the correction factor is 4.00 g/ 10.00 g = 0.40. If the analytical result was 10 ppm based on 10 grams, then it should be 0.40 x 10 ppm = 4 ppm based on 4 grams. The results could be written as 4 ppm or 4 $\mu g/cm^3$. Likewise, if a 10-gram scoop of lake sediment weighed 12 grams, then the correction factor is 12.00 g / 10.00 g = 1.20. If the analytical result was 10 ppm based on a 10 gram scoop, then it should be 1.20 x 10 ppm = 12 ppm based on 12 grams. The result could be written as 12 ppm or 12 $\mu g/cm^3$. These are all dry weight determinations.

Delineating Areas of Potential Nuisance Curlyleaf and Milfoil Growth: Delineating an area of potential nuisance plant growth is based on conventional soil survey methods. When a sediment sample analysis has a nitrogen reading over 10 ppm and has an organic matter content of less than 20%, it has a high potential for nuisance milfoil growth. For sediment results with a high growth potential collected in a cove, typically, the water depths in the cove from 5 to 7 feet would be designated as having a potential for nuisance growth. If high potential samples are found along a stretch of shoreline, a designated high potential area would be delineated until there was a shoreline break or change in sediment texture. In other cases, if the next site down the shoreline records a low potential reading, then the designated nuisance area would extend midway between a high and low potential sample sites.

Influence of Lake Sediments on Non-Native Aquatic Plant Growth

For managing exotic plants it is helpful to know where the plants have the potential to grow to nuisance conditions. A technique used by Blue Water Science shows where nuisance growth of curlyleaf pondweed and Eurasian watermilfoil can occur in a lake based on lake sediment characteristics. This technique was applied to Schmidt Lake. A total of 15 sediment sites were sampled, basically one site per aquatic plant transect. Sediment sites and locations are shown in Table 2 and Figure 2.

Table 2. Sediment sample location information.

Sediment Sample	Location	Water Depth (ft)	Curlyleaf Pondweed Density (June 2, 2004)	Eurasian Watermilfoil Density (Sept 13, 2004)	Other Plants	Notes
1	T1	6	1			
2	T2	7.5	1	1		
3	T3	7	2.5	2		weakly branching
4	T4	5.5-6	1		elodea (3); flatstem (1)	muck over peat
5	T5	6	--		water celery (4)	sand-mud zone transition
6	T6	6	--		flatstem (4); coontail (1)	fine grain grayish muck
7	T7	6	1.5		water celery (1); flatstem (4)	peaty sand, weird sediment
8	T8	3	1	2.5	coontail; flatstem	
9	T9	6	1	1	flatstem (3)	
10	T10	5.5	0.5	2		
11	T11	5	2	3.5		EWM not branching
12	T12	7	4	2		
13	T13	7	3	in the area	coontail (3); flatstem (2)	
14	T14	6	1	in the area	coontail (3)	
15	T15	7	1.5	in the area	coontail (3)	

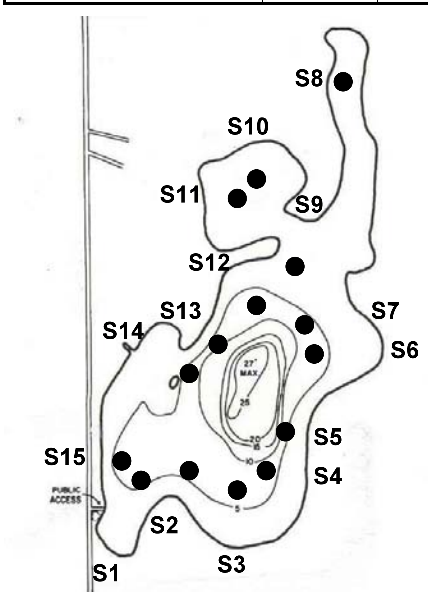

Figure 2. Lake sediment sample locations.

Schmidt Lake sediment results are shown in Table 3. A total of 15 parameters were analyzed for each sediment sample. The low bulk density indicates lake sediments are soft and the organic matter content indicates there is peat and muck present at most of the sample sites. The lake sediment pH is 7.1 or less, this is a little bit low and actually may help to inhibit severe curlyleaf pondweed growth. Lake sediment phosphorus concentrations are moderate.

Table 3. Sediment data for 15 sites on Schmidt Lake collected on September 13, 2004.

Sample	Bulk Density g/cm3 (dry)	Organic Matter	pH	Corrected Bray-P (ppm)	Corrected Olsen-P (ppm)	Corrected K (ppm)	Corrected Ca (ppm)	Corrected Mg (ppm)	Corrected NH4-N (ppm)	Corrected Fe (ppm)	Corrected Cu (ppm)	Corrected Mn (ppm)	Corrected Zn (ppm)	Corrected Boron (ppm)	Corrected SO4-S (ppm)
S-1	0.87	7.6	6.6	3.7	7.4	141	1824	304	7.5	257	42.0	21.2	6.8	0.7	110
S-2	0.67	33.4	6.2	3.4	2.3	81.5	1517	234	3.7	279	9.1	15.6	4.4	1.0	107
S-3	0.68	35.8	6.3	1.2	1.2	78.9	1438	208	3.9	255	7.1	17.7	1.6	0.6	32.3
S-4	0.74	17.2	6.7	2.5	2.5	109	1609	212	3.5	183	20.0	11.7	5.0	0.5	49.7
S-5	0.90	4.4	6.8	4.6	2.3	70.5	837	123	3.1	74.0	18.3	5.9	2.1	0.3	42.9
S-6	0.93	5.6	7.1	1.6	9.5	152	2731	254	7.1	244	67.3	23.4	5.8	0.4	102
S-7	0.75	18.6	7.1	2.6	3.2	90.7	1764	169	6.5	173	46.2	17.9	5.5	0.4	62.6
S-8	0.62	18.6	5.9	4.2	3.2	74.2	1244	220	4.4	273	21.4	25.8	6.1	0.6	37.6
S-9	0.52	25.4	6.3	2.6	1.8	49.2	1078	196	2.8	151	39.9	13.0	4.1	0.4	79.0
S-10	0.81	8.4	5.7	7.6	8.3	128	1152	200	7.7	405	4.7	82.0	7.2	0.6	27.5
S-11	0.77	9.6	5.8	7.2	7.2	112	1156	208	6.3	336	10.1	39.3	6.7	0.6	52.6
S-12	0.70	19.1	6.1	2.4	2.4	92.8	1443	204	3.9	234	4.3	13.5	4.5	0.7	37.5
S-13	0.80	17.3	6.7	4.1	4.1	117	1837	241	6.0	202	47.5	19.0	4.9	0.7	75.7
S-14	0.80	12.1	6.8	4.7	4.7	128	1801	330	6.8	206	56.1	16.6	6.9	0.7	86.8
S-15	0.85	7.9	6.5	6.5	8.0	145	1577	293	8.1	242	23.0	15.0	6.5	0.8	57.1
S-1D	0.84	10.5	6.0	3.6	5.0	142	1580	274	6.1	296	6.6	20.2	35.7	0.9	72.6

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 4, Figure 3).

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 4. 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)
Site	Depth					
1	6	0.87	7.6	6.6	0.06	Low
2	7.5	0.67	33.4	6.2	0.06	Medium
3	7	0.68	35.8	6.3	0.07	Medium
4	6	0.74	17.2	6.7	0.06	Low
5	6	0.9	4.4	6.8	0.08	Low
6	6	0.93	5.6	7.1	0.1	Low
7	6	0.75	18.6	7.1	0.1	Medium
8	3	0.62	18.6	5.9	0.09	Medium
9	6	0.52	25.4	6.3	0.09	Medium
10	5.5	0.81	8.4	5.7	0.2	Medium
11	5	0.77	9.6	5.8	0.12	Medium
12	7	0.7	19.1	6.1	0.06	Medium
13	7	0.8	17.3	6.7	0.09	Low
14	6	0.8	12.1	6.8	0.08	Low
15	7	0.85	7.9	6.5	0.06	Low
1D	6	0.84	10.5	6	0.07	Medium

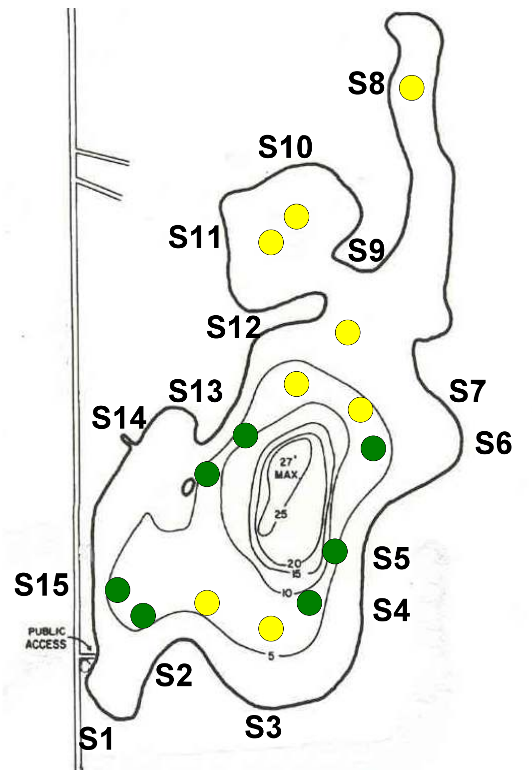

Figure 3. Sediment sample locations are shown with dots. The dot color indicates the potential for nuisance curlyleaf pondweed to occur at that site. Key: green dot = low; yellow dot = medium; red dot = high potential.

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 5 and Figure 4).

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 5. 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)
Site	Depth			
1	6	7.5	7.6	Medium
2	7.5	3.7	33.4	Medium
3	7	33.9	35.8	Medium
4	6	3.5	17.2	Medium
5	6	3.1	4.4	Medium
6	6	7.1	5.6	Medium
7	6	6.5	18.6	Medium
8	3	4.4	18.6	Medium
9	6	2.8	25.4	Medium
10	5.5	7.7	8.4	Medium
11	5	6.3	9.6	Medium
12	7	3.9	19.1	Medium
13	7	6	17.3	Medium
14	6	6.8	12.1	Medium
15	7	8.1	7.9	Medium
1D	6	6.1	10.5	Medium

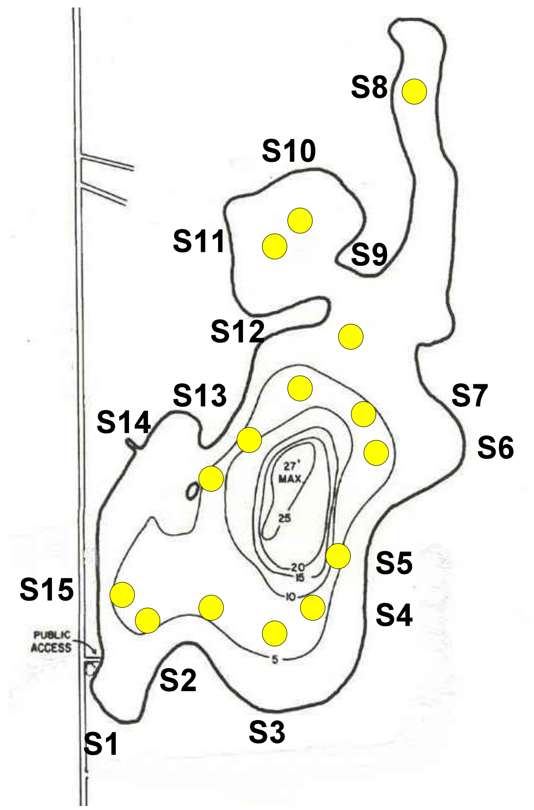

Figure 4. Sediment sample locations are shown with dots. The dot color indicates the potential for nuisance Eurasian milfoil to occur at that site. Key: green dot = low; yellow dot = medium; red dot = high potential.

Aquatic Plant Goals

- An aquatic plant distribution goal is to maintain native plant distribution to 40% of the lake area. This type of coverage generally promotes clear water conditions. Currently aquatic plant distribution is at about 66%. Therefore this goal is reached. The challenge will be to maintain this coverage. To maintain this coverage, water clarity minimums should be 4 to 5 feet so plant growth with colonize out 8-10 feet of water depth. A map showing the existing native plant coverage is shown in Figure 5.

- Maintain a no-net loss of the shoreline coverage of emergent plants. The goal is to maintain shorelines with emergent plant growth and to encourage emergent growth in areas where it is absent.

- Maintain diversity of submerged native plants. Currently is a relatively good diversity of native plants in Schmidt Lake. This goal is reached.

- Manage nuisance growth of the exotic plant species, curlyleaf pondweed and Eurasian watermilfoil by using the minimum effort necessary to reduce the nuisance conditions.

- With an increase in clarity, there may be a need to manage new growth of Eurasian watermilfoil.

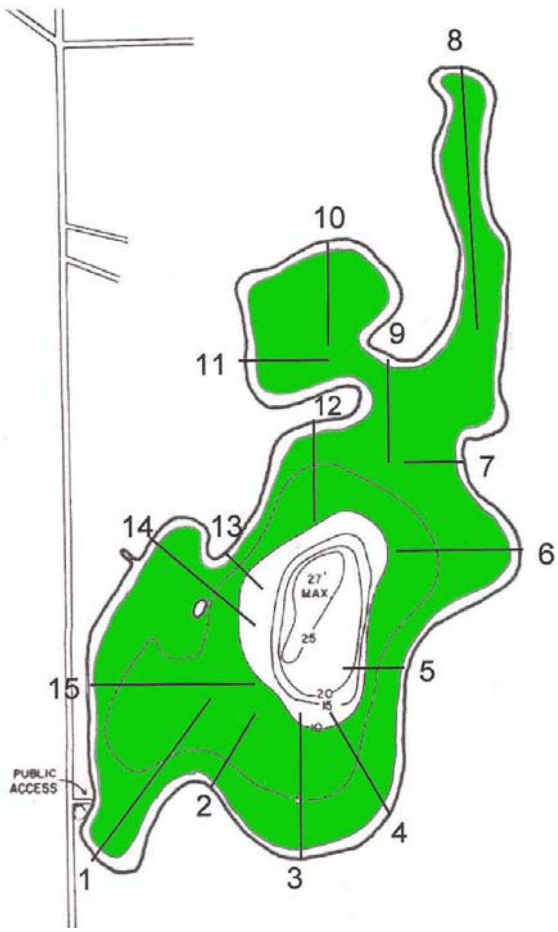

Figure 5. A coverage of native plants is shown in green shading. This represents about 66% of the lake bottom.

Aquatic Plant Projects

A list of aquatic plant management options that were initially considered are presented in the Appendix. Also, current aquatic management projects were reviewed. From these options, aquatic plant management projects were considered and a program was prepared.

Exotic Plant Management

Curlyleaf Pondweed: Curlyleaf pondweed does not produce the heavy nuisance level of growth in Schmidt Lake that has been observed in other lakes in the metro area (Figure 6) but there is widespread light nuisance growth covering about 24 acres. At the present time curlyleaf does not impose a significant water quality problem with a die back, so curlyleaf control measures are primarily for improving navigation and aesthetics.

Lake sediment analysis indicates there is a low to moderate potential for future nuisance curlyleaf growth to occur. Therefore, treating the minimum amount of curlyleaf to allow for lake navigation is recommended.

Existing Management Practices: Currently, a contact herbicide is applied early in the summer to control nuisance levels of curlyleaf pondweed. This addresses the major growth areas, but requires an annual treatment. Herbicides have been used for curlyleaf control on an annual basis since the 1990s. In 2004, permits have been issued representing 26 acres of the littoral zone. The Schmidt Lake Association is managing curlyleaf at the present time based on dues collected from lake residents.

Figure 6. Crystal Lake in Burnsville is an example of a lake with heavy nuisance growth of curlyleaf pondweed in 2003. Schmidt Lake has widespread curlyleaf growth, but not widespread matted growth.

Curlyleaf Pondweed Management Plan: It is estimated that curlyleaf pondweed is present in about 24 acres of Schmidt Lake. However, it grows to the surface creating a recreational nuisance in only a few acres. Current herbicide applications appear to control nuisance occurrences of curlyleaf pondweed. This continues to be the first option. In the future, based on additional monitoring or surveying, the treatment acreage could be reduced.

The second option is to contract with a mechanical weed harvester to remove up to approximately 10 acres of curlyleaf pondweed. Only the densest patches need to be removed. The cost is approximately $550/acre and the harvesting cost would be approximately $5,500 per year.

The third option is to forego treatment for a year and map the extent and the level of curlyleaf growth. This apparently hasn't been done in about 15 years. Does curlyleaf grow to nuisance conditions every year? Lake sediment analysis indicates widespread nuisance growth would not be expected. Taking a year off from herbicide application could reveal what the existing curlyleaf growth status is. Maybe herbicides are unnecessary.

A fourth option was evaluated but is not recommended for Schmidt Lake. Aggressive whole lake curlyleaf treatments have been conducted in experimental trials on several lakes in Minnesota. The research results are not in yet. However, for Schmidt Lake, the aggressive approach is unnecessary. Nuisance curlyleaf growth can be contained with spot treatments or with harvesting.

Figure 7. An aquatic plant harvester is an option for curlyleaf control for Schmidt Lake.

Eurasian Watermilfoil: Eurasian watermilfoil was first detected in Schmidt Lake in 1990 (based on MnDNR records) and is widely distributed throughout Schmidt Lake in water depths of nine feet or less. Eurasian watermilfoil will grow to the lake surface in several spots, but does not profusely branch and its distribution is scattered around the lake. As of 2004, Eurasian watermilfoil does not impose significant navigational problems.

Lake sediment analysis indicates most of the lake bottom out to nine feet of water depth could support moderate milfoil growth, however, wide spread surface matting is not expected.

Existing Management Action: Currently, a systemic herbicide, 2,4-D is applied in mid-summer for nuisance milfoil control.

Eurasian Watermilfoil Management Plan: It is estimated that Eurasian watermilfoil is present in about 18 acres of Schmidt Lake, mixed in with other native plants. It rarely tops out and nuisance conditions probably represent less than 2 acres. At the present time there are no nuisance EWM growth areas out from shore beyond 6 feet of water depth. For managing nuisance Eurasian watermilfoil growth, the Schmidt Lake Association has several management options (nuisance growth is defined as milfoil growing horizontally along the lake surface with multiple branching). The management options for the Lake Association include the following:

1. No control, but monitor.
2. Spot treatment with herbicides (current approach).
3. Cut channels with a contracted mechanical harvester.

Figure 8. Nuisance, matted Eurasian watermilfoil growth in a bay on White Bear Lake. Schmidt Lake has only several patches where milfoil tops out at the surface.

Native Plant Management

Emergent Native Plants: Emergent plants are present, but could be more widely distributed which would enhance water quality and wildlife. Factors that are limiting growth are lack of light penetration due to algae blooms and lakeside residents removing vegetation. Reestablishing emergent plants probably will not succeed unless the limiting factors are removed.

Existing Management Plan: No formal plan is in place.

Emergent Native Plant Management Plan: Prepare educational materials for lake residents. Begin to establish new emergent plant stands as clarity improves using lakescaping techniques.

Submersed Native Plants: The diversity of submersed aquatic plants is adequate at the present time. However, in some shallow areas along shorelines, aquatic vegetation is abundant. The dominant plant in this shallow water area is usually water celery, a highly desirable native plant because of its fish habitat and wildlife values.

Existing Management Plan: No formal plan is in place

Submersed Native Plant Management Plan:
Because Schmidt Lake is a moderately fertile lake basin, there will always be some type of plant growth in the lake. If submerged plants dominate, then algae growth will probably be low and clear water will result. This is the recommended plant condition for Schmidt Lake -- aquatic plants and clear water. Therefore only the minimum amount of native submersed plants should be removed in order to facilitate nearshore recreational activities.

The most aggressively growing nearshore plant in 2004 was water celery. Because this species is more resistant to herbicides than other plants, it is recommended that lake residents rake out areas that are exhibiting nuisance growth, but only enough area for swimming or launching boats. Submerged plants can be removed in a 50 foot by 50 foot area by lake residents without a MnDNR permit.

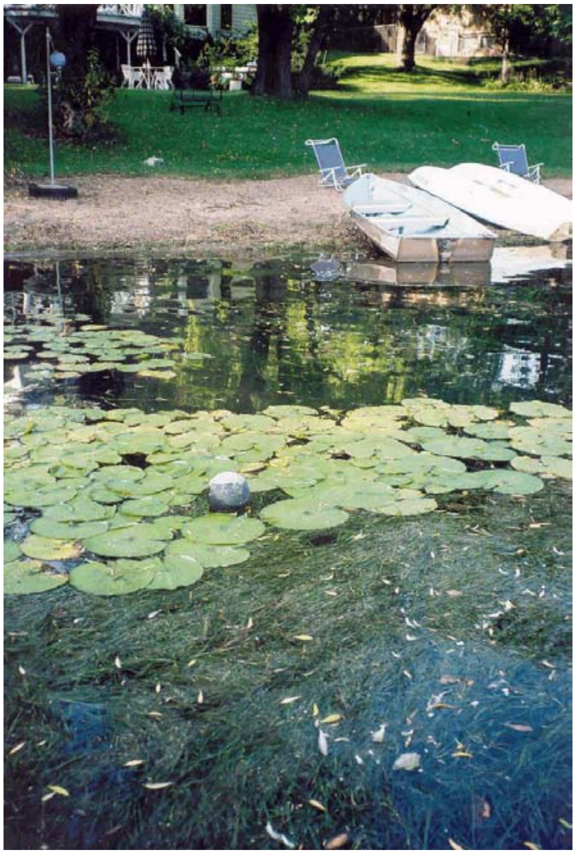

Figure 9. Some nearshore areas have abundant aquatic plant growth (leave the lilies in place).

Aquatic Plant Management Plan Summary

	Goals	Management Plan
Exotic Plants		
Curlyleaf pondweed	Manage nuisance growth of curlyleaf pondweed.	Management options for the Schmidt Lake Association include the following: 1. Continue annual herbicide applications. 2. Contract with a mechanical weed harvester to cut up to 10 acres for a total cost of $5,500. 3. No removal, but monitor.
Eurasian watermilfoil	Manage nuisance growth of Eurasian watermilfoil.	Management options for the Schmidt Lake Association include the following: 1. No removal, but monitor. 2. Continue spot treatment with herbicides. 3. Cut channels with a contracted mechanical weed harvester.
Native Plants		
Emergent plants	Increase the shoreline coverage of emergent plants.	Prepare educational materials for lake residents. Begin to establish new emergent plant stands as clarity improves using lakescaping techniques.
Submersed plants	Maintain diversity of submerged native plants. This is relatively high diversity for Schmidt Lake.	Remove the minimum amount of nearshore vegetation (primarily water celery) to facilitate swimming and boat launching. Lake residents are responsible for their own nearshore areas.

APPENDIX

Summary of Native and Exotic Aquatic Plant Species in 2004

Summer plant diversity was fair in Schmidt Lake in 2004 (Table 1). The plant community was dominated by coontail and curlyleaf pondweed in the early summer survey. Later in the summer, coontail and flatstem pondweed were dominant. Eurasian watermilfoil was first reported in 1990 (based on MnDNR records). Eurasian watermilfoil was common in the late summer survey. The native northern watermilfoil was scarce in Schmidt Lake. Curlyleaf was reported to be present in 1987, but it is unknown when it first invaded Schmidt Lake.

Plants grew out to a water depth of 12 feet in both early and late summer surveys.

Table 1. Comparison of Schmidt Lake aquatic plant occurrences and densities for the two summer plant surveys of 2004. 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.

	Jun 2	Sept 13
Spatterdock (*Nuphar variegatum*)	0	3 (0.5)
White waterlily (*Nymphaea sp*)	18 (1.2)	23 (1.9)
Chara (*Chara sp*)	5 (0.5)	10 (1.3)
Coontail (*Ceratophyllum demersum*)	74 (1.3)	82 (1.7)
Curlyleaf pondweed (*Potamogeton crispus*)	77 (1.8)	0
Elodea (*Elodea canadensis*)	64 (1.0)	36 (1.3)
Eurasian watermilfoil (*Myriophyllum spicatum*)	8 (0.8)	54 (1.0)
Flatstem pondweed (*Potamogeton zosteriformis*)	41 (1.1)	74 (1.5)
Milfoil (*Myriophyllum sp*)	13 (1.1)	0
Naiads (*Najas flexilis*)	0	3 (0.5)
Needle spikerush (*Eleocharis palustris*)	0	3 (0.5)
Nitella (*Nitella sp*)	13 (1.1)	0
Northern watermilfoil (*Myriophyllum sibiricum*)	5 (0.5)	0
Sago pondweed (*Stuckenia pectinata*)	0	3 (1.0)
Stringy pondweed (*Potamogeton pusillus*)	3 (1.0)	8 (1.2)
Water celery (*Vallisneria americana*)	21 (0.6)	51 (2.6)
Water stargrass (*Zosterella dubia*)	0	3 (0.5)
Filamentous algae	21 (0.7)	3 (1.0)
Acres Covered by Plants (acres)	24	24
Percent Area Covered (%)	66	66

Native Aquatic Plant Status

At least 15 native aquatic plant species were observed in Schmidt Lake in 2004. Water celery is abundant in shallow water and its growth is perceived by some lake residents to be excessive. Coontail is the dominant plant in the mid to deep depths, but does not grow to nuisance conditions.

Exotic Plant Status

Two exotic plants are present in Schmidt Lake. They are curlyleaf pondweed and Eurasian watermilfoil. Each species is discussed separately.

Curlyleaf Pondweed Status: Curlyleaf pondweed is widely distributed in early summer in Schmidt Lake. Biomass production is moderate to light and curlyleaf is a moderate navigational hindrance in Schmidt. Curlyleaf has been chemically treated for about the last 15 years in Schmidt Lake. Heaviest growth was observed between 6 to 10 feet of water depth.

Eurasian Watermilfoil Status: Eurasian watermilfoil (EWM) is widely distributed in Schmidt Lake, but grows to nuisance conditions (growing up to the surface) at only a few locations representing less than 2 acres. Biomass production is moderate. The EWM grows primarily as single stems with slight branching and does not produce large-scale matting conditions. Heaviest growth occurs between 4 to 6 feet.