

# The Use Of Copper Sulfate As A Method Of Partial Control Of Elodea (*Elodia densa*) In Lake Thonosassa, Florida

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The nutrient enrichment of many of Florida's lakes has accelerated the process of eutrophication and greatly increased the biomass supported by these waters. This phenomenon, generally resulting from man's activities, has created many problems for fisheries workers by changing the aquatic environments to a condition that is less suitable for the production of game fish. Rounsefell and Everhart(2) stated that extensive fertilization of lakes may lead to their eutrophication and early extinction. In many cases this results in conditions suitable only for forage or undesirable species of fish.

In Lake Thonosassa this process of accelerated eutrophication is pronounced. In past years the lake was reported as clean, sand bottom lake, with occasional scattered patches of aquatic vegetation along the shoreline (C. L. Phillippy, Personal Communication). During this period the lake provided good fishing, swimming, and boating. Recently, following the establishment of citrus groves and other agricultural practices on the watershed, the lake developed a weed choked shoreline (primarily elodea), slight turbidity, and increasing numbers of forage and undesirable species of fish. Swimming and boating have practically been eliminated and fishing has been confined to the deeper water in the center of the lake where the elodea has not established.

Since no feasible process of nutrient removal capable of reversing eutrophication was available, a decision had to be made either to eliminate the elodea or to initiate a program of partial control in order to obtain greater recreational use of the lake. Clugston(1), reporting of Lake Apopka, described this lake as being clear and supporting a heavy growth of pondweed (*Potamogeton illinoensis*) in 1946. At this time the game fish population was considered to be about 35 per cent of the species present. However, by 1950 the pondweed disappeared and a plankton bloom developed. As the plankton bloom persisted the population of gizzard shad

(*Dorosoma cepedianum*) increased until by 1956-57 (Game and Fresh Water Fish Commission, 1959) it was estimated the gizzard shad comprised 82 per cent of the fish population. Because a similar phenomenon would have been expected to occur in Lake Thonosassa if the elodea was eliminated, it was decided a partial control program in access areas, the swimming area, and popular fishing spots would add fewer nutrients.

## DESCRIPTION OF THE AREA

Lake Thonosassa is located approximately ten miles northeast of Tampa, along State Road 580, in Hillsborough County, Florida. It is a natural lake with a surface area of 1,541 acres, a maximum depth of sixteen feet, and an average depth of ten feet. The water color is dark from lignin and tannin and occasionally supports a light plankton bloom. The lake's structure is saucer shaped with a shallow sloping shoreline which is lined with cypress trees. The adjacent uplands are developed with private homes and citrus groves.

The aquatic vegetation present in Lake Thonosassa consists of emergent, submerged and floating plants. The emergent plants are cattail (*Typha sp.*) and maidencane (*Panicum sp.*), which occur in widely scattered patches around the shoreline. The submerged vegetation is primarily elodea (*Elodea densa*) and is present in a solid, almost impenetrable mat, along the shoreline. The elodea extends 100-200 yards from the shoreline to the seven foot water depth contour, and occurs infrequently in water deeper than seven feet. Other submerged plants found occasionally scattered in the elodea are naiad (*Najas sp.*) and coontail (*Ceratophyllum sp.*). The floating plants are water hyacinth (*Eichornia crassipes*), duckweed (*Lemna sp.*) and azolla (*Azolla caroliniana*). Recently, the duckweed and azolla have rapidly increased, creating an additional nuisance by wind-rowing in large mats on the elodea.

## MATERIALS AND METHODS

Three one-acre plots were measured and staked off in the elodea. Because dilution aided by wind action was considered to be an important factor in the success of chemical treatment, the plots were established in the middle of the mats of elodea. This created a buffer zone of vegetation, approximately 100 feet wide between the turbulent open water and the experimental plots, which would help eliminate dilution caused by wind action. The water depth in the treated areas ranged from three to five feet. Each plot was selected to be as identical as possible and the surface area of each was completely covered with elodea at the time of the treatment.

Copper sulfate was applied to plots one and two at the rate of 50 pounds per surface acre and 100 pounds per surface acre respectively. Fine crystal copper sulfate, about the size of table salt, was used. The method of application was to pour the material raw, straight from the bag, in strips approximately ten feet apart horizontal to the shoreline, over the entire plot. The third plot was treated with two gallons of Diquat which was mixed at the rate of one gallon to 20 gallons of water and sprayed with a John Bean Pump and spray gun over the entire test area.

## RESULTS AND DISCUSSION

Following the application of chemical to the test plots, inspection was made, ten days, 20 days and 90 days after the treatment to determine the results.

In test plot number one, treated with 50 pounds of copper sulfate approximately 50 per cent of the elodea was void of chlorophyll and decomposing ten days after treatment. Within 20 days approximately 75 per cent of the plants were eliminated, but no additional decomposition was observed. The remaining plants were green and appeared to be healthy. Ninety days after treatment some regrowth of the area had occurred to approximately 50 per cent of the original density.

In test plot number two, treated with 100 pounds of copper sulfate, all of the elodea appeared to be decomposing ten days after treatment. No healthy chlorophyll bearing plants could be found. Twenty days after treatment the area was void of elodea, indicating 100 per cent control had been obtained. On the 90 day inspection, no elodea could be found in the test plot and no indication of regrowth was observed.

In test plot number three, treated with two gallons of Diquat, approximately 75 per cent of the elodea at the surface was decomposing ten days after treatment. However, only the plants at the surface appeared to be affected. Plants

collected six inches below the surface of the water appeared to be green and healthy. Twenty days after treatment approximately 40 per cent of the plants at the surface had been eliminated, but the elodea occurring one foot below the surface was green and appeared healthy. The 90 day inspection after treatment revealed some regrowth of the elodea. It was estimated that approximately 30 per cent control was obtained.

Based on these results 500 pounds of copper sulfate was applied to an approximate five acre section of elodea in front of the boat ramp and swimming beach. Three weeks following the treatment the area was void of vegetation and has remained clean for four months. Although regrowth has not occurred to date, it is anticipated during the coming summer, at which time retreatment will probably be necessary.

During the treatment no fish kills occurred from the copper sulfate nor were distressed fish observed. The newly created openings in the vegetation proved to be popular fishing areas providing good fishing, especially for panfish.

The water analysis of Lake Thonotosassa, determined with the Hach Direct Reading Portable Water Laboratory, was as follows: pH - 7.3 and total hardness - 65 p.p.m. as Ca CO<sub>3</sub>. Possibly water quality may have considerable influence on the use of copper sulfate for control of aquatic vegetation. Phillippy, (personal communication) working in other lakes in the same area, has reported poor results in using this chemical for elodea control, but his method of application was different. Recently, however, in attempting to control elodea in the Crystal River, Citrus County, he has reported good results with copper sulfate applied with the same method and rate as used in this study.

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## LITERATURE CITED

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