

Dealing with Drought: Aquatic Plants and Summer Fish Kills

Iowa's hot July and August days are notorious for producing pond water conditions that can lead to fish kills. The recent heat wave has increased evaporation tremendously and caused a low water table, and thus low water conditions in watershed and spring-fed ponds state-wide.

With increased evaporation and decreased influx of water, the remaining pond water has been concentrated down and has very high concentrations of nutrients, which has led to increased aquatic plant issues in some ponds for 2012. Reports of submerged plants like coontail, sago pondweed and American pondweed, as well as filamentous algae have been quite high this year. Many pond owners are having issues with floating plants like duckweed and watermeal. The low water conditions have led to an expansion of habitat for emergent vegetation like cattails and smartweed. Concurrently, these aquatic plant problems have led to the use of aquatic herbicides by pond managers, which may lead to oxygen depletion issues that are problematic for fish.

Why are the aquatic plants so abundant?

It is common in warm, nutrient-rich waters to have exponential increases in the algae biomass, or phytoplankton (microscopic algae) blooms. Plants produce oxygen during the day through photosynthesis, but are respiring and consuming oxygen all the time. Fish, insects, bacteria and other organisms are also respiring constantly. The combined consumption of oxygen is very high at night during the summer because the warm weather increases the total number of organisms in the water as well as the metabolic rate of the organisms. Additionally, oxygen is naturally more abundant in cold water than in warm water, thus the low capacity of oxygen and the high demand for oxygen leads to a very unstable environment.



Why do fish kills occur?

Different fish species and sizes have different tolerances to low dissolved oxygen (DO). Larger fish are much less tolerant of low DO than small fish, and will expire first. Coldwater fish do not tolerate low DO as well as warmwater fish. It is important to consider the stress level of the fish also, as stressed fish may succumb more easily to diseases and other toxicants in the water like unionized ammonia nitrogen. Fish kills can be devastating to fish populations, but rarely eliminate all fish in a pond. A good rule of thumb is that fish need at least 5 mg/L DO by using an aerator.

How can aeration help?

The main purpose of an aerator is to increase the surface area of the water in contact with the air so that gas exchange of oxygen, carbon dioxide, hydrogen sulfide and nitrogen gases can be either incorporated into the water (O_2) or toxicants (CO_2 , H_2S , and N_2) to be released from the water. Another benefit of aeration is that oxygen rich water can help bind phosphorus to the soil

sediments, thus making them unavailable for aquatic plant use, and decreasing the plant load in the pond.

Which aerator should I use?

Surface aerators usually utilize a propeller to force water up out of the water, and can draw water from approximately 6 feet below the surface. A small surface aerator will provide adequate aeration, and are the best choice for emergency aeration. Keep in mind that aquatic plants can clog and damage the propeller.



Above: Surface Aerator
Below: Diffuser

Diffusers consist of porous air stones connected to a pressurized air compressor, which bubble to the surface and carry water up from the bottom. Diffusers are used mainly to break stratification rather than oxygenate the water and are not as efficient at oxygen transfer as a surface aerator. However, diffusers may be a cost effective alternative to surface aerators because many diffuser air stones can be run off a single air compressor, and have no moving parts, so there are few issues that occur from aquatic plants.



When should I use aerators?

Floating aerators can be used as needed for oxygen supplementation as needed. Diffusers should be run constantly from May through September to avoid stratification. If stratification is broken during the summer, it may cause a 'turnover' or mixing of the upper and lower water column and cause oxygen depletion. Finally, aeration should always be available when using chemicals to treat aquatic plants. Killing off any plants can raise the biological oxygen demand of the water, and may cause fish kills. Aeration should begin before chemical treatment, and should be continued for a week or more (especially if it is hot and still) after treatment.

Additional references:

[Aquatic Pest Control](#)—A guide for Commercial Pesticide Applicators
[Iowa State University Fisheries Extension](#)
[North Central Regional Aquaculture Center](#)

Prepared by D. Allen Pattillo
Fisheries and Aquaculture Extension Specialist
Iowa State University, Ames, IA 50010
Contact at (515)294-8616 or pattillo@iastate.edu

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