

# 2015 YEAR-END REPORT

## Fanwort (*Cabomba caroliniana*) Control in Gooseberry Cove, Wequaquet Lake, and Bearse Pond - Barnstable, Massachusetts



**March 2016**

*Prepared for:*

**Town of Barnstable  
c/o Office of the Purchasing Agent  
230 South Street  
Hyannis, MA 02601**

*Prepared by:*



**Aquatic Control Technology  
21 West Main Street  
Spencer, MA 01562**

## BACKGROUND

Wequaquet Lake is a 654-acre lake located in the town of Barnstable, Massachusetts. This large water body may be broken into three distinct basins – the main lake (545.5 acres), Bearnse Pond (67.5 acres), and Gooseberry Pond (41 acres) (**Image 1**). This lake is typified by a maximum depth of thirty-four (34) feet and an average depth of twelve (12) feet. Water flows out of Wequaquet Lake over a dam at Phinney's Lane to the south, and continues south through a dug herring run to Long Pond where it eventually joins the Centerville River estuary system.



Wequaquet Lake serves as a highly utilized recreational resource. This lake's nearly 7.5-mile shoreline is heavily developed with many seasonal and year-round homes.

Additionally, a town-owned boat ramp on the north end of the main lake (i.e., off of Shootflying Hill Road) provides boat access to the lake for the general public. Widespread access puts this lake at high risk for the infestation of aquatic invaders.

For at least the past decade, fanwort (*C. caroliniana*), has been known to exist in Wequaquet Lake. Through a coordinated effort by the Town of Barnstable/Conservation Division (the Town), the Wequaquet Lake Protection Association (WLPA), and multiple private environmental consulting firms, several management strategies have been implemented to control *C. caroliniana* in the Bearnse Pond, Gooseberry Pond, and Johnson's Lane Coves portions of the lake. A summary of these management activities is provided as follows:

Year	Management Activities
2001 & 2006	Conducted fluridone treatments in Bearnse Pond (in 2001) and Gooseberry Pond (in 2006); treatments successfully reduced <i>C. caroliniana</i> growth for several years
2010	Biological survey documented regrowth of <i>C. caroliniana</i> in five distinct cove areas located in Bearnse and Gooseberry Ponds; <i>C. caroliniana</i> extent totaled approximately four (4) acres
2011-2012	Submitted Notice of Intent (NOI) proposing the use of fluridone to manage the <i>C. caroliniana</i> to the Barnstable Conservation Commission (the Commission), the Massachusetts Department of Environmental Protection (the MassDEP), and the Natural Heritage and Endangered Species Program (the NHESP) <sup>1</sup> on 4/26/11 Fluridone treatments not approved; however, management via Diver Assisted Suction Harvesting (DASH) permitted and conducted (amended Order of Conditions (OOC), DEP File #3-4937; NHESP File #11-29582) in 2012
2013	Submitted an additional NOI on 5/22/13 to allow for the use of fluridone and DASH to control <i>C. caroliniana</i> in a small cove (i.e., Gooseberry Cove) in Gooseberry Pond to MassDEP, the Commission, and the NHESP A one-time fluridone treatment (including an initial and booster applications) and DASH was permitted (OOC, DEP File #3-5096 and NHESP File #11-29582); however, due to the limited <i>C. caroliniana</i> density observed in this area during the pre-management

Year	Management Activities
	surveys, DASH and hand-harvesting served as a more appropriate management technique at Gooseberry Cove in 2013 Filed a Request for Determination of Applicability on 5/20/13 proposing the expansion of physical removal efforts (DASH, hand-harvesting, and benthic barrier installation) throughout Wequaquet Lake <sup>1</sup> ; application resulted in a negative determination (Determination of Applicability [DA] #13036; NHESP File #11-29582), thereby, approving physical removal efforts throughout Wequaquet Lake Utilized DASH and hand-harvesting to control the <i>C. caroliniana</i> observed outside of Gooseberry Cove – Johnson’s Lane Coves and Bearse Pond; however, late-season emergence of prolific <i>C. caroliniana</i> growth in Bearse Pond limited the efficacy of these management techniques in 2013 and as such, fluridone treatments would be needed in this location in the future
2014	Submitted permit application for a MA DEP License to Apply Chemicals permit for the application of Sonar herbicide to select areas of Wequaquet Lake. Performed multiple Sonar herbicide treatments using Sonar One pellets to control scattered areas of fanwort growth. Surveys indicated that treatments provided excellent control of targeted fanwort growth
<sup>1</sup> Wequaquet Lake falls within the ‘NHESP Estimated Habitats of Rare Wildlife’ and ‘NHESP Priority Habitats of Rare Species’ data layers, and therefore a ‘Simple MESA Project Review’ by the NHESP was required in conjunction with each NOI and RDA filing.	

### PRE-TREATMENT SURVEY

Due to the low-density and highly scattered nature of the fanwort growth in Wequaquet Lake, detailed survey work necessary to identify deeper water patches of fanwort in order to facilitate effective use of DASH (Diver Assisted Suction Harvesting). For this reason, the pre-treatment survey focused in the littoral areas (shoreline to 10-12 ft. depth contour) where the fanwort has historically been found. Also, in addition to the more traditional visual and rake toss survey methods, we used high resolution hydro-acoustic survey/mapping technology (ciBioBase) to enhance our ability to identify the small areas of isolated fanwort growth. This approach has the ability to map aquatic plant biomass by interpreting georeferenced depth sounder data. This works particularly well for identifying areas of non-native plant growth like fanwort that often grow taller and more robustly than most native plants.

Given that the fanwort growth in Wequaquet Lake has historically been slower to emerge the pre-treatment survey was performed in mid-July (7/10/15). The vegetation assemblage at the time of the survey was dominated by low to moderate growth of native plants species. The plant growth conditions observed and recorded are outlined below.

- The native plant assemblage was dominated by the growth of coontail (*Ceratophyllum demersum*), robbins pondweed (*Potamogeton robbinsii*), and waterweed (*Eldoea canadensis*).
- The bulk of the rooted vegetation growth was observed growing 6-7 ft. or less of water; however, plant growth was documented in depth reaching 10-12 ft.
- The native plant growth varied in density throughout the littoral zone, but the densest most robust aquatic macrophyte growth was noted in the southeast quadrant of the lake near Gooseberry Pond.
- Other native plant species observed at the time of the survey included water shield (*Brasenia schreberi*), quillwort (*Isoetes sp.*), lowly watermilfoil (*Myriophyllum humile*), aquatic moss (*Musci sp.*), naiad (*Najas sp.*), white lily (*Nymphaea odorata*), yellow lily (*Nuphar*

*variegata*), ribbon-leaf pondweed (*Potamogeton epihydrus*), clasping-leaf pondweed (*Potamogeton perfoliatus*), thin-leaf pondweed (*Potamogeton pusillus*), bladderwort (*Utricularia sp.*), and tapegrass (*Vallisneria americana*). The density/abundance of these plant species ranged from trace to moderate.

- Fanwort (*Cabomba caroliniana*) was observed and recorded in the northwest quadrant of the lake adjacent to Johnson's Lane. In this area a large deeper water patch of growth was identified using the ciBioBase technology. The area consisted of approximately two acres of sparse growth.
- Other locations of fanwort growth were noted off the point at the end of Nyes Neck Road and in the easternmost cove in Gooseberry Pond. Both of these occurrences were small patches of trace level growth.

### **DIVER ASSISTED SUCTION HARVESTING (DASH)**

Given the extent of the fanwort growth observed throughout the lake it was determined that the infestation near Johnson's Lane posed the greatest risk to the remainder of the lake and was therefore the number one management priority. The frequency of fanwort growth and the sheer density of growth in this area far exceeded the growth observed anywhere else in the lake. For this reason the DASH crew was instructed to complete this area before moving on to other lesser infested areas.

Due to weather and scheduling, the DASH effort was initiated on 9/1/15. A two person dive team and an 18 ft. DASH unit were employed at the site. The scattered fanwort growth along the shoreline of the Johnson's Lane area was completed before addressing the large deeper water patch further offshore. This scattered growth was pulled in one day. A total of two 18 gallon buckets were removed from the shoreline areas.

On September 2, the DASH crew initiated work on the larger off-shore patch. At this time of the growing season additional fanwort growth was noted along the perimeter of the main patch. The extent of the area infested with trace to sparse growth had expanded to nearly 2.5 acres. The DASH team spent the remaining eight days of the allotted nine-day program budget thoroughly removing this large area of growth. The DASH team removed a total of 155 buckets (2,790 gallons) of fanwort biomass from this location. The removal productivity varied slightly during the course of the removal, but averaged roughly 19 buckets per day. Because this area exhausted the contracted DASH budget no additional fanwort removal was completed.

During the course of the nine day DASH effort a total of 157 buckets (2,826 gallons) were removed from the Johnson's Lane area of Wequaquet Lake.

### **POST-MANAGEMENT SURVEY**

The post-management survey was conducted on 10/9/15 using the same methods that were established during the pre-management survey. The littoral zone was visually inspected using an underwater camera and throw rake. ciBioBase hydro-acoustic mapping data was also collected at the same time.

As expected, the vegetation assemblage was similar to that which was observed at the time of the pre-management survey. The most notable changes in the aquatic vegetation growth were the expansion of previously vegetated areas, increases in the frequency of occurrence of a variety of native species, and an increase fanwort frequency. The vegetation growth conditions observed at the time of the survey are outlined below.

- Significant expansion of the coontail, Elodea, and naiad dominated plant assemblage was observed southeastern quadrant of the lake near Gooseberry Pond. This native plant assemblage not only expanded into deeper areas, but also increased in density from trace-sparse to sparse-moderate.
- The frequency of bladderwort occurrence increased in the northeast quadrant of the lake. This is not uncommon, given bladderwort's later season emergence and maturation.
- More of the western shoreline was vegetated with robbins pondweed and tapegrass.
- No fanwort growth or regrowth was observed anywhere in the Johnson's Lane area of the lake.
- Two additional area of fanwort growth were identified in Bearses Pond. This growth consisted trace level scattered individual plants.
- The two other fanwort growth locations that were previously identified during the pre-management survey, remained relatively unchanged in size and density. As expected the fanwort plants were more mature/robust at the time of the post-management survey.

## **MANAGEMENT RECOMMENDATIONS**

Given the invasive nature of fanwort and the low probability of eradication was established, continued management will be required to maintain non-problematic levels and prevent additional spread within the lake. Based on the level of fanwort growth observed during the post-management survey in October 2015, we feel that small scale control measures (hand-pulling and DASH) remain the best approach managing the fanwort infestation.

Considering the budget limitation experienced in 2015 we recommending modifying the survey and reporting protocols of the program to allow a greater amount of the available budget to be allocated toward active control/management of the fanwort. Considering that no herbicide treatment is proposed, the likelihood on significant non-target plant impacts are minimal; therefore, performing complete vegetation assemblage mapping pre and post management is likely not warranted in the immediate future. For this reason, we recommend reducing the early and late season survey effort to simply mapping the presence/absence of target non-native plant growth. This reduction in survey effort should allow for the addition of a few more days of DASH without increasing the current management budget.



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|--|---|
|  Dominated by coontail, robbins pondweed, and tapegrass with lesser amounts of Elodea, bladderwort, and naiad        |  Dominated by robbins pondweed and watershield with lesser amounts of ribbon-leaf pondweed |
|  naiad dominant  |  Bladderwort dominant  |
|  Dominated by coontail, Elodea and naiad with lesser amounts of tapegrass, robbins pondweed and ribbon-leaf pondweed |  Coontail dominant   |
|  Yellow lily dominant  |  Dominated by robbins pondweed, naiad with lesser amounts white lily and coontail          |

## Pre-Management Survey

### Wequaquet Lake Barnstable, MA

-  Sparse fanwort growth
-  Trace fanwort growth



11 JOHN ROAD  
SUTTON, MASSACHUSETTS 01590  
PHONE: (508) 865-1000  
FAX: (508) 865-1220  
WEB: WWW.AQUATICCONTROLTECH.COM

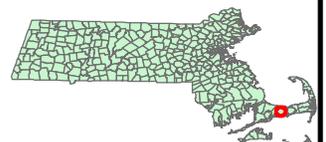
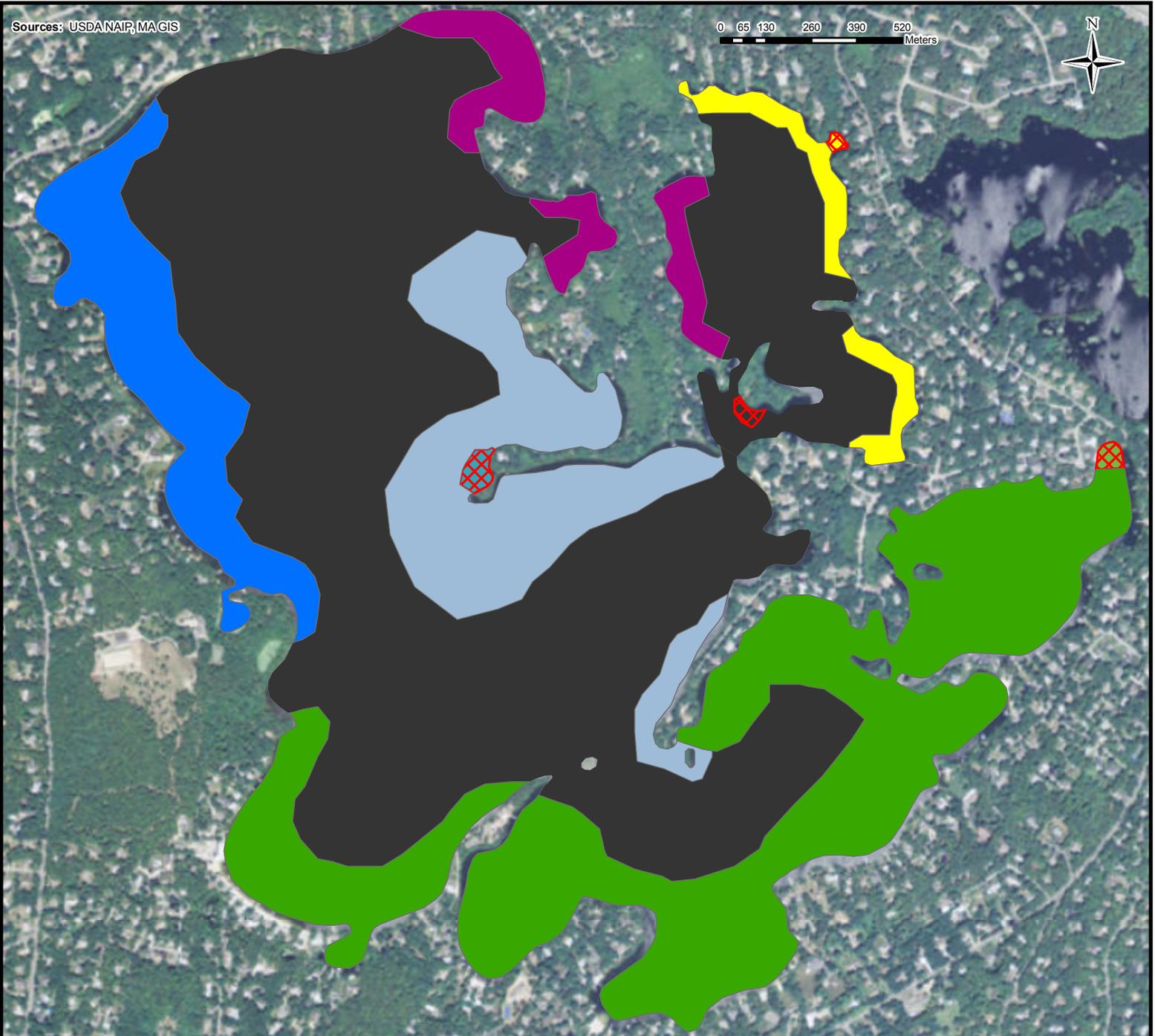


FIGURE:	SURVEY DATE:	MAP DATE:
1	7/10/15	3/31/16



- |  |   |   |   |
|--|---|---|---|
|  | Dominated by coontail, robbins pondweed, and tapegrass with lesser amounts of Elodea, bladderwort, and naiad        |  | Dominated by robbins pondweed and watershield with lesser amounts of ribbon-leaf pondweed and tapegrass |
|  | Dominated by coontail, Elodea and naiad with lesser amounts of tapegrass, robbins pondweed and ribbon-leaf pondweed |  | Dominated by bladderwort, tapegrass, and coontail with lesser amounts of Elodea                         |
|  | Dominated by robbins pondweed, naiad with lesser amounts white and yellow lily, tapegrass and coontail              |  | Trace fanwort growth  |

## Post-Management Survey

**Wequaquet Lake**  
Barnstable, MA

 **AQUATIC CONTROL TECHNOLOGY, INC.**

11 JOHN ROAD  
SUTTON, MASSACHUSETTS 01590  
PHONE: (508) 865-1000  
FAX: (508) 865-1220  
WEB: WWW.AQUATICCONTROLTECH.COM

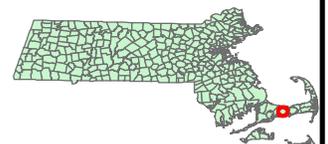


FIGURE:	SURVEY DATE:	MAP DATE:
2	10/9/15	3/31/16