

# Pond and Lake Management Part I: Dealing with Aquatic Plants & Algal Blooms

Fact Sheet FS1076



## **Cooperative Extension**

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### **The Need for Pond and Lake Management**

Waterbodies such as lakes and ponds are valuable resources. Lakes and ponds can either be natural, or man-made, and management depends on the desired use of the waterbody. For example, not all lakes are suitable for swimming, and different management practices will be applied to areas where swimming is encouraged and areas where it is not. Human actions, as well as natural phenomena, contribute to unwanted pond and lake conditions. Excessive plant growth, algal blooms, oxygen depletion, sediment build-up, bank erosion, and pests are the most common issues faced in the management of a lake or pond. In many cases there is a “quick fix” remedy that can eliminate the symptoms of a problem at least temporarily. However, the issue will return if the root cause of the problem is not addressed. A sound pond or lake management plan addresses not only management of the symptoms, but also remediation of the causes of common pond and lake issues.

### **Dealing with Aquatic Plants**

Aquatic plants add aesthetic character to a pond or lake setting, and they provide valuable ecological functions. Aquatic plants stabilize banks, oxygenate the water, take up nutrients, provide shelter and spawning habitat for fish and amphibians, are a food source for waterfowl and other wild-life, and harbor zooplankton. Aquatic plants become nuisance weeds when one species grows out of control. These “weeds” can clog channels used for boating, making swimming areas unfit for swimming, or cause the pond or lake to have an

unsightly overgrown appearance. Sometimes weeds may out-compete other more functional plants for space. Excessive aquatic plant growth is caused by a combination of high nutrient levels, invasion by exotic species, and/or low water levels.

Before a weed management control regiment is initiated, the plants causing the problem should be identified. Exotic or invasive species usually reappear more rapidly and require a more rigorous management approach. The most common method of controlling aquatic plants is to simply remove them. The plants are usually cut, raked, and/or pulled.

In order for the weed removal to be effective, the cut or pulled weeds need to be taken out of the water and disposed of off-site, preferably by drying and composting. If the cuttings are not collected and removed, they may reattach themselves and re-grow. If left in the water, decaying plants deplete the water of oxygen and add nutrients to the water which can cause other problems such as algal blooms and/or fish kills. The equipment and manpower necessary to remove aquatic weeds depends on the size of the area to be cleared of weeds, the density of the plants, and how firmly they are rooted. Non-rooted, floating plants or floating filamentous algae can be contained and collected using weed containment booms or nets. For weakly rooted weeds, the cheapest method of weed removal is hand pulling. When the weeds are pulled, the entire biomass and root system is removed, and this method works well in most sediment types.

In waters deeper than four feet, or with more deeply rooted weeds, pulp hooks or bailing hooks can be used. Uprooting horizontal root or rhizome systems with hooks is easier than uprooting by hand. Often deeply rooted plants break when pulled by hand, pull up a lot of muck when pulled, or may be

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so deeply rooted they cannot be pulled. In this case it may be better to cut the plants. Hand held cutting tools include V-shaped drag cutters, scythes, weed whips, and machetes. The V-shaped cutter is the most versatile. It can be thrown out into the water and reeled in, or it can be dragged behind a boat, where weeds can be placed after cutting, thus reducing trips to shore. There are specialized weed barges that are designed with cutting bars and a conveyor to deposit cut plants onto the barge. Another option for weed removal is raking. Raking is most effective right after weeds have been cut. Garden rakes, lake and shore rakes, modified silage forks, and landscape rakes are all excellent choices. Sometimes the level of the pond or lake is lowered for weed removal. Lowering the water level during the winter months may also control weed growth, but in some cases it can also kill desired species. If the water level is to be lowered, a lake-lowering/draw-down permit is required from the New Jersey Department of Fish & Wildlife Bureau of Freshwater Fisheries. Algae can also be physically removed from the waterbody using nets or brooms.

## Aquascaping

Aquascaping is like landscaping, only in a waterbody instead of on land. Aquatic plants are creatively used to manage nuisance plants and create a desirable plant community. Nuisance weeds are replaced by desirable native species. Maintenance of the aquascaped area is required until the plants become established. Long-term control of undesirable plants will improve fish habitat and will stabilize near shore areas.

## Dyes

Liquid dyes can be used to inhibit plant and algal growth by prohibiting sunlight from reaching the plants. The dyes tint the water blue and work by absorbing the light waves used in photosynthesis, thereby inhibiting plant growth. Dyes are easy to apply, are nontoxic to wildlife, and do not restrict swimming. They are most effective in waterbodies that have long residence times. If there is a large influx of water into the lake from a stream, for example, the dye will quickly become diluted and will not be as effective.

## Herbicides

Herbicides can be used to kill targeted weeds. In New Jersey, only certified pesticide applicators can apply herbicides to surface waters, and every herbicide application must be permitted through the NJDEP Pesticide Control Program. An herbicide can be applied from a boat and is effective in both deep and shallow waters. Herbicides do have some drawbacks. The long-term effects of herbicide use on lake ecosystems are not fully understood. Non-targeted species may be affected when using an herbicide. Dead weeds that decompose in the waterbody deplete the dissolved oxygen

supply. Using an herbicide might not be the most economical choice of plant management because regrowth may happen so fast that reapplications are necessary, especially during the summer months. The most effective way to use an herbicide is to first cut the plants and then apply; less herbicide will be necessary and the plants will be more susceptible.

## Preventing and Managing Algal Blooms

### Source Control

When algal populations in ponds and lakes grow out of control it is called an algal bloom. Since algae are often free floating, they are more difficult to target than plants. Algal control, therefore, is usually a whole lake or pond effort. The most effective way to control algal blooms is through source control. Algal populations grow to nuisance proportions when there are excess nutrients, such as phosphorus and nitrogen, in the water. The nutrients enter ponds and lakes as runoff from nonpoint sources such as fertilized lawns, farms, and recreational fields or from bottom sediments.

Algal blooms indicate a nutrient enriched or eutrophic system. If algae have nutrients and sunlight, they will grow, so the best way to manage the algae is to manage the nutrients. Since nutrients come from diffuse sources, it is sometimes difficult to identify an exact source. In residential areas, lawns are the greatest source of nutrients. Reducing fertilizer use on lawns is the most effective way to reduce nutrient inputs; however, it is more difficult to enforce. When excess fertilizer is carried to the lake in stormwater when it rains, it has the same effect on the lake as it does on a lawn; growth is increased. A management plan should establish guidelines for fertilizer use such as not applying right before a rain event or on paved surfaces such as sidewalks and driveways. Landscaping that replaces lawn area with native plants to reduce the area of applied fertilizer should also be encouraged. Homeowners should be advised to have their soil tested to see if phosphorus is even needed to fertilize their lawns at all. A buffer strip of tall grasses or other native plants should be planted between any fertilized lawn areas and the pond or lake. Leaves should be raked and removed because they also contribute nutrients, especially nitrogen, when they decompose. To prevent runoff from bringing nutrients into the pond or lake, boat landings and driveways should be left unpaved. On-site septic systems can be major contributors to a nutrient enriched waterbody. They should be properly maintained. The sediments at the bottom of the pond or lake also contain nutrients; however, algae do not have access to these nutrients unless the bottom is disturbed. Boat traffic can disturb these sediments; therefore outboard motor restrictions can be useful in controlling nutrient inputs.

## Chemicals and Aeration

If source control does not manage algal blooms, there are other options available. Chemicals such as buffered alum can be applied that form nontoxic precipitates that remove phosphorous from the water column and cover the bottom sediments so nutrients are not available to the algae. Limestone and lime have also been proven to be effective. Aeration promotes artificial circulation that brings oxygen poor water up to the surface. Surface agitators such as paddlewheel devices, bubblers, and fountain sprayers can be used to create substantial turbulence that dissolves oxygen from the air into the water. Fountains consist of a float, nozzle or sprayer head, and a pump that draws water from the pond and sprays it into the air. They are usually powered by an electric pump, or less commonly, by a windmill device. Fountains promote mixing if the water is drawn from the bottom oxygen-poor layer of the pond. Aeration and mixing are important because they:

- provide oxygen for aerobic bacteria to decompose organic matter,
- trigger processes that control blue-green algae,
- provide well-oxygenated water throughout the pond so that the pond is less likely to experience a fish-kill, and
- liberate dissolved gases, such as ammonia, carbon dioxide, hydrogen sulfide, and methane, into the air instead of allowing them to build to harmful levels in the pond.

## Barley Straw Bales

Barley bales have been on the forefront of algal control technology. As the barley straw decays when submerged in water, it releases a chemical that inhibits algal growth. The bales should be placed in the pond in early spring, kept close to the surface, and secured to allow removal prior to winter. As a rule of thumb 100 to 300 pounds of straw should be used per surface acre. Barley bales can be acquired from most plant suppliers.

## Removal of Bottom Sediments

Dredging may be necessary to prevent stored nutrients in the sediments from entering the water column and stimulating plant growth. Dredging is discussed in more detail in the Fact Sheet Pond and Lake Management Part II.

## Additional Resources:

Butler Sr., B. R. & Terlizzi, D. 1999. FS-766 Integrated Pond Management for Maryland.  
<http://www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=86>

Holdren, C.W. Jones & J. Taggart. 2001. Managing Lakes and Reservoirs. N. Am. Lake Manage. Soc. And Terrene inst., in coop. with Off. Water Assess. USEPA, Madison, WI.

McComas, Steve. 1993. Lake Smarts. Terrene Institute. Washington D.C.

Ohio Pond Management Bulletin 374-99. Ohio State University Extension.  
[http://ohioline.osu.edu/b374/b374\\_4.html](http://ohioline.osu.edu/b374/b374_4.html)

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