Controlling Vegetation Problems in Ponds

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(Note: Products and chemicals mentioned were current in 1983, and may or may not be current today. Specific update notes are added in italics. Product labels should always be referred to for specifics including water use restrictions and use sites.)

Fishing, swimming, boating, ice-skating, irrigation, wildlife attraction, aesthetic appeal, and high property value are some of the potential benefits offered by park or campground ponds. Very few recreational sources provide such diversity and utility. Unfortunately, many ponds are under-utilized, improperly managed, or neglected. Recreational dollars are spent for swimming pools, tennis courts, golf courses, and other facilities, but the ol' swim'n and fish'n hole may soon be forgotten, depriving both young and old of many enjoyable, relaxing, and exciting experiences.

Not unlike other facilities, ponds require maintenance. However, managers with expertise in forestry, turf, and landscaping often have limited knowledge of and experience in pond care. Routine scheduled maintenance is often limited to trash and litter pick-up around the shoreline and occasional salvage operations for submerged picnic tables and park benches. Grounds work priorities are established with the philosophy that Mother Nature will take care of the pond.

It is true that nature will take care of the pond. Similar to an unattended field, an ignored pond will go through a series of changes. These are characterized by the development of overabundant vegetation, a loss in water depth, a depletion in dissolved oxygen concentrations, and a decline in fish life. This process, scientifically known as eutrophication, is caused by the increasing fertility (nutrient content) within the water. In environments undisturbed by man, this transition from pond to swamp may take centuries. However, eutrophication is extremely accelerated in a pond located within a well-fertilized watershed area or fed by urban runoff. Therefore, it is imperative that decisions be made and actions be taken to protect, manage, and in some cases renovate a pond before it has lost all value due to excessive vegetation.

The uses, location, and existing condition of a pond will dictate the degree of management required. Obviously, physical and technological limitations as well as budget, manpower, and equipment availability will enter into formulating a plan. The important thing is to get "Pond Management Costs" included on your budget and "Pond Management Projects" included in your work schedule.

Do not be too nearsighted when examining your pond. Some of the problems did not develop *in* it but *outside* it. The quality of the water is largely a function of the management practices carried out in the surrounding drainage or watershed area. Simple alterations in grounds maintenance procedures can save money and headaches. Avoid fertilizing areas in the immediate drainage area. Replace earthen pathways around the pond with wood chip or gravel-covered walkways. Maintain a sturdy vegetation cover on the embankments, especially heavily used sites. Do not plant messy, deciduous trees within 25 feet of the water's edge. Provide some railroad ties, logs, or boulders for your shoreline guests. These simple measures will yield positive benefits in the maintenance of water quality.

The next step is determining what should be done within the pond itself. This is often an area where maintenance people do not want to get their feet wet. The control of aquatic vegetation is probably the most universal problem facing the pond manager. Aquatic weeds and algae not only detract from the appearance of a pond, but also can inhibit functional uses. Public response to infested waterways is quite negative. People often believe this condition indicates the water is "polluted." Visitors and guests, spoiled by swimming in clear, chlorinated pools, have a very low tolerance of aquatic vegetation. Shoreline fishermen find it impossible to reach their quarry through the tangled growth. Fish production may suffer. Water hazard ponds become eyesores, irrigation ponds become clogged and nonfunctional.

It might be helpful to know something about the nature of these plants. Aquatic plants, like terrestrial vegetation, require sunlight, nutrients, and water for growth. They have a diversity of special adaptations, which allow them to survive in water. Leaf and stem tissues contain air pockets for buoyancy. Many of the submerged flowering types have unique flower parts, which allow pollination to take place at the water surface. Physiologically, aquatic plants have the ability to maintain osmotic balance despite differences in water pressure and dissolved salt concentrations. Algae and free-floating plants are able to extract nutrients directly from the water column. Many rooted species have this adaptation in addition to their root uptake ability. Generally, the only factors limiting the amount of aquatic growth in a body of water are the availability of nutrients and the depth of sunlight penetration.

Faced with the fact that most ponds will provide suitable habitat for some type of aquatic plant growth, it is often imperative that some control measures be undertaken. The degree of control will be determined by the water uses. The safest, most economical, and effective approach often is chemical treatment. A number of EPA registered herbicides and algaecides are specially labeled for aquatic use. These have been thoroughly screened and tested to ensure they present minimum hazards to the environment when used as directed. At present, none of these aquatic chemicals have been placed in the Federal Restricted Use Classification. However, some states may be more restrictive, and it is best to check with local authorities to determine permit and licensing requirements.

Costs for maintaining an acre of water for seasonal control of aquatic vegetation are comparable to those involved in mowing, fertilizing, fungiciding, and herbiciding high maintenance turf areas. A two-man crew equipped with boat, motor, and power sprayer can treat up to 50 acres per day. Equipment requirements are minimal. Some terrestrial sprayers are adaptable, and a spray set-up specifically for aquatic chemical application can be purchased for $600 to $1000.

Training is an important consideration to help ensure safety to the applicator and environment. All states presently offer training and licensing programs in the aquatic pest control category. Park districts may want to certify several individuals to carry out treatment programs. Should your situation warrant contracting this work out to professionals, commercial aquatic applicators are available in many parts of the country.

A chemical treatment program for aquatic weed control can be initiated by following these step-by-step guidelines.

1. Identify the target plants

2. Determine the size of the treatment area

3. Obtain suitable types and amounts of chemical

4. Choose proper application equipment

5. Apply according to label instructions

6. Post the necessary water use restrictions

7. Follow-up, as needed, to establish a regular maintenance program

Identifying Plants

Not unlike terrestrial weed control, it is necessary to know what you are trying to control. Either obtain an identification manual on aquatic plants (for example, *How* to *Identify and Control Water Weeds and Algae* is available from Applied Biochemists, Inc., © 1976 *(now in its fifth edition-1998)*), or take an aquatic plant to the Department of Natural Resources or a local university. Aquatic plants are generally classified by their growth forms and location in the environment. Scientifically, they are categorized by differences in anatomy (structure) and physiology (function). Generally, aquatic plants are separated into two groups, weeds and algae.

Algae are either single-celled or simple multi-cellular plants, which have no true leaves, stems, flowering structures, roots, or vascular tissues. Single-celled types, which suspend themselves in the water column, are referred to as *planktonic algae.* They will often overpopulate, developing bloom conditions, which create a dark green cast, offensive odors, and potentially toxic conditions. *Filamentous algae* derive their name from their structure, which consists of a series of cells joined end to end. The filaments are visible to the naked eye and frequently grow in tangled masses throughout the water. Their texture can range from coarse to slimy depending upon species. Often, they will begin growth attached to some substrate and eventually break loose to float upon the surface in mats. More advanced forms of algae such as *Chara,* also known as muskgrass because of its pungent odor, resemble rooted weeds. They commonly grow in thick beds off the pond bottom in relatively clear water. Older plants become gray-green to whitish in color due to gritty calcium deposits on their outer surfaces.

Basic aquatic weed groupings are differentiated by location in the environment and growth form. *Emergent plants* grow along the shoreline or in shallow, marshy areas. Their leaves and/or stems extend above the water surface and are rigid enough to support themselves. Examples include cattails, rushes, sedges, and arrowheads. *Floating plants* include both free-floating and rooted floating-leaved plants. These are found on the water surface, their leaves lying parallel or protruding from the water. Rooted species are generally found in shallow areas, whereas free-floating types may be distributed throughout. Examples include water lilies, water hyacinth, watershield, duckweed, and watermeal. *Submerged plants* are found underwater and may be either rooted or lying on the bottom. They grow up through the water column, often reaching the surface. Nuisance species can dominate an area making it inaccessible to recreational activities. Common examples include watermilfoil, pondweeds, elodea, and hydrilla.

Determining Treatment Area

Having identified the weed, it is next necessary to calculate the size of the treatment area. Most aquatic pesticide labels give application rates in terms of surface acres or acre-feet. One acre equals 43,560 square feet. One acre-foot is a volume measurement, which takes into account average water depth. An acre-foot equals 43,560 cubic feet and contains approximately 326,000 gallons of water. Average depth times surface acreage will give acre-feet. Determine average depth by taking a number of depth readings within the treatment area.

Choosing the Proper Chemical

It is advisable to obtain specimen labels for the various aquatic herbicides and algaecides in order to determine which are most suitable for your situation. Following is a brief summary of some commonly used products.

Cutrine-Plus is a concentrated 9 percent chelated copper algaecide. The liquid is used at the rate of 0.6 gallons per acre-foot for the control of planktonic and filamentous algae, or 1.2 gallons per acre-foot for Chara control. Rates up to three gallons per acre-foot are herbicidal against species such as hydrilla. By being chelated, Cutrine-Plus does not precipitate out of solution in hard water, as does copper sulfate. This allows for longer contact time and more effective control. There are no water use restrictions for drinking, swimming, irrigation, fishing, or stock watering following treatment. Cutrine-Plus is also available in a 3.7 percent active granular formulation for treatment of bottom-growing algae. A rate of 60 lbs. per surface acre is recommended.

Weedtrine II is a granular 2,4-D ester formulation, which is approved for aquatic use *(Weedtrine II is no longer on the market-Navigate marketed by Applied Biochemists is a 2,4-D granular product that is now available)*. As in terrestrial applications, 2,4-D is selective as to the weeds it controls in the aquatic environment. Mainly, it is used as an early season treatment on watermilfoil, coontail, water lilies, and several emergent shoreline species. Application rates range from 100-200 lbs. per surface acre. It is best used when plants are actively growing and before flowering has occurred.

Aquathol K (liquid and granular *(manufactured by Cerexagri)*) is a dipotassium endothall compound used for the control of a fairly broad range of submerged aquatic plants, especially those belonging to the pondweed family. Application rates range from .5 to 2 gallons per acre-foot depending upon target species. Water use restrictions following treatment are: one day no swimming, three days no fishing, and 7-25 days no irrigation (depending upon concentration used). Irrigation restrictions do not apply to bent grasses.

Diquat liquid *(now labeled as Reward for aquatic use-manufactured by Syngenta)* is a contact-type herbicide, which controls a broad range of both aquatic and terrestrial plants. Species controlled include elodea, milfoil, pondweeds, cattails, and sedges. Application rates range from one to two gallons per surface acre. Less concentrated formulations such as Weedtrine-D *(manufactured by Applied Biochemists)* are available for small treatment areas. Water use restrictions following application are 14 days for swimming, irrigating, and domestic uses *(now reduced to 5 days)*. There are no restrictions on fish consumption.

Both Diquat *(now Reward)* and Aquathol K are compatible in tank mix combinations with Cutrine-Plus. The copper from the algaecide has been shown to increase herbicidal activity, thus reducing costs while improving effectiveness. Generally, Cutrine-Plus is mixed with Diquat *(now Reward)* in a ratio of 1:1 and applied at rates of one to three gallons of mix per surface acre. Aquathol K is mixed 2:1 or 3:1 with Cutrine-Plus and applied at the rate of one to three gallons per acre-foot.

Application Equipment

Choice of equipment for applying aquatic chemicals will depend upon the size and nature of the treatment area and the formulation being used. Even distribution of the chemical over the intended treatment area is the main objective. Dilution of the chemical prior to application is usually required.

Spot treatments with granular formulations can be facilitated with a hand scoop used to broadcast the material over the area. Hand-held fertilizer spreaders also work quite well. More extensive granular treatments may require power operated spreaders mounted on a boat.

Small-scale liquid treatments may only require backpack sprayers or portable wheel-mounted tank sprayers. These units are particularly effective for foliar treatment of emergent shoreline vegetation.

For areas in excess of one acre or for frequent treatments it is best to design or purchase a set-up specifically for aquatic chemical applications. Portable, high-volume water pumps can be modified to bring in pond water for dilution while drawing in chemical at the same time. This is done by tapping a smaller diameter chemical intake and ball valve into the main water intake side of the pump. An adjustable nozzle on the discharge hose allows for use of different spray patterns. These units can be used from the shoreline or a boat.

Other methods of chemical application can be adapted to fit your needs. Electrical metering pumps can be tied into re-circulating or irrigation ponds as a means of providing periodic algaecide treatments. These systems are installed with timers to inject chemicals on a regular and periodic basis. Where no electrical outlets are available, gravity-feed drip systems can be used in flowing water.

Chemical Application

For safety and effectiveness, several considerations must be kept in mind regarding timing of treatments and application technique. Remember that you are adding chemicals to water, a fluid medium. To avoid drift and dilution below effective concentrations, water should be calm during and following application. Generally, water temperatures should be above 60^0F while plants are in an active growth stage. Where algae mats have formed, it is best to break them apart physically prior to application. This will ensure good contact. If severe growths are present, it is advisable to treat only one-third to one-half the area at a time, allowing one to two weeks between treatments. This will prevent oxygen depletion problems.

Post-Treatment

Clean application equipment by rinsing thoroughly with water. Dispose of empty pesticide containers in accordance with label instructions. If water use restrictions are required, public access areas should be conspicuously posted. Knockdown time on algae and weeds may take one to two weeks, so be patient.

Follow-Up

Aquatic vegetation control with chemicals is a maintenance procedure. Several treatments may be required during a season to maintain desirable conditions. Keep accurate records of the plant species in your pond as well as chemical usage. Be on the lookout for new types of growth. Always maintain an extra supply of chemical, especially algaecide, to be ready for rapidly developing blooms.

Chemicals are effective tools for restoring aesthetic, functional, and recreational value to vegetation-choked waterways. Take care of your water along with your grounds maintenance.