HEAT, DROUGHT AND OTHER PROBLEMS

Continued drought and high temperatures can become critical to both commercial fish producers and sportfish pond managers.

As ponds lose water, the fish become more crowded and confined in a smaller volume of water and are stressed. Adding to this stress is the deterioration of water quality as water evaporates from the pond. Evaporation concentrates waste metabolites in the water like ammonia, carbon dioxide, and nitrites. Increased concentrations of these metabolites can stress or kill fish outright.

There is also a bigger problem facing a pond manager--oxygen depletion! As fish and other aquatic organisms are crowded into an increasingly smaller volume of water, the less the total amount of oxygen there is for fish to breathe. Adding insult to injury, the warmer the water, the less dissolved oxygen it can hold. For example, at 77°F, dissolved oxygen saturation in water is 8.11 parts per million; and at 95°F, it is 7.04 parts per million. Assume a 3 acre pond with an average depth of 4 feet (3 acres x 4 feet = 12 acre-feet) at normal water level last spring had 1500 lbs of fish. If the water temperature was 77°F and if the water was saturated with oxygen, there would have been 264.7 pounds of oxygen available for the fish to breath.

Assume this same pond this summer has a surface acreage of 1.5 and an average depth of 2-feet (3 acre-feet of water) and still is supporting 1500 pounds of fish. If the water temperature now is 95°F and if the water is saturated with oxygen, there would be only 57.5 pounds of oxygen available to the fish.

The ideal (but unfortunately least available) solution to most pond owners is to refill the pond. Otherwise, he must be prepared to treat the pond for an oxygen depletion. The most effective treatment is mechanical aeration of the water. There are a number of ways the water can be aerated mechanically. Whichever method is used, the sooner it is applied and the larger the volume of water sprayed or agitated per unit of time, and if a current is established, the more effective it will be. If mechanical aeration is used, it is important not to disturb the bottom mud. Bottom mud contains a large amount of organic material and decomposing bacteria that will contribute to oxygen depletion problems if mixed with water. If mechanical aerators cannot be used continuously, they should at least be operated during the hours before sunrise.

1. Large Volume Pumps - Any large volume pump can be used to aerate a pond. Ideally the pump should be set up so that it creates a current and at the same time blows or sprays water across the pond surface.

2. Bushhog Mower - Bushhog mowers can also be used to aerate a pond. Essentially, they are backed into the water and the mower blade is used to circulate the water.

3. Outboard Motors - Outboard motors also produce current if run in a fixed position. However, driving a boat in the pond in order to stir the water is practically useless.
4. Chemical Measures - chemical measures can also be used in the emergency treatment of a pond. However, chemicals are not as effective as mechanical aeration or flushing the pond with aerated water. Chemicals are listed below in their relative order of effectiveness. Anyone of these treatments will help during an oxygen depletion, but best results are achieved when they are used in combination.

a. Treat water with 6 to 8 pounds of potassium permanganate per acre-foot as soon as the problem is observed. Treat again at one-half the above rate if the purple color disappears in one hour.

b. About midday add 50-100 pounds of triple super phosphate per surface acre. A thorough phosphate fertilizer promotes oxygen production, it is not wise to use them if excessive plant growth has caused the oxygen depletion.

c. At dusk add 50 pounds of builder’s hydrated lime per surface acre. Hydrated lime will remove any accumulated carbon dioxide in the water and allow the fish to better utilize the remaining oxygen.

SIGNS OF AN OXYGEN DEPLETION

One or a combination of the following observations often indicates an oxygen depletion may be about to occur:

1. Fish suddenly stop feeding.
2. Fish at the surface in the early morning but return to deeper water later in the day.
3. Water rapidly changes color, usually brown, black, or gray.
4. ‘Me pond suddenly has a putrid odor.
5. A depletion of the green algae bloom.
6. Extended periods of hot, overcast weather.
7. The period following a heavy, summer rainstorm.

CRITICAL MONTHS FOR OXYGEN DEPLETION

Oxygen depletion is the most common cause of fish kills in ponds. They can occur from April through November, but are most common in July, August and September. The weather during these critical months can trigger an oxygen depletion.

During the critical months, be aware of local weather conditions and look at your pond frequently. There are several signs of a developing oxygen problem: (1) fish swim at the surface and gulp; (2) fish stop feeding; (3) rapid change of water color from bright green to brown. Oxygen is at the lowest daily level at dawn. If oxygen has not depleted to a lethal level, fish are
at the surface early in the morning but return to deeper water as oxygen builds up during the day. This may occur several
days before fish begin to die. Check a pond at dawn. If signs of an oxygen depletion occur, take immediate corrective action.

Any form of mechanical aeration of the water is best. The larger the volume of water aerated in the shortest amount of time
is most effective.

If an irrigation pump is used, set the intake 2 to 3 feet deep. Do not set it deeper. Water below this depth may be stagnant
and make the problem worse. **Spray the water at least 4 feet** into the air and allow it to fall back into the pond. The more
the spray is broken up, the more oxygen will increase. **It may be necessary to aerate during the next few nights to prevent**
reoccurrence of the oxygen depletion.

**BUYING TIME**

Although looking for and being prepared to treat for oxygen depletion is the most important step a pond owner can take in
the management of a drought affected pond, there are some other things he can do to decrease the chances of a fish kill.

1. Keep cows and other livestock from having direct access to the pond. Livestock wading the pond will muddy the water and
further stress the fish. Also, their manure will contribute to an oxygen depletion problem.

2. Do not apply herbicides to the pond. High water temperature and decreasing water volume will increase the chances for an
oxygen depletion as a result of plant decaying.

3. Thin out the existing fish population.

4. Fertility influences dissolved oxygen production and consumption in farm ponds. The two primary sources of dissolved
oxygen are photosynthesis from green plants and diffusion from the air. The green "bloom" characteristic of fertilized ponds
is due to the abundance of microscopic green plants (phytoplankton). These phytoplankters, like other green plants, produce
oxygen in the presence of light but use oxygen when there is no light. Under "normal" conditions, dissolved oxygen
concentrations in a farm pond will reach a state of balance with phytoplankters producing as much oxygen as they use. This
often results in wide daily fluctuations of dissolved oxygen with very high concentrations during the late afternoon and low
concentrations just after dawn. Problems are likely to occur when, because of cloudy weather and reduced sunlight,
phytoplankters use more oxygen than they produce. The problem is compounded by reduced water levels and higher water
temperatures. Warmer water contains less dissolved oxygen; and if the same amount of nutrients are present in a reduced
volume of water, the nutrients will support more phytoplankters. Very fertile waters are more likely to experience oxygen
depletions during summer drought conditions.

Because of the dangers of oxygen depletion, pond owners should consider reducing or ceasing fertilization during low water
and extremely hot conditions. At the very least, normal fertilization programs should be reduced.
HOW MUCH RAIN IS NEEDED TO REFILL AN IMPOUNDMENT?

This is a difficult question to answer. The amount of rain needed to refill an impoundment depends upon the size and type of watershed and the amount and rate of rainfall. It is our best guess, but even with average spring rains, some impoundments will not refill by summer. To illustrate this point, let's assume we have a 2.5 acre pond with a woodland watershed of 30 acres. The present water level is 24 inches below normal. It would take the equivalence of a two inch rain and 100 percent of this water entering the pond from the watershed to refill it. However, not all of the water from this rain would enter the pond. The amount of water a pond receives after a rain depends primarily upon how much is absorbed by the soil and the amount and type of vegetative cover on the watershed. Assuming a two inch rain in a 24 hour period, only a tenth to one half inch of that rain will run off the watershed.

Thus, it would take somewhere between four and 20 rainfalls of two inches in a 24 hour period to refill the pond in this example. To refill the pond after one 24 hour rainfall it would require a four to ten inch rain.

DROUGHT AND LEAKY PONDS

If your pond has lost a considerable amount of water, be certain that a leak in the pond has not aggravated the problem. If you suspect your pond is leaking water, contact your county Soil Conservation Service office. They can help you evaluate the problem and suggest corrective measures.

LOW WATER LEVELS AND WEED PROBLEMS

Many ponds have had declining water levels since early summer. In some of these ponds, weeds have established on the exposed mud bottom. These weeds can be a potential problem when the pond refills. If at all practical, these weeds should be burned this winter. If burning is not possible, mowing and/or disking of this area should be considered. Any woody plants that have established on the exposed pond bottom should be treated this winter with a herbicide. Your county Extension agent can advise you on herbicide controls of woody plants.

EFFECTS OF LOW WATER ON FISH POPULATIONS

Depending upon the time of year, low water levels can have various effects upon a fish population. In the fall and winter months, moderately low water levels can benefit a fish population. Decreasing water levels force young bream out into open water making them easy prey for bass. A fall-winter drawdown can be used to correct a mildly overcrowded bream population. In itself, low water levels in the spring may not affect a fish population. However, if heavy rains refill the pond while bass are on the spawning beds, it may force them to abandon their nests. The eggs on the nest will silt over or be consumed by predators. Refilling of the pond shortly after the newly hatched bass leave the nest may provide additional food and cover and be a benefit to the fish population. Declining water levels during the summer months can severely stress fish and sometimes result in a fish kill.