

# Aquatic Weed Control Becomes Technical Operation



Truesdale Lake, N. Y., is one of many lakes cleared of aquatic weeds by Robert E. Sheridan and Sons, Inc. Beginning about 1950, this corporation was established and has worked primarily with northern New Jersey lakes. Excellent results were obtained on Truesdale Lake by use of 2,4,5-T and copper sulfate for weed and algae control.

This special report on aquatic weed control by a leading contractor on the eastern seaboard was prepared for WTT by Douglas G. Bennett, Phelps Dodge Refining Corporation. It is an excellent example of the scientific and technical knowledge and experience needed to serve this field.

**E**XTENSIVE growth of duckweed in the water adjoining a home, David J. Sheridan says, usually indicates a leaky septic tank in the vicinity. Sheridan, partner with Warner G. Johnson of Robert E. Sheridan and Sons, Inc., Dover, New Jersey, specialists in aquatic weed control, finds himself with so much work both in New Jersey and nearby states that he says, "It's hard to believe that as late as 1950, many northern New Jersey lakes were comparatively clear of aquatic vegetation." However, as lake-side colonies sprang up, wastes poured into lake water, fish populations were depleted, nature's balance was upset and water weeds took over.

In 1950, Sheridan's father, Robert E. Sheridan, Sr., recognizing an increasing need for

aquatic weed control, established the company and began working out the aquatic weed control methods which are proving successful in New Jersey and neighboring states.

With a careful study and analysis of problems, Sheridan has constantly refined his methods. He was first to undertake commercial application of the then new aquatic weed control agent, 2,4,5-T, in New Jersey. Previously the Sheridans had excellent results with this chemical on Truesdale Lake in New York State. Use of air boats to apply copper sulfate for algae control is another Sheridan inspiration. Robert E. Sheridan and Sons, Inc., works on most of the major lakes in New Jersey, as well as on bodies of water in neighboring states, operating on the basis of seasonal contracts.

## Careful Study Precedes Treatment

Before embarking on the actual work of weed eradication, the firm makes a complete and comprehensive study of the lake to be treated. This includes analysis of water samples taken from a number of locations and

depths in the lake, water temperatures, soundings to plot a contour of the lake bottom, samples of the weeds to be destroyed, and current flow. All of these factors are necessary in order to plan correct treatment procedures. Sheridan says, "What will work for one lake will not necessarily be successful on another even though they may be adjoining." These studies also serve as a basis for Sheridan to explain causes of weed growth to clients.

Most privately owned or state-controlled lake communities require septic tanks of approved design and good condition. However, faulty construction or ground movement due to frost or settling sometimes causes leaks in a system. Sewage can then seep underground into a lake where the released nutrients nourish a crop of undesirable weeds. Sheridan has noted over the years that an extensive growth of duckweed in the water adjoining a home is a strong indication that sewage is leaking into the lake. Sheridan explains such a situation to the property owner, giving the owner an opportunity to take corrective



measures, thus cutting down the nutrient level of the water and the incidence of weed propagation.

Sheridan cites two examples why more and more lakes are experiencing weed problems. One is White Lake in New Jersey. When this private lake was developed in 1940, water was clear and free of weeds and algae. As homesites surrounding the lake were developed and occupied, nutrient content of the water rose because more sewage found its way into the lake. Resulting weed growth over the years then impaired use of the lake for swimming, boating, and fishing. Since value of lakeside property is directly in proportion to use of the water and esthetic values of scenic beauty, unsightly and odoriferous weeds which restrict activities on the lake tend to reduce property values. This is a strong incentive for the governing bodies of lake communities to take corrective action. Another reason for the rising incidence of weed growth is increasing popularity of outboard motor boats.

"Boats play an important role in infecting lakes with weeds by spreading the seeds," says Dave Sheridan. "People used to keep their boats on the lake where they had their homes. Now, with the ease of loading on trailers, many people who do not live near the water own boats and haul them to whatever lake they desire. Weed seeds are transported from lake to lake in this manner since they will adhere to the hull, even though the boat is dried out between weekends. Thus, in the course of one season, a large number of lakes can be infected."

#### Equipment Must Fit the Job

Once the initial survey work is completed and the company receives the go-ahead, equipment is moved onto the lake and treatment started. Because phys-

ical conditions and requirements vary from job to job, today's applicator must not only have standard boats, tanks, and pumps at his disposal, but also must be adept at designing and constructing special chemical-dispensing equipment that may be required to meet unique situations. Sheridan uses any one of three air boats of 100, 103 and 125 hp with varying capacities, as dictated by the density of the weeds, depth of the lake, and the amount of material to be carried. He has found that with the variety of chemicals used, a mixing tank of Type 316 stainless steel and brass boom jets are the most satisfactory.

Sheridan's initial use of air boats was a result of a contract to treat the lakes at the New York World's Fair in 1963 and '64. The lakes, situated within the exhibition area, were subject to extensive, unsightly growths of weeds and algae. Because these lakes were shallow (four to six feet) and had a soft layer of sediment on the bottom, use of an outboard-driven boat to dispense copper sulfate was impractical. Test runs had shown that the outboard caused underwater turbulence to the point that the copper sulfate was being absorbed into the sediment instead of going into solution with sufficient residual to destroy the algae.

Other problems specific to these lakes were also encountered:

1. Because considerable amounts of nutrients necessitated frequent applications, equipment had to have a great deal of mobility.

2. Dependability and mobility were essential because of limited application time available. Since the Fair opened to the public at 10 a.m. daily, application had to be concluded by then. Thus, a system capable of efficient use of available time, with the potential of counteracting any extenuating circumstance, had to be provided.

3. Due to the ease with which bottom sediment was disturbed, some method of propulsion, eliminating turbulence, had to be worked out. At the same time, the shallow depth required the elimination of any projection below the boat.

4. Turbulence would also decrease the residual copper after application, since the copper sulfate would tie up with this agitated material, reducing the action on the algae and necessitating increased dosages to arrive at desired results.

5. As a result of the increased dosage required, the problem of providing adequate protection of the fish population arose.

6. The last major factor involved was the unusually high alkalinity found in the World's Fair lakes which compounded the dosage problem.

After considerable study of the situation, and based upon



Lake, right, is typical of many in area served by Sheridan corporation. Algae and weed problems are carefully studied prior to treatment. Treatments to solve specific problems may vary even though lakes are located in adjoining areas.

previous experience, Sheridan decided on the use of an air boat as the most practical means of applying copper sulfate as an algaecide. The following results substantiated this decision:

1. Mobility was solved by providing a system that was self-contained, easily transferable and ready for use without extensive preparation. This proved to be the air boat.

2. The time factor was solved by providing a system that allowed for varying speeds, patterns, and solutions. The speed of the air boat can be regulated with a great degree of precision up to 25 miles per hour. The spray pattern, through the use of boom jets, allows a variation in width up to sixty feet with instant control of the pattern on either side of the boat. The chemical solution can be controlled in the mixing tanks by adjusting a simple regulating valve and through the use of a flow meter. The quantity of liquid in the tanks is further regulated by a float valve.

3. Projections extending below the boat and turbulence by un-

Comparison of Lake Treating Methods		
	Old Method	New Method
1. Method of application	standard	spray
2. Propulsion	outboard motor	air motor
3. Agitation of bottom deposits	substantial	minor
4. Pounds of copper applied	14,350	11,300
5. Total cost	\$2,858.00	\$2,422.00
6. Residual copper after 24 hrs. as $CU^{++}$ , MG/1	(1) 0.83 (2) 0.69	(1) 1.00 (2) 1.08
7. Residual copper after 94 hrs. as $CU^{++}$ , MG/1*	(1) 0.33 (2) 0.21	(1) 0.56 (2) 0.66

\*milligrams per liter as copper

derwater propulsion were eliminated through the use of the aircraft motor and propeller.

4. The loss of copper sulfate by absorption into bottom sediment was also solved by removing the source of turbulence; that is, the underwater propulsion.

5. Greater protection was afforded to the fish population because less algaecide was now required to achieve the desired residual of copper in the water. Further protection was provided by applying copper sulfate to the lakes in sections; the first and second sections to be treated being on the opposite ends of the lake.

6. The problem of high alka-

linity was solved by recognizing the diurnal characteristics of alkalinity in water and providing for application early in the morning when the pH was still fairly low.

The interrelationship of the above factors can be readily seen since the solution of one problem generally facilitated the solution of another. The control provided by this new method can be graphically illustrated by comparing tests in the accompanying table made with the standard procedures and the new method of application on the lakes.

Several important factors may be determined by figures in the preceding table. By using spray application with an air motor, the initial dosage of copper can be decreased while still achieving the same desired result. Therefore, the initial cost of chemical can be much less. Secondly, by eliminating the agitation of bottom sediment, coupled with the spray methods, the residual copper found in the water was greater and persisted at a higher concentration for a longer period of time.

Thus, by providing a flexible system with a new method of application, the major factors preventing normal methods of adequate control were eliminated and increased effectiveness was provided at reduced cost.

An entirely different situation was encountered in treating the lakes on the estate of Doris Duke, Hillsborough, N.J. The



Lakes within exhibition area of recent New York World's Fair were subject to extensive growth of weeds and algae. Sheridan turned to air boats to avoid turbulence in shallow lakes. Copper sulfate was ejected to rear and on both sides of propeller. Spray covered almost 60 feet on each side of unit.



eleven lakes had been designed, as part of the landscaping of the estate, to flow into one another. When Sheridan was called in, the weeds had grown to a point where they were not only unsightly but were clogging the outlets. This prevented free flow of water from lake to lake. Since the lakes were stocked with game fish, extreme care had to be used to insure that chemicals introduced to the upper lakes did not become concentrated in the lower lake to the point of toxicity to fish and other aquatic life. At the same time, the streams connecting the lakes had to be freed of weeds to permit water flow through the entire chain. The program undertaken by Sheridan required 4 years before all the lakes were completely weedless. Once this was the case, periodic treatments have kept the weeds at a minimum and no problems have occurred that required intensified or drastic measures.

The Truesdale Lake was ringed with summer homes and was a popular watering spot until it became choked with weeds. Weed growth virtually ruled out swimming, boating, and fishing. Members of the Truesdale Lake Property Owners Association faced decreasing fun and declining property values. Something had to be done.

Necessary arrangements were made with the City and State of New York to treat the lake during the summer of 1961. Since the lake is part of the watershed serving New York City, special arrangements were made to measure chemical concentrations in the water.

This program was conducted under the general supervision of Dr. E. C. Raney, Professor of Fisheries, Biology and Zoology, Cornell University, with assistance from Roy R. Younger, New Jersey Department of Conservation. Sheridan was engaged to undertake the treatment.

A mixture of 2,4,5-T and water was applied as a coarse spray over the surface of the lake. The chemical formed a white emulsion in the water, persisting for about 20 minutes and eliminating the need for marker buoys. This chemical is effective in controlling some of the most obnoxious aquatic weeds when as little as two parts per million are applied in lake water.

The operation produced no adverse effects. Kill of fish was minor. This seems almost inevitable in aquatic vegetation control work since decaying vegetation ties up oxygen in the water. However, 2,4,5-T kills aquatic plants gradually, keeping this problem at a minimum.

#### Restrictions Common For Municipal Systems

There are many occasions when chemical weed control is restricted in treatment of lakes on the watershed of municipal water systems. Water companies are extremely careful about use of chemicals when there is a possibility that the chemical residual may leach to the reservoir system or be carried into it by streams flowing from lakes in the watershed. When Sheridan encounters such a restriction, sheets of black plastic 100' x 40' are spread over the lake bottom and held in place with sandbags.

**Scuba gear** for underwater research prior to recommending aquatic weed and algae control are standard procedures. Demonstrating equipment and method, left, is David J. Sheridan.

Within 14 days all aquatic growth under the sheet is killed off. Sheets are perforated to allow gases caused by the decomposing weeds to escape.

Algae control is also an important facet of Sheridan's work since decaying weeds following treatment can result in an increase of algae. When the company contracts to treat a section or an entire lake, algae control with copper sulfate is recommended. Obviously the company cannot predict the extent of algae growth nor guarantee against it. As part of their service, Sheridan takes periodic tests of water for algae and also bacteria. If count is on the rise and general conditions are conducive to algae and bacterial growth, Sheridan recommends copper sulfate treatment. "Correct timing is of utmost importance when treating, to maintain a balanced water condition. It's just like the cultivation of roses or any other plant," says partner and biologist, Warner G. Johnson.

Sheridan does its own water analysis and also sends samples to established commercial and state labs for cross-checks. This helps insure correct analyses and also protects the company against claims rising from destruction of fish or any conditions which may have started prior to treatment. Tendency is to blame the applicator and chemicals used, regardless of who or what may be at fault.

In addition to work in aquatic weed control, Robert E. Sheridan and Sons, Inc., applies flocculants such as aluminum sulfate to any body of water where there is a large amount of suspended dirt or mud. Such situations are often the result of heavy rains, floods, or construction work where excavated dirt has been swept or blown into the water.

With the continuing increase and interest in development of lakeside communities and creation of private ponds, Sheridan and other algae and aquatic weed control specialists can look forward to a growing demand for their specialized services.

