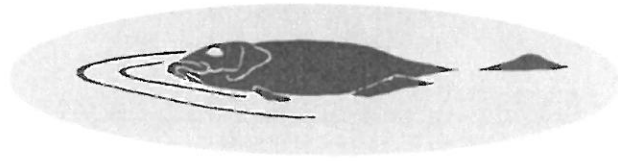


# Chapter 6: Pond Problems and Solutions



*Most pond problems can be prevented by proper pond construction, management, and maintenance. However, not all pond owners are lucky enough to have participated in the design and construction of their pond, or in its management and maintenance through the pond's entire history. Common pond problems include fish kills, undesirable fish, muddy water, pond leaks, and animal damage. Each of these problems has a solution that can put a pond back on track in almost every case.*

Ponds managed to provide good fishing need regular maintenance to prevent problems from developing. Minor pond related problems can usually be dealt with as they arise. However, major problems like fish kills often require additional effort. Common problems pond owners might encounter are addressed in this chapter. Having a thorough understanding of the conditions that lead to problems can help in preventing them before they start. Solutions to ongoing pond problems are also presented.

## Fish Kills

Most fish kills can be attributed to one of three major causes: 1) fish suffocation due to lack of oxygen, 2) poisoning, or 3) disease outbreak. In most cases, dead fish are the only sign of a problem. Unfortunately, little can be done to reverse a kill once it has started. This is why understanding and preventing pond conditions that increase the chances of a fish kill are so important.

Water quality testing can be useful in determining the cause of a fish kill if tests are run during or immediately after the kill. This is rarely practical since summerkills often go unnoticed for several days and winterkills may go unnoticed for several months. If a pond owner can document the general water quality and weather conditions during a fish kill, its cause can frequently be determined with reasonable accuracy.

Determining the cause of a fish kill is the best way to prevent future fish kills. Table 6.1 on pages 43 and 44 summarizes the symptoms, problems, and solutions to the most common types of fish kills.

**Fish Kills Due to Suffocation.** Ponds receive about 80 percent of their dissolved oxygen through plant photosynthesis. The rest of the dissolved oxygen is obtained by absorption through the water's surface caused by wind and wave action. A good supply of dissolved oxygen is necessary to support fish and other aquatic animals, but levels in a pond can vary greatly within a 24-hour period and throughout the year. The terms "winterkill" and "summerkill" are generally used to describe fish kills that result from critically low levels of dissolved oxygen in the water. Although the results of each type of kill are the same, understanding the differences between the two is the first step in prevention.

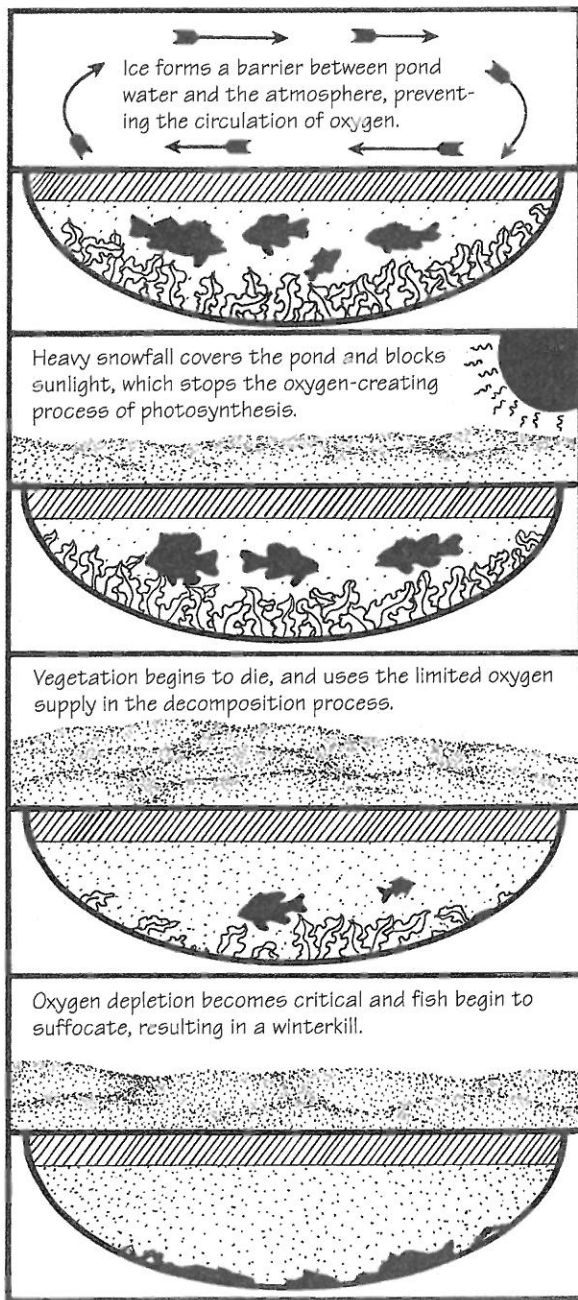
*Winterkill.* During severe Ohio winters, ice forms on ponds and creates a seal between the water and the atmosphere. This prevents a pond from obtaining dissolved oxygen from the atmosphere. At this point, photosynthesis by aquatic plants, the other pathway for dissolved oxygen to enter the pond, becomes even more important.

Clear ice or even cloudy ice allows enough sunlight penetration for plants to photosynthesize and produce sufficient dissolved oxygen to support fish. However, very little sunlight can reach the plants when ice becomes blanketed with snow. This reduces or stops photosynthesis and dissolved oxygen production. Under these conditions there is not enough dissolved oxygen produced during the day to compensate for normal daily uses by fish and other aquatic animals, aquatic plants, and bacteria. If this continues for an extended period of time, fish will eventually suffocate. Dissolved oxygen can become depleted within days or over the course of the entire winter depending on the severity of these conditions. The northern-most counties in Ohio are



susceptible to winter fish kills because of colder temperatures and more frequent snows. Winterkill is most common in shallow, nutrient rich ponds that have high accumulations of organic material.

#### The winterkill process.



**Summerkill.** As is the case with winter fish kills, summer fish kills can usually be attributed to a loss of dissolved oxygen that results in total or partial death of the pond's fish population. Summerkill is also most common in shallow ponds that are heavily vegetated and have high accumulations of decomposing organic matter. Four events, singly or in combination, can result

in the loss of dissolved oxygen in ponds and lead to summer kill: 1) cloudy, hot and still days in the heat of summer, 2) large-scale die-offs of tiny microscopic plants, or phytoplankton, 3) sudden thermal turnover or inversions caused by dramatic weather changes, and 4) chemical treatment of algae or aquatic weeds that result in excessive decay.

Cloudy weather during the heat of the summer can cause gradual reductions in the amount of dissolved oxygen in a pond. Under sunny conditions, ponds have the highest dissolved oxygen levels late in the afternoon following a long period of plant photosynthesis. During the night, oxygen production stops, but oxygen consumption continues, thereby reducing dissolved oxygen supplies that were "built up" during the day. When cloudy skies prevail for several days in a row, the rate of photosynthesis is reduced and a gradual reduction of dissolved oxygen results. These conditions are made worse by air and water temperatures greater than 80°F and calm winds that often prevail in July and August. These conditions set the stage for any event that would cause a further loss of dissolved oxygen.

Ponds that receive excessive amounts of phosphorus and nitrogen from the surrounding watershed can produce dense "blooms" of microscopic algae (phytoplankton). These blooms may give the water an appearance of pea soup or green paint floating at the surface. A sudden phytoplankton die-off and the decomposition of dead plankton that follows can reduce dissolved oxygen to levels lethal to fish.

Layers of pond water often stratify by temperature during the summer or winter. Water stratifies because water density differs according to temperature. Summer stratified ponds are characterized by having very warm surface waters that may be 10 to 15° F warmer than bottom water. The surface water usually has enough dissolved oxygen to support fish life. Bottom waters often have little or no oxygen because it is being used up by bacteria breaking down organic matter. This is especially true in heavily vegetated ponds. Once a pond is stratified, any event that causes the oxygen deficient bottom water to mix with the warmer surface water can result in a fish kill. Mixing of these layers during summer is most often caused by a thunderstorm that produces heavy cool rain and strong winds. The rapid inflow of cool surface runoff coupled with strong wind and wave action can lead to what is commonly referred to as an "inversion." Small ponds