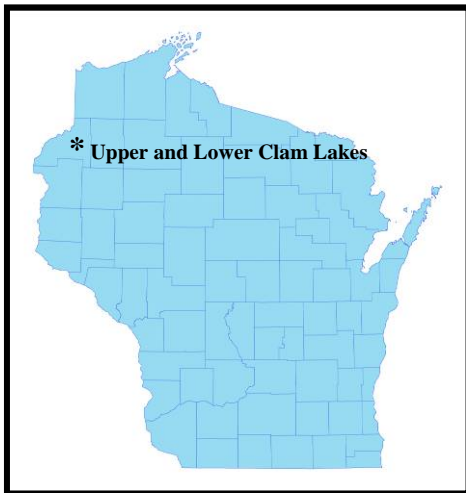


**Curly-leaf Pondweed and Bed Mapping Surveys
Upper and Lower Clam Lakes
Burnett County, Wisconsin
WBIC: 2656200 and 2655300**



Project Initiated by:
Clam Lakes Protection and Rehabilitation District and
Short, Elliot, Hendrickson Inc.



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TABLE OF CONTENTS

	Page
LIST OF FIGURES AND TABLES.....	ii
INTRODUCTION	1
METHODS	2
RESULTS AND DISCUSSION.....	3
UPPER CLAM LAKE RESULTS.....	3
DESCRIPTION OF THE CLP BEDS ON UPPER CLAM LAKE.....	5
LOWER CLAM LAKE RESULTS.....	5
DESCRIPTION OF THE CLP BED ON LOWER CLAM LAKE.....	6
LITERATURE CITED	8
APPENDIX.....	9
I: Upper and Lower Clam Lake Maps with Survey Sample Points.....	9

LIST OF FIGURES AND TABLES

	Page
Figure 1: Aerial Photo of Clam Lakes.....	1
Figure 2: Rake Fullness Ratings.....	2
Figure 3: Upper Clam Lake CLP Density.....	3
Figure 4: Upper Clam Lake CLP Bed Map.....	4
Table 1: CLP Bed Summary Upper Clam Lake, Burnett Co. June 6, 2009.....	4
Figure 5: Lower Clam Lake CLP Density.....	5
Figure 6: Lower Clam Lake CLP Bed Map.....	6
Table 2: CLP Bed Summary Lower Clam Lake, Burnett Co. June 6, 2009.....	6
Figure 7: CLP Shoreline Cleanup on Lower Clam Lake.....	7

INTRODUCTION:

Upper Clam Lake (WBIC 2656200) and Lower Clam Lake (WBIC 2655300) combine to form a 1544 - acre (Upper Clam 1,207 acres and Lower Clam 337 acres) stratified drainage system in central Burnett County, Wisconsin in the Towns of Siren and Meenon (T39N R16W S34 SE SE and T39N R16W S26 SW SE). Upper Clam Lake achieves a maximum depth of 11ft in the central basin with an average depth of approximately 5ft. Lower Clam Lake reaches its maximum depth of 14ft on the west side where the river enters and has an average depth of approximately 7ft (Sather et al, 1964). Although historical data was unavailable (WDNR 2009), we expect both lakes are eutrophic in nature with maximum Secchi readings that are likely <5ft making for poor to very poor water clarity under normal summer conditions. The early season littoral zone reached approximately 7.5ft in Upper Clam and 8ft in Lower Clam. Both lakes' bottom substrate is predominately muck with scattered sandy shoreline areas.



Figure 1: Aerial Photo of Clam Lakes

The Clam Lakes Protection and Rehabilitation District, and Short, Elliot, Hendrickson Inc. authorized a series of full lake plant surveys as part of developing an updated Aquatic Plant Management Plan (APMP) in 2009. Curly-leaf pondweed (*Potamogeton crispus*) density surveys were carried out on May 14 on Lower Clam and 19-20 on Upper Clam. CLP bed mapping surveys were conducted on both lakes on June 6. This sub-report is a summary of those surveys.

METHODS:

We completed a density survey where we recorded the level of CLP at each point in the lake's littoral zone (Appendix I). We located each survey point using a handheld mapping GPS unit (Garmin 76CSx), and used a rake to sample an approximately 2.5ft section of the bottom. CLP was assigned a rake fullness value of 1-3 as an estimation of abundance (Figure 2). We also recorded visual sightings of CLP within six feet of the sample point.


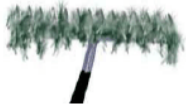

<u>Rating</u>	<u>Coverage</u>	<u>Description</u>
1		A few plants on rake head
2		Rake head is about ½ full Can easily see top of rake head
3		Overflowing Cannot see top of rake head

Figure 2: Rake Fullness Ratings (UWEX, 2009)

Following this survey, we used the resulting density map coupled with a meandering shoreline survey to locate and map all beds of CLP on Upper and Lower Clam Lakes. We defined a bed based on the following two criteria: CLP plants made up greater than 50% of all aquatic plants in the bed, and the CLP had canopied at the surface or was close enough to the surface that it would likely interfere with normal boat traffic.

Using a GPS unit, we recorded a string of waypoints that circled around the edges of the beds. We then uploaded these points into ArcView, created bed shapefiles, and determined the total acreage and perimeter of the bed to the nearest tenth of an acre and meter respectively.

RESULTS AND DISCUSSION:

We found CLP to be dominant throughout the littoral zone of Lower Clam Lake, but only scattered in the northern 1/4 of Upper Clam Lake. While CLP in Lower Clam was generally monotypic and highly invasive, Upper Clam's plants tended to be found in lower densities, were generally not bed forming, and had native species mixed in.

Upper Clam Lake Results:

We checked all 668 points on Upper Clam as they potentially all could have fallen in the littoral zone. We found CLP present at 33 locations or 4.9% of the points surveyed. Of these, 3 had a rakefull rating of 3 and another 10 a 2 indicating <2% of the lake had a significant infestation. CLP was essentially absent from the bottom 3/4 of the lake (Figure 3). The only plants we found here were single stems, and repeated rakings at the locations turned up no further individuals. In the northwest bay where the majority of the lake's CLP was found, the plants were not canopied, and were beginning to form turions indicating the vegetative growth phase was essentially over.

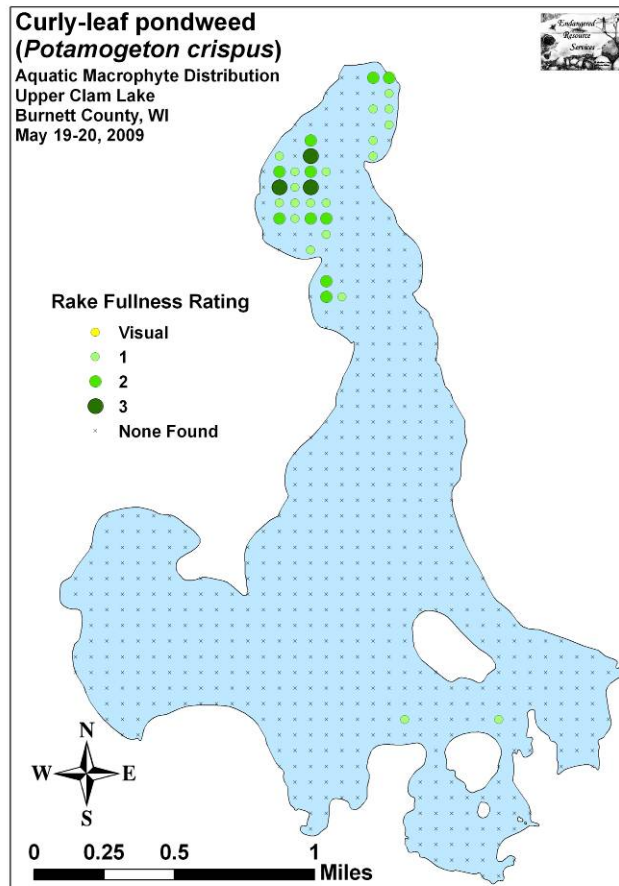


Figure 3: Upper Clam Lake CLP Density

We located and mapped two small beds in the northeast bay near the river outlet (Figure 4). They covered a total of 2.6 acres or 0.2% of the lake's 1207 acres (Table 1).

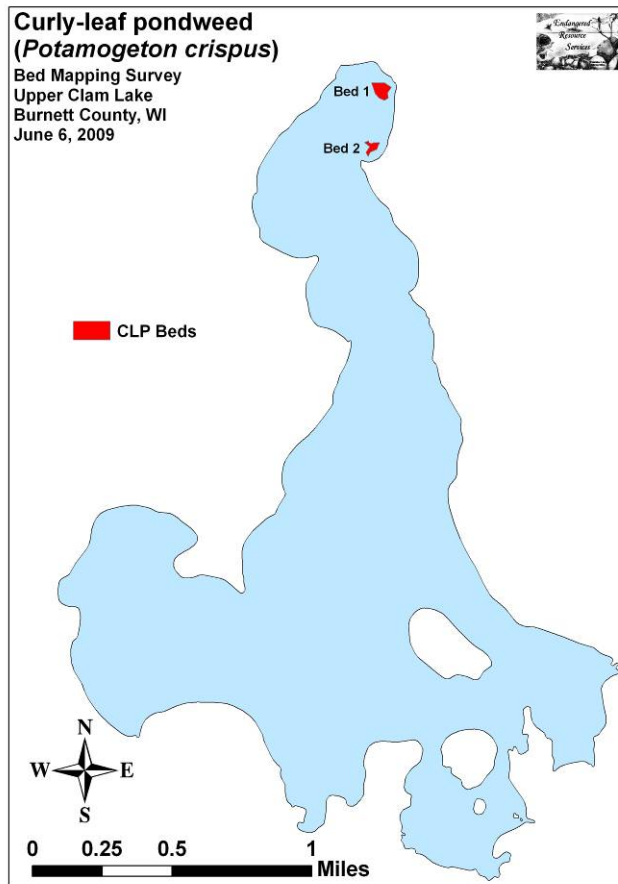


Figure 4: Upper Clam Lake CLP Bed Map

Table 1: CLP Bed Summary
Upper Clam Lake, Burnett Co. June 6, 2009

Bed Number	Acreage	Perimeter (m)
1	1.8	351
2	0.8	316
Total Acres	2.6	

Description of the CLP Beds on Upper Clam Lake:

Bed 1 – We found that most plants in this bed were canopied and had formed turions. The borders were poorly defined, and it wasn't particularly dense. There was some evidence of boat prop trails through the bed.

Bed 2 – This bed also had poorly defined borders, and was only moderately dense. An inside passage along shore made this bed easier to avoid, and people were fishing on both sides of it.

Lower Clam Lake Results:

We sampled all 350 points on Lower Clam Lake (Figure 5), and found CLP present at 231 locations or 66% of the area surveyed. Of these, 160 points had a rakefull rating of 3 and another 44 a 2 indicating approximately 58% of the lake had a significant infestation. The only places on the lake not dominated by CLP were the deepest areas along the old river channel that were beyond the littoral zone, the lake's sandy shorelines and the far eastern bay. At the time of the survey, this bay was the only place on the lake that had ANY native vegetation growing. The densest areas were in approximately 4-6ft of water, but plants were found from 1-8ft.

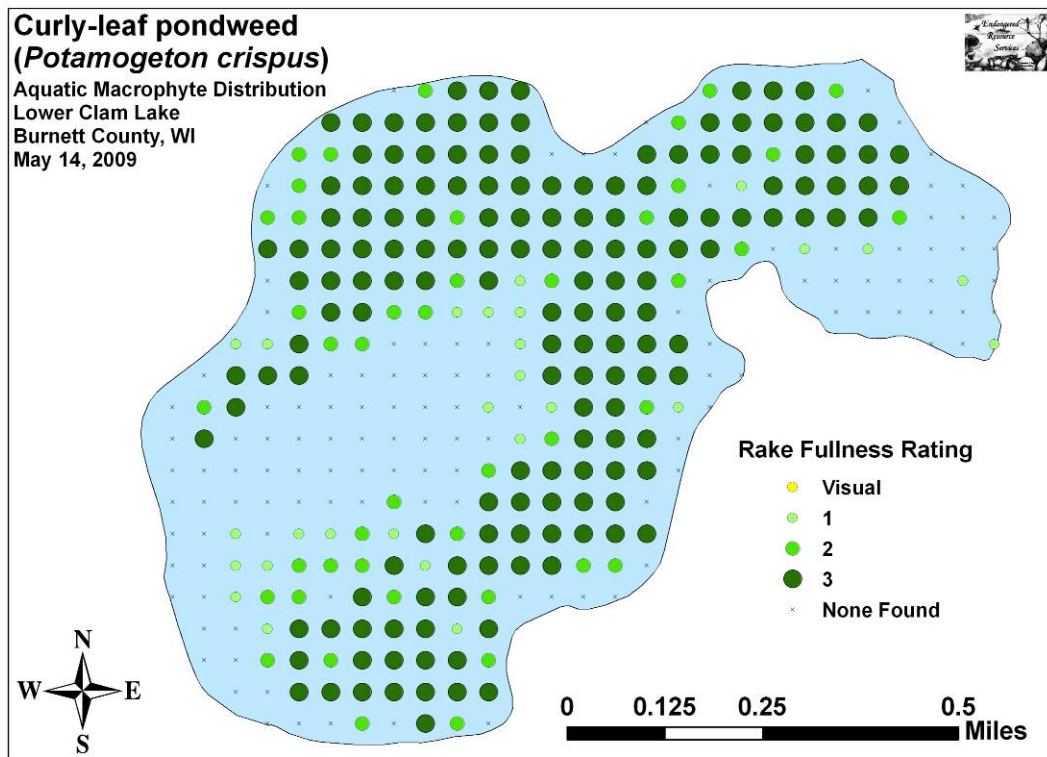


Figure 5: Lower Clam Lake CLP Density

We located and mapped a single expansive bed of CLP that dominated the littoral zone of the lake (Figure 6). It covered a total of 220.2 acres or 65.3% of the lake's 337 acres (Table 2).

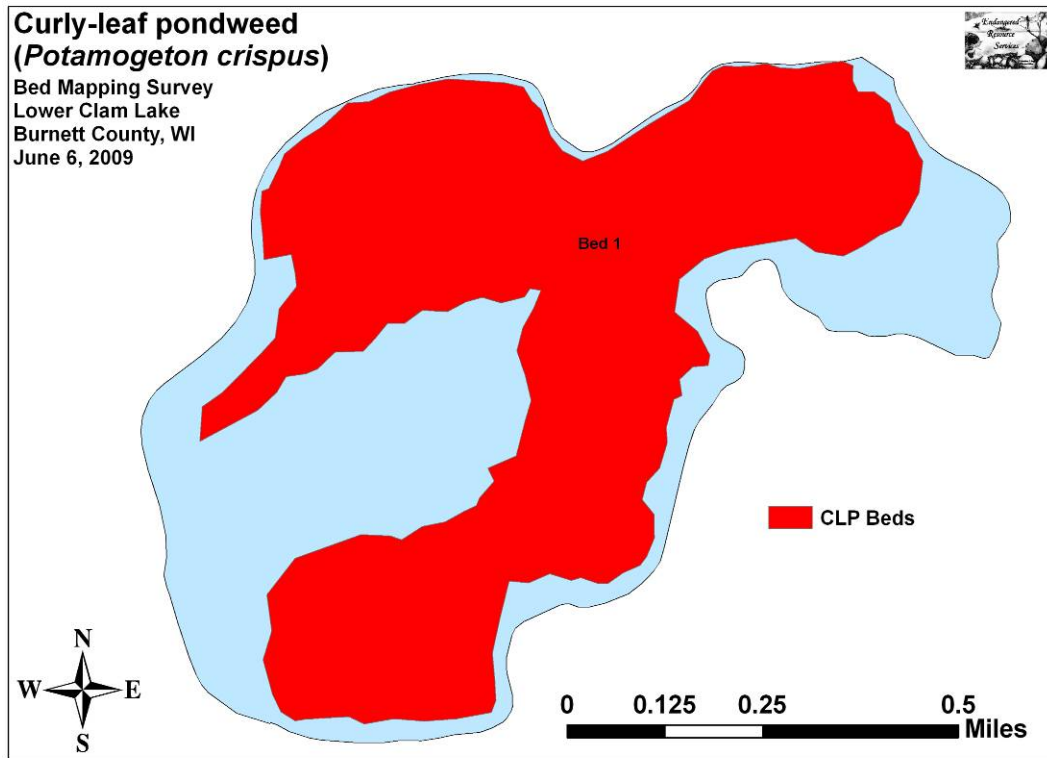


Figure 6: Lower Clam Lake CLP Bed Map

**Table 2: CLP Bed Summary
Lower Clam Lake, Burnett Co. June 6, 2009**

Bed Number	Acreage	Perimeter (m)
1	220.2	6,822
Total Acres	220.2	

Description of the CLP Bed on Lower Clam Lake:

Bed 1 – This giant bed extended almost unbroken from the north to south shores of the lake with the exception of the previously mentioned areas. Plants were canopied throughout, prop trails were everywhere, and it was obvious that the beds were impeding boat traffic and general lake use. Also of note were the huge piles of uprooted plants that had accumulated along the shore forcing residents to spend significant time and effort to clean up their property (Figure 7).



Figure 7: CLP Shoreline Cleanup on Lower Clam Lake

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Sather, L, R. Hopke, M. Perkins, and E. Eaton [online]. 1964. Upper and Lower Clam Lake Maps. Available from <http://www.dnr.state.wi.us/org/water/fhp/lakes/lakemap/2656200a.pdf> and <http://www.dnr.state.wi.us/org/water/fhp/lakes/lakemap/2655300a.pdf> (2009, June).

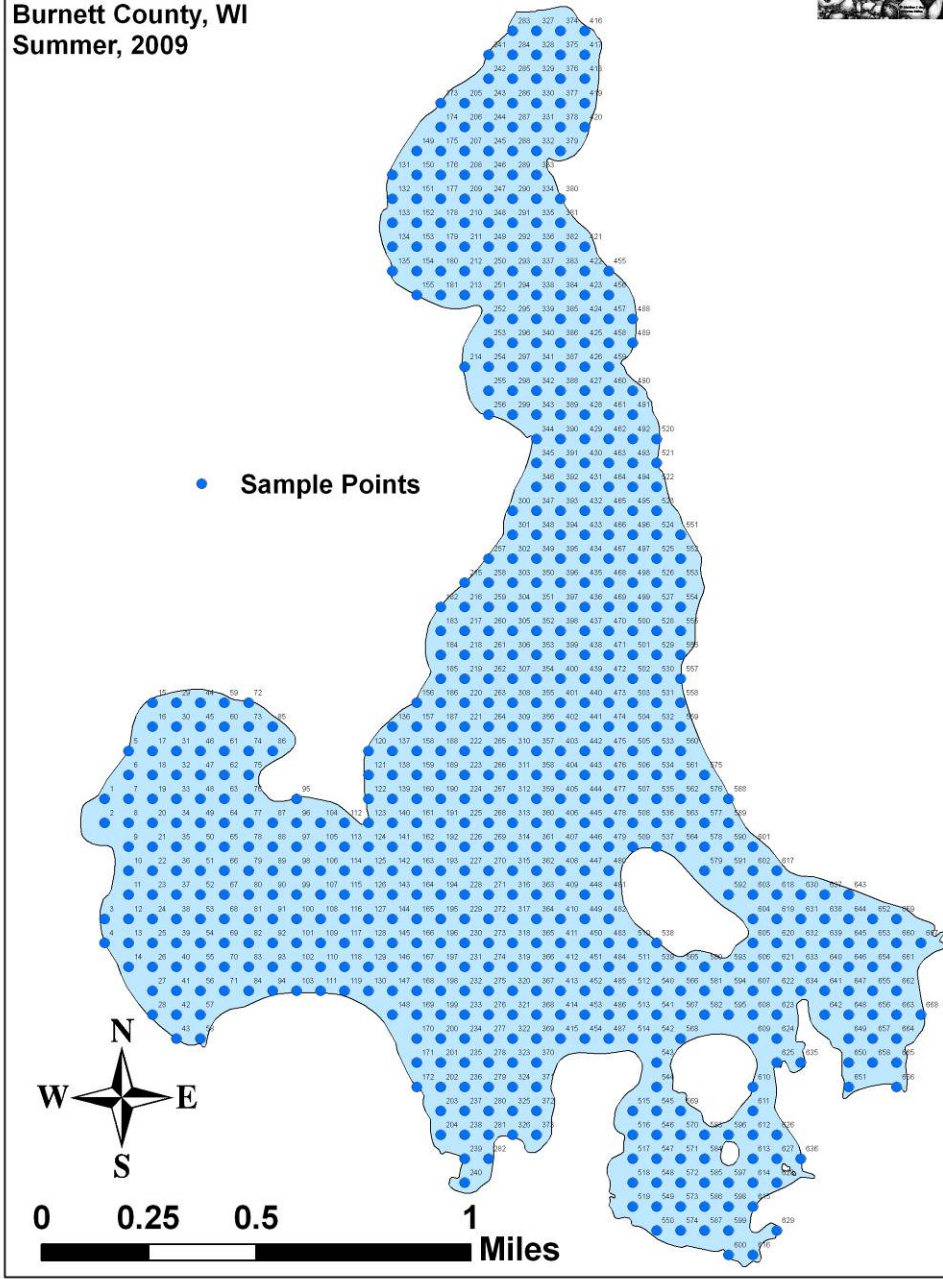
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Appendix I: Upper and Lower Clam Lake Maps with Sample Points

Survey Sample Points

Upper Clam Lake
Burnett County, WI
Summer, 2009



Survey Sample Points

Lower Clam Lake
Burnett County, WI
Summer, 2009

