

2011 Project Completion Report
SONAR Herbicide Treatment Program at Warner’s Pond
Concord, Massachusetts

Report Prepared by: Aquatic Control Technology, Inc.
11 John Road
Sutton, MA 01590



Report Prepared for: Bill Straub P.E., CMA Engineers
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Division

Introduction

In 2011 a treatment program using Sonar AS & Sonar One herbicides was conducted at Warner’s Pond to control growth of non-native, invasive fanwort (*Cabomba caroliniana*) and variable watermilfoil (*Myriophyllum heterophyllum*). The Project Completion Report for the 2011 Sonar Herbicide Treatment Program follows. This report will serve to document the herbicide application process and the observed response of the targeted weeds. Attached to this report are several figures and supporting documentation that further help to explain the project and the observed results.

All work performed at Warner’s Pond in 2011 was conducted in accordance with the Order of Conditions (OOC) issued by the Concord Natural Resources Commission (DEP # 137-895), Water Quality Certification – DEP File # 137-895, U.S. Army Corp of Engineers Permit # 2006-2088 and the License to Apply Chemicals issued by the MA DEP – Office of Watershed Management (# 11202).

A chronology of this past year’s management and brief description of events follows.

2011 Program Chronology

- DEP License to Apply Chemicals Issued..... 5/19/11
- Early Season Vegetation Survey 5/20/11
- Initial Sonar Application 6/3/11
- Collection of FasTEST Immunoassay samples 6/22/11
- First Follow-up Sonar Application 7/7/11
- Collection of FasTEST Immunoassay samples 7/26/11
- Mid-Treatment Inspection 7/26/11
- Second Follow-up Sonar Application 8/10/11
- Late Season Vegetation Survey..... 9/2/11

Pre-Treatment Survey

A pre-treatment survey of Warner's Pond was conducted on May 20, 2011 to document pre-treatment aquatic plant composition and distribution. The survey methodology used was consistent with surveys performed in 1999, 2003 and 2004 and utilized the same transects and data points established in 1999. In total eight transects and 66 data points were surveyed.

The following information was recorded at each data point: water depth, sediment type, overall cover index, biovolume, dominant aquatic plant species and present aquatic plant species. Plant cover and the percent area occupied by plants was estimated in two-dimensions using a semi-quantitative scale. Cover index was assigned as follows: areas with no plants were assigned a value of 0; areas were assigned 1 where plant coverage was approximately 1-25%; 2 for 26-50%; 3 for 51-75% coverage and 4 for 76-100% coverage. Overall biovolume was estimated based on the relative volume of each plant of the community at each point. The biovolume index ranges from 0-4 according to the following breakdown: 0 – no plants, 1 – plants generally low-growing within a foot of the bottom, 2 – plants generally half-way through the water column, 3 – plants within 1-2 feet of the surface, 4 – plants just below or at the surface.

A map depicting transect and data point locations (Figure 1) as well as the data collected on 5/20/11 are attached to this report. This data was provided to the Town in advance of the initial Sonar application in 2011. A formal discussion of the data and the data collected during the post treatment survey performed by ESS Group and ACT, Inc. will be presented in a separate report prepared by ESS Group.

Pre-Treatment Conditions

At the time of the pre-treatment survey (5/20/11) plant growth in the pond was fairly advanced but had not topped-out allowing for good access to most areas of the pond. Fourteen different aquatic species were identified during the course of the survey (see attached Field Data), however the vegetative composition was generally dominated by three species namely fanwort, variable watermilfoil and coontail (*Ceratophyllum demersum*).

Fanwort was the most widely distributed plant in the pond and was documented at 45 (68%) of the 66 surveyed data points. In most locations growth of fanwort was secondary in abundance to cover of coontail and/or variable watermilfoil. Coontail was the most abundant plant in the pond and formed a dense blanket throughout the shallower areas of the pond. While it was only the dominant species at 19 of the 37 locations where documented, coontail cover was dense throughout the northern, "open water" portion of the pond. Variable watermilfoil was also well distributed and was recorded at 31 (47%) of the data points surveyed. At the time of the survey growth both coontail and variable watermilfoil was more advanced than the observed fanwort growth and was in most areas within only a few inches to a foot of the surface; fanwort by contrast was lower growing and was generally only visible with the use of an underwater camera system. Cover of curlyleaf pondweed was also advanced at the time of the survey and was the only species that was growing to the top of the water column. Growth of curlyleaf pondweed was low-density and was typically tertiary or quaternary in abundance but was well distributed and was identified at 25 (38%) of the surveyed data point locations.

Cover of other aquatic plants was fairly limited however other species of note include: flat-stem pondweed (*Potamogeton zosteriformis*) which was documented at 25% of the data point locations; white waterlily (*Nymphaea odorata*) at 35%; and, yellow waterlily (*Nuphar variegatum*) at 30%.

Treatment Summary

Consistent with the proposed treatment scope provided to the Town on March 4, 2011 the 25 acre "open water" area of Warner's Pond was treated with Sonar (active ingredient fluridone) herbicide for control of fanwort (*Cabomba caroliniana*) and variable watermilfoil (*Myriophyllum heterophyllum*). Sonar effectively controls both species at low concentrations (<20 ppb) provided that herbicide contact-time with the targeted plants is maintained for 60-90 days. Two formulations of Sonar herbicide [SonarOne (pellet) - EPA Reg. No. 67690-45 and

Sonar AS (liquid) – EPA Reg. No. 67690-4] were applied on three separate occasions. A map depicting the extent of the treatment area is attached to the end of this report (Figure 2)

A complete summary of the treatment program is provided below:

Herbicide Applications:

Date	Product Applied	Estimated Concentration (ppb) applied	Comments
6/3/11	SonarOne – 300 lbs.	50 ppb in treatment area ~33 ppb lakewide	<ul style="list-style-type: none"> Water level estimated to be 0.5-1.0-foot above normal/full pool Fanwort and milfoil plants had 3-4 feet of new growth at the time of the initial treatment
7/7/11	SonarOne – 180 lbs Sonar AS – 5.0 qts.	50 ppb in treatment area ~33 ppb lakewide	<ul style="list-style-type: none"> Considerable rainfall and outflow occurred between 1st and 2nd treatments Small amount of chlorosis (whitening) noticeable on fanwort and white waterlily
8/10/11	SonarOne – 110 lbs Sonar AS – 3.0 qts.	30 ppb in treatment area ~20 ppb lakewide	<ul style="list-style-type: none"> Considerable chlorosis evident on fanwort and milfoil, but plants remain upright in the water column Waterlilies showing signs of chlorosis, but plants were still viable Pondweeds and all emergent species (pickerelweed, rushes, cattails, woody shrubs, etc) seen in adjacent wetlands were not showing any signs of chlorosis
TOTALS	SonarOne – 590 lbs Sonar AS – 8.0 qts.	130 ppb in treatment area ~86 ppb lakewide	<ul style="list-style-type: none"> Totals for all three applications

Herbicide applications were conducted by Aquatic Control using an airboat. The SonarOne pellet formulation was applied using a calibrated spreader mounted on the bow of the airboat. The Sonar AS liquid formulation (used during the 7/7/11 & 8/10/11 applications) was diluted with pond water and injected subsurface through weighted hoses using a calibrated pumping system. The treatment area was preloaded into a GPS unit that was used for real-time navigation during each treatment to insure that the herbicide was applied accurately. The GPS treatment track recorded during the initial application on 6/3/11 is depicted in Figure 2 attached to this report.

Prior to all applications notification of the treatment was submitted to the Town and posters warning of the temporary water restrictions to be imposed following treatment were posted along the shoreline of the pond.

FasTEST Immunoassay samples were collected twice during the course of the treatment to help assist in the timing and dosing of subsequent Sonar applications. Sample Site 1 was located in the open-water area at the north end of the pond. Sample Site 2 was located between the boat launch and Boy Scout Island. FasTEST samples were collected by ACT, Inc. and shipped to the SePRO Laboratory in Whitakers North Carolinian via overnight mail for analysis. Results from the FasTEST samples were used to guide timing of subsequent Sonar applications to ensure that lethal concentrations of fluridone were maintained in the pond for a minimum of 60 days. Results from the four samples collected at Warner’s Pond in 2011 are below. Laboratory reports from SePRO are attached.

Warner’s Pond FasTEST Results:

Warner’s Pond	6/22/2011	7/26/2011
Sample Site 1	8.4 ppb	4.9 ppb
Samples Site 2	11.5 ppb	3.3 ppb

Results/Discussion

Fanwort and milfoil plants in the treatment area showed signs of fluridone exposure soon after the initial treatment and chlorosis or bleaching was evident at the time of the first FasTEST sample collection on 6/22/11. While both fanwort and variable watermilfoil plants in the treatment area remained in the water column well into early August, chlorosis persisted and progressed throughout the summer. By the time of the final application fanwort in the pond was bleached white in the upper 6-10 inches of the plant and variable watermilfoil had collapsed out of the water column. Coontail was slow to develop signs of fluridone exposure but was exhibiting some slight chlorosis at the time of the second FasTEST sample collection on 7/26/11. This slow progression is typical with coontail and has been observed at many other waterbodies treated with fluridone.

By the time of the post-treatment survey conducted on 9/2/11, fanwort, variable watermilfoil and coontail were all heavily impacted in the treatment area and only low-density, severely damaged coontail existed within the designated 25-acre treatment area. While fanwort and variable watermilfoil were visible and even abundant outside the treatment area, especially west of Boy Scout Island, little to no growth was found within treated areas. Some thinning of waterlilies (*Nymphaea* & *Nuphar*) was evident in the treated portion of the pond and what remained floating showed signs of chlorosis (yellowing around their edges); however and estimated 50% of the waterlilies remained. Waterlily coverage outside of the treatment areas appeared untouched by treatment save for some slight discoloration in some of the waterlily pads towards the edge of the treated area.

Overall the treatment performed in 2011 appears to have provided excellent control of both fanwort and variable watermilfoil in the designated treatment area, while also providing suppression and thinning of the native coontail and waterlily growth. We would expect to see nuisance-level fanwort control throughout the 2012 and possibly the 2013 seasons within the treated areas. Variable milfoil often recovers more rapidly following treatment with Sonar herbicide, but control through the 2012 season is anticipated. The native waterlily and coontail growth usually recovers more rapidly than the invasive fanwort and milfoil, but thinned-out populations of these plants should persist throughout the 2012 season.

Warner's Pond will continue to suffer from problematic aquatic weed growth. The presence of fanwort in the western (inflow) portion of the pond, high water flows, and mucky bottom sediments will limit the duration of control that can be achieved using Sonar (fluridone) herbicide. Herbicides with a faster mode of action may be more appropriate for partial pond treatments in the future.

Enclosures: Data Point/Transect Map
 Field Survey Data – 5/20/11
 DEP License to Apply Chemicals
 2011 Treatment Map
 FasTEST laboratory reports
 Photo-documentation



Warners Pond
Concord, Ma
Data Point Locations

FIGURE:	SURVEY DATE:	MAP DATE:
1	5/20/11	7/5/11

Legend:

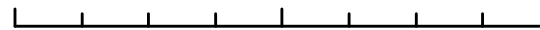


Data Point Locations surveyed on
8/6 & 8/9/99 and 5/20/11

N



0 62.5 125 250 Feet



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Transect Number & Sampling Point	Water Depth	Sediment Type	Cover Index	Biovolume	Cd	Mh	Pc	Cc	Pz	Ny	Nu	Poly	Dec	U	Ni	Fa	Cal	Ec
A 1	4.5	M/S	2	2	D		X	X		X			X					
2	9	M	0	0														
3	11	M	0	0														
4	10.5	M	0	0														
5	7.3	M	1	3	D	X	X	X		X								
6	5	M	2	3	D	X	X	X		X								
B 1	4.5	M	3	4	X	D	X	X		X								
2	5	M	2	2	X	D	X				X							
3	9.1	M	0	0														
4	7.8	M	1	2	D	X	X											
5	6.1	M	2	2	X	X	D	X										
6	9.5	M	0	0														
7	6.5	M	2	1	X		X	D		X								
C 1	3.5	M	2	3		X		X				X	D					
2	4	M	2	2	X	X		X	X	X		X						
3	4	M	3	3	D	X	X	X	X		X							
4	5.5	M	3	2		D	X	X	X									
5	5	M	3	3	X	D	X	X	X		X							
6	5.5	M	4	3	D		X	X			X							
7	6.5	M	2	2	D		X	X										X
8	6	M	2	1	D			X										X
9	6.5	M	3	2	D		X	X										
10	5.5	M	2	2	D	X	X	X	X									
D 1	3.5	M/S	3	2		D				X								
2	3.5	M	4	2		D			X		X							
3	4.5	M/S	3	3		X		D	X	X	X							
4	6	M	2	1		X		D	X									
5	5	M	3	2	D	X	X	X	X						X			
6	5	M	4	3	D	X			X		X							
7	3	M/S	2	2	D	X		X	X		X							
8	5.5	M	3	2	D		X	X										
9	5.3	M	3	2	D		X	X			X						X	
10	6	M	3	2	D	X	X											
E 1	3.5	M	3	2		X		X			D				X	X		
2	4.5	M	3	3	X	X		X	X	X	D				X	X		
3	4.5	M	4	3		D		X			X							
4	4	M	3	3				X		X	X	X	D					

Transect Number & Sampling Point	Water Depth	Sediment Type	Cover Index	Biovolume	Cd	Mh	Pc	Cc	Pz	Ny	Nu	Poly	Dec	U	Ni	Fa	Cal	Ec
5	4	M	2	2	X	D		X	X									
6	5.5	M	3	2	X	D		X										
7	6	S	3	2	D													
8	6	M	2	2	D	X	X			X								
F 1	3.5	M	1	1				X		X	X	X	D					
2	2	M	3	2				X		D	X							
3	4	M	3	3				X	D	X								
4	2.5	M	2	2						X	X	X	D					
5	3.2	M	2	1	D			X										X
6	6.1	M	2	1	X		X	D			X							
7	7.5	M	2	1				D										
G 1	4	M	2	2				X		D								
2	4.5	M	3	3		X		X		D	X							
3	2.5	M	3	2				X		D				X				
4	4.5	M	3	3		X		D	X	X				X				
5	4.8	M	3	3	X	X		D	X	X	X			X				
6	4.5	M	4	3	X	X		D		X	X			X				
7	5	M	4	3	X	D	X	X										
8	5.5	M	2	2	X			D										
9	5	M	1	1	X		X	D	X	X								
H 1	7	R/S	0	0														
2	4	M	3	2	X		X	D		X								
3	6	M/S	1	1											D			
4	7	S/G	1	1	X		X	D										
5	8	S/G	0	0														
6	8.5	S/G	0	0														
7	5	9	1	1	X										D			
8	4	R/G	0	0														

Average 5.4 2.2 1.8

	Cd	Mh	Pc	Cc	Pz	Ny	Nu	Poly	Dec	U	Ni	Fa	Cal	Ec
Present	18	21	24	33	16	19	18	5	1	4	3	2	1	3
Dominant	19	10	1	12	1	4	2	0	4	0	2	0	0	0
Total	37	31	25	45	17	23	20	5	5	4	5	2	1	3
% frequency	56%	47%	38%	68%	26%	35%	30%	8%	8%	6%	8%	3%	2%	5%

Cd: *Ceratophyllum demersum*
Mh: *Myriophyllum heterophyllum*
Pc: *Potamogeton crispus*
Pz: *Potamogeton zosteriformis*
Ny: *Nymphaea odorata*
Nu: *Nuphar variegatum*
Poly: *Polygonum* sp.
Dec: *Decadon* sp.
U: *Utricularia* sp.
Ni: *Nitella* sp.
Fa: Filamentous algae
Cal: *Callitriche*
Ec: *Elodea canadensis*
Pn: *Potamogeton natans* (observed, not at data point)
Ms: *Myriophyllum spicatum* (observed, not at data point)



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 627 Main Street, Worcester MA 01608 • 508-792-7650

DEVAL L. PATRICK
Governor

RICHARD K. SULLIVAN JR.
Secretary

TIMOTHY P. MURRAY
Lieutenant Governor

KENNETH L. KIMMELL
Commissioner

LICENSE TO APPLY CHEMICALS FOR CONTROL OF NUISANCE AQUATIC VEGETATION

Applicant: TOWN OF CONCORD
License No.: 11202
Name of Lake: WARNERS POND
PALIS Number:
Location of Lake: CONCORD

AUTHORITY FOR ISSUANCE

Pursuant to the authority granted to the Department of Environmental Protection, by Massachusetts G.L.c. 111, s5E, the following license is hereby issued to GERALD N. SMITH, PRESIDENT, AQUATIC CONTROL TECHNOLOGY, INC. (hereinafter called the "licensee"), authorizing the application of chemicals for the control of nutrients, algae or aquatic plants to WARNERS POND, CONCORD such authorization being expressly conditional on compliance by the licensee with all terms and conditions of the license hereinafter set forth. This license shall become effective on the date of the Director's signature and shall expire nine months from the date of issuance.

for David Ferris, Director
Division of Watershed Management
Department of Environmental Protection

19 May 11

Date

Transmit
Number:

X236911

Record
Number:

A. Application Condition(s)

CHEMICAL NAME	MAXIMUM WEIGHT or VOLUME	MAXIMUM APPLICATION RATE/ACRE	MAXIMUM TREATMENT in ACRES
SONAR ONE	675 POUNDS	27 POUNDS	25
SONAR AS	16.875 QUARTS	0.675 QUARTS	25
3 TREATMENTS			

B. Proposed Date(s) of Treatment:

The proposed date(s) of treatment are: 05/01/2011; 06/01/2011; 07/01/2011
Changes to proposed treatment dates are acceptable for the period May through November when the above chemicals are applied according to manufacturer's label directions in an environmentally responsible fashion.

C. Application Report

By December 31 of the year of this treatment the licensee shall submit a written report to the Department certifying the treatment date, application rate, and the total weight/volume for each chemical used in the treatment, in accordance with requirements of Section I.A. of this license.

D. Modification of Application Conditions

The licensee shall not apply chemicals in a manner contrary to, or inconsistent with, the application conditions set forth in Section I.A. of this license without the prior written approval of the Department.

II. GENERAL CONDITIONS

A. The licensee is hereby notified that chemical treatments to control aquatic nuisances in public or private lakes and ponds of the Commonwealth involve the alteration of wetland resource areas protected under both Massachusetts G.L.c. 131, s40, the Wetlands Protection Act and 310 CMR 10.00, Massachusetts Wetlands Protection Regulations.

B. The licensee is hereby notified that issuance of this license does not in any way constitute the Department's approval of the chemical treatment as it relates to the provisions of the Wetlands Protection Act.

C. The licensee shall obtain either a final Order of Conditions or a negative Determination of Applicability from the CONCORD Conservation Commissions prior to application of chemicals authorized under this license.

D. Shoreline areas of the lake or pond must be posted with signs warning the general public of any water use restrictions stated on the chemical label for a minimum of one week. This is especially important at bathing beaches and other areas of common access. These signs shall clearly state that the chemical treatment is being conducted pursuant to a license issued by the Department of Environmental Protection, "DEP." A new sign shall be posted for each treatment event.

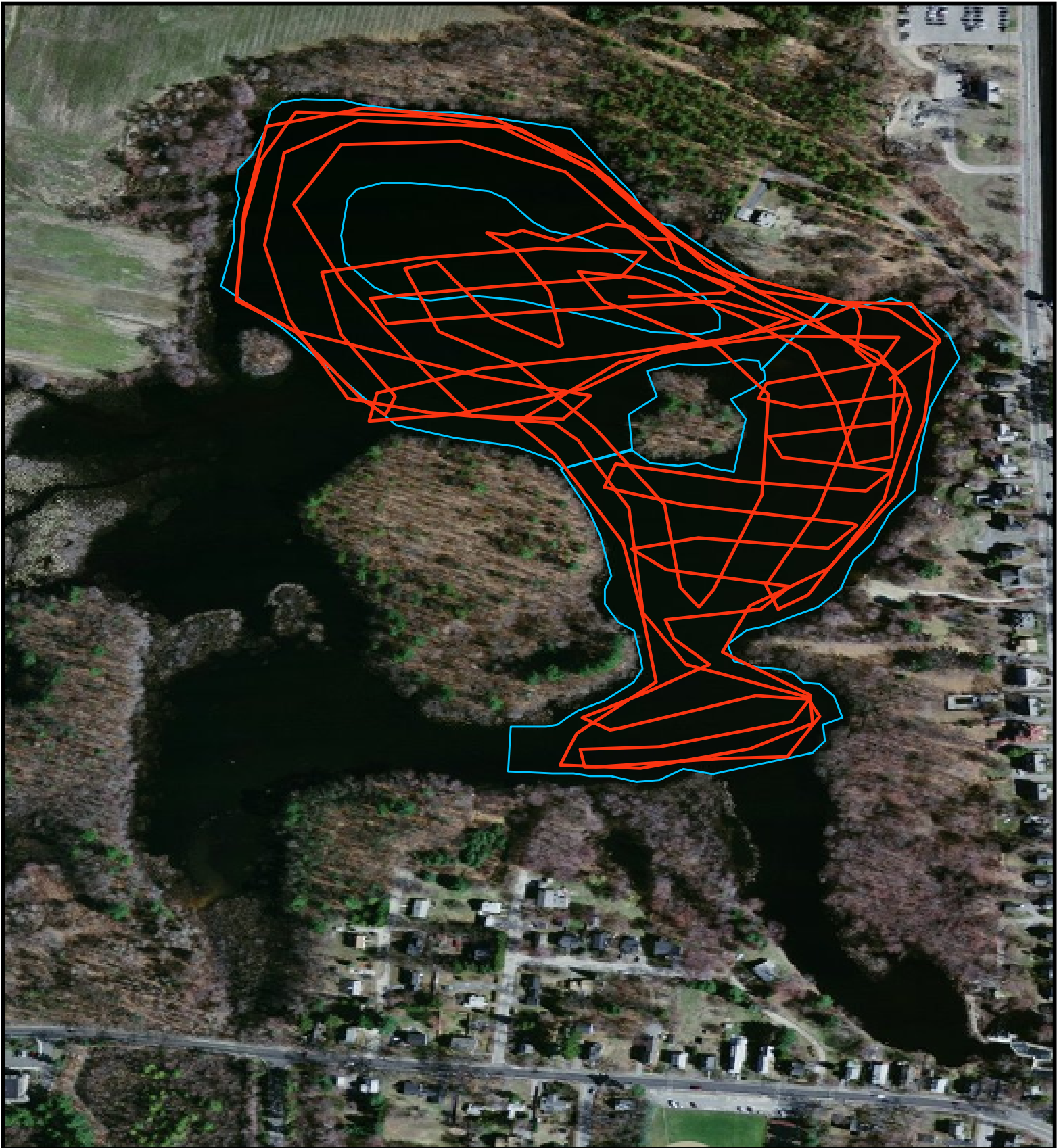
E. The Department may require the licensee to cease application of chemicals to a body of water at any time following the issuance of a license if the Department determines that the chemical treatment will be ineffective, or will result in unreasonable restrictions on current water uses, or will produce unnecessary adverse side effects on nontarget flora or fauna.

F. Chemical applications shall be performed in accordance with the manufacturer's label directions, existing pesticide use laws, and any conditions imposed by other local or state agencies.

G. Chemical treatments shall only be performed by an applicator currently licensed by the Massachusetts Department of Food and Agriculture Pesticide Bureau in the aquatic weed category.



H. Issuance of this license does not release the licensee from liability resulting from the use of chemicals or from negligent or reckless application of chemicals specified in Section I.A. of this license.

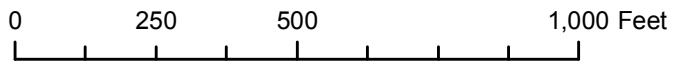
I. Electronic notification of treatment must be made to the Massachusetts Division of Fisheries and Wildlife (richard.hartley@state.ma.us and colleen.hubbard@state.ma.us) and the Massachusetts Department of Environmental Protection (robert.kubik@state.ma.us). Notification that the treatment was performed or postponed shall be made within 24 hours of treatment. The notification message should include waterbody, town, license number and chemicals used.



Warners Pond
 Concord, Ma
 2011 Treatment Area

Legend:

-  2011 Treatment Area (~25 acres)
-  GPS Treatment Track - 6/3/11



 **AQUATIC CONTROL TECHNOLOGY, INC.**
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 SUTTON, MASSACHUSETTS 01590
 PHONE: (508) 865-1000
 FAX: (508) 865-1220
 WEB: WWW.AQUATICCONTROLTECH.COM



FIGURE:	SURVEY DATE:	MAP DATE:
2	--	11/22/11



Chain of Custody D078C7DA-5

Customer Company

Customer Contact

Company Name:	Aquatic Control Technology, Inc.	Contact Person:	Gerald N
Address:	11 John Road	E-mail Address:	gsmith@aquaticcontroltech.com
City:	Sutton	Phone:	
State:	MA 01590-2509	Fax:	

Payment Information

Payment Type:	Invoice	Card Number/Expiration Num:	
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Waterbody Information

Waterbody:	Warners Pond	Waterbody Size (acres):	48.00
Depth Average:	5.00		
Target Plants			

Sample Information

Sample Site ID	Date Treated	Date Sample Collected	Sample Location	Products	Acres Treated	Rate	Active	Result
1	06/03/2011	06/22/2011	treated area	Sonar One	25	40	Fluridone	8.4 ppb
2	06/03/2011	06/22/2011	ramp	Sonar One	25	40	Fluridone	11.5 ppb

Laboratory Information

Date Received:	6/27/2011	Date Analysis Performed:	6/27/2011
Date Results Sent:	6/27/2011	Storage Conditions	Analyzed Immediately



Chain of Custody 17F425AA-1

Customer Company

Company Name: Aquatic Control Technology, Inc.
Address: 11 John Road
City: Sutton
State: MA 01590-2509

Customer Contact

Contact Person: Gerald N
E-mail Address: gnsmith@aquaticcontroltech.com
Phone:
Fax:

Payment Information

Payment Type: Invoice
Card Number/Expiration Num:

Waterbody Information

Waterbody: Warners Pond
Waterbody Size (acres): 48.00
Depth Average: 5.00
Target Plants: Fanwort,

Sample Information

Sample Site ID	Date Treated	Date Sample Collected	Sample Location	Products	Acres Treated	Rate	Active	Result
1	07/07/2011	07/26/2011	treated area	Sonar A.S., Sonar One	25	20	Fluridone	4.9 ppb
2	07/07/2011	07/26/2011	ramp	Sonar A.S., Sonar One	25	20	Fluridone	3.3 ppb

Laboratory Information

Date Received: 8/4/2011
Date Results Sent: 8/5/2011
Date Analysis Performed: 8/5/2011
Storage Conditions: Analyzed Immediately

Warner's Pond 2011 Sonar Herbicide Treatment Program

Pre-treatment: Waterlily cover near Boy Scout Island



Pre-treatment: Submersed weed growth



During treatment: boat ramp looking north



During treatment: chlorosis evident on fanwort



Post-treatment: boat ramp looking north



Post-treatment: decomposing coontail growth

