CHAPTER 6
POND PROBLEMS & 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 than 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.

Pond snow removal

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 37 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.

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 (Figure 6.1). 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.

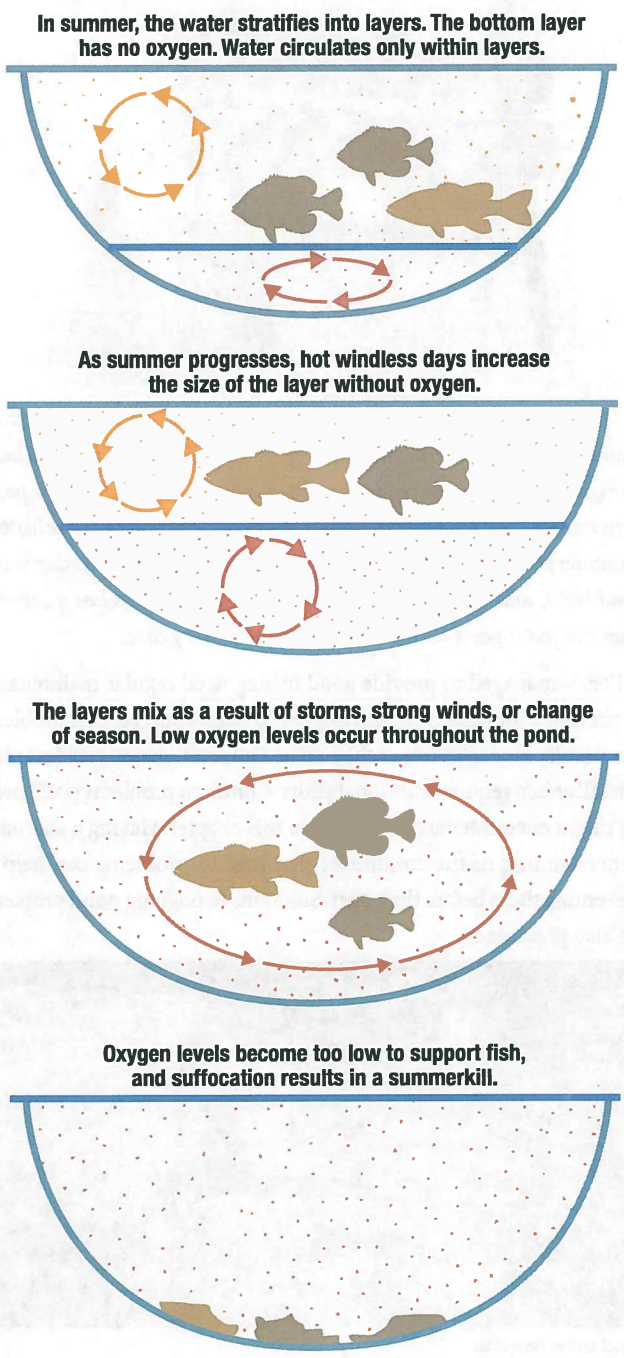
Cloudy weather during the heat of the summer can cause gradual reductions in the amount of dissolved oxygen in a pond. Under sunny conditions, ponds have the highest dissolved oxygen levels late in the afternoon following a long period of plant photosynthesis. During the night, oxygen production stops, 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 which have large watersheds with steep slopes can be especially susceptible to inversions because of high runoff rates.

Summerkills can also be caused by over-treating a pond with aquatic herbicides, or runoff of animal waste products into the pond. Treating ponds with aquatic herbicides to control nuisance vegetation can cause large amounts of decomposing plant matter, resulting in oxygen deficiencies. Chapter 4 describes uses and precautions for application of aquatic herbicides. Another factor is waste products from livestock, which can overfertilize a pond and cause dense blooms of undesirable algae. Large-scale die-offs of these algae can trigger summerkill.

FIGURE 6.1 THE SUMMERKILL PROCESS



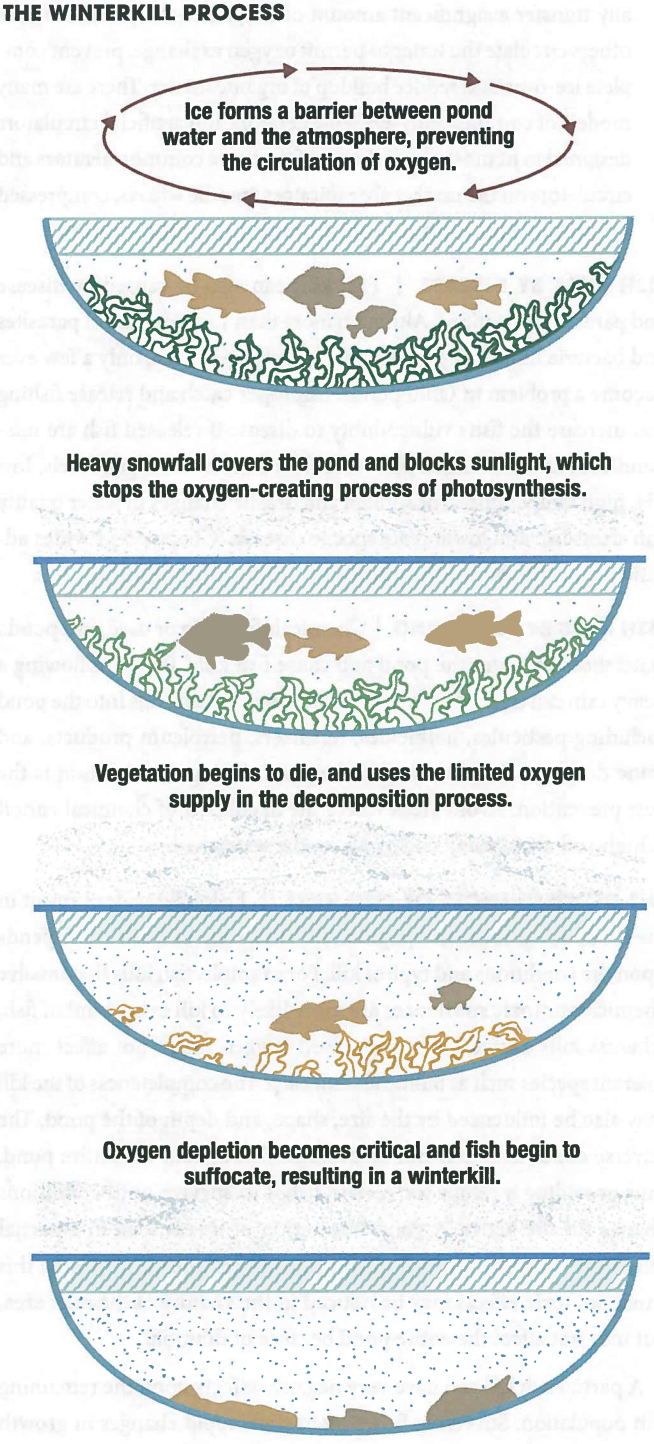
WINTERKILL | During severe Ohio winters, ice forms on ponds and creates a seal between the water and the atmosphere (Figure 6.2). This prevents a pond from obtaining dissolved oxygen from the atmosphere. At this point, photosynthesis by aquatic plants, the other pathway for dissolved oxygen to enter 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 during the course of the entire winter depending on the severity of these conditions. The northernmost 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.

Reducing Winterkill and Summerkill / The single most important preventative measure that can be taken to prevent winterkill and summerkill is proper pond construction. Ponds should be constructed at least 8 to 10 feet deep and have a 3:1 shoreline slope to prevent excessive growth of aquatic vegetation (Chapter 1). Unfortunately, pond owners are often living with the consequences of a previous owner's pond design. Small shallow ponds that lose fish frequently may be better off managed as wetlands for wildlife rather than fishing. Managing these ponds for fishing by repetitive stocking is expensive and unproductive. In some cases, the likelihood of fish kills can be reduced by diligent snow removal or artificial aeration.

The most practical method to increase oxygen production and prevent winterkill is snow removal. Snow accumulations of less than 2 inches usually melt soon after a storm passes and do not warrant removal. However, heavy snowfall accumulations that persist should be removed as soon as possible. Removal of at least 30 percent of the snow usually provides adequate light transmission. Pond owners should concentrate on removal in shoreline areas if only a portion of the pond is to be cleared.

FIGURE 6.2 THE WINTERKILL PROCESS



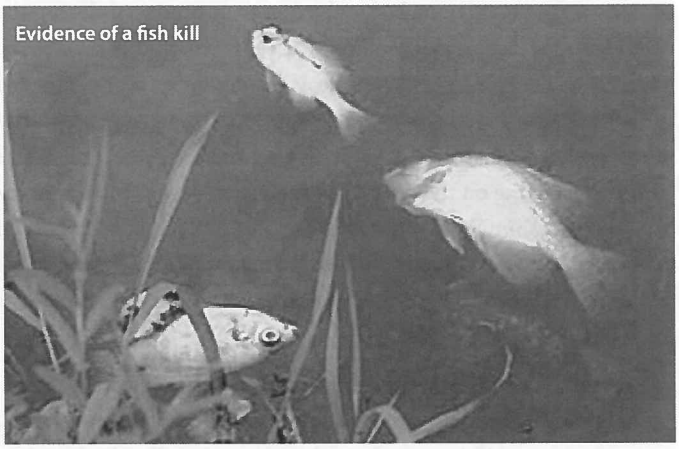
Commercially available aeration and circulation systems can be used to prevent both winterkill and summerkill. Some systems actually transfer a significant amount of oxygen to the pond, whereas others circulate the water to permit oxygen exchange, prevent complete ice-over, and reduce buildup of organic matter. There are many models of commercially available aerators and artificial circulators designed to fit most ponds. Some of the more common aerators and circulators on the market are aspirators, paddle wheels, compressed air injectors, fountain aerators, and wind-powered aerators.

FISH KILLS BY DISEASE | Fish kills can also be caused by disease and parasite infestations. Although more than 1,000 species of parasites and bacteria inhabit the freshwater of North America, only a few ever become a problem in Ohio ponds. Improper catch and release fishing can increase the fish's vulnerability to disease if released fish are mishandled. Also, prolonged periods of low dissolved oxygen levels, low pH, high temperatures, or sudden and drastic changes in water quality can stress fish and lower resistance to disease. Chapter 5 provides additional details about fish diseases.

FISH KILLS BY POISONING | Chemicals found in or used on a pond's watershed can enter the pond and cause fish kills. Runoff following a heavy rain can transport a variety of unwanted chemicals into the pond including pesticides, herbicides, fertilizers, petroleum products, and mine drainage. Proper siting of the pond during construction is the best prevention. Avoid areas where the likelihood of chemical runoff is high and avoid using chemicals on the watershed.

THE CONSEQUENCES OF FISH KILLS | Fish kills seldom result in the death of the entire fish population. The extent of a fish kill depends upon the conditions and type of kill. For example, fish kills that involve chemicals or toxic substances are more likely to kill every kind of fish, whereas kills caused by low dissolved oxygen might not affect more tolerant species such as bullheads and carp. The completeness of the kill may also be influenced by the size, shape, and depth of the pond. The adverse conditions may not be uniform throughout the entire pond, thus providing a refuge for certain fishes to survive until conditions change for the better. A good illustration of this is seen in a partial kill caused by pesticide or fertilizer run-off from nearby fields. In this situation, toxic effects may be noticed in the vicinity of the inlet area, but may not affect the entire pond because of dilution.

A partial fish kill can have very negative effects upon the remaining fish population. Surviving fishes often show rapid changes in growth and the remaining population may not easily return to the desired level for fishing. In addition, if undesirable fishes were present, they may overpopulate the pond due to reduced competition and lack of predation from largemouth bass. These examples indicate some of the problems that develop from drastic changes in the type of fishes present and their relative abundance after a partial fish kill. Ponds that have experienced a partial fish kill may not readily return to producing satisfactory fishing unless corrective measures are taken. In some situations, it may be best if the entire fish population was killed to allow a complete restocking.


Evidence of a fish kill

Undesirable Fish

It is not unusual for fishes other than the kinds stocked to show up in a pond. Simply not releasing these back into the pond may be all the control that is necessary. Undesirable fishes become a problem when they become abundant enough to affect water quality or ruin fishing for preferred fish. When this happens, the pond owner has little choice other than to literally start over. Draining the pond or chemical eradication of the entire fish population are recommended if undesirable types of fish become a problem. The pond can be drained completely if an outlet structure exists, or pumped dry. After draining, allow the bottom a few weeks to dry before refilling. Chemical treatment becomes necessary when the pond cannot be drained. Five percent emulsified, or 2.5 percent synergized rotenone is effective in killing undesirable fishes. **Prior to treatment, a permit from the Ohio EPA is required if the pond has an outflow into public waters. Rotenone is a restricted chemical, so only licensed, certified applicators can use it to treat ponds.**