MANAGING AQUATIC PLANTS IN SMALL LAKES AND PONDS

Small lakes and ponds make attractive additions to parks, golf courses, commercial landscapes, and private estates. However, it is the role of nature to fill in a body of water with time. Proper maintenance and construction can slow down the process.

Natural lakes through siltation become shallower and thus better growing sites for aquatic weeds. Fertilization of watershed areas for whatever reason encourages growth of vegetation in lakes and ponds. Seepage from sewage treatment systems serves to feed aquatic vegetation. Or perhaps, man has simply entered an area where aquatic vegetation was already established and he wants to eliminate it from his property.

Whatever the cause, any aquatic weed problem cannot be solved without investigation of all the reasons why a small lake or pond has an overabundance of weeds.

Construction

More than seven million acres of lakes have been constructed on U.S. farms alone. Most of these were constructed under U.S. Department of Agriculture Soil Conservation guidelines. Owners of privately constructed lakes may not have had the benefit of knowledge available to the farmers.

The following points should be considered when building a small lake or altering an existing lake:

—depths less than three ft. should be avoided. Eight to ten ft. is satisfactory for a small lake.

—for each acre of lake surface there should be approximately 15 acres of watershed if the lake is not stream-fed.

—lakes much smaller than one acre do not provide good natural conditions for fish.

—a spillway should be built to control overflow during heavy rains. Lakes with more than 20 acres of watershed per acre of lake surface should have a cement or stone spillway.

—the lake should not be surrounded by tall trees which shade the water surface. Trees should not be planted close to the shore since roots may encourage erosion.

—measures should be taken to prevent wave erosion for lakes in windy locations.

—sand should not be used heavily for lake beaches since it will quickly drift to the bottom causing depth problems.

—loose soil should be avoided in the watershed area to avoid rapid siltation. Siltation should not exceed one percent of the original depth of the lake in one year.

—if there are a number of lakes fed from one stream, it is preferable to branch each lake off the stream, rather than to have one lake feeding into another.

—good air circulation above the lake is needed to mix upper and lower water levels if the lake is not stream-fed.

—aquatic vegetation produces oxygen during photosynthesis and is therefore necessary for good fish production. It also serves to stabilize bottom sediment.

—the lake bottom should be watertight to the degree that serious drops in water level are not experienced in dry weather. Periodic checks for damage by burrowing animals is advisable.

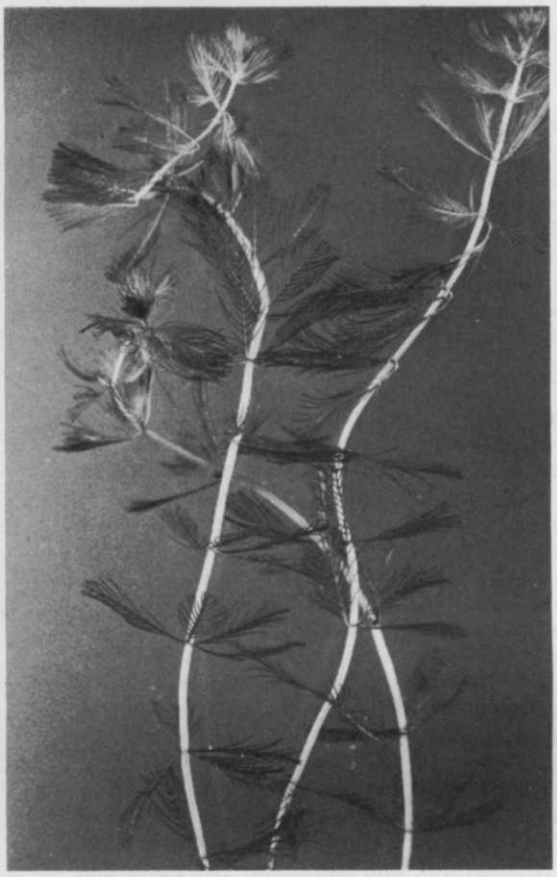
Oxygen content is a crucial factor in lake management. Water holds less dissolved oxygen as it gets warmer. Spring water, although cold, does not carry much oxygen since it has not been exposed to the air. The oxygen content in a lake drops in the summer, especially at lower depths.

A phenomenon called stratification also can occur in the summer. Stratification is the separation of the water into definite layers caused by differences in density as a result of temperature differences. The warmer, less dense, surface layer does not mix with the colder and denser lower layers. Consequently, oxygen does not reach the lower depths of the lake.

Oxygen depletion can also be caused by decay (oxidation) of organic matter in the water. Sewage or organic effluent from livestock can cause severe reduction in oxygen content of the water. Also, lakes near swamps may suffer from an excess of organic matter.

Fish, cold-blooded animals, experience increased respiration as the temperature of the water rises. Consequently, fish use up more oxygen in warmer water. If fish begin to swim at the surface of the lake a serious oxygen problem exists.

Winter presents oxygen problems as well. A thick, snow-covered layer of ice over a lake not



Infestations of aquatic weeds can cause serious drops in land value (far left). Specimen of the submersed watermilfoil (left). The white amur is an exotic species of carp which has great promise for small lake weed control.

only seals out air from the water, but shades the plants under the ice and stops their photosynthesis and oxygen production.

Bubblers and other devises to keep the water layers mixed are available. They can reduce the chance of stratification in the summer and prevent total ice coverage in the winter. Kembro, Inc. makes such a unit.

A small lake should have a natural balance insured by proper maintenance and construction. If it gets out of balance, then the need for a variety of methods to achieve control over aquatic vegetation is evident.

Types of Aquatic Vegetation

Four types of aquatic vegetation are of primary concern in weed control; algae, submergent weeds, emergent weeds, and floating weeds.

Algae are small plant organisms that, when abundant, or in bloom, create an unsightly, smelly, and damaging problem. Algae can clog water filters, irrigation systems, and other machinery. Algal blooms can shade out submerged plants or deplete oxygen dangerously from nighttime respiration. Massive kill-off of other aquatic vegetation can create tremendous amounts of decaying material in a body of water and rob it of its oxygen content. Certain forms of algae are toxic to animals and serve to transmit fish diseases and parasitic infections.

Submergent weeds are rooted in the lake bottom and are totally under water.

Emergent weeds grow in shallow areas with stems and leaves usually out of water.

Floating weeds are either free-floating or bottom-rooted plants which have leaves that float on the water's surface.

Overabundance of any of these plants can interfere with the recreational uses of a lake, speed up the rate of siltation, clog irrigation and drainage systems, cause unpleasant odors, impart a bad taste to the water, crowd out wildlife, and reduce the value of property the lake is on.

Control Measures

Prevention is the first method of aquatic weed control. Regular observation and maintenance of the lake is as critical as any other form of vegetation management. A healthy balance of the aquatic environment should reduce the need for artificial control measures, except for swampy areas where man has entered.

When the lake environment gets out of balance, effective mechanical, biological and chemical means to control weeds are available. Each has particular advantages and disadvantages. In the case of small lakes and ponds, control techniques designed primarily for large lakes are not practical. Attention should be paid not to create a large amount of dead and decaying vegetation in the lake at any one time.

Chemical control of algae is most practical. Application rates should be closely figured and adhered to to avoid any danger to fish. Copper-based compounds, especially in pelleted form, are very useful and are available from a number of manufacturers: 3M Co., Great Lakes Biochemical

Submersed Weeds

Pondweed
Hydrilla
Buttercup
Cabomba
Coontail
Watermilfoil
Slender naiad
American Elodea
Bladderwort

Emergent Weeds

Arrowhead
Bullrush
Cattails
Water primrose
Alligator Weed
Water willow
Smartweed

Floating Weeds

Duckweed
Water Pennywort
Water Lily
Water Lettuce
Salvinia
Water Hyacinth

Hydrilla

Co., Phelps Dodge Refining Corp., Applied Biochemists Inc., and Thompson-Hayward Chemical Co. (See list for addresses.)

Other chemicals for algae control are Aquazine from Ciba Giegy Corp., Diquat from Ortho Div. of Chevron Chemical Co., and Aquathol K from the Agchem Div. of Pennwalt.

Higher aquatic plants are hardier than algae and control is consequently more difficult. The first alternative is to cut and remove them mechanically. This could be done by hand for small areas. Larger jobs may require harvesters that cut swaths of weeds from pontoon-like platforms. Aquamarine Corp., and Air-Lec Industries, Inc. manufacture such devices. Harvested weeds should be removed from the lake and disposed of away from the watershed area. Dredging, burning, and lowering the water level for winter are a few other methods of mechanical control.

Although a number of biological control methods have been tried, the white amur, a species of carp imported from China appears to have the most promise for small lake weed control. The fish is outlawed in most states at the present time, but research by Sutton at the University of Florida may help legalize the fish in more states.

Sea-Ranch Inc. produces white amur commercially. The fish are legal in the states of Arkansas, Florida, Mississippi, and Alabama. The amur con-

sumes large amounts of aquatic vegetation and does not reproduce successfully in the U.S.

Other natural consumers of aquatic vegetation are crayfish, ducks and geese, other types of fish, snails, and insects.

Chemicals for higher aquatic weeds are applied to the lake bottom after the water level has been drawn down, as granules that sink to the lake bottom, as liquid spray onto the surface, or as a foliar spray. Most chemicals require swimming restriction for a period of time after application. Also, if lake water is used for irrigation, there may be restrictions on use for irrigation. If this is the case, treatment should be avoided in the summer when the demand for irrigation water is greatest.

For submerged weeds the following chemicals are available: Aquazine by Ciba Geigy Corp.; Aquathol and Hydrothol by Pennwalt; Diquat by Ortho Div. of Chevron Chemical Co.; Casoron by Thompson-Hayward; Fenac and 2,4-D by Amchem Products, Inc.; and Systems E and L by 3M.

For emergent weeds the following products are available: Diquat; Dalapon by Dow; Casoron; Weedtrine-D by Applied Biochemists Inc.; and 2,4-D products from Amchem.

For floating weeds there is Aquathol and Diquat.

It is extremely important to read the label of any product and to ask for full information about products from dealers.

Dosages are in pounds per acre-foot. Acre feet are derived by multiplying the surface area of the lake in acres by the average depth in feet. The dealer will also help you make these calculations.

Aquatic weed control is not a simple matter. There are many considerations to be made and questions to ask before going ahead with a weed control program. **WTT**

Manufacturers of Aquatic Weed Control Products

Air-Lec Industries, Inc., 3306 Commercial Ave., Madison, Wi. 53714.
Amchem Products Inc., Brookside Ave., Ambler, Pa. 19002
Applied Biochemists, Inc., 5300 W. County Line Rd., Mequon, Wi. 53092
Aquamarine Corp., 225 N. Grand Ave., Waukesha, Wi. 53186
Chevron Chemical Co., Ortho Div., 575 Market St., P.O. Box 3744, San Francisco, Ca. 94105
Ciba Geigy Corp., P.O. Box 11422, Greensboro, NC 27409
Dow Chemical Corp. P.O. Box 1706, Midland, Mi. 48640
Great Lakes Biochemical, 6120 W. Douglas, Milwaukee, Wi. 53218
Kembro, Box 205, Mequon, Wi. 53092
Pennwalt Corp., 1630 E. Shaw Ave., Fresno, Ca. 93710
Sea-Ranch Inc., Rt. 2, Box 604, Sheridan, Ark. 72150
Thompson-Hayward Chemical Co., 5200 Speaker Rd., Kansas City, Ks. 66110
3M Co., 3M Center, St. Paul, Minn. 55101.

For ad on following page circle 102 on free information card