2017 Binational Great Lakes Aquatic Invasive Species Forum

Eric Fischer Aquatic Invasive Species Coordinato Indiana Dept. of Natural Resourses



INDIANA DEPARTMENT OF

CASE STUDIES IN AQUATIC PLANT RESPONSE AND CONTROL -STARRY STONEWORT

- STARRY STONEWORT FIRST DISCOVERED IN 2008 AT LAKE WAWASEE
- EXPLOSIVE GROWTH AND SPREAD
 - AS AN EXAMPLE
 - 15 ACRES IN 2009
 - 56 ACRES IN 2011
 - 233 ACRES IN 2016



2016 Starry Stonewort treatments- NE Indiana.

Treated 14 lakes Total of 276.61 ac Rapid Response, Control, Eradication? Prevent the spread



Current Control and Herbicide selection

- 2.4 gal/ acre ft Cutrine Ultra w/ Hydrothol 1 qt per acre ft
 - Clipper at a rate of 200ppb



SSW control on limited acreage

First discovered 2015

- 4.0 acres no other indication of other plants
- Treated with Flumioxazin at a rate of 200ppb
- In 2016 1 fragment found early in season treated 4.5 acres twice.
- Aquatic vegetation survey in August found no SSW
- Treatments will continue in 2017
- 3 lakes w/ Flumioxazin and 3 lakes w/ Cutrine/hydrothol



2015 FIELD TRIAL WITH Clemson Univ. and Applied Biochemists (Lonza)



Materials and Methods

- Water and starry stonewort biomass were collected from Indiana and shipped to Clemson University
- Starry Stonewort was subjected to algaecide and algaecide + herbicide combinations using the ACT methodology
 - Clearigate[®] Algaecide (7 day test duration)
 - Cutrine-Ultra[®] Algaecide(7 day test duration)
 - Clipper[®] Herbicide (7 day test duration)
 - Clearigate[®] Algaecide and Clipper[®] Herbicide (7 day test duration)
 - Cutrine-Ultra[®] Algaecide and Clipper[®] Herbicide (7 day test duration)
- ACT was conducted from July 9, 2015 to July 16, 2015
- Starry Stonewort responses were measured through visual observations and chlorophyll a analysis

Materials and Methods

- Following the ACT, Indiana DNR established two, 5 acre plots on the lake
 - 1 untreated reference plot
 - 1 treatment plot
- 10 pretreatment biomass samples were harvested in both plots using the spinning rake method (Johnson and Newman 2011)
 - Application of product occurred in September 2015
 - 10 additional biomass samples were harvested from both plots 5 WAT



Starry Stonewort: Field

- The pretreatment mass in the treatment plot was 266.7 ± 59.1 g/DW/sample
- Starry stonewort mass 5
 WAT decreased (p<0.01) to 33.3 ± 17.6 g/DW/sample
- An 87.5% change from the beginning of the study



Figure 1. Mean (± 1 SE) mass of starry stonewort in small plots in an Indiana lake pretreatment and 5 weeks after an application of Clearigate[®]. An asterisk denotes a difference (p≤0.05) in biomass between the pretreatment and post treatment sampling times according to a Wilcoxin Signed Rank Test.

Follow-up 2016 Herbicide effectiveness trial on Lake Wawasee w/ Grace College

- 7.6% of Lake Wawasee's total acreage, a review of current treatment options was essential.
- Study put three different types of treatments through trials to evaluate their effectiveness in decreasing starry stonewort abundance.
- Study sites included open water and channel plots with 3 different herbicide choices and corresponding control plots.
 - T1= Clearigate
 T2= Algimycin/Clipper
 - T3= Cutrine ultra/Hydrothol





Data use subject to license. © DeLorme. XMap® 6. www.delorme.com

Data use subject to license. © DeLorme. XMap® 6. www.delorme.com

DELORME



16 Test plots

- T1= Clearigate
- T2= Algimycin/Clipper T3= Cutrine ultra/Hydrothol C = Control plots

Plot	Average depth (m)	Location type	Treatment type	Chemical amount	
				2.4 gal/ac-ft; 0.8 ppm, 1 quart/ac-ft; 0.2	
0	1.20	Main lake	Т3	ppm	
1	1.40	Main lake	T2	3.2 gal/ac-ft; 0.6 ppm, 0.8 lbs/ac-ft; 150 ppb	
2	1.22	Main lake	T1	2.2 gal/ac-ft; approx. 0.3 ppm	
3	1.79	Main lake	С	N/A	
6	2.33	Main lake	T1	2.2 gal/ac-ft; approx. 0.3 ppm	
7	0.64	Main lake	T2	3.2 gal/ac-ft; 0.6 ppm, 0.8 lbs/ac-ft; 150 ppb	
				2.4 gal/ac-ft; 0.8 ppm, 1 quart/ac-ft; 0.2	
8	1.59	Main lake	Т3	ppm	
9	1.36	Main lake	С	N/A	
				2.4 gal/ac-ft; 0.8 ppm, 1 quart/ac-ft; 0.2	
10	1.49	Main lake	Т3	ppm	
11	1.50	Main lake	Т2	3.2 gal/ac-ft; 0.6 ppm, 0.8 lbs/ac-ft; 150 ppb	
12	1.48	Main lake	С	N/A	
13	1.49	Main lake	T1	2.2 gal/ac-ft; approx. 0.3 ppm	
				2.4 gal/ac-ft; 0.8 ppm, 1 quart/ac-ft; 0.2	
15	0.49	Channel	Т3	ppm	
16	0.49	Channel	T2	3.2 gal/ac-ft; 0.6 ppm, 0.8 lbs/ac-ft; 150 ppb	
17	0.46	Channel	T1	2.2 gal/ac-ft; approx. 0.3 ppm	
18	0.50	Channel	С	N/A	

Table: Summary of starry stonewort abundance as measured in dry sample density (in g/m²) for every plot before treatment, after the first application of treatment, and after the second application of treatment.

Plot	Pre-Treatment	Post 1 Treatment	Post 2 Treatment	Treatment type
0	1116.6	562.5	58.1	Т3
1	882.1	8.6	108.4	Т2
2	3342.3	3656.0	2804.7	T1
3	1208.5	2291.8	1838.0	с
6	3408.5	3091.5	4069.6	T1
7	7173.5	5122.8	3079.1	Т2
8	1097.1	1854.5	1846.6	Т3
9	1045.9	1245.6	388.4	С
10	804.8	1464.1	417.5	Т3
11	782.4	801.5	765.0	Т2
12	1290.2	575.6	655.5	С
13	1497.7	361.3	330.2	T1
15	3407.2	1758.0	1060.8	Т3
16	1713.8	704.3	738.3	Т2
17	882.5	455.9	601.9	T1
18	6052.5	1588.4	1414.4	С

Confounding Factors and Uncertainty

- Mixed results in how each treatment managed the SSW
- Quick decrease of each treatment's chemical concentration likely negatively impacted the treatment's effectiveness
- Differences in water movement and concern over copper uptake related to plant biomass
- Biomass surrounding the test plots have an unknown influence on effectiveness
- Some of the herbicides (Clipper) efficacy is negatively effected by higher pH levels.

Plan for 2017

- Continue monitoring of SSW populations
- Expanded surveillance to detect SSW populations not documented
- Trial with Granular Copper algaecides on Lake George in cooperation with Ionza/applied biochemists
 - Area 1 Cutrine-Plus[®] Granular Algaecide at 0.75 ppm
 - Area 2 Harpoon[®] Granular Herbicide at 0.75 ppm
 - Area 3 Harpoon[®] Granular Herbicide at 1.0 ppm



Evaluation of Clipper (Flumioxazin) vs Cutrine Ultra on lakes with minimal acreage.

QUESTIONS?

ERIC FISCHER 402 W. WASHINGTON ST, RM W273 INDIANAPOLIS, IN 46204 (317)234-3883 efischer@dnr.in.gov