



Elodea in Moody Lake, Chisago County, Minnesota, June 17, 2020

Curlyleaf Pondweed Delineation and Assessment Surveys for Moody Lake, Chisago County, Minnesota, 2020

Curlyleaf Pondweed Delineation: April 27 and May 1, 2020

Curlyleaf Treatment: May 22, 2020 (3.11 ac)

Curlyleaf Pondweed Assessment: June 17, 2020

Prepared for:
Comfort Lake/Forest Lake
Watershed District
Forest Lake, Minnesota



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December 3, 2020

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Summary

Curlyleaf Pondweed Delineation: Moody Lake (MnDNR ID #13-0023) is a 45 acre lake located in Chisago County, Minnesota. Water clarity has a summer average of 2.3 feet in 2018 (source: Comfort Lake/Forest Lake Watershed District). A curlyleaf pondweed meander survey was conducted on April 27, 2020 and a full point intercept survey conducted on May 1, 2020 by Blue Water Science. Data from both surveys were combined to delineate areas for curlyleaf pondweed treatment and to look for Eurasian watermilfoil. Results of the curlyleaf delineation using both surveys found curlyleaf pondweed was widespread in the nearshore area of Moody Lake (Figure S1). A treatment area of 3.11 acres was delineated and was treated on May 22, 2020 using Aquathol K at 1.25 ppm (3.2 gallons/acre). A lakewide concentration of the active ingredient was 31 ppb.

Curlyleaf Pondweed Assessment: A point intercept survey was used for the curlyleaf pondweed assessment and was conducted on June 17, 2020 by Blue Water Science (Figure S1). Results of the curlyleaf pondweed assessment found no viable curlyleaf in Moody Lake. Also, in June, Moody Lake had a low diversity of aquatic plants, with coontail, elodea, and moss the only other submerged aquatic plant species observed. Eurasian watermilfoil was not observed on June 16, 2014.

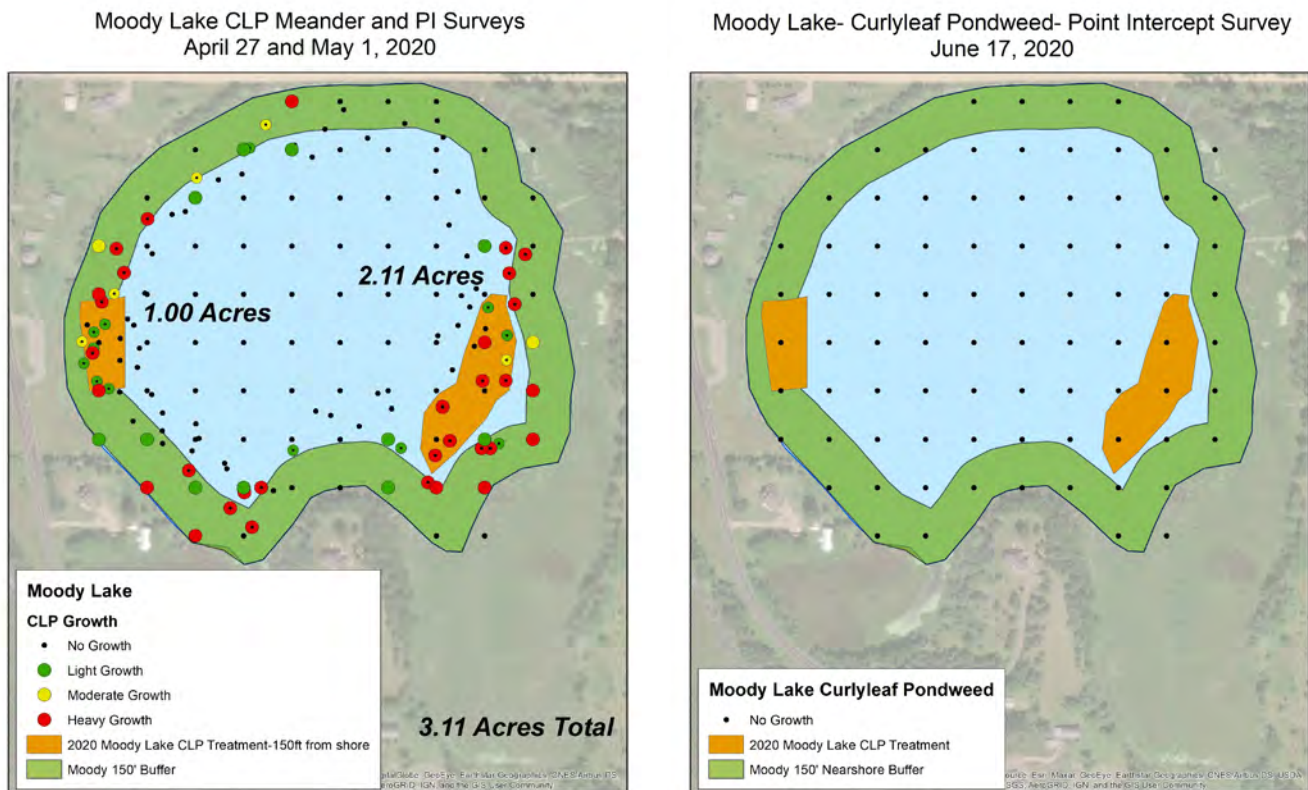


Figure S1. [left] Curlyleaf pondweed treatment areas Moody Lake that were delineated on April 27 and May 1, 2020. [right] Curlyleaf pondweed coverage for Moody Lake on June 17, 2020 (no CLP was observed). Key: green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, orange shaded areas = treatment area, and green shaded area = 150 foot buffer around the perimeter of the lake.

Curlyleaf Pondweed Delineation and Assessment Surveys for Moody Lake, Chisago County, Minnesota, 2020

Moody Lake, Chisago County (ID: 13-0023)

Size: 45 acres (MnDNR)

Littoral area: 22 acres (MnDNR)

Maximum depth: 48 ft (MnDNR)

Introduction

A curlyleaf pondweed delineation was conducted on April 27 and May 1, 2020 on 45 acre Moody Lake, Chisago County. The objective of the delineation was to check the distribution and abundance of curlyleaf pondweed. A curlyleaf pondweed assessment was conducted on June 17, 2020 again to check the distribution and abundance of curlyleaf pondweed and Eurasian watermilfoil and to characterize all native plants.

Methods

Curlyleaf Pondweed Delineation: At the time of the spring CLP delineations, only a fraction of the peak curlyleaf biomass is present. For spot treatments, the areas to be treated should be delineated prior to curlyleaf developing peak biomass. Curlyleaf stem counts on a rake sampler were used to identify areas that had a potential to produce dense curlyleaf. After a short sweep of about 1-foot (30 cm), 4 curlyleaf stems or more per rake sample generally indicated some CLP plants had developed runners and would likely produce heavy growth in the next few weeks. Alternatively, sites where 3 stems or less were collected per rake sample were not predicted to produce dense growth at the peak growing period. These areas were not treated. This delineation method was used for spot lake treatments in Gleason Lake and has worked for other lakes as well (McComas et al, 2015*).

An endothall herbicide application at 3.2 gallons/acre was conducted by Lake Management, Inc and a total of 3.11 acres were treated on May 22, 2020. A lakewide concentration of the active ingredient was estimated at 31 ppb.

Point Intercept Surveys and the Curlyleaf Pondweed Assessment: Two point intercept surveys were conducted by Blue Water Science on May 1 and June 17, 2020. Grid spacing was 50 meters. The plant species were recorded and the density of each species was assigned. Densities were based on the coverage on the teeth of the rake. Density ratings were from 1 to 3 with 1 being sparse and 3 being a nuisance. Based on these sample sites, plant distribution maps were constructed.

**McComas, S.R., Y.E. Christianson, and U. Singh. 2015. Effects of curlyleaf pondweed control on water quality and coontail abundance in Gleason Lake, Minnesota. Lake and Reservoir Management. 31:109-114.*

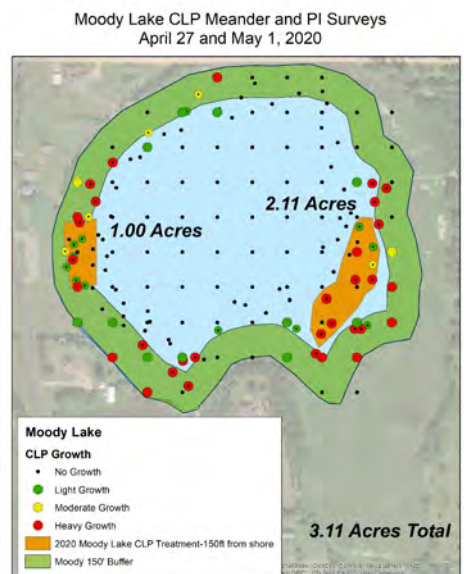
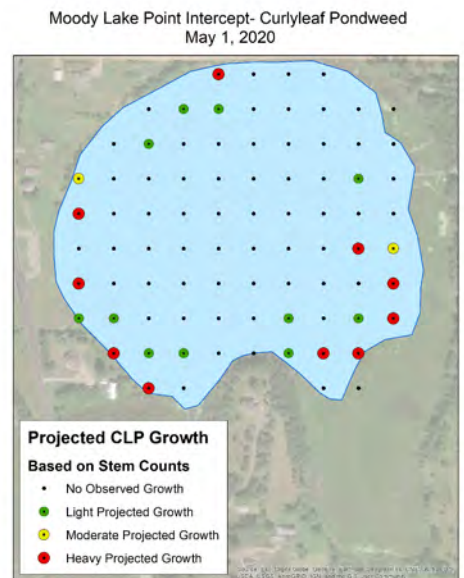
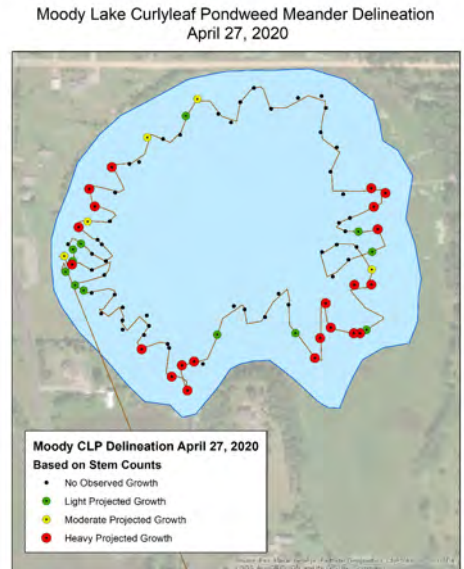
Results for the CLP Delineation: Meandering Survey (April 27, 2020) and Point Intercept Survey (May 1, 2020)

Two surveys were conducted to delineate CLP in 2020. The first survey was a meander survey conducted on April 27, 2020 (Figure 1) and then a point intercept survey was conducted on May 1, 2020 (Figure 1). Results from both surveys were combined and areas of significant curlyleaf pondweed growth were delineated (Figure 1) based on CLP stem densities that were predicted to produce heavy growth at peak CLP abundance in June (Figure 1). Two areas totaling 3.11 acres were delineated for treatment. Coontail and elodea were the only other plant species observed (Tables 1, 2, and 3).



Figure 2. There was no plant growth deeper than 6 feet in Moody Lake on April 27 and May 1, 2020.

Figure 1. [top] Curlyleaf pondweed meandering delineation on April 27, 2020.
[middle] Projected CLP growth from a point intercept survey on May 1, 2020.
[bottom] Curlyleaf pondweed potential treatment areas Moody Lake that were delineated on April 27 and May 1, 2020.
Key: Green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, orange shading = treatment area, and the green shaded area = 150 foot buffer around Moody Lake.



Meandering Survey (April 27, 2020) Plant Data for the Delineation

Low plant diversity was found in Moody Lake with a total of 3 aquatic plant species (Table 3). Curlyleaf pondweed was the most common plant observed in this delineation survey.

Table 1. Aquatic plant occurrence and stem density for sample points in the meandering survey in Moody Lake, April 27, 2020. Gray shading indicates depths with no plants

Site	Depth (ft)	CLP stems	Coontail	Elodea	No Plants	Site	Depth (ft)	CLP stems	Coontail	Elodea	No Plants
350	2	4				325	6				1
349	3	2				335	6				1
351	3	5				341	6				1
366	3	8	1			357	6				1
385	3	3				359	6				1
297	4	1				362	6	1			
310	4	8				371	6				1
319	4	3				374	6				1
323	4				1	376	6				1
333	4	4				305	7				1
339	4	5				311	7				1
345	4				1	314	7				1
347	4	6				343	7				1
354	4	5				358	7				1
355	4	8				360	7				1
367	4	13				378	7				1
381	4	2				342	8				1
384	4	5				382	8				1
298	5	2				330	9				1
299	5	2				373	10				1
301	5	1				308	11				1
306	5	12				303	12				1
307	5	3				328	15				1
312	5	7				300					1
318	5	1				304					1
320	5				1	317					1
322	5				1	321					1
332	5	4				326					1
334	5	6				327					1
338	5	1				329					1
340	5	2				331					1
346	5	3				336					1
348	5	14				337					1
352	5	4				344					1
353	5	5				361					1
356	5	1				363					1
364	5	15				372					1
365	5	10				375					1
368	5				1	Average		4.9	1	1	49
369	5				1	Occur (89 sites)		39	2	1	
370	5	4	1			% occurrence		44	2	1	
377	5				1						
379	5				1						
380	5	2									
383	5				1						
302	6				1						
309	6	8									
313	6			1							
315	6	3									
316	6				1						
324	6				1						

Results for the May 1, 2020 Point Intercept Delineation

Results of the point intercept survey conducted on May 1, 2020 found there was significant curlyleaf pondweed growth at most of the sample sites in the nearshore area (Table 2). Based on the results from the meander and the point intercept surveys, two areas representing 3.11 acres were delineated that had the characteristic stem densities that were predicted to produce heavy growth at peak CLP abundance in June (Figure 3). Coontail and elodea were the only other plant species observed (Table 2).

In early season surveys, projected CLP growth data is different than rake density ratings (Figure 3). Projected CLP growth can be a light density in May but grow into heavy growth by mid-June. Standard rake densities for CLP are shown in Figure 3, the map on the right.

Table 2. Moody Lake aquatic plant occurrences and densities for the May 1, 2020 point intercept survey based on 83 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=83)	
	Occur	% Occur
Coontail (<i>Ceratophyllum demersum</i>)	5	6
Elodea (<i>Elodea canadensis</i>)	5	6
Curlyleaf pondweed (<i>Potamogeton crispus</i>)	23	27

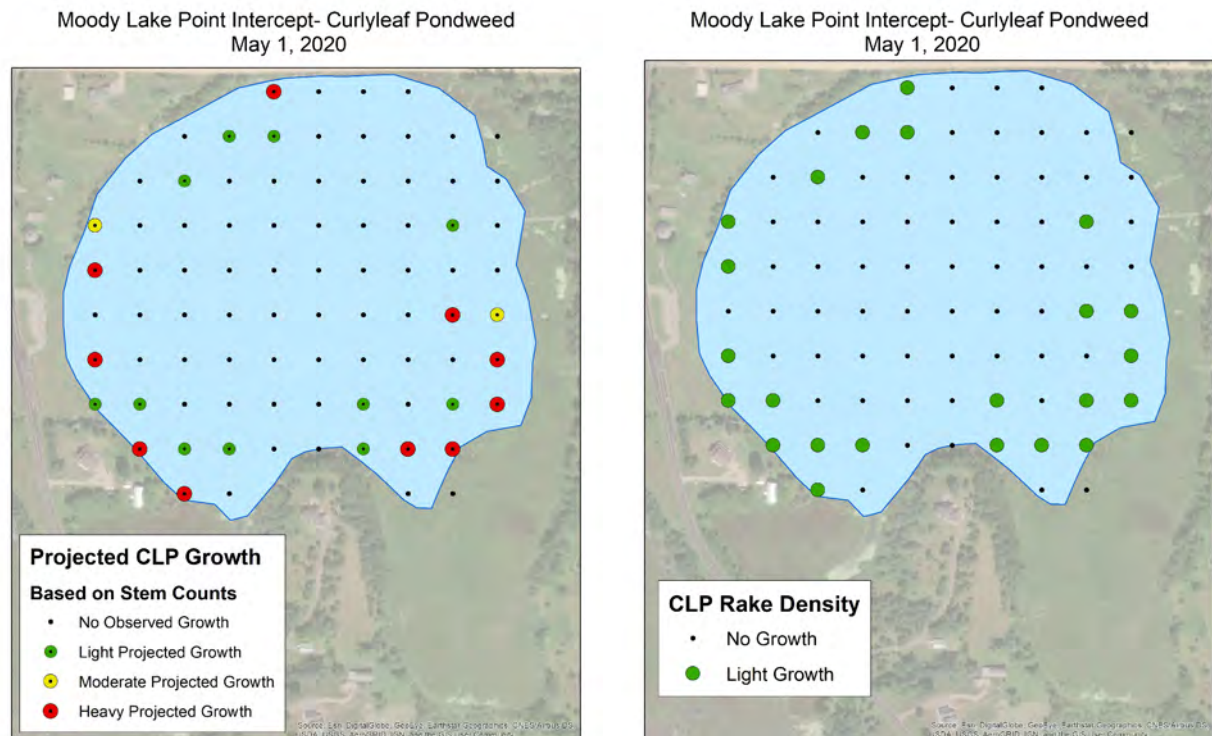


Figure 3. [left] Projected CLP growth on May 1, 2020. [right] Curlyleaf pondweed rake density on May 1, 2020.

Key: Green dots = light growth or projected light growth, yellow dots = projected moderate growth, red dots = projected heavy growth, and black dot = no growth.

Point Intercept Survey (May 1, 2020) Plant Data for the Delineation

Low plant diversity was found in Moody Lake in the May 1, 2020 point intercept survey with a total of 3 aquatic plant species (Table 3). Curlyleaf pondweed was the most common plant observed in this point intercept survey.

Table 3. Aquatic plant occurrence and stem density for the point intercept sample points in Moody Lake, May 1, 2020. Gray shading indicates depths with no plants.

Site	Depth (ft)	CLP stems	Coontail	Elodea	FA	No Plants
1	2	8	1			
2	2		1			
12	2	4	1	1		
13	2	2				
22	2	15				
52	2				1	1
5	3	5				
21	3	1			1	
32	3	15		1		
80	3	4		1	2	
7	4	2	1			
8	4					1
9	4					1
11	4	6		1		
14	4	2				
20	4					1
23	4	6				
33	4					1
42	4	3				
43	4	4		1		
53	4	3				
62	4					1
63	4					1
72	4					1
81	4					1
82	4				1	1
83	4					1
6	5	2				
10	5	1				
18	5					1
19	5	2				
31	5					1
41	5	4				
51	5					1
61	5	2				
73	5	1				
74	5	1				
15	6		1			
16	6					1
17	6					1
30	6					1
54	6					1
64	6	1				

Site	Depth (ft)	CLP stems	Coontail	Elodea	FA	No Plants
29	7					1
40	7					1
70	7					1
24	10					1
34	10					1
75	10					1
76	10					1
28	11					1
50	13					1
55	14					1
27	15					1
39	15					1
77	15					1
44	16					1
25	22					1
26	22					1
78	Island					1
79	Island					1
3	cattails					1
4	cattails					1
Average		4.1	1	1	1.3	
Occur (83 sites)		23	5	5	4	39
% occur		27	6	6	5	

Results for the June 17, 2020 Point Intercept Survey and CLP Assessment

Results of the June 17, 2020 assessment using a point intercept survey found there were 3 submerged plant species, coontail, elodea, and moss with elodea being the dominant plant (Table 4). No curlyleaf pondweed was observed in the lake (Table 4 and Figure 4). Results from the assessment found native plants growing out to a depth of 8 feet (Table 5)(Figure 5). Both elodea and coontail increased in occurrence from the May 1, 2020 point intercept survey.

Table 4. Moody Lake aquatic plant occurrences and densities for the June 17, 2020 survey based on 83 sites. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=83)		
	Occur	% Occur	Density
Elodea (<i>Elodea canadensis</i>)	18	22	1.3
Coontail (<i>Ceratophyllum demersum</i>)	16	19	1.0
Moss (<i>Drepanocladus sp</i>)	1	1	1.0

Moody Lake- Curlyleaf Pondweed- Point Intercept Survey
June 17, 2020

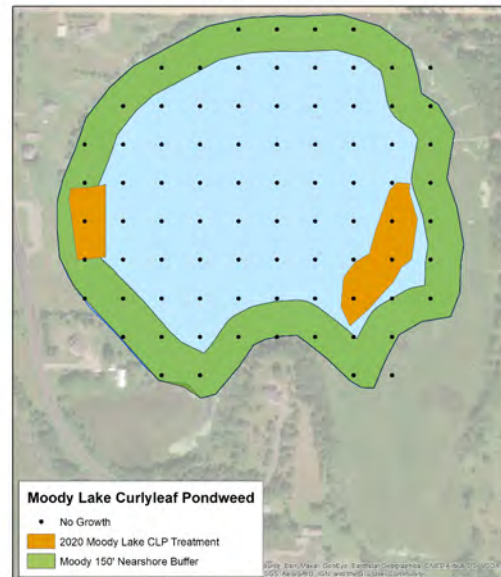
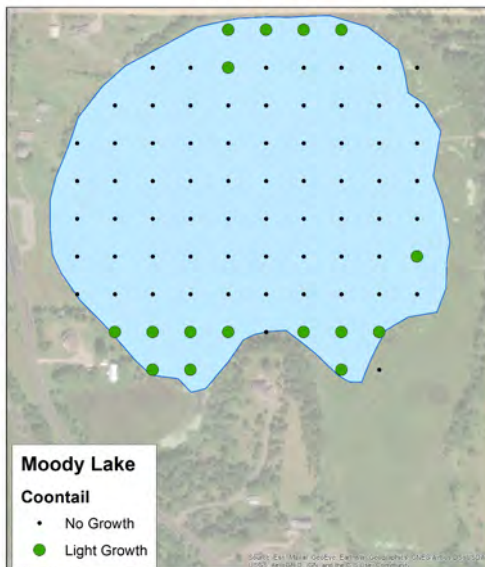


Figure 4. Curlyleaf pondweed coverage for Moody Lake on June 17, 2020. Key: black dots = no growth, orange shading = treatment areas, and green shading = 150 foot contour around the lake.

Moody Lake Point Intercept Survey--Coontail
June 17, 2020



Moody Lake Point Intercept Survey--Elodea
June 17, 2020

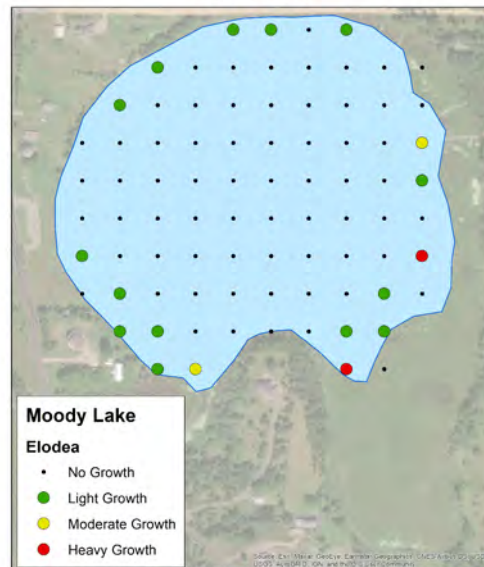


Figure 5. Coontail (left) and elodea (right) coverage for Moody Lake on June 17, 2020. Key: green dots = light growth, yellow dots = moderate growth, red dots = heavy growth, and black dots = no growth.

Point Intercept Survey (June 17, 2020) Plant Data for the Assessment

Low plant diversity was found in Moody Lake with a total of 3 submerged aquatic plant species (Table 5). Elodea was the most common plant observed in this survey. Elodea was sampled at light to heavy growth.

Table 5. Aquatic plant occurrence and density for the point intercept sample points in Moody Lake, June 17, 2020. Gray shading indicates depths with no plants.

Site	Depth (ft)	Coon-tail	Elodea	Moss	FA-benthic	No Plants
1	2	1	1			
3	2	1	3			
2	3	1	2			
10	3	1				
12	3	1	1			
21	3		1			
5	4	1	1			
11	4	1	1			
22	4			1		
23	4		1			
32	4	1	3			
42	4					1
52	4		1			
62	4		2			
72	4		1			
80	4	1	1			
81	4	1	1			
6	5	1	1			
7	5	1				
8	5	1				
31	5					1
33	5					1
43	5					1
53	5					
63	5		1		1	
82	5	1				
83	5	1	1			
19	6					1
20	6					1
51	6					1
54	6					1
61	6					1
70	6					1
73	6					1
74	6	1				
15	7					1
16	7					1
17	7					1
18	7					1
24	7					1
30	7					1
75	7					1
14	8		1			
29	8					1
64	8					1
25	10					1
76	10					1
77	11					1
44	12					1
34	16					1
67	17					1
69	20					1
68	25					1
4						1
9						1
13						1
26						1
27						1
28						1
35						1
36						1
37						1
38						1
39						1
40						1
41						1
45						1
46						1
47						1
48						1
49						1
50						1
55						1
56						1
57						1
58						1
59						1
60						1
65						1
66						1
71						1
78						1
79						1
Average		1.0	1.3	1.0	1.0	
Occur (83 sites)		16	18	1	1	58
% occur		19	22	1	1	