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A Potential for Pond Problems **September 5, 2013**

Over the last several years, the biggest concern that most pond owners had was most likely low water levels because of prolonged drought. Lately, we've had plenty of rain and ponds are at full pool or overflowing, yet we still have several issues revolving around our farm ponds. There have been weed problems, algae blooms, and sporadic fish kills all summer. Some or all of these problems can be related to each other under certain conditions. Most often, the ultimate reason for the fish kill can be attributed to low dissolved oxygen (DO) levels.

Fish must obviously be able to breath in order to live, and they do this by absorbing oxygen directly from the water through their gills. For fish to survive, there must be adequate concentrations of oxygen dissolved in the pond water. Oxygen enters pond water through a few pathways: through direct diffusion, through wave and wind interactions, and through photosynthesis of aquatic plants and phytoplankton.

Oxygen produced by plants occurs primarily during the day, especially when sunlight is plentiful. Because of this, oxygen levels are usually their highest during the day. At night, respiration by plants and animals results in much lower oxygen levels during night and is often lowest early in the morning. When oxygen used exceeds oxygen produced, oxygen depletion occurs.

Oxygen depletion can result in fish kills. Most species of fish are stressed when DO levels fall to 2-4 Mg/L and mortality usually occurs at levels below 2 Mg/L. Larger fish are usually the first to succumb to critically low DO levels rather than smaller fish.

Oxygen depletion and subsequent fish kills can be a result of several factors, and can really occur at any time. However, oxygen depletion during summer time is very common. Cloudy weather (which we've had quite a bit of lately) can lead to less photosynthesis and lower oxygen production. Pond stratification and turnover may occur when large temperature differences between upper and lower parts of the pond cause a physical barrier preventing any mixing of waters and diffusion of oxygen in the pond. When a thunderstorm or other large disturbance in the pond occurs, the mixing of such drastically different oxygen saturated waters can result in quick and drastic oxygen depletion.

An overabundance of algae or plant life may die off, resulting in a lack of photosynthesis and a large oxygen reduction due to organic matter decomposition. Although plants and algae are the most important oxygen producers in a pond ecosystem, they can also be the most important oxygen user.

You can determine if low DO was a result of your fish kill by paying attention to some details. If many fish die at the same time (especially overnight or pre-dawn); large fish are more affected than small fish, fish are observed "gasping" for air at the pond surface; weather has been hot, still, or overcast or a severe thunderstorm has recently occurred; or a change in pond color (due to organic matter decomposition) can all be important clues to an oxygen depletion caused fish kill.

Immediate action to mitigate oxygen depletion or prevent a fish kill requires aeration of the pond. Although aeration is not an ultimate solution to the problems associated with low DO, it is the only method to quickly resolve potential problems. Common aerators include paddlewheel and pump-sprayers and are often powered by tractor PTO or electric motors. Aeration is most critical during late evening and before morning.

Fish kills can be a common occurrence during the summer. Sometimes a fish kill is just an indication of the pond finding a new balance in fish population. Ponds that are under-fished can also lead to over-populated ponds that can no longer support that much life. Proper pond management can help reduce the risk of fish kill, but even the best managed pond can suffer from low DO.