AQUATIC PLANT SURVEY REPORT - 2001
NORTH AND SOUTH SONAR™ TREATMENT PLOTS
SARATOGA LAKE

December 2001

Prepared for:

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INTRODUCTION

Aquatic Control Technology, Inc. of Sutton, Massachusetts was retained by the Saratoga Lake Protection and Improvement District (SLPID) to conduct early and late season aquatic plant surveys in 2001. The surveys focused on the two 100-acre plots that were treated with SONAR (fluridone) herbicide during the 2000 season for control of Eurasian watermilfoil (*Myriophyllum spicatum*).

Aquatic Control was selected to perform the SONAR demonstration treatment project in 2000 through a competitive procurement process. Pre and post-treatment monitoring of the aquatic plant community throughout the two treatment plots was an essential component of the program to quantify the level of milfoil control that was achieved and to assess impacts to non-target plants. The limited response of the milfoil following the two initial treatments with SONAR SRP (slow release pellet), prompted SePRO – the manufacturer of SONAR – and Aquatic Control to perform additional treatments with SONAR AS (liquid) to achieve the desired control of milfoil. Milfoil was finally controlled to the target levels in each plot by the end of the summer. In order to assess the duration of milfoil control that could be expected from partial-lake SONAR treatments at Saratoga Lake continued monitoring of the two plots was recommended through the 2001 season.

Findings from the early and late season aquatic plant surveys are presented in the following report, along with recommendations for future milfoil management efforts.

SURVEY METHODS

The same methods and approach used in 2000 were employed for the 2001 sampling effort. The surveys attempted to provide a quantitative assessment and qualitative impressions of the dominant aquatic plant distribution throughout the north and south treatment plots. Both areas were toured and sampled by boat. A concerted effort was made to replicate transect and data point locations using GPS. The plant community was assessed through visual inspection, submersed plants were collected using a throw rake and the submersed plant community was verified using an Aqua-Vu underwater camera system.

A less comprehensive inspection of the aquatic plant community occurred during the early season inspection on June 26, 2001. The submersed plant distribution was checked along each transect, but the data point sampling was not performed. The dominant aquatic plants present, percent cover and a biomass index were recorded at several intervals along each transect. Weather conditions were sunny and the lake was fairly calm, yielding good visibility.

Transect and data point sampling was completed during the late season inspection on September 28, 2001. GPS was used to approximate transect and data point locations. At each data point the following information was recorded:

- Water depth - using a depth sounder and a weighted fiberglass tape measure in areas of dense plant growth
- Dominant vegetation present - based on bottom drags with a throw rake and observations using the Aqua-Vu underwater camera
- Percent Total Plant Cover - was given a percentage rank based on the areal coverage of plants. Generally, in areas with 100% cover, bottom sediments could not be seen through the vegetation. Percentages less than 100% indicated the amount of bottom area covered by plant growth.
- Biomass Index - was an estimate of the weight of plants per unit area, based on a scale from 0-4 (0-no biomass, plants generally absent; 1-low biomass, plants growing only as a low layer on the sediment; 2-moderate biomass, plants protruding well into the water column but generally not reaching the water surface; 3-high biomass, plants filling enough

of the water column and/or covering enough of the water surface to be considered a possible recreational nuisance or habitat impairment; 4 -extremely high biomass, water column filled and/or surface completely covered obvious nuisance conditions and habitat impairment severe)

- Percent Milfoil Cover - relative to the overall plant cover

A discussion of findings from the early and late season survey is provided in the following section. Field data collected during the surveys is provided in the Appendix. Computer generated maps of the Dominant Aquatic Vegetation Distribution were produced in a GIS format and are also provided in the Appendix. Figure 1 shows the early and late season plant distribution of the North Plot. Figure 2 shows the early and late season plant distribution of the South Plot. The approximate transect and data point locations are depicted in Figure 3.

RESULTS AND FINDINGS

A fairly diverse assemblage of aquatic plants during was observed in portions of each plot during both the early and late season inspections. The greatest plant diversity was observed in areas where the water was between 3 and 10 feet deep, which generally occurred within 300 feet from shore. Less plant diversity was observed in areas where the water depth exceeded 10 feet. The dominant plants encountered were identified to genus and species when possible. A list of plants encountered, along with the abbreviations used in the field data is shown below.

Table 1 -List of Dominant Species Encountered

Macrophyte Species	*Common Name*	*Abbreviation*	*Notes*
Ceratophyllum demersum	Coontail	Cd	Abundant in deeper water
Elodea canadensis	Waterweed/elodea	E	Common
Heteranthera dubia	Water stargrass	Hd	Abundant along shoreline
Myriophyllum spicatum	Eurasian watermilfoil	Ms	EXOTIC – scattered to abundant
Najas sp.	Naiad	Na	Scattered
Potamogeton crispus	Curlyleaf pondweed	Pc	EXOTIC – abundant early
Potamogeton illinoensis	Illinois pondweed	Pi	Scattered
Potamogeton pectinatus	Sago Pondweed	Ps	Scattered early season only
Potamogeton richardsonii	Richardson Pondweed	Pn	Scattered late season only
Potamogeton robbinsii	Robbin's pondweed	Pr	Scattered
Potamogeton zosteriformis	Flatstem pondweed	Pz	Scattered
Vallisneria americana	Wild celery/tapegrass	V	Scattered

Early Season Survey – 6/26/01

The aquatic plant distribution observed during the early season inspection was very similar to what was observed during the post-treatment inspection last year. It appeared as if much of the early growing curlyleaf pondweed growth had already died back, leaving fairly diverse plant cover throughout each plot. Milfoil densities were greatest along the margins of each treatment plot. The most prolific native plant growth was found in shallow water areas, closest to the shorelines. Dense water stargrass growth was dominant with lesser amounts of curlyleaf pondweed, other pondweeds and elodea. Milfoil was found in varying densities through the center of each plot, while the deeper water areas were dominated by coontail, with lesser amounts of curlyleaf pondweed and scattered milfoil. A more detailed summary of conditions observed in each plot is provided below.

North Plot

- Center of plot (200-300 ft. from shore) - Plant cover dominated by curlyleaf pondweed, sago pondweed, water stargrass and coontail (75% cover; 2-3 biomass). Milfoil cover was less than 10% and less than 5% within 100 ft. from shore.
- Center of plot (300-1200 ft. from shore) - Plant cover dominated by curlyleaf pondweed and coontail (50-75% cover; 2 biomass). Milfoil generally 10-25% cover, a few pockets with 50% cover were encountered.
- North and south edges of plot - Milfoil accounting for 50-75% of the total plant cover. Curlyleaf pondweed, coontail, water stargrass and other pondweeds also present. Total plant cover 75%; 2-3 biomass. Milfoil drops off in deeper water (>12 feet). Some of the heaviest milfoil growth on the lake extends for several thousand feet beginning at southern edge of the plot.
- Overall - Milfoil cover appeared to be less than 20-30% throughout the entire plot. Native plants were fairly well distributed throughout the plot.

South Plot

- Center of plot (between 100 and 300 ft. from shore) - Plant cover dominated by water stargrass and curlyleaf pondweed (50-75% cover; 2 biomass). Milfoil was generally absent from the center of the plot
- Center of plot (300-800 ft. from shore) - Plant cover dominated by elodea, coontail and curlyleaf pondweed (50% cover; 1-2 biomass). Milfoil was mostly absent, a few individual plants were observed, but cover was less than 5%.
- Center of plot (800-1500 ft. from shore) - Plant cover dominated by coontail and elodea (10-25% cover; 1 biomass). Milfoil was mostly absent, a few individual plants were observed, but cover was less than 5%.
- North and south edges of plot - Milfoil accounting for 10-25% of the total plant cover. Elodea, coontail, curlyleaf pondweed and flat-stem pondweed also prsent. Total plant cover 50-75%; 1-2 biomass. Milfoil cover increased to 50% beyond the treatment plot on the western side.
- Overall - Milfoil cover appeared to be less than 10% throughout the entire plot. Native plants were well distributed throughout the plot.

Milfoil growth appeared to be considerably more advanced in other portions of the lake, particularly along the western shoreline and near the weevil stocking site on the north side of Snake Hill. Even areas just beyond the treatment plots appeared to have greater milfoil coverage. This was most evident at the North Plot, where milfoil coverage appeared to increase to between 50-75% on the north side of the plot and to between 75-100% on the south side of the plot.

Based on the results of the early season survey, there did appear to be to a reduction of milfoil growth in both treatment plots.

Late Season Survey – 9/28/01

There were some significant changes in the dominant aquatic plant distribution in each treatment plot during the late season inspection. The most notable difference was the increased density of milfoil. This was particularly evident in the North Plot. The percentage of milfoil cover increased from 20-30% observed during the early season inspection to nearly 60% by the time the late season inspection was performed. Milfoil had become reestablished as the dominant plant throughout the mid-depth (8-12 feet) portions of the plot. A 50-75 foot wide band of dense milfoil growth was matted to the surface through the center of the plot. This area was relatively devoid of milfoil growth during the post-treatment inspection in September 2000 and during the early season inspection this year. Increased milfoil coverage in the South Plot was not as evident. Milfoil density did increase throughout the center of the plot, but it still rarely accounted for more than 25% of the plant cover. A summary of the various assemblages seen in each plot are described in greater detail below:

North Plot

- Shallowest area (<200 ft. from shore) - Plant cover dominated by 50-75% cover of milfoil, wild celery, water stargrass, richardsons pondweed and coontail (>80% cover; 3 biomass).
- Center of plot 50-75 foot band of dense milfoil matted to surface (100-200 ft. from shore) – Understory growth of wild celery, water stargrass and richardsons pondweed (100% cover; 4 biomass).
- Southern side of plot (200-400 feet from shore) – Dense milfoil growth (>90%) with lesser amounts of wild celery, water stargrass and richardsons pondweed (100% cover; 3-4 biomass).
- Center portion and majority of plot (200-1000 feet from shore) – Milfoil common to abundant (25-90%) with lesser amounts of coontail, curlyleaf pondweed, flatstem pondweed, and illinois pondweed (>85% cover; 2 biomass).
- Deepest area (>1000 feet from shore) – Coontail dominated with lesser amounts of milfoil (<10%) and curlyleaf pondweed (10% cover; 1 biomass).
- Overall - Milfoil dominated plot with coverage approaching 60%.

South Plot

- Shallowest area (<200 ft. from shore) - Plant cover dominated by water stargrass, wild celery, elodea and richardsons pondweed (>75% cover; 1-2 biomass). No milfoil observed.
- Slightly deeper water (200-300 ft. from shore) – water stargrass and coontail dominated, with lesser amounts of wildde celery, milfoil (<10%) and elodea (>75% cover; 2 biomass)
- Mid depths along edges of plot (300-700 feet from shore) – Coontail and curlyleaf pondweed dominated with less than 50% milfoil cover (60-80% cover; biomass 1-2)
- Center portion and majority of plot (300-1500 feet from shore) – Coontail and <25% milfoil cover (25-75% cover; biomass 1).
- Deepest area (>1500 feet from shore) – Coontail dominated (<50% cover; 1 biomass).
- Overall – Milfoil density slight increased, but still secondary to other plants. Elodea was overtaken by coontail in deeper water areas.

The post-treatment survey in 2000 was performed on September 26th and this year's late season inspection was performed on September 28th. Averages of the quantitative data collected during these surveys are shown below.

Table 2 – Comparison of Quantitative Sampling Averages

	North Plot				*South Plot*		
Survey Date	*%Total Plant Cover*	*Biomass Index*	*% Milfoil Cover*	*Survey Date*	*%Total Plant Cover*	*Biomass Index*	*% Milfoil Cover*
	68.18	1.82	41.36	9/26/00	59.35	1.70	
	68.18	2.36	59.32	9/28/01	63.75	1.55	

The increase in milfoil cover was clearly more evident in the North Plot. A slight increase in milfoil cover was noted in the South Plot.

The survey results indicate that some carryover control of milfoil did occur in the South Plot through the 2001 season. This was obviously not the case in the North Plot. These results are consistent with the response of milfoil following the initial SONAR SRP applications in 2000. Greater impacts on the milfoil were observed in the South Plot following these applications. The SONAR AS treatments did control the milfoil in the north plot in the year of treatment, but there may not have been sufficient translocation into the root structures to prevent the milfoil from growing back this year. It appears as if it only slowed the development of milfoil in the North Plot in 2001.

DISCUSSION AND FUTURE TREATMENT RECOMMENDATIONS

Milfoil was not immediately controlled by the two SONAR SRP applications in 2000, necessitating the follow-up treatments with SONAR AS later in the summer to reach the anticipated level of control. With the majority of milfoil controlled by the end of the summer in 2000, it was hoped that carryover benefit would persist for the 2001 season.

Results of the early season inspection in 2001 were promising. The milfoil density in each plot was essentially unchanged from what was observed in late September 2000 and there was a fairly diverse assemblage of native plants. By the time the late season inspection was performed in late September 2001, milfoil had returned to nuisance densities in the North Plot. The South Plot showed slight increases in milfoil coverage, but plants were still well below the surface and did not appear as if they would interfere with recreational activities through the center portion of the lake. Reasonable carryover milfoil control was achieved in the South Plot.

The increase in milfoil coverage and density in the North Plot seen over the 2001 summer, confirms that the two plots responded differently to the treatment program. Even prior to treatment there was concern that this may occur, since the North Plot was located directly across the lake from the primary inlet (Kaydeross Creek) and in close proximity to the outlet (Fish Creek). This greater potential for water exchange and dilution was the reason that the guaranteed level of milfoil control was reduced to 60% in the North Plot as compared to the 85% milfoil control that was guaranteed in the South Plot. The fact that milfoil re-grew so vigorously in the North Plot this year suggests that the root structures were not effectively controlled during the 2000 treatment program.

Both the extremely slow response of milfoil seen during the year of treatment and the re-growth of milfoil in the North Plot this year can probably be attributed to insufficient SONAR concentrations due to dilution and water movement. SePRO – the manufacturer of SONAR – has been reviewing the active ingredient (fluridone) release rates for the SRP formultaion over the past several years. It was determined that SONAR SRP releases fluridone much slower than was originally thought. This would explain the delayed response seen during the 2000 treatment program. SePRO recently released a new pellet formulation of SONAR called PR (Precision Release). It releases fluridone more quickly, which should improve the amount of chemical uptake by highly susceptible plants like Eurasian watermilfoil.

Fluridone treatment at Saratoga Lake may still be a viable and effective milfoil control strategy. Whole lake treatments with liquid formulations of fluridone are more proven and generally preferred to shoreline or partial-lake applications. The large size of Saratoga Lake and its rapid flushing rate (5 months) makes a whole-lake application a formidable and expensive task. For a whole-lake treatment to be successful, 8-10 ppb (parts per billion) of fluridone would need to be maintained in the lake for approximately 45 days. Milfoil control has been achieved at concentrations as low as 6 ppb, but the duration of control is reduced. Increasing the target concentration to 8-10 ppb should insure that at least 2-3 years of effective milfoil control is achieved. The treatment program would likely need to be performed between the months of May and June, when the milfoil is actively growing, but before it reaches its peak biomass. There is a high probability of excessive outflow at this time of year due to runoff from snowmelt and heavy spring rains. This will likely require several booster applications to maintain the target concentration for a 45-day period. Budgeting for a total of at least 15 ppb of fluridone to be applied throughout the treatment program is recommended. Using a thermocline depth of 15 feet over this 4028-acre lake, 15 ppb translates into 612 gallons of fluridone.

A generic formulation of fluridone is now available, which has stimulated price competition with SONAR. However, even using a conservative price estimate of $1,200/gallon, the chemical cost alone

for 612 gallons (15 ppb) would be $734,400. Application services and fluridone residue monitoring would likely add another $75,000-$100,000 to the treatment program cost.

Partial lake fluridone treatments at Saratoga are still probably limited to using pellet formulations of SONAR. One alternative is to deploy suspended containment barriers or limno-corrals to sequester smaller portions of a lake that can be treated with fluridone liquid. This approach has been effectively used at a number of waterbodies. The barriers is usually solid PVC material that has a foam floatation collar to keep the barrier at the surface and a weighted chain ballast to keep the other end along the bottom. Drawbacks of using barriers include their high purchase price and labor costs for installation, maintenance and removal. The barriers would also block boat traffic where they are deployed and might be a boating hazard. Milfoil grows to problematic densities at water depths in excess of 12 feet at Saratoga Lake. The purchase price for a barrier that deep could exceed $15 per linear foot. For example, enclosing the North Plot would require nearly 5,000 feet of barrier, which might have a purchase price of $75,000 or more. The labor to install, monitor during the treatment program and then remove the barrier would likely cost an additional $10,000. Of course the barriers could be reused.

The advantage of using the barrier is that chemical costs would be greatly reduced using the liquid fluridone formulation. A total of 20 ppb of liquid fluridone should effectively control the milfoil in an enclosed area, since little dilution would occur. The chemical costs would probably run closer to $20,000 compared to the more than $44,000 of SONAR SRP that was applied to each 100-acre plot in 2000. The liquid formulation of fluridone is predictably more effective than the pellet formulation. Milfoil control should be achieved within 60 days of the initial application.

SONAR PR (Precision Release), the new pellet formulation of fluridone being introduced by SePRO, should also be considered. Its faster release rate should be better suited for treating shoreline infestations of highly sensitive plants like Eurasian watermilfoil. Chemical costs are still expected to be higher than when liquid fluridone is used for whole lake or enclosed treatment sites, because some dilution will occur. However, it is anticipated that less SONAR PR will be needed than SONAR SRP for treatment of the same size area, and better results will be obtained. Currently, there is limited field experience with SONAR PR. It is recommended that the efficacy of SONAR PR be tested on smaller sites, before attempting larger (≥100 acres) treatments.

Many of the other aquatic herbicides have limitations for use at Saratoga Lake. Contact-acting products like diquat (Reward®) and endothal (Aquathol K®) generally only provide one year of effective milfoil control, with variable carryover benefit the second year. The are not as selective for milfoil as fluridone or 2,4-D and will likely have greater impacts on the native plant community. Use of lake water for irrigation and drinking would also need to be restricted for 3-14 days post-treatment with either Reward or Aquathol K and Aquathol K has a 3-day fish consumption restriction. For partial lake applications where milfoil clearly dominates the plant community, treatment with contact herbicides may offer an effective and affordable treatment alternative.

The only other systemic-acting herbicide that is effective on milfoil is 2,4-D granular (Aqua-Kleen® or Navigate®). 2,4-D only targets dicot plants like milfoil and waterlilies. Most of the native pondweeds are monocots and would not be impacted by the treatment. The granular formulation is also very effective for shoreline or partial lake treatments. The major drawback to using 2,4-D had been the water use restrictions post-treatment. The old label stated that treated water could not be used for irrigation or drinking purposes. There was no length of time listed on the label so many states interpreted this as an indefinite period of time. The new Aqua-Kleen label now lists the concentrations that 2,4-D must drop below before irrigation and drinking usage can resume. The manufacturer is also offering a rapid assay test kit to determine when these levels are reached. This may enable 2,4-D to be permitted for use on

multiple use waterbodies. Milfoil is effectively controlled with 100 pounds per acre of 2,4-D granular, which costs about $2.25 per pound. Treatment unit costs would be similar to the cost of liquid fluridone formulations, but with 2,4-D no barriers would be needed for effective milfoil control along lake margins and coves.

The final herbicide that is effective on milfoil is triclopyr. Garlon 3A®, a terrestrial formulation, has been around for many years. Demonstration treatments performed under an Experimental Use Label have shown that it does selectively control milfoil and it can be used for partial lake or shoreline treatments. It is hoped that triclopyr will provide similar levels of control as 2,4-D with fewer water use restrictions. Currently, it is has not received full aquatic registration. It is being reviewed by the USEPA for full aquatic registration under the trade name Renovate™, which will be marketed by SePRO Corporation, the manufacturer of SONAR. It is still uncertain what water use restrictions will be imposed on the aquatic label and when it will be available.

Chemical treatment continues to be the most cost-effective management strategy for achieving milfoil selective control on large lakes like Saratoga. We recommend that SLPID continue to explore the use of SONAR (fluridone) and other USEPA/NYSDEC registered aquatic herbicides. The herbaceous weevil (*E. lecontei*) has yet to be demonstrated as a proven means of controlling milfoil. Dr. Robert Johnson from Cornell University provides an interesting update on weevils for milfoil control in an article published in the Fall 2001 issue of the "Nor'Easter," the newletter of the Northeast Aquatic Plant Management Society. The only other option for large-scale milfoil control at Saratoga Lake is to continue with the current mechanical harvesting program.

APPENDIX

- Vegetation Survey Field Data
- Figure 1 – North Plot – Dominant Aquatic Plant Distribution
- Figure 2 – South Plot – Dominant Aquatic Plant Distribution
- Figure 3 – Location of Survey Transects & Data Points
- Photographic Documentation

VEGETATION SURVEY FIELD DATA - SARATOGA LAKE (2001)

North Plot - Late Season Survey Data (9/28/01)

Transect & Data Point	Water Depth (ft.)	Dominant Vegetation	% Total Plant Cover	Biomass Index	% Milfoil Cover
A1	4	V, M, Pn, Hd, Cd, Ec	100	4	50
A2	8.5	M, Cd	100	3	95
A3	9.5	M, Cd, Pz	100	3	95
A4	11	Ms	80	2	90
A5	12.25	Cd, M	80	2	25
A6	14	Cd, M	25	1	50
A7	17	Cd	10	1	0
A8	18	Cd	5	1	0
B1	3	M, V, Hd, Pn	90	3	70
B2	6.5	M, V, Hd	100	4	95
B3	9	M, Pc, Pn	100	3	90
B4	11	M, Cd, Pi	80	2	40
B5	12.25	M	50	2	100
B6	14.5	Cd	75	2	0
B7	16.5	Cd, M	10	1	50
B8	17	Cd	10	1	0
C1	3.5	M, V, Hd, Pn	80	3	70
C2	7	M, Hd, Pn	100	4	95
C3	9	M	100	4	100
C4	11.5	M	100	3	100
C5	12.5	M, Cd	25	2	90
C6	14.5	Cd, M	80	1	0
		AVERAGES	***68.18***	***2.36***	***59.32***

South Plot - Late Season Survey Data (9/28/01)

Transect & Data Point	Water Depth (ft.)	Dominant Vegetation	% Total Plant Cover	Biomass Index	% Milfoil Cover
D1	8	Hd, Ec, V	90	2	0
D2	10	Cd, V, M, Ec	100	3	10
D3	11	Cd, M, Ec	90	2	10
D4	11.5	M, Cd	25	1	50
D5	13.5	Cd	50	1	0
D6	15	Cd	25	1	0
D7	16	Cd	10	1	0
E1	5.5	Hd, Pn, V	75	1	0
E2	8.5	Hd, V, M	75	2	10
E3	10.5	Cd, Pc, M	60	1	10
E4	11	Cd, Pc	50	1	0
E5	12	Cd, M	75	1	25
E6	15	Cd, M	50	1	5
F1	5	Hd	80	2	0
F2	8.25	Ec, M, Cd, V, Hd	100	3	30
F3	9.5	Pc, M	70	2	30
F4	10.75	Cd, M	100	2	40
F5	12	Cd, M	75	2	40
F6	13.5	Cd, M	50	1	10
F7	15	Cd, M	25	1	10
		AVERAGES	***63.75***	***1.55***	***14.00***

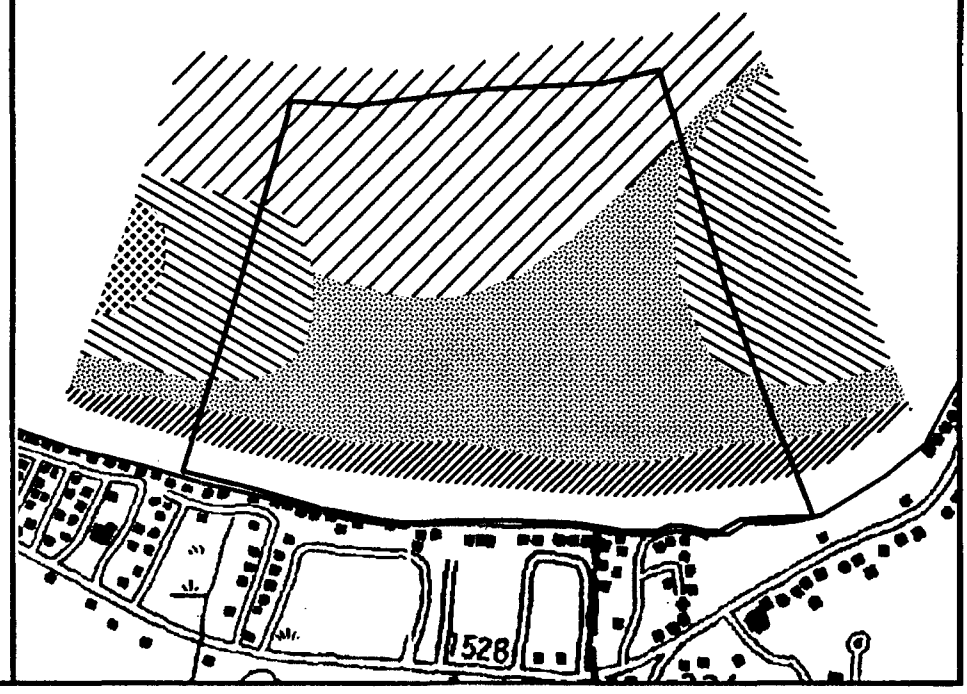
SOUTH PLOT

Pre-Treatment
Vegetation Coverages

Survey Date 6/26/01

- Water Stargrass, Curlyleaf Pondweed, Elodea, Flatstem Pondweed, Eurasian Watermilfoil (<5%) - Total Plant Cover >80%; Biomass 2
- Elodea, Curlyleaf Pondweed, Eurasian Watermilfoil (<5%) - Total Plant Cover 40-80%; Biomass 1-2
- Elodea, Coontail, Eurasian Watermilfoil (<5%) - Total Plant Cover 10-25%; Biomass 1
- Eurasian Watermilfoil (10-25%), Elodea, Coontail, Flatstem Pondweed, Curlyleaf Pondweed - Total Plant Cover 50%; Biomass 1
- Eurasian Watermilfoil (25-50%), Elodea, Coontail, Flatstem Pondweed, Curlyleaf Pondweed - Total Plant Cover 75-85%; Biomass 2

Note - plants are listed in decreasing order of abundance



SOUTH PLOT

Pre-Treatment
Vegetation Coverages

Survey Date 9/28/01

- Water Stargrass, Wild Celery, Elodea, Richardsons Pondweed - Total Plant Cover >75%; Biomass 1-2
- Water Stargrass, Coontail, Wild Celery, Eurasian Watermilfoil (<10%), Elodea - Total Plant Cover >75%; Biomass 2-3
- Coontail, Wild Celery, Eurasian Watermilfoil (<10%), Elodea - Total Plant Cover >90%; Biomass 2-3
- Coontail, Curlyleaf Pondweed, Eurasian Watermilfoil (<50%) - Total Plant Cover 60-80%; Biomass 1-2
- Coontail, Eurasian Watermilfoil (<25%) - Total Plant Cover 25-75%; Biomass 1-2
- Coontail -Total Plant Cover <50%; Biomass 1

Note - plants are listed in decreasing order of abundance

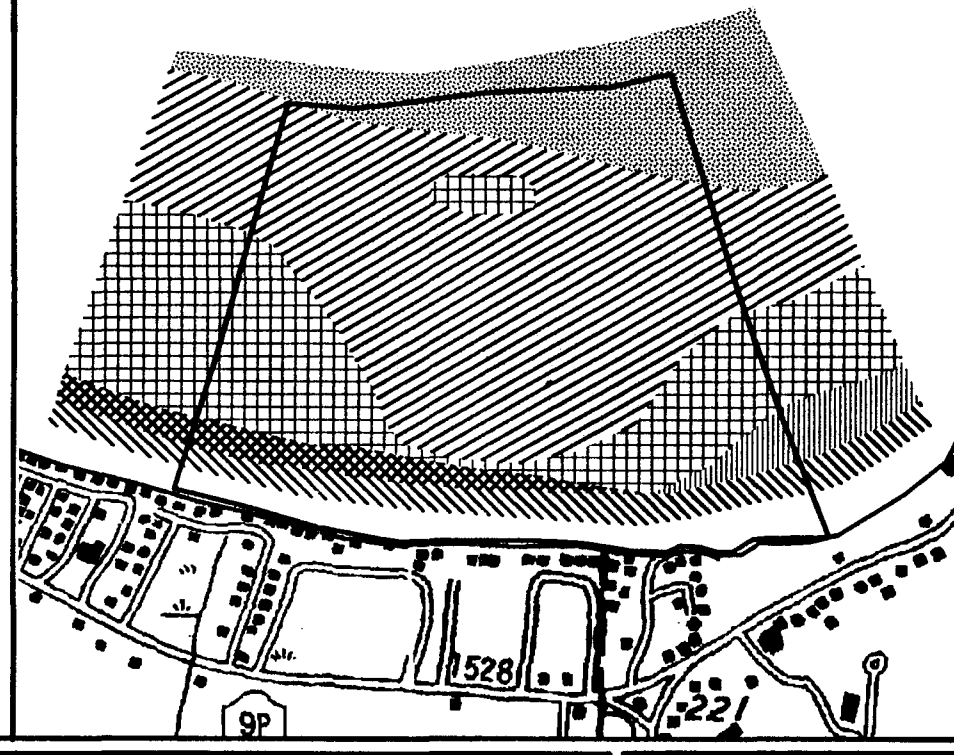


FIGURE NUMBER: 2

Saratoga Lake
SOUTH PLOT
Dominant Aquatic
Vegetation Distribution
Summer 2001

SCALE:

400 0 400 800 1200 Feet

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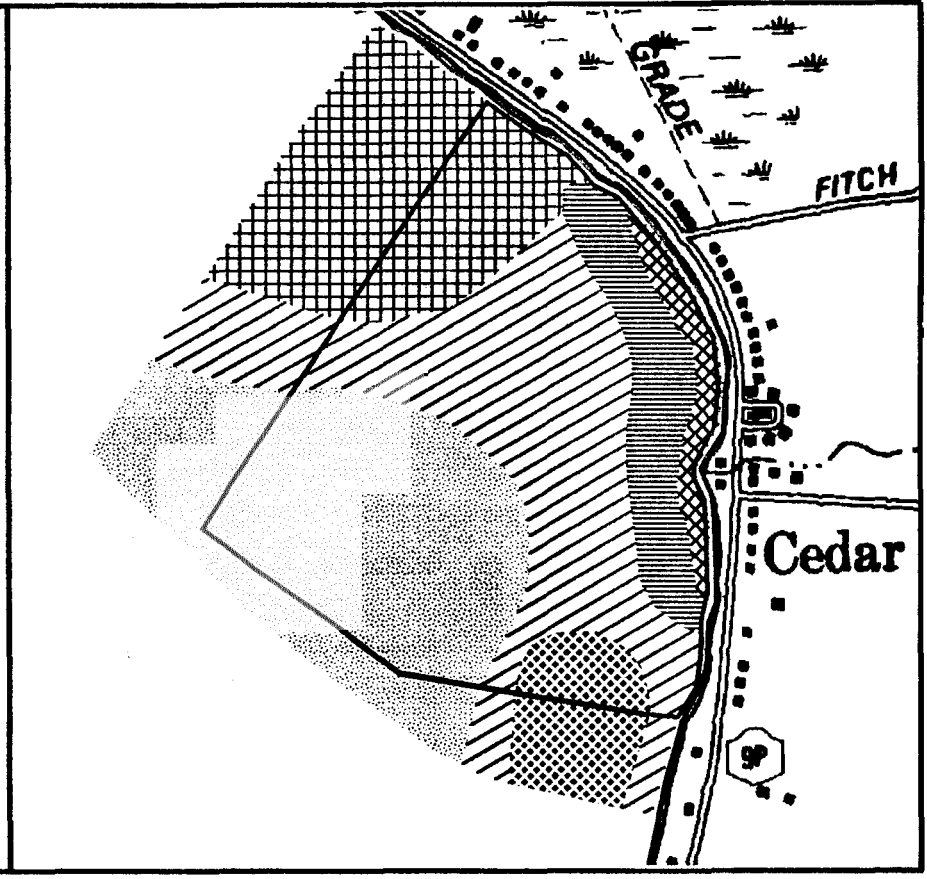
NORTH PLOT

Early Season 2001
Vegetation Coverages

Survey Date 6/26/01

- Sago Pondweed, Water Stargrass, Curlyleaf Pondweed, Eurasian Watermilfoil (<5%) - Total Plant Cover 75%; Biomass 2-3
- Curlyleaf Pondweed, Coontail, Flatstem Pondweed, Robbins Pondweed, Eurasian Watermilfoil (<10%) - Total Plant Cover 50-75%; Biomass 2
- Curlyleaf Pondweed, Eurasian Watermilfoil (50%), Water Stargrass - Total Plant Cover 75%; Biomass 2
- Curlyleaf Pondweed, Coontail, Eurasian Watermilfoil (25-50%) - Total Plant Cover 60-80%; Biomass 2
- Eurasian Watermilfoil (>75%), Curlyleaf Pondweed - Total Plant Cover 100%; Biomass 2-3
- Coontail, Eurasian Watermilfoil (<10%) Curlyleaf Pondweed - Total Plant Cover 50%; Biomass 2

Note - plants are listed in decreasing order of abundance



NORTH PLOT

Late Season 2001
Vegetation Coverages

Survey Date 9/28/01

- Eurasian Watermilfoil (>90%), Coontail, Richardsons Pondweed, Curlyleaf Pondweed, Water Stargrass - Total Plant Cover 100%; Biomass 3-4
- Eurasian Watermilfoil (25-90%), Coontail, Curlyleaf Pondweed, Flatstem Pondweed, Illinois Pondweed - Total Plant Cover >85%; Biomass 2
- Eurasian Watermilfoil (50-75%), Wild Celery, Water Stargrass, Richardsons Pondweed, Coontail - Total Plant Cover >80%; Biomass 3
- Eurasian Watermilfoil (dense surface mat), Wild Celery, Water Stargrass, Richardsons Pondweed - Total Plant Cover 100%; Biomass 4
- Coontail, Eurasian Watermilfoil (<10%) Curlyleaf Pondweed - Total Plant Cover 10%; Biomass 1

Note - plants are listed in decreasing order of abundance

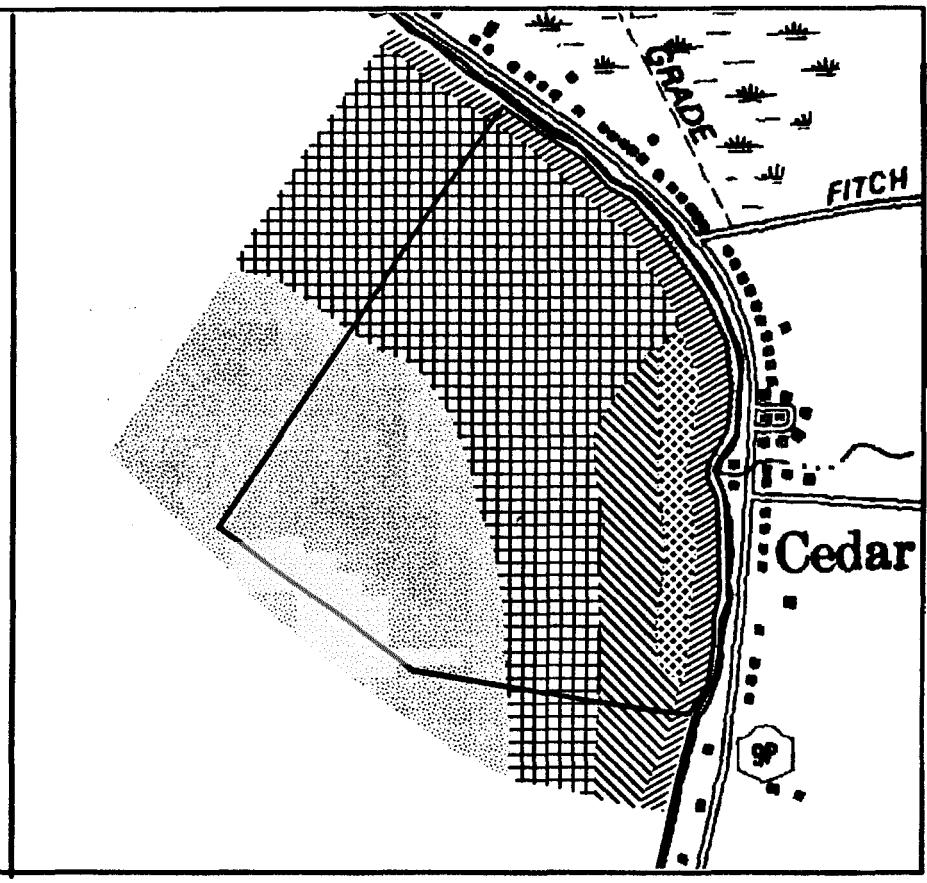


FIGURE NUMBER: 1

Saratoga Lake
NORTH PLOT
Dominant Aquatic
Vegetation Distribution
Summer 2001

SCALE:
400 0 400 800 1200 Feet

N

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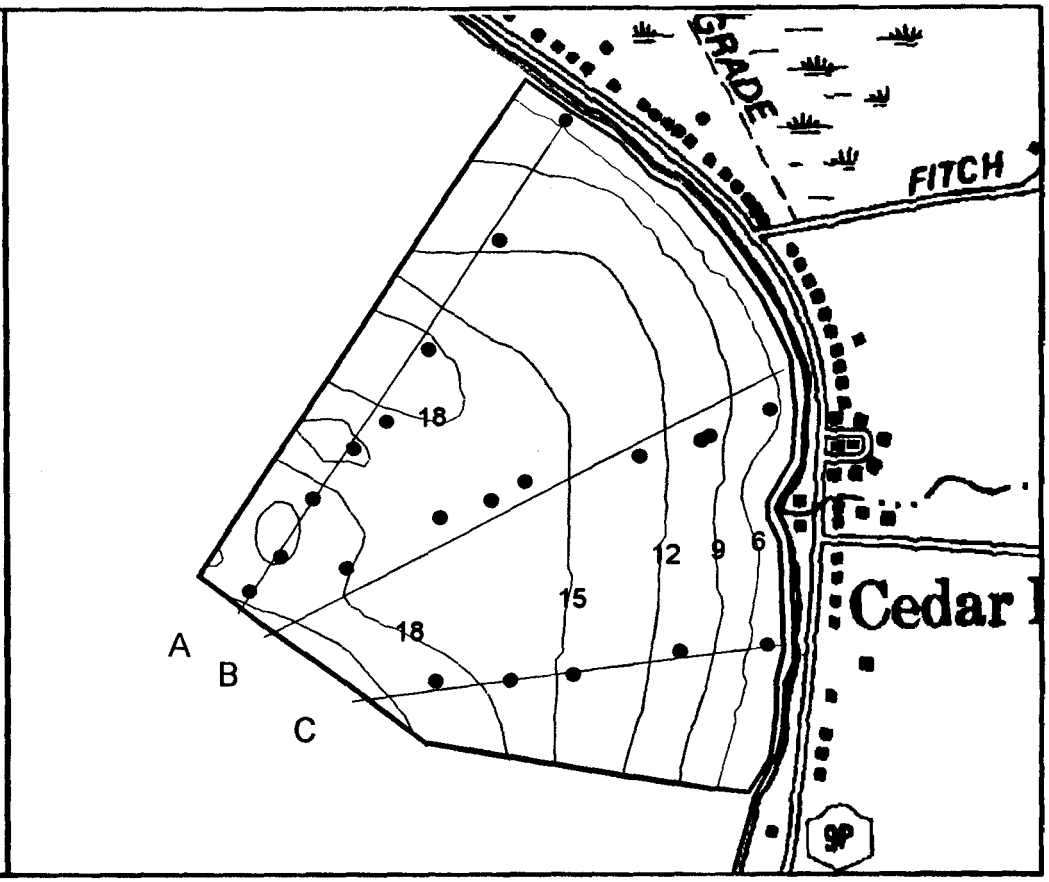
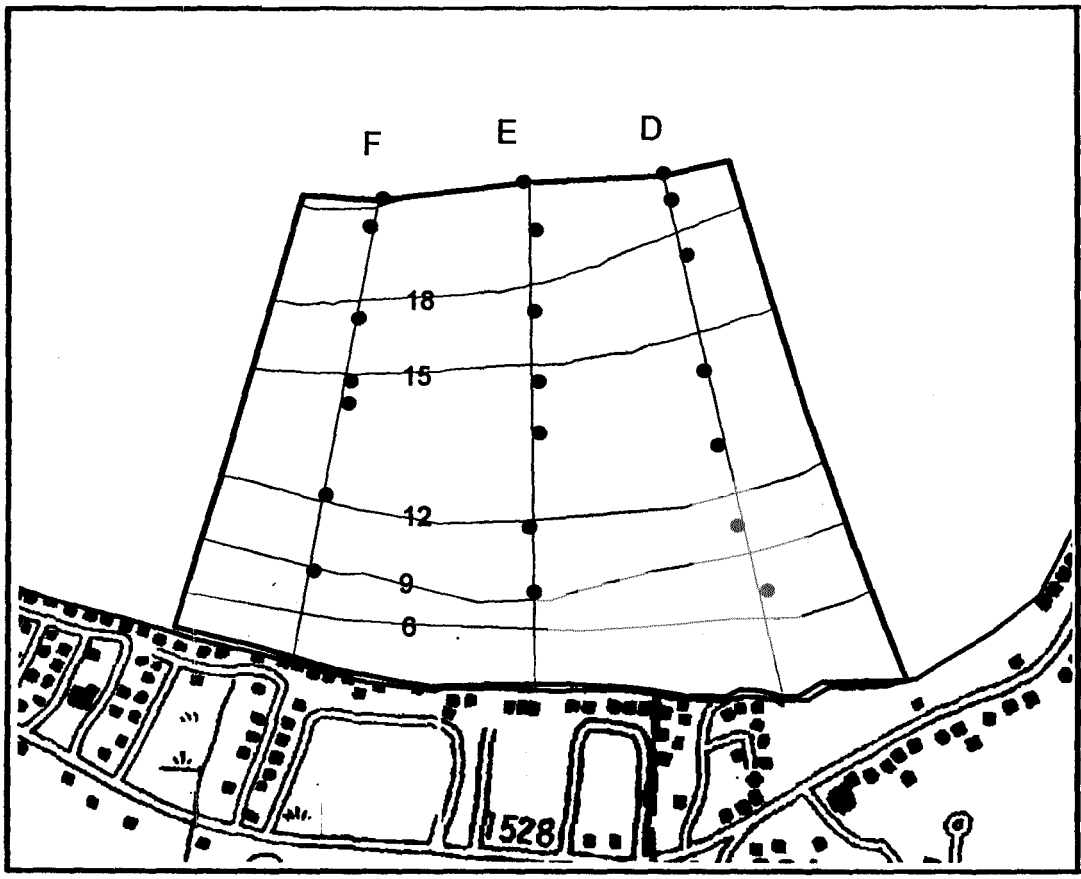
NORTH PLOT

* Colored dots represent approximate GPS data point location taken during 4/25/00 survey. Approximate locations were replicated for 9/28/01 survey.





SOUTH PLOT

* Colored dots represent approximate GPS data point location taken during 4/25/00 survey. Approximate locations were replicated for 9/28/01 survey.

FIGURE NUMBER: 3

Saratoga Lake

Transect and Data Point Locations for Pre & Post-Treatment Plant Surveys 2000 Early & Late Season Plant Surveys 2001

Legend:

Transect locations

Bathymetry contour lines in feet

400 0 400 800 Feet

N

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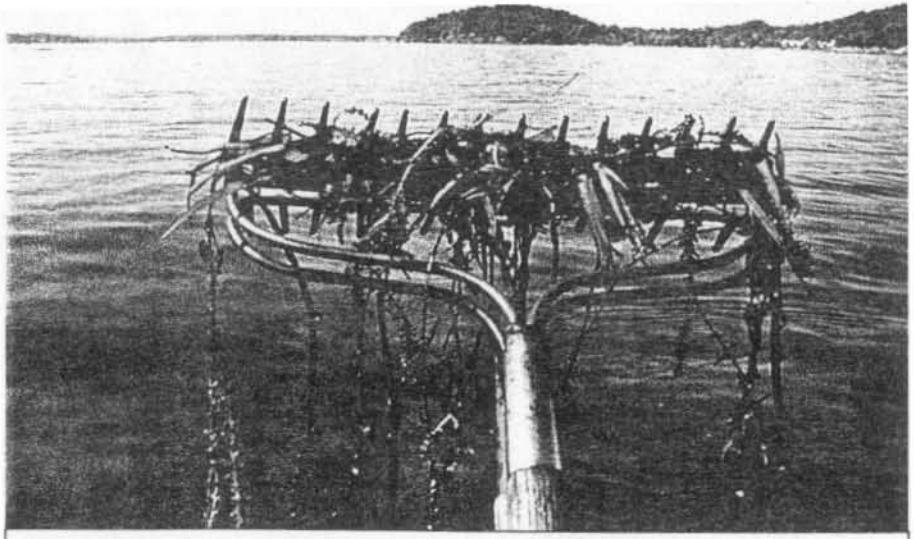
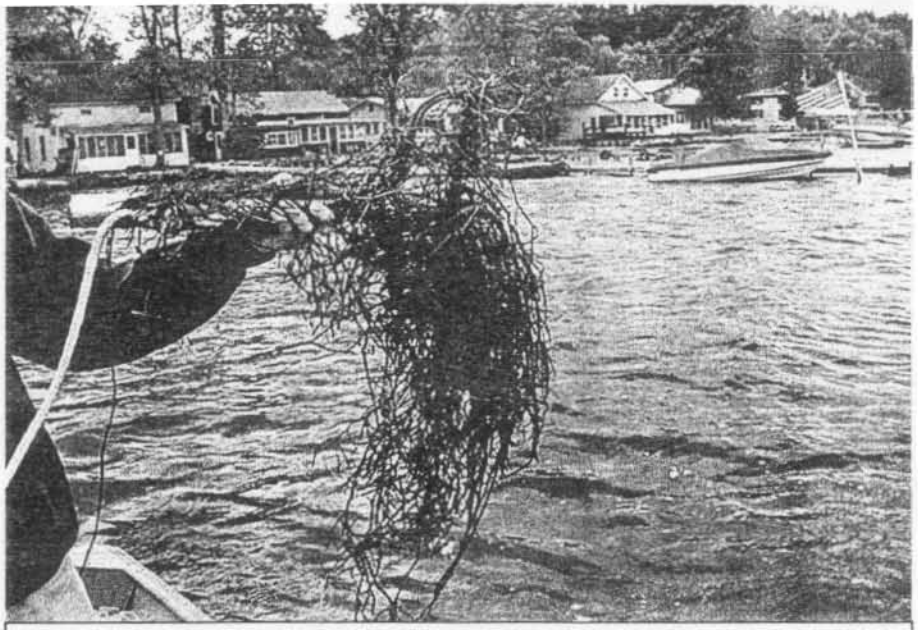


6/26/01 – Mixed plant assemblage found in shallows of South Plot



9/28/01 – Dense water stargrass growth near shore in South Plot

9/28/01 – Milfoil matted to surface in North Plot

9/28/01 – Dense milfoil growth found in North Plot