

# Bashan Lake

## Aquatic Plant Surveys and Treatment

### 2016



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Gregory J. Bugbee and Jennifer M. Fanzutti



# CAES

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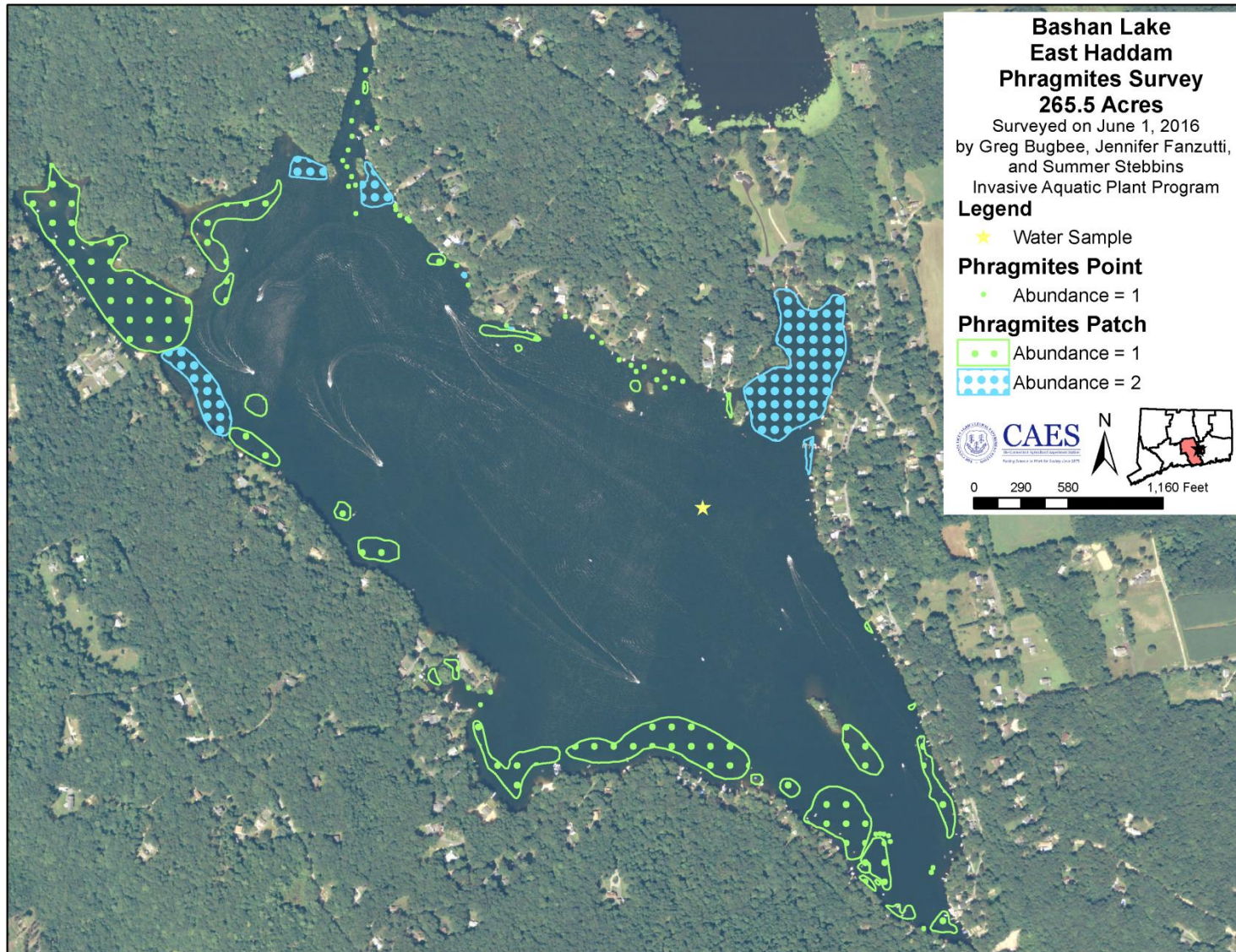


**Figure 1.** Phragmites in partially filled Bashan Lake in March (left) and June (right).

## Introduction

The Connecticut Agricultural Experiment Station (CAES) Invasive Aquatic Plant Program (IAPP) has monitored and treated invasive plants in Bashan Lake, East Haddam for nearly 15 years. The work has focused on mapping and treating variable watermilfoil (*Myriophyllum heterophyllum*). Aquatic plant surveys for all native and invasive plants were performed by CAES IAPP in 2004 and 2014 (see maps in appendix). These surveys have documented 21 plant species ([www.ct.gov/caes/iapp](http://www.ct.gov/caes/iapp)). Unfortunately, the lake had extensive areas of invasive variable watermilfoil and a small area of invasive fanwort (*Cabomba caroliniana*). No other plants were considered a nuisance. In 2014, the lakes dam underwent a complete rebuild. In the process, the water was lowered approximately 18 feet. Rebuilding was completed in early 2015, however, the lake level remained more than four feet below normal through the fall of 2016. When the lake was lowered most of the variable watermilfoil that escaped CAES IAPP treatment was likely killed by exposure to freezing and desiccation. Unfortunately, the exposed sediment provided excellent habitat for invasive phragmites (*Phragmites australis*). In 2016, CAES IAPP mapped the phragmites in preparation for a CTDEEP herbicide permit application. In addition, CAES IAPP did a complete vegetation survey and marked the locations of variable milfoil.





**Figure 2.** Locations of phragmites in or along the shoreline of Bashan Lake on June 1, 2016.

## Methods

### *Surveillance:*

On March 17, 2016, CAES staff walked the periphery of Bashan Lake and marked the locations of phragmites with a Trimble® global positioning system(GPS) (Figure 1, left). On June 1, 2016 the lake was resurveyed for phragmites using a 14 foot Jon boat. This allowed better access to stands of phragmites now present in up to 7 feet of water (Figure 1, right). Maps were assembled using ArcGIS® software (Figure 2) and supplied to CTDEEP (Connecticut Department of Energy and Environmental Protection) for permit review (see appendix). On October 5-6 2016, CAES performed a complete aquatic vegetation survey using the same techniques utilized in 2004 and 2014 ([www.ct.gov/caes/iapp](http://www.ct.gov/caes/iapp)). The only exception was the inability to resurvey the georeferenced transects because they were partially out of the water. Locations of deep water plants such as variable watermilfoil and bladderwort (*Utricularia sp.*) were aided with the help of GPS linked underwater video equipment.

### *Permitting:*

Three CTDEEP permits were necessary to perform the phragmites herbicide application; 1) State listed species – bridled shiner (Natural Diversity Database Division), 2) Special Use License (Land Acquisition Division) and 3) Aquatic herbicide (Pesticide Division). CAES applied for and obtained each permit. The CAES surveys proved critical in delineating areas to be treated and providing other information necessary for CTDEEP staff to move forward with the approvals. The permit applications and approved permits are in the appendix of this report.

### *Phragmites Herbicide Application:*

On September 26 and 27, 2016, CAES treated the phragmites designated with an abundance of two (per CTDEEP permit requirements) shown in figure 2. A 1/1 by volume mixture of Rodeo® (glyphosate), Habitat (imazapyr) plus Cygnet spreader/sticker was diluted in water and spot treated at a rate equivalent to three pints of Rodeo and three pints of imazapyr per acre. The herbicide mixture



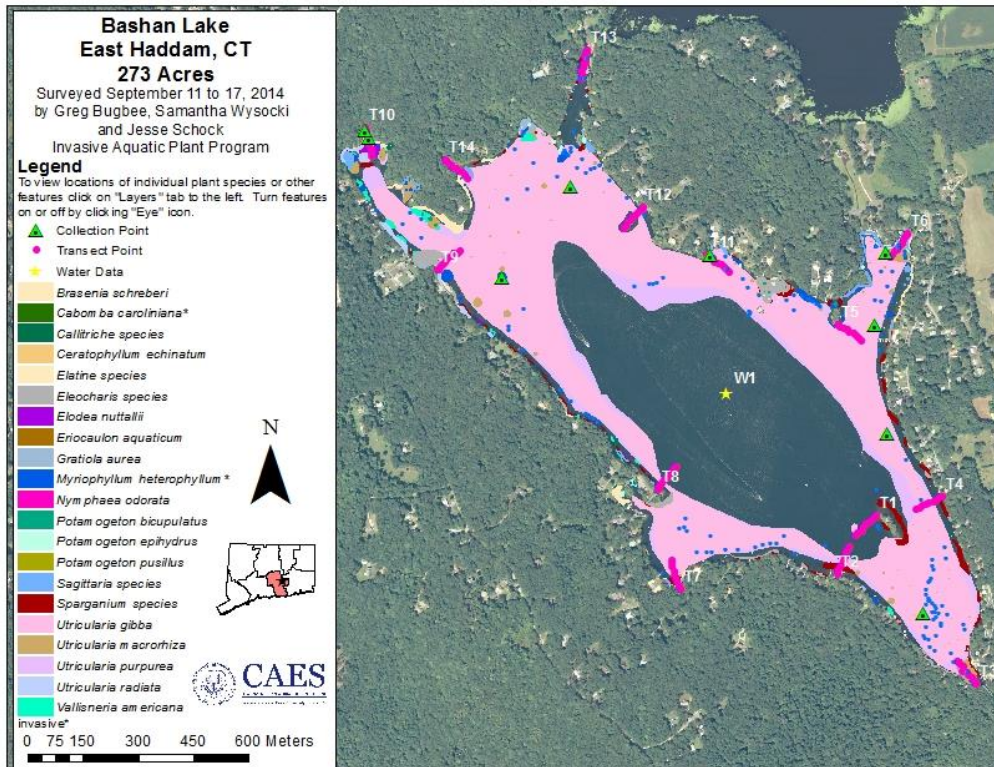


Figure 3. CAES aquatic plant survey of Bashan Lake 2014.

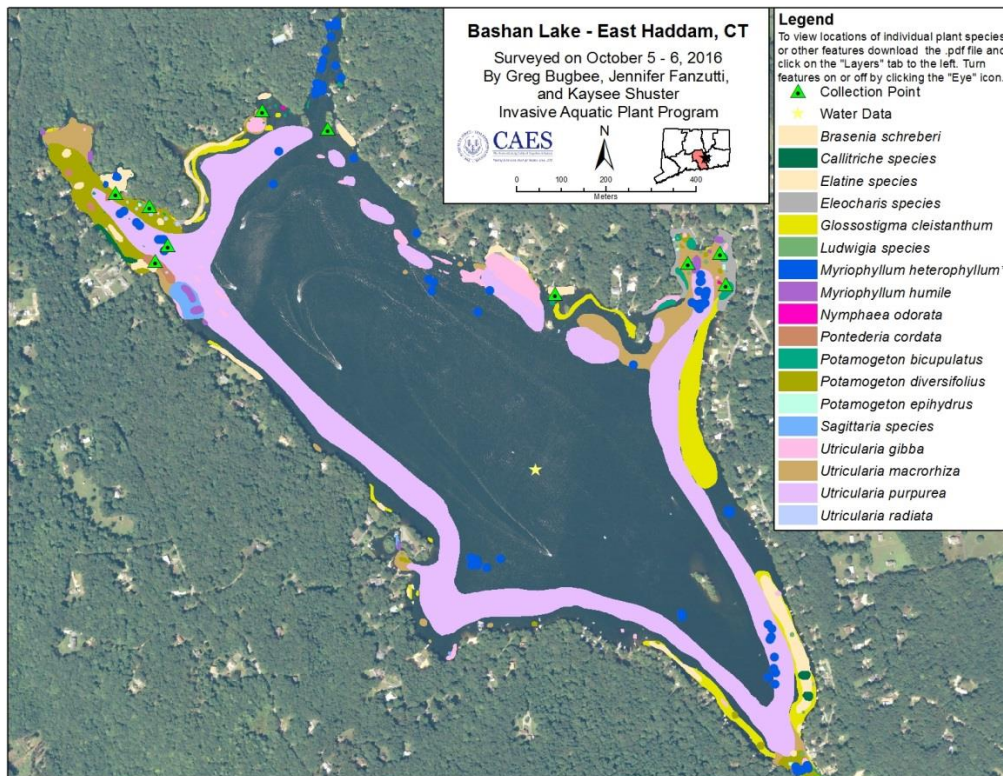


Figure 4. CAES aquatic plant survey of Bashan Lake 2016.

**Table 1.** Comparison of aquatic plants found in Bashan Lake 2014 versus 2016 (X=present).

Scientific Name	Common Name	2014	2016
<i>Brasenia schreberi</i>	Watershield	x	x
<i>Cabomba caroliniana</i>	Fanwort	x	
<i>Callitriche species</i>	Water starwort	x	
<i>Ceratophyllum echinatum</i>	Spineless hornwort	x	
<i>Elatine species</i>	Waterwort	x	x
<i>Eleocharis species</i>	Spikerush	x	x
<i>Elodea nuttallii</i>	Western waterweed	x	
<i>Eriocaulon aquaticum</i>	Sevenangle pipewort	x	
<i>Glossostigma cleistanthum</i>	Mudmat		x
<i>Gratiola aurea</i>	Golden hedge-hyssop	x	
<i>Myriophyllum heterophyllum</i>	Variable leaf watermilfoil	x	x
<i>Myriophyllum humile</i>	Low watermilfoil		x
<i>Nymphaea odorata</i>	White water lily	x	x
<i>Phragmites australis</i>	Phragmites		x
<i>Pontederia cordata</i>	Pickerelweed		x
<i>Potamogeton bicupulatus</i>	Snailseed pondweed	x	x
<i>Potamogeton diversifolius</i>	Water thread pondweed		x
<i>Potamogeton epihydrus</i>	Ribbon leaf pondweed	x	x
<i>Potamogeton pusillus</i>	Small pondweed	x	
<i>Sagittaria species</i>	Arrowhead	x	x
<i>Sparganium species</i>	Burr-reed	x	
<i>Utricularia gibba</i>	Humped bladderwort	x	x
<i>Utricularia macrorhiza</i>	Common bladderwort	x	x
<i>Utricularia purpurea</i>	Purple bladderwort	x	x
<i>Utricularia radiata</i>	Floating bladderwort	x	x
<i>Vallisneria americana</i>	Eel grass	x	
	<b>Total</b>	<b>21</b>	<b>17</b>

was applied with a 25 gallon electric sprayer. Weather conditions on both days were sunny with light winds and no precipitation.

### Results and Discussion:

Phragmites found in March was limited to a few areas and the abundance was sparse (Figure 1, left). The June resurvey, however, found extensive areas of phragmites both along the shore and in up to five feet of water (Figure 1, right and 2). CAES ranks the abundance of vegetation on a one (very sparse) to five

(complete coverage) scale. The June phragmites patches were ranked either a one or a two. This information was supplied to the CTDEEP as part of the permit application and the permit reviewers allowed only the areas with an abundance of 2 to be treated. CAES treatment of the phragmites proved difficult in the deeper water as most of the foliage was submersed and not receptive to foliar sprays. In shallow water and out of the water along the shore, the herbicide spray was well received. Due to the natural yellowing of phragmites in the fall, the effectiveness of the treatment cannot be assessed until spring. If the lake is full in the spring most of the treated phragmites will be underwater and this alone could offer considerable control.

The October 2016 full survey found a markedly different plant community compared to the last CAES survey in 2014 (Figures 3 and 4). This is likely explained by the exposed lake bottom during dam repairs and shallow water over fine textured and more fertile bottom sediments normally too deep to support diverse plant community. The total number of species was reduced from 21 in 2014 to 17 in 2016 (Table 1). There were two invasive species in 2014 (variable watermilfoil and fanwort) and only one in 2016 (variable watermilfoil). The fanwort may have been eliminated by the low water levels experienced during the dam repairs. If so, a significant benefit would be realized. Unfortunately, variable watermilfoil remained in many of the same places it occurred in 2014 prior the lake being lowered for dam repairs. CAES contacted the CTDEEP Pesticides Division in an attempt to amend the herbicide permit to treat the variable milfoil without success. Mudmat (*Glossostigma cleistanthum*) was not present in 2014 but covered large areas in 2016. This plant is not native to Connecticut but has not been placed on the states invasive species list. It grows only a few inches tall and forms a mat-like covering in water less than 6 feet deep. This covering could displace native species but is often preferred to taller growing plants that can be a nuisance.

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**Future Suggestions:**

1) The normalization of Bashan Lakes water level should be prioritized to assure the lake is full by spring of 2017. This will maximize the natural control of phragmites and other nuisance plants by the deep water.

2) Bashan Lake should be surveyed for phragmites, variable watermilfoil and fanwort during the summer of 2017.

3) A CTDEEP three year aquatic herbicide application should be prepared for controlling phragmites and variable water milfoil. The three year option offers the convenience of only having to file in the first year with the downside of having to make an educated guess as to what will need treatment and where it is located. If a change is needed a permit can sometimes be amended via a request to the CTDEEP.

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# Appendix

# CTDEEP Aquatic Herbicide Permit

# Natural Diversity Database



# Land Acquisition

# Pesticides

# CTDEEPAquatic Herbicide Permit



