Beaver Creek Reserve – Citizen Science Center

Aquatic Plant Community in Amacoy Lake

From 2008 -2013

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INTRODUCTION

Amacoy Lake, with an area of 278 acres, is a eutrophic drainage lake located west of the Chippewa River in Rusk County, Wisconsin, four miles southwest of Bruce. Amacoy Lake has a maximum depth of 20 feet with an average depth of 13 feet (Figure 1.).

The public uses Lake Amacoy as a fishing lake. The heaviest use by fishermen is during the ice fishing season. There is currently one public access launch owned and maintained by the town of Stubbs with three other unmaintained access points around the lake. Amacoy provides critical habitat for fish and wildlife, stabilizes sediments, and buffers nutrient inputs from the surrounding watershed. The majority of the shoreline is privately owned in lots ranging from 45' to greater than 500' of frontage.

In 2008, the Amacoy Lake Property Owners Association (ALPOA) requested that Beaver Creek Reserve - Citizen Science Center(CSC) complete a point intercept aquatic plant survey of Amacoy Lake. The presence of curly-leaf pondweed (*Potamogeton crispus* L.) was documented in Amacoy Lake at 14 of 135 surveyed points with an average rake fullness of one (a few plants on rake head sample). The infested sites were confined to the north east bay of the lake. The discovery of the curly-leaf pondweed (CLP) was reported to and confirmed by the Wisconsin Department of Natural Resources (WDNR). ALPOA recognized the need for monitoring the CLP population in the lake.

High densities with rake fullness of three (overflowing, cannot see top of rake head) were seen in the spring of 2010 in areas in addition to the north east bay. This change in densities led to the application for a Rapid Response Grant (AIRR-092-11) by ALPOA with the WDNR for 2011-2013. The goal of the Rapid Response grant was to try and control the CLP while the population was still small enough to manage. ALPOA's choice of management was the use of chemicals (Aquathol K) in the spring of each of the three years of the grant. The CSC's role in the grant was to conduct monitoring of the aquatic plants throughout the grant period.

The specific goals of the CSC's monitoring was to: 1) survey and map treatment areas to note locations and abundance of CLP to assist in decisions of where to chemically treat 2) survey treatment areas to assess treatment success, 3) track changes in the aquatic plant community including native species, and 4) conduct a full PI survey of the lake in the summer of 2013.

Amacoy Lake

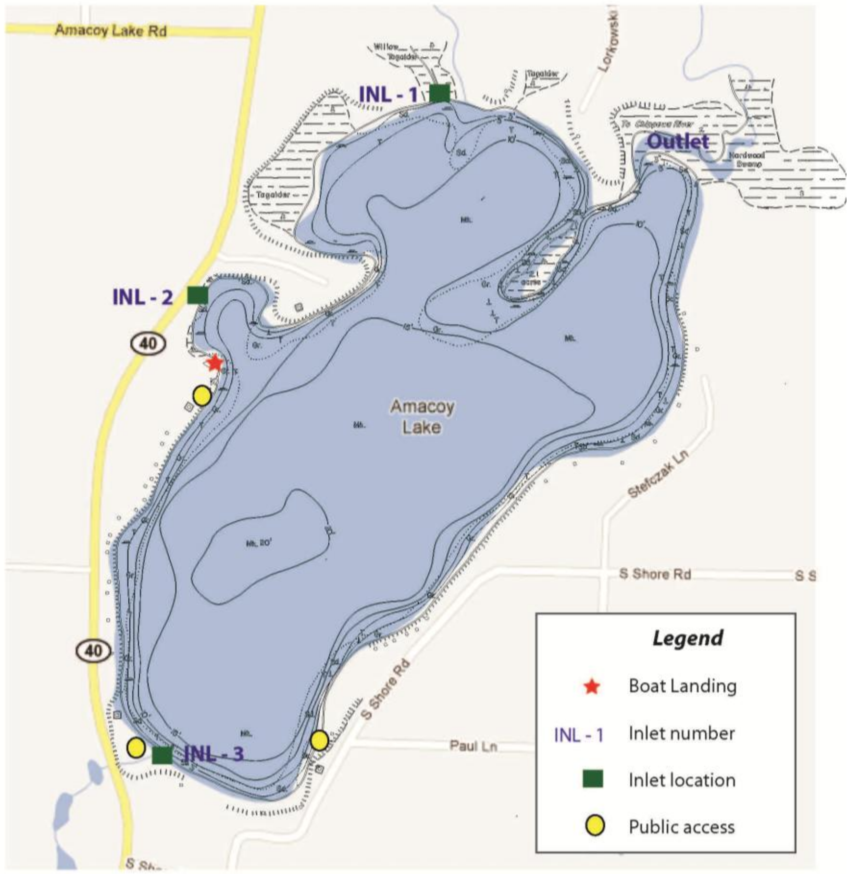

Figure 1. Map of study location, Amacoy Lake.

METHODS

Field Methods

Amacoy Lake was surveyed for plants three times per year from 2011-2013 via a boat. Amacoy was surveyed once in the spring (April/May depending upon the weather and spring thaw) before chemical application occurred. The lake was again surveyed in June/July to assess treatment success as well as in fall (September) to have a better idea of where to look for CLP the following spring. The nine sampling events occurred only in the treatment areas and those adjacent that would be affected by the chemicals. The 2013 summer PI survey included the whole lake.

All surveying events used the sampling sites determined by the WDNR research department and were the same as those employed during the 2008 PI survey. The data points were set on a grid of 52 m^2, and data collected were 1) point sampling of plant density, 2) species list of all plants observed, 3) location of CLP, and 4) water depth and sediment type.

A total of 135 points were visited on Amacoy Lake. At each grid point all species present were recorded and densities were taken using WDNR raking protocol. One rake sample was taken, using a steel-thatching rake, off the bow of the boat. The aquatic plant species present on each rake sample were recorded. Each species was given an occurrence rating (0-3) based on the observed amount of plants on the rake.

A rating of 1 indicated the species was present with few plants on rake head.
A rating of 2 indicated the species was present on about ½ of rake head.
A rating of 3 indicated the species was present overflowing on rake head.

The actual depth and sediment type were recorded; sediment type was classified visually. If actual depth was greater than 12 feet, the point was deemed outside the littoral zone and not sampled. Visual inspection and periodic samples were taken between grid points in order to record the presence of any species that did not occur at the sampled points for use in the species list only. Nomenclature was according to Crow and Hellquist (2000) and Gleason and Cronquist (1991).

Appropriate APM permits were applied for through the WDNR to add aquatic herbicides in the lake. Chemical treatments were conducted by a third party applicator using April/May survey data. Dosage rates, acre feet to be treated, and areas to be treated were all determined by the applicator (see *Appendix A* for treatment records).Permit conditions were adhered to such as: treatments occurred early in spring, before water temperatures reach 60ºF, and with wind speeds less than 5 mph.

Data Analysis

The 2013 PI data was analyzed for percent frequency (number of sites at which species occurred / total number of sites visited), and relative frequency (number of sites at which species occurred / sum of all species occurrences) was calculated for each species.

A Chi squared test was used to look at the changes seen in the aquatic plant community between the 2008 and 2013 PI surveys and deem whether the changes are considered statistically significant. Chi squared tests were also used for changes in CLP within a year (pre/post-chemical treatment) and between the years of the grant.

The diversity of the plant population was measured using Simpson's Diversity Index and compared with other lakes in the region.

An Aquatic Macrophyte Community Index (AMCI), developed for WisconsinLakes, was applied to Amacoy Lake. Data in seven categories that characterize the aquatic plant community was converted to values 0 – 10 and combined as outlined by Nichols et al. (2000).

Coefficients of Conservatism (Ĉ) and Floristic Quality Index (FQI) were used to evaluate the closeness of Amacoy's aquatic plant community to an undisturbed condition (Nichols, 1999). A Coefficient of Conservatism is an assigned value, 0 – 10, based on the probability that a species will occur in a relatively undisturbed habitat. The Average

Coefficient of Conservation (Ĉ) is the mean of the coefficients of conservatism for all species found in a lake; the Floristic Quality Index was calculated from the average coefficients, and represents a measure of a plant community's closeness to an undisturbed condition.

RESULTS

Water Quality – rooting depth

The predicted maximum rooting depth is calculated from secchi disc readings (Dunst 1982). The secchi disc reading on Amacoy Lake was 4.5 feet. Predicted rooting depth (ft.) = (secchi disc (ft.) * 1.22) + 2.73. The predicted rooting depth of Amacoy Lake based on 2013 data is 8.2 feet.

It was found that Amacoy Lake had a maximum rooting depth of 10 feet in 2013 (see Figure 2.). Due to the amount of such things as algae, silt, or tannins, enough light to support plant growth is only able penetrate to 10feet in depth and is considered the littoral zone. Aquatic plants can survive with a minimum of 1 - 2% of original surface illumination. Plants vary in their tolerance to low light levels, so changes in water clarity could cause shifts in species composition of an aquatic plant community. Figure 3 shows the average secchi disk readings taken on Amacoy Lake by volunteers or WDNR personnel from 1986-2013. Readings have stayed relatively constant over the last decade.

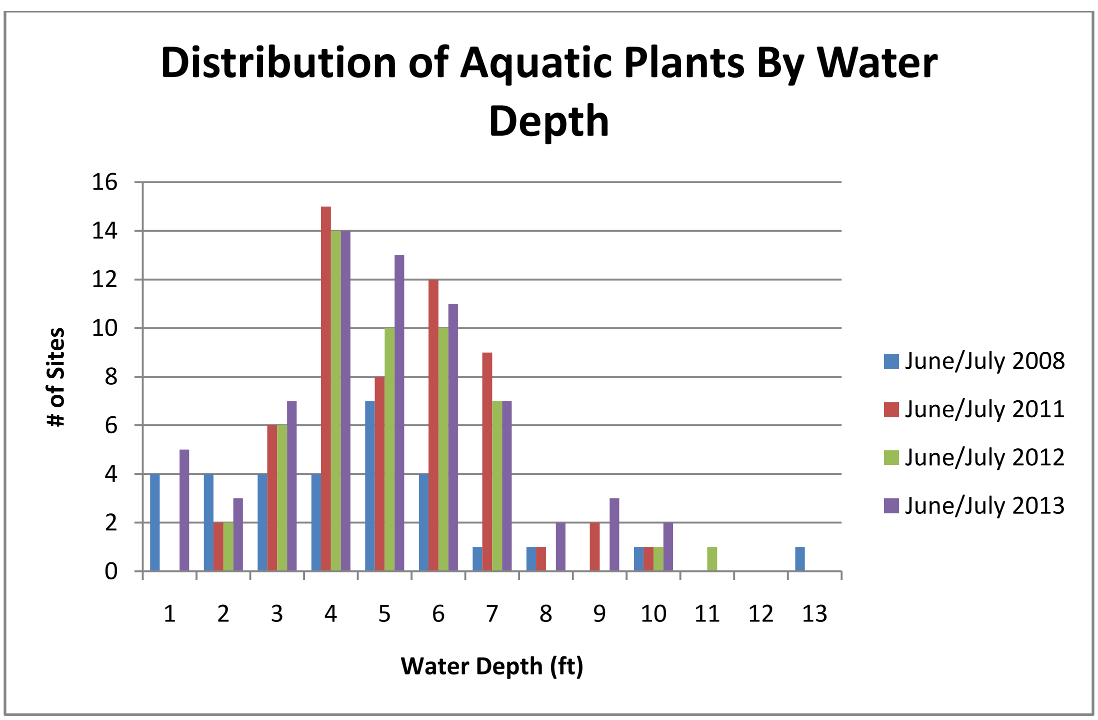

Figure 2. Distribution of aquatic plants by water depth in Amacoy Lake from surveys between 2008-2013.

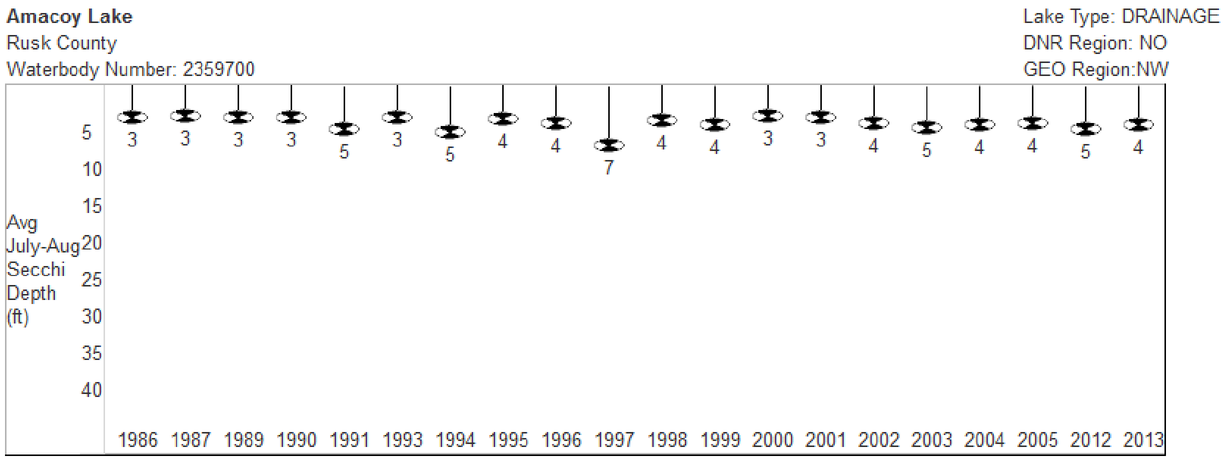

Figure 3. Average secchi disk readings taken on Amacoy Lake by volunteers or WDNR personnel from 1986-2013. Only July and August readings were used to determine averages.

Lake Morphometry

A total of 120 sites were sampled during pre- and post- monitoring from 2011-13. A total of 135 sites were sampled during the full PI survey in July of 2013. Approximately 265 sample sites were not sampled due to water depths greater than 12 feet knowing that depth was greater than the predicted and actual rooting depth by several feet. 102 sites (25%) were shallower than the maximum rooting depth and make up the littoral zone.

Sediment Influence

A total of 129 sites were sampled for sediment in Amacoy Lake. Sand and muck were nearly equally common. Rock was found at one site. 56% of the vegetated sites had sand substrate while 42% were muck, and 2% were rock.

Macrophyte Data

A total of 135 sites were sampled for aquatic plants in Amacoy Lake. 67 sites had vegetation in them, which is 16.5% of the entire lake, and 65.5% of the littoral zone. Vegetation was most common in water three to seven feet deep (Figure 2).
Thirty-two species (Table 1 and 5) were found in Amacoy Lake: 7 emergents, 7 floating leaf, and 18 submersed species, five of which were visuals. None of these species were listed as endangered, threatened or species of special concern. Three species considered sensitive to disturbance were found; *Potamogeton amplifolius, P. robbinsii,* and *P. zosteriformis.* These sensitive species accounted for 0.5% of all species occurrences. One invasive species, *Potamogeton crispus*, was found only as present during the 2013 PI survey. It was found to be more numerous in other surveys conducted on the lake from 2008-13 (see Tables 2-4 and Figures 4-6).

Table 1. Amacoy Lake aquatic plant stats from 2008-2013.

Community Characteristics	2008	2011	2012	2013
Number of Species	16	22	18	32
Maximum Rooting Depth (ft)	13 ft.	10	11	10
% Littoral Zone Vegetated	59.6%	75%	55.5%	65%
% Emergents	9%	8.5%	7.5%	9%
% Submergents	62%	54.5%	52.5%	57.5%
% Floating-Leaf	31%	34.5%	37.5%	33%
% Exotic Species	14.3%	2.5%	2.5%	.5%
% Sensitive Species	32%	5.5%	.5%	.5%
Simpson's Diversity Index	0.89	.90	.89	.89
Average Coefficient of Conservatism	6.33	5.6	5.6	5.8
AMCI	50	46	45	45
FQI	25.33	26.4	24	30.21

Table 2. Changes in curly-leaf frequency at survey sites pre-chemical (April/May) and post-chemical (June/July) treatment in Amacoy Lake from 2011 to 2013.

	# of Sites CLP Found at		
Year	Pre-treatment	Post-treatment	Change in frequency
2011	7	5	negative, **NOT** statistically significant
2012	13	4	negative, statistically significant
2013	10	0	negative, statistically significant

Table 3. Changes in curly-leaf pondweed frequency at survey sites from year to year during management. Comparisons are made only using data from June/July plant surveys that are post-chemical treatments, with the exception of 2008 when no chemical treatment occurred.

	# of Sites CLP Found at		
Comparison Years	Former Year	Latter Year	Change in Frequency
2008 to 2011	14	5	negative, statistically significant
2011 to 2012	5	4	negative, **NOT** statistically significant
2012 to 2013	4	0	negative, statistically significant
2008 to 2013	14	0	negative, statistically significant

Table 4. Curly-leaf pondweed densities and acreage in spring surveys from 2010-13.

CLP Acreage in Spring Surveys				
	2010 acreage	2011 acreage	2012 acreage	2013 acreage
Density 1	7.5	7	11	6.3
Density 2	1.3	0	0	0
Density 3	12.4	0	0	0
Total acreage	21.2	7	11	6.3

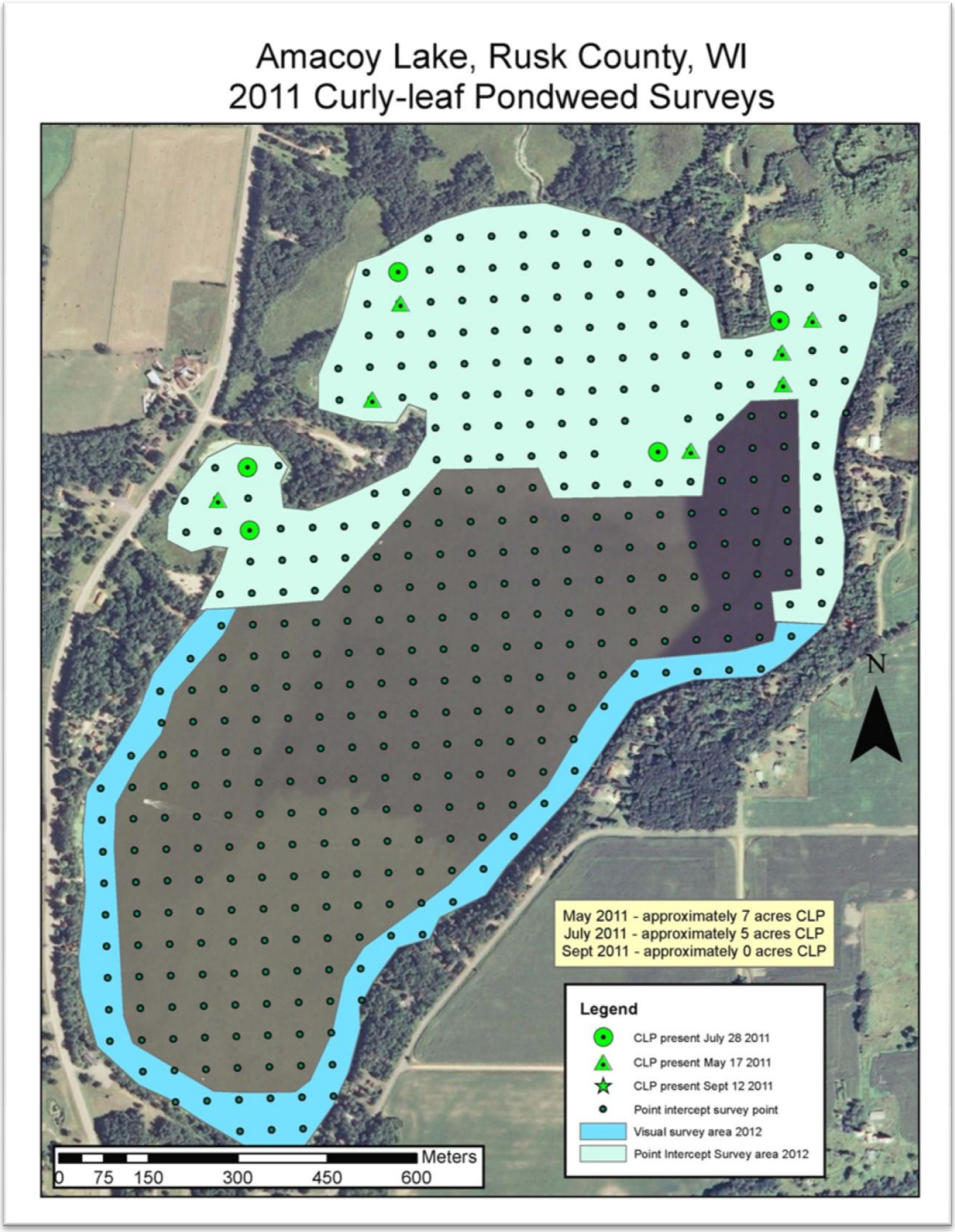

Figure 4. 2011 curly-leaf pondweed survey results.

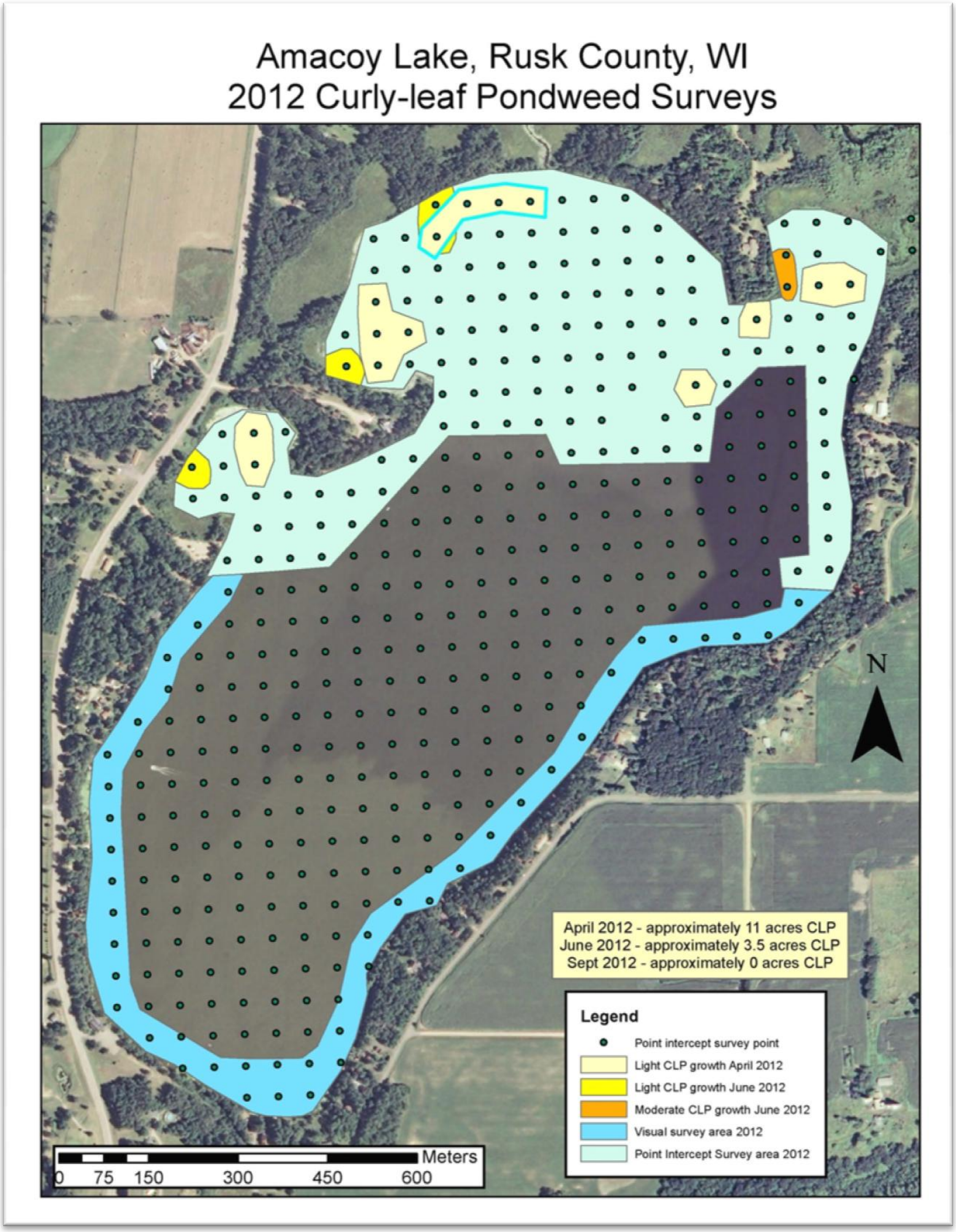

Figure 5. 2012 curly-leaf pondweed survey results.

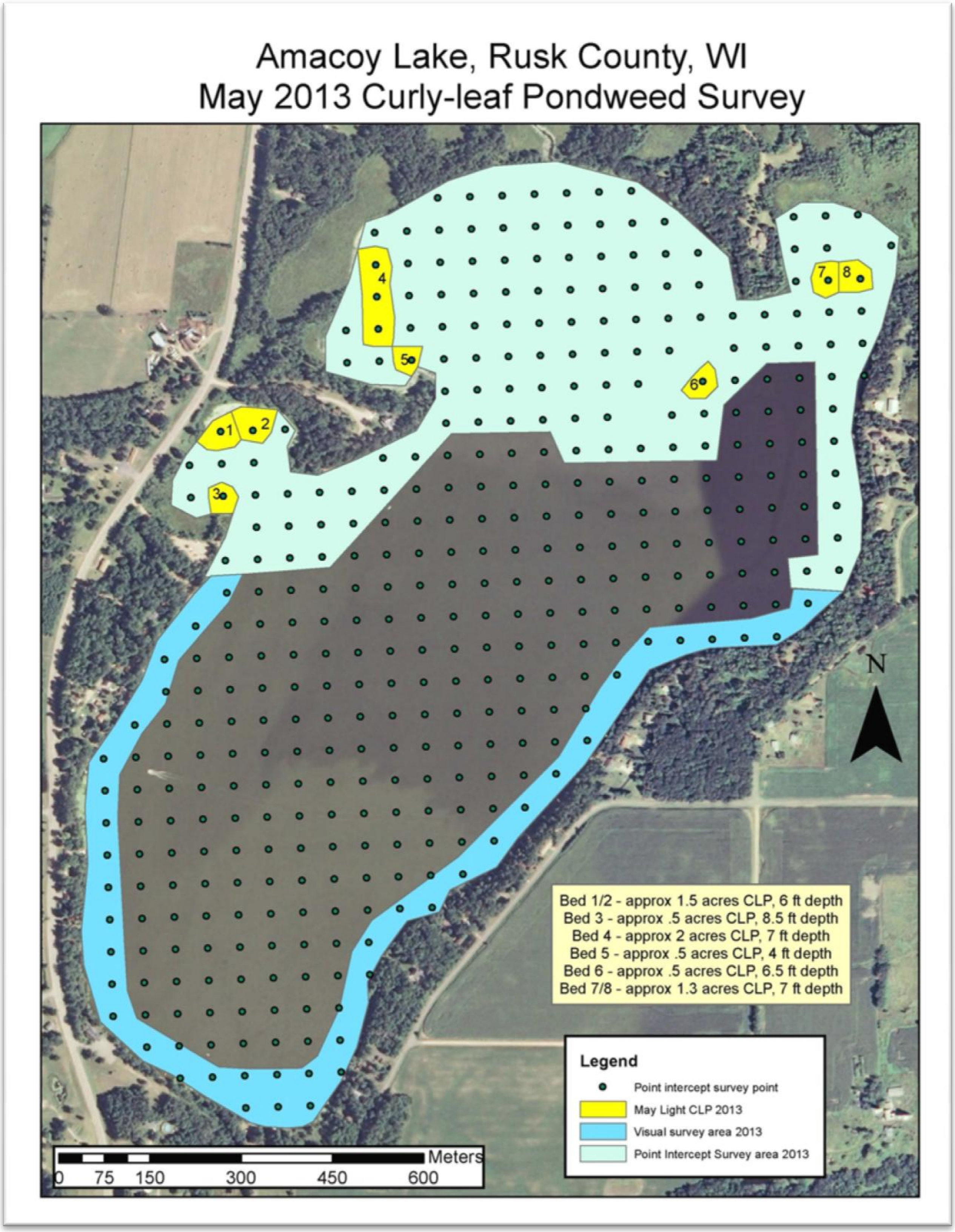

Figure 6. 2013 curly-leaf pondweed survey results.

Table 5. Changes in the Amacoy Lake aquatic plant community composition from 1995 to 2013. 1995 data is shown as relative abundance while 2008-13 data is shown as frequency of occurrence within vegetated areas (%). Present indicates that species was not seen on a rake sample but somewhere else in the lake. A *zero* shows that species was not seen anywhere in the lake during the survey. The top five most common species in a given survey year are highlighted. 1995 data was collected in August while 2008-13 was collected in June or July.

	1995	2008	2011	2012	2013
Species	Relative abundance	Frequency of occurrence within vegetated areas (%)	Frequency of occurrence within vegetated areas (%)	Frequency of occurrence within vegetated areas (%)	Frequency of occurrence within vegetated areas (%)
Brasenia schreberi	6	9.68	10.71	15.69	13.43
Ceratophyllum demersum	30	54.84	67.86	66.67	71.64
Chara sp.	0	0	0	0	2.99
Eleocharis palustris	0	0	0	0	1.49
Eleodea nutallii	16	0	0	0	0
Elodea canadensis	present	0	5.36	5.88	13.43
Equisetum fluviatile	0	0	0	0	1.49
Eriocaulon septangulare	2	0	0	0	0
Isoetes sp.	1	0	0	0	1.49
Lemna minor	0	6.45	14.29	7.84	7.46
Myriophyllum sibiricum	18	19.35	3.57	3.92	5.97
Najas flexilis	0	0	0	11.76	19.4
Najas gracillima	0	0	21.43	19.61	20.9
Najas sp.	52	0	0	0	0
Nitella sp.	2	0	19.64	21.57	5.97
Nuphar variegata	3	12.9	28.57	21.57	41.79
Nymphaea odorata	8	12.9	55.36	62.75	43.28
Polygonum amphibium	0	0	1.79	0	0
Potamogeton amplifolius	present	9.68	7.14	present	present
Potamogeton crispus	19	45.16	8.93	7.84	present
Potamogeton epihydrus	0	0	0	0	Present
Potamogeton gramineus	present	0	1.79	0	0
Potamogeton obtusifolius	0	0	0	0	1.49
Potamogeton pussilis	0	3.23	0	0	2.99
Potamogeton richardsonii	7	16.13	0	3.92	1.49
Potamogeton robbinsii	25	35.48	8.93	1.96	1.49
Potamogeton spirillus	8	0	0	0	0
Potamogeton vaseyi	9	0	0	0	0
Potamogeton zosteriformis	8	58.06	3.57	present	Present
Pontederia cordata	2	9.68	5.36	9.8	8.96
Riccia fluitans	0	0	0	0	1.49
Sagittaria sp.	10	6.45	3.57	3.92	4.48
Schoenoplectus acutus	1	12.9	17.86	7.84	10.45
Schoenoplectus tabernaemontani	present	0	0	0	0
Sparganium eurycarpum	0	0	1.79	3.92	1.49
Spirodela polyrhiza	0	3.23	17.86	7.84	11.94
Typha latifolia	0	0	0	0	2.99
Utricularia vulgaris	0	0	0	0	Present
Vallisneria americana	85	0	39.29	35.29	56.72
Wolfia columbiana	0	0	3.57	5.88	1.49

Ceratophyllum demersum was the dominant plant species in Amacoy Lake (Table 5.) with 71% frequency of occurrence within vegetated areas, followed by *Valisneria americana* (56%), *Nymphea odorata* (43%), *Nuphar verigata* (41%), and *Najas gracilima* (21%) as the five highest frequencies of occurrence. These five species have not always been the most frequent species in Amacoy Lake and a number of species have become more or less so since 2008 (see Figure 7.)

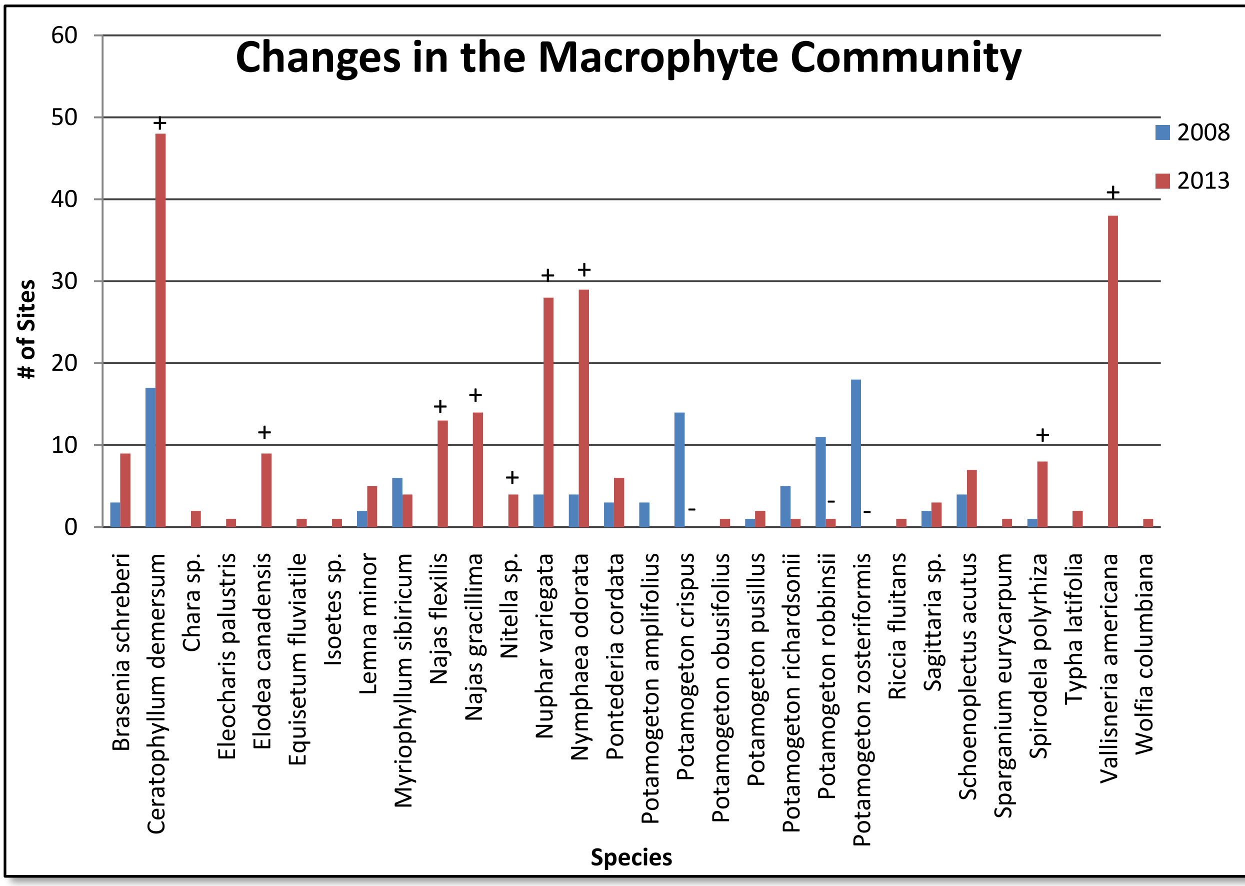

Figure 7. Plant species found in Amacoy Lake during 2008 and 2013 point intercept surveys. A + above nine species denotes that a statistically significant increase was seen from 2008 to 2013. A – above three species denotes that a statistically significant decrease was seen from 2008 to 2013. Lack of annotation indicates that no statistically significant change was noted from 2008 to 13.

The Aquatic Macrophyte Community Index (AMCI) developed by Nichols et al. (2000) was applied to Lake Amacoy. The greatest value for the index is 70. The AMCI in Amacoy Lake was calculated at 50 in 2008, 46 in 2011, 45 in 2012, and 45 in 2013 (Table 1.). Lakes in the Northern Lakes and Forest Region range from 35 to 70. Amacoy Lake's AMCI values were compared to lakes in Wisconsin and the Northern Lakes and Forests (NL) region. Table 6 illustrates where Amacoy Lake falls on the continuum of values for the NL region. Concerning AMCI values, Amacoy Lake fell in the lower quartile for the submersed species frequency, sensitive species frequency and total AMCI score. Amacoy Lake fell near median values for all other AMCI values.

Table 6. Comparison of Aquatic Macrophyte Community Index (AMCI) of the Northern Lakes and Forests region to those of Amacoy Lake.

AMCI variable	Northern Lakes and Forests Region Values					Amacoy AMCI Value
	Minimum	Lower quartile	Median	Upper quartile	Maximum	
Maximum rooting depth (m)	1.5	2.9	3.25	4.8	8	3.03
Littoral area vegetated (%)	20	51	75	90	100	65
Simpson's diversity index	61	87	88	91	100	89
Submersed species (relative frequency %)	10	66	80	91	98	57.5
Sensitive species (relative frequency %)	1	16	23	28	82	0.4
Taxa number	6	15	18	27	43	23
Exotic species (relative frequency %)	0	0	0	3	8	0.5
AMCI Total	35	51	57	61	69	45

One method for evaluating the closeness of an aquatic plant community to an undisturbed condition is the Coefficient of Conservatism (Ĉ). The Ĉ-value is the probability that a specific species of aquatic plant will be located in an undisturbed area (Nichols, 1999). Applied to Amacoy, the Coefficient of Conservatism in 2013 was 5.8. This value is below the state average (6.0) and the regional average (6.6) (Nichols, 1999).

Another method of evaluating the closeness of an aquatic plant community to an undisturbed condition is the Floristic Quality Index (FQI); the value is derived with the use of the Ĉ-value. Lake Amacoy's current *FQI* value (30.2) is above the state (16.9-27.5) and just within the regional (17.8-30.2) averages. If all visuals were included in the FQI calculation Amacoy's value would be 32, which is higher than the regional average.

DISCUSSION

The water clarity is having a greater effect on where plants grow than the morphometry or sediment of the lake. Lake Amacoy's main basin has a gently sloped littoral zone offering many opportunities for aquatic plant colonization. It is known that gentle slopes support more plant growth than steep slopes (Engel, 1985). Amacoy's bays are also shallow, which is likely an effect of sedimentation due to the elevated lake water level from the control structures on the outflow. This sedimentation created a mix of sand and muck that plants are colonizing almost equally. In 2013, most of the plants were found below the predicted rooting depth of 8.2 feet, with only 6 sites deeper containing plants. There is ample habitat for the plants deeper than 8 ft before the lake bottom drops off. An increase of one foot in secchi readings would increase the predicted rooting depth by over one foot.

There can be many causes of poorer water quality such as phosphorus and sediment. Through the Soft Maple and Hay Creeks Priority Watershed Surface Water Resource Appraisal (Roesler, 1995) it was found that the largest source of external phosphorus to Amacoy Lake was the farmyard to the west that has had remediation to limit that load, leaving no other large point sources. DNR specialists have suggested that internal phosphorus loading may be an issue but a large scale watershed planning grant would have to be undertaken to determine that and provide solutions.

Aquatic Plant Community

It is often helpful to compare the study lake to similar lakes in the same ecoregion, as was done earlier in this report. Amacoy falls within the Northern Lakes and Forests region instead of the slightly southerly Northern Central Hardwood Forests region. In comparison to the NL region, Amacoy was in the lower quartile for three categories and near median values for the other four and total score. This indicates that Amacoy is average to below average for its eco-region.

The only factor that Amacoy is above average for is the Floristic Quality Index (FQI), Amacoy's closeness to an undisturbed condition. The FQI-value, which is derived from the average Coefficient of Conservation, is considered subjective. Floristic Quality Index has been used to successfully describe terrestrial plant communities in Wisconsin (Nichols, 1999). Unfortunately, the Floristic Quality in lakes appears to be so heavily related to water quality and number of species found that it is not considered a valuable measurement on its own (Nichols, 1999).

Aquatic plant communities are ever changing throughout the year and from year to year. This can make it hard to say with certainty that a factor is causing the change. Often times the simple variability of how accurate a gps or surveyor is when navigating to sampling points creates the illusion of change as a foot in either direction will cause different plants to show up on the sampling rake. Despite these limitations several noted changes have occurred in Amacoy Lake over the years.

The five most common species have been different in each of the last five years (1995, 2008, 2011-13) of surveys on Amacoy. *Ceratophyllum demersum* is the only species that was in the top five all five years. This plant is beneficial in that it takes nutrients directly out of the water column helping improve water quality. It does have the potential to increase to nuisance levels by matting near the surface making navigation difficult in very thick beds. *Nuphar variegata, Nymphea odorata,* and *Valisneria americana* have been in the top five for the last three years. Three of the top five species found in 2008 significantly decreased by summer 2011.

Several species have declined in relative frequency since the start of management for curly-leaf pondweed. These species include *Potamogeton amplifolius*, *P. crispus*, *P. robbinsii*, and *P. zosteriformis*. Only the latter three have been statistically significant. It is not surprising that these species have declined for several reasons. *P. amplifolius, P. robbinsii,* and *P. zosteriformis* are all deemed sensitive to change/disturbance according to Nicols et al (2000). Chemical management is a type of disturbance. The chemical treatments are targeting the invasive *P. crispus,* which is structurally similar to the other three species listed above, making residual effects to these species unavoidable. Lastly, as *P. crispus* was the target species of the chemical treatments, it would be expected to see a decrease in the amount of it in the lake.

The rapid response grant that this work falls under scheduled three years of chemical treatments for curly-leaf pondweed. These treatments were able to significantly decrease both the density and overall acreage covered by the plant. Turions are still present in the sediment and probably will be for years to come. The chemical treatments may never completely eliminate the *P. crispus* but they have gotten it down to a manageable level. The lake association is currently considering the possibility of stopping chemical treatments and instead employing a few staff in the beginning of June to hand pull or rake visible curly-leaf pondweed. Ideally this strategy would be more cost effective, target specific, and more environmentally friendly than chemical treatments. Harvesting has not been an option due to the lack of curly-leaf density and because it is interspersed with other native plants. If the hand pulling strategy is ineffective, chemical and other treatment options will be considered. Monitoring of the aquatic plant community is essential to assess the changes in curly-leaf population that they are managing.

CONCLUSION

Amacoy Lake's aquatic plant community has changed over time. The maximum rooting depth is lower now than it has been in the past and is probably a function of water quality versus suitable substrate and lake morphometry. Based on the calculated AMCI and the other plant stats, Amacoy is an overall average to below average drainage lake in the NorthernLakes and Forest region of Wisconsin. Amacoy does have an above averageFQI value when visual species sightings are added to the calculation, which is higher than it has been in the past. Additional changes to the plant community include the decline of a few previously dominant species. Most noted are the species similar to *Potamogeton crispus* and *P. crispus* itself. These significant decreases are likely due to the chemical treatments for *P. crispus* that have been occurring on the lake since the spring of 2011. It is critical that management for *P. crispus* still occurs even after the chemical treatments stop. This management may be light (such as raking), but it is important to keep the *P. crispus* population under control. Equally important is the need to have continued monitoring of the *P. crispus* in the spring of the year (May/June) to assess how the population is changing and if management strategies should be adapted.

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Appendix A – *Aquatic Herbicide Treatment Records*

Aquatic herbicide treatment record from May 2011.

Aquatic Plant Management Herbicide Treatment Record
Form 3200-111 (5/01) Page 2 of 2

Sheet ____ of ____ Date: ________

Treatment Site and Chemical Information (Use attached additional site / herbicide sheet if necessary)

Site No, Property Name, Address / Fire No	Treated Shoreline Length (ft)	Treated Distance Off Shore	Treated Acreage	Permitted Acreage (per property)	Sensitive Area?	Herbicide(s) Used / EPA Reg. Number(s)	Amount Applied (e.g., gals, lbs)	GPS Location Latitude / Longitude
1			2.1	2.1	☐ Y	Aquathol K 70506-176	12.2g	° ' N ° ' W
9			1.3	1.3	☐ Y		7.5	° ' N ° ' W
11			1.3	1.3	☐ Y		5.6	° ' N ° ' W
13			0.5	0.5	☐ Y		2.2	° ' N ° ' W
14			0.5	0.5	☐ Y		2.2	° ' N ° ' W
15			1.2	1.2	☐ Y		7.0	° ' N ° ' W
16			2.1	2.1	☐ Y		12.2g	° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
CLP Mostly					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
6-11 internodes					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
No turion formation					☐ Y			° ' N ° ' W
observed.					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W

Aquatics at Treatment Site – TS = Target Species SP = Species Present

TS	SP	Species	Site(s)	TS	SP	Species	Site(s)	TS	SP	Species	Site(s)	TS	SP	Other Aquatics	Site(s)
☐	☐	cattail		☐	☐	white-stem pondwd		☐	☑	coontail	All	☐	☐		
☐	☐	yellow pond lily		☐	☑	flat-stem pondwd	9	☐	☑	elodea	1	☐	☐		
☐	☑	white water lily	1, 16, 15, 11	☐	☐	floating-leaf pondwd		☐	☐	filamentous algae		☐	☐		
☐	☐	watershield		☐	☐	sago pondwd		☐	☐	richardson pondwd		☐	☐		
☐	☐	large-leaf pondwd		☐	☐	e. milfoil		☐	☐	illinois pondwd		☐	☐		
☑	☐	curly-leaf pondwd	All	☐	☐	n. milfoil		☐	☐	planktonic algae		☐	☐		

Aquatic herbicide treatment record from May 2012.

Sheet ____ of ____ Date: ________

Aquatic Plant Management Herbicide Treatment Record

Form 3200-111 (R 11/11)

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Treatment Site and Chemical Information (attach additional sheets if necessary)

Site No, Property Name, Address / Fire No	Treated Acreage	Permitted Acreage	Sensitive Area?	Latitude	Longitude	Herbicide Name: Aquathol K; EPA Reg No.: 70506-176 Amount Applied	Concentration (mg/l = ppm)	Herbicide Name: EPA Reg No.: Amount Applied	Concentration (mg/l = ppm)	Herbicide Name: EPA Reg No.: Amount Applied	Concentration (mg/l = ppm)
1	1.67	1.67	☐ Y			9.2 gal	1.3				
2	3.01	3.01	☐ Y			14.5 gal	1.3				
3	2.0	2.0	☐ Y			11.5	1.75				
4	.86	.86	☐ Y			4.3	1.3				
5	.75	.75	☐ Y			3.2	1.3				
6	1.7	1.7	☐ Y			9.3	1.3				
			☐ Y								
			☐ Y								
			☐ Y								
NOTE: on Bed # 3 I			☐ Y	treated the Eastern 2 Acres of the							
			☐ Y	2.75 Acres Anna Mapped. That is where							
			☐ Y	I saw the more dense clp.							
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
					Totals						

Aquatics at Treatment Site: TS = Target Species SP = Species Present

TS	SP	Species	Site(s)
☐	☑	Cattail	All
☐	☐	Chara	
☐	☐	Coontail	
☑	☑	Curly-Leaf Pondweed	All
☐	☐	Duckweed	
☐	☐	Elodea	
☐	☐	Eurasian/hybrid Milfoil	
☐	☐	Filamentous Algae	
☐	☐	Flat-Stem Pondweed	
☐	☐	Floating-Leaf Pondweed	
☐	☐	Illinois Pondweed	
☐	☐	Large-Leaf Pondweed	
☐	☐	Northern Milfoil	
☐	☐	Phragmites	
☐	☐	Planktonic Algae	
☐	☐	Purple Loosestrife	
☐	☐	Richardson Pondweed	
☐	☐	Robbins Pondweed	
☐	☐	Sago Pondweed	
☐	☐	Watershield	
☐	☑	White Water Lily	1 2 3 5 6
		Other Aquatics	
☐	☐	White-Stem Pondweed	
☐	☐	Wild Celery	

Aquatic herbicide treatment record from May 2013.

Sheet _____ of ___ Date: ____________

Aquatic Plant Management Herbicide Treatment Record
Form 3200-111 (5/01)
Page 2 of 2

Treatment Site and Chemical Information (use attached additional site / herbicide sheet if necessary)

Site No, Property Name, Address / Fire No	Treated Shoreline Length (ft)	Treated Distance Off Shore	Treated Acreage	Permitted Acreage (per property)	Sensitive Area?	Herbicide(s) Used / EPA Reg. Number(s)	Amount Applied (e.g., gals, lbs)	GPS Location Latitude / Longitude
TS2					☐ Y			° ' N ° ' W
1/2			1.5	1.5	☐ Y	Aquathol 4581-204	11.7g	° ' N ° ' W
3			.5	.5	☐ Y		5.5	° ' N ° ' W
4			2	2	☐ Y	All targeted	18.2	° ' N ° ' W
5			.5	.5	☐ Y	2.0 ppm	4.6	° ' N ° ' W
6			.5	.5	☐ Y		4.2	° ' N ° ' W
7/8			1.3	1.3	☐ Y		11.8	° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y		total 54	° ' N ° ' W
					☐ Y	No Turion formation		° ' N ° ' W
					☐ Y	observed.		° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W
					☐ Y			° ' N ° ' W

Aquatics at Treatment Site: TS = Target Species SP = Species Present

TS	SP		Site(s)	TS	SP		Site(s)	TS	SP		Site(s)	TS	SP	Other Aquatics	Site(s)
☐	☐	cattail		☐	☐	white-stem pondwd		☐	☒	coontail	1, 2, 3, 4	☐	☐		
☐	☐	yellow pond lily		☐	☐	flat-stem pondwd		☐	☐	elodea		☐	☐		
☐	☑	white water lily	1, 2, 4, 7, 8	☐	☐	floating-leaf pondwd		☐	☐	filamentous algae		☐	☐		
☐	☐	watershield		☐	☐	sago pondwd		☐	☐	richardson pondwd		☐	☐		
☐	☐	large-leaf pondwd		☐	☐	e. milfoil		☐	☐	illinois pondwd		☐	☐		
☑	☐	curly-leaf pondwd	#11	☐	☐	n. milfoil		☐	☐	planktonic algae		☐	☐		
☐	☐	robbins pondwd		☐	☐	wild celery		☐	☐			☐	☐		