The

Connecticut

Agricultural

Experiment

Station,

New Haven

Control of Cabomba, Eurasian Milfoil and Water Lily in Lake Quonnipaug with Herbicides and Hydroraking 2002

BY GREGORY J. BUGBEE

AND JASON C. WHITE

Bulletin 1002

June 2005

Control of Cabomba Eurasian Milfoil and Water Lily in Lake Quonnipaug with Herbicides and Hydroraking 2002

BY GREGORY J. BUGBEE AND JASON C. WHITE

INTRODUCTION

Concerns about the increasing amounts of weedy aquatic vegetation in Lake Quonnipaug prompted the Guilford Conservation Commission (GCC) to develop an Action Plan for the lake. A priority of this plan was to find ways to control invasive nonnative plant species that threaten the lake's recreational and ecological value. The plant species of greatest concern were Eurasian milfoil (*Myriophyllum spicatum)* and cabomba (*Cabomba caroliniana).* Additional goals of the plan included; safeguarding the state protected plant species called water marigold *(Megalodonta beckii),* encouraging the growth of a low-growing plant called robbins pondweed *(Potamogeton robbinsii),* protecting biodiversity and wildlife habitat, restoring the southern section of the lake and maintaining the swim area at the town beach.

During 2000, scientists at The Connecticut Agricultural Experiment Station (CAES) studied the lakes water chemistry (Bugbee and White, 2000) and concluded the water in Lake Quonnipaug is slightly eutrophic (oligo-mesotrophic). This condition has changed little from previous studies (Canavan and Siver, 1995; Frink and Norvell, 1984). Contrary to the somewhat static nature of the lake's water chemistry, the types and densities of rooted aquatic vegetation has changed rapidly. An aquatic vegetation survey by CAES and Northeast Aquatic Research in 2000 (Knocklien, 2001) documented extensive areas of Eurasian milfoil and cabomba. Frink and Norvell (1983) did not report finding cabomba in the lake in 1980, and by the late 1990's, the boat launch cove and some other areas were nearly completely choked with the weed. In 2001, CAES scientists studied the effectiveness of controlling cabomba by the state boat launch with granular fluridone (Sonar SRP) and of controlling Eurasian milfoil near the town beach with granular 2,4-D (Navigate) (Bugbee and White, 2001). In both cases control was excellent, and these herbicides offered the prospect of successfully removing these weeds from select locations.

OBJECTIVES

1. Continue research on the control of Eurasian milfoil with spot applications of granular 2,4-D in areas near the shoal in the center of the lake.

2. Monitor the residual control of the cabomba treated in 2001 with granular fluridone (Sonar SRP).

3. Determine the effectiveness of a combination of foliar treatments of glyphosate and hydroraking on the control of lily pads and other emersed vegetation in the south cove.

4. Conduct water testing to quantify herbicide movement and residue. Test water for pH, alkalinity, conductivity, phosphorus, temperature, dissolved oxygen (D.O.) and transparency.

5. Survey the lake for aquatic vegetation, including water marigold, an endangered plant.

Figure 1.

Aquatic Plant Survey September 27, 2001

Gregory J. Bugbee
Jason C. White

CT Agricultural Experiment Station
Department of Soil and Water
123 Huntington Street
P.O. Box 1106
New Haven, CT 06504

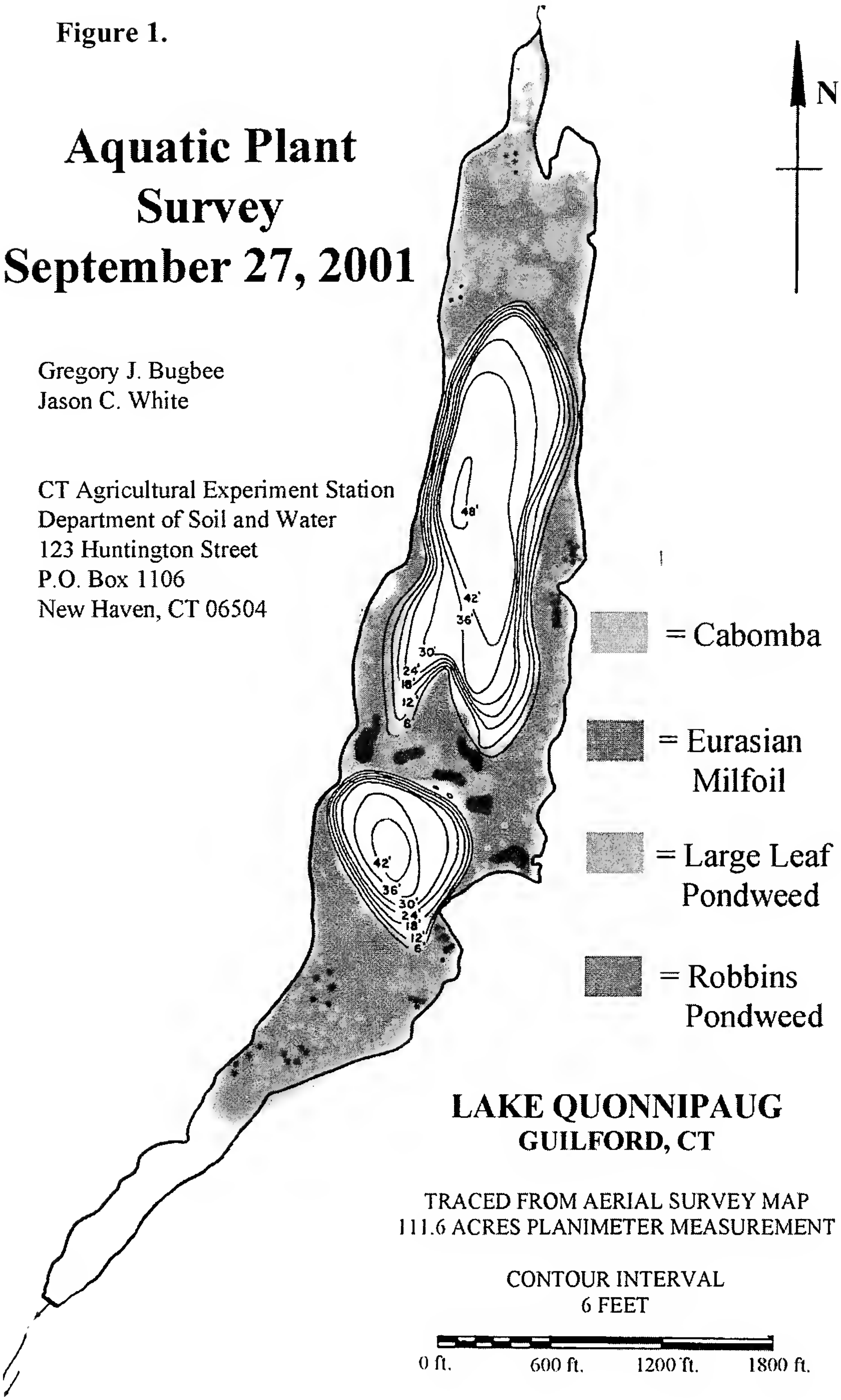
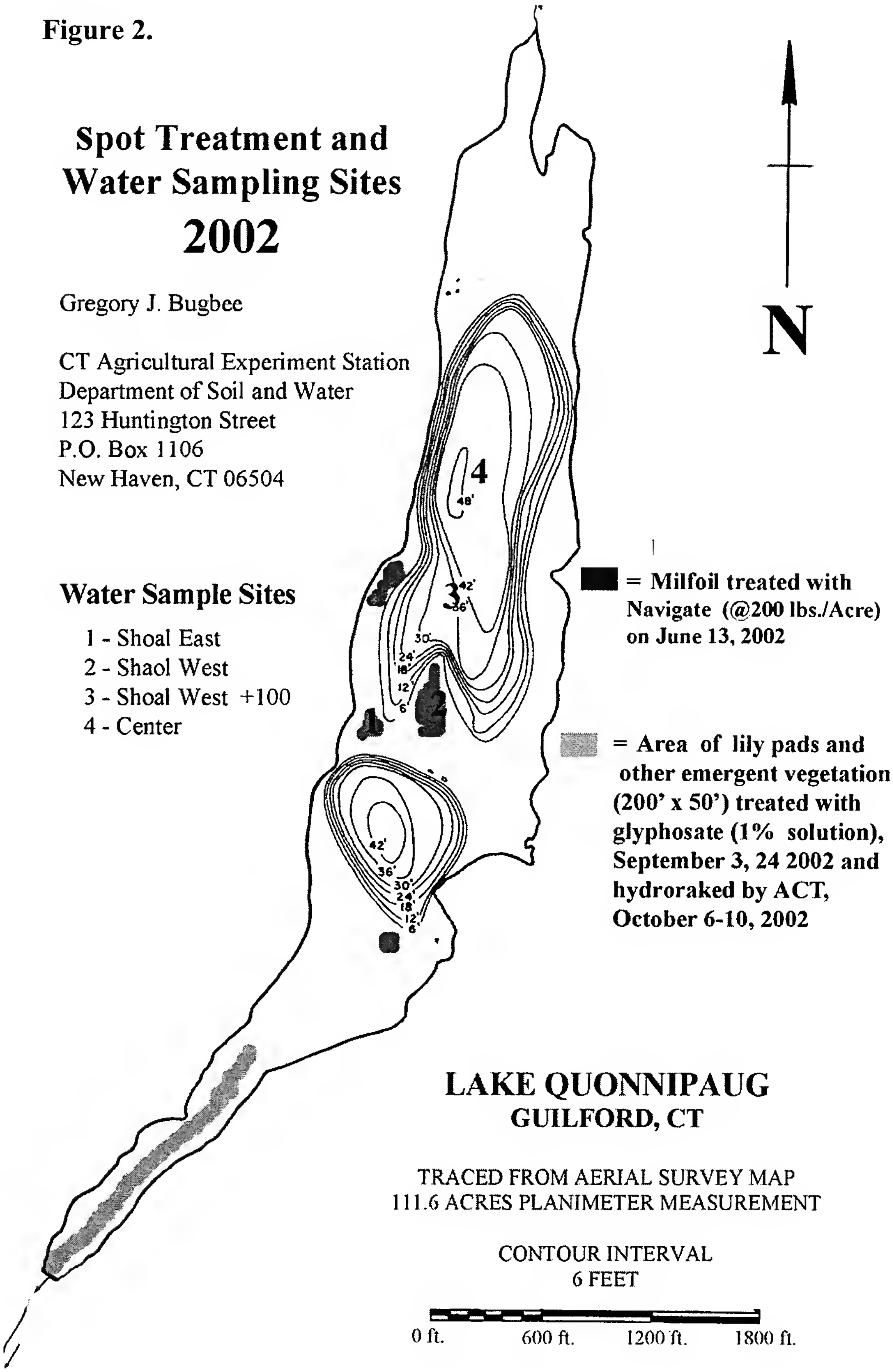


Figure 2.


Spot Treatment and
Water Sampling Sites
2002
Gregory J. Bugbee
CT Agricultural Experiment Station
Department of Soil and Water
123 Huntington Street
P.O. Box 1106
New Haven, CT 06504
Water Sample Sites
1 - Shoal East
2 - Shaol West
3 - Shoal West +100
4 - Center
N
= Milfoil treated with Navigate (@200 lbs./Acre) on June 13, 2002
= Area of lily pads and other emergent vegetation (200' x 50') treated with glyphosate (1% solution), September 3, 24 2002 and hydroraked by ACT, October 6-10, 2002
4
48'
3
42'
36'
30'
24'
18'
12
6'
2
1
42'
36'
30'
24'
18'
12'
6'
LAKE QUONNIPAUG
GUILFORD, CT
TRACED FROM AERIAL SURVEY MAP
111.6 ACRES PLANIMETER MEASUREMENT
CONTOUR INTERVAL
6 FEET
0 ft.
600 ft.
1200 ft.
1800 ft.

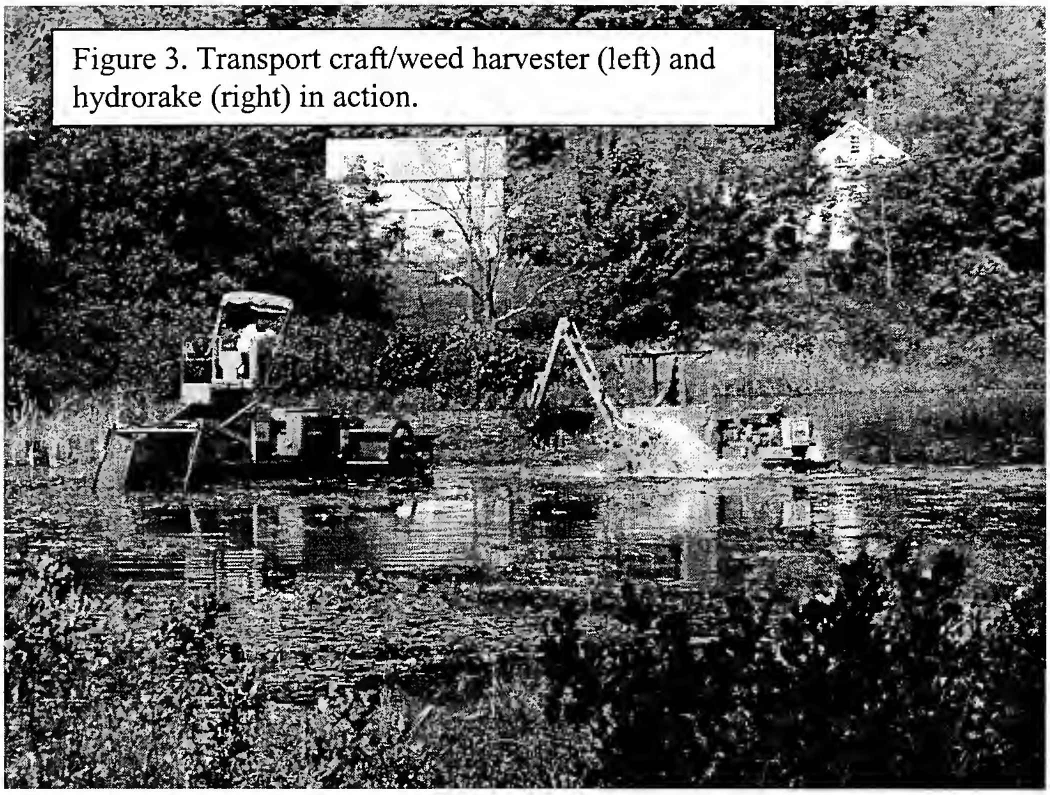


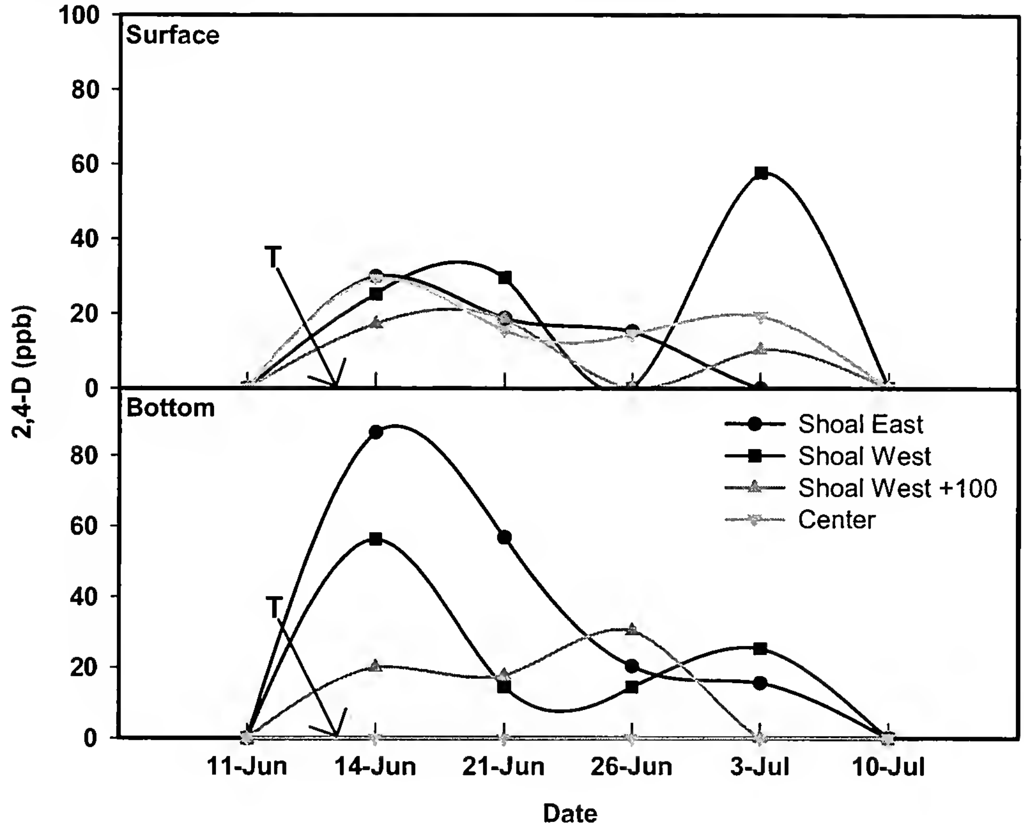
Figure 3. Transport craft/weed harvester (left) and hydrorake (right) in action.

MATERIALS AND METHODS

Meetings were held with the Guilford Conservation Commission, officials from the town of Guilford, Friends of Lake Quonnipaug and the Connecticut Department of Environmental Protection (CTDEP) to discuss the weed control options. A decision was made to treat Eurasian milfoil in the beach area and shoal areas in the center of the lake with Navigate (granular 2,4-D). In the southern section of the lake, an area of emersed vegetation was designated for treatment with glyphosate (Eagre, Rodeo). After weeds were controlled with herbicide, hydroraking by Aquatic Control Technologies (ACT, Sutton, MA) would remove vegetative matter and floating islands of muck and plant roots. Locations for the Navigate treatment sites were determined by weeds found and documented on the September 27, 2001 survey (Figure 1) and visual confirmation by an informal survey conducted on June 11, 2002. A survey for water marigold was performed with Nancy Murray and Brian Hunter (CTDEP) on August 14, 2002, and a general aquatic vegetation survey was done on July 30, 31, 2002. Resources for plant identification included: *Aquatic and Wetland Plants of Northeastern North America: Volumes 1 and 2* (Crow and Hellquist, 2000) and *Aquatic Plants of the United States* (Muenscher, 1944).

In March 2002, CAES scientists applied to CTDEP for a permit to use 500 pounds of Navigate and 8 pints of Rodeo or Eagre. The permit was granted in May 2002. Navigate was applied on June 13, 2002 to Eurasian milfoil near the town beach and shoal areas in the center of the lake (Figure 2) at a rate of 150 pounds per acre. An electric spreader, mounted on the back of a powerboat, was used to distribute the granules. Liquid glyphosate (Eagre, 1% solution) was applied on September 3, 2002 to areas of emersed vegetation in a 2000' x 50' wide swath starting at the dam and running north in a nonlinear fashion. On September 24, 2002, treated vegetation that still appeared healthy was retreated with glyphosate. The public was notified of each herbicide application by a legal notice in the Shoreline Times, and handouts were distributed to lakefront land owners. Signs were also posted at the town beach and boat launch ramp.

Figure 4. Concentrations of 2,4-D in Lake Quonnipaug, 2002



Notification protocol was pursuant to Section 22a-66a(g) of the CT General Statutes.

Lake water samples for pH, alkalinity, conductivity and 2,4-D analysis were obtained from the surface and near the bottom in center of the east shoal treatment site, 100 feet away from the east shoal site and in the control site (>1000 feet away from treatment). Samples were collected 2 days prior to treatment on June 11, 1 day after treatment (DAT) on June 14, 8 DAT on June 21, 13 DAT on June 26, 21 DAT on July 3 and 28 DAT on July 10. When 2,4-D fell below the detection limit of 1 ppb in all samples, this testing ceased. Water was analyzed for 2,4-D by solid phase extraction and liquid chromatography with a detection limit of 1 ppb (Bugbee et al., 2003). Total phosphorus was measured using the ascorbic acid method preceded by potassium persulfate digestion (APHA et al., 1995). Water temperature and dissolved oxygen where monitored with an YSI 58 meter at the surface and bottom of the treatment sites and at 1 meter intervals in the lake center. Transparency was determined with a Secchi disk. Alkalinity, pH and conductivity was measured on 250 ml samples taken 0.5 m below the surface and kept chilled before being tested in the laboratory. A Fisher AR20 meter was used to determine pH and conductivity. Alkalinity was quantified using a Hach digital titrator and is expressed as mg/l $CaCO_3$. The titrant was 0.16 N H_2SO_4 and the titration end point was pH 4.5. Bottom sediment was obtained with a 15 x 15 x 15 cm Ekman grab sampler from three spots in the 2001 boat launch treatment site. Sediment was tested for organic matter using loss on ignition (Ball, 1964) and for particle size distribution using the pipette method (Day, 1965).

Aquatic Control Technologies (ACT) performed hydroraking of the area treated with glyphosate (Figure 2) in mid October. A hydraulically powered hydrorake removed a vegetation/sediment mixture and placed it in a motorized weed harvester (Figure 3) that transported it to an unloading station on the southwest shore. Here the material was loaded into trucks by town personnel and taken away for disposal.

Figure 5. Dissolved oxygen in Lake Quonnipaug, 2002.

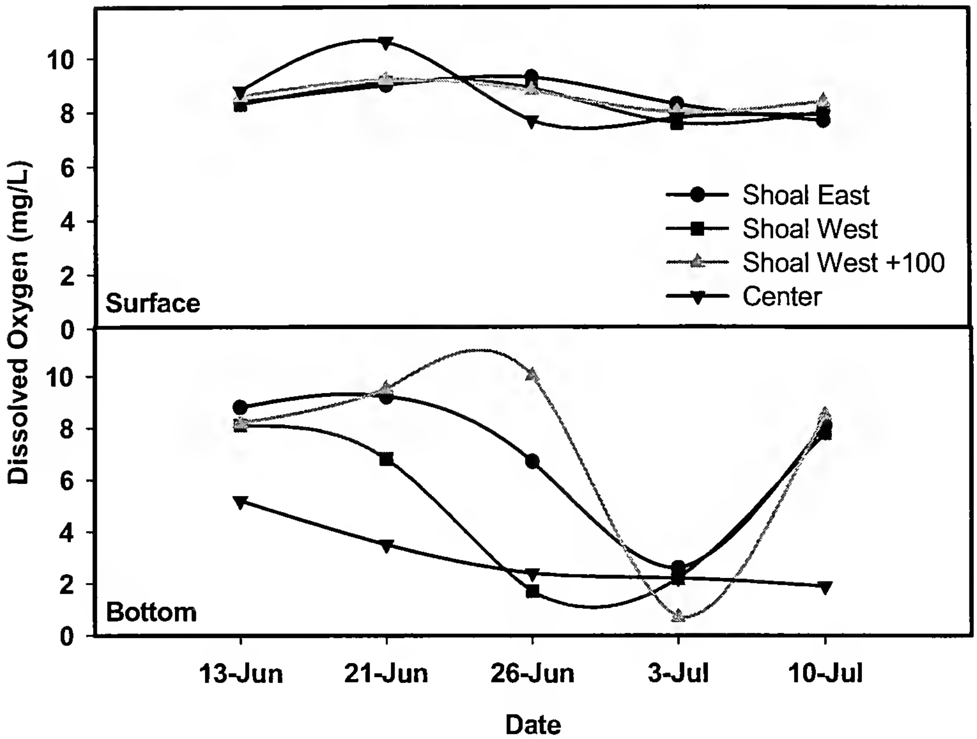


Figure 6. D. O. and temperature with depth, Lake Quonnipaug, 2002.

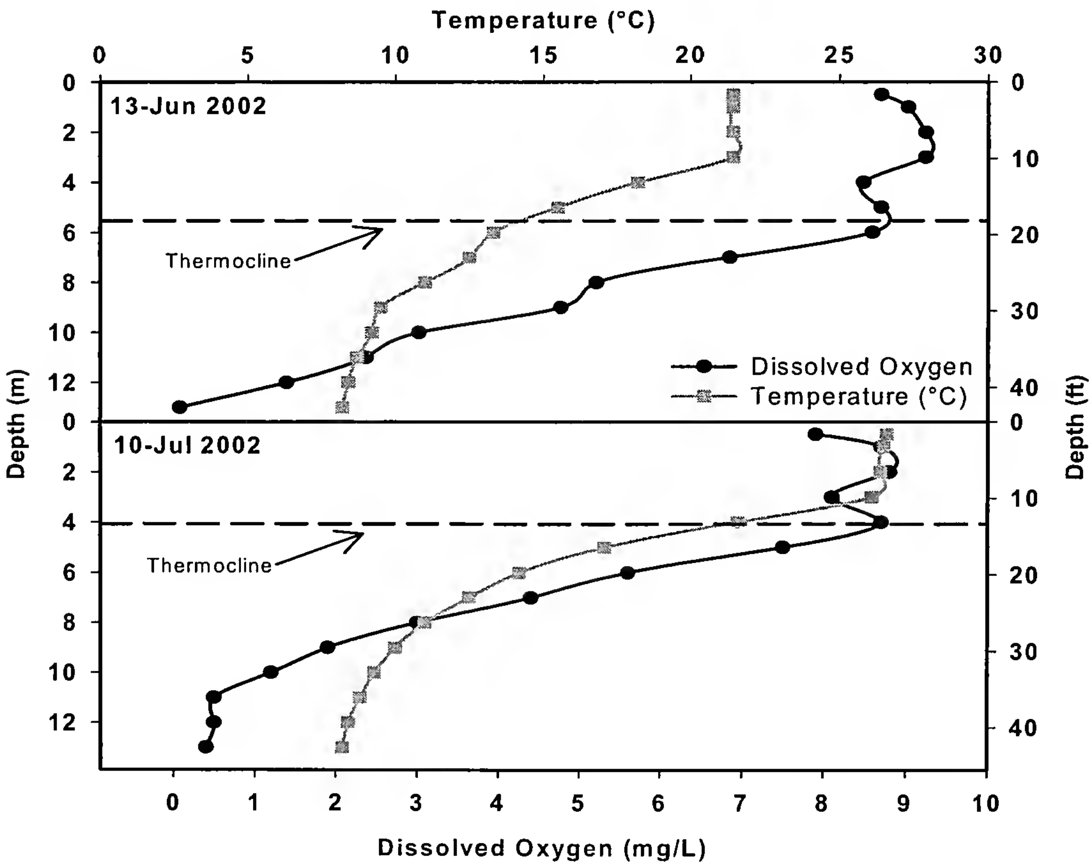
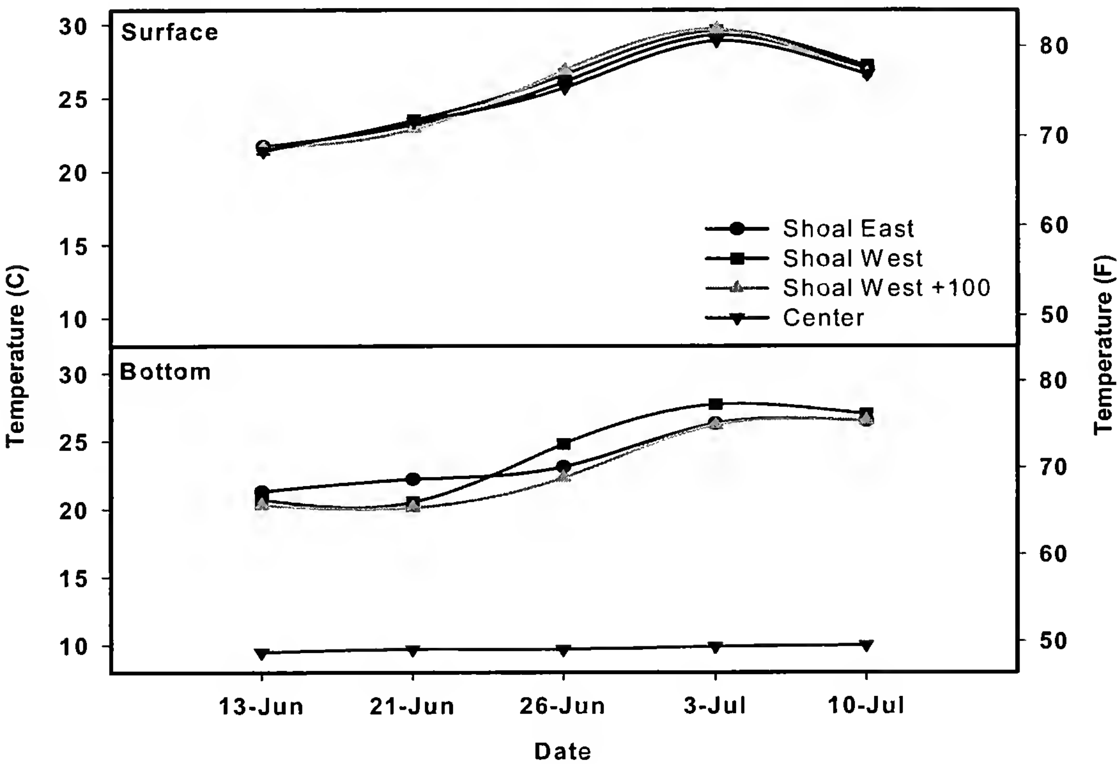


Figure 7. The water temperature in Lake Quonnipaug, 2002.

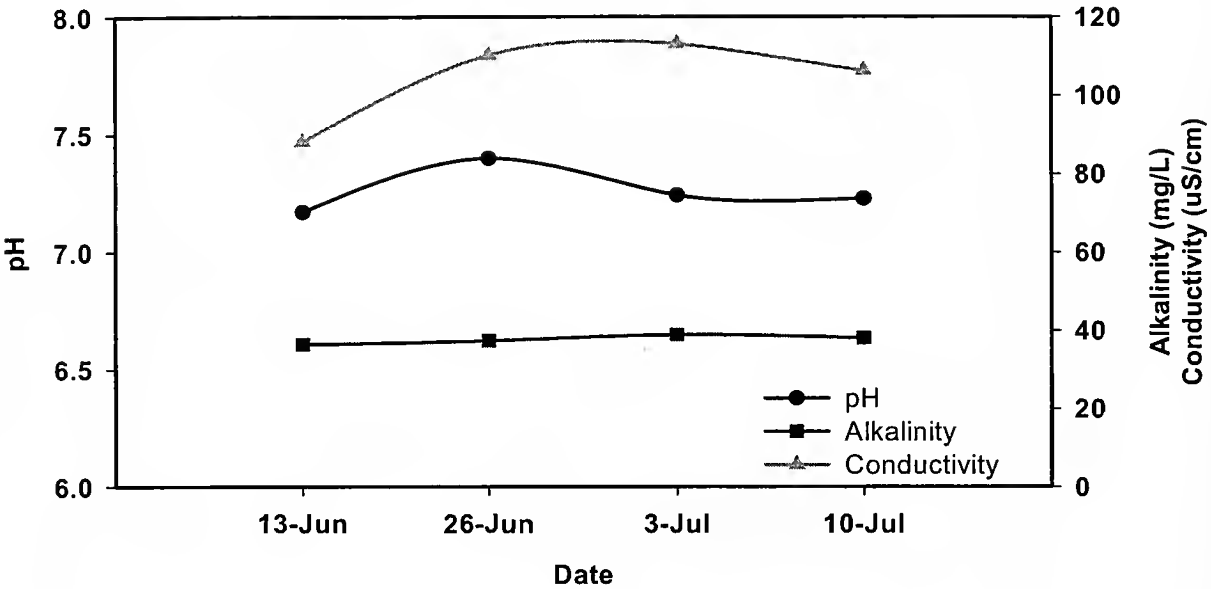


RESULTS AND DISCUSSION

The pretreatment visual inspection of the lake on June 11, 2002 revealed that the aquatic vegetation survey performed on September 27, 2001 (Figure 1) was accurate in its description of the current situation. No cabomba was apparent in the boat launch cove where treatment with Sonar SRP occurred in 2001. This area, however, did contain a sparse population of Eurasian milfoil, variable milfoil (*Myriophyllum heterophyllum*), robbins pondweed, large leaf pondweed (*Potamogeton amplifolius*), coontail (*Ceratophyllum sp.*), and elodea (*Elodea canadensis*). Lily pads (*Nymphea sp., Nuphur sp.*) and other emersed vegetation were present along the shoreline. In other portions of the lake, particularly along the southeast shore, cabomba was present either as diffuse plants or occasional dense patches. Eurasian milfoil occurred mainly in the center shoal areas and at a few locations on the east side of the lake. A few small patches of Eurasian milfoil were present on the southern side of the swim area at the town beach. This was an area that had been treated with Navigate in spring 2001 and, thus, may indicate incomplete control. Sporadic Eurasian milfoil could be found elsewhere. Water marigold was difficult to find, but this is not unusual because most of the growth of this plant occurs later in the season. The lake bottom between 3 and 9 feet deep was mainly covered with robbins pondweed. Large leaf pondweed was present in frequent dense patches in the northern parts of the lake and in the center shoal area. In other parts of the lake, less than 6 feet deep, large leaf pondweed occurred in sporadic patches.

The June 13th Navigate treatments of the beach and shoal areas (Figure 2) resulted in slow but steady decline of the milfoil. After two weeks (June 26), the milfoil looked healthy except for some slight elongation and distortion of the growing tips. After four weeks (July 10), the milfoil was still

Figure 8. pH, alkalinity and conductivity in Lake Quonnipaug, 2002.



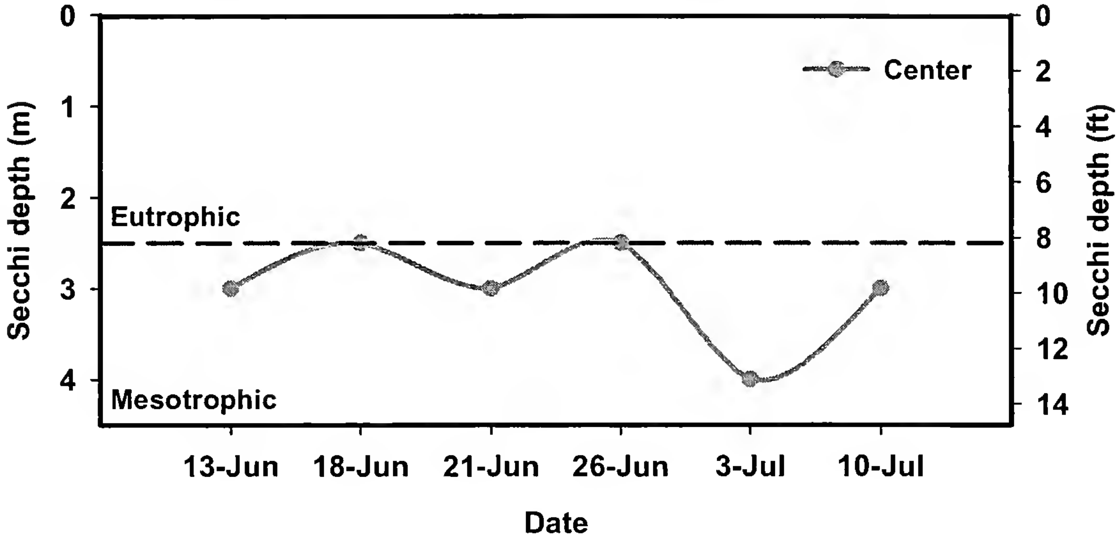
visible from the surface, but the foliage had begun to thin and turn brown. Some slight distortion of the stems was also apparent. Aquatic plant surveys on July 30 revealed little milfoil in treated areas.

Concentrations of 2,4-D in the treatment sites (Figure 4) were well below the desired concentration of 1000 ppb suggested by Green and Westerdahl (1990). The highest 2,4-D concentrations were found in water near the bottom of the east shoal treatment site where levels were 87 ppb - 1 DAT, 57 ppb - 8 DAT, 20 ppb - 13 DAT, 16 ppb - 21 DAT and below the detection limit of 1 ppb - 28 DAT. Movement of the herbicides throughout the lake was probably the reason for the low concentrations in the treatment sites. 2,4-D was found at concentrations approaching that of the treated area in both the center of the lake (treatment site +1000 ft.) and shoal west +100' site. Movement of 2,4-D may have been accelerated because of the exposed central location of the shoal treatment sites. Because control of Eurasian milfoil was very good, albeit somewhat slow, it appears the 2,4-D concentration of 1000 ppb thought necessary for good control is considerably higher than needed in Lake Quonnipaug. The irrigation standard of 100 ppb 2,4-D was not exceeded in any of the water samples.

Low levels of dissolved oxygen can be associated with the decay of plant tissue when controlling unwanted vegetation with an herbicide. Tests revealed that all surface water samples contained abundant dissolved oxygen throughout the sampling period (Figure 5). In the water near the bottom, dissolved oxygen fell below a desirable level of greater than 3.0 mg/l on June 26 (13 DAT) and July 3 (21 DAT). Dissolved oxygen in these bottom water samples recovered to non-deficient conditions by July 10 (28 DAT). The brief low dissolved oxygen levels are typical in lake bottom water in the summer and did not occur solely in the treatment areas. Dieback of milfoil was, therefore, not likely the cause.

Surface-water temperatures warmed from near 70° F in mid-June to near 80° F in mid-July (Figure 7). Bottom temperatures in the treatment sites differed little from the surface. In the center of the lake, where a complete temperature profile could be determined, the thermocline (demarcation between warm surface and cool subsurface water) was at a depth of 18' on June 13 and 12' on July 10 (Figure 6). Water pH ranged from 7.1 to 7.4, while alkalinity ranged from 34.2 to 43.8 mg/l $CaCO_3$ (Figure 7). Transparency was between 2.5 to 4 meters throughout the spring and summer (Figure 8). The clearest water occurred in early July.

Figure 9. Transparency in Lake Quonnipaug, 2002.

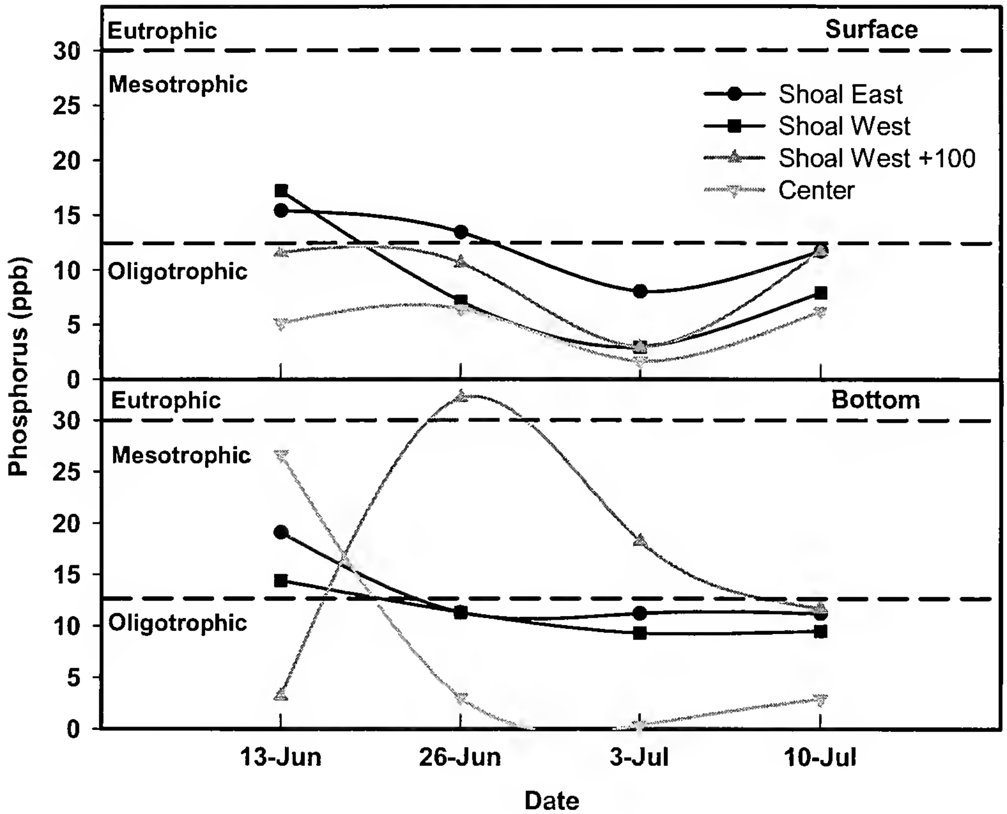


Total phosphorus (P) concentrations in the lake water are considered a key indicator of the state of eutrophication. Frink and Norvell (1983) reported that lakes with P levels below 15 ppb can be considered oligotrophic, lakes with P between 15 and 30 ppb are mesotrophic and lakes with P over 30 ppb are eutrophic. P concentrations during this study (Figure 9) generally ranged between 5 and 20 ppb and would classify Lake Quonnipaug as oligo/mesotrophic. This is similar to concentrations found in previous studies (Canavan and Siver, 1995; Frink and Norvell, 1983).

Sediment in the boat launch treatment site contained 32.6 %/wt organic matter, 13.2 %/wt sand (2.0 - 0.05 mm), 67.1 silt (0.05 - 0.002 mm) and 19.7 %/wt clay (<0.002 mm). Variability between sites, expressed as standard deviation, was 1.6 for organic matter, 1.9 for sand, 10.6 for silt and 8.7 for clay. The high organic content of the sediment is thought to have played a role in binding and later releasing the fluridone (Sonar SRP) applied in 2001. This may explain the slower than expected control of the cabomba (Bugbee and White, 2001).

The aquatic plant survey performed on July 30, 31 (Figure 11) revealed good residual control of cabomba in 2001 at the boat launch treatment site. Cabomba harvesting on July 29 and 31, removed a total of 110 plants from the site. Most plants appeared to be recently rooted fragments that had floated in from other parts of the lake. An area of concentrated cabomba occurred at the mouth of the inlet stream to the north of the boat ramp. These plants probably were not exposed to sufficient concentrations of fluridone because of the dilution caused by stream flow. Treatment of Eurasian milfoil in the beach and center shoal areas successfully removed most of the weeds. The beach area was completely free of vegetation, and the shoal areas contained only sporadic milfoil, mainly along the edges. Water marigold was generally sparse but easier to find than in previous years. No water marigold was found in the boat launch treatment site. Other aquatic vegetation observed by CAES scientists are described in Table 1 and generally corresponded to that found in the pretreatment aquatic plant survey (Figure 1).

Figure 10. Total phosphorus concentrations in Lake Quonnipaug, 2002.



Treatment of the lily pads and other emersed vegetation with glyphosate on September 3, 2002 resulted in considerable dieback of the plants after three weeks. Enough living vegetation was apparent, however, to require a follow-up application on September 24. The uncontrolled plants could have remained because of missed plants, wash off of herbicide or lack of sensitivity of certain plant species. The effectiveness of this second application could not be fully determined because the hydroraking of the area began approximately one week later. Hydroraking appeared to remove most plants from the area shown in Figure 2. Some broken plant parts (roots, stems, tubers etc.) were floating in the water after hydroraking, but winds from the north and flow of water to south (over the dam) probably minimized their movement northward into the main body of the lake. Future monitoring is needed in areas where lily pads were removed to determine how rapid regrowth occurs and if nonnative plants such as cabomba and water milfoil begin to proliferate.

Figure 11.

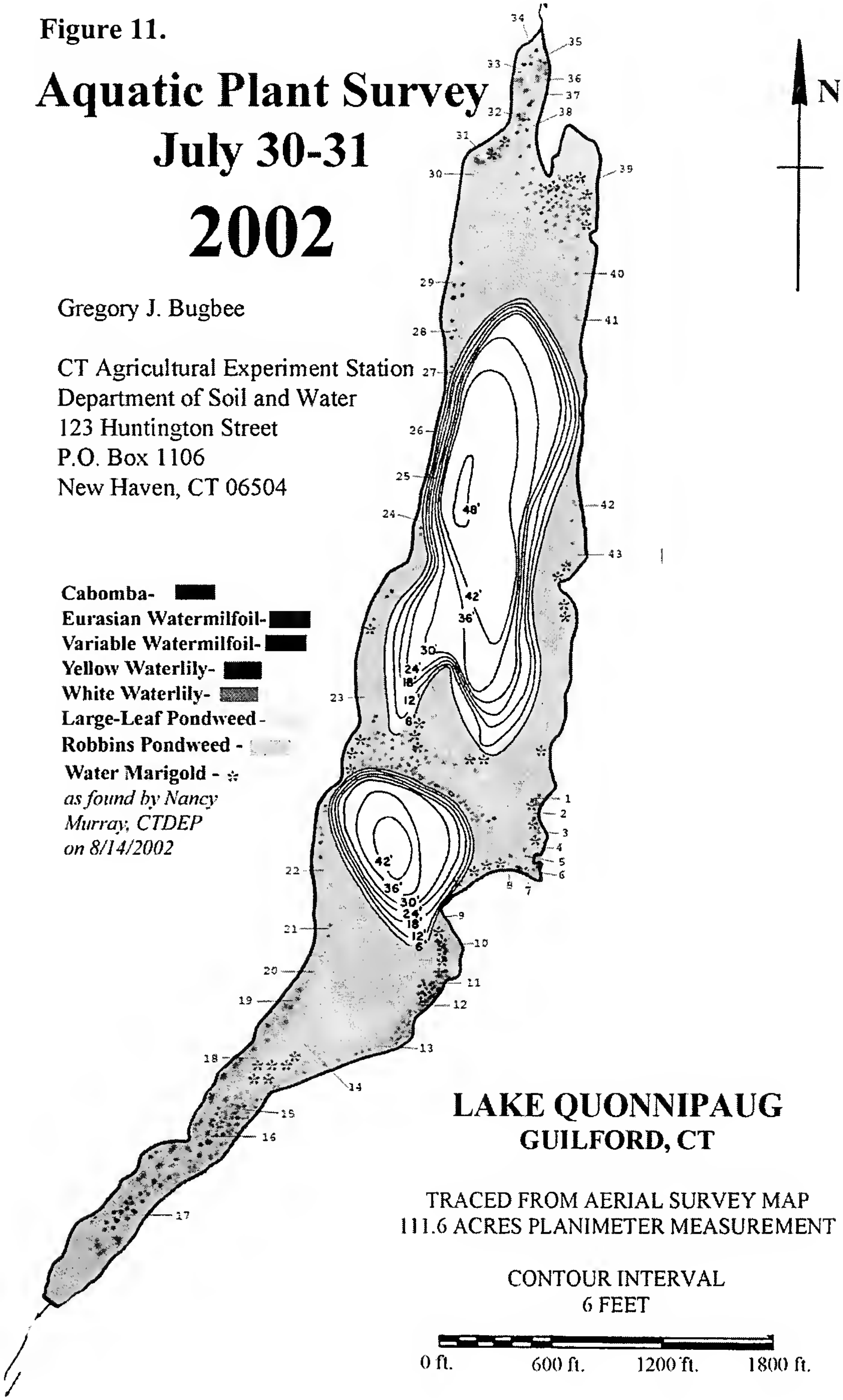

Aquatic Plant Survey
July 30-31
2002
Gregory J. Bugbee
CT Agricultural Experiment Station
Department of Soil and Water
123 Huntington Street
P.O. Box 1106
New Haven, CT 06504
Cabomba-
Eurasian Watermilfoil-
Variable Watermilfoil-
Yellow Waterlily-
White Waterlily-
Large-Leaf Pondweed -
Robbins Pondweed -
Water Marigold -
as found by Nancy Murray, CTDEP on 8/14/2002
N
48'
42'
36'
30'
24'
18'
12'
6'
LAKE QUONNIPAUG
GUILFORD, CT
TRACED FROM AERIAL SURVEY MAP
111.6 ACRES PLANIMETER MEASUREMENT
CONTOUR INTERVAL
6 FEET
0 ft.
600 ft.
1200 ft.
1800 ft.

Table 1. Aquatic vegetation described by CAES scientists at sites in Lake Quonnipaug, July 30-31 2002.

Site	Plants Species
1.	Sparse cabomba, valisneria
2.	`Large-leaf pondweed, sparse cabomba
3.	Watershiled, white water lily, yellow water lily near shore
4.	Sparse elodea
5.	Red flowered water lily, sparse Eurasian watermilfoil
6.	Sparse Eurasian watermilfoil, white water lily
7.	Sparse valisneria, Eurasian watermilfoil, patches of large-leaf pondweed, 10x10 ft. patch of yellow water lily, sparse cabomba, sparse coontail
8.	Sparse coontail, a few Eurasian watermilfoil plants
9.	White water lily along shore, patches of large-leaf Pondweed
10.	White water lily mixed with large-leaf pondweed 20-30 ft off shore, cabomba and Eurasian watermilfoil 30-40 ft. off shore.
11.	Yellow water lily and white water lily along shore, dense cabomba, Eurasian watermilfoil, variable watermilfoil
12.	White water lily and yellow water lily to 50 ft. off shore
13.	Eurasian watermilfoil, valisneria, water lilies
14.	Large-leaf pondweed
15.	Dense white water lily, flowering cabomba and variable watermilfoil, white waterlily, sparse elodea
16.	White water lily, yellow water lily, watershiled, dense cabomba, dense flowering variable watermilfoil, sparse Eurasian watermilfoil
17.	Patches of large-leaf pondweed
18.	Sparse yellow and white waterlily
19.	Patches of valisneria
20.	Sparse Eurasian watermilfoil
21.	Red flowering water lily
22.	Cabomba, sparse Elodea
23.	Sparse curly leaf pondweed, elodea and fine-leaf pondweed
24.	Sparse cabomba and Valisneria along shore
25.	Sparse elodea and fine-leaf pondweed, valisneria along shore
26.	Sparse elodea and Eurasian watermilfoil
27.	Sparse Eurasian watermilfoil, cabomba and bladderwort
28.	Sparse variable watermilfoil, cabomba and fine-leaf pondweed
29.	White water lily along shore
30.	Dense large-leaf pondweed, sparse Eurasian watermilfoil
31.	Dense white and yellow water lily, sparse watershieled, dense large-leaf pondweed, Eurasian watermilfoil, cabomba
32.	Cabomba, large-leaf pondweed, sparse Eurasian watermilfoil, curly-leaf pondweed and variable watermilfoil
33.	White water lily, yellow water lily and watershield along shore, sparse Eurasian and variable watermilfoil, cabomba
34.	White water lily, yellow water lily and watershield along shore, sparse cabomba, Eurasian watermilfoil, large-leaf pondweed and variable watermilfoil
35.	Moderate variable watermilfoil, cabomba, Eurasian watermilfoil and large-leaf pondweed
36.	Moderate Eurasian watermilfoil, large-leaf pondweed
37.	Moderate cabomba and Eurasian watermilfoil
38.	Large patch of white water lily, dense cabomba and white waterlily
39.	White water lily, cabomba, large-leaf pondweed, valisneria along shore
40.	Sparse Eurasian watermilfoil
41.	Sparse Eurasian watermilfoil, fine-leaf pondweed
42.	Large-leaf pondweed, sparse cabomba
43.	Sparse Eurasian watermilfoil

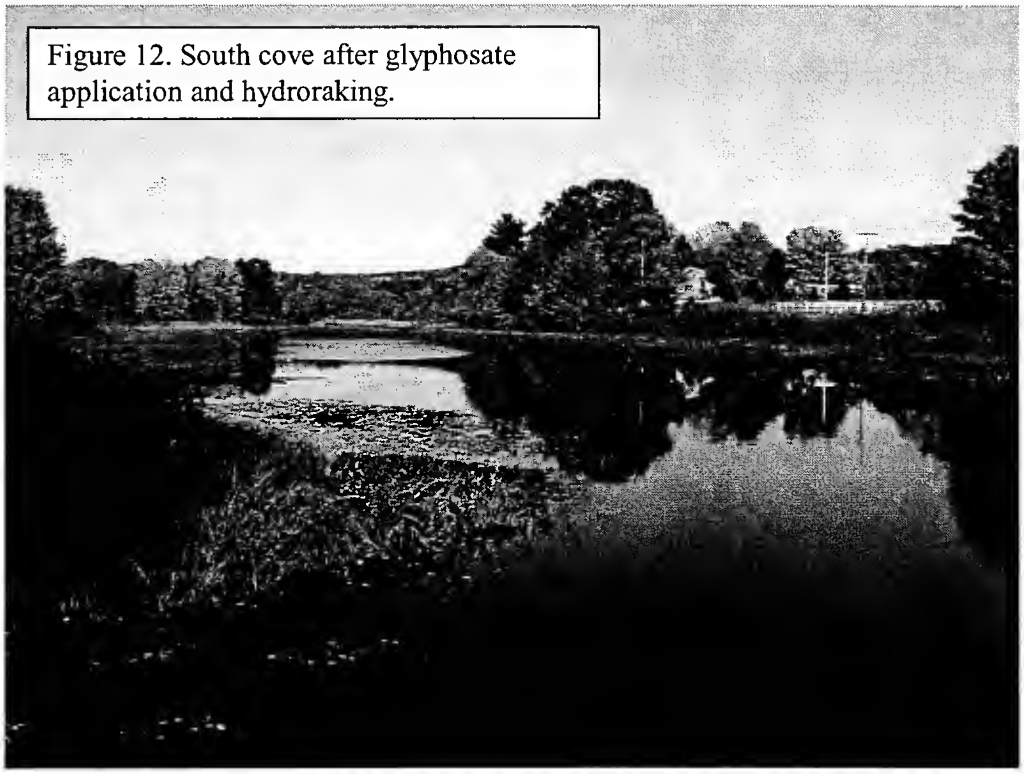


Figure 12. South cove after glyphosate application and hydroraking.

CONCLUSIONS

Spot treatments of cabomba with Sonar SRP and Eurasian milfoil with Navigate can provide local control of the weeds in Lake Quonnipaug. The 2001 application of Sonar SRP resulted in only approximately 100 cabomba plants reappearing in 2002. These plants were removed by about two hours of hand pulling. Navigate successfully removed most Eurasian milfoil from the treated areas. Milfoil control will take at least four weeks. Use of lake water for irrigation, after a localized treatment, was not a problem as no levels of 2,4-D exceeded the irrigation standard of 100 ppb. A significant population of water marigold was found in many areas of the lake outside the treatment sites. This indicates that offsite movement of the herbicides does not threaten this plant. A fall hydroraking, preceded by a foliar application of glyphosate to the emersed plants in the south cove, resulted in the removal of the plants. The time required before significant regrowth occurs needs further study. Chemical analysis of the water, conducted in 2002, revealed that the lake was in the oligo/mesotrophic state of eutrophication, a condition similar to previous years.

ACKNOWLEDGMENTS

The assistance of the following individuals is gratefully acknowledged.

Carl Balestracci, Jr., First Selectman, Guilford, CT.
Mark Hood, Department of Soil and Water, CAES
Ed Finger, Guilford Conservation Commission
Charles Frink, Department of Soil and Water, CAES
Brian Hunter, Natural Diversity Data Base, CTDEP
Bill Johnson, Chairman, Guilford Conservation Commission
Chuck Lee, Bureau of Planning and Standards, CTDEP,
Nancy Murray, Natural Diversity Data Base, CTDEP
Mark Reynolds, Department of Soil and Water, CAES
Brad Robinson, Pesticide Control, CTDEP
Judy Singer, Pesticide Control, CTDEP
Gerry Smith, Aquatic Control Technologies, Sutton, MA
Joan Stettbacher, 5 Cheryl Lane, Guilford, CT
Ben Sylvester, 114 Quonnipaug Lane, Guilford, CT
Lydia Wagner, Department of Soil and Water, CAES

This project was funded by grants from the Town of Guilford, USDA Specific Cooperative Agreement 58-6629-2-205 and USDA Hatch CONH00768.

REFERENCES

APHA, AWWA, WEF. 1995. Standard methods for the examination of water and wastewater. 19th Ed. Mary Ann Franson ed. American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. 4:106-112.

Ball, D.F. 1964. Loss-on- ignition as an estimate of organic matter and organic carbon in non-calcarious soils. J. Soil Sci., 15:84-91.

Bugbee, G. J. and J. C. White. 2000. Lake Quonnipaug water testing 2000. A report to the Guilford Conservation Commission. The Connecticut Agricultural Experiment Station. P.O. Box 1106, New Haven CT, 06504. 42 pp.

Bugbee, G. J. and J. C. White. 2001. Control of cabomba and Eurasian milfoil in Lake Quonnipaug 2001. A report to the Guilford Conservation Commission. The Connecticut Agricultural Experiment Station. P.O. Box 1106, New Haven CT, 06504. 25 pp.

Bugbee, G. J., J. C. White, and W. J. Krol. 2003. Control of variable watermilfoil in Bashan Lake, CT with 2,4-D: Monitoring of lake and well water. J. Aquat. Plant Manag. 41:18-25.

Canavan IV, R.W. and P.A. Siver. 1995. Connecticut Lakes: A study of the chemical and physical properties of fifty-six Connecticut Lakes. Connecticut College Arboretum. New London, CT.

Crow, G.E. and C. B. Hellquist. 2000. Aquatic and Wetland Plants of Northeastern North America. Volume One Pteridophytes, Gymnosperms, and Angiosperms: Dicotyledons. Madison, Wisconsin. The University of Wisconsin Press. 480 pp.

Crow, G.E. and C. B. Hellquist. 2000. Aquatic and Wetland Plants of Northeastern North America. Volume Two Angiosperms: Monocotyledons. Madison, Wisconsin. The University of Wisconsin Press. 400 pp.

Day, P.R. 1965. Particle fractionation and particle size analysis. *in*: Methods of Soil Analysis, Part 1, Physical and Mineralogical Properties, Including statistics of measurement and sampling. American Society of Agronomy, Inc. Madison, Wisconsin 545-562.

F
rink, C.R. and W.A. Norvell. 1984. Chemical and physical properties of Connecticut lakes. Conn. Agric. Exp. Sta. Bull. 817.

Knocklein, G.W. 2001. Aquatic plant survey of Lake Quonnipaug. A report to the Guilford Conservation Commission. Northeast Aquatic Research, LLC, 74 Higgins Highway, Mansfield Center, CT 06250

Madsen, J.D, L.W. Eichler and C.W. Boylen. 1988. Vegetative spread of Eurasian watermilfoil in Lake George, New York. J. Aquat. Plant Manag. 26:47-50

Muenscher, W.C. 1944. Aquatic Plants of the United States, Ithaca, New York, USA. Comstock Publishing Company Inc. Cornell University

NOTES

NOTES