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Controlling Waterweeds

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*"The reed when seen for the first time, or carved in stone upon some Egyptian monument, is a beautiful plant with delicate arching fronds making a hieratic pattern against the sky. But when it is multiplied to madness, hundreds of square miles of it spreading away like a green sea on every side, the effect is claustrophobic and sinister."**

We really can't be sure if ancient Pharaohs had problems controlling waterweeds. The quote above indicates they may have had their hands full.

One thing we can be sure of, however, is that modern-day Texans have plenty of problems associated with hydrilla, waterhyacinth, alligatorweed, and numerous other waterweeds.

Waterweeds are responsible for depressing the value of lakefront property in Texas by more than $100 million annually, based on a 1979 study. Additionally, water loss due to waterweeds has been estimated at $39.3 million annually in 17 western states including Texas.

The whole issue of controlling waterweeds is complicated and controversial. What is a weed and what is not really is just a judgement call. A dictionary definition of weeds is "plants of no value which tend to overgrow or choke out more desirable plants." Waterweeds such as waterhyacinth, for example, may be lovely if just one or two are floating on a pond. When there are thousands of them growing in a river or lake, however, they may become a nuisance.

Waterweeds, ironically enough, seem to be a problem man has brought upon himself. Most of the problem species of aquatic weeds in the United States are not native to this country, but have been imported from various countries.

Alligatorweed was unknown in the U.S. until it arrived by accident in the ballast of a South American ship in 1894. Waterhyacinth was imported from Venezuela in 1884 as an ornamental because of its exotic foliage and lavender blooms. Hydrilla was imported to the U.S. from Africa as an aquarium plant in the late 1950s. By 1969, it had spread to cover 60,000 acres in south Florida.

The three major noxious waterweeds in Texas are hydrilla, alligatorweed, and waterhyacinth. Both hydrilla and alligatorweed form dense floating mats near the water's surface. Hydrilla's roots are anchored to the bed of a lake or stream, but the roots of alligatorweed are not; hydrilla grows underwater, while alligatorweed rises above the water. Alligatorweed grows in a wider range of aquatic conditions than any other waterweed, but is most common in streams and canals. Waterhyacinth, a free-floating plant, features smooth, waxy leaves and brilliant lavender foliage. Its roots are long, dark, and fibrous.

These aquatic weeds are difficult to control because they are removed from their natural enemies and because they grow so rapidly. Waterhyacinth, for example, doubles in size and mass every 11 to 15 days. In a normal eight-month growing season, 10 plants can multiply to produce 655,000 plants covering an area of 1.5 square acres. In Africa's Congo River, Waterhyacinth spread 1,000 miles in just three years in the 1950s.

The rapid, unchecked growth of waterweeds carries with it a number of problems. Aquatic weeds can clog hydroelectric and irrigation installations and can pose a danger for lowland rice and other crops flooded for extended periods of time.

Aquatic weeds can render navigation all but impossible, damage rudders and propellers, and make swimming and fishing unpleasant and hazardous. Fish populations may be depressed when oxygen levels are depleted as waterweeds decompose at the bottom of a lake or river. The aquatic weeds can create harbors for mosquitoes and snails and areas aesthetically unpleasant and odoriferous.

Waterweed populations can cause reservoirs and irrigation canals to lose water at rates many times faster than normal through evaporation and transpiration. They also cause flooding by restricting the flow of water by up to 90 percent in canals designed for drainage and flood control.

The aquatic weed problem is magnified in manmade lakes like Lake Conroe. These structures prevent the expulsion of the weeds during periods of heavy rainfall.

Biological Controls

Surprisingly, the best way to control aquatic weeds may not come in the form of modern chemical herbicides but from the waterweeds' own natural enemies--biological agents such as mammals, insects, snails, fish, and plant pathogens.

Herbicides may cause pollution problems and may become ineffective at controlling waterweeds over a prolonged period as the weeds develop a resistance to the chemicals.

They may also be toxic to some aquatic species and may lower oxygen levels. In contrast, biological controls may offer a long lasting pollution-free solution to clearing up waterways overrun with aquatic weeds.

A number of biological controls, some more practical than others, have been proposed over the years to control waterweeds. Experiments have been conducted using water buffaloes and 1,000-pound manatees or "sea cows" as possible biological controls. Unfortunately, the manatee is near extinction and raising a water buffalo just to get rid of hydrilla isn't very practical.

Some species of snails are potentially effective biological controls, but they become pests themselves as they devour not only the waterweeds but beneficial plants as well. Other snail species are carriers of serious human and animal parasites.

Certain insects have been touted as biological controls, and they offer promising prospects. Flea beetles, thrips, the larvae of the *Arzama dense* moth and stemborers all have the potential for controlling certain weed species. Weevils, mites, and the larvae of the *Sameodes* moth may be useful in controlling waterhyacinth.

The idea of using plant pathogens (plant diseases)--specifically, fungi (parasitic plants like mold, mildew, and rust)--as biological controls also has its advantages. Although research on the pathogens' potential took many years to develop, their application requires only minimal technology. The almost unlimited number of plant pathogens offers versatility in selecting specific controls. Virtually none of the plant pathogens attack man or animals, and the fungi could kill a number of aquatic weeds in an area without entirely eliminating the species. Fungi are currently being studied to combat hydrilla and waterhyacinth.

* From Alan Moorehead, *The White Nile* [New York: Harper, 1961]

The Lake Conroe Experiment

Some exciting research to control waterweeds is currently underway at Texas A&M University (TAMU). Researchers from the Department of Plant Sciences, together with scientists from the Department of Wildlife and Fisheries, are testing the use of biological controls as a way to rid Lake Conroe of waterweeds.

Lake Conroe is a 20,000-acre manmade reservoir in Montgomery County, 45 miles northeast of Houston. Construction of the lake began in 1970, and by 1973 it was filled with water and opened to the public.

Aquatic weeds, particularly hydrilla, became a problem in the lake shortly after it opened. Researchers from TAMU and the Texas Agricultural Experiment Station (TAES) received a mandate from the Texas legislature to research the problem in 1979.

One of the first steps in the research was to map the extent that the waterweeds had overrun the lake. Aerial photographs with infrared photography showed that by 1979 nearly 30 percent of the lake had been infested with 17 species of aquatic weeds. More than 23 percent of Lake Conroe was infested with hydrilla--the dominant waterweed species in the lake. Other dominant weeds which were present included waterhyacinth, milfoil, coontail, and duckweed. Arrowhead, alligatorweed, fanwort, and cattail were also present, among other species.

The researchers repeated the aerial photography in 1980. By that time, more than 40 percent of the lake was infested, and 34 percent of the lake was covered with hydrilla. By the summer of 1981, almost half the lake (more than 9,000 acres) was infested with waterweeds.

The second stage of the research was to determine a biological control method that would be acceptable to taxpayers, lake managers, environmentalists, and lakefront property owners. Researchers decided that the solution would be the grass carp, a fish originally found along the Amur River in Manchuria, China and the Soviet Union. The grass carp had been used effectively in experiments in Florida as a biological control for hydrlila.

Because the fish are not legal in Texas they had to be purchased in Arkansas where they are legal. With a special permit from the Texas Department of Parks and Wildlife, more than 250,000 of the grass carp were stocked in Lake Conroe during 1981 and 1982.

The Lake Conroe experiment is the biggest grass carp project ever undertaken in the U.S. The project is now in a monitoring and evaluation phase, and a final report is expected to be released in 1987. The grass carp have grown from an average length of eight inches to a size of up to 26 inches. While the grass carp weighed just eight ounces at the time of their stocking, some of the fish now weigh a hefty 26 pounds.

According to TAMU researchers the experiment has been successful. Hydrilla, milfoil, and coontail populations have been greatly diminished in the lake. During the same time, a naturally occurring fungus infected the waterhyacinth, greatly reducing its population in Lake Conroe.

Sport fishing has improved now that fishermen have better access to the lake. Property values around Lake Conroe, which were depressed at the time the aquatic weed problem was at its worst, have also stabilized. Development in the area has improved.

Despite the apparent success of this project and the enthusiasm generated by it, some questions still remain. Although it is desirable to reduce waterweed populations, it may be detrimental to eradicate a lake of all its waterweeds. The grass carp will not reproduce in Lake Conroe and will apparently starve after most of the aquatic weeds in the lake have been removed. If the grass carp eventually disappear, it isn't known how soon the aquatic weeds will return.

The grass carp activity may also be affecting predator-prey relationships in the lake because they are eating away the vegetation some species need for food and cover.

Biological controls of waterweeds, even the grass carp, are still experimental. It may be well into the future before they can be applied on a routine basis. They do hold a promise, however, of ridding Texas of one of its most irritating, and most expensive water problem.