



View from Landing on Round Lake, 2013

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# Aquatic Plant Surveys and Water Quality for Round Lake and Two Tributary Ponds, Eden Prairie, 2013

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Round Lake Early Summer Aquatic Plant Survey: June 11, 2013  
Round Lake Late Summer Aquatic Plant Survey: August 19, 2013

Prepared for:  
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# Aquatic Plant Surveys and Water Quality for Round Lake and Two Tributary Ponds, Eden Prairie, 2013

## Summary

**Round Lake Aquatic Plant Surveys:** Two aquatic plant point-intercept surveys were conducted on Round Lake (31 acres at normal water levels) in the summer of 2013. The objective of the June 11 survey was to evaluate curlyleaf pondweed and native plants and the objective of the August 19 survey was to look for Eurasian watermilfoil and characterize native plants.

In the early summer of 2013, curlyleaf pondweed was observed in 8% of the samples (4 sites)(Table S-1) while Eurasian watermilfoil was found at 10% of the samples (5 sample sites) and out to about 8 feet of water depth. Nuisance conditions, where plants were matting at the water surface, were not found in Round Lake.

In August, Eurasian watermilfoil was found at 10% of the samples (5 sample sites)(Table S-1) and at low densities. Plants grew out to about 10 feet of water in late summer. Submerged plants, dominated by native species, covered about 21 acres of the lake bottom in June and August. Water lilies had abundant growth along much of the shoreline.

**Table 1. The percent occurrence of aquatic plants for Round Lake in 2013. 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 5 out of 10 stations, its percent occurrence would be 50%.**

	June 11, 2013 % Occurrence (49 stations)	August 19, 2013 % Occurrence (49 stations)	Changes from June to August (+/-)
White waterlily ( <i>Nymphaea tuberosa</i> )	33	47	+
Coontail ( <i>Ceratophyllum demersum</i> )	49	65	+
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	10	0
Brittle naiad ( <i>Najas minor</i> )	0	4	+
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	8	0	-
Stringy pondweed ( <i>P. sp</i> )	2	4	+
Filamentous algae	22	0	-
Number of submerged species	4	4	0
Aquatic Plant Coverage (acres)	20	21	
Secchi disc (ft)	10.3	5.0 (August 14)	-

The aquatic plant community had four species of submerged plants in early season and four species in late summer. This is a relatively low plant diversity condition (Figure S-1).

Eurasian watermilfoil was first observed in Round Lake in 1995 and was found growing at low densities in 2013. The brittle naiad, another non-native aquatic plant, was first found in Round Lake, just north of the public access on June 9, 2010. In 2009, brittle naiad was found in a stormwater pond (08-13-A) that discharges to Round Lake. On August 19, 2013, brittle naiad was again observed in Round Lake at two sample sites. It is not spreading very rapidly.

Curlyleaf pondweed has been found in Round Lake in the past and does not require control at this time. Eurasian watermilfoil was observed with light densities in 2013, and presented no recreational problems.

Because aquatic plants are important for sustaining good water quality, plant surveys should be conducted again in 2014. If milfoil growth is heavy and interferes with recreational lake use, mechanical harvesting is recommended as a control method.

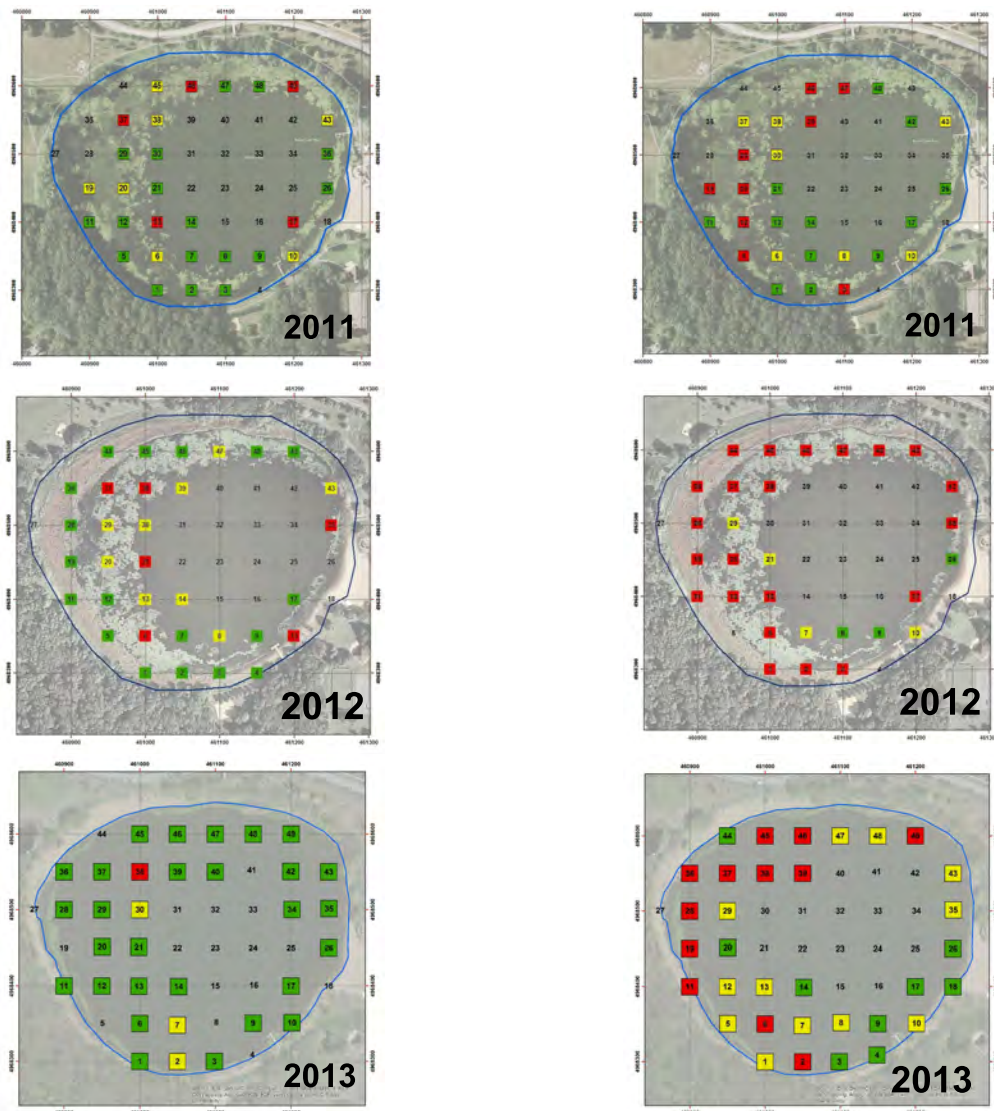


Figure S-1. Early summer total aquatic plant coverage on the left and late summer total aquatic plant coverage on the right for 2011, 2012, and 2013. Green squares = light growth, yellow squares = moderate growth, and red squares = heavy growth.

**Round Lake Water Quality:** In general, Round Lake has good water quality but it fluctuates from year to year. The water quality for the last eight years is shown in Table S-2. Water clarity (Secchi disc) has been in an unimpaired category for the last eight out of eight years. The total phosphorus concentration has been unimpaired for three out of the last eight years and the chlorophyll concentration has been unimpaired for three out of the last eight years. Over the last couple of years, low water levels may be a factor, but a buildup of phosphorus in the bottom water may also be a factor. Water quality data for 2013 is shown in Table S-3.

**Table S-2. Round Lake water quality summary for 2006-2013. Calcium nitrate was added into Round Lake on June 15, 2010. An alum application was conducted on November 12, 2012 in Round Lake.**

	Secchi Disc (m)	Total Phosphorus (ppb)	Chlorophyll (ppb)	Source
Impaired Criteria	<1.4	>40	>14	MPCA
2006	1.9	35	18	BWS
2007	2.1	38	16	BWS
2008	2.2	30	11	BWS
2009	2.1	52	18	BWS
2010	1.6	47	29	RPCWD*
2011	2.2	42	6.5	BWS
2012	1.5	44	19.4	BWS
2013	2.5	43	6	BWS

\*Riley-Purgatory Creek Watershed District

**Table S-3. Water quality data for Round Lake, Eden Prairie, Minnesota in 2013.**

	Secchi Disc (feet)	Total Phos (ppb)	Chl a (mg/l)	TSS (mg/l)	Total Alkalinity (mg/l)	Ortho Phos (ppb)	Chloride (mg/l)	Nitrate + Nitrite (mg/l)	Ammonia Nitrogen (mg/l)	Kjeldahl Nitrogen (mg/l)
May 7	9.2	44 58 - D	2.0	107	36	<5	66.3	<0.2	<0.16	1.1
May 29	11.1	63 50 - D	1.4	<2	38	9	75.4	<0.2	0.71	1.5
June 11	10.3	49 57 - D	1.9	<2	36	<20	73.4	<0.2	0.80	1.3
June 25	8.0	49 44 - D	6.2	4	38	6	68.3	<0.2	<0.16	3.4
July 9	8.2	31 68 - D	6.8	<2	38	<5	70.7	<0.2	<0.16	0.9
July 25	3.2	46 62 - D	24.8	2	38	<5	59.5	<0.2	<0.16	1.3
Aug 14	5.0	36 230 - D	7.9	5	40	<20	60.3	<0.2	0.23	1.1
Aug 27	7.3	45 129 - D	5.4	2	44	<5	59.8	<0.2	0.51	1.0
Sep 19	8.7	35 37 - D	3.6	5	44	<5	64.2	<0.2	<0.16	0.7
Sep 27	10.2	31 43 - D	2.4	<2	44	<5	65.3	<0.2	<0.16	1.1
Oct 11	10.5	29 38 - D	2.8	<2	44	7	61.6	<0.2	<0.16	0.8
Oct 28	13.3	27 28 - D	5.2	2.0	46	<5	78.8	<0.2	<0.16	1.2
<b>May-September Average</b>										
	8.1	43 78 - D	6	13	40	9	66	0.2	0.3	1.3
<b>Jun-September Average</b>										
	7.6	40 84 - D	7	3	40	9	65	0.2	0.3	1.4



**Water Quality in Two Stormwater Ponds Tributary to Round Lake:** Phosphorus concentrations are moderate to high in both ponds (Table S-4). However chlorophyll concentrations are low in Park Pond but proportional to phosphorus concentrations in RLP Pond. Chloride concentrations are higher in Park Pond compared to RLP Pond due primarily to the high value on May 7, 2013. Pond locations are shown in Figure S-2.

**Table S-4. Eden Prairie water quality data for three ponds in 2013. Results for Secchi disc (SD) are in feet, total phosphorus (TP), and chlorophyll a (Chl) are in ppb and chlorides are in mg/l.**

	Round Pond NE (0.8-13-A)(Park Pond)			Round Pond NW (08-23-A)(RLP Pond)		
	TP (ppb)	Chl (ppb)	Chloride (mg/l)	TP (ppb)	Chl (ppb)	Chloride (mg/l)
May 7	76	16.5	609	51	16.5	100
May 29	69	<1	59.8	105	21.4	63.3
June 11	145	1.4	45.0	191	42.7	66.4
June 25	171	10.3	38.0	233	4.5	7.9
July 9	200	35.4	34.7	457	2.4	18.2
July 25	221	31.0	10.4	122	21.7	18.6
Aug 14	226	13.0	11.1	135	19.2	17.7
Aug 27	229	4.3	24.0	38	30.6	18.8
Sept 19	184	3.8	7.9	237	66.4	15.5
Sept 27	97	3.1	21.2	134	41.6	18.6
Oct 11	66	4.3	8.2	123	22.4	15.9
Oct 28	52	7.9	6.8	79	20.4	14.6
<b>May-September Average</b>						
	162	12	86	170	27	35
<b>Jun-September Average</b>						
	184	13	24	193	29	23



**Figure S-2. Location of the Round Lake ponds sampled in 2013. Round Pond NE = Park Pond and Round Pond NW = RLP Pond.**

# Aquatic Plant Surveys and Water Quality for Round Lake and Two Tributary Ponds, Eden Prairie, 2013

**Lake ID: 27-0071**

**Size: 31 acres (at normal water elevations, source: MnDNR)**

**Littoral area: 23 acres (source: MnDNR)**

**Maximum depth: 37 ft (source: MnDNR lake map)**

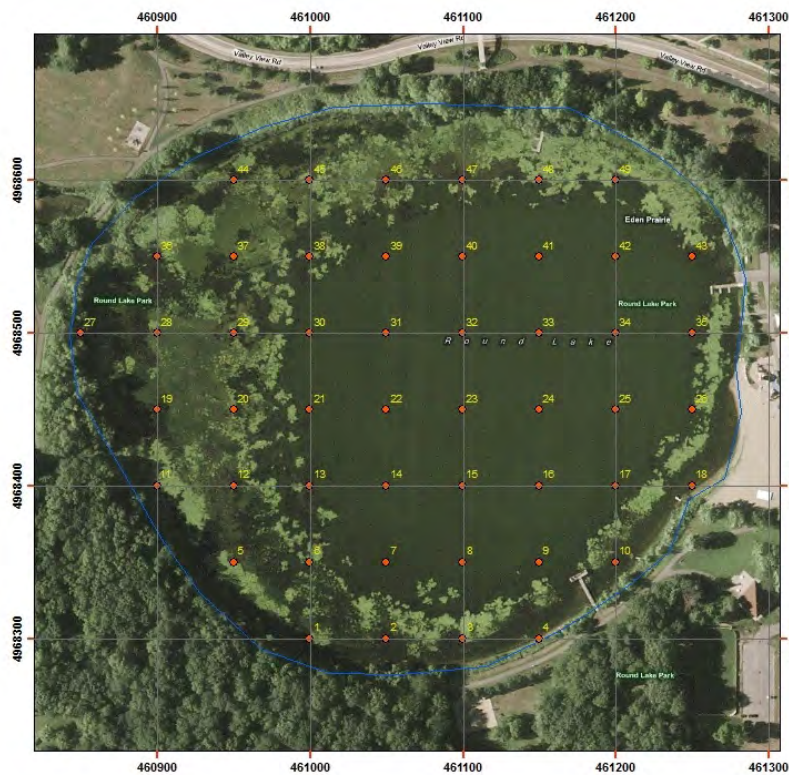
**Mean depth: 11 feet**

**Eurasian watermilfoil first observed: 1995**

## Introduction

Round Lake is 31 acres at normal lake levels and is a moderately fertile lake in Eden Prairie, Minnesota.

The aquatic plant point-intercept surveys of Round Lake were conducted to evaluate curlyleaf pondweed, 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 Round Lake on June 11 and August 19, 2013. Also, Round Lake water quality and stormwater pond water quality are included after the plant survey results.



**Figure 1. Sample site map for plant surveys on June 11 and August 19, 2013.**

## Methods

We used a point-intercept survey method that consisted of 49 sample locations set on a grid pattern over the lake (Figure 1). Sample sites were spaced about 50 meters apart.

Aquatic plant density was estimated based on a scale from 1-5 with 1 being the least dense and 5 representing plants matting at the surface. Plant density ratings were based on the amount of plants, of a single species, 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 were 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.

One to two rake samples were collected at each point (Figure 2). 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.



**Figure 2. Aquatic plants were sampled with a rake in Round Lake. Here coontail and stringy pondweed were sampled on August 19, 2013.**



# Results of the Early Summer Survey -- June 11, 2013

The most abundant plant in early summer in Round Lake was coontail and it was found at 49% of the stations (Table 1). Coontail was found growing out to water depths of 12 feet. Eurasian watermilfoil was found at 10% of the stations and curlyleaf pondweed was found at 8% of the stations in Round Lake.

An aquatic plant coverage map is shown in Figure 3. Plants covered about 21 acres.

A summary of plant density and occurrence for individual sample sites is shown in Table 2.

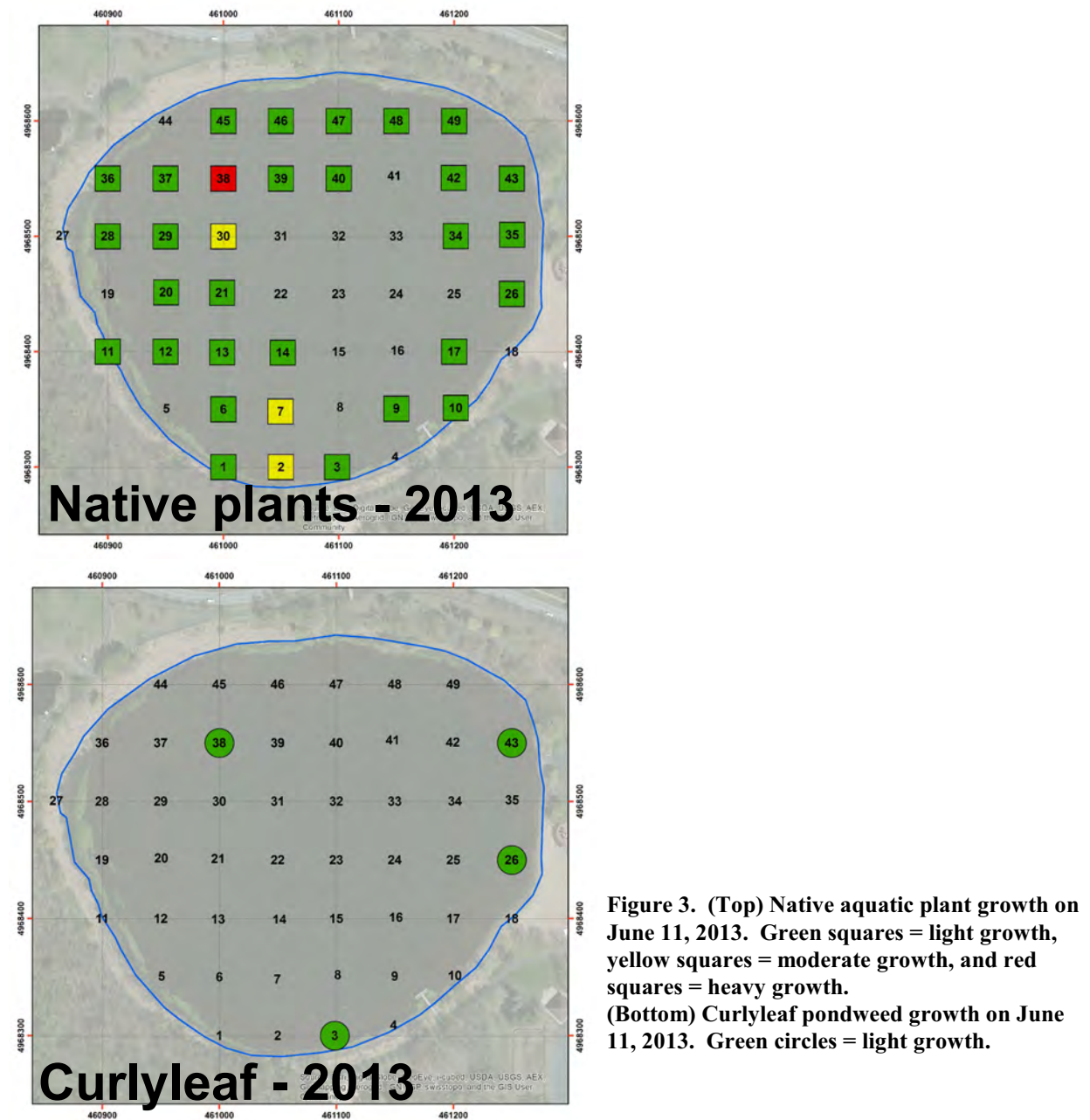


Figure 3. (Top) Native aquatic plant growth on June 11, 2013. Green squares = light growth, yellow squares = moderate growth, and red squares = heavy growth. (Bottom) Curlyleaf pondweed growth on June 11, 2013. Green circles = light growth.



**Table 1. Round Lake aquatic plant occurrences and densities for the June 11, 2013 survey based on 49 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=49)		
	Occurrence	% Occurrence	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	16	33	1.2
Coontail ( <i>Ceratophyllum demersum</i> )	24	49	1.8
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	5	10	1.4
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	4	8	1.0
Stringy pondweed ( <i>P. sp</i> )	1	2	1.0
Filamentous algae	11	22	1.1



**Figure 4. White waterlilies were common in Round Lake in 2013.**

**Table 2. Individual site data for Round Lake on June 11, 2013.**

Site	Depth (ft)	White lilies	Coontail	Curlyleaf pondweed	Eurasian watermilfoil	Stringy pondweed	Filamentous algae
1	1					1	
2	6	1	3				
3	6		2	1	1		
4	2						
5	4						
6	5	2					
7	8		3				
8	10						
9	12		2				
10	3		1				
11	4	1					1
12	5	1	1				
13	7	1	2				
14	8		2				
15	27						
16	24						
17	8		2		2		
18	2						
19	4						
20	6	1	1				1
21	11		1				
22	23						
23	32						
24	32						
25	30						
26	5		1	1	1		
27	land						
28	4	1					1
29	5	1	2				1
30	8		3				
31	28						
32	32						
33	35						
34	9		2				
35	4		2				
36	4	1	1				1
37	5	1	1				1
38	7		4	1	2		
39	10	1					
40	11		1				
41	12						
42	11		1				
43	5		2	1	1		
44	3						
45	4	1					1
46	4	1	1				1
47	5	2					2
48	5	2	1				1
49	4	1					1
<b>Average</b>		1.2	1.8	1.0	1.4	1.0	1.1
<b>occurrence (49 sites)</b>		16	24	4	5	1	11
<b>% occurrence</b>		33	49	8	10	2	22

## Results of the Late Summer Survey -- August 19, 2013

The aquatic plant community changed slightly from the May to August surveys. Coontail was found in 59% of the stations (Table 3). Curlyleaf pondweed was not found in the August survey. Eurasian watermilfoil was found at 8% of the sample sites.

A map of native aquatic plant coverage is shown in Figure 5. Aquatic plants covered about 21 acres and grew out to about 9 feet of water depth.

The occurrence and density of plants for individual sample sites are shown in Table 4.

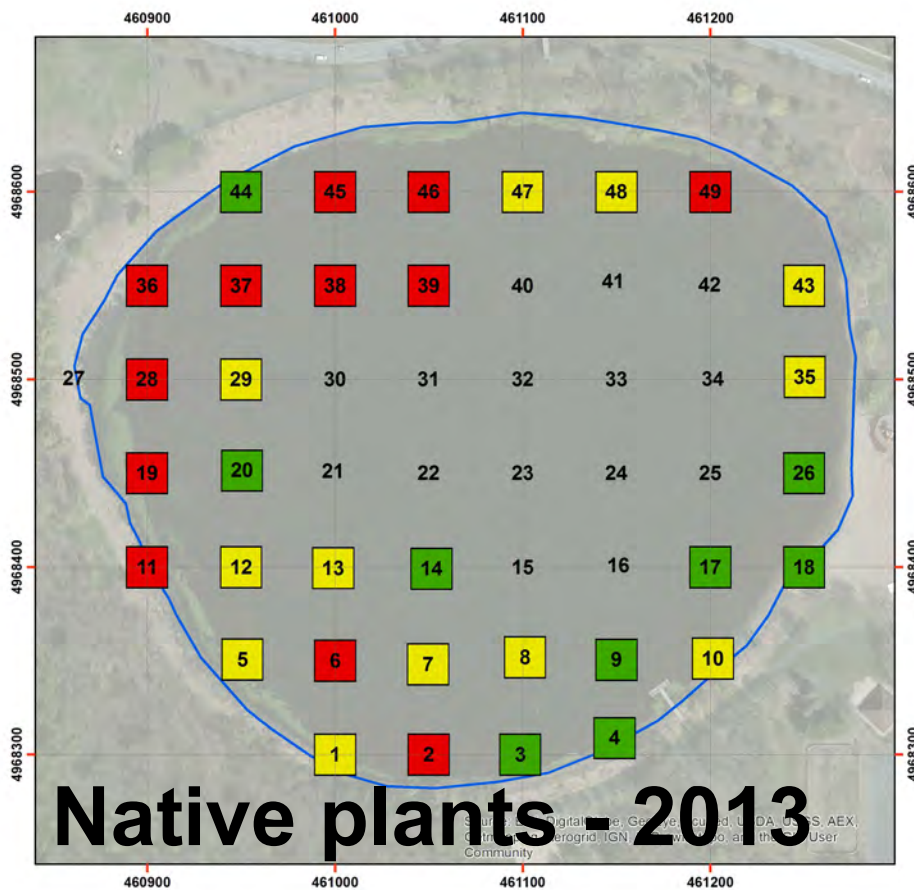


Figure 5. Native aquatic plant growth map for Round Lake on August 19, 2013.

Key: Green squares = light growth, yellow squares = moderate growth, and red squares = heavy growth.



**Table 3. Round Lake aquatic plant occurrences and densities for the August 19, 2013 survey based on 49 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=49)		
	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	23	47	2.6
Coontail ( <i>Ceratophyllum demersum</i> )	32	65	2.8
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	5	10	1.2
Brittle naiad ( <i>Najas minor</i> )	2	4	1.5
Stringy pondweed ( <i>Potamogeton</i> sp)	2	4	1.0



**Figure 6. Coontail sampled in Round Lake on August 19, 2013.**

**Table 4. Individual site data for Round Lake on August 19, 2013.**

site	depth (ft)	White lilies	Brittle naiad	Coontail	Eurasian watermilfoil	Stringy pondweed
1	3	1		3		
2	4	4		2		
3	4			2	1	
4	2	1	1	1		1
5	4	2		3		
6	6			5		
7	7			3		
8	8			3		
9	9	1		1		
10	4			3	1	
11	4	1		4		
12	6	3		3		
13	6	3		2		
14	10			2		
15	27					
16	24					
17	8	1		2		
18	2			2		
19	4	4		3		
20	8			1		
21	12					
22	23					
23	32					
24	32					
25	30					
26	5		2		2	1
27	land					
28	4	2		4		
29	7	3		3		
30	12					
31	28					
32	32					
33	35					
34	12					
35	6	1		3	1	
36	4	3		4		
37	6	4		3		
38	6	4		4		
39	8			4		
40	12					
41	12					
42	12					
43	5	2		3		
44	3	2		2		
45	4	4		3		
46	4	4		3		
47	6	3		3		
48	5	3		3	1	
49	4	4		2		
<b>Average</b>		2.6	1.5	2.8	1.2	1.0
<b>occurrence (49 sites)</b>		23	2	32	5	2
<b>% occurrence</b>		47	4	65	10	4

## Comparison of Early and Late Summer Aquatic Plant Surveys in 2013

Two aquatic plant point-intercept surveys were conducted on Round Lake (31 acres at normal water levels) in the summer of 2013. The objective of the June 11 survey was to evaluate curlyleaf pondweed and native plants and the objective of the August 19 survey was to look for Eurasian watermilfoil and characterize native plants.

In the early summer of 2013, Eurasian watermilfoil was found at 10% of the samples (5 sample sites) and out to about 8 feet of water depth. Nuisance conditions, where plants were matting at the water surface, were not found in Round Lake. Curlyleaf pondweed was observed in 8% of the samples (4 sample sites) in June 2013.

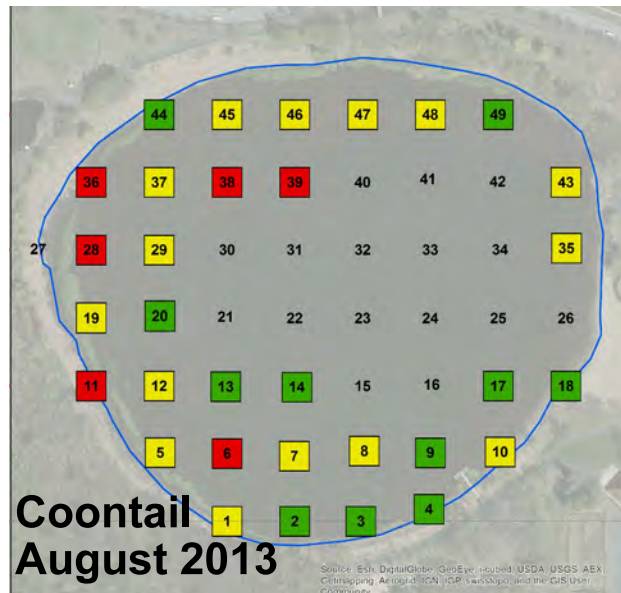
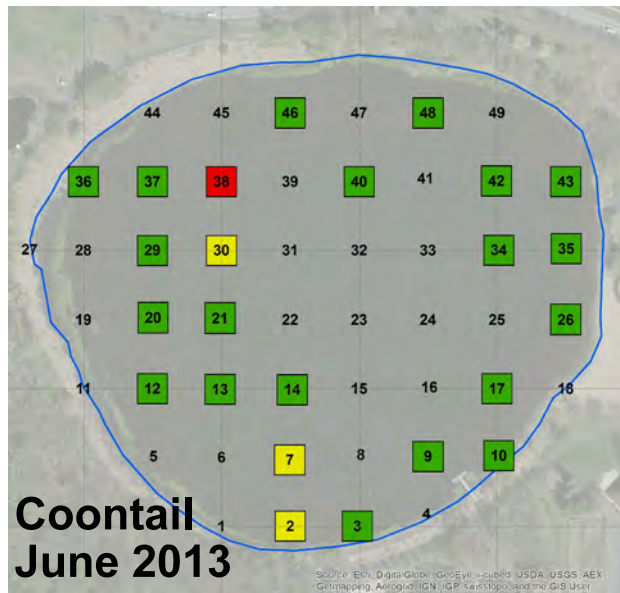
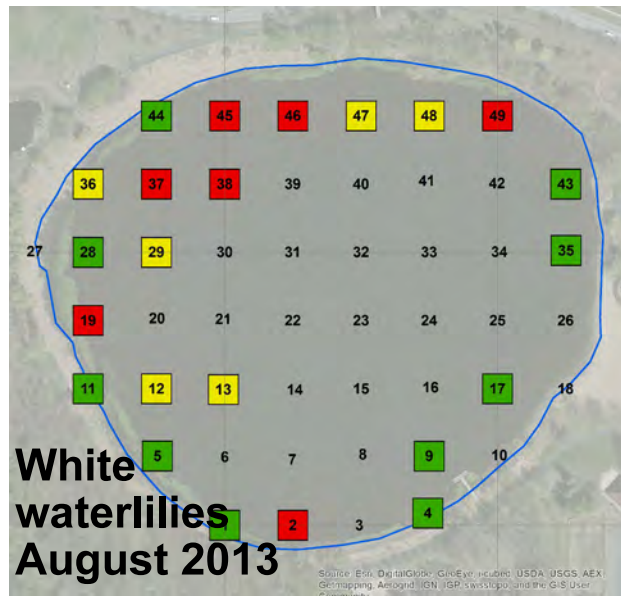
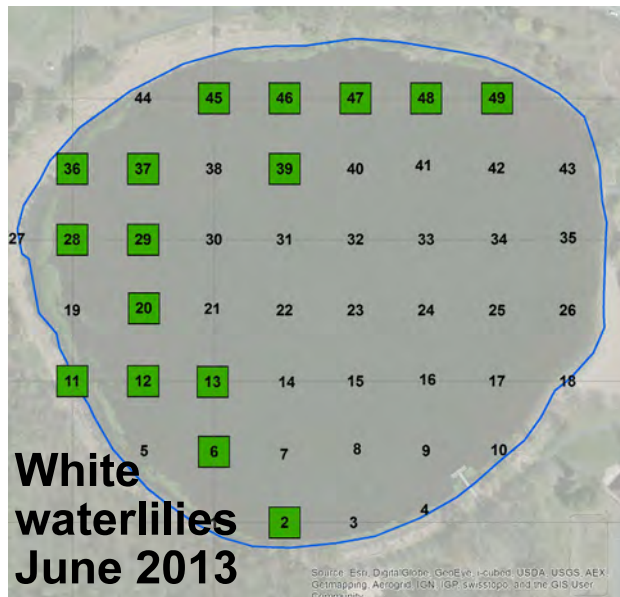
In August, Eurasian watermilfoil was found at 10% of the samples (5 sample sites) and at low densities (Table 5). Plants grew out to about 10 feet of water in late summer.

Submerged plants covered about 21 acres of the lake bottom in June and about 21 acres in August. Both waterlilies and coontail increased in distribution and abundance from June to August (Figure 7). This is fairly common for lakes in this region.

**Table 5. The percent occurrence of aquatic plants for Round Lake in 2013. 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 5 out of 10 stations, its percent occurrence would be 50%.**

	June 11, 2013 % Occurrence (49 stations)	August 19, 2013 % Occurrence (49 stations)	Changes from June to August (+/-)
White waterlily ( <i>Nymphaea tuberosa</i> )	33	47	+
Coontail ( <i>Ceratophyllum demersum</i> )	49	65	+
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	10	0
Brittle naiad ( <i>Najas minor</i> )	0	4	+
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	8	0	-
Stringy pondweed ( <i>P. sp</i> )	2	4	+
Filamentous algae	22	0	-
Number of submerged species	4	4	0
Aquatic Plant Coverage (acres)	20	21	
Secchi disc (ft)	10.3	5.0 (August 14)	-





**Figure 7. [top-left] White waterlilies distribution and abundance - June 2013  
 [top-right] White waterlilies distribution and abundance - August 2013.  
 [bottom-left] Coontail distribution and abundance - June 2013.  
 [bottom-right] Coontail distribution and abundance - August 2013.  
 Key: Green squares = light growth, yellow squares = moderate growth, and red squares = heavy growth.**

## Summary of Aquatic Plant Surveys for 2006 - 2013

**Early Summer Surveys:** The aquatic plant community has been somewhat stable in the early summer from 2006 to 2013 with coontail being the dominant plant (Table 6). Overall, aquatic plant species diversity is low.

Both curlyleaf pondweed and Eurasian watermilfoil were present in 2013 but were producing mostly light growth conditions.

Eurasian watermilfoil and coontail distribution have decreased since 2010.

**Table 6. Summary of aquatic plant surveys from 2006 - 2013 conducted by Blue Water Science. The top number is the percent occurrence (%) and the bottom number is the density.**

	Early Summer							
	2006 May 30 (n=20)	2007 May 14 (n=20)	2008 May 28 (n=20)	2009 June 9 (n=20)	2010 May 25 (n=20)	2011 June 9 (n=49)	2012 May 17 (n=49)	2013 June 11 (n=49)
Duckweed	0	0	0	0	0	0	0	0
Spatterdock	0	0	0	0	0	0	2 (1.0)	0
White waterlily	65 (1.1)	45 (1.2)	40 (1.3)	40 (2.1)	25 (1.6)	35 (1.4)	31 (1.0)	33 (1.2)
Coontail	100 (2.5)	100 (2.6)	100 (2.6)	65 (3.1)	90 (2.6)	49 (2.5)	33 (2.5)	49 (1.8)
Chara	0	0	0	0	0	4 (1.5)	0	0
Elodea	5 (0.1)	0	0	0	0	10 (1.0)	10 (1.0)	0
Eurasian watermilfoil	85 (1.0)	70 (1.5)	95 (2.2)	100 (3.6)	100 (3.6)	29 (1.3)	29 (1.3)	10 (1.4)
Naiads	0	0	0	0	0	0	0	0
Brittle naiad	0	0	0	0	0	0	0	0
Curlyleaf pondweed	5 (0.6)	15 (1.3)	10 (0.8)	0	0	6 (1.3)	14 (1.0)	8 (1.0)
Floatingleaf pondweed	0	0	0	0	0	0	0	0
Stringy pondweed	10 (0.8)	0	0	0	0	14 (1.7)	6 (1.0)	2 (1.0)
Flatstem pondweed	0	0	0	0	0	0	2 (1.0)	0
Buttercup	0	0	0	0	0	0	1 (2.0)	0
Filamentous algae	85 (1.9)	55 (2.8)	85 (2.1)	30 (3.3)	55 (1.4)	10 (3.2)	33 (2.3)	22 (1.1)
Number of submerged plant species	5	3	3	2	2	6	7	4

**Late Summer Surveys:** For all eight late summer plant surveys, coontail has been the dominant plant (Table 6). Other native plant species have been found lower frequencies. Eurasian watermilfoil is present and growth increased for a few years, but has declined since 2010 (Table 6). Coontail has also declined since 2010, but not to the same degree.

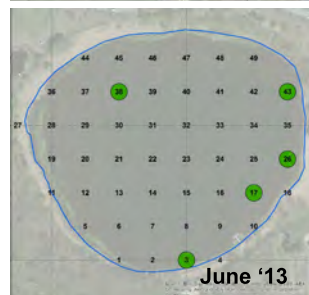
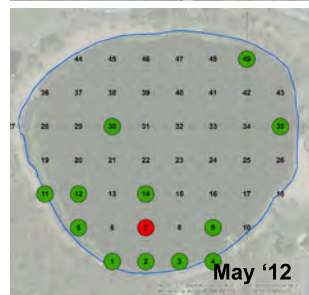
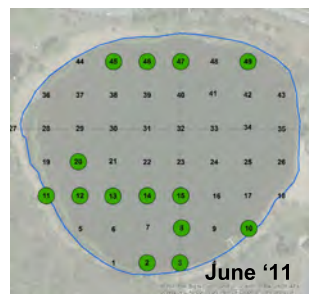
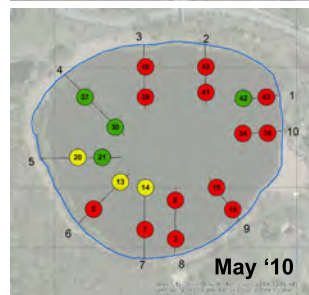
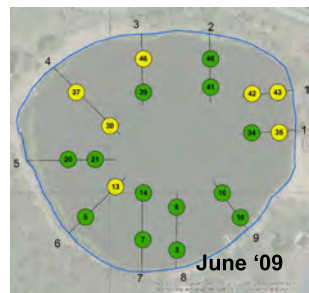
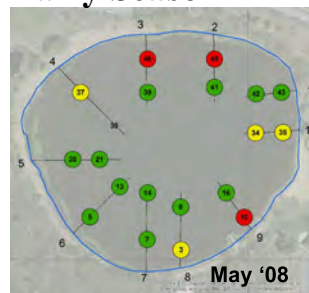
**Table 6. Summary of aquatic plant surveys from 2006 - 2013 conducted by Blue Water Science. The top number is the percent occurrence (%) and the bottom number is the density.**

	Late Summer							
	2006 July 26 (n=22)	2007 Aug 16 (n=20)	2008 Aug 25 (n=20)	2009 Aug 31 (n=20)	2010 July 9 (n=20)	2011 Sept 12 (n=34)	2012 Aug 1 (n=49)	2013 Aug 19 (n=49)
Duckweed	0	0	0	5 (1.0)	0	0	0	0
Spatterdock	5 (0.3)	0	0	0	0	0	2 (2.0)	0
White waterlily	60 (2.7)	55 (2.1)	45 (3.7)	50 (2.6)	45 (3.5)	56 (2.9)	51 (3.2)	47 (2.6)
Coontail	100 (3.4)	100 (2.6)	100 (3.1)	100 (2.4)	90 (3.5)	82 (2.3)	59 (3.7)	65 (2.8)
Chara	0	0	0	0	0	0	0	0
Elodea	0	5 (0.5)	0	0	0	3 (0.5)	4 (1.0)	0
Eurasian watermilfoil	45 (0.8)	85 (0.9)	100 (2.7)	100 (2.1)	90 (2.3)	15 (1.3)	8 (1.0)	10 (1.2)
Naiads	5 (0.5)	0	0	0	0	3 (1.0)	0	0
Brittle naiad	0	0	0	0	0	0	0	4 (1.5)
Curlyleaf pondweed	0	0	0	0	0	0	0	0
Floatingleaf pondweed	0	0	0	0	0	3 (1.0)	2 (1.0)	0
Stringy pondweed	0	5 (1.0)	0	5 (1.0)	0	6 (0.8)	2 (1.0)	4 (1.0)
Flatstem pondweed	0	0	0	0	0	0	0	0
Buttercup	0	0	0	0	0	0	0	0
Filamentous algae	25 (2.6)	15 (2.7)	30 (1.3)	15 (1.7)	55 (2.6)	59 (3.1)	27 (2.3)	0
Number of submerged plant species	3	4	2	3	2	6	5	4

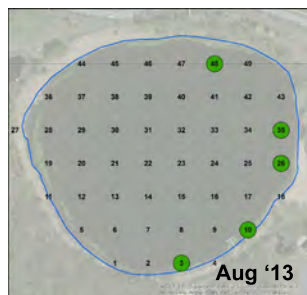
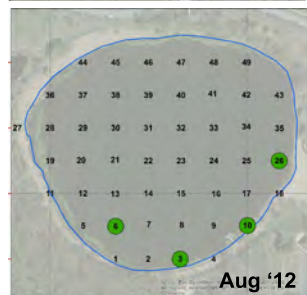
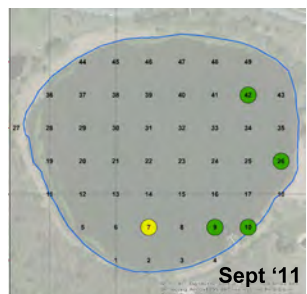
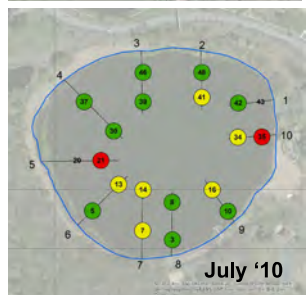
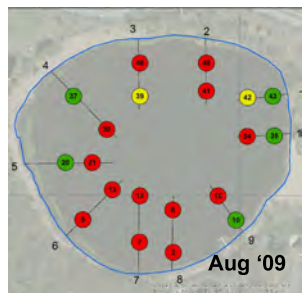
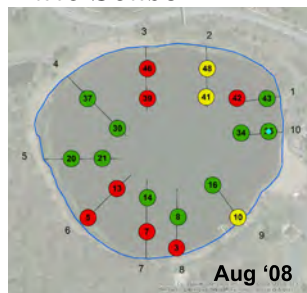


# EWM in Round Lake, Eden Prairie, from 2008 Through 2013

## Early Season



## Late Season



Point-transect surveys using 20 points/survey were conducted from May 2006 - July 2010. Maps for 2006 and 2007 are not shown. Light growth was observed at all sites in 2006 and 2007. Occurrence included: May 2006: 17/20 sites; July 2006: 9/20 sites; May 2007: 14/20 sites; and August 2007: 17/20 sites.

EWM abundance was increasing starting in May 2008 and peaked in August 2009 with carry over to May 2010. EWM started to decline in July 2010 and has had mostly light growth since 2011.

Point-intercept surveys using 49 points were started in June 2011 and have continued to the present.

From June 2011 through August 2013, EWM growth has been mostly light.

## Summary and Recommendations for Aquatic Plant Management in Round Lake

In 2013, the aquatic plant community had four species of submerged plants in early and late summer. This is a relatively low plant diversity condition.

Eurasian watermilfoil was first observed in Round Lake in 1995 and was found growing at low densities in 2013. On June 9, 2010, brittle naiad, another non-native aquatic plant, was found in Round Lake. Brittle naiad was found just north of the public access. In 2013 brittle naiad was again observed at this same location at two sample sites.

Curlyleaf pondweed has been found in Round Lake in the past and does not require control at this time. Eurasian watermilfoil was present but with light growth in 2013, and presented no recreational problems.

Because aquatic plants are important for sustaining good water quality, plant surveys should be conducted again in 2014. If milfoil growth is heavy and interferes with recreational lake use, mechanical harvesting is recommended as a control method.



**Figure 8. Swimming beach at Round Lake in August, 2013.**

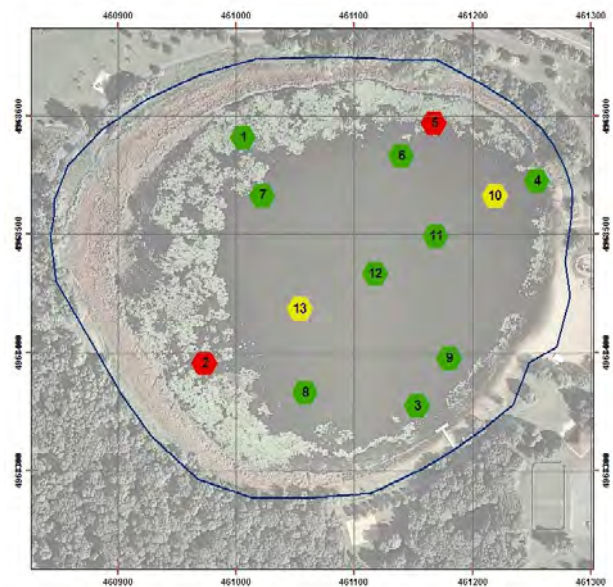


**Curlyleaf Pondweed Growth Potential Based on Lake Sediments:** Research has found curlyleaf is limited or enhanced based on lake sediment characteristics. Curlyleaf does best in sediments with a high pH and low iron content (McComas, unpublished). Based on lake sediment characteristics, curlyleaf could produce light, moderate, or heavy growth on an annual basis.

In Round Lake it is predicted that curlyleaf will grow at mostly light densities with a couple of areas producing heavy growth on a year to year basis (Table 7 and Figure 9). If treatment is considered in the future, the latest research indicates that harvesting or herbicides produce annual control but long-term control is unlikely.

**Table 7. Round Lake sediment data and rating for potential heavy curlyleaf pondweed growth.**

Site	Depth (ft)	pH (su)	Organic Matter (%)	Fe:Mn Ratio	Potential for CLP Growth
		<7.4	0.1 - 5	>4.5	Light (green)
		7.4 - 7.7	6 -19	4.5 - 1.6	Moderate (yellow)
		>7.7	>20	<1.6	Heavy (red)
<b>2005</b>					
1	5	7.3	38.6	5.1	Light
2	6	7.8	37.6	3.3	Heavy
3	6	6.4	1.7	9.2	Light
4	5	6.9	7.8	6.6	Light
5	6	7.8	29.1	2.7	Heavy
<b>2011</b>					
6	7	6.8	11.1	15.9	Light
7	8	6.7	7.9	12.7	Light
8	7	6.4	8.7	7.9	Light
9	7	6.3	14.0	11.8	Light
10	9	7.5	33.5	3.5	Moderate
11	31	5.9	17.7	11.7	Light
12	32	7.3	36.2	4.6	Light
13	22	7.6	28.5	4.4	Moderate



**Figure 9. Curlyleaf pondweed potential based on sediment testing. Green shading = light growth; yellow shading = moderate growth, and red shading = heavy growth.**



Light growth (left) refers to non-nuisance growth that is mostly below the surface and is not a recreational or ecological problem. Moderate growth (middle) refers to growth that is just below the water surface. Heavy growth (right) refers to nuisance matting curlyleaf pondweed. This is the kind of nuisance growth predicted by high sediment pH and a sediment bulk density less than 0.51.

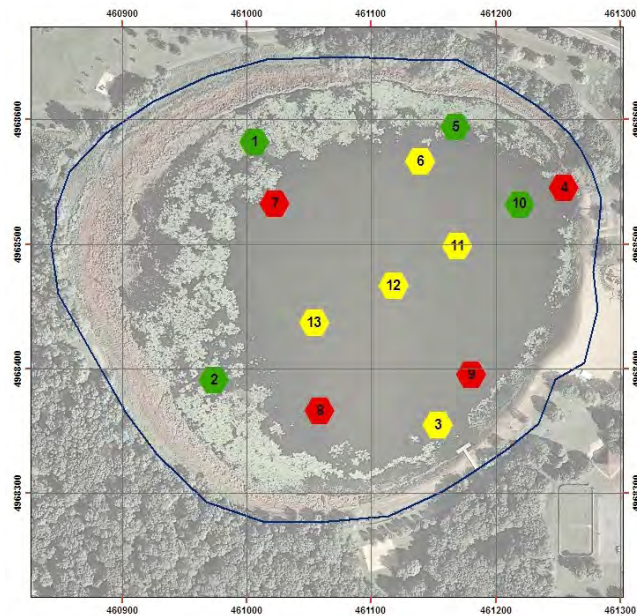


**Eurasian Watermilfoil Growth Potential Based on Lake Sediments:** Lake sediment sampling results from 2005 and 2011 have been used to predict lake bottom areas that have the potential to support heavy EWM growth. Eurasian watermilfoil was first observed in Round Lake in 1995 (source: MnDNR). The potential for milfoil growth, based on lake sediment sampling, ranges from light to heavy growth (Table 8 and Figure 10). In other lakes heavy milfoil growth has been correlated with high sediment nitrogen conditions with sediment ammonia nitrogen over 10 ppm. In the growing zone, 4 out of the 10 samples had high nitrogen. In the other six samples sediment nitrogen was low to moderate.

For Round Lake, it is estimated the plants have the potential to grow down to at least 11 feet of water depth. It is predicted, there should be a mix of milfoil growth types in Round Lake.

**Table 8. Round Lake sediment data and ratings for potential EWM growth.**

Site	Depth (ft)	NH <sub>4</sub> Conc (ppm)	Organic Matter (%)	Potential for EWM Growth
		<4	<0.5 and >20	Light (green)
		4 - 10	0.6 - 2 and 18 - 20	Moderate (yellow)
		>10	2 - 17	Heavy (red)
<b>2005</b>				
1	5	9.07	38.6	Light
2	6	2.51	37.6	Light
3	6	3.29	1.7	Moderate
4	5	21.13	7.8	Heavy
5	6	2.17	29.1	Light
<b>2011</b>				
6	7	5.43	11.1	Moderate
7	8	11.60	7.9	Heavy
8	7	16.60	8.7	Heavy
9	7	13.18	14.0	Heavy
10	9	3.94	33.5	Light
11	31	4.50	17.7	Moderate
12	32	5.50	36.2	Moderate
13	22	4.19	28.5	Moderate



**Figure 10. Eurasian watermilfoil growth potential based on sediment testing. Green shading = light growth; yellow shading = moderate growth, and red shading = heavy growth.**



Light growth (left) refers to non-nuisance growth that is mostly below the surface and is not a recreational or ecological problem. Heavy growth (right) refers to nuisance matting Eurasian watermilfoil. This is the kind of nuisance growth predicted by high sediment nitrogen values and a sediment organic matter content less than 20%.

## Round Lake Water Quality Summary

Summer water chemistry data collected since 1972 includes Secchi disc, total phosphorus (TP), and chlorophyll *a* (Chl *a*) (Table 9). Overall, the three water quality indicators (Secchi disc, total phosphorus, and chlorophyll *a*) over the years indicate Round Lake has had fluctuating water quality.

**Table 9. Round Lake summer averages (source: Barr Engineering Company except for 2005 which is Blue Water Science). Summer averages for 1972-1997 are from June-August (Barr 1999, p. 1-7). For 2001-2003, summer averages are from June-August and the June-September average is also shown. For 2005, the average is July and August. 2008 - 2013 data was collected by Blue Water Science.**

Date	SD (m)	SD (ft)	TP (µg/l)	CHL (µg/l)
1972	5.0	16.5	20	5.2
1975	2.4	7.9	72	17.2
1978	2.0	6.6	43	15.1
1980	2.1	6.9	49	11.3
1981	4.6	15.2	41	4.7
1982	4.4	14.5	28	6.6
1983	2.6	8.6	42	13.8
1984	3.0	9.9	38	9.6
1985	2.4	7.9	41	11.4
1986	2.9	9.6	34	13.6
1987	1.8	5.9	99	30.0
1988	1.1	3.6	88	22.4
1991	1.0	3.3	74	35.7
1993	2.3	7.6	56	9.2
1997	1.3	4.3	60	19.0
2001 (Jun - Aug)	2.3	7.5	27	4.8
average (Jun - Sept)	2.1	6.9	30	7.6
range	1.4 - 3.0	4.6 - 9.9	21 - 48	1.3 - 1.5
n	9	9	9	9
2002 (Jun - Aug)	1.6	5.2	34	13.1
average (Jun - Sept)	1.2	4.0	33	13.6
range	1.1 - 2.0	3.6 - 6.6	28 - 42	0.5 - 15
n	5	5	5	5
2003 (Jun - Aug)	1.3	4.3	57	39
average (Jun - Sept)	1.2	4.0	53	37
range	0.5 - 2.4	1.7 - 7.9	40 - 64	0.5 - 70
n	5	5	5	5
2005 (Jul - Aug)	1.9	6.3	34	11
range	1.7 - 2.0	5.6 - 6.6	33 - 34	9.9 - 11.7
n	2	2	2	2
2008 (May - Sept)	2.3	7.2	30	10.8
range	1.0 - 4.3	3.4 - 14.1	19 - 42	1.2 - 21.3
n	10	10	10	10
2009 (May - Sept)	2.1	7.0	52	18
range	0.9 - 4.2	3.1 - 13.9	42 - 72	1.8 - 58.9
n	10	10	10	10
2010 (May - Sept)	1.6	5.2	47	29
range	0.5 - 4.0	1.6 - 13.1	24 - 1,200	2.7 - 77
n	16	16	12	12
2011 (May - Sept)	2.2	7.3	42	6.5
average (Jun - Sept)	2.1	6.9	40	7.8
range	1.4 - 3.8	4.7 - 12.5	23 - 54	1.1 - 6.0
n	10	10	10	10
2012 (May - Sept)	1.5	4.9	44	19.4
average (Jun - Sept)	1.5	4.8	40	17.7
range	1.0 - 2.2	3.3 - 7.1	27 - 73	5.3 - 42.1
n	10	10	10	10
2013 (May - Sept)	2.5	8.1	43	6
average (Jun - Sept)	2.3	7.6	40	7
range	1.0 - 3.4	3.2 - 11.1	31 - 63	1.4 - 24.8
n	10	10	10	10

**Water Quality in Two Stormwater Ponds Tributary to Round Lake:** Phosphorus concentrations are moderate to high in both ponds (Table 10). However chlorophyll concentrations are low in Park Pond but proportional to phosphorus concentrations in RLP Pond. Chloride concentrations are higher in Park Pond compared to RLP Pond due primarily to the high value on May 7, 2013. Pond locations are shown in Figure 11.

**Table 10. Eden Prairie water quality data for three ponds in 2013. Results for Secchi disc (SD) are in feet, total phosphorus (TP), and chlorophyll a (Chl) are in ppb and chlorides are in mg/l.**

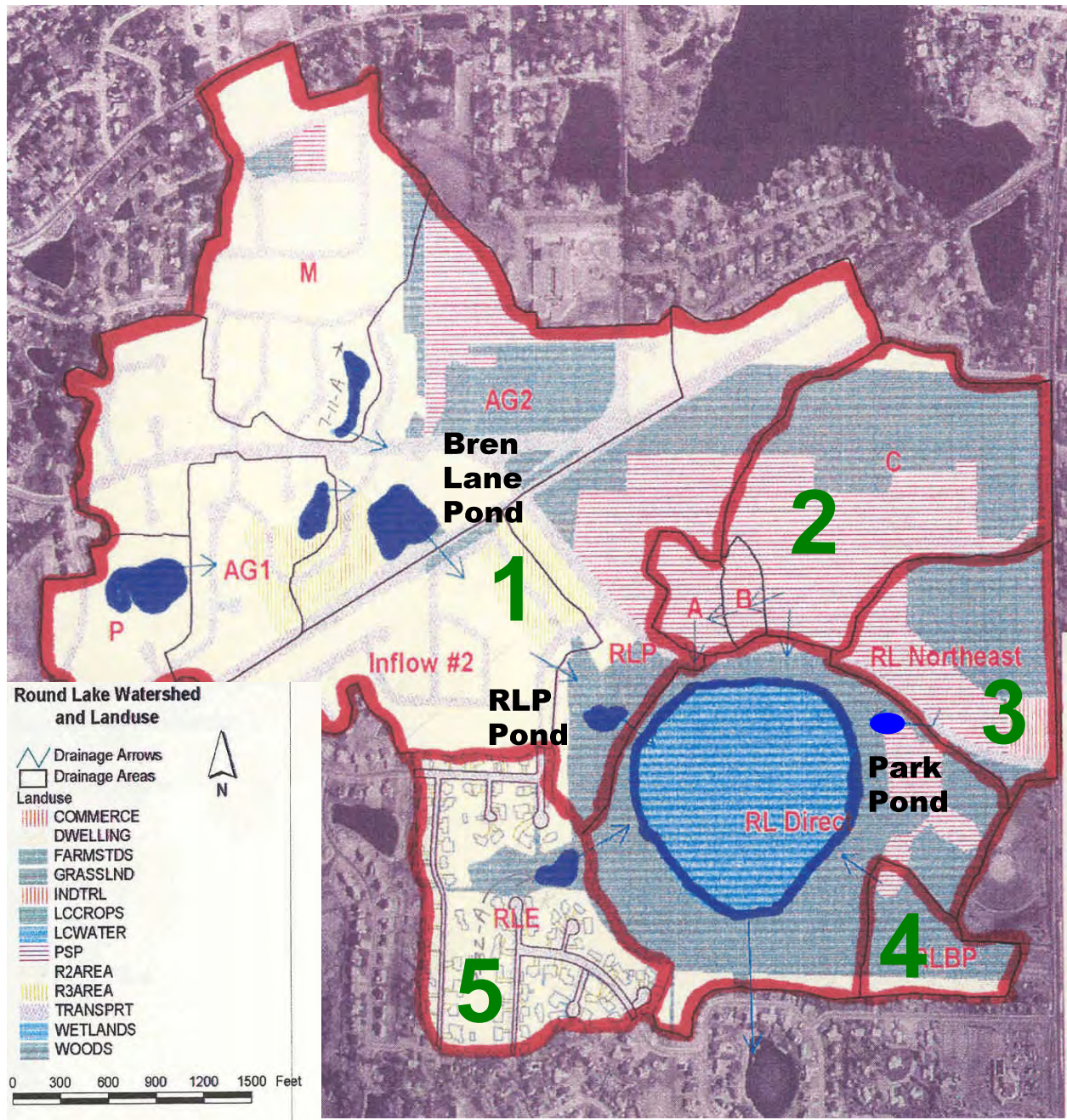
	Round Pond NE (0.8-13-A)(Park Pond)			Round Pond NW (08-23-A)(RLP Pond)		
	TP (ppb)	Chl (ppb)	Chloride (mg/l)	TP (ppb)	Chl (ppb)	Chloride (mg/l)
May 7	76	16.5	609	51	16.5	100
May 29	69	<1	59.8	105	21.4	63.3
June 11	145	1.4	45.0	191	42.7	66.4
June 25	171	10.3	38.0	233	4.5	7.9
July 9	200	35.4	34.7	457	2.4	18.2
July 25	221	31.0	10.4	122	21.7	18.6
Aug 14	226	13.0	11.1	135	19.2	17.7
Aug 27	229	4.3	24.0	38	30.6	18.8
Sept 19	184	3.8	7.9	237	66.4	15.5
Sept 27	97	3.1	21.2	134	41.6	18.6
Oct 11	66	4.3	8.2	123	22.4	15.9
Oct 28	52	7.9	6.8	79	20.4	14.6
<b>May-September Average</b>						
	162	12	86	170	27	35
<b>Jun-September Average</b>						
	184	13	24	193	29	23



**Figure 11. Location of the Round Lake ponds sampled in 2013. Round Pond NE = Park Pond and Round Pond NW = RLP Pond.**



**Round Lake Watershed:** Two ponds sampled in 2013 are shown in Figure 12.



**Round Lake Watershed (444 acres, including the lake)**

**Subwatershed Areas:**

- |           |          |               |
|-----------|----------|---------------|
| 1. 235 ac | 2. 58 ac | 3. 26 ac      |
| 4. 11 ac  | 5. 37 ac | Direct: 46 ac |

Figure 12. Round Lake subwatershed boundaries are outlined in red. The watershed area was calculated to be 444 acres (includes lake area). The largest subwatershed is subwatershed 1 and is 235 acres in size (source: Barr 1999). Bren Lane Pond and Round Lake Pond (RLP) are located in subwatershed 1 and Park Pond is located in the direct drainage subwatershed.





**RLP (Round Lake Pond)(2010) in Subwatershed 1**



**Bren Lane Pond (2010) in Subwatershed 1**



**Park Pond (2009) (receives storm flows from Subwatershed 3)**

## Water Quality for Bren Lane Pond, RLP Pond, Park Pond, and Round Pond C for 2007 Through 2012

**Table 11. Eden Prairie water quality data 2007. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, chlorophyll a (chl) are in ppb.**

	Bren Lane Pond			RLP Pond			Park Pond		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
May 14		134	28.7		186	27.9			
May 25							1.0	131	8.4
June 11	2.5	244	102	1.2	187	55.2	2.9	154	7.3
June 28									
July 9									
July 27	0.5	373	269	1.0	859	218	1.5	134	23.8
Aug 16		473	179		386	136		789	9.6
Aug 30									
Sept 10									
Sept 25	0.9	197	149	0.9	190	66	0.5	251	66.8
<b>May - September Average</b>									
	1.7	286	146	1.2	362	101	1.5	292	23

**Table 12. Three stormwater ponds water quality data for 2008. Results for total phosphorus (TP) are in ppb and chlorophyll a (chl) are in ppb.**

	Bren Lane Pond		RLP Pond		Park Pond	
	TP	Chl	TP	Chl	TP	Chl
May 15						
May 28	159		221		124	
June 9	228		257		269	
June 20						
July 10	164	33	104	<1	131	3.4
July 28	139		dry		115	
Aug 6	134		dry		84	
Aug 25						
Sept 16	117		266		120	
Sept 28						
<b>May - September Average</b>						
	157		212		141	

**Table 13. Eden Prairie water quality data for 2009 for two stormwater ponds. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll a (chl) are in ppb.**

	Bren Lane Pond			Park Pond		
	SD	TP	Chl	SD	TP	Chl
May 18	1.4	138	--	2.0+	242	--
May 27	1.3	559	--	1.8	264	--
June 9	0.5	278	--	2.0+	181	--
June 24	1.3	237	--	1.3+	213	--
July 10	1.0	373	--	1.6	172	--
July 28	0.7	266	--	2.0	191	--
Aug 17	0.5	159	--	2.0+	110	--
Aug 31	1.5	156	--	2.0	60	--
Sept 14	1.0	200	115	2.0+	132	<1
Sept 30	1.2	278	179	2.5+	137	--
<b>May-September Average</b>						
	1.0	264	147	1.9	170	<1
<b>Jun-September Average</b>						
	1.0	243	147	1.9	150	<1

**Table 14. Stormwater pond water quality data 2010. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, chlorophyll a (chl) are in ppb, conductivity (Cond) are in umhos, and pH are in standard units.**

Lakes	Round Lake Pond (RLP)					Bren Lane Pond					Park Pond				
	SD	TP	Chl	Cond	pH	SD	TP	Chl	Cond	pH	SD	TP	Chl	Cond	pH
May 6							31	17.1				51	--		
May 25						2.5b	208	2.8	250	6.8	2.0	140	BDL	420	6.9
June 10						2b	106	24.6	470	8.5	--	--	--		
June 28						2.8	560	44.5	150	7.3	2	182	34.2	105	7.4
July 9						3.7	70	19.4			2.2	167	10.4		
July 27	0.9	121	5.9	140	10.2	1.1	113	130	80	9.2	2b	134	8.4	55	8.4
Aug 13	1.3	154	62.1	40	7.6	<1	218	63.9	45	7.1	1	147	25.1	20	8.0
Aug 30	1.0	160	106	100	9.9	0.7	303	20.9	90	9.3	2b	131	8.9	100	9.1
Sept 8	0.8	198	89.4	80	8.9	0.7	252	110	70	8.8	2b			70	8.9
Sept 30		77	30.7	65	8.4	1.8	220	68.8	70	7.4				55	7.4
<b>May-September Average</b>															
	1.0	142	58.8	85	9	1.78	208	50.2	153	8	2.0	131	13.4	118	8
<b>Jun-September Average</b>															
	1.0	142	58.8	85	9	1.75	230	60.3	139	8.3	2.0	130	13.4	68	8.2

**Table 15. Stormwater pond water quality data 2011. Results for Secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll a (chl) are in ppb. Conductivity (Cond) is reported in umhos, and pH is in standard units.**

Lakes	Round Lake Pond (RLP)									Bren Lane Pond								
	SD	TP	Chl	TKN	ORP	Cond	pH	Temp	DO	SD	TP	Chl	TKN	ORP	Cond	pH	Temp	DO
May 10	4.0	64	6.6	--	--	250	6.5	17.1	9.1	2.6	68	7.4	--	--	200	7.2	18.0	9.9
May 27	2.1	88	15.1	--	--	220	7.70	17.7	12.7	2.7	84	11.1	--	--	195	7.28	17.3	10.7
June 9	2.4	72	14.8	--	--	225	8.30	77	--	2.5b	159	22.4	--	--	195	8.63	77	--
June 27	2.2	104	21.3	--	--	160	9.12	--	--	2.5b	77	1.7	--	--	140	9.55	--	--
July 13	1.5	146	57.9	--	--	--	--	24.7	6.9	2.7	91	7.1	--	--	--	--	24.1	6.7
July 29	1.8	137	42.7	--	--	105	7.09	27.0	10.2	3.1	160	4.8	--	--	90	8.27	24.9	6.21
Aug 11	2.1	112	57.6	--	--	110	8.58	24.2	10.1	4.2	280	152	--	--	100	7.49	23.1	4.1
Aug 23	1.4	137	36.0	--	--	100	7.99	25.2	7.5	4.0	89	44.6	--	--	95	7.46	23.5	8.2
Sept 9	2.1	165	47.2	2.3	127	125	7.46	23.2	9.7	3.9	88	3.9	1.5	82	110	7.35	21.0	8.6
Sept 23	1.8	183	38.4	2.4	120	125	7.37	15.0	8.1	4.2	79	4.6	1.4	--	120	7.10	15.1	8.1
<b>May-September Average</b>																		
	2.1	121	33.8			158	7.79	27.9	9.3	3.2+	118	26.0			138	7.15	27.1	7.8
<b>Jun-September Average</b>																		
	1.9	132	39.5			136	7.99	30.9	8.8	3.4+	128	30.1			121	7.98	29.8	7.0

Lakes	Park Pond									Round Pond C								
	SD	TP	Chl	TKN	ORP	Cond	pH	Temp	DO	SD	TP	Chl	TKN	ORP	Cond	pH	Temp	DO
May 10	2.0b	46	1.8	--	--	260	7.8	20.0	11.0									
May 27	2.5b	35	<1	--	--	270	7.67	18.0	11.5									
June 9	2.3b	165	2.9	--	--	350	9.02	78	--									
June 27	2.5b	125	2.4	--	--	100	9.94	--	--									
July 13	2.0b	124	3.1	--	--	--	--	24.6	5.31									
July 29	2.5b	69	6.6	--	--	70	6.83	26.3	6.4									
Aug 11	2.0b	78	1.7	--	--	90	7.16	23.1	6.5									
Aug 23/31	2.3b	64	3.0	--	--	70	7.17	24.2	6.4		83	32.0	1.2					
Sept 9	2.0b	48	2.4	0.7	49	120	7.13	20.6	7.7	2.0b	108	23.3	1.2	102	275	8.66	22.1	18.1
Sept 23	--	61	<1	1.9	29	150	7.26	14.1	7.2	3.8	135	107	1.7	129	310	8.61	16.6	18.0
<b>May-September Average</b>																		
	2.2+	82	2.6			164	7.78	27.7	7.8									
<b>Jun-September Average</b>																		
	2.2+	92	2.9			136	7.79	30.1	6.6									

**Table 16. Stormwater pond water quality data for 2012. Results for Secchi disc (SD) are in feet, total phosphorus (TP), and chlorophyll a (Chl) are in ppb. Conductivity (Cond) is in umhos/cm<sup>2</sup>, pH is in standard units, temperature (Temp) is in °C, and dissolved oxygen (DO) is in ppm.**

Lakes	Bren Lane							Park Pond					
	Secchi (ft)	TP (ppb)	Chl (ppb)	Cond (umhos)	pH	Temp (C)	DO (ppm)	Secchi (ft)	TP (ppb)	Cond (umhos)	pH	Temp (C)	DO (ppm)
May 9	--	--	--	--	--	--	--	--	--	--	--	--	--
May 29	4.4+	127	8.8	90	7.40	20.5	8.3	--	--	--	--	--	--
June 11	--	--	--	--	--	--	--	--	--	--	--	--	--
June 27	--	97	--	100	7.20	--	--	--	156	95	7.14	--	--
July 10	--	304	--	60	6.70	--	--	--	--	--	--	--	--
July 25	--	216	--	80	7.18	--	--	--	60	50	7.65	--	--
Aug 8	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug 24	3.0+	87	--	100	6.56	24.1	6.5	2.4+	43	90	--	25.1	5.6
Sept 12	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept 25	4.5+	75	--	130	7.08	16.0	9.8	3.0+	63	150	7.36	16.8	9.8
Oct 15	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct 29	--	238	--	90	8.0	5.4	6.8	--	152	70	8.0	4.9	10.8
<b>May-September Average</b>													
	4.0	151	8.8	93	7.0	20.2	8.2	2.7	81	96	7.4	21.0	7.7
<b>Jun-September Average</b>													
	3.8	156	0.0	94	6.9	20.1	8.2	2.7	81	96	7.4	21.0	7.7

\* total phosphorus data were not used, the samples were suspected of being contaminated with sediments.

Lakes	Red Rock Pond							Round Lake Pond					
	Secchi (ft)	TP (ppb)	Chl (ppb)	Cond (umhos)	pH	Temp (C)	DO (ppm)	Secchi (ft)	TP (ppb)	Cond (umhos)	pH	Temp (C)	DO (ppm)
May 9	1.8	179	<1	100	7.03	22.0	11.1	--	--	--	--	--	--
May 29	3.3	192	14.4	75	8.64	20.5	8.3	--	--	--	--	--	--
June 11	2.0+	182	7.8	80	8.30	25.6	8.7	--	--	--	--	--	--
June 27	3.2	178	15.7	50	7.34	25.1	8.2	--	90	100	7.83	--	--
July 10	2.0	233	56.8	80	8.00	31.2	9.7	--	--	--	--	--	--
July 25	2.0+	251	218	110	9.31	28.7	13.1	--	212	110	7.26	--	--
Aug 8	--	273	40.9	140	8.3	--	--	--	--	--	--	--	--
Aug 24	1.0+	272	58.4	120	7.1	24.1	7.1	2.0	100	100	8.3	26.0	8.6
Sept 12	1.5	415	150	130	6.9	18.9	3.4	--	--	--	--	--	--
Sept 25	--	340	172	115	7.4	16.9	7.4	1.7	149	120	9.14	17.1	10.8
Oct 15	--	762	320	130	7.9	--	--	--	--	--	--	--	--
Oct 29	--	403	146	40	8.7	6.0	7.9	--	182	90	8.0	5.7	9.7
<b>May-September Average</b>													
	2.1	252	73.5	100	7.8	23.7	8.6	1.9	138	108	8.1	21.6	9.7
<b>Jun-September Average</b>													
	2.0	268	90.0	103	7.8	24.4	8.2	1.9	138	108	8.1	21.6	9.7

\* total phosphorus data were not used, the samples were suspected of being contaminated with sediments.



## Use of Barley Straw in Bren Lane Pond to Improve Water Quality

Historically barley straw has been used to control algal growth in ponds. Recent research results (McComas unpublished) indicate barley straw acts as an organic carbon amendment which stimulates carbon-limited microbial growth in ponds. Because barley straw has a unique characteristic of having a low phosphorus content, as the microbial community begins to multiply, it consumes the organic carbon in the barley, but is forced to obtain its phosphorus requirements from the water column of a pond or lake. Based on field monitoring data, it appears that the installation of barley straw in ponds can result in a net phosphorus removal from the water column. Based on results from other ponds, it may be possible to achieve up to a 50% reduction in phosphorus outflow concentrations from stormwater ponds compared to a condition where no barley has been used (Steve McComas, unpublished).

### Barley Straw Results and Recommendations

The installation of barley straw into Bren Lane Pond appears to have reduced phosphorus concentrations from 2006 through 2012. Barley straw was not installed in 2013.

A water quality goal for the stormwater ponds is to maintain a seasonal total phosphorus concentration average of 150 ppb. Although the TP concentration in Bren Lane Pond is greater than 150 ppb in most years it is suspected fish may be contributing to elevated phosphorus concentrations negating the benefits of phosphorus reduction by barley straw.

**Table 17. Existing phosphorus conditions and target conditions for pond phosphorus concentrations.**

	Bren Lane (barley @ 400 lbs/ac)	RLP	Park (no barley)
<b>Pond Characteristics</b>			
Pond size (ac)	2.0	0.4	0.5
Mean depth (ft)	3.3	1.5	1.7
Watershed size (ac)	149	235	26
Watershed:Pond ratio	75	588	52
<b>Estimated and Predicted Pond Conditions based on P8 model loading estimates and using the MNLEAP lake model (loading estimates are from Barr 1999)</b>			
Predicted TP concentration (ppb)(2005 conditions)	193	285	206
Estimated watershed TP load (kg/year)(Barr 1999)	25 kg	40 kg	4.4 kg
Estimated runoff TP FWMC (ppb)	322	325	320
Estimated pounds of phosphorus per watershed ac (kg/ac)	0.37	0.37	0.37
2006 Observed TP concentration (ppb)(May-Sept)	196	266	99
Estimated watershed TP load in 2006 (kg)	26 kg	37 kg	2.0 kg
2007 Observed TP concentration (ppb)(May-Sept)	286	362	292
Estimated watershed TP load in 2007 (kg)	41 kg	52 kg	7.0 kg
2008 Observed TP concentration (ppb)(May-Sept)	157	212	141
Estimated watershed TP load in 2008 (kg)	20 kg	30 kg	3.0 kg
2009 Observed TP concentration (ppb)(May-Sept)	264	No data	170
Estimated watershed TP load in 2009 (kg)	34 kg	--	3.4 kg
2010 Observed TP concentration (ppb)(May-Sept)	208	142	131
Estimated watershed TP load in 2010 (kg)	27 kg	20 kg	3.0 kg
2011 Observed TP concentration (ppb)(May-Sept)	118	121	82
Estimated watershed TP load in 2011 (kg)	15 kg	17 kg	1.9 kg
2012 Observed TP concentration (ppb)(May-Sept)	151	138	81
Estimated watershed TP load in 2012 (kg)	20 kg	19 kg	1.9 kg

# **Appendix**

## **Appendix A: Aquatic Plant Surveys for 2006-2012**

# APPENDIX A: Aquatic Plant Survey Results

2006: Round Lake aquatic plant occurrences and densities for the May 30, 2006 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	7	70	1.4	6	60	0.8	13	65	1.1
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.1	10	100	1.9	20	100	2.5
Elodea ( <i>Elodea canadensis</i> )	--	--	--	1	10	0.1	1	5	0.1
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	8	80	1.1	9	90	0.9	17	85	1.0
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	1	10	0.6	--	--	--	1	5	0.6
Stringy pondweed ( <i>P. sp</i> )	2	20	0.8	--	--	--	2	10	0.8
Filamentous algae	9	90	2.9	8	80	0.8	17	85	1.9

2006: Individual transect data for Round Lake on May 30, 2006.

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily			3	0.3	1			0.5	1	1
Coontail	2	2	3	1.3	3	1.8	3.5	1.5	4	2
Elodea										
Eurasian watermilfoil	0.5	1	1	1.7	1	2	0.3	0.5		
Curlyleaf pondweed										
Stringy pondweed	0.5						1			
Filamentous algae		0.7	3	0.7	2	1	2.5	1	5	

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	0.5		3	2	0.5	0.2			1	0.5
Coontail	3	2.8	3	2	4	1.5	2	2	3.5	2.5
Elodea						0.1				
Eurasian watermilfoil		0.3	1.5	1.3	0.5	0.2	2	0.7	2	0.3
Curlyleaf pondweed	0.6									
Stringy pondweed										
Filamentous algae	4	1	2.5		2	0.5	3	0.7	2.5	0.5

2006: Round Lake aquatic plant occurrences and densities for the July 26, 2006 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Spatterdock ( <i>Nuphar variegatum</i> )	1	10	0.3	--	--	--	1	5	0.3
White waterlily ( <i>Nymphaea tuberosa</i> )	10	100	2.8	2	20	2.3	12	60	2.7
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.8	10	100	3.1	20	100	3.4
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	4	40	0.8	5	50	0.8	9	45	0.8
Naiads ( <i>Najas flexilis</i> )	1	10	0.5	--	--	--	1	5	0.5
Filamentous algae	5	50	2.6	--	--	--	5	25	2.6

2006: Individual transect data for Round Lake on July 26, 2006.

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
Spatterdock										
White waterlily	3.5		3		2		3	1.5	3	
Coontail	2	4	5	1.8	5	5	5	3	4.5	3
Eurasian watermilfoil	0.5			0.5	1	1				1
Naiads										
Filamentous algae			2		3		5		2	
	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
Spatterdock			0.3							
White waterlily	3		1	3	2.5		4.5		2.5	
Coontail	4.5	3.3	3.8	3	3.8	3.5	2.5	2	2	2
Eurasian watermilfoil		0.5	0.3	1	1.3					
Naiads									0.5	
Filamentous algae	1									

**2007: Round Lake aquatic plant occurrences and densities for the May 14, 2007 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	8	80	1.3	1	10	1.0	9	45	1.2
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.0	10	100	2.2	20	100	2.6
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	6	60	1.5	8	80	1.4	14	70	1.5
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	--	--	--	3	30	1.3	3	15	1.3
Filamentous algae	10	100	3.0	1	10	1	11	55	2.8

**2007: Individual transect data for Round Lake on May 14, 2007.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	1		1		1		1	1	1	
Coontail	3	2.5	2	2	4	1.5	1	1	3	3
Eurasian watermilfoil	2	1	2	2		2	1	2		1
Curlyleaf pondweed				1						
Filamentous algae	0.5		3		4		2		4	

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	1						1		3	
Coontail	3.5	3	4	2	3	2.5	3.5	2	3	2.3
Eurasian watermilfoil		1		1	1	1.5	2		1	
Curlyleaf pondweed		2		1						
Filamentous algae	4		3		4		2	1	3	

**2007: Round Lake aquatic plant occurrences and densities for the August 16, 2007 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	9	90	2.5	2	20	0.5	11	55	2.1
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.0	10	100	2.2	20	100	2.6
Elodea ( <i>Elodea canadensis</i> )	1	10	0.5	--	--	--	1	5	0.5
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	8	80	1.1	9	90	0.7	17	85	0.9
Stringy pondweed ( <i>Potamogeton sp</i> )	1	10	1.0	--	--	--	1	5	1.0
Filamentous algae	3	30	2.7	--	--	--	3	15	2.7

**2007: Individual transect data for Round Lake on August 16, 2007.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	1.5		3		2		3		3	0.5
Coontail	3	1.5	3	3	4	3	2	4	4	2
Elodea	0.5									
Eurasian watermilfoil	0.5	0.5	2	1		2	2	0.5	0.5	0.5
Stringy pondweed	1									
Filamentous algae			2		3		3			

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	3		2				2	0.5	3	
Coontail	4	3	3	1.5	2	2	2	1	3	1
Elodea										
Eurasian watermilfoil	1	0.5		0.5	1	0.5	0.5		1	0.5
Stringy pondweed										
Filamentous algae										



**2008: Round Lake aquatic plant occurrences and densities for the May 28, 2008 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	8	80	1.3	--	--	--	8	40	1.3
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.0	10	100	2.2	20	100	2.6
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	9	90	1.9	10	100	2.5	19	95	2.2
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	2	20	0.8	--	--	--	2	10	0.8
Filamentous algae	8	80	2.4	9	90	1.7	17	85	2.1

**2008: Individual transect data for Round Lake on May 28, 2008.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily			0.5				2		1	
Coontail	2	1	2	2	4	2	4	3	4	2.3
Eurasian watermilfoil	2	2	0.5	4	1	4		3	1.5	2
Curlyleaf pondweed									0.5	
Filamentous algae	3	2	1		3	2	3	2	1.5	1

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	2		1		1		1		2	
Coontail	4	3	3.5	4	2	2	2	2	2	1
Eurasian watermilfoil	1	1.5	1	2	3	1	4	2	3	3
Curlyleaf pondweed	1									
Filamentous algae		0.5	2	2		1	2	2	4	3

**2008: Round Lake aquatic plant occurrences and densities for the August 25, 2008 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	9	90	3.7	--	--	--	9	45	3.7
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	3.4	10	100	2.7	20	100	3.1
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	100	2.7	10	100	2.5	20	100	2.7
Filamentous algae	5	50	3.0	1	10	5.0	6	30	1.3

**2008: Individual transect data for Round Lake on August 25, 2008.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	4		4		4		2		4	
Coontail	2	2	2	2	4	3	3	3.5	4	4
Eurasian watermilfoil	4	2	3.3	3	4	4.5	1	1	1	2
Filamentous algae					3		2		4	

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	4		5		3		3			
Coontail	4	3	4	2	4	2	4	2	3	3
Eurasian watermilfoil	4	4.5	4.5	2	4	2	3	2	1	2
Filamentous algae	3	5			3					

**2009: Round Lake aquatic plant occurrences and densities for the June 9, 2009 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	8	80	2.1	--	--	--	8	40	2.1
Coontail ( <i>Ceratophyllum demersum</i> )	5	50	2.6	8	80	3.4	13	65	3.1
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	100	3.7	10	100	3.5	20	100	3.6
Filamentous algae	6	60	3.3	--	--	--	6	30	3.3

**2009: Individual transect data for Round Lake on June 9, 2009.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	2		4		1		3		2	
Coontail		3		4	3	4	3	4	3	3
Eurasian watermilfoil	3	1	4.5	4.5	3	4.5	4.5	2	2	4.5
Filamentous algae					4		4		3	

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily					2		2		1	
Coontail		3		3		3	3		1	
Eurasian watermilfoil	5	4.5	5	4.5	4	4.5	2	3.5	4	1
Filamentous algae	3		3				3			

**2009: Round Lake aquatic plant occurrences and densities for the August 31, 2009 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
Duckweed ( <i>Lemna sp</i> )	1	10	1.0	--	--	--	1	5	1.0
White waterlily ( <i>Nymphaea tuberosa</i> )	10	100	2.6	--	--	--	10	50	2.6
Coontail ( <i>Ceratophyllum demersum</i> )	10	100	2.6	10	100	2.2	20	100	2.4
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	100	1.9	10	100	2.3	20	100	2.1
Stringy pondweed ( <i>Potamogeton sp</i> )	1	10	1.0	--	--	--	1	5	1.0
Filamentous algae - floating	3	30	1.7	--	--	--	3	15	1.7

**2009: Individual transect data for Round Lake on August 31, 2009.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
Duckweed							1			
White waterlily	3		3		3		4		3	
Coontail	1	2	3	2	3	3	3.5	3	3	3
Eurasian watermilfoil	3	3	2	2	1.5	3	2.5	2.5	2	2
Stringy pondweed	1									
Filamentous algae					2				1.5	

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
Duckweed										
White waterlily	3		1		2		2		2	
Coontail	3	3	1.5	2	2.5	1	3	1	2	2
Eurasian watermilfoil	1	2.5	2	1	1	2	2	2	2	3
Stringy pondweed										
Filamentous algae	1.5									

**2010: Round Lake aquatic plant occurrences and densities for the May 25, 2010 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	5	50	1.6	--	--	--	5	25	1.6
Coontail ( <i>Ceratophyllum demersum</i> )	9	90	2.7	9	90	2.5	18	90	2.6
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	10	100	4.0	10	100	3.2	20	100	3.6
Filamentous algae - floating	9	90	1.6	2	20	0.8	11	55	1.4

**2010: Individual transect data for Round Lake on May 25, 2010.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily			1				3		2	
Coontail	1	2	3	1	2.5	2	3	3.5	3.5	3
Eurasian watermilfoil	4	2	4	4	4.5	4.5	1	2	3	2
Filamentous algae - floating			1		3		2		2	1

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	1								1	
Coontail	2	4	3	1	3	3	3	3		
Eurasian watermilfoil	5	3	5	2.8	4.5	4	4.5	4.5	4	4
Filamentous algae - floating	1		2	0.5	1		1		1	

**2010: Round Lake aquatic plant occurrences and densities for the July 9, 2010 survey based on 10 transects and 2 depths, for a total of 20 stations. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	Depth 0 - 6 feet (n=10)			Depth 7 - 12 feet (n=10)			All Stations (n=20)		
	Occur	% Occur	Density	Occur	% Occur	Density	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	9	90	3.5	--	--	--	9	45	3.5
Coontail ( <i>Ceratophyllum demersum</i> )	9	90	3.2	9	90	3.1	18	90	3.5
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	2	80	2.0	10	100	2.5	18	90	2.3
Filamentous algae - floating	9	90	2.6	2	20	2.5	11	55	2.6

**2010: Individual transect data for Round Lake on July 9, 2010.**

	T1		T2		T3		T4		T5	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily	3		4		3		4		4	
Coontail	3.5	4	2	4	4	2.5	4	4	4	
Eurasian watermilfoil		1	1	2.5	1	2	2	1		4.5
Filamentous algae	1		4		4		4		2	3

	T6		T7		T8		T9		T10	
	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12	0 - 6	7 - 12
White waterlily			3.5		3		4		3	
Coontail	4	4.5	1	2	4	4	2	2		1
Eurasian watermilfoil	2	3	3	3	2	2	1	3	4	3
Filamentous algae	3	2	4		0.5				1	

**2011: Round Lake aquatic plant occurrences and densities for the June 9, 2011 survey based on 49 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=49)		
	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	17	35	1.4
Coontail ( <i>Ceratophyllum demersum</i> )	24	49	2.5
Chara ( <i>Chara sp</i> )	2	4	1.5
Elodea ( <i>Elodea canadensis</i> )	5	10	1.0
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	14	29	1.3
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	3	6	1.3
Stringy pondweed ( <i>P. sp</i> )	7	14	1.7
Filamentous algae - benthic	1	2	2.0
Filamentous algae - floating	4	8	3.5

**2011: Individual transect data for Round Lake on June 9, 2011.**

site	depth (ft)	White waterlily	Chara	Coontail	Curlyleaf	Elodea	Eurasian watermilfoil	Stringy pondweed	FA benthic	FA floating
1	5	2	2					2		
2	5	2				1	2	1		
3	5	1		1		1	1	2		
4										
5	5	2		2	1			1		
6	6	1		3						
7	6			2						
8	12			2			2			
9	11			2						
10	5	2		3			0.5			
11	5	2		2			0.5	1		
12	5			2			2		2	
13	7	1		4			2			
14	11			1			0.5			
15	TD						1			
16										
17	8	1		4						
18										
19	4							3		
20	6	1		3			1			1
21	12			1						
22										
23										
24										
25	TD									
26	5			2						
27										4
28										
29	5	2						2		
30	12			1.5						
31										
32										
33										
34	TD									
35	6	1		2						
36										
37				4						
38	7	1		3						
39										
40										
41										
42	TD									
43	6	1		3						
44										
45	5		1	3		1	1			4
46		1		4			1			5
47	5	1		2	1	1	1			
48	5				2	1				
49	5	2		4			2			
<b>Average</b>		<b>1.4</b>	<b>1.5</b>	<b>2.5</b>	<b>1.3</b>	<b>1.0</b>	<b>1.3</b>	<b>1.7</b>	<b>2.0</b>	<b>3.5</b>
<b>occurrence (49 sites)</b>		17	2	24	3	5	14	7	1	4
<b>% occurrence</b>		35	4	49	6	10	29	14	2	8



**2011: Round Lake aquatic plant occurrences and densities for the September 12, 2011 survey based on 34 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=34)		
	Occur	% Occur	Density
White waterlily ( <i>Nymphaea tuberosa</i> )	19	56	2.9
Coontail ( <i>Ceratophyllum demersum</i> )	28	82	2.3
Elodea ( <i>Elodea canadensis</i> )	1	3	0.5
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	5	15	1.3
Naiads ( <i>Najas flexilis</i> )	1	3	1.0
Floatingleaf pondweed ( <i>Potamogeton natans</i> )	1	3	1.0
Stringy pondweed ( <i>P. sp</i> )	2	6	0.8
Filamentous algae - floating	20	59	3.1

**2011: Individual transect data for Round Lake on September 12, 2011.**

site	depth (ft)	White waterlily	Coontail	Elodea	Eurasian watermilfoil	Floatingleaf pondweed	Naiads	Stringy pondweed	FA floating
1	3	1	2						1
2	3	2	2						4
3	5	4	0.5			1	1		1
5	4	4	2						2
6	6	2	3					0.5	3
7	7	1	1		3				2
8	8		3						
9	7		2		1			1	
10	5	3	3		1				2
11	1	2	2						2
12	5	4	2						4
13	7		2						
14	12		1						
15	26								
17	8		2						
18	land								
19	3	5	2						3
20	5	5	2						4
21	9		2						
26	4.5	2.5	2.5	0.5	0.5				1
28	land								
29	5	4	2						5
30	9		3						
37	6	3	3						4
38	6	2	3						5
39	7		4						1
40	16								
42	9		2		1				
43	6	1	3						5
45	land								
46	3	4	2						5
47	4	4	3						4
48	4	2	3						4
49	land								
<b>Average</b>		<b>2.9</b>	<b>2.3</b>	<b>0.5</b>	<b>1.3</b>	<b>1.0</b>	<b>1.0</b>	<b>0.8</b>	<b>3.1</b>
<b>occurrence (34 sites)</b>		19	28	1	5	1	1	2	20
<b>% occurrence</b>		56	82	3	15	3	3	6	59

**2012: Round Lake aquatic plant occurrences and densities for the May 17, 2012 survey based on 49 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=49)		
	Occurrence	% Occurrence	Density
Spatterdock ( <i>Nuphar variegatum</i> )	1	2	1.0
White waterlily ( <i>Nymphaea tuberosa</i> )	15	31	1.0
Coontail ( <i>Ceratophyllum demersum</i> )	33	67	2.5
Elodea ( <i>Elodea canadensis</i> )	5	10	1.0
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	14	29	1.3
Curlyleaf pondweed ( <i>Potamogeton crispus</i> )	7	14	1.0
Stringy pondweed ( <i>P. sp</i> )	3	6	1.0
Flatstem pondweed ( <i>P. zosteriformis</i> )	1	2	1.0
Buttercup ( <i>Ranunculus sp</i> )	1	2	2.0
Filamentous algae - floating	16	33	2.3

**2012: Individual transect data for Round Lake on May 17, 2012.**

Site	Depth (ft)	Spatter- dock	White waterlily	Buttercup	Coontail	Curlyleaf pondweed	Elodea	Eurasian watermilfoil	Flatstem pondweed	Stringy pondweed	FA floating
1	4	1	1		2	1		1			1
2	4		1		2	1		1	1		3
3	4		1		2	1	1	2			1
4	3				2		1	1			
5	4		1					1		1	1
6	5				4	1					
7	6				2			4.5			
8	8				3						
9	7				2			1			
10	6		1		4						
11	4				2	1	1	1		1	3
12	4				2			1			3
13	5		1		3						
14	9				3	1		1			
15	25										
16	22										
17	12				1						
18	1										
19	3		1		1					1	3
20	5		1		3						1
21	9				4						
22	25										
23	30										
24	35										
25	27										
26	6				2			1			
27	land										
28	2				1						3
29	3				3						3
30	8			2	3			1			
31	25										
32	30										
33	35										
34	31										
35	5				4			1			1
36	2				1						3
37	5				4	1					
38	6		1		4						
39	10				3						
40	15										
41	17										
42	17										
43	4		1		3						2
44	3		1		2						2
45	4		1		2						4
46	5				1		1				
47	5		1		3						
48	5		1		2		1				
49	5		1		2			1			3
<b>Average</b>		<b>1.0</b>	<b>1.0</b>	<b>2.0</b>	<b>2.5</b>	<b>1.0</b>	<b>1.0</b>	<b>1.3</b>	<b>1.0</b>	<b>1.0</b>	<b>2.3</b>
<b>occurrence (49 sites)</b>		1	15	1	33	7	5	14	1	3	16
<b>% occurrence</b>		2	31	2	67	14	10	29	2	6	33

**2012: Round Lake aquatic plant occurrences and densities for the August 1, 2012 survey based on 49 sample sites. Density ratings are 1-5 with 1 being low and 5 being most dense.**

	All Stations (n=49)		
	Occur	% Occur	Density
Spatterdock ( <i>Nuphar variegatum</i> )	1	2	2.0
White waterlily ( <i>Nymphaea tuberosa</i> )	25	51	3.2
Coontail ( <i>Ceratophyllum demersum</i> )	29	59	3.7
Elodea ( <i>Elodea canadensis</i> )	2	4	1.0
Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )	4	8	1.0
Floatingleaf pondweed ( <i>P. natans</i> )	1	2	1.0
Stringy pondweed ( <i>P. sp.</i> )	1	2	1.0
Filamentous algae	13	27	2.3

**2012: Individual transect data for Round Lake on August 1, 2012.**

site	depth (ft)	Spatterdock	White waterlily	Coontail	Elodea	Eurasian watermilfoil	Floatingleaf pondweed	Stringy pondweed	FA floating
1	3	2		4					
2	4		4	4	1				
3	5		5	4.5		1			1
4	land								
5	4		5						
6	6		4	4		1			
7	7			3					
8	9			1					
9	8		1	2					
10	4		1	3	1	1	1	1	
11	4		5	4					
12	5		5	4					
13	6		2	4.5					1
14	13								
15	25								
16	20								
17	7		1	4					
18	land								
19	4		5	4					
20	5		5	4.5					
21	8		2	3					
22	23								
23	32								
24	32								
25	25								
26	4			1		1			
27	land								
28	4		4	4					3
29	6		2	3					4
30	13								
31	28								
32	32								
33	35								
34	30								
35	6			4					
36	3		4	4					4
37	5		2	4					4
38	6		2	5					2
39	8								
40	23								
41	20								
42	19								
43	4		3	4					1
44	3		5	4					2
45	5			4.5					4
46	5		1	4					2
47	6		4	4					1
48	6		4	4.5					
49	6		3	4					1
<b>Average</b>		<b>2.0</b>	<b>3.2</b>	<b>3.7</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>2.3</b>
<b>occurrence (49 sites)</b>		1	25	29	2	4	1	1	13
<b>% occurrence</b>		2	51	59	4	8	2	2	27