Phase One Final Summary Report

Lower and Upper Clam Lakes
Point Intercept Plant Survey and Education

Siren, Wisconsin

SEH No. CLAML 106825

January 2011

Phase One Final Summary Report

Point Intercept Plant Survey and Education
Lower and Upper Clam Lakes

Prepared for:
Clam Lakes Protection and Rehabilitation District
Siren, Wisconsin

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Date

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Phase One Final Summary Report

Lower and Upper Clam Lakes
Point Intercept Plant Survey and Education

Prepared for Clam Lakes Protection and Rehabilitation District

1.0 Introduction

The Clam Lakes Protection and Rehabilitation District (CLPRD) is sponsoring a four-phased project to complete a comprehensive lake management plan with an aquatic plant management emphasis for Lower and Upper Clam Lakes. The final deliverable will be a single lake management plan that includes methodologies, results, and management alternatives discussion with an implementation plan. Interim deliverable for each phase include a progress report with results, including maps, spreadsheets, and other data collected during the given phase.

2.0 Point-Intercept Plant Surveys

Using a standard formula that takes into account the shoreline shape and distance, water clarity, depth, islands and total lake acres, Michelle Nault (WDNR) generated a 668 point sampling grid for Upper Clam Lake and a 350 point grid for Lower Clam Lake (Appendix A). Early-season cold water and mid-season warm water whole lake point-intercept plant surveys were completed on both lakes during the 2009 season by Endangered Resources Services (ERS), LLC. The early season surveys concentrated on identifying and mapping curly-leaf pondweed (*Potamogeton crispus*) and the mid-season survey focused on all plants. The Wisconsin Department of Natural Resources (WDNR) and the CLPRD have both received copies of the curly-leaf pondweed CLP and whole lake plant survey reports. The reports are summarized in the following sections.

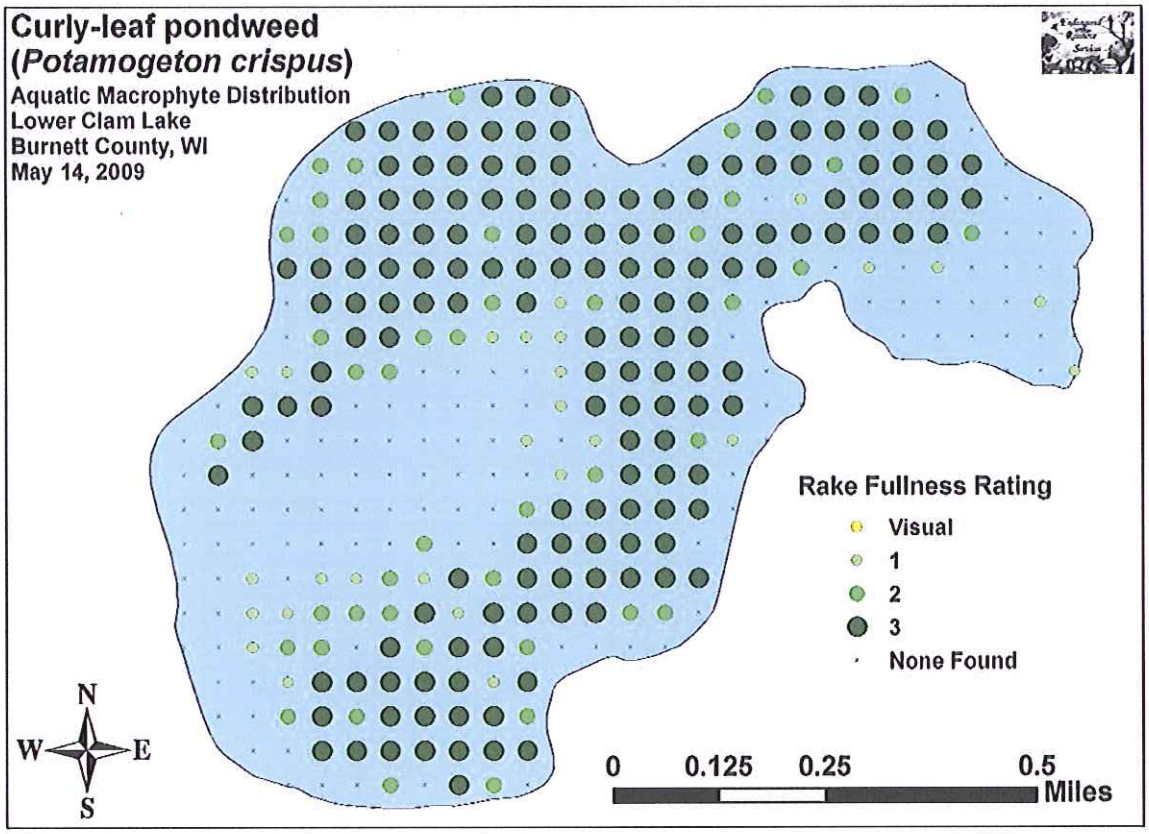
2.1 Curly-leaf Pondweed (*Potamogeton crispus*)

CLP density surveys were carried out on May 14, 2009 on Lower Clam and May 19-20, 2009 on Upper Clam. CLP bed mapping surveys were conducted on both lakes on June 6. CLP was found 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.

2.1.1 Lower Clam Lake Results

All 350 WDNR established point-intercept locations on Lower Clam were checked for the presence of CLP. CLP was present at 231 locations or 66% of the area surveyed. Of these, 160 points had a rakefull rating of 3 and another 44 were rated as a 2 indicating approximately 58% of the lake had a significant infestation (Figure 1). The only areas 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 early-

season survey, the far eastern bay was the only place on the lake that had any native vegetation growing. The densest areas of CLP were in approximately 4-6 ft of water, but plants were



found from 1-8 ft.

Figure 1 – CLP Presence and Density Lower Clam Lake

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

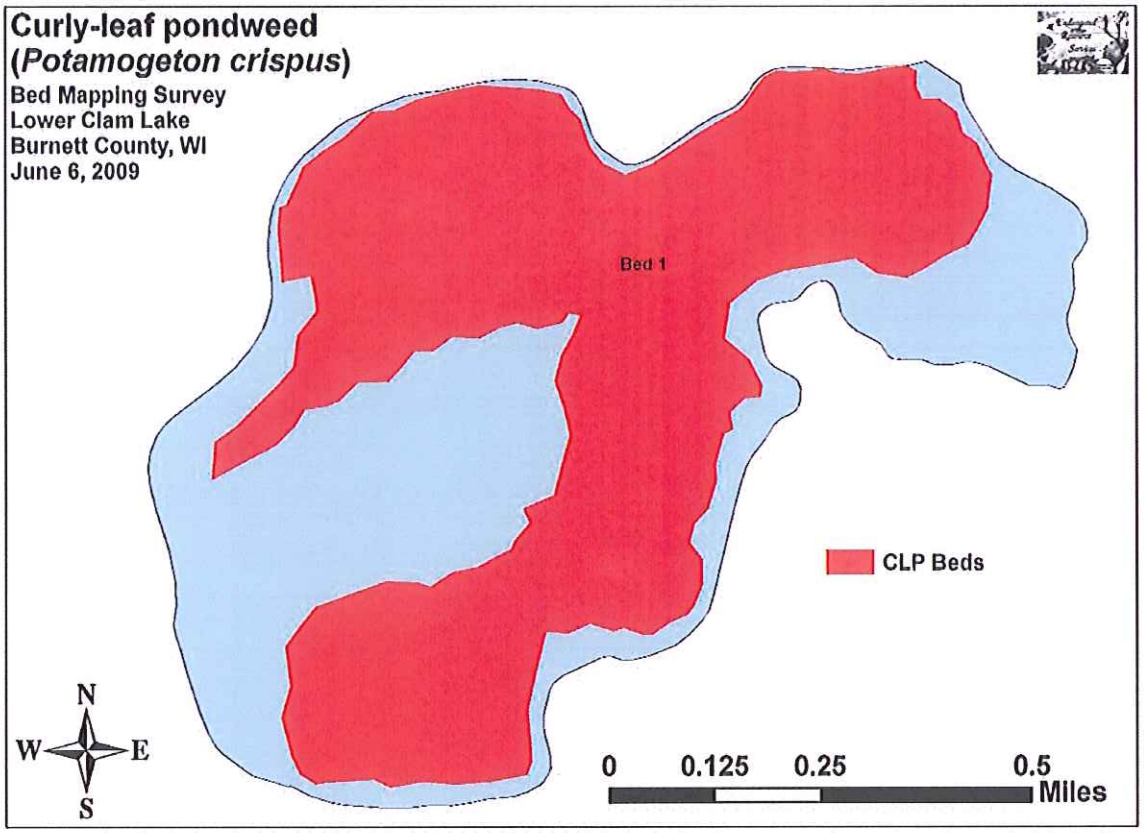


Figure 2 – CLP Bed Mapping Lower Clam Lake

2.1.2 Upper Clam Lake Results

All 668 WDNR established point-intercept locations on Upper Clam were checked for the presence of CLP as all could have fallen in the littoral zone. CLP was 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 ¾ of the lake. The only CLP 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. Two small beds in the northeast bay near the river outlet were located and mapped. They covered a total of 2.6 acres or 0.2% of the lake's 1207 acres.

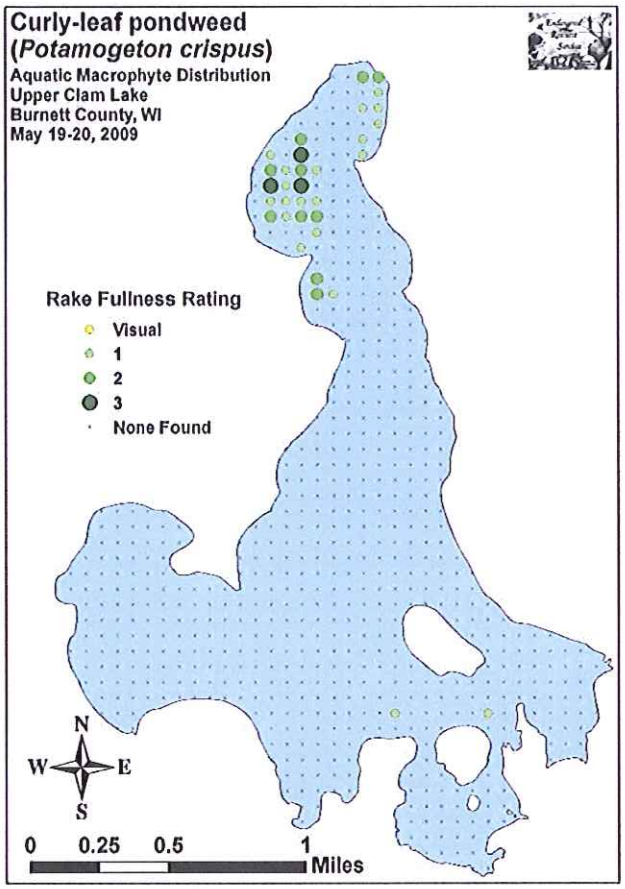


Figure 3 – CLP Presence and Density Upper Clam Lake

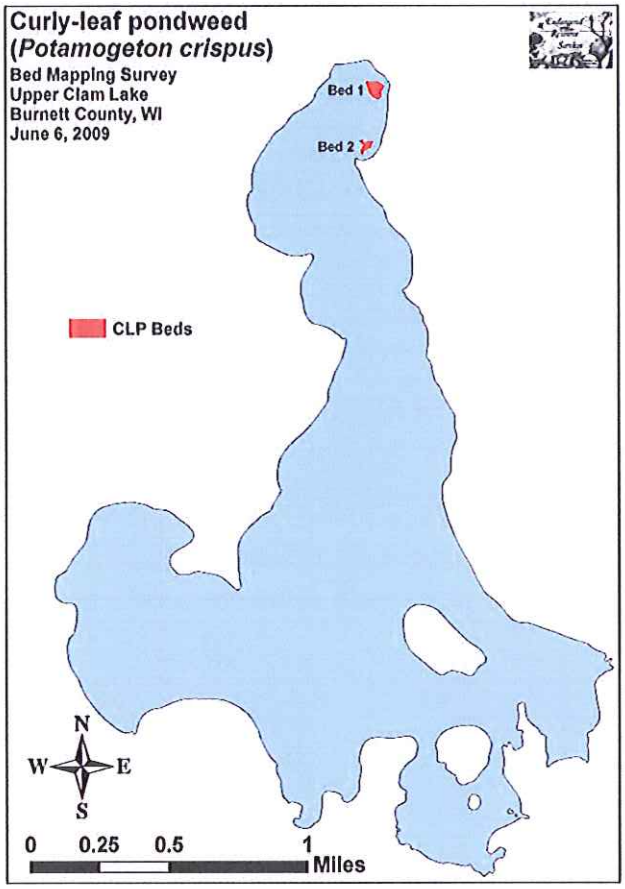


Figure 4 – CLP Bed Mapping Upper Clam Lake

2.2 Mid-season Aquatic Plant Survey

ERS completed a warm water point/intercept survey of all aquatic macrophytes from July 24-27, 2009. The survey used the Wisconsin Department of Natural Resources statewide guidelines for conducting systematic point intercept macrophyte sampling. The guidelines ensure that all sampling in the state is conducted in the same manner, thus allowing data to be compared across time and space. The immediate goals of the project were to determine if Eurasian water milfoil (*Myriophyllum spicatum*) had invaded the lakes and to gather data on the diversity, abundance and distribution of native aquatic plant populations. These data provide a baseline for long-term monitoring of each lake's macrophyte community.

2.2.1 Lower Clam Lakes Results

The Lower Clam Lake survey grid contained 350 points. As with Upper Clam, almost the entire lake was within the littoral zone so every point was surveyed. Lower Clam's substrate was 88.9% muck and 11.1% sand. The main basin was ringed in sugar sand with deeper sites having a uniform sandy muck bottom. The east bay offered the only thick organic muck habitat in the whole lake. Plants were found growing in just 20.0% of the entire lake bottom, and in 20.7% of the littoral zone. Summary statistics are included in Table 1.

Table 1
Aquatic Macrophyte P/I Survey Summary Statistics, Lower Clam Lake, Burnett County (July 24-25, 2009)

Total number of points sampled	350
Total number of sites with vegetation	70
Total number of sites shallower than the maximum depth of plants	338
Frequency of occurrence at sites shallower than maximum depth of plants	20.71
Simpson Diversity Index	0.92
Maximum depth of plants (ft)	8.00
Number of sites sampled using rope rake (R)	0
Number of sites sampled using pole rake (P)	350
Average number of all species per site (shallower than max depth)	0.48
Average number of all species per site (veg. sites only)	2.31
Average number of native species per site (shallower than max depth)	0.43
Average number of native species per site (veg. sites only)	2.41
Species Richness	26
Species Richness (including visuals)	28
Species Richness (including visuals and boat survey)	30
Mean depth of plants (ft)	3.96
Median depth of plants (ft)	3.50

Lower Clam Lake's overall diversity was slightly higher than Upper Clam's with a Simpson Diversity Index value of 0.92. However, species richness was much lower with 30 total species found growing in and immediately adjacent to the lake. The western 80% of the lake that had been so completely dominated by dense curly-leaf pondweed beds in the spring was almost totally barren of plants in during this survey. Even the boat survey produced little more than a few scattered patches of sago pondweed, bushy pondweed, and mud plantain (*Heteranthera dubia*) in this part of the lake. Common bur-reed, and river bulrush were again common along shore in undeveloped areas.

Lower Clam's east bay contained most of the lake's diversity. The bay was dominated by coontail, white water lily (*Nymphaea odorata*) and spatterdock (*Nuphar variegata*). Closer to the channel, these beds were widely scattered, but they became progressively denser and richer as the lake grew shallower to the southeast. The highest species richness was noted on the far eastern transect where the lake was <1 ft deep and bordered a diverse sedge marsh.

Coontail, bushy pondweed, muskgrass and curly-leaf pondweed were the most common macrophyte species in Lower Clam Lake. A total of 24 native plants were identified to species during the point intercept survey. They produced a mean Coefficient of Conservatism of 5.4 and a Floristic Quality Index of 26.3. This mean C was again well below average for this part of the state while the FQI was slightly above average. Vasey's pondweed (*Potamogeton vaseyi*), a state species of special concern with a C value of 10, was the lake's most notable sensitive plant.

2.2.2 Upper Clam Lake Results

The Upper Clam Lake survey grid contained 668 points. Because almost the entire lake fell within a foot of the littoral zone, every point was sampled. Upper Clam's substrate was categorized as 89.7% muck and 10.3% sand. The southwest, south and both southeast bays had thicker organic muck while the main basin was primarily sandy muck. Pure sugar sand was found along the big island's shorelines, at the Clam River Inlet, on the mid-lake bar, and on the margins of the main basin. Plants were found growing on 32.8% of the entire lake bottom, and in 33.1% of the littoral zone. Summary statistics are provided in Table 2.

Table 2
Aquatic Macrophyte P/I Survey Summary Statistics, Upper Clam Lake, Burnett County (July 26-27, 2009)

Total number of points sampled	668
Total number of sites with vegetation	219
Total number of sites shallower than the maximum depth of plants	661
Frequency of occurrence at sites shallower than maximum depth of plants	33.13
Simpson Diversity Index	0.90
Maximum depth of plants (ft)	9.00
Number of sites sampled using rope rake (R)	0
Number of sites sampled using pole rake (P)	668
Average number of all species per site (shallower than max depth)	0.89
Average number of all species per site (veg. sites only)	2.68
Average number of native species per site (shallower than max depth)	0.88
Average number of native species per site (veg. sites only)	2.68
Species Richness	38
Species Richness (including visuals)	40
Species Richness (including visuals and boat survey)	44
Mean depth of plants (ft)	3.33
Median depth of plants (ft)	3.50

Upper Clam Lake's overall diversity was high with a Simpson Diversity Index value of 0.9. Species richness was also very high with 44 total species found growing in and immediately adjacent to the lake. The majority of aquatic macrophytes were found growing in relatively shallow water with a mean depth of 3.3 ft and a median depth of 3.5 ft. Total lake plant biomass was incredibly low. Plants were widely scattered throughout the littoral zone with depth seeming to be less important than in most other lakes. With almost no exceptions, high density, richness and total rake biomass sites were near shore in water <3 ft. Specifically, Upper Clam's four southern bays provided most of the lake's diversity. These shallow bays supported expansive floating, and emergent plant beds. However, with the exception of the southern ends of the two south-central bays, almost no submergent plants were found. Detritus in the bays gave evidence of expansive submergent plant communities of flat-stem pondweed (*Potamogeton zosteriformis*) and potentially other species in the past so this loss of plant density and diversity appears to be relatively recent. Surviving submergent species tended to have bristly, hard, or thin leaves like coontail (*Ceratophyllum demersum*) and floating-leaf pondweed (*Potamogeton natans*). Plants with broad, soft leaves like common waterweed (*Elodea canadensis*), clasping-leaf pondweed (*Potamogeton richardsonii*), and ribbon-leaf pondweed (*Potamogeton epihydrus*), showed evidence of being grazed on by carp (*Cyprinus carpio*), and were almost entirely absent from the lake.

The sandy/sandy muck bottom areas of the central basin were almost totally devoid of plants with the exception of a few dense emergent beds immediately adjacent to the shore. In general, these areas supported not only much lower densities, but also many fewer species albeit ones unique to these habitats. Bushy pondweed (*Najas flexilis*), muskgrass (*Chara* sp.), and sago pondweed (*Stuckenia pectinata*) were the most widely distributed submergents in this habitat type while common bur-reed (*Sparganium eurycarpum*), river bulrush (*Bolboschoenus fluviatile*), hardstem bulrush (*Schoenoplectus acutus*) and threesquare (*Schoenoplectus pungens*) were the most common emergent species.

Bushy pondweed, coontail, muskgrass, and small pondweed were the most common macrophyte species in Upper Clam Lake. A total of 36 native plants were identified to species. They produced a mean Coefficient of Conservatism of 5.6 and a Floristic Quality Index of 33.7 putting Upper Clam Lake well below average for the coefficient of conservatismthis part of the state. The FQI was, however, well above the mean FQI of 24.3 for the Northern Lakes and Forest Region (Nichols 1999). High quality plants like Northern wild rice (*Zizania palustris*) and Ribbon-leaf pondweed were notable contributors to this value.

2.3 Invasive Species

No evidence of Eurasian watermilfoil was found in either of the Clam Lakes. However, Purple loosestrife (*Lythrum salicaria*), another invasive species, occurred at scattered locations along the south border of the far east bay of Lower Clam. Reed canary grass is widely distributed in undeveloped shoreline areas of the lake.

2.4 Wild Rice

Once considered one of the best producing wild rice lake in the state at over 300 acres, the abundance of wild rice in the Clam Lakes has declined rapidly since 2007, to the point that in 2009, there was almost no wild rice in either lake. The reasons for this rapid and continuing decline may be numerous, but carp and poor water quality conditions are certainly a possibility. Additional work has been included in the activities planned in 2010 to take a closer look at the status of wild rice in the Clams.

3.0 Water Quality Sampling

Tribal resources have been collecting water quality data on the Clam Lakes since 2001. This data has been combined with water quality data collected by Lake District volunteers through the Citizen Lake Monitoring Network (CLMN) since late 2008. In 2009, Lake District volunteers spent more than 85 hours collecting Secchi, temperature, dissolved oxygen, total phosphorous, and chlorophyll data on two sites, one in Lower Clam and one in Upper Clam (Appendix B). All 2009 CLMN water quality data was entered into the SWIMS data base. Water quality in the Clam Lakes was less than desirable in 2009, likely due to conditions created by limited flushing through precipitation and an almost total lack of any substantial submerged aquatic vegetation. Negative impacts caused by what appears to be a very large year class of carp may also have contributed. Disturbances to the bottom sediments through feeding and spawning activities very likely impacted suspended sediment, re-introduced phosphorous, and facilitated the lack of submerged vegetation growth.

4.0 Education

Lake User education is an important part of any lake management project. In Phase One of the Clam Lakes project, educational efforts were to include watercraft inspection through the Clean Boats, Clean Waters Program (CBCW), aquatic invasive species monitoring through the CLMN program, and general lake stewardship education related to shore land best management practices, protection and value of wild rice, public involvement.

4.1 Watercraft Inspection

On June 6, 2009 a Lake District volunteer was trained in accepted watercraft inspection protocol when they attended a CBCW training session in Spooner, Wisconsin offered by the Washburn County Aquatic Invasive Species (AIS) Coordinator. Two CBCW support kits were purchased by the Lake District. Several other Lake District volunteers were trained by the attendee of the Washburn County workshop. These folks combined for a total of 42 hours of watercraft inspection at boat landings on the Clam Lakes. This time has been recorded in the SWIMS data base (Appendix C). Training and data input to SWIMS added an additional 20 hours of time.

While this time fell way short of the goal for watercraft inspection by Clam Lake volunteers, it did establish a legitimate CBCW program which was continued in the 2010 season. Very sparse vegetation, and seriously degraded water quality conditions limited the number of fisherman using the lake. There were no reports of illegal to launch violations at the Clam Lakes landings, nor were there any reports of Eurasian watermilfoil or other aquatic invasive species being found on any watercraft launching into the Clam Lakes

In addition, Burnett County employees spent at least 16 hours at Clam Lakes landings inspecting watercraft. The WDNR added another four hours.

4.2 Aquatic Invasive Species Monitoring

Also on June 6, 2009 the Burnett County AIS Coordinator hosted an AIS Monitoring Training session at the Hwy 70 boat launch. Fourteen people attended this training that lasted for three hours. Two kits of AIS monitoring materials were handed out at this training. Several participants in this training completed a few hours of AIS monitoring mostly consisting of floating around the lake checking out the littoral area of the lake and near public boat access points. In addition, one couple put in 100 hours of AIS monitoring as every weekend they were at their cabin they made it a point to travel around the entire littoral area of the Lower Lake looking for AIS. They spent additional time during extended stays at their cabin. The total time spent training for and actually completing AIS monitoring on the two lakes in 2009 was 142 hours. End of year summary reports for monitoring have been submitted to the SWIMS database (Appendix D). Except for curly-leaf pondweed, purple loosestrife, and Chinese mystery snails, no new aquatic invasive species were identified. Hydrilla, freshwater jellyfish, and several other species were not looked for. Rusty crayfish traps were set, but no crayfish were captured. Docks and other structures in the water for a long time were checked for the presence of zebra mussels, but none were found.

4.3 Lake Stewardship

A Project Kick-off Meeting held on May 29, 2009 was attended by 20 people. The purpose of this meeting was to introduce the project and the goals within it, and to encourage Lake District members to get involved. Watercraft inspection was introduced and discussed and AIS monitoring was introduced and discussed. Members of the organization were informed that a Lake User Survey would be developed and that they should look for it and answer all

questions on it honestly and completely. The User Survey was tested at the annual Lake District Meeting held in August 2009, and then made available to over 400 people. The return rate on the survey was excellent with at least 260 surveys completed and returned. A summary of survey results is included in the Phase Two Summary Report.

During the 2009 Lake Fair held on August 29, 2009, presentations were given on protecting and preserving wild rice, shoreland restoration for wildlife, and on the impacts of carp in a lake. Displays were set up including Burnett County's Shoreland Protection Program, Loon Watch, Aquatic Plants, and Water Quality.

5.0 Final Summary

The role of Short Elliott Hendrickson Inc. (SEH®) in the first phase of the Clam Lakes project was limited to training, project oversight, attendance at meetings, and preparation of this summary report. All these activities have been completed. The Lake District was charged with collecting additional water quality data, instigating a watercraft inspection program, and setting up an AIS monitoring program. This has been done and data collected in 2009 has been submitted to the SWIMS database. The largest expense associated with Phase One was the completion of the early-season and mid-season aquatic plant surveys on both lakes. This has been completed by ERS. Paper and digital copies of the complete ERS reports have been sent to the WDNR, CLPRD, and SEH. Two sets of plants vouchers have been collected and pressed. One was distributed to Dr. Robert Freckman for voucher approval, the other was given to the CLPRD for their use.

Data collection in this phase of the project is complete. Phase Two of this project is also complete and a final summary report and request for reimbursement will be submitted. Phase Three of this project is being completed in 2010. Data from all phases will be used to assemble a final aquatic plant and limited lake management plan for the Clam Lakes in Phase Four, to be completed in early 2011.

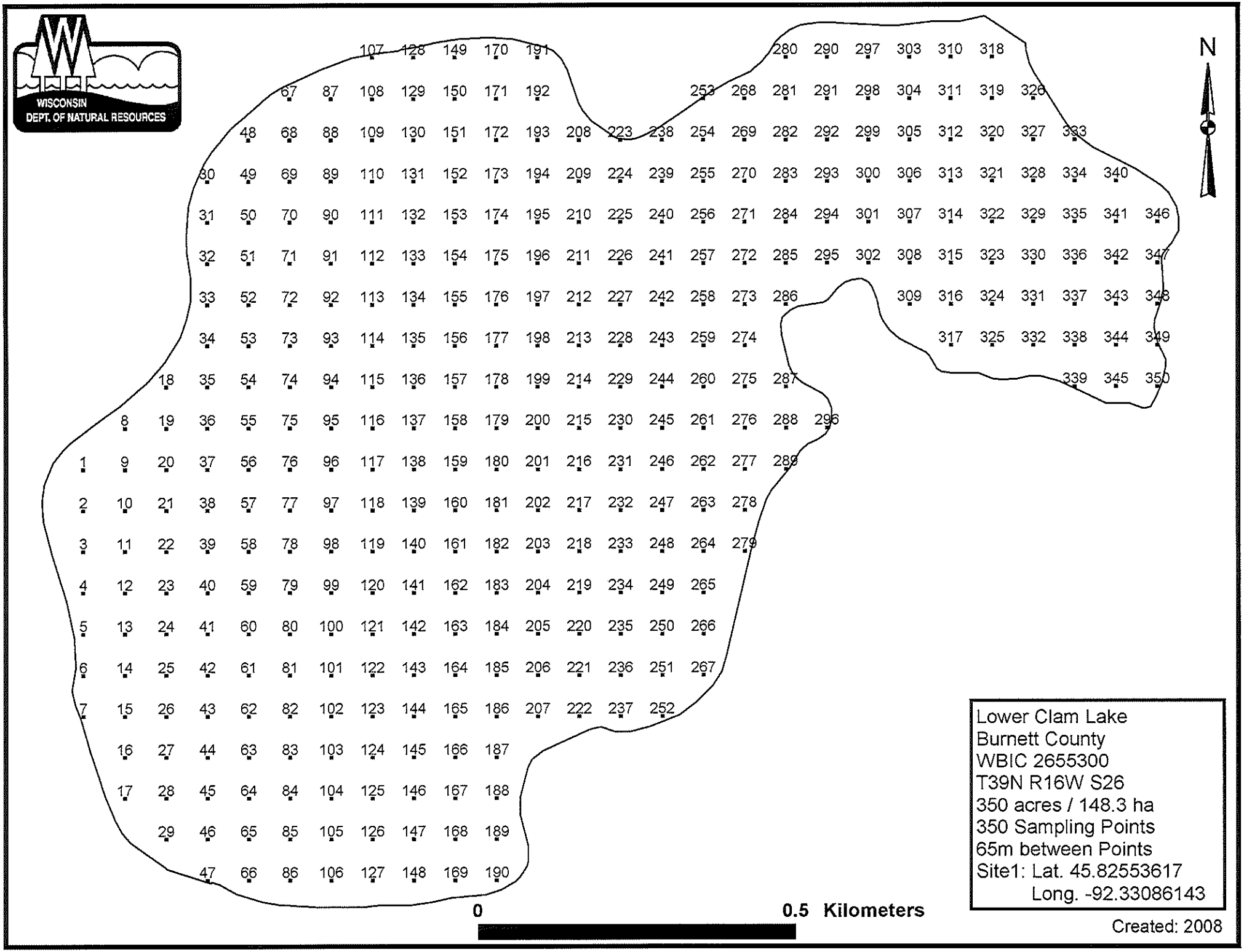
Accompanying this report is a request for reimbursement prepared by the CLPRD for costs associated with Phase One and the necessary volunteer and donated labor support sheets to show proper match. Please consider this the final report for Phase One and reimburse the Lake District appropriately.

DLB/ls

Figures

Appendix A

WDNR Point-intercept Maps for Lower and Upper Clam Lakes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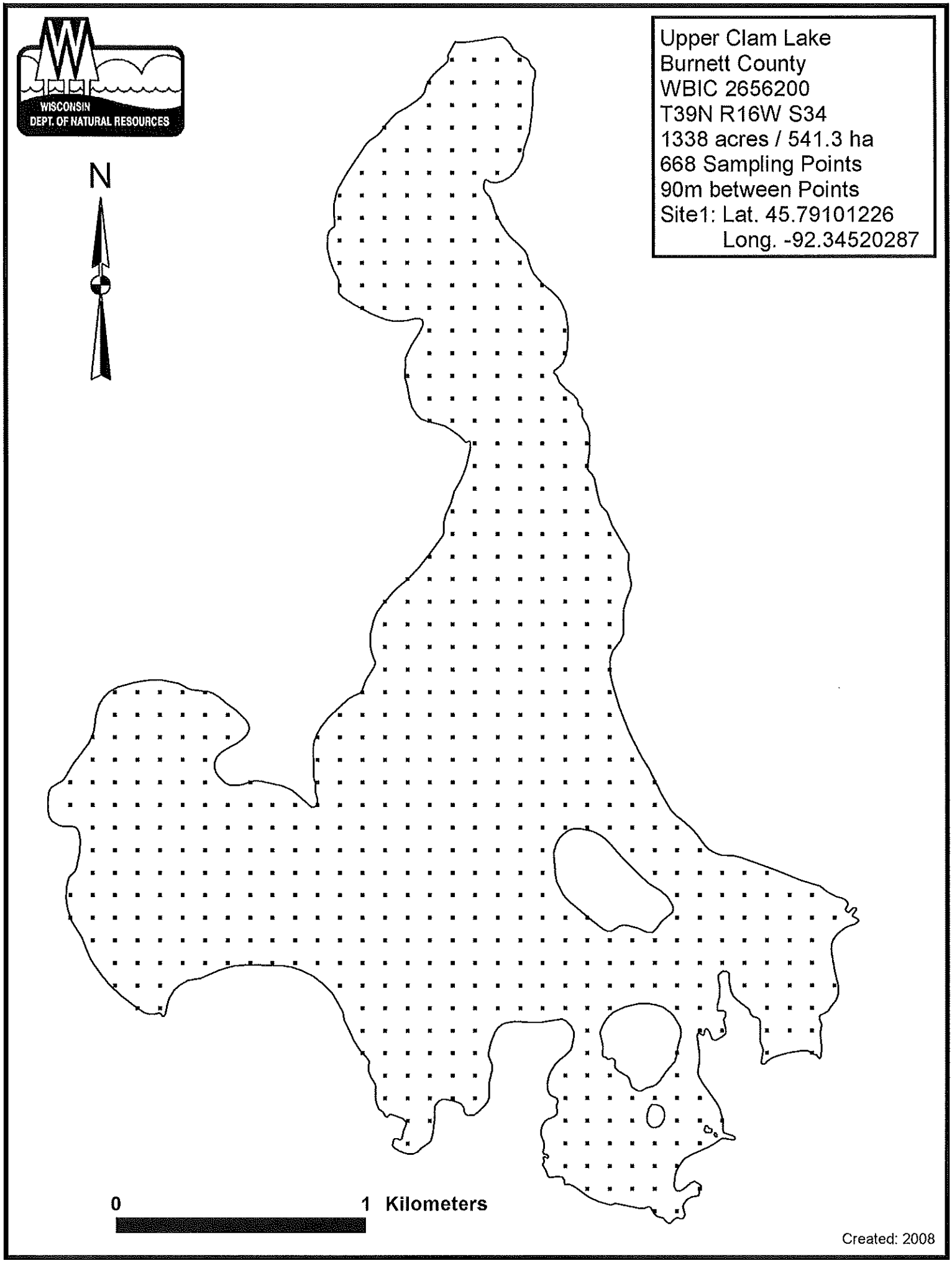
0
0.5 Kilometers
Lower Clam Lake
Burnett County
WBIC 2655300
T39N R16W S26
350 acres / 148.3 ha
350 Sampling Points
65m between Points
Site1: Lat. 45.82553617
Long. -92.33086143
Created: 2008


WISCONSIN
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N
Upper Clam Lake
Burnett County
WBIC 2656200
T39N R16W S34
1338 acres / 541.3 ha
668 Sampling Points
90m between Points
Site1: Lat. 45.79101226
Long. -92.34520287
0
1 Kilometers
Created: 2008

Appendix B

2009 Citizen Lake Monitoring Network Water Quality Reports for Lower and Upper Clam Lakes

Lake Water Quality 2009 Annual Report

Lower Clam Lake
Burnett County
Waterbody ID Number: 2655300

Lake Type: DRAINAGE
DNR Region: NO
GEO Region: NW

Site Name	Station ID
Lower Clam Lake at Center	10029236

Date	SD (feet)	SD (meters)	Hit Bottom?	CHL	TP	TSI (SD)	TSI (Chl)	TSI (TP)	Lake Level	Staff Gauge	Clarity	Color	Perception
04/27/2009	3	.9	NO		78	61		62	LOW		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
05/07/2009	3.6	1.1	NO			59			NORMAL		MURKY	BROWN	
05/31/2009	2.8	.9	NO			62			NORMAL		MURKY	GREEN	
06/04/2009	2.6	.8	NO			63			NORMAL		MURKY	GREEN	
06/18/2009	3	.9	NO	23.6	46	61	59	58	NORMAL		MURKY	GREEN	4-Would not swim but boating OK (algae)
07/05/2009	2.6	.8	NO			63			NORMAL		MURKY	GREEN	
07/23/2009	1.3	.4	NO	33.5	83	73	61	62	HIGH		MURKY	BROWN	4-Would not swim but boating OK (algae)
08/06/2009	2.25	.7	NO			65			NORMAL		MURKY	BROWN	
08/19/2009	8	2.4	YES			47			LOW		MURKY	BROWN	
10/04/2009	3	.9	NO			61			NORMAL		CLEAR	BROWN	
10/17/2009	3	.9	NO			61			NORMAL		CLEAR	BROWN	
10/22/2009				9.66	38		52	56					

04/27/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
3	53	7

06/18/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
0	72	

07/23/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
0	75	

SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter (ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD),TSI(CHL),TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet; Temp = Temperature in degrees Fahrenheit; D.O. = Dissolved Oxygen in parts per million.

Wisconsin Department of Natural Resources * Wisconsin Lakes Partnership
Report Generated: 02/02/2011

04/27/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
6	53	8.3

06/18/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
2	71.6	7.2
5	76	9

07/23/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
3	71.6	9
6	70.5	9

08/06/2009		
Depth	Temp.	D.O.
0	75.9	
3	74.1	
6	71	

Date	Fieldwork Comment
04/27/2009	Overcast- breezy- chem training- light precipitation night before
06/18/2009	Calm- Cloudy- water normal
07/05/2009	Sunny and Clear
07/23/2009	Rain last night

Date	Data Collectors	Project
04/27/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
05/07/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
05/31/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
06/04/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
06/18/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
07/05/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
07/23/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
08/06/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
08/19/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
10/04/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
10/17/2009	David and Mary Clements	Citizen Lake Monitoring - Water Quality - Lower Clam Lake at Center
10/22/2009	Earl Hoscheit	CLAM LAKE P + R DISTRICT: PI Plant Survey + Education- Phase 1

SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter (ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD),TSI(CHL),TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet; Temp = Temperature in degrees Fahrenheit; D.O. = Dissolved Oxygen in parts per million.

Lake Water Quality 2009 Annual Report

Clam Lake
Burnett County
Waterbody ID Number: 2656200

Lake Type: DRAINAGE
DNR Region: NO
GEO Region: NW

Site Name	Station ID
Upper Clam Lake at Center Main Basin	10029237

Date	SD (feet)	SD (meters)	Hit Bottom?	CHL	TP	TSI (SD)	TSI (Chl)	TSI (TP)	Lake Level	Staff Gauge	Clarity	Color	Perception
04/27/2009	2	.6	NO			67			LOW		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
04/27/2009					109			64					
05/12/2009	2.5	.8	NO			64			LOW		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
05/26/2009	2.5	.8	NO			64			LOW		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
06/10/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
06/18/2009	3	.9	NO			61			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
06/18/2009				31.5	65		61	60					
06/25/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
07/08/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
07/23/2009	3	.9	NO			61			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired

SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter (ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD),TSI(CHL),TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet; Temp = Temperature in degrees Fahrenheit; D.O. = Dissolved Oxygen in parts per million.

Date	SD (feet)	SD (meters)	Hit Bottom?	CHL	TP	TSI (SD)	TSI (Chl)	TSI (TP)	Lake Level	Staff Gauge	Clarity	Color	Perception
07/23/2009				30	69		61	61					(algae)
08/11/2009	3	.9	NO			61			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
08/26/2009	2	.6	NO			67			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
08/26/2009				52	74		65	61					
09/11/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
09/26/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
10/12/2009	2.5	.8	NO			64			NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
10/22/2009	2.5	.8	NO	11.2	44	64	53	57	NORMAL		MURKY	BROWN	3-Enjoyment somewhat impaired (algae)

04/27/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
3	53	10
6	55	

06/18/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
0	71	
2		6.2
3	70.7	
5		7.3
6	70.3	

07/23/2009		
Depth	Temp.	D.O.
FEET	DEGREES F	MG/L
0	73.9	
3	71	10
6	69	9

08/26/2009		
Depth	Temp.	D.O.
0	73.4	
3	71	
6	69.8	

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Date	Fieldwork Comment
04/27/2009	windy overcast chem training spring rain (small amount)
06/18/2009	windy overcast
07/23/2009	clear
08/26/2009	clear

Date	Data Collectors	Project
04/27/2009	Earl Hoscheit	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
04/27/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
05/12/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
05/26/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
06/10/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
06/18/2009	Earl Hoscheit	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
06/18/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
06/25/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
07/08/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
07/23/2009	Earl Hoscheit	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
07/23/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
08/11/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
08/26/2009	Earl Hoscheit	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
08/26/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
09/11/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
09/26/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
10/12/2009	Jon Schoepke	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin
10/22/2009	Earl Hoscheit	CLAM LAKE P + R DISTRICT: PI Plant Survey + Education- Phase 1
10/22/2009	Earl Hoscheit	Citizen Lake Monitoring - Water Quality - Upper Clam Lake at Center Main Basin

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Appendix C

2009 Clean Boats, Clean Waters Report

Station Name	Start Date	Start Time	End Date	End Tir	Inspectors	Boats	People	Time	Paid	Volunteer	
Clam Lake -- Access	8/28/2009	17:00			Mike Isaksen	3	4	2	2		
Clam Lake -- Ramp	5/22/2009	15:30	5/22/2009	16:30	Mike Isaksen	4	8	1	1		
Lower Clam Lake -- Clam Lake (Lower) Access	5/15/2009	10:00	5/15/2009	11:00	Mike Isaksen	1	2	1	1		
Lower Clam Lake -- Clam Lake (Lower) Access	5/17/2009	11:45	5/17/2009	14:00	Mike Isaksen	8	15	2.25	2.25		
Lower Clam Lake -- Clam Lake (Lower) Access	6/7/2009	9:00	6/7/2009	12:30	Mike Isaksen	7	9	3.5	3.5		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	5/29/2009	14:00	5/29/2009	15:30	Mike Isaksen	2	2	1.5	1.5		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/2/2009	15:00			Mike Isaksen	2	2	1	1		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/4/2009	9:00	7/4/2009	12:00	Mike Isaksen	7	18	3	3		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/25/2009	14:15	7/25/2009	15:00	Mike Isaksen	1	1	0.75	0.75		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	5/23/2009	0:00			Kris Larsen	12	32	4	4		
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	9/4/2009	10:00	9/4/2009	2:00	Jean Hauan	8		4		4	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	8/8/2009	9:00	8/8/2009	11:00	Jean Hauan	9	15	2		2	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	8/1/2009	9:00	8/1/2009	11:00	Jean Hauan			2		2	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/19/2009	8:00	7/19/2009	0:00	Jean Hauan			8		8	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/18/2009	10:00	7/18/2009	13:00	Jean Hauan	13	13	6		6	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	6/27/2009	9:00	6/27/2009	12:00	Jean Hauan	5	7	6		6	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	6/28/2009	9:00	6/28/2009	12:00	Jean Hauan	6	11	6		6	
Lower Clam Lake -- Hwy 70 Public Access Boat Landing	7/19/2009	8:00	7/19/2009	12:00	Jean Hauan	5	7	8		8	
						93	146	62	20	42	

Appendix D

2009 Citizen Lake Monitoring Network Aquatic Invasive Species Monitoring Reports

Fieldwork Start	Fieldwork End	Project(s)	Data Collector(s)	Status	Station Name	Parameter	Description	Result	Units
5/20/2009	10/30/2009 23:55	Citizen Aquatic Invasives Monitoring - L	Douglas Boddicker	COMPLETE	Lower Clam Lake	SWIMS	Total Volunteer Hours Spent	8	HOURS
5/20/2009	10/30/2009 23:55	Citizen Aquatic Invasives Monitoring - L	Jim & Nancy Lang	COMPLETE	Upper Clam Lake	SWIMS	Total Volunteer Hours Spent	100	HOURS
5/29/2009	7/31/2009 23:55	Citizen Aquatic Invasives Monitoring - L	Jon and Debra Schoepke	COMPLETE	Upper Clam Lake	SWIMS	Total Volunteer Hours Spent	8	HOURS
6/20/2009 13:00	6/20/2009 15:30	Citizen Aquatic Invasives Monitoring - L	Debbie Schoepke	COMPLETE	Upper Clam Lake	SWIMS	Total Volunteer Hours Spent	2.5	HOURS
7/6/2009 12:00	7/6/2009 12:30	AIS Monitoring - Burnett County	Mike Isaksen	COMPLETE	Upper Clam Lake	SWIMS	Total Paid Hours Spent	0.5	HOURS