

# **Medicine Lake, City of Plymouth, Supplemental Curlyleaf Pondweed Data for 2004-2015**

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**Appendix A: Medicine Lake Notes from 2004-2015**

**Appendix B: Summary of Curlyleaf Pondweed Stem  
Density at Four Permanent Sites from 2004-2015**

**Appendix C: Aquatic Plant Conditions in the Early and  
Late Curlyleaf Season**



**Underwater view of curlyleaf pondweed on June 21, 2013.**

# Appendix A

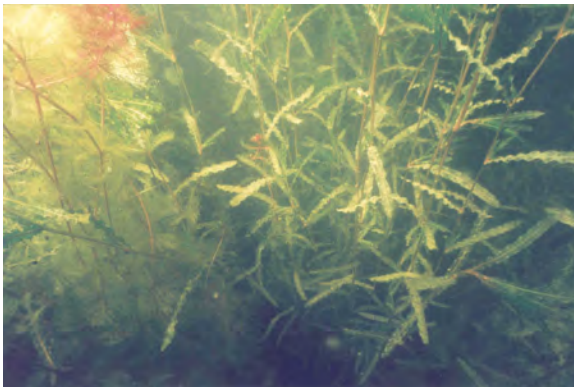
## Medicine Lake Curlyleaf Pondweed Notes: 2004 to 2015

Annual aggressive herbicide treatments were used to treat all known curlyleaf areas (which were estimated at 300 acres) in Medicine Lake from 2004 through 2006 with the objective to achieve long-term control of nuisance curlyleaf pondweed growth. The early season herbicide treatment, using Aquathol K, significantly reduced the spring density of curlyleaf pondweed at four monitoring sites in Medicine Lake following the application, indicating there was good annual control.

It was also observed that pre-treatment stem densities had decreased in 2005, 2006, and 2007 compared to pre-project stem densities taken in 2004.

In 2007, there was no herbicide treatment. Early season stem densities on April 17, 2007 were low at all four sample sites. Although some areas had curlyleaf present, the decision was made to not treat the lake. When re-sampling occurred about six weeks later, curlyleaf stem densities had increased at three of the four sample sites, reaching nuisance densities (arbitrarily set at 150 stems/m<sup>2</sup>) at several individual quadrat locations. Curlyleaf pondweed stem densities declined slightly from the April to May at one sample site.

In 2008, early season monitoring of curlyleaf pondweed by the US ACE, MnDNR, and Blue Water Science found curlyleaf was widespread in Medicine Lake, with slightly higher densities in the north and south ends of the lake. A total of 80 acres were treated in the North and South ends of Medicine Lake and heavy growth of curlyleaf was limited in Medicine Lake in 2008. In 2009, early season monitoring delineated 62 acres of curlyleaf to be treated. After a herbicide treatment, no heavy growth of curlyleaf was observed in Medicine Lake in 2009. In 2010, early season monitoring delineated 29.1 acres of curlyleaf to be treated. After the herbicide treatment, only small patches of heavy curlyleaf growth were observed. In 2011, early season monitoring delineated 14.7 acres of curlyleaf to be treated. After the herbicide treatment, control was poor overall. In 2012, early season monitoring delineated 59 acres of curlyleaf to be treated. After the herbicide treatment, control in the treated areas was good. In 2013, early season monitoring delineated 30.9 acres of curlyleaf to be treated. In 2014, slightly more curlyleaf with treatment areas totaling 47 acres. In 2015, about 60 acres of curlyleaf pondweed were treated.



[top] Curlyleaf pondweed at Site 3 on May 30, 2007. There was no treatment in 2007.

[bottom] Curlyleaf pondweed grew to the surface in several areas in Medicine Lake on May 30, 2007. Heavy curlyleaf growth has been limited in 2008 through 2013 with partial lake treatments.

# Medicine Lake Curlyleaf Pondweed Observations and Speculation

- The three year annual application of the herbicide, Aquathol K, that treated over 300 acres per year eliminated nuisance aquatic plant conditions on an annual basis, but did not eliminate curlyleaf regrowth the following year in Medicine Lake.
- Use of herbicides that kill curlyleaf before it produces turions appears to reduce the stem density of next year's curlyleaf "crop".
- Continued use of herbicides can continue to artificially induce a lower stem density condition the following year.
- It is uncertain how many years of aggressive treatment are necessary to eliminate nuisance growth on a long term basis.
- Curlyleaf growth is strongly influenced by the substrate. If stem densities are artificially reduced, as can occur with herbicides, and herbicide applications cease, curlyleaf will grow to satisfy substrate characteristics within a year or two.
- Long-term nuisance control of curlyleaf may be difficult to achieve unless substrate composition changes occur that limits curlyleaf growth.
- Curlyleaf stem densities may be correlated with sediment conditions. Under the right sediment conditions, stem densities will be naturally high. Under less hospitable sediment conditions, stem densities will be naturally low.
- Herbicide treatments that target areas of heavy curlyleaf growth while leaving areas of light growth untreated is a management option.

# Long-term Curlyleaf Control Is a Challenge

In Medicine it appears it will be difficult to achieve long term control of curlyleaf pondweed. Even if it was possible to destroy all curlyleaf turions in a lake there would still be a potential for curlyleaf reestablishment. Curlyleaf could come back from seed germination. Although the seed germination rate is low (estimated at a germination rate of 0.001%. Rogers and Breen 1980\*) it occurs. Seed germination has the potential to repopulate a lake in 3 to 4 years. Therefore, because curlyleaf can come back from seeds it is probable that long term control of curlyleaf is unlikely.

From data on Medicine Lake as well as other lakes, indicates if sediment conditions are conducive to growth, curlyleaf will grow. Therefore, annual treatments are a good option. Since long-term control with existing techniques is unlikely, treating only areas that produce nuisance growth, while leaving other areas alone is a consideration.

Selective treatments would achieve nearly the same results as whole lake treatments and are less expensive.

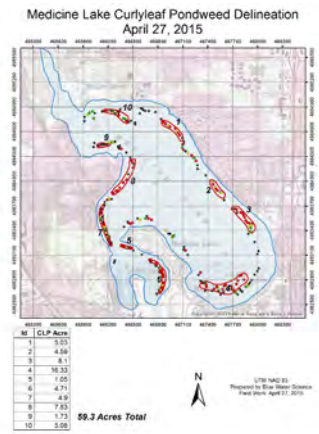
**Curlyleaf regrowth from seeds. Assume seed density of 1,445 seeds/m<sup>2</sup> and a germination rate of 0.001%. After turion production is re-established, assume 60% germination rate of turions (from Rogers and Breen 1980).**

	Year 1	Year 2	Year 3
<b>Early Season Stem Density (stems/m<sup>2</sup>)</b>	<b>0.01445 stems/m<sup>2</sup></b> (assume 0.001% germination of seeds and a seed density of 1,445 seeds/m <sup>2</sup> )	<b>0.87 stems/m<sup>2</sup></b> (assume 60% germination of 1.445 turions/m <sup>2</sup> from Year 1)	<b>52 stems/m<sup>2</sup></b> (assume 60% germination of 87 turions/m <sup>2</sup> from Year 2)
<b>Late Season Stem Density (stems/m<sup>2</sup>)</b>	<b>0.1445 stems/m<sup>2</sup></b> (runners produce 10 stems)	<b>8.70 stems/m<sup>2</sup></b> (each sprouted turion produces runners and results in 10 stems/turion)	<b>520 stems/m<sup>2</sup></b> (each sprouted turion produces 10 stems. 520 stems/m <sup>2</sup> in year 3 represents heavy growth of curlyleaf)
<b>Turions Produced (turions/m<sup>2</sup>)</b>	<b>1.445 turions/m<sup>2</sup></b> (each of the 10 stems produces 10 turions)	<b>87 turions/m<sup>2</sup></b> (each of the 10 stems produces 10 turions)	<b>5,200 turions/m<sup>2</sup></b> (each of the 10 stems produces 10 turions. There is a potential for nuisance growth conditions from here on.)

\* Rogers, K.H. and C.M. Breen. 1980. Growth and reproduction of *Potamogeton crispus* in a South African lake. *Journal of Ecology* 68:561-571.

Observations of curlyleaf pondweed density for April 27, 2015.

Site	Depth (ft)	CLP stems	Coon-tail	EWM	Site	Depth (ft)	CLP stems	Coon-tail	EWM	Site	Depth (ft)	CLP stems	Coon-tail	EWM	Site	Depth (ft)	CLP stems	Coon-tail	EWM
1	4				71	5				141	13				211	4			
2	5	7		1	72	6				142	4	12			212	12			
3	6	4			73	6				143	4	8			213	5			3
4	6	1			74	7				144	13				214	4	3		2
5	6	1			75	7				145	4	2			215	5	2		
6	7	8		1	76	7	3			146	4	5			216	5	3		
7	7			1	77	6	1			147	7	3			217	4			
8	5				78	9	5			148	10				218	7	7		
9	5				79	10	6			149	5				219	12			
10	6				80	10	4			150	6	4			220	8	1		
11	5			1	81	9	18		1	151	6	9			221	10	9		
12	3				82	8	30		1	152	4	14			222	11			
13	4				83	7			1	153	11				223	4			
14	4			1	84	7			1	154	8	5			224	8			
15	4				85	6			1	155	7	25			225	10			
16	4			2	86	6			1	156	3	8			226	4			
17	4		1		87	7	2		1	157	8	15			227	4			
18	4				88	8	9		1	158	12				228	4	3		
19	5	15			89	8	15		1	159	10				229	4	1		
20	6	7			90	9	5		1	160	6	3			230	6	1		
21	7	3	3		91	8	4		1	161	4	15			231	9	1		
22	7	5			92	9	4		1	162	5	10			232	8			
23	6	6			93	8	6		1	163	9	3			233	9			
24	6	3			94	5			1	164	7	6			234	8	6		
25	7	8			95	5			1	165	9				235	6	10		
26	7	18			96	7			1	166	11				236	5			
27	4				97	8	3			167	9	6			237	5	2		
28	5				98	8	11			168	4				238	5			
29	6	4			99	8	10			169	7	5			239	5	3		
30	6				100	6				170	12				240	5			
31	6	2			101	4				171	5	5			241	4	4		
32	8	6			102	8	4			172	3				242	3			
33	8		2		103	9	7			173	7	10							
34	9	3			104	11				174	12								
35	10	7			105	11	2			175	4	3							
36	8	13			106	9	10			176	4								
37	7	2			107	8				177	5								
38	7	8	2		108	6				178	5	2							
39	5				109	9				179	6	3							
40	6				110	11	8			180	8	6							
41	10				111	7				181	6	4							
42	6	3			112	8	4			182	12								
43	7	10			113	6			2	183	9								
44	8	3			114	9				184	5	1							
45	8	8			115	7	3			185	14								
46	8	7			116	9	1			186	7	18							
47	8				117	11	1			187	13								
48	6	3			118	10				188	6	5							
49	5				119	10				189	15								
50	6				120	6	3			190	16								
51	6	6			121	6	13			191	5								
52	7	9			122	7	10			192	5	5							
53	11				123	11				193	7	3							
54	6	15			124	6	1			194	12								
55	6	12			125	9	3			195	4	9							
56	8	6			126	12				196	8	10							
57	9	18			127	6	12			197	6	6							
58	10	4			128	6	10			198	5	12							
59	9	12			129	7	8			199	5	12							
60	6	11			130	11				200	8	10							
61	5	8			131	12				201	5								
62	6	3			132	10	6			202	9	10							
63	7	3			133	9	18			203	9	1							
64	5	1			134	10	2			204	8	6							
65	6	1			135	8	12			205	8	9							
66	7				136	9	12			206	8								
67	5				137	13				207	12								
68	5				138	13				208	10	7							
69	8				139	4	6			209	5	4							
70	5				140	9	6			210	4								



**Observations of curlyleaf pondweed density for June 9, 2015 about 5 weeks after the May 1 herbicide application.**

Site	Depth (ft)	CLP	CLP - stems	EWM	Chara	Coontail	Water stargrass	FA	No plants
1	7	1	1	3					
2	6			3					
3	5			2					
4	3								1
5	4								1
6	6								1
7	7	1	3						
8	5								1
9	6			2				3	
10	4								1
11	6					2		2	
12	6			2		1		1	
13	6					2			
14	6								1
15	6	1	1	1					
16	4			1				1	
17	6			3		2			
18	7			2		3			
19	6					2			
20	5					2			
21	8			1					
22	3								1
23	8			2		2			
24	3					3			
25	12								1
26	6					2			
27	5			2		2			
28	5			3		1			
29	3			2				1	
30	7					3			
31	8								1
32	7	2	7			5			
33	7					3			
34	7					2			
35	7			3					
36	8					3			
37	5			5					
38	5			4		2			
39	7			4					
40	7			4		2			
41	7			4					
42	8			4					
43	7			4					
44	4			5					
45	5			1					
46	4			1		4		4	
47	8			1		3			
48	5	1	1	1					
49	5			1		2		2	
50	6								1
51	6			1					
52	11								1

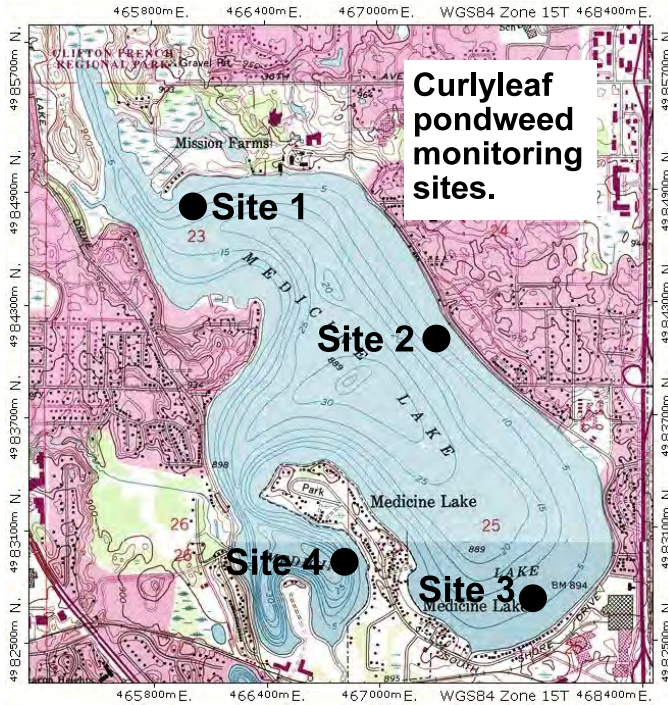
**Observations of curlyleaf pondweed density for June 9, 2015 about 5 weeks after the May 1 herbicide application.**

Site	Depth (ft)	CLP	CLP - stems	EWM	Chara	Coontail	Water stargrass	FA	No plants
53	10	1	1						
54	6	3	10						
55	6			1		3			
56	3			2			2		
57	4	1	3						
58	5			1		3			
59	4	1	3			3			
60	9								1
61	4				1	3			
62	5					2			
63	5			1		3			
64	8								1
65	8								1
66	6			1		2			
67	4			2					
68	4			1					
69	12								1
70	6					2			
71	10								1
72	5			2		1		1	
73	5			2					
74	5			1		1			
75	5			2					
76	7			2		1			
77	4			3					
78	6	1	4	2		2			
79	11								
80	11					1			
81	4					5			
82	4					4		4	
83	9								
84	9			3					
Average		1.3		2.2	1.0	2.4	2.0	2.1	
Occurrence		10		43	1	37	1	9	16
% occur		12		51	1	44	1	11	

# Appendix B

## Summary of Curlyleaf Pondweed Stem Density at Four Permanent Sites from 2004-2015

### Methods



Curlyleaf stem density has been sampled at four sites and at two depths on two dates from 2004 through 2015. The four site locations are shown to the left.

Site locations of four plant sampling sites. At each site, plants at 6 feet and 9 feet were sampled.

**Stem Density Methods:** For each year, two depths (6 feet and 9 feet) have been sampled at each of four sites for a total of eight sites per sample date. At each site a total of ten curlyleaf stem density samples were taken using a 0.10 m<sup>2</sup> quadrat. The ten stem density samples were randomly collected along a 50 meter transect line that ran parallel to the shoreline at each site. Other plant species were counted if present.



A 0.10 m<sup>2</sup> quadrat was used to quantify curlyleaf stem densities.



## Summary of Curlyleaf Pondweed Stem Densities at Four Permanent Sites for 2004-2015

Summary of curlyleaf pondweed stem densities prior to the effects of herbicide treatment and after the herbicide treatment at each of the four sites for 2004 through 2015. Blue shading indicates sites where no treatment occurred.

	Pre-Herbicide Condition (stems/m <sup>2</sup> )									
	6-foot Depth Sites					9-foot Depth Sites				
	1	2	3	4	AVE	1	2	3	4	AVE
2004 (May 6)	761	928	555	327	643	572	432	666	219	472
2005 (April 22)	415	600	11	650	419	192	215	43	120	143
2006 (April 24)	24	205	159	121	127	38	22	100	15	44
2007 (April 17)	1	17	5	29	13	14	15	12	16	14
2008 (May 4)	146	32	17	25	55	116	133	19	15	71
2009 (April 22)	54	19	1	66	35	32	23	4	31	23
2010 (April 20)	16	1	11	48	19	9	1	7	15	8
2011 (May 4)	35	1	15	135	47	12	3	41	43	25
2012 (April 18)	463	250	443	454	403	367	177	517	101	291
2013 (May 13)	15	24	37	67	36	42	51	66	47	52
2014 (May 16)	0	21	39	34	24	6	42	18	68	34
2015 (April 27)	7	44	2	68	30	9	14	48	19	23

	Post Herbicide Condition (stems/m <sup>2</sup> )									
	6-foot Depth Sites					9-foot Depth Sites				
	1	2	3	4	AVE	1	2	3	4	AVE
2004 (June 14)	1	3	0	0	1	2	1	0	0	1
2005 (June 2)	0	0	0	0	0	0	0	0	0	0
2006 (May 24)	0	14	66	50	33	0	17	79	0	24
2007 (May 30)	41	77	33	20	43	81	83	270	9	111
2008 (June 9)	0	59	0	323	96	0	58	0	480	135
2009 (June 12)	5	0	0	0	1	2	0	0	9	3
2010 (June 4)	0	13	37	64	29	0	8	40	13	15
2011 (June 16)	216	10	172	281	170	125	6	138	16	71
2012 (June 5)	0	0	0	0	0	0	5	0	0	1.3
2013 (June 21)	27	6	345	274	163	118	106	215	113	138
2014 (June 25)	0	1	3	0	1	2	15	9	1	7
2015 (June 9)	14	0	7	0	11	15	0	2	0	9

**Summary of curlyleaf pondweed stem densities for both early and late spring (pre and post herbicide treatment) conditions for all four sites for 6 ft and 9 ft depths.**

Stem Density (#/m <sup>2</sup> )												
Early Spring (Pre-Herbicide Conditions)												
	2004 (May 6)	2005 (Apr 22)	2006 (Apr 24)	2007 (Apr 17)	2008 (May 4)	2009 (Apr 22)	2010 (Apr 20)	2011 (May 4)	2012 (Apr 18)	2013 (May 13)	2014 (May 16)	2015 (Apr 27)
6 ft	643 (n=40)	419 (n=40)	127 (n=40)	13 (n=40)	55 (n=40)	35 (n=40)	19 (n=40)	47 (n=40)	403 (n=40)	36 (n=40)	24 (n=40)	30 (n=40)
9 ft	472 (n=40)	143 (n=40)	44 (n=40)	14 (n=40)	71 (n=40)	23 (n=40)	8 (n=40)	25 (n=40)	291 (n=40)	52 (n=40)	34 (n=40)	23 (n=40)
Late Spring (Post Herbicide Conditions)												
	2004 (Jun 14)	2005 (Jun 2)	2006 (May 25)	2007 (May 30)	2008 (Jun 9)	2009 (Jun 12)	2010 (Jun 4)	2011 (Jun 16)	2012 (Jun 6)	2013 (Jun 21)	2014 (Jun 25)	2015 (Jun 9)
6 ft	1 (n=40)	0 (n=40)	33 (n=40)	43 (n=40)	96 (n=40)	1 (n=40)	29 (n=40)	170 (n=40)	0 (n=40)	163 (n=40)	1 (n=40)	11 (n=40)
9 ft	1 (n=40)	0 (n=40)	24 (n=40)	111 (n=40)	135 (n=40)	3 (n=40)	15 (n=40)	71 (n=40)	1.3 (n=40)	138 (n=40)	7 (n=40)	9 (n=40)

# Results of Sampling on May 6 and June 14, 2004

Medicine Lake curlyleaf stem counts and biomass for May 6, 2004 for four sites and two depths at each site. Coontail was also observed at Site 1 and coontail stem densities (stems/m<sup>2</sup>) are shown in parentheses.

Sample	Site							
	1		2		3		4	
	6 ft: 04 66 009 E 49 84 608 N		6 ft: 04 67 355 E 49 83 876 N		6 ft: 04 67 873E 49 82 510 N		6 ft: 04 66 880 E 49 82 657 N	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	850	430 (20)*	550	580	620	840	400	140
2	1,380 (20)*	560	870	720	570	610	520	260
3	250 (20)	900 (20)	1,260	550	730	750	280	510
4	410 (10)	450	610	270	640	760	620	100
5	1,250	750 (10)	840	390	670	660	640	370
6	580 (10)	860 (20)	1,090	460	620	690	60	120
7	870 (20)	420 (20)	880	270	380	740	140	180
8	610	370 (40)	470	320	350	620	80	240
9	740 (10)	440	1,640	500	500	450	320	120
10	670 (10)	540 (90)	1,070	260	470	540	210	150
<b>Average Curlyleaf Stem Density</b>	<b>761</b>	<b>572</b>	<b>928</b>	<b>432</b>	<b>555</b>	<b>666</b>	<b>327</b>	<b>219</b>
<b>Average g/stem</b>	<b>0.117</b> (n=414 stems)	<b>0.076</b> (n=189 stems)	<b>0.078</b> (n=268 stems)	<b>0.086</b> (n=185 stems)	<b>0.157</b> (n=192 stems)	<b>0.123</b> (n=220 stems)	<b>0.096</b> (n=120 stems)	<b>0.097</b> (n=191 stems)
<b>Estimated Biomass (g/m<sup>2</sup>)</b>	<b>89.0</b>	<b>43.5</b>	<b>72.4</b>	<b>37.2</b>	<b>87.1</b>	<b>81.9</b>	<b>31.4</b>	<b>21.2</b>

\* number in parenthesis indicates number of coontail stems found at that site.

Medicine Lake curlyleaf stem counts and biomass for June 14, 2004 for four sites and two depths at each site.

Quadrat	Site							
	1		2		3		4	
	6 ft: 04 66 009 E 49 84 608 N		6 ft: 04 67 355 E 49 83 876 N		6 ft: 04 67 873E 49 82 510 N		6 ft: 04 66 880 E 49 82 657 N	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	10	10	10	0	0	0	0
2	0	10	20	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
<b>Average Curlyleaf Stem Density</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Average g/stem</b>	<b>0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>0.04</b>	--	--	--	--
<b>Estimated Biomass (g/m<sup>2</sup>)</b>	<b>0.03</b>	<b>0.06</b>	<b>0.06</b>	<b>0.04</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Notes	Scattered coontail & filamentous algae		Curlyleaf resprouting in sand - small plants. Water celery present.		Coontail 1-3 stems/quadrat on 5 different samples.		1 curlyleaf plant found at 3 feet not on transect. Water celery at 7 ft to 5 ft 2-4 stems /quadrat.	

# Results of Sampling on April 22 and June 2, 2005

Medicine Lake curlyleaf stem counts for April 22, 2005 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science, April 22, 2005. Medicine Lake was treated on April 19 and 21, 2005. Typical plant length was 21-27 inches with 10 or 11 nodes. Secchi disc transparency was 6.0 feet.

Site	1		2		3		4	
GPS Coord (UTM)	6 ft: 04 66 009 E 49 84 608 N		6 ft: 04 67 355 E 49 83 876 N		6 ft: 04 67 873E 49 82 510 N		6 ft: 04 66 880 E 49 82 657 N	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	430	250	1,090	240	30	20	1,070	80
2	380	190	90	110	10	100	1,200	200
3	370	70	1,080	440	10	40	990	190
4	390	80	1,000	400	20	0	790	140
5	480	300	690	120	0	0	420	120
6	470	270	300	70	0	20	410	180
7	280	250	330	250	0	10	300	230
8	300	210	390	140	0	110	450	250
9	390	130	480	160	0	90	200	250
10	660	170	550	220	40	40	670	120
<b>Average Curlyleaf Stem Density</b>	<b>415</b>	<b>192</b>	<b>600</b>	<b>215</b>	<b>11</b>	<b>43</b>	<b>650</b>	<b>176</b>
<b>Average g/stem</b>	<b>0.11</b>	<b>0.14</b>	<b>0.12</b>	<b>0.09</b>	<b>0.05</b>	<b>0.09</b>	<b>0.09</b>	<b>0.08</b>
<b>Estimated Biomass (g/m<sup>2</sup>)</b>	<b>45.7</b>	<b>26.9</b>	<b>72.0</b>	<b>19.4</b>	<b>0.6</b>	<b>3.9</b>	<b>58.5</b>	<b>14.1</b>

Medicine Lake curlyleaf stem counts for June 2, 2005 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science, June 2, 2005. Medicine Lake was treated on April 19 and 21, 2005. Typical plant length was 21-27 inches with 10 or 11 nodes. Secchi disc transparency was 6.0 feet.

Site	1		2		3		4	
GPS Coord (UTM)	6 ft: 04 66 009 E 49 84 608 N		6 ft: 04 67 355 E 49 83 876 N		6 ft: 04 67 873E 49 82 510 N		6 ft: 04 66 880 E 49 82 657 N	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
<b>Average Curlyleaf Stem Density</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# Results of Sampling on April 24, and May 25, 2006

Medicine Lake curlyleaf stem counts for April 24, 2006 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science, April 24, 2006. Medicine Lake was treated on April 18, 2005. Typical plant length was 21-27 inches with 10 or 11 nodes. Secchi disc transparency was 7.1 feet.

GPS Coord (UTM)	Site							
	1		2		3		4	
	6 ft: 04 66 007 E 49 84 595 N		6 ft: 04 67 348 E 49 83 915 N		6 ft: 04 67 897 E 49 82 499 N		6 ft: 04 66 850 E 49 82 660 N	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	50	60	210	20	140	60	120	20
2	70	50	260	40	190	170	190	20
3	90	80	190	30	150	110	180	50
4	0	0	320	20	70	70	40	20
5	0	0	190	30	90	120	190	20
6	0	90	130	20	180	80	110	10
7	0	100	250	30	160	70	80	0
8	10	0	130	0	220	70	130	0
9	20	0	180	30	240	110	90	10
10	0	0	190	0	150	140	80	0
<b>Average Curlyleaf Stem Density</b>	<b>24</b>	<b>38</b>	<b>205</b>	<b>22</b>	<b>159</b>	<b>100</b>	<b>121</b>	<b>15</b>
<b>Average wt/stem (g)</b>	<b>0.10</b>	<b>0.11</b>	<b>0.05</b>	<b>0.06</b>	<b>0.08</b>	<b>0.08</b>	<b>0.09</b>	<b>0.09</b>
<b>Estimated Biomass (g/m<sup>2</sup>)</b>	<b>2.4</b>	<b>4.2</b>	<b>10.3</b>	<b>1.3</b>	<b>12.7</b>	<b>8.0</b>	<b>10.9</b>	<b>1.4</b>

Medicine Lake curlyleaf stem counts for May 25, 2006 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science, May 25, 2006. Medicine Lake was treated on April 18, 2006.

GPS Coord (UTM)	Site							
	1		2		3		4	
	6 ft: 04 66 009 E 49 84 608 N		6 ft: 04 67 355 E 49 83 876 N		6 ft: 04 67 873 E 49 82 510 N		6 ft: 04 66 880 E 49 82 657 N	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	20	40	70	80	130	0
2	0	0	0	50	30	140	0	0
3	0	0	0	0	0	90	0	0
4	0	0	0	0	10	30	0	0
5	0	0	0	0	20	210	40	0
6	0	0	40	30	120	60	50	0
7	0	0	0	0	50	40	40	0
8	0	0	20	0	90	120	60	0
9	0	0	0	50	180	0	180	0
10	0	0	60	0	90	20	0	0
<b>Average Curlyleaf Stem Density (#/0.1 m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>17</b>	<b>66</b>	<b>79</b>	<b>50</b>	<b>0</b>
<b>Average wt/stem (g)</b>	<b>--</b>	<b>--</b>	<b>0.12</b>	<b>0.19</b>	<b>0.46</b>	<b>0.46</b>	<b>0.18</b>	<b>--</b>
<b>Estimated Biomass (g/m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>1.7</b>	<b>3.2</b>	<b>30.4</b>	<b>36.3</b>	<b>9.0</b>	<b>0</b>

# Results of Sampling on April 17 and May 30, 2007

Medicine Lake curlyleaf stem counts for four sites and two depths at each site. Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science. Secchi disc transparency was 5.4 feet. Red shading indicates stem densities at nuisance conditions (>150 stems/m<sup>2</sup>).

CURLYLEAF PONDWEED STEM DENSITIES - APRIL 17, 2007

	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	40	30	0	20	40	0	40
2	0	10	60	0	20	0	0	0
3	0	10	0	30	10	0	100	0
4	0	20	0	50	0	0	60	0
5	0	0	0	0	0	60	40	60
6	0	0	30	0	0	0	40	20
7	0	0	50	50	0	0	30	0
8	0	0	0	0	0	0	0	0
9	0	40	0	0	0	20	0	40
10	0	20	0	20	0	0	20	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>1</b>	<b>14</b>	<b>17</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>29</b>	<b>16</b>

EURASIAN WATERMILFOIL STEM DENSITIES - APRIL 17, 2007

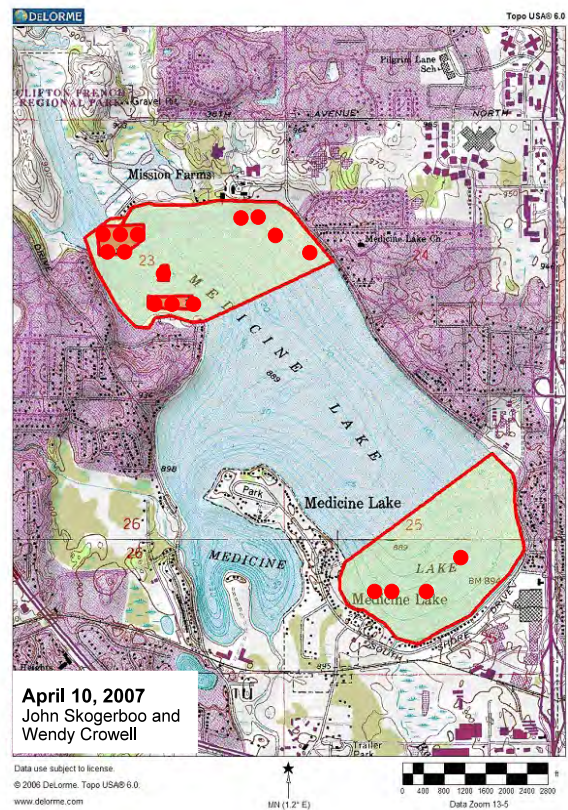
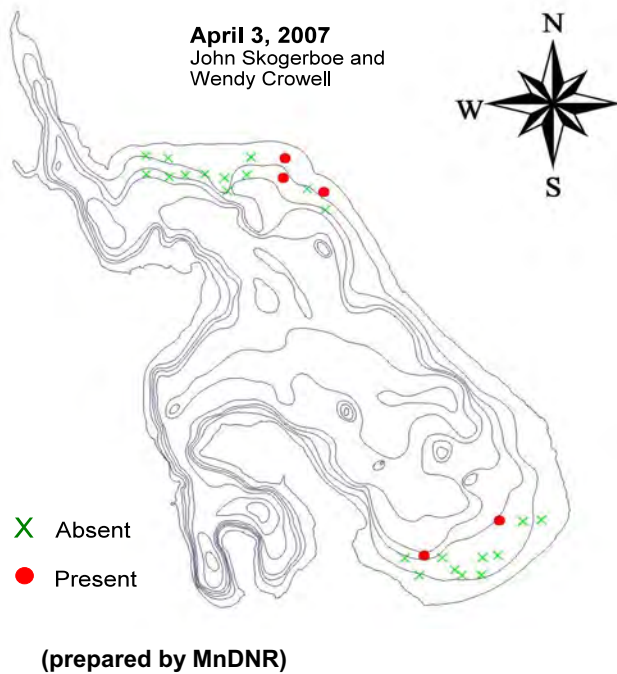
	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	0	40	20	40	0	0	0
2	0	0	20	30	60	30	0	0
3	0	20	30	0	40	60	0	0
4	0	70	40	0	30	60	20	20
5	0	30	50	0	20	20	20	0
6	0	0	0	30	60	0	10	0
7	0	0	20	20	80	0	0	10
8	0	20	50	0	40	40	0	0
9	0	10	40	40	60	90	0	0
10	0	0	0	20	0	20	0	20
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>1</b>	<b>15</b>	<b>29</b>	<b>16</b>	<b>43</b>	<b>32</b>	<b>5</b>	<b>5</b>

CURLYLEAF PONDWEED STEM DENSITIES - MAY 30, 2007

	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	90	10	70	30	250	30	40
2	0	140	110	60	30	300	40	0
3	0	40	90	170	10	400	30	0
4	20	140	50	40	60	230	30	0
5	90	0	100	0	0	140	0	0
6	140	0	130	70	0	320	0	0
7	60	0	60	60	30	210	0	0
8	0	70	40	100	40	280	30	0
9	100	130	100	120	130	250	30	20
10	0	200	80	140	0	320	10	30
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>41</b>	<b>81</b>	<b>77</b>	<b>83</b>	<b>33</b>	<b>270</b>	<b>20</b>	<b>9</b>

# Curlyleaf Pondweed Growth Characteristics in 2007

On the first lake visit of 2007, curlyleaf was rare on April 3. On the next visit on April 10, curlyleaf was more abundant. Curlyleaf sampling was conducted by John Skogerboe, US ACE, and Wendy Crowell, MnDNR.



(prepared by the US Army Corps of Engineers)

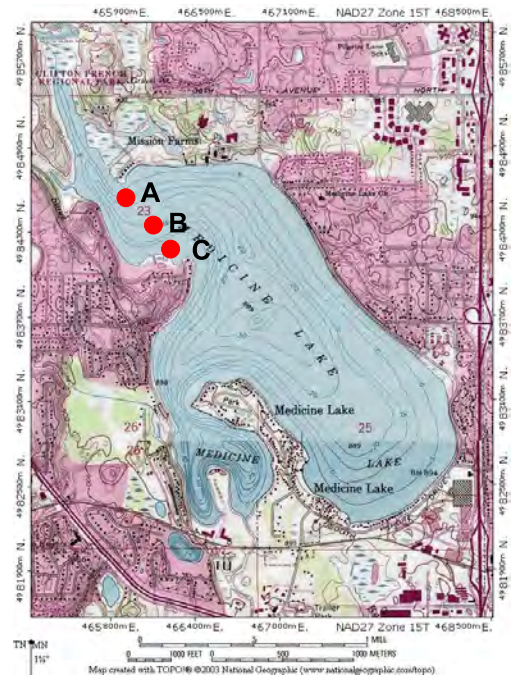
Early April plant evaluations were conducted to assess the status of curlyleaf pondweed at several locations in Medicine Lake in 2007. After ice-out, curlyleaf has the potential to spread and grow rapidly.

# Medicine Lake Curlyleaf Pondweed Check April 27, 2007

Based on a curlyleaf assessment in mid-April, by John Skogerboe, U.S. Army Corps of Engineers, three sites were delineated as having curlyleaf at densities high enough to consider treatment. These three sites in Medicine Lake were monitored on April 27, 2007 by Blue Water Science to check curlyleaf pondweed densities. The three sites are labeled A, B, and C (see map below) and stem densities were determined at sites A and C by scuba diving methods. Site A has stem densities averaging over 150 stems/m<sup>2</sup> at a 6-foot depth. Site C averaged less than 150 stems/m<sup>2</sup> based on 10 quadrat readings. However, out of the 10 readings, several individual quadrat densities were approaching nuisance densities. The total acreage of nuisance growth for sites A, B, and C was estimated at about 15 acres.

**Medicine Lake curlyleaf stem counts for April 27, 2007 for two sites (locations are shown on the map). Plant data collected by Steve McComas and Jo Stuckert, Blue Water Science, April 27, 2007. Secchi disc transparency was 7.2 feet.**

	Site				
	A			C	
	E 04 65 900 N 49 84 580			E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )			Stem Density (#/m <sup>2</sup> )	
	4 ft	5 ft	6 ft	5 ft	6-7 ft
1	30	100	250	110	20
2	50	80	160	110	40
3	10	80	100	120	20
4	20	60	80	130	30
5	0	40	180	80	0
6	0	0	230	60	0
7	0	0	300	0	0
8	0	0	320	0	0
9	0	0	0	0	0
10	0	0	0	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>11</b>	<b>36</b>	<b>162</b>	<b>61</b>	<b>11</b>
<b>MnDNR Rating</b>	<b>0 - 1</b>	<b>2</b>	<b>2 - 3</b>	<b>2</b>	<b>1</b>
<b>Stems on Rake</b>	<b>1</b>	<b>2 - 3</b>	<b>8 - 12</b>	<b>2 - 3</b>	<b>1</b>





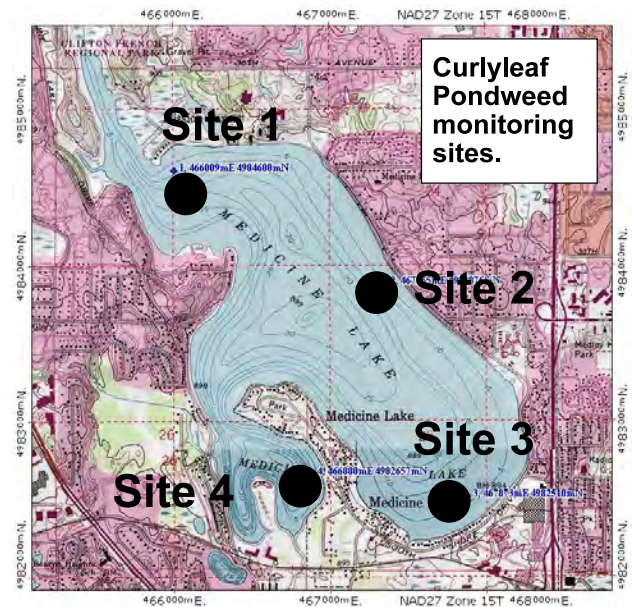
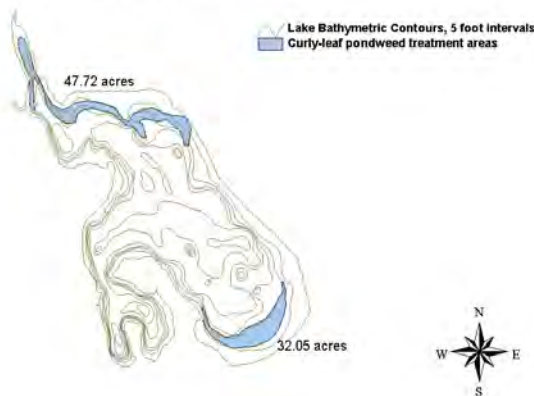
# Results of Sampling on May 4 and June 9, 2008

Medicine Lake curlyleaf stem counts for May 4, 2008 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas, Blue Water Science, May 4, 2008. Secchi disc transparency was 4 feet.

## CURLYLEAF PONDWEED STEM DENSITIES - MAY 4, 2008

GPS Coord (UTM)(NAD 27) Quadrat	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	50	310	60	480	0	30	20	30
2	200	50	30	100	40	20	10	0
3	210	60	0	150	20	20	0	20
4	40	0	10	40	10	40	0	10
5	80	40	7	0	20	50	10	0
6	80	180	40	10	30	0	40	50
7	120	80	50	160	20	20	50	0
8	260	120	10	240	20	10	30	30
9	140	0	20	40	10	0	70	10
10	280	320	30	110	0	0	20	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>146</b>	<b>116</b>	<b>32</b>	<b>133</b>	<b>17</b>	<b>19</b>	<b>25</b>	<b>15</b>

Medicine Lake, Hennepin County  
Curly Leaf Pondweed Proposed treatment areas (80 acres)  
based on April 28 and 30, 2008 field work  
Mapping: Wendy Crowell, May 2, 2008



Medicine Lake curlyleaf stem counts for June 9, 2008 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas, Blue Water Science, June 9, 2008. Red shading indicates stem densities at nuisance densities (>150 stems/m<sup>2</sup>). Stem densities shown in parentheses represent non-viable stems.

### CURLYLEAF PONDWEED STEM DENSITIES - JUNE 9, 2008

	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0 (130)	0 (190)	10	40	0 (100)	0 (200)	180	660
2	0 (300)	0 (27)	0	60	0 (120)	0 (250)	150	750
3	0 (300)	0 (210)	10	80	0 (70)	0 (100)	530	530
4	0 (290)	0 (120)	10	140	0 (0)	0 (310)	300	510
5	0 (260)	0 (40)	70	0	0 (30)	0 (0)	400	630
6	0 (80)	0 (140)	40	160	0 (80)	0 (50)	350	380
7	0 (160)	0 (110)	140	0	0 (250)	0 (220)	400	230
8	0 (330)	0 (310)	180	50	0 (310)	0 (0)	480	360
9	0 (400)	0 (280)	80	10	0 (150)	0 (70)	160	420
10	0 (110)	0 (300)	50	40	0 (40)	0 (140)	180	330
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>0 (236)</b>	<b>0 (197)</b>	<b>59</b>	<b>58</b>	<b>0 (115)</b>	<b>0 (134)</b>	<b>323</b>	<b>480</b>

### EURASIAN WATERMILFOIL STEM DENSITIES - JUNE 9, 2008

	Site							
	1		2		3		4	
	E 04 63 978 N 49 84 560		E 04 67 443 N 49 83 809		E 04 67 861 N 49 82 421		E 04 66 836 N 49 82 735	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	30	10	40	100	10	10	0	0
2	50	50	60	120	20	10	0	0
3	30	10	60	80	0	10	0	0
4	50	10	80	160	0	0	10	10
5	150	20	60	80	10	0	10	10
6	110	40	80	40	10	60	0	10
7	80	0	0	60	30	30	0	0
8	20	0	100	100	60	20	0	0
9	20	0	60	90	80	40	0	0
10	0	0	20	50	30	0	0	0
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>54</b>	<b>14</b>	<b>56</b>	<b>79</b>	<b>25</b>	<b>18</b>	<b>2</b>	<b>3</b>

# Results of Sampling on April 22 and June 12, 2009

Medicine Lake curlyleaf stem counts for April 22, 2009 for four sites and two depths at each site.

**CURLYLEAF PONDWEED STEM DENSITIES (stems per m<sup>2</sup>) - April 22, 2009**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	04 65 992 49 84 810		04 67 349 49 84 127		04 67 839 49 82 737		04 66 841 49 82 904	
Quadrat	Stem Density		Stem Density		Stem Density		Stem Density	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	40	20	30	30	10	30	110	50
2	60	70	20	110	0	10	140	160
3	70	20	10	20	0	0	110	30
4	50	30	0	30	0	0	60	20
5	80	0	0	40	0	0	200	30
6	60	0	30	0	0	0	0	20
7	0	40	30	0	0	0	0	0
8	0	60	40	0	0	0	40	0
9	180	80	10	0	0	0	0	0
10	0	0	20	0	0	0	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>54</b>	<b>32</b>	<b>19</b>	<b>23</b>	<b>1</b>	<b>4</b>	<b>66</b>	<b>31</b>

**EURASIAN WATERMILFOIL STEM DENSITIES - APRIL 22, 2009**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	E 04 65 992 N 49 84 810		E 04 67 349 N 49 84 127		E 04 67 839 N 49 82 737		E 04 66 841 N 49 82 904	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	30	0	0	0	0	0
2	0	0	30	40	10	0	0	0
3	30	10	10	0	0	0	40	10
4	30	20	0	0	20	0	10	0
5	20	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	10	30	0	0	0	0
8	0	0	0	60	0	0	0	0
9	0	0	0	50	0	0	0	0
10	0	0	0	10	0	0	0	0
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>8</b>	<b>3</b>	<b>8</b>	<b>19</b>	<b>3</b>	<b>0</b>	<b>5</b>	<b>1</b>

**COONTAIL STEM DENSITIES - APRIL 22, 2009**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	E 04 65 992 N 49 84 810		E 04 67 349 N 49 84 127		E 04 67 839 N 49 82 737		E 04 66 841 N 49 82 904	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	0	0	50	50	0	30
2	30	0	0	20	50	50	0	40
3	0	0	0	0	50	50	0	0
4	0	0	0	0	50	50	0	0
5	20	20	0	0	50	50	40	40
6	20	20	0	0	60	60	40	40
7	20	20	0	0	60	60	40	40
8	20	20	0	0	60	60	40	40
9	20	20	0	0	60	60	40	40
10	20	20	0	0	60	60	40	40
<b>Average Coontail Stem Density (stems/m<sup>2</sup>)</b>	<b>15</b>	<b>12</b>	<b>0</b>	<b>2</b>	<b>55</b>	<b>55</b>	<b>24</b>	<b>31</b>

Medicine Lake stem counts for June 12, 2009.

CURLYLEAF PONDWEED STEM DENSITIES - JUNE 12, 2009

	Site							
	1		2		3		4	
	E 04 65 992 N 49 84 810		E 04 67 349 N 49 84 127		E 04 67 839 N 49 82 737		E 04 66 841 N 49 82 904	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	10	0	0	0	0	0 (320)	60
2	20	10	0	0	0	0	0 (320)	30
3	10	20	0	0	0	0	0 (50)	0
4	10	10	0	0	0	0	0 (80)	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0 (270)	0
9	0	0	0	0	0	0	0 (120)	0
10	0	0	0	0	0	0	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0 (116)</b>	<b>9</b>

EURASIAN WATERMILFOIL STEM DENSITIES - JUNE 12, 2009

	Site							
	1		2		3		4	
	E 04 65 992 N 49 84 810		E 04 67 349 N 49 84 127		E 04 67 839 N 49 82 737		E 04 66 841 N 49 82 904	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	30	40	150	60	10	10	10	10
2	40	40	100	220	10	10	60	10
3	30	40	70	150	60	20	0	20
4	20	40	130	200	30	0	0	0
5	10	80	120	150	0	0	0	0
6	10	80	80	150	0	0	0	0
7	0	80	80	180	0	0	0	0
8	0	80	100	140	0	0	0	0
9	0	80	120	170	0	0	0	0
10	0	80	60	200	0	0	10	0
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>14</b>	<b>64</b>	<b>101</b>	<b>162</b>	<b>11</b>	<b>4</b>	<b>8</b>	<b>4</b>

COONTAIL STEM DENSITIES - JUNE 12, 2009

	Site							
	1		2		3		4	
	E 04 65 992 N 49 84 810		E 04 67 349 N 49 84 127		E 04 67 839 N 49 82 737		E 04 66 841 N 49 82 904	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	40	40	20	10	420	50	0	40
2	40	40	30	10	290	50	60	60
3	80	40	10	10	230	70	60	0
4	80	40	0	0	100	70	50	0
5	80	80	0	0	100	70	50	0
6	80	80	0	0	80	70	40	40
7	80	80	0	0	80	80	0	60
8	100	80	0	0	40	80	0	40
9	100	80	0	0	40	80	0	40
10	100	80	0	0	100	80	50	0
<b>Average Coontail Stem Density (stems/m<sup>2</sup>)</b>	<b>78</b>	<b>64</b>	<b>6</b>	<b>3</b>	<b>148</b>	<b>70</b>	<b>31</b>	<b>28</b>

# Results of Sampling on April 20 and June 4, 2010

Medicine Lake curlyleaf stem counts for April 20, 2010 for Sites 1, 2, 3, and 4. Plant data collected by Steve McComas, Blue Water Science, and Kevin Springob, City of Plymouth.

**CURLYLEAF PONDWEED STEM DENSITIES (stems per m<sup>2</sup>) - April 20, 2010**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	E04 65 990 N49 84 811		E04 67 340 N49 84 115		E04 67 840 N49 82 689		E04 66 871 N49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	40	10	10	10	10	50	20
2	20	0	0	0	40	20	60	30
3	10	0	0	0	30	20	80	0
4	30	0	0	0	20	20	30	0
5	40	0	0	0	10	0	50	10
6	10	0	0	0	0	0	40	20
7	10	0	0	0	0	0	30	40
8	30	0	0	0	0	0	60	20
9	0	30	0	0	0	0	70	0
10	0	20	0	0	0	0	10	10
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>16</b>	<b>9</b>	<b>1</b>	<b>1</b>	<b>11</b>	<b>7</b>	<b>48</b>	<b>15</b>

**EURASIAN WATERMILFOIL STEM DENSITIES - APRIL 20, 2010**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	E04 65 990 N49 84 811		E04 67 340 N49 84 115		E04 67 840 N49 82 689		E04 66 871 N49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	10	10	10	10	0	0	0
2	0	20	0	10	0	0	0	0
3	0	0	0	10	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>

**COONTAIL STEM DENSITIES - APRIL 20, 2010**

GPS Coord (UTM) Zone: WGS 84	Site							
	1		2		3		4	
	E04 65 990 N49 84 811		E04 67 340 N49 84 115		E04 67 840 N49 82 689		E04 66 871 N49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	20	20	10	10	30	30	10	20
2	30	20	10	10	30	30	20	20
3	30	20	0	10	30	20	10	10
4	20	20	0	10	40	20	20	10
5	30	20	0	0	30	10	20	0
6	30	0	0	0	40	0	0	0
7	20	10	0	0	0	0	0	0
8	10	20	0	0	0	0	0	0
9	20	0	0	0	0	0	0	0
10	20	20	0	0	0	0	0	0
<b>Average Coontail Stem Density (stems/m<sup>2</sup>)</b>	<b>23</b>	<b>15</b>	<b>2</b>	<b>4</b>	<b>20</b>	<b>11</b>	<b>8</b>	<b>6</b>

Medicine Lake curlyleaf stem counts for June 4, 2010 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas, Blue Water Science, June 4, 2010.

**CURLYLEAF PONDWEED STEM DENSITIES - JUNE 4, 2010**

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	20	30	40	40	40	10
2	0	0	10	20	20	110	80	40
3	0	0	20	30	0	0	60	60
4	0	0	0	0	100	60	120	20
5	0	0	0	0	20	70	140	0
6	0	0	10	0	0	120	50	0
7	0	0	30	0	30	0	70	0
8	0	0	20	0	40	0	40	0
9	0	0	0	0	20	0	40	0
10	0	0	20	0	10	0	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>8</b>	<b>37</b>	<b>40</b>	<b>64</b>	<b>13</b>

**EURASIAN WATERMILFOIL STEM DENSITIES - JUNE 4, 2010**

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	0	0	0	20	20	0
2	0	0	0	0	0	30	10	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
<b>Average Eurasian Watermilfoil Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>0</b>

**COONTAIL STEM DENSITIES - JUNE 4, 2010**

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	0	20	0	40	0	20
2	0	0	0	20	0	60	0	40
3	0	0	0	30	0	80	0	20
4	0	0	0	50	0	100	0	30
5	0	0	0	0	0	0	0	40
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	100	0	0
8	0	0	0	0	0	100	0	0
9	0	0	0	0	0	100	0	0
10	0	0	0	0	0	100	0	0
<b>Average Coontail Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>68</b>	<b>0</b>	<b>15</b>

# Results of Sampling on May 4 and June 16, 2011

Medicine Lake curlyleaf stem counts for May 4, 2011 for Sites 1, 2, 3, and 4. Plant data collected by Kevin Springob, City of Plymouth and Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES (stems per m<sup>2</sup>) - MAY 4, 2011

	Site							
	1		2		3		4	
	E04 65 984 N49 84 840		E04 67 340 N49 84 115		E04 67 830 N49 82 686		E04 66 862 N49 82 857	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	20	30	10	30	30	80	100	80
2	30	30	0	0	0	60	120	100
3	30	10	0	0	0	50	180	60
4	0	0	0	0	20	30	200	50
5	80	0	0	0	20	60	180	30
6	80	30	0	0	0	0	140	40
7	0	20	0	0	0	10	50	0
8	30	0	0	0	10	40	80	30
9	10	0	0	0	40	50	140	30
10	40	0	0	0	30	30	160	10
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>35</b>	<b>12</b>	<b>1</b>	<b>3</b>	<b>15</b>	<b>41</b>	<b>135</b>	<b>43</b>

Medicine Lake curlyleaf stem counts for June 16, 2011 for four sites and two depths at each site (locations are shown in Figure 1). Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - JUNE 16, 2011

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	70	120	30	30	160	180	300	0
2	160	160	30	30	80	200	220	0
3	340	140	40	0	60	80	340	50
4	200	160	0	0	260	60	350	40
5	390	80	0	0	200	100	160	0
6	220	120	0	0	150	190	160	0
7	160	100	0	0	250	160	420	20
8	240	60	0	0	200	100	380	0
9	160	180	0	0	180	110	160	40
10	220	130	0	0	180	200	320	20
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>216</b>	<b>125</b>	<b>10</b>	<b>6</b>	<b>172</b>	<b>138</b>	<b>281</b>	<b>16</b>

# Results of Sampling on April 18 and June 5, 2012

Medicine Lake curlyleaf stem counts for April 18, 2012 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - APRIL 18, 2012

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site							
	1		2		3		4	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	190	120	310	160	190	450	440	120
2	130	210	240	140	980	530	380	0
3	1120	140	280	270	410	470	300	160
4	340	310	320	250	480	400	350	170
5	500	400	130	230	530	620	400	210
6	560	610	140	180	180	580	410	80
7	200	580	100	60	500	490	610	70
8	650	300	210	100	450	580	850	100
9	250	520	300	170	320	410	190	60
10	690	480	470	210	390	640	640	40
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>463</b>	<b>367</b>	<b>250</b>	<b>177</b>	<b>443</b>	<b>517</b>	<b>457</b>	<b>101</b>

Medicine Lake curlyleaf stem counts for June 5, 2012 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - JUNE 5, 2012

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site												
	1			2				3			4		
	Stem Density (#/m <sup>2</sup> )			Stem Density (#/m <sup>2</sup> )				Stem Density (#/m <sup>2</sup> )			Stem Density (#/m <sup>2</sup> )		
	6 ft (alive)	6 ft (dead)	9 ft	6 ft (alive)	6 ft (dead)	9 ft (alive)	9 ft (dead)	6 ft (alive)	6 ft (dead)	9 ft (dead)	6 ft (alive)	6 ft (dead)	9 ft (dead)
1	0	270	0	0	140	10	40	0	280	150	0	550	400
2	0	190	0	0	160	30		0	370	200	0	280	350
3	0	160	0	0	200	10		0	140	--	0	240	520
4	0	260	0	0	180	0		0	230	--	0	260	250
5	0	340	0	0	120	0		0	140	--	0	290	380
6	0	--	0	0	120	0		0	--	--	0	--	--
7	0	--	0	0	80	0		0	--	--	0	--	--
8	0	--	0	0	160	0		0	--	--	0	--	--
9	0	--	0	0	180	0		0	--	--	0	--	--
10	0	--	0	0	130	0		0	--	--	0	--	--
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>244</b>	<b>0</b>	<b>0</b>	<b>147</b>	<b>5</b>		<b>0</b>	<b>232</b>	<b>175</b>	<b>0</b>	<b>324</b>	<b>380</b>

## CHARA (CH, COONTAIL (CN), AND EURASIAN WATERMILFOIL (EWM) STEM DENSITIES - JUNE 5, 2012

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site																							
	1						2						3						4					
	Stem Density (#/m <sup>2</sup> )						Stem Density (#/m <sup>2</sup> )						Stem Density (#/m <sup>2</sup> )						Stem Density (#/m <sup>2</sup> )					
	6 ft			9 ft			6 ft			9 ft			6 ft			9 ft			6 ft			9 ft		
	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM	CH	CN	EWM
1	0	0	0	0	0	0	0	0	50	0	0	30	0	0	30	0	0	20	0	50	0	0	20	0
2	0	0	0	0	0	0	0	0	40	0	0	20	0	0	0	0	0	10	0	70	0	0	10	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Average Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>



# Results of Sampling on May 13 and June 21, 2013

Medicine Lake curlyleaf stem counts for May 13, 2013 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - MAY 13, 2013

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site							
	1		2		3		4	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	20	0	10	30	120	30	10
2	10	30	0	110	40	50	50	150
3	20	10	30	30	90	0	60	50
4	0	80	0	40	20	50	40	20
5	10	10	130	70	20	110	60	0
6	50	50	10	110	20	80	50	60
7	30	50	0	10	40	80	90	40
8	20	20	10	20	0	30	130	60
9	0	10	20	40	10	50	10	80
10	0	140	40	70	100	90	60	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>15</b>	<b>42</b>	<b>24</b>	<b>51</b>	<b>37</b>	<b>66</b>	<b>67</b>	<b>47</b>

Medicine Lake curlyleaf stem counts for June 21, 2013 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - JUNE 21, 2013

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site							
	1		2		3		4	
	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	290	0	50	260	170	280	90
2	0	80	20	100	310	250	210	160
3	0	170	0	120	430	280	280	80
4	10	100	0	70	390	290	200	110
5	10	0	0	140	390	170	280	100
6	0	110	20	80	430	180	180	120
7	10	50	0	60	330	260	310	190
8	20	280	20	150	300	250	270	100
9	100	40	0	100	240	190	320	90
10	120	60	0	190	370	210	410	90
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>27</b>	<b>118</b>	<b>6</b>	<b>106</b>	<b>345</b>	<b>215</b>	<b>274</b>	<b>113</b>

## COONTAIL (CN) AND EURASIAN WATERMILFOIL (EWM) STEM DENSITIES - JUNE 21, 2013

GPS Coord (UTM) Zone: WGS 84 Quadrat	Site															
	1				2				3				4			
	Stem Density (#/m <sup>2</sup> )				Stem Density (#/m <sup>2</sup> )				Stem Density (#/m <sup>2</sup> )				Stem Density (#/m <sup>2</sup> )			
	6 ft		9 ft		6 ft		9 ft		6 ft		9 ft		6 ft		9 ft	
	CN	EWM	CN	EWM	CN	EWM	CN	EWM	EWM	CN	EWM	CN	EWM	CN	EWM	
1	0	80	0	0		100		100	0	0	0	10	0	0	0	
2	0	100	20	0		140		20	40	30	0	60	0	10	0	
3	150	80	0	0		50		50	0	0	10	50	0	30	0	
4	100	60	0	10		100		50	0	20	0	70	30	50	0	
5	60	60	0	0		70		0	0	70	0	10	0	20	10	
6	20	200	0	30		50		50	0	60	0	0	0	20	0	
7	0	70	0	50		100		20	20	30	0	20	0	20	0	
8	20	50	0	0		80		20	30	0	0	0	0	10	10	
9	40	10	20	60		100		0	20	0	0	20	0	10	0	
10	20	30	30	50		80		40	20	0	0	0	0	20	0	
<b>Average Stem Density (stems/m<sup>2</sup>)</b>	<b>41</b>	<b>74</b>	<b>7</b>	<b>20</b>		<b>87</b>		<b>35</b>	<b>13</b>	<b>21</b>	<b>1</b>	<b>24</b>	<b>3</b>	<b>19</b>	<b>2</b>	

# Results of Sampling on May 16 and June 25, 2014

Medicine Lake curlyleaf stem counts for May 16, 2014 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - MAY 16, 2014

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	40	0	0	20	0	0	0
2	0	0	80	60	40	0	0	60
3	0	0	0	0	90	20	0	60
4	0	0	10	0	80	30	220	0
5	0	0	50	10	20	40	30	0
6	0	0	50	20	10	20	0	30
7	0	10	0	60	60	0	0	110
8	0	10	0	120	60	30	20	120
9	0	0	20	0	0	40	10	120
10	0	0	0	150	10	0	60	180
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>0</b>	<b>6</b>	<b>21</b>	<b>42</b>	<b>39</b>	<b>18</b>	<b>34</b>	<b>68</b>

Medicine Lake curlyleaf stem counts for June 25, 2014 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - JUNE 25, 2014

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	10	10	20	20	0	0	0	20
2	0	30	0	0	0	0	0	0
3	0	30	0	0	0	0	0	0
4	0	50	0	10	0	0	0	0
5	0	20	0	10	0	0	0	0
6	0	10	0	30	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	20	0	0	0	0
9	0	0	10	0	0	0	0	0
10	0	0	0	0	0	10	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>1</b>	<b>15</b>	<b>3</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>

# Results of Sampling on April 27 and June 9, 2015

Medicine Lake curlyleaf stem counts for April 27, 2015 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

## CURLYLEAF PONDWEED STEM DENSITIES - APRIL 27, 2015

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	20	0	120	40	0	20	130	30
2	0	0	10	0	10	0	0	0
3	0	0	0	0	0	0	60	40
4	0	0	0	0	0	0	180	0
5	0	0	30	0	0	30	90	0
6	0	0	0	0	10	100	0	0
7	0	0	190	0	0	180	10	40
8	0	40	50	20	0	90	140	0
9	0	0	0	0	0	30	0	30
10	50	50	40	80	0	40	70	50
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>7</b>	<b>9</b>	<b>44</b>	<b>14</b>	<b>2</b>	<b>48</b>	<b>68</b>	<b>19</b>

Medicine Lake curlyleaf stem counts for June 9, 2015 for four sites and two depths at each site. Plant data collected by Steve McComas, Blue Water Science.

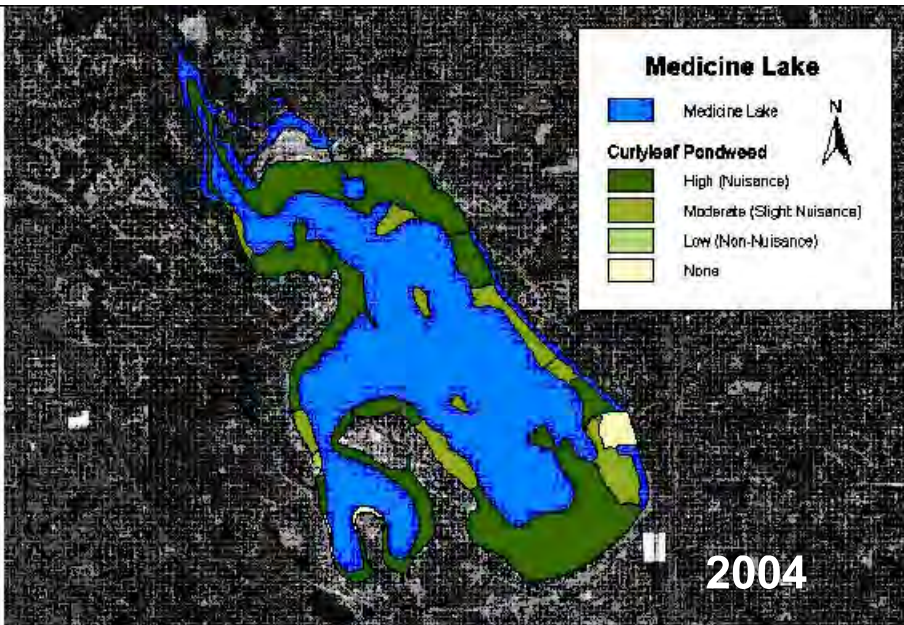
## CURLYLEAF PONDWEED STEM DENSITIES - JUNE 9, 2015

	Site							
	1		2		3		4	
	E 04 65 990 N 49 84 811		E 04 67 340 N 49 84 115		E 04 67 840 N 49 82 689		E 04 66 871 N 49 82 854	
Quadrat	Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )		Stem Density (#/m <sup>2</sup> )	
	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft	6 ft	9 ft
1	0	0	0	0	0	0	0	0
2	20	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	80	15	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	40	0	0	0	70	20	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
<b>Average Curlyleaf Stem Density (stems/m<sup>2</sup>)</b>	<b>14</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>

# Appendix C

## Aquatic Plant Conditions in the Early and Late Curlyleaf Season

### Curlyleaf Pondweed Community in 2004 and 2007



(prepared by Three Rivers Park District)



May 29, 2007 (prepared by Three Rivers Park District)

## 2004: Pre-herbicide Conditions

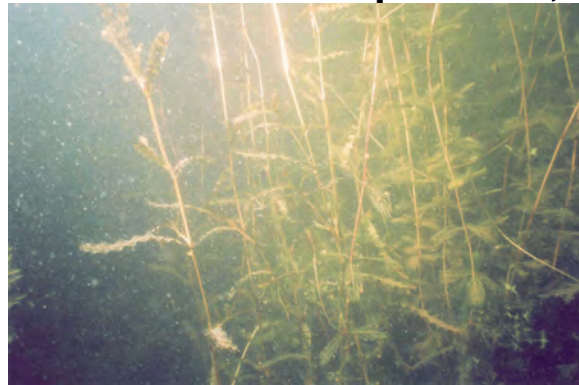


Site 1. [top] Curlyleaf was 2 to 3 feet tall on May 6, 2004.  
[bottom] Stem densities in 6 feet of water were high averaging 555 stems/m<sup>2</sup>.

# Photographic Inventory of Four Medicine Lake Sample Sites, 2007



**SITE 1: April 17, 2007**



**SITE 1: May 30, 2007**



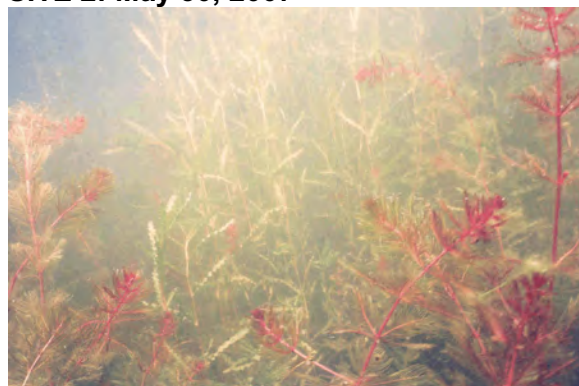
**SITE 2: April 17, 2007**



**SITE 2: May 30, 2007**



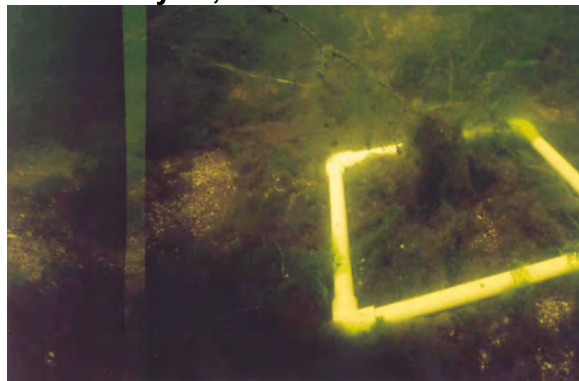
**SITE 3: April 17, 2007**



**SITE 3: May 30, 2007**



**SITE 4: April 17, 2007**



**SITE 4: May 30, 2007**

# Medicine Lake Curlyleaf Conditions in May and June, 2008

May 4, 2008



Site 1, May 4, 2008

June 9, 2008



Site 1, June 9, 2008



Site 2, May 4, 2008



Site 2, June 9, 2008



Site 3, May 4, 2008



Site 3, June 9, 2008



Site 4, May 4, 2008



Site 4, June 9, 2008

# Medicine Lake Curlyleaf Conditions in April and June, 2009

April 22, 2009

June 12, 2009



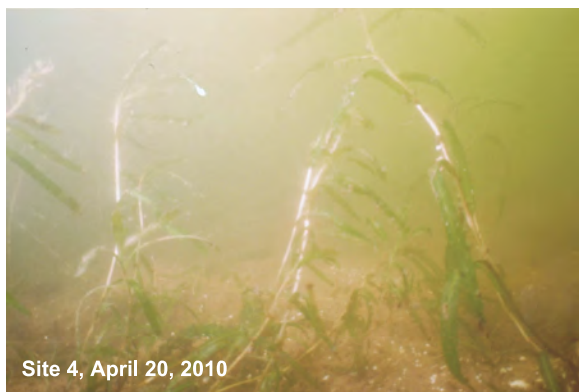


# Medicine Lake Curlyleaf Conditions in April and June, 2010

April 20, 2010



June 4, 2010



Curlyleaf conditions at four sample sites. White frame is a 0.1m<sup>2</sup> quadrat.

# Aquatic Plant Conditions in Early and Late Spring

**April 20, 2010**



**June 4, 2010**



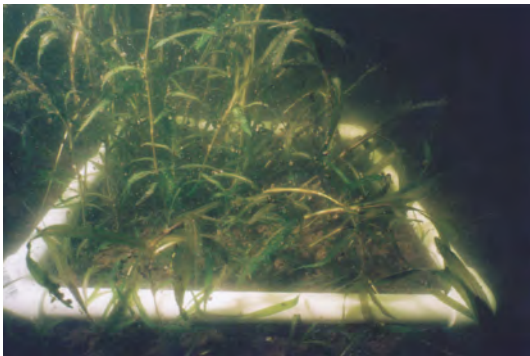
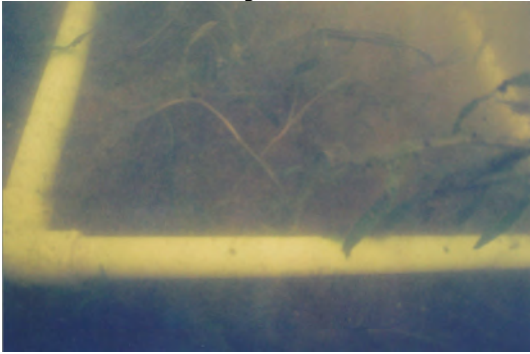
[top] Curlyleaf was sparse to common in April 20, 2010. Although 29 acres of curlyleaf was treated on April 23, 2010, some curlyleaf remained. The curlyleaf patch in the upper right is in the north arm, close to shore and was not treated.

[middle] Coontail was common in April and common to abundant in June.

[bottom] Buttercup was common in some areas in April and had produced white flowers along some stretches of the western shoreline in June.

# Underwater Curlyleaf Pondweed Growth Characteristics in 2011

May 4, 2011

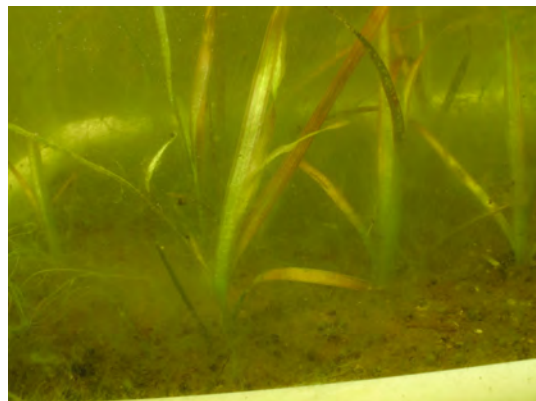


June 16, 2011

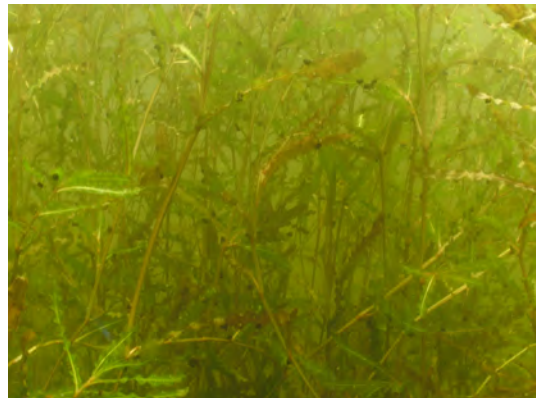
Site 1



Site 2



Site 3



Site 4



# Underwater Curlyleaf Pondweed Growth Characteristics in 2012

April 18, 2012

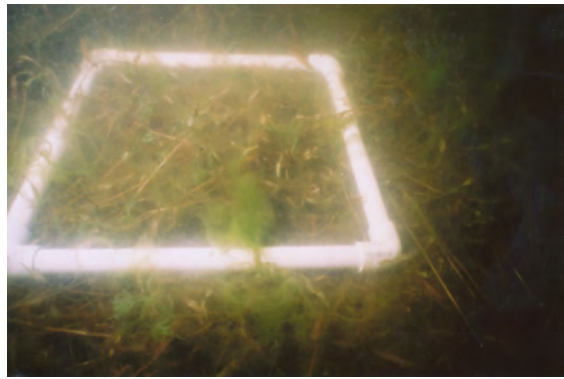


Site  
1

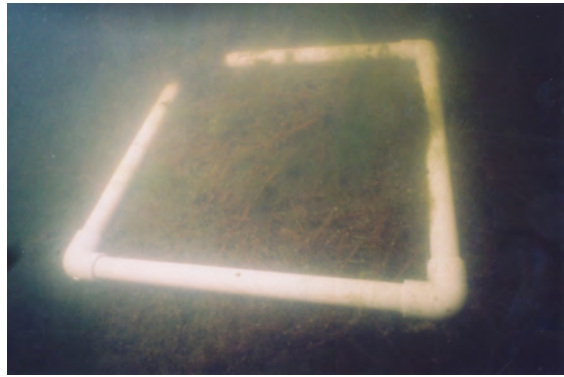
June 5, 2012



Site  
2



Site  
3



Site  
4

