Weed Control As It Relates To The Aquatic Environment

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The relationship of aquatic vegetation to fish and wildlife has been discussed by various authors in numerous publications (1, 2, 4, 5, 6). Many authors agree that native aquatic plants not only provide fish with shade, food, shelter, spawning grounds, a method of softening water, and protection for newly hatched young, but also provide waterfowl with food, nesting material, shelter for young, and protection for adults. These benefits may be mitigated by some aquatic plants. For example: waterhyacinths (*Eichhornia crassipes* (Mart.) Solms, Eurasian watermilfoil (*Myrophyllum spicatum* L.), and hydrilla (*Hydrilla verticillata* Casp.), which do provide points of attachment, cover, and shade for invertebrates, do not make up for the disadvantage associated with the dense stands of growth characteristic of these plants.

Reduction in the rate of water flow, loss of general water usage including both sport and commercial fishing, and general lowering of the aesthetic value of the water area are some disadvantages of dense stands of aquatic vegetation (2). Also, dense stands of aquatic vegetation in lakes, rivers and streams not only reduce the predator-prey relationship to the point our water areas become overpopulated with stunted panfish, but are also responsible for depleting dissolved oxygen during prolonged periods of cloudy weather, which is a major cause of the death of many fish.

Investigations into reasons that exotic vegetation is usually not a problem in its native habitat indicate that nature has developed a natural check system consisting of disease or parasites, or both, which often do not accompany the plant during importation. The absence of such control has allowed unrestricted growth not characteristic of the plants in their original habitat.

Management of vegetation can be accomplished by chemical, biological, mechanical, or physical methods, or a combination of these. No one method will become a panacea because of the complexities of the aquatic environment.

Chemical control is effective in shallow backwater areas. Management of vegetation by chemical spraying has several disadvantages. The use of chemicals, although economical, increases the biochemical oxygen demand levels in aquatic habitats which, in many situations, are already at a dangerous level from man's other activities. Water hyacinths sprayed with chemicals die, sink to the bottom of the water area, and decay, adding more nutrient to already over-enriched lakes and streams. When aquatic plants die naturally, or from chemical application, the oxygen level in the body of water is reduced and the nutrients which have been tied up in the plants are released into the water. This additional nutrient load in many cases triggers phytoplankton blooms characteristic of many lakes in central Florida (1).

By passing poorly digested material through the digestive tract, some biological weed control agents, for example, fish, have a tendency to add to the nutrient load, which is presently at a peak in most Florida lakes. Herbivorous fish with which we are familiar, including Congo tilapia (*Tilapia melanopleura* Dumeril), blue tilapia (*Tilapia aurea* Steindachner), and white amur (*Ctenopharyngodon idella* Val.) are not sufficiently selective in their eating habits to lead us to believe they won't destroy the good vegetation along with the bad. This could prove disastrous to our migratory waterfowl populations. However, these drawbacks do not rule out their use under certain conditions. For example, a non-reproducing species, thoroughly tested to determine its effects on native sport fishes, could be stocked in isolated problem areas to control undesirable aquatic plants and removed when they have done their work. Or, with sufficient knowledge of food preferences and food consumption of a certain species, it could perhaps be stocked at a rate that would allow substantial control of a pest plant without seriously damaging beneficial vegetation. Some fish, the white amur, for example, may contribute to the sportsman's creel.

The basic weakness of most biological controls from the fish and wildlife standpoint is that they—like chemical control—do not remove nutrients from the water. Nutrient removal is the one big advantage of mechanical control. At this time, unfortunately, the relatively high cost of mechanical control has not permitted full exploitation of this advantage.

Mechanical harvesting of aquatic vegetation is not a recent development. The present approach is to find a use for the end product in an effort to reduce the overall cost of the operation. Possible uses include the manufacturing of paper, food supplements for cattle, chickens and swine, mulching materials, and a possible source of pure protein.

One serious disadvantage of mechanically harvesting aquatic vegetation is the high cost involved not only in the acquisition of the equipment, but expenses incurred when disposing of the harvested material. Up to the present time, no commercial use has been found for either water hyacinths or submersed aquatic plants that can be harvested by machines.

Blanchard (3) estimated costs of $35.56 per acre to mechanically harvest submersed aquatic plants which included hydrilla and vallisneria (*Vallisneria americana* Michx.) from six lakes located at Winter Park, Florida. The harvesting equipment operated at 65% efficiency due to breakdowns, servicing of equipment, travel, and moving time. This figure did not include disposal of the vegetation, which could double the cost, depending on distance to dump, labor costs, and location of the operation.

Physical management of aquatic vegetation by lowering lake levels and allowing the exposed plants to die, may be the most inexpensive method. Total cost depends on the geographical location of the water area, general topography of the lake, and the amount of pumping required to lower the water. A secondary benefit derived from any drawdown is the increase in sport fishing which usually occurs while the lake is filling up and for several years thereafter. Drawing lakes down to manage aquatic vegetation is limited by the very nature of most of Florida's lakes, which are shallow, large, and natural rather than man-made.

The future outlook for management of aquatic plants will call for a combination of the available measures presently being employed in the state. Chemical, biological,

mechanical, and physical methods of aquatic plant management must be applied, where appropriate, if we are to maintain the highest possible utilization of our natural resources, including fresh water sport fishing, waterfowl hunting, boating, and other water-oriented activities.

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