



Gleason Lake Curlyleaf Pondweed on June 20, 2011, After an Herbicide Treatment, Curlyleaf was Sparse

Aquatic Plant Surveys for Gleason Lake, Hennepin Co, Minnesota, 2011

Activities:

April 27, 2011 (pre-herbicide survey)

May 5, 2011 (herbicide application: 16.3 acres, 39 gallons)

June 20, 2011 (post-herbicide survey)

September 15, 2011 (late summer survey)

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Summary

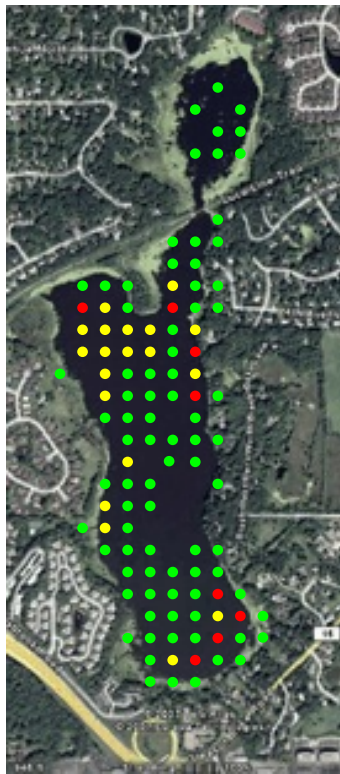
In Gleason lake (160 acres), curlyleaf pondweed has been treated on a whole-lake basis for three consecutive years (2007, 2008, and 2009) and with a partial treatment of 27.9 acres in 2010 and 16.3 acres in 2011 using an endothall herbicide.

In 2011, three aquatic plant point intercept surveys were conducted in Gleason Lake. The first survey was conducted on April 27, prior to the effects of a herbicide treatment for curlyleaf pondweed. The second survey was conducted on June 20 after the effects of the herbicide treatment were realized and the third survey was conducted on September 15, which would characterize late summer plant conditions. Curlyleaf was significantly reduced following the May 5, 2011 herbicide application and the June 20, 2011 shows the results. Coontail had significant growth in all three surveys in 2011 and on September 15, 2011, total coontail coverage was estimated at 87 acres with an estimated area of heavy growth of 41 acres.

Table 1. Summary of aquatic plant results from three plant surveys conducted in 2011.

	Occurrence and (% Occurrence)		
	April 27, 2011 Pre-Herbicide Conditions	June 20, 2011 Post Herbicide Conditions	Sept 15, 2011 Late Summer Survey
NORTH BASIN (23 (9/15); 27 (6-20); 29 (4-27) sites in 2011)			
Duckweed	--	19 (70%)	11 (48%)
Watermeal	--	17 (63%)	18 (78%)
White waterlily	--	10 (37%)	8 (35%)
Coontail	27 (93%)	27 (100%)	21 (91%)
Curlyleaf	2 (7%)	1 (4%)	--
Elodea	4 (14%)	2 (7%)	1 (4%)
Star duckweed	--	21 (78%)	2 (9%)
Filamentous algae - benthic	3 (10%)	--	--
Filamentous algae - floating	--	16 (59%)	4 (17%)
MAIN LAKE (128 sites)			
Cattails	--	2 (2%)	1 (1%)
Duckweed	--	20 (21%)	14 (13%)
Watermeal	--	27 (28%)	37 (35%)
White waterlily	--	15 (16%)	30 (28%)
Coontail	66 (52%)	53 (55%)	87 (81%)
Curlyleaf	12 (9%)	19 (20%)	--
Elodea	10 (8%)	5 (5%)	6 (6%)
Moss	--	--	1 (1%)
Sago pondweed	--	--	--
Star duckweed	--	2 (2%)	3 (3%)
Filamentous algae - benthic	3 (2%)	--	2 (2%)
Filamentous algae - floating	13 (10%)	41 (43%)	15 (14%)
Number of submerged aquatic plant species	3 (128 sites)	3 (96 sites)	4 (107 sites)

Curlyleaf Pondweed Distribution from 2007 - 2011



2007



2008



2009



2010



2011

Curlyleaf Distribution Has Been Decreasing Since Herbicide Treatments Started in 2007:

In the April 2011 survey (pre-treatment survey), curlyleaf pondweed distribution was the lowest it's been since 2007 (Figure 1). In 2011, the May herbicide treatment successfully prevented the growth of curlyleaf pondweed by the time the second survey was conducted on June 20, 2011.

Figure 1. Early season curlyleaf pondweed distribution and abundance in Gleason Lake prior to whole lake herbicide treatments. Green dots = light growth; yellow dots = moderate growth; and red dots = heavy growth. The density scale ranges from 1 to 5 with 5 the densest.

Stem Densities Prior to Herbicide Treatments: In addition to whole lake point intercept surveys, quantitative curlyleaf stem densities were collected at 10 sites at one location in Gleason Lake prior to herbicide treatments in 2007 through 2011. When stem densities are greater than 400 stems/m², it is often perceived by lake users as nuisance conditions at peak biomass conditions in early June. In 2011, Gleason Lake stem densities averaged 21 stems/m² for ten samples on April 27. This is down from the 817 stems/m² that were counted in 2007, prior to the initiation of the treatment program.

In 2011, after the herbicide treatment, stem densities were measured again at the same location. During the June stem density determination, no viable curlyleaf pondweed was noted in the 10 quadrat samples.

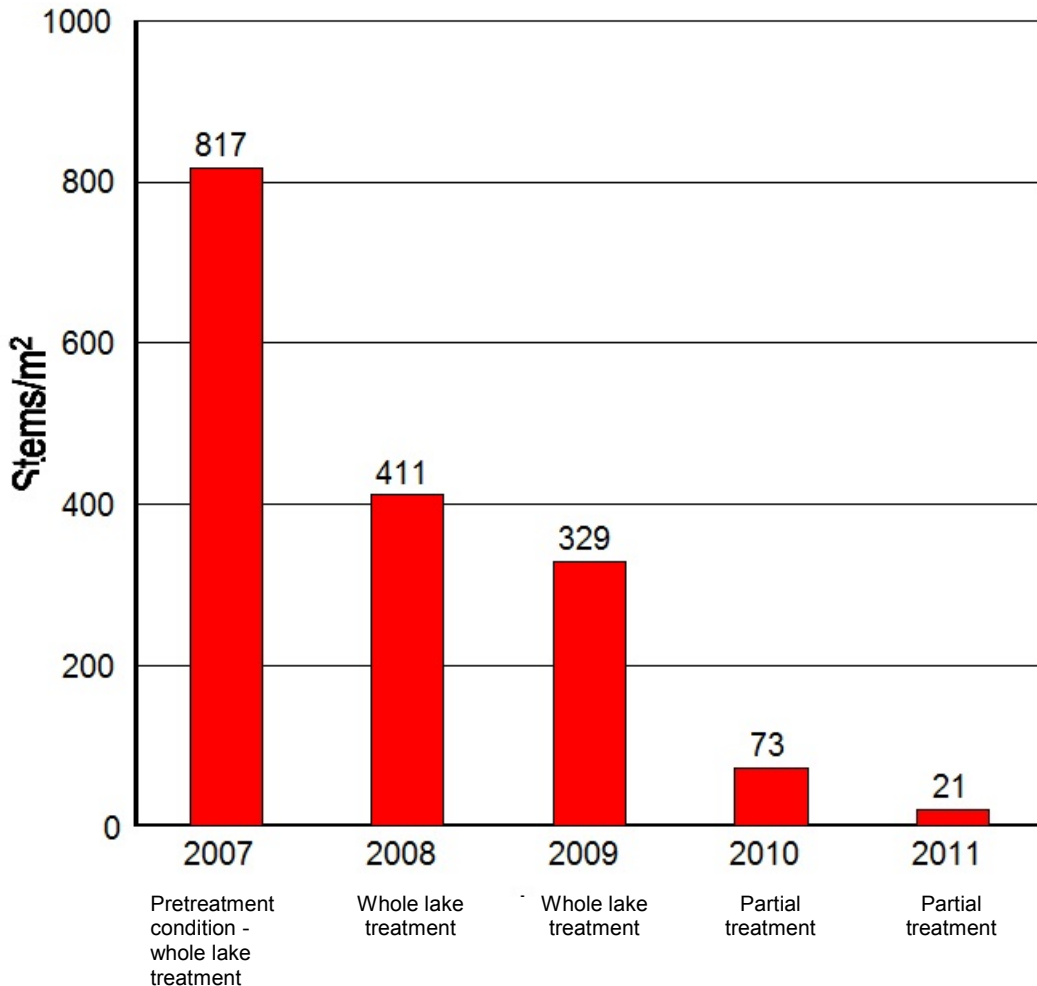
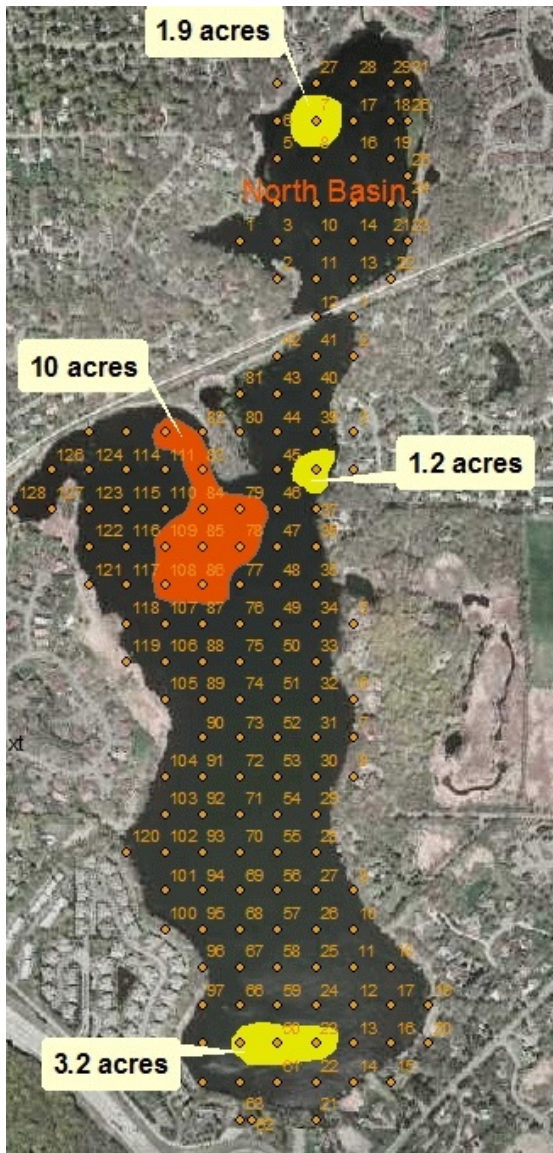


Figure 2. Curlyleaf pondweed stem densities at Point Intercept Site 79 (n=10) have decreased since herbicide treatments have occurred. The benchmark curlyleaf density was determined in 2007 prior to the first whole lake curlyleaf treatment. Whole lake curlyleaf treatments occurred in 2007, 2008, and 2009. Partial treatments occurred in 2010 (27.9 acres) and in 2011 (16.3 acres).

Curlyleaf Pondweed Treatment on May 5, 2011: A total of 16.3 acres of curlyleaf pondweed was treated on May 5, 2011. Treatment areas are shown in Figure 3. Aquathol K was applied to 14.4 acres in the main basin and to 1.9 acres in the North Basin.

Table 2. Herbicide treatment history in Gleason Lake from 2007 - 2011.

	2007	2008	2009	2010	2011
Acres Treated	137	137	140	27.9	16.3
Gallons of Herbicide	521	521	517	97.8	39



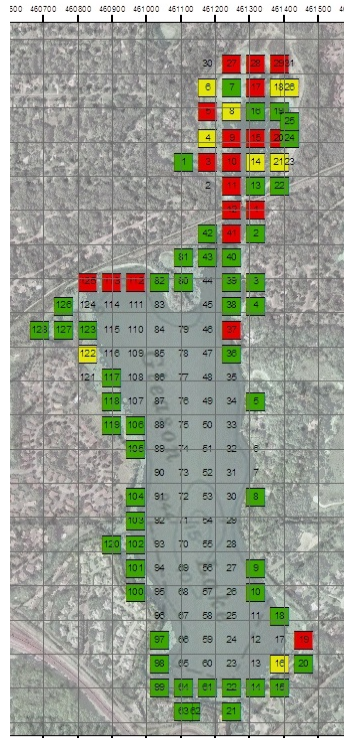
Pre-Herbicide Condition: curlyleaf was patchy. April 27, 2011



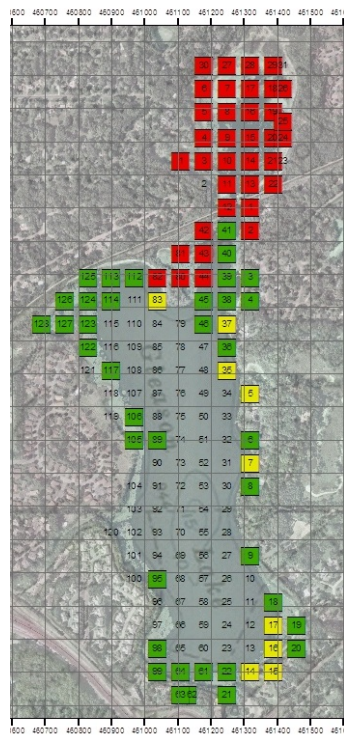
Post Herbicide Condition: curlyleaf had mostly light growth. June 20, 2011

Figure 3. [left] Treatment areas in Gleason Lake in 2011. [right] Curlyleaf was reduced in distribution and abundance following the April 27, 2011 herbicide treatment when follow-up sampling occurred on June 20, 2011.

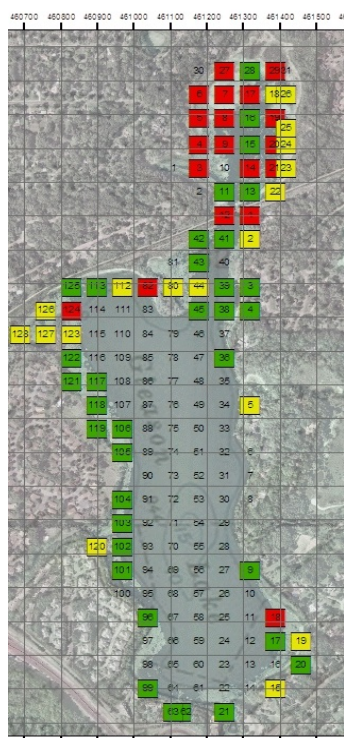
Coontail Distribution from 2007 - 2011



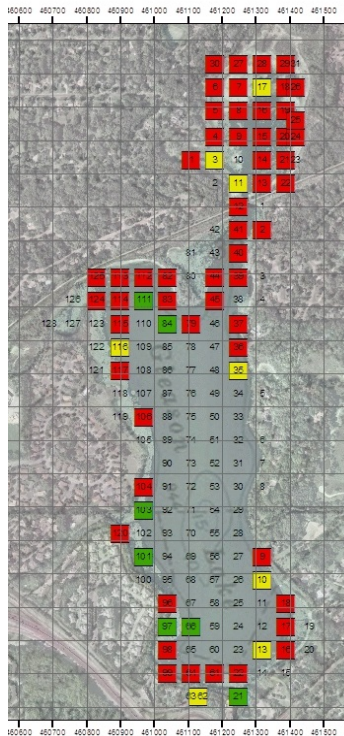
2007



2009

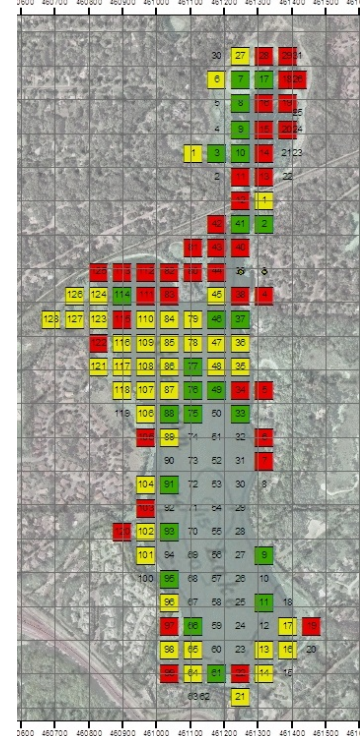


2008



2010

Coontail Distribution Has Increased Dramatically in 2010 and 2011 Compared to Previous Surveys (based on late summer surveys): Native plant growth has increased since 2007 and most noticeably in 2010 and 2011. Coontail has been the dominant native species (Figure 4).



2011

Figure 4. Late summer coontail distribution and abundance in Gleason Lake prior to whole lake herbicide treatments. Green squares = light growth; yellow squares = moderate growth; and red squares = heavy growth. The density scale ranges from 1 to 5 with 5 the densest.

Summary of Pre-Herbicide Surveys: A summary of the occurrence and percent occurrence of aquatic plant species for the aquatic plant point intercept surveys conducted from 2007 through 2011 is shown in Tables 3, 4, and 5. The early season surveys in April and May indicate the distribution of curlyleaf has declined compared to the start of the herbicide program in 2007 (Table 3).

Table 3. Summary of aquatic plant results from plant surveys conducted in 2007 through 2011 prior to herbicide treatments.

	Occurrence and (% Occurrence)				
	April 24, 2007 Pre-Herbicide Conditions	May 5, 2008 Pre-Herbicide Conditions	April 30, 2009 Pre-Herbicide Conditions	April 16, 2010 Pre-Herbicide Conditions	April 27, 2011 Pre-Herbicide Conditions
NORTH BASIN (29 sites in 2011, 27 sites in 2010, 28 sites in 2009, 27 sites in 2007)					
Cattails	--	--	--	--	--
Duckweed	--	--	--	--	--
Watermeal	--	--	--	--	--
White waterlily	--	--	1 (4%)	--	--
Coontail	25 (93%)	28 (97%)	27 (96%)	26 (93%)	27 (93%)
Curlyleaf	8 (30%)	1 (3%)	3 (11%)	3 (11%)	2 (7%)
Elodea	--	--	--	1 (4%)	4 (14%)
Filamentous algae	8 (30%)	--	5 (18%)	--	3 (10%)
MAIN LAKE (128 sites)					
Cattails	--	--	--	3 (2%)	--
Duckweed	--	--	--	--	--
Spatterdock	--	--	--	--	--
Watermeal	--	--	--	--	--
White waterlily	--	--	4 (3%)	3 (2%)	--
Coontail	50 (39%)	33 (26%)	47 (37%)	45 (35%)	66 (52%)
Curlyleaf	101 (79%)	90 (71%)	73 (57%)	53 (41%)	12 (9%)
Elodea	--	--	2 (2%)	14 (11%)	10 (8%)
Sago pondweed	--	--	--	1 (1%)	--
Star duckweed	--	5 (4%)	3 (2%)	1 (1%)	--
Filamentous algae	17 (13%)	10 (8%)	23 (18%)	9 (7%)	16 (13%)
Number of submerged aquatic plant species	2	3	4	5	3

Summary of Post Herbicide Surveys: The herbicide applications in 2007 through 2011 nearly eliminated all curlyleaf in the lake as observed in the June surveys (Table 4).

Table 4. Summary of aquatic plant results from three plant surveys conducted in 2007 through 2011 after the effects of herbicide applications.

	Occurrence and (% Occurrence)				
	June 6, 2007 Post Herbicide Conditions	June 17, 2008 Post Herbicide Conditions	June 8, 2009 Post Herbicide Conditions	June 8, 2010 Post Herbicide Conditions	June 20, 2011 Post Herbicide Conditions
NORTH BASIN (27 sites in 2011, 31 sites in 2010, 28 sites in 2009, 27 sites in 2007)					
Cattails	--	1 (1%)	--	1 (3%)	--
Duckweed	15 (75%)	13 (48%)	13 (46%)	22 (71%)	19 (70%)
Watermeal	--	--	--	17 (55%)	17 (63%)
White waterlily	16 (59%)	15 (56%)	9 (32%)	10 (32%)	10 (37%)
Coontail	27 (100%)	27 (100%)	26 (93%)	28 (90%)	27 (100%)
Curlyleaf	1 (4%)	--	--	7 (23%)	1 (4%)
Elodea	--	--	--	4 (13%)	2 (7%)
Star duckweed	--	--	--	--	21 (78%)
Filamentous algae	18 (67%)	14 (52%)	5 (18%)	10 (32%)	16 (59%)
MAIN LAKE (128 sites)					
Cattails	--	2 (2%)	--	2 (2%)	2 (2%)
Duckweed	20 (16%)	18 (14%)	15 (12%)	15 (12%)	20 (16%)
Spatterdock	1 (1%)	--	2 (2%)	--	--
Watermeal	--	--	--	10 (8%)	27 (21%)
White waterlily	37 (29%)	35 (27%)	39 (30%)	14 (11%)	15 (12%)
Coontail	32 (25%)	37 (29%)	44 (34%)	34 (27%)	53 (41%)
Curlyleaf	1 (1%)	1 (1%)	1 (1%)	5 (4%)	19 (15%)
Elodea	2 (2%)	4 (3%)	5 (4%)	4 (3%)	5 (4%)
Sago pondweed	--	--	--	--	--
Star duckweed	--	1 (1%)	--	--	2 (2%)
Filamentous algae	43 (34%)	45 (35%)	32 (25%)	11 (9%)	41 (32%)
Number of submerged aquatic plants	3	4	3	3	3

Summary of Late Summer Surveys: Native submerged aquatic plant species diversity is low in Gleason Lake, with coontail the dominant plant for surveys in late summer in 2007 through 2011 (Table 5). In the north basin, in addition to coontail, duckweed and watermeal were abundant with white lilies dense in some areas. In the main lake, in addition to coontail, white lilies and duckweed were abundant along the shoreline areas and bays.

Table 5. Summary of aquatic plant results from plant surveys conducted in 2007 through 2011 in late summer.

	Occurrence and (% Occurrence)				
	Aug 27, 2007 Late Summer Survey	Sept 3, 2008 Late Summer Survey	Aug 25, 2009 Late Summer Survey	Aug 25, 2010 Late Summer Survey	Sept 15, 2011 Late Summer Survey
NORTH BASIN (23 sites in 2011, 28 sites in 2010, 28 sites in 2009, 27 sites in 2007)					
Cattails	--	1 (3%)	--	--	--
Duckweed	24 (89%)	15 (50%)	18 (64%)	--	11 (48%)
Watermeal	23 (85%)	2 (7%)	--	--	18 (78%)
White waterlily	13 (48%)	15 (50%)	11 (39%)	--	8 (35%)
Coontail	27 (100%)	27 (100%)	28 (100%)	30 (97%)	21 (91%)
Curlyleaf	--	--	--	--	--
Elodea	--	--	--	4 (13%)	1 (4%)
Star duckweed	--	--	--	1 (3%)	2 (9%)
Filamentous algae	--	--	--	30 (97%)	4 (17%)
MAIN LAKE (128 sites)					
Cattails	--	2 (2%)	--	--	1 (1%)
Duckweed	38 (30%)	11 (9%)	13 (10%)	12 (9%)	13 (10%)
Spatterdock	--	--	--	--	--
Watermeal	--	3 (2%)	--	14 (11%)	36 (28%)
White waterlily	42 (33%)	43 (34%)	47 (37%)	22 (17%)	29 (23%)
Coontail	53 (41%)	46 (36%)	55 (43%)	43 (34%)	86(67%)
Curlyleaf	--	--	--	--	--
Elodea	--	1 (1%)	4 (3%)	8 (6%)	6 (5%)
Noss	--	--	--	--	1 (1%)
Sago pondweed	--	1 (1%)	3 (2%)	--	--
Star duckweed	--	--	1 (1%)	--	3 (2%)
Filamentous algae	--	--	--	2 (2%)	17 (13%)
Number of submerged aquatic plant species	1	3	4	2	4

Aquatic Plant Management Recommendations for 2012: Curlyleaf pondweed has been widely distributed in Gleason Lake in the past, but its abundance has been uneven. The heaviest growth has been in the north and south ends of Gleason Lake. A lake sediment survey of Gleason Lake in 2009 found the sediments had characteristics that would support light to moderate growth over most of the lake. A map showing predicted potential curlyleaf growth based on lake sediment characteristics is shown in Figure 5.

In 2012, it is likely curlyleaf pondweed will colonize areas that were colonized in 2011. A total of 16.3 acres of curlyleaf was treated in 2011. The predicted treatment area in 2012 is expected to be about the same or possibly greater approximately 16 to 25 acres. An early season assessment is recommended to delineate a potential treatment area for curlyleaf control in 2012.

With a curlyleaf control program resulting in less curlyleaf in the lake, Gleason Lake may be undergoing some changes. Clearer water in early summer, may enhance the growth of native plants including coontail and water lilies. In fact, coontail exhibited heavy growth in 2010 and 2011 in a number of areas around Gleason Lake. Although the distribution of coontail increased only slightly, its abundance increased significantly. Growing conditions were ideal for coontail in 2010 and 2011 with exceptionally clear water and warm water temperatures early in the summer. It is unlikely the exact conditions will be repeated this year and coontail growth is not expected to grow to the abundance level it exhibited in 2011. However, if it does, harvesting or herbicides are a control option.

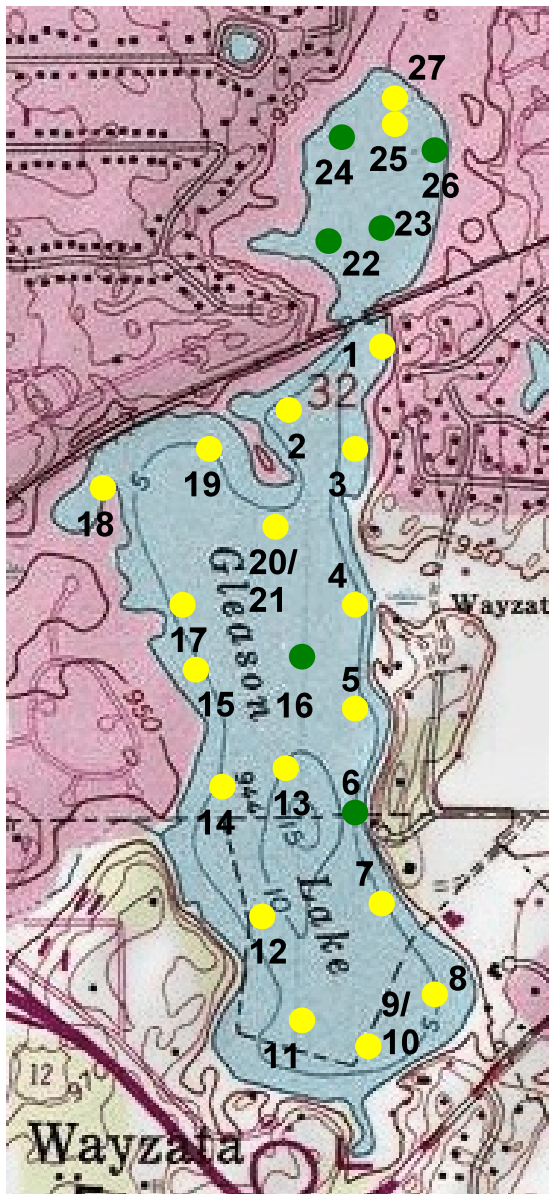


Figure 5. Predicted Curlyleaf Pondweed Growth. Sediment sample locations are shown with a circle. The circle color indicates the type of curlyleaf pondweed growth predicted to occur at that site. Key: green = light; yellow = moderate.

Gleason Lake Water Quality Summary *(data from Minnehaha Creek Watershed District)*

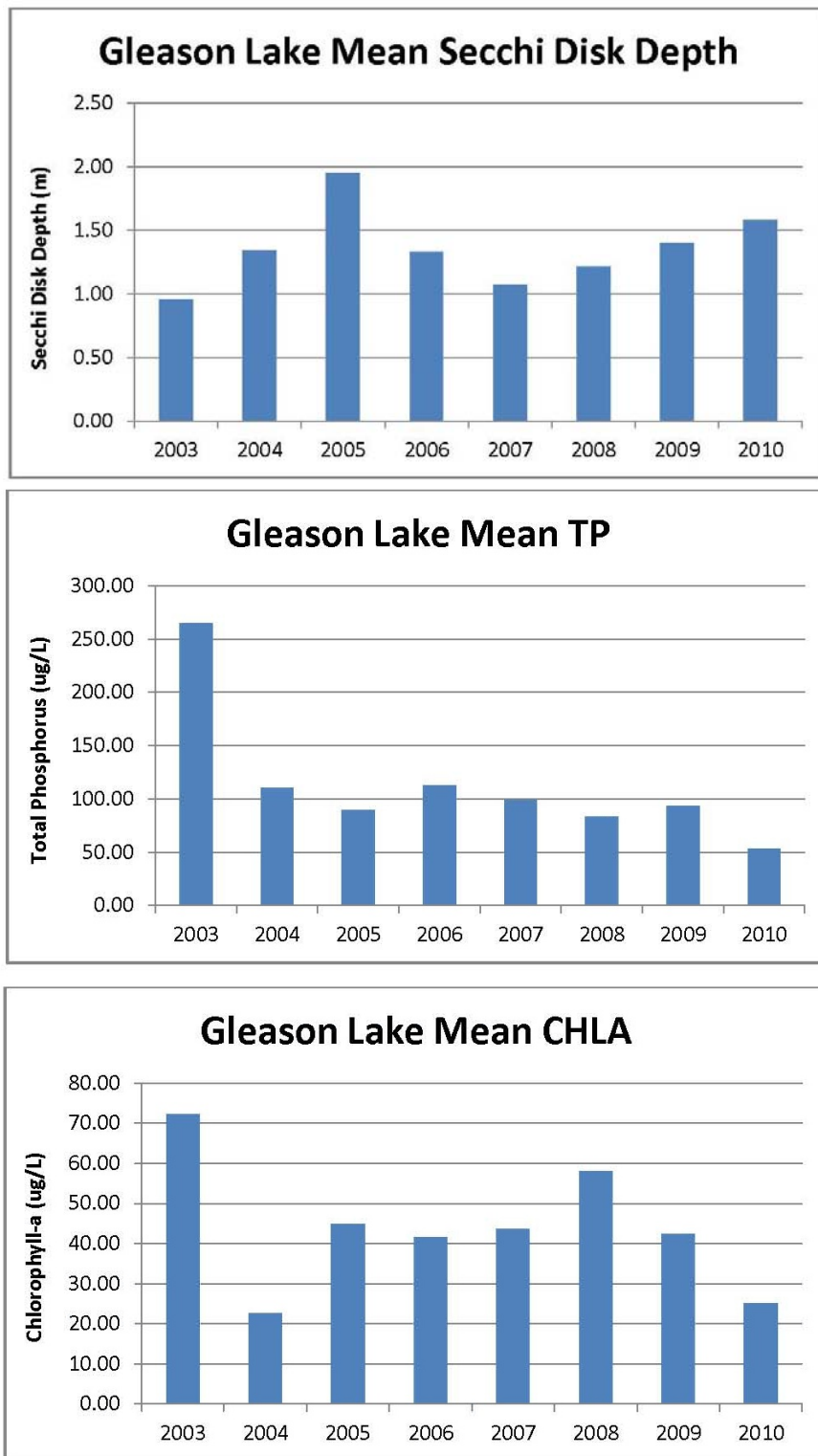


Figure 6. Gleason Lake seasonal averages for water quality from 2003 through 2010.
[top] Transparency has been increasing since 2007, but not reached the level of 2005.
[middle] Phosphorus is not increasing and has been below 100 ppb since 2007.
[bottom] Chlorophyll decreased in 2009 and 2010 compared to 2008.