



2009 Summary of *Potamogeton crispus*
Big Arbor Vitae Lake, Vilas County, WI

Big Arbor Vitae Lake

Big Arbor Vitae Lake is located within the Town of Arbor Vitae. It is a drainage lake in the north eastern section of the Upper Tomahawk River Watershed (Figure: 1). The surface water area is 1090 acres, the maximum depth is 41 feet and there is 7.8 miles of shoreline. Four percent of the lake area has an average depth of 3 feet or less and 49% of the lake area has an average depth of 20 feet or more. The substrate is primarily gravel and sand (WDNR-Website). There are three public boat landings on Big Arbor Vitae Lake: two at the southeastern side of the lake and one at the far northern side of the lake. The boat landing at the northern end has a public beach and picnic area. The southern shoreline is developed with a moderate to high concentration of homes and resorts. The northern shoreline has limited to no development and is relatively undisturbed.

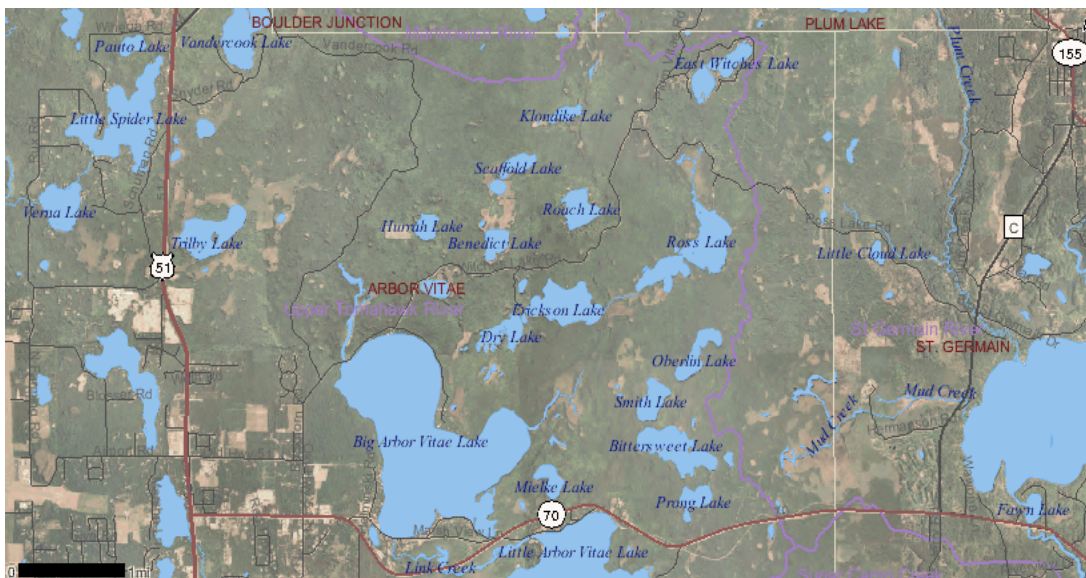


Figure 1: Map of Big Arbor Vitae Lake, land cover and northeastern boundary of the Upper Tomahawk River Watershed.

Potamogeton crispus History

A Spiny Water-flea survey crew from the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) initially discovered Curly leaf-pondweed (CLP) in 2008 (Figure: 2). The infestation was discovered in the southeastern portion of the lake in a smaller bay near the two boat landings. GLIFWC conducted a preliminary CLP survey by traversing

the perimeter of the bay where it was initially discovered. The locations were mapped and the data was submitted to the Vilas County Invasive Species Coordinator.

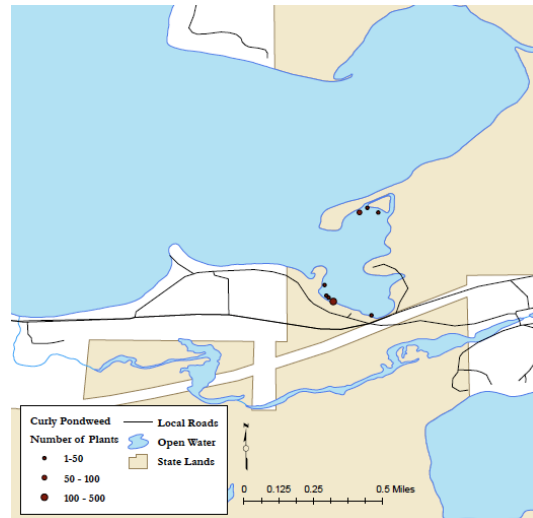


Figure 2: 2008 GLIFWC Survey Map of CLP on Big Arbor Vitae Lake

CLP 2009 Survey Methods and Findings

In 2009 two surveys were conducted on Big Arbor Vitae Lake. The first survey was to collect information on the abundance and distribution of CLP. The second survey was a to collect quantitative information on the aquatic native plant community and CLP.

The first survey was conducted on the 15th & 16^h of June, 2009. The survey included: relocating CLP at the initial areas of discovered by GLIFWC, quantify if the distribution and abundance had changed and determine the presence of CLP in other parts of the lake. The initial discoveries were all relocated and the population distribution and abundance were consistent with the 2008 findings (Figure: 3 & Table: 1). Based on the location and abundance from the information gathered by GLIFWC, there was no detectable change between 2008 to 2009 in the distribution and abundance of CLP. It was noted that the plants were not at their peak biomass and several inches below the water surface.



Figure 3: 2009 CLP locations from June 2009 survey.

Table 1: Big Arbor Vitae CLP Survey Results		
Grid	Lat/Lon hddd.ddddd°	
Datum	WGS 84	
Dates	6.15.09 & 6.16.09	
GPS ID	GPS WAYPOINT	RELATIVE ABUNDANCE
1	N45.91775 W89.63796	1 plant
2	N45.91858 W89.63988	1 plant
4	N45.92313 W89.63805	1-50 plants
5	N45.92296 W89.63863	1-10 plants
6	N45.91777 W89.63799	1-10 plants
7	N45.91840 W89.63964	1-50 plants
8	N45.91864 W89.63993	1-50 plants
9	N45.92318 W89.63801	1-50 plants

Once the CLP 2008 sites were relocated, larger areas surrounding the sites were traversed using an underwater camera. During these traverses, no additional CLP was located. Once the surrounding areas were traversed, the entire southeastern bay was traversed in 10-15 meter strips. First a visual method was used to identify any new locations of CLP, then a second pass was performed to detect CLP that may have been missed visually by using an underwater camera. No new locations of CLP were found.

To determine if CLP had spread to other parts of the lake, the entire perimeter of

the lake was traversed. In addition to the perimeter, shallow water areas that extended into off shore portions of the lake were also traversed. The underwater camera was used in portions of the large weed bed that extended from “Honeymoon Point” north into the center of the lake. No new locations of CLP were found.

In July of 2009 a WDNR plant survey crew conducted a point intercept (PI) survey for Big Arbor Vitae Lake. One thousand ninety (1090) points were sampled at a 63-meter resolution. During the survey, 13 additional locations of CLP were found (Figure: 4 & Table: 2). The largest concentration was found in the central portion of the southern basin (Figure: 5). There were three additional PI points where CLP was collected: the far northwestern bay (point number 010), the northeastern bay (point number 022) and the north central shoreline (point number 011). The rake fullness for CLP for at all sites was not greater than 1. The overall the rake fullness for native vegetation was greater than that for CLP at all these sites.



Figure 4: 2009 CLP locations from point intercept survey.

Table 2: Big Arbor Vitae CLP Locations from PI Survey

Grid Lat/Lon hddd.ddddd*
Datum WGS 84

GPS ID	GPS WAYPOINT	RAKE FULLNESS	PI NUMBER
10	N45.93744 W89.66594	1	7
11	N45.93114 W89.64648	1	738
12	N45.92661 W89.64650	1	746
13	N45.92434 W89.64571	1	769
14	N45.92377 W89.64571	1	770
15	N45.92264 W89.64572	1	772
16	N45.92604 W89.64488	1	785
17	N45.92434 W89.64489	1	788
18	N45.92320 W89.64490	1	790
19	N45.92263 W89.64490	1	791
20	N45.92660 W89.64407	1	803
21	N45.92263 W89.64409	1	810
22	N45.92883 W89.63024	1	1088



Figure 5: Largest concentration of CLP in the southern basin, based on the point intercept survey.

Conclusions

These two surveys conclude that the distribution of CLP has spread to numerous areas of the lake; however the abundance is relatively low. The samples collected show

that even though CLP was present, it was not dominating the substrate. In addition it was noted that the CLP plants were significantly smaller in stature than the native plants. The two main areas of concentration are within the southeastern bay and the central area of the southern basin. Since CLP is found in a multiple of locations through out the entire lake it is critical to continue monitoring its spread and any changes in density.

Big Arbor Vitae should be monitored annually for CLP. Feasibility may determine the extent and time dedicated, however five main areas should be prioritized. These areas include the three PI locations (PI #'s 010, 022 & 011). Information gathered from this will assist in determining if these particular populations are changing. The remaining two priority areas are the southern basin site and the entire southeastern bay. Fine resolution sampling in these areas would be beneficial to determine changes in population extant and extent. Annual findings should be provided to the WDNR office in Rhinelander and to the Vilas County Invasive Species Coordinator.

Big Arbor Vitae Lake is a popular recreational and angling lake. There are several resorts on the lake and three boat landing accesses. The largest concentration of CLP is located near two of these boat landings. Understanding the mechanics of how aquatic invasive species are spread, Big Arbor Vitae Lake may be a potential source for the dispersal of CLP to other lakes within the vicinity.

This report was prepared as part of the requirements for grant #SPL-203-09, by Barb Gajewski. She was contracted by Vilas County to assist the WDNR in several PI surveys within the county. Over the past seven years she has worked on several projects that focus on aquatic native and invasive plant species. Some agencies that she has performed worked for include: Watersmeet, MI Township, USDA Ottawa National Forest and the Army Core of Engineers (ERDC). She is currently a Masters Candidate in Water Resource Management in The Gaylord Nelson Institute of Environmental Studies, UW-Madison.