



ARCHIBALD LAKE FLOWERING RUSH CHEMICAL TREATMENT RESULTS

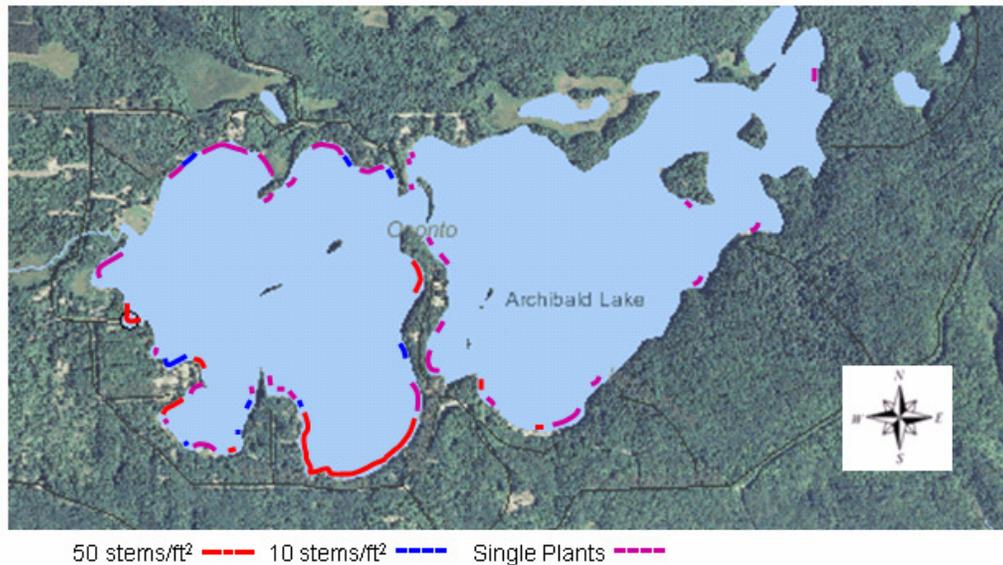
Steve & Karen Fleming

The following is a brief summary of the Archibald Lake flowering rush chemical treatment research that was done between July 2011 and September 2012.

Background

Archibald Lake is one of a number of lakes in Wisconsin that has flowering rush. Best estimates indicate that flowering rush has been in the lake since the early 1980's. Starting in 2008 the Archibald Lake Association has been researching different methods of trying to control the infestation. Figure 1 is a map of the flowering rush in Archibald Lake as of 2009

Figure 1



A number of methods have been tried with some being more effective than others on a small scale. The methods currently being utilized are hand digging, cutting, and cutting flowers before they flower. All of these methods are limited to small accessible areas.

In 2011, the Lake Association received a four year Research and Control Grant from the Wisconsin DNR. The grant was written in such a way that the Association could experiment with different chemical treatment approaches until a solution was found that worked and then implement that method for future control.

The Archibald Lake Association would like to thank Dr. Peter Rice for his willingness to share his wealth of knowledge and guidance; the Wisconsin DNR



(Brenda Nordin for her help with the grant process and Greg Sevener for his plant knowledge and sharing the method of plant density sampling); Dr. John Madsen for sharing his research and his thoughts and suggestions regarding our approach; John Skogerboe and the Army Corps for their chemical analysis and suggestions; Mark Heilman and SePRO for their chemical analysis and suggestions; Stan Hall and Dick Boyer for their willingness to collect all the water samples needed; Archibald Lake APM Team (Kevin Springob, Betsy Nock, Tim McGuire, Cay Brusky and Matt Marty) for their participation in the planning efforts; Tera Guetter, Detroit Lakes, Minnesota for all the information regarding what they have tried and are trying and Cason and Associates (Brad Roost) for their application expertise.

Chemical Treatment

In June 2011, after many discussions with Dr. Peter Rice, it was decided to do two chemical applications; one of Renovate Max G and one of Aquathol Super K. Three locations were chosen, one control area and two chemical trial locations. The two trial locations were over 1,000 feet apart. Plant densities were measured in all three areas before and after treatment.

The “Before Treatment” plant densities were taken on 7/3/11 with the chemical application occurring on 7/11/11. Plant densities were measured by dropping a one foot square PVC pipe into the water and counting the number of stems present inside the square.

Both areas were approximately 0.5 acre in size. 141 pounds of Renovate Max G was applied for a rate of 5 ppm and 31 pounds of Aquathol Super K was applied for a rate of 3 ppm.

Immediately following the treatment water samples were gathered per the instructions provided by Jon Skogerboe and Mark Heilman. The water samples were shipped and analyzed. The results can be found in the Appendix A of this document. Per Mark Heilman, “samples collected on the first day after application indicates that only about 10-15% of the theoretical dose was achieved. The strong decrease in herbicide concentrations to levels <10 ppb by 7/14 (3 days post application) indicates that exposures to effective doses of MAX G were sustained for 1 – 2 days at the most in this high exchange scenario for the treatment. Various research to date by Dr. Peter Rice and others would suggest that the period of exposure measured was insufficient to achieve optimal control of flowering rush.”

The “After Treatment” plant density data was taken on 9/8/12.



Summary of Results

The “before” and “after” plant density data for all three locations is shown in Figure 2.

Figure 2

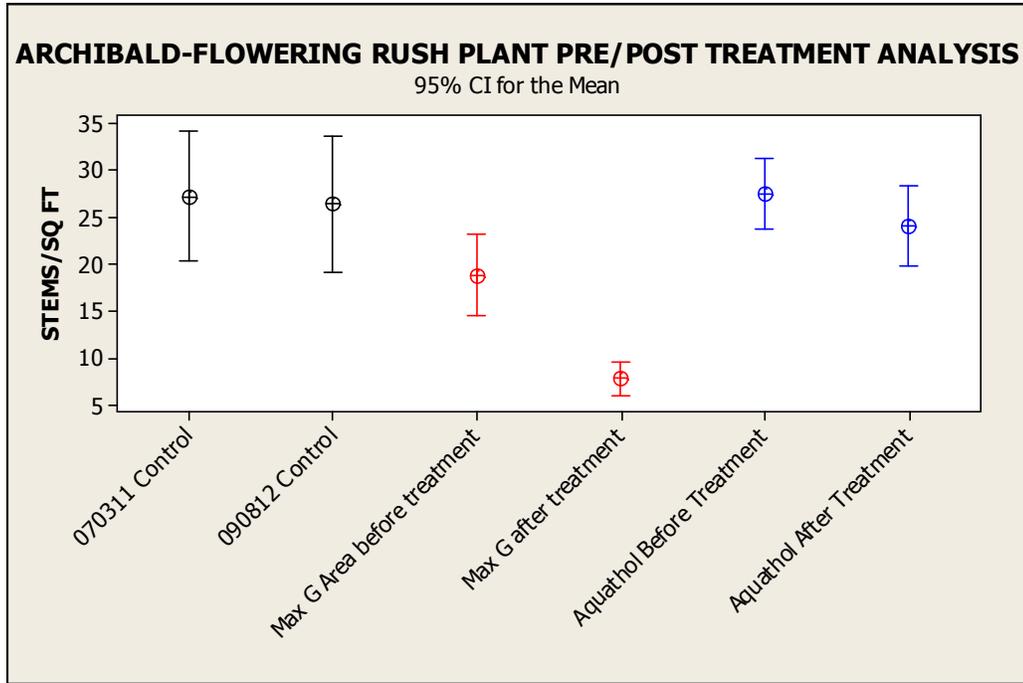


Figure 2 is an interval plot showing the average stem counts (center circle) for thirty locations within the control area and each treatment area. The length of the lines above and below the center circle represents the 95% confidence interval around the mean. We saw a statistically significant 59% reduction in total stem counts from 2011 to 2012 for the Renovate Max G plot. The p-value for the mean difference was 0.000. The Aquathol Super K plot did show a slight decrease in plant density but the difference was not statistically significant with a p-value of over 0.50. The “Control area” showed no difference in plant densities from 2011 to 2012.

After determining that there was a difference before vs. after for Renovate Max G, we also did an analysis to see if there was a difference between the chemical impact on emergent and submergent plants. The analysis is shown in Figure 3.



Figure 3

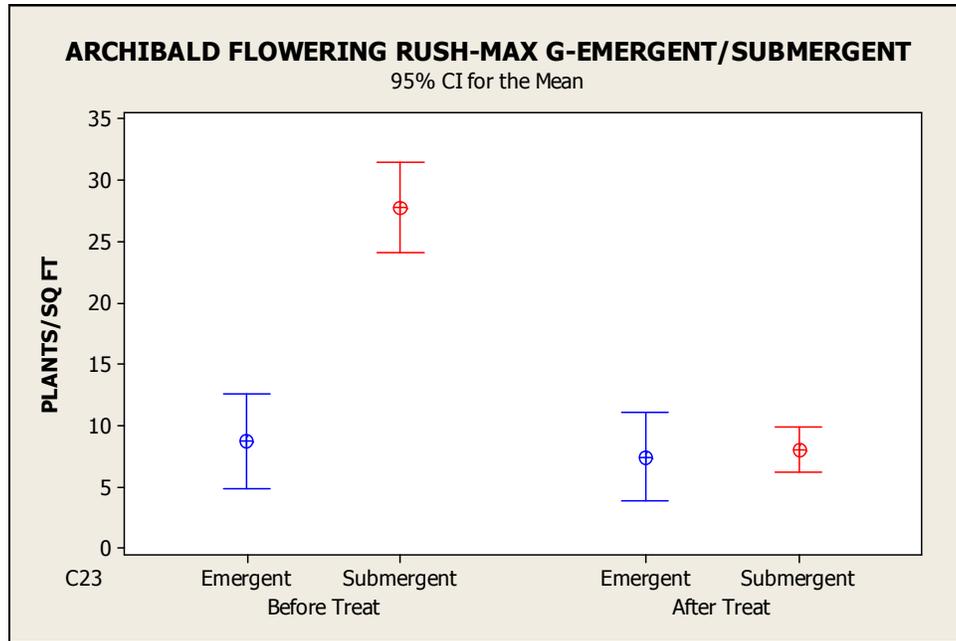


Figure 3 shows that there is a statistically significant 71% reduction in submergent plant densities but no difference in emergent plant densities before and after treatment. The p-value for the difference in submergent plants was 0.000. The p-value for emergent plants was greater than 0.50.

For reference, the samples sizes for the three areas were as follows. For the Control area we took 17 samples in both 2011 and 2012. For the Renovate Max G area we took 33 samples in both 2011 and 2012 with 17 of those samples coming from a submerged area. For the Aquathol Super K area we took 28 samples in 2011 and 2012.

Comments

We are very pleased with the trial results using Renovate Max G. We realize that this was a non-replicated trial performed over one year in one lake. Statistically the data shows that it is very unlikely that these results could have happened by random chance. More experiments need to be done with Renovate Max G to confirm and fully understand the chemical's impact on flowering rush. We don't believe there is any reason to try any further trials with Aquathol Super K.



Remaining Questions

As with most experiments, they often leave as many questions as they provide answers. Here is our initial list of questions. We are sure there are more.

1. Why did the chemical analysis indicate that both chemicals probably would not be effective but yet we indeed saw a significant impact using Renovate Max G? We have heard some theories but don't know the answer for sure.
2. Why didn't the Renovate Max G work on emergent plants? Again, we have heard some theories.
3. What are the next steps? We have heard of some very promising results from Detroit Lakes in Minnesota using Diquat. This question will be answered as we get more information and as more questions are answered. We could definitely consider future trials with Renovate Max G and/or a combination of Renovate Max G and Diquat.

Again the Archibald Lake Association would like to thank all those who shared knowledge and time with respect to these trials.

If you have any questions, comments, or suggestions please contact me at

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Appendix A

Archibald Lake - Residual Data Analysis on Aquathol Super K (Endothol), July 2011

Water Samples were collected from 2 sites in Archibald Lake, 11-14 July 2011, by lake resident volunteers. Samples were fixed with 3 drops of muriatic acid and stored in a refrigerator until they were shipped to the ERCL laboratory at the Center for Aquatic and Invasive Plants, Gainesville, FL.

Data showed rapid dissipation (Figure 1). The mean for each time interval and the standard error were calculated (Figure 2). Concentration data were log transformed and a linear regression was conducted to determine the mean, R^2 , and half life (Figure

Figure 1

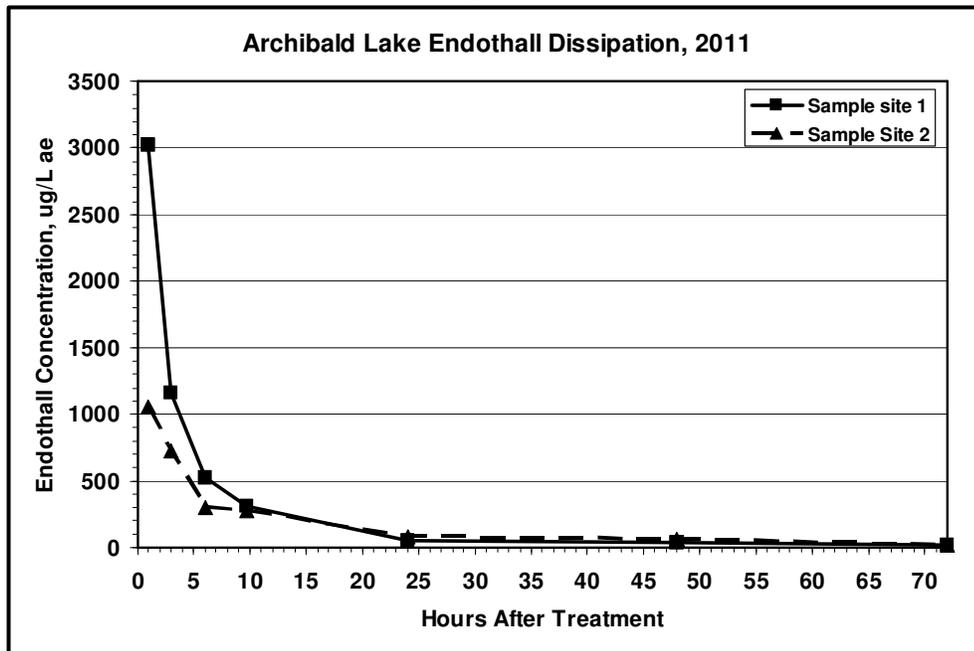




Figure 2

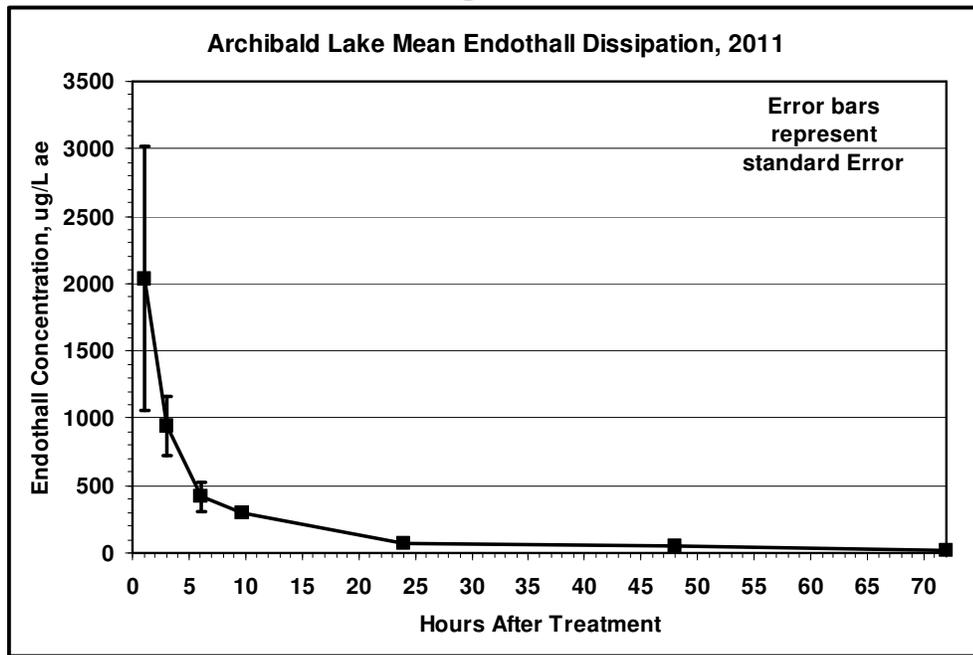
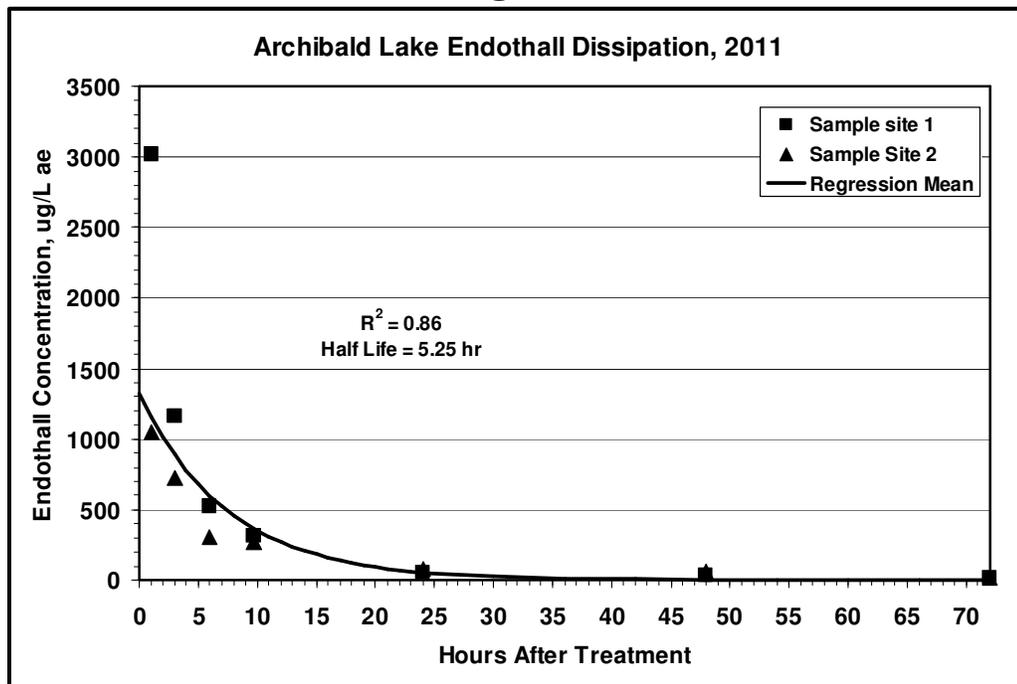


Figure 3





Appendix B

Archibald Lake Residual Analysis of Renovate Max G provided by Mark Heilman (SePRO)

Sample Site ID	Date Treated	Date Sample Collected	Sample Location	Products	Acres Treated	Rate	Active	Result
1	07/11/2011	07/11/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.135 ppm
1	07/11/2011	07/11/2011		Renovate MAX G - 24D	0	0	2-4D	486.4 ppb
2	07/11/2011	07/11/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.101 ppm
2	07/11/2011	07/11/2011		Renovate MAX G - 24D	0	0	2-4D	375.4 ppb
1	07/11/2011	07/14/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.001 ppm
1	07/11/2011	07/14/2011		Renovate MAX G - 24D	0	0	2-4D	7.7 ppb
2	07/11/2011	07/14/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.000 ppm
2	07/11/2011	07/14/2011		Renovate MAX G - 24D	0	0	2-4D	4.7 ppb
1	07/11/2011	07/18/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.000 ppm
1	07/11/2011	07/18/2011		Renovate MAX G - 24D	0	0	2-4D	3.6 ppb
2	07/11/2011	07/18/2011		Renovate MAX G - Tri	0	0	Triclopyr	0.000 ppm
2	07/11/2011	07/18/2011		Renovate MAX G - 24D	0	0	2-4D	3.8 ppb