

Northeast Aquatic Research

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Lake Zoar Pre- and Post- Aquatic Plant Treatment Survey Results for 2017

Pre-treatment Survey: partial survey conducted on June 7th, 2017.

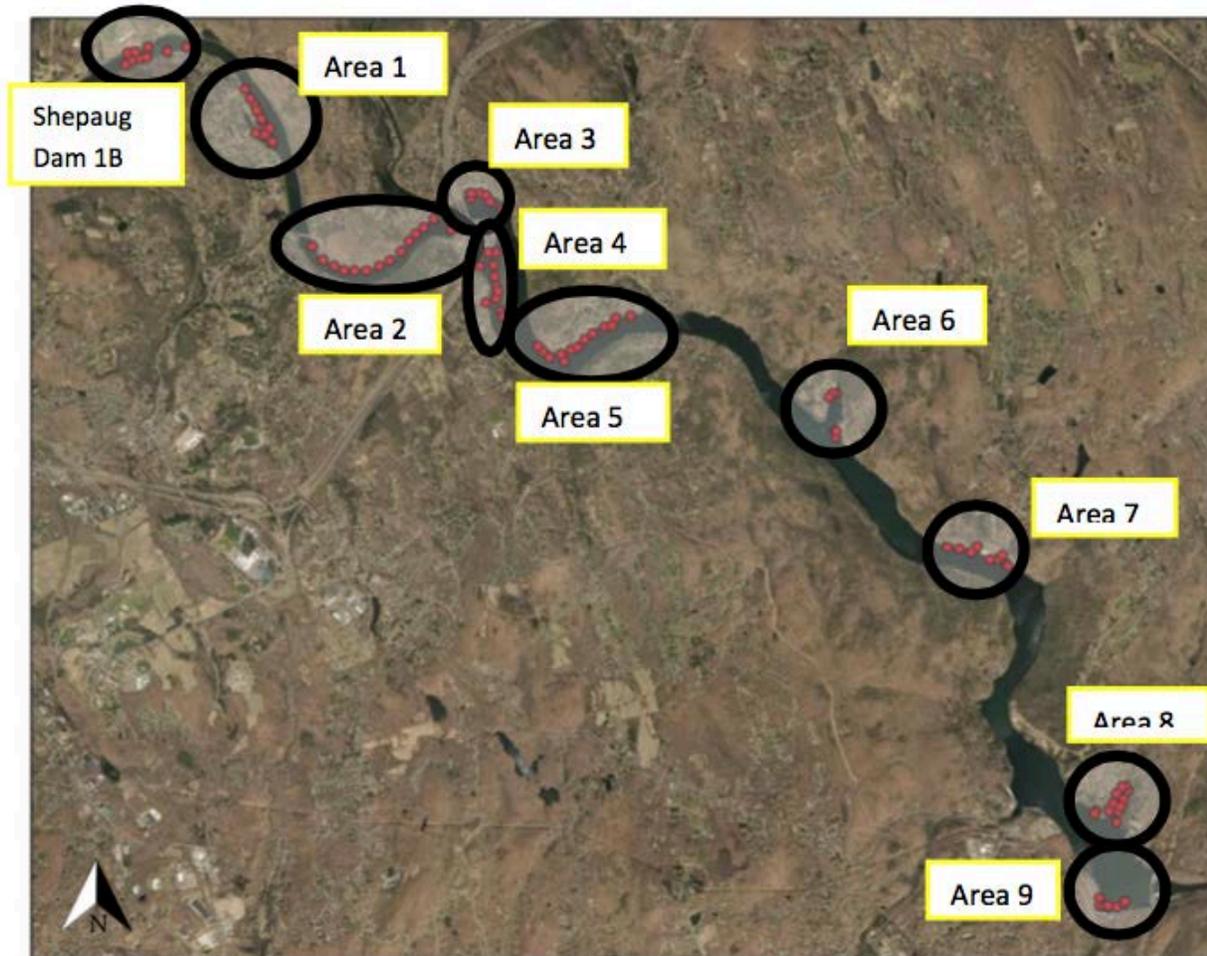
Treatment Dates: June 15th and August 24th, 2017. Target plants: Eurasian milfoil, Curly-leaf pondweed, and spiny naiad.

Post-Treatment Surveys: All sites surveyed on July 21st, 2017, 5 weeks after the first treatment. All sites surveyed again on September 21st, 4 weeks after the second treatment.

Treatment Areas (shown in Map 1):

Area	Size (acres)	Location - Description
1B	5.9	Narrow bands 100 feet wide opposite each other along the eastern and western shorelines.
1	10.0	Narrow band 100 feet wide along western side and within small cove about 1 mile below the Shepaug Dam.
2	5.7	Narrow band 70 feet wide along eastern shore about 2.5 miles below Shepaug Dam. Includes small bed on western side immediately above I84 Bridge.
3	8.2	Large bay on eastern side immediately below I84 Bridge, bounded to the west by large sandbar.
4	14.4	Large area that includes both sides of central sandbar and shallow waters on the western side.
5	11.2	Large shallow area offshore of DEEP boat launch and narrow band 75 wide along eastern shore.
6	5.0	Inner end of cove at Kettletown State Park.
7	2.4	Two small coves on eastern shore at Jackson Cove State Park.
8	8.4	Narrow band 50 feet wide and cove on eastern side about 2.5 miles above Stevenson Dam.
9	3.2	Small bay on western side about 1000 feet above Stevenson Dam.
Total	74.4	

Map 1 - Overview of All Sites



Invasive species results from survey following 1st herbicide treatment (July 21st):

Area	Avg. Eurasian Milfoil % cover	Avg. Spiny Naiad % cover
1B	26 = Moderate	None
1	30 = Moderate	None
2	15 = Good	None
3	49 = Moderate	None
4	16 = Good	None
5	2 = Very Good	None
6	55 = Poor	None
7	32 = Moderate	None
8	15 = Good	2 = Very Good
9	41 = Moderate	3 = Very Good

Invasive species results from survey following 2nd herbicide treatment (September 21st):

Area	Avg. Eurasian Milfoil % cover	Avg. Spiny Naiad % cover
1B	47 = poor	None
1	21 = Moderate	None
2	12 = Good	1 = Very Good
3	0 = Excellent	None
4	0 = Excellent	None
5	0 = Excellent	None
6	1 = Very Good	None
7	0 = Excellent	None
8	0 = Excellent	None
9	0 = Excellent	None

Treatment Areas Details

The treatment areas (outlined in white) are drawn to contain the milfoil beds found during the pre-treatment survey. The maps also include red dots to signify areas where milfoil was found during the first post-treatment survey. Average percent cover is a combination of the density and frequency of occurrence within each area.

Map 2 - Treatment Area 1B



Pre-treatment:

Milfoil was growing in a band along the western shoreline, becoming denser closer to the dam. No milfoil was present in the treatment area along the eastern shoreline. No other species were found in this area.

First post-treatment: Dense milfoil covered most of this area in a long band along the shoreline. Curly leaf pondweed was found at one waypoint but at a low density. No spiny naiad was found in this treatment area. Tape grass and aquatic moss were also found at one waypoint each in this area.

Second post-treatment: Milfoil remained dense along the shoreline in this area. Tape grass expanded slightly, present at 50% of waypoints at a relatively high density. Water stargrass and sago pondweed were also present at one waypoint each. No curly leaf pondweed or spiny naiad was found in this treatment area.

Map 3 - Treatment Area 1



Pre-treatment:

Milfoil filled this treatment area, present at 100% of the waypoints. The milfoil was dense at most waypoints, although a few waypoints exhibited a medium or low density. Curly-leaf pondweed was present in approximately half of the area, mostly at a low density. The only other species found in this area was water stargrass, which was found at one waypoint.

Post-treatment: Milfoil decreased to half of the waypoints in Area 1, growing in moderate to dense patches. Curly leaf pondweed was found at two waypoints, but was very sparse. Tape grass, ceratophyllum demersum, and water stargrass and western waterweed were also found at a moderate density in this area. Spiny naiad was not found in Area 1.

Second post-treatment: Milfoil remained dense and present in approximately 50% of the treatment area. Tape grass expanded to nearly 90% of the treatment area at a high density and coontail and western waterweed were also dominant at a medium density. Water stargrass, aquatic moss, long-leaf pondweed and clasping-leaf pondweed were each present at one waypoint. No spiny naiad or curly-leaf pondweed was found in this area.

Map 3 - Treatment Area 2



Pre-treatment:

Eurasian milfoil filled this treatment area. While the majority of the milfoil in this area was dense, a small portion of the shoreline had milfoil growing at a low to moderate density. Curly-leaf pondweed was present at approximately 40% of the waypoints at a low density. Coontail was also found at a low density at one waypoint.

Post-treatment:

Coontail, tape grass, and Eurasian milfoil dominated the treatment area. After the herbicide treatment, milfoil decreased to 50% of waypoints. It was sparse in most of the area but two patches were dense. No curly-leaf pondweed or spiny naiad was found in this treatment area. Several other native species were present at varying densities.

Second post-treatment:

Milfoil was present at the same frequency and density as the first post-treatment survey. Spiny naiad was also found at two waypoints at a low density during this survey. Tape grass, coontail and water stargrass remained dominant and had spread since the first post-treatment survey. Waterweed, aquatic moss, sago pondweed, claspingleaf pondweed and small pondweed were each found at one waypoint each at a low density.

Map 4 - Treatment Area 3



Pre-treatment:

This treatment area had dense (100% cover) Eurasian milfoil at nearly 70% of waypoints. Curly-leaf pondweed was present in 50% of the area, at a high density at two waypoints. Western waterweed was present in nearly 70% of the area, but at a very low density.

Post-treatment:

Only four species were present in this area and all four species were dominant, present at more than 20% occurrence. The milfoil patches did not decrease in size after the treatment but the patches did become less dense. Tape grass, water stargrass, and coontail were also dominant species. No spiny naiad or curly-leaf pondweed was found in this area.

Second post-treatment:

Tape grass was present at all the waypoints in this treatment area, growing at a medium density. The only other species were coontail and small pondweed, each present at one waypoint at a low density. No invasive species were found in the area during this survey.

Map 5 - Treatment Areas 4



Pre-treatment: Eurasian milfoil was present at all waypoints in this treatment area. The milfoil was growing at 50-100% cover at most waypoints although one waypoint had just one plant. Curly-leaf pondweed and coontail were each found at two waypoints at a low density.

Post-treatment:

Milfoil, tape grass, and *Potamogeton bicupulatus* were the dominant species in this area. The herbicide treatment successfully decreased milfoil in this area. During the post treatment survey, it was present at approximately 60% frequency and 30% average density. Curly leaf pondweed was present at one waypoint but was very sparse. Coontail, water stargrass and elodea were also present. No spiny naiad was found in this area.

Second post-treatment:

Tape grass and coontail both spread since the first post-treatment survey. Tape grass was present at all but one waypoint at a moderate density and coontail was present at 60% frequency and approximately 25% average density. Curly-leaf pondweed also remained present at one waypoint at a low density. Elodea, aquatic moss, and clasping-leaf pondweed were each present at one or two waypoints. No invasive species were found in the area during this survey.

Map 6 - Treatment Area 5



Pre-treatment: Curly-leaf pondweed was found at 100% of waypoints in this treatment area, mainly at a medium to high density. Milfoil was growing at a medium density in the upstream half of the treatment area. No milfoil was found in the downstream portion. Tape grass and coontail were each found at one waypoint at a low density.

Post-treatment:

Eurasian milfoil, tape grass, coontail, and snail-seed pondweed were all dominant species in Area 5. The Eurasian milfoil was present at a similar frequency in both the pre- and post-treatment surveys, but the milfoil was less dense during the post-treatment survey. The curly-leaf pondweed decreased drastically compared to the pre-treatment survey. However, this decrease was likely natural, rather than a result of the treatment, because curly-leaf pondweed begins to die off by mid summer. No spiny naiad was found in this area.

Second post-treatment:

Tape grass remained dominant after the second treatment, present at all but one waypoint. The only other species found in this area was clasp-leaf pondweed, present at just one waypoint at a low density. No invasive species were found in this treatment area.

Map 7 - Treatment Area 6



Pre-treatment:

Eurasian milfoil was present in 75% of the cove at a medium to high density. The only other plant found in the cove was curly-leaf pondweed, found at one waypoint at a low density. Consistent with the surveys from recent years, no native species were found in this area.

Post-treatment:

The herbicide treatment did not appear to significantly reduce the milfoil in this area. Consistent with the findings from the pre-treatment survey, milfoil filled nearly the entire treatment area at a moderate to high density. No other species were present.

Second post-treatment:

Milfoil decreased drastically following the second treatment, with just a few small, newly growing plants found at one waypoint. Coontail, however, had spread in this area, present at all waypoints but remaining at a low density. No other species were found in this treatment area.

Map 8 - Treatment Area 7



Pre-treatment:

Eurasian milfoil was growing in just under 70% of this area at varying densities, from 15% – 100% cover. Coontail was also present at one waypoint at a low density.

Post-treatment:

Eurasian milfoil remained present at nearly 90% frequency and was moderately dense, consistent with the findings from the pre-treatment survey. This suggests that the treatment did not successfully reduce milfoil in this area. The only other species found in this area were tape grass and coontail, present at one and two waypoints respectively.

Second post-treatment:

No plants were found in this area following the second herbicide treatment.

Map 9 - Treatment Area 8



Pre-treatment:

Eurasian milfoil was present in 60% of this treatment area. Overall, the average density of milfoil was lower here (25% cover) than in the other treatment areas. Coontail was also present at two waypoints at a low density. This treatment area appeared to have fewer plants overall compared to the other treatment areas.

Post-treatment:

Eurasian milfoil was present at over 50% of the waypoints in Area 8 at a moderate to low density, which is similar to the findings from the pre-treatment survey. Coontail was also dominant at this area at a moderate density. Spiny naiad was found at one waypoint, also at a moderate density.

Second post-treatment:

The majority of this treatment area was devoid of any plants. Coontail was present at one waypoint and one dead milfoil plant was found at this same waypoint.

Map 10 - Treatment Area 9



Pre-treatment:

Eurasian milfoil was present at a high density at all but one waypoint in this treatment area. Coontail was also found at one waypoint at a low density. No curly-leaf pondweed was found in this area.

Post-treatment:

Tape grass, Eurasian milfoil, and ceratophyllum demersum were all dominant in this area at approximately 60% occurrence. The milfoil patches did not appear to decrease significantly in size or density compared to the pre-treatment survey. Spiny naiad, curly-leaf pondweed and water stargrass were also dominant in this area at 25% occurrence but at a low density. No other species were present in this area.

Second post-treatment:

Tapegrass was present at 100% of the waypoints surveyed in this area and was relatively dense. Coontail also remained dominant but was less dense than the first post-treatment survey. One unknown pondweed was found at one waypoint in this area. No invasive species were found in the area during this survey.

Summary of 2017 Results

- The first herbicide treatment controlled Eurasian milfoil reasonably well in the upstream half of the river (Areas 1B – 6). However, the treatment did not appear to significantly reduce the milfoil in the downstream portion (Areas 7 – 9). The results from the 2016 treatment also showed a similar reduced impact in the downstream portion. This could be due to an increased flushing rate in this part of the river.
- A second herbicide treatment was conducted after the first treatment was not completely successful. This second treatment did a much better job of controlling the milfoil in the downstream portion of the river. Following this treatment, only one small patch of milfoil was found throughout treatment areas 3 – 9. Milfoil patches remained in treatment areas 1B, 1 and 2.
- The invasive species spiny naiad was not found during the pre-treatment survey and very little was found both of the post-treatment surveys, suggesting that the 2016 and 2017 herbicide treatments have successfully begun to control this species.
- Very few native plants were found during the pre-treatment survey, likely due to the dense milfoil beds. More native plants were present during the post-treatment surveys, possibly because the reduced milfoil allowed room for native species. However, several treatment areas, became dominated by native species mostly tape-grass, coontail, stargrass and pondweeds after the first treatment.

Action Plan for 2018

- Conduct a pre-treatment inspection of aquatic plant beds in late May or early June 2018.
 - Develop pre-treatment maps of areas to be treated.
- Make first application of herbicides in late June. Treatments should be timed with FirstLight use of Stevenson Dam to generate electricity. However this coordination is not mandatory, having proved to be difficult or impossible to schedule application of herbicide in the lake when no generation is expected for 6 to 12 hours.
- Conduct the first Post-Treatment survey approximately 3-4 weeks post treatment or about mid-July. Assess initial effect of herbicides on target plants.
- Make a second application of herbicides in late August based on pervasiveness of milfoil and spiny naiad.
- Conduct a second Post-treatment survey in early September to assess effect of the second treatment.
- Prepare Pre- Post-Treatment summary report.

Appendix – Aquatic Plant species and average percent cover in each treatment area

July 2017

September 2017

	1B	1	2	3	4	5	6	7	8	9		1B	1	2	3	4	5	6	7	8	9	
<i>Valisneria americana</i>	13	8	33	50	17	40		3		30		38	71		30	50	54					70
<i>Myriophyllum spicatum</i>	26	29	15	49	16	2	55	32	15	41		47	21	62					1			
<i>Ceratophyllum demersum</i>		6	28	4	4	3		7	12	19			9	12	3	14						9
<i>Najas minor</i>									2	3				36								
<i>Potamogeton crispus</i>	2	1				3				1				8								
<i>Zosterella dubia</i>		4	1	6	3					2		7	4									
<i>Potamogeton bicupulatus</i>			1		10	15								7								
<i>Elodea nuttallii</i>			4		1								1			1						
<i>Fontinalis sp.</i>	2												1	1		1						
<i>Potamogeton nodosus</i>			8										1									
<i>Stukenia pectinata</i>												1										
<i>Potamogeton perfoliatus</i>													1	1		1	2					
<i>Potamogeton berchtoldii</i>														2.1	1.3							

Scientific name

Common name

<i>Valisneria americana</i>	Tape grass
<i>Myriophyllum spicatum</i>	Eurasian milfoil
<i>Ceratophyllum demersum</i>	Coontail
<i>Najas minor</i>	Spiny naiad
<i>Potamogeton crispus</i>	Curly-leaf pondweed
<i>Zosterella dubia</i>	Water Stargrass
<i>Potamogeton bicupulatus</i>	Snailseed pondweed
<i>Elodea nuttallii</i>	Elodea
<i>Fontinalis sp.</i>	Aquatic moss
<i>Potamogeton nodosus</i>	River Pondweed
<i>Stukenia pectinata</i>	Sago Pondweed
<i>Potamogeton perfoliatus</i>	Clasping-leaf pondweed
<i>Potamogeton berchtoldii</i>	Narrow leaf pondweed