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To: Rains County Leader

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My Fish Have Died, What Caused the Problem?

Every year I get numerous phone calls from East Texas pond owners who lose part or all of their farm pond fish population due to an oxygen depletion. Oxygen depletion are not the only cause of fish die-offs in Texas ponds, but about 85% of the time it is the most common cause of fish kills. Pond owners should be aware of the causes, signs and corrective measures to lessen the likelihood of experiencing oxygen depletions.

There are many factors or combinations of factors that can contribute to oxygen depletion. The most common factors (not all of which can be controlled by the pond owner) which account for the majority of oxygen depletions in Texas farm ponds are as follows:

(1) SEASON - Most oxygen depletions occur in warm weather, usually June-September. Warm water holds less oxygen than does cool water. In addition, fish experience a faster metabolic rate as water temperature increases, therefore their requirement for oxygen increases. As a result, more oxygen is needed by the fish during a season when less is available. The fish are therefore more likely to become stressed during the warmer months.

(2) WEATHER CONDITIONS - Sunlight is necessary for phytoplankton to produce oxygen through photosynthesis. Several cloudy days in succession will limit photosynthesis, which then decreases oxygen production. If the cloud cover is accompanied by hot, still weather, conditions continue to worsen. The oxygen demand by fish and plants can exceed the rate oxygen is replaced so conditions become conducive for a depletion to occur. Another weather condition conducive to oxygen depletion is cold wind and/or rain during the summer. Usually, ponds are stratified during the summer season, with a warm oxygen-rich layer of water near the surface and a cooler oxygen-deficient layer of water on the bottom. Cold wind and/or rain cause these two

layers to mix rapidly, resulting in the breakdown of organic material present on the bottom. This process removes oxygen that would normally be available for fish to utilize

(3) EXCEEDING THE CARRYING CAPACITY OF THE POND -This simply means too many pounds of fish in too little water. A pond is just like a pasture. It has a carrying capacity.

A good rule of thumb is to never exceed 1000 pounds of fish per surface acre (the key words are 1000 lbs per *surface acre*) during the warm months. This will seldom be a problem except in some ponds that are heavily stocked with catfish being intensively fed. It is not implied that a die-off due to low oxygen cannot occur in a pond with only 50 pounds of fish/surface acre, but high pounds increase the risk and warrant closer attention by the pond owner. A rate of 1000 fish/surface acre does not have to be stocked in order to feed every day. This figure is a maximum which should not be utilized unless the pond owner has (1) use for large poundage of fish, or (2) the pond can be efficiently harvested (seined) to crop off a portion of the population present.

It is doubtful that a pond owner, who stocked 1000 fish/surface acre in a pond that can't be seined, could harvest enough fish after the first growing season to prevent going over the 1000 pounds/surface acre rule of thumb. The answer is not to stop feeding to slow weight gain, but rather to stock fewer fish so the pond owner's needs and desires can still be met.

Pond owners contribute to overcrowding by encouraging mature catfish to spawn. This is not a good idea unless predator species are present or the resulting hatch can be transferred to another pond. In ponds where natural spawning cover is available, attempts should be made to harvest fish before they reach maturity (three years of age).

Pond owners should also keep in mind the lowest water level their ponds reach during a typical summer. If the pond is one surface acre when full (or during the wet season), but only one-half surface acre during the summer, the pond should be stocked for one-half surface acre. This will help prevent crowding of fish during dry weather.

(4) IMPROPER AQUATIC WEED CONTROL -Most pond owners wait until aquatic weeds hamper recreational activities before they decide to make herbicide applications. This is usually too late! Herbicides should be applied when new growth begins, usually April or May for most submersed plant species. Better control will be gained at that time than when the plants mature in July and August.

Treated aquatic weeds sink to the bottom and decay. Remember that this decomposition process removes oxygen and if the treatments are made when water temperatures have peaked, oxygen content is already marginal.

If a heavy enough growth of weeds is killed in a short period of time (single application) during the warm months, then oxygen depletion is likely to occur. A pond that must be treated in late summer should be treated in three or four different sections, a week or so

apart. The herbicide you choose should be in a formulation that lends itself to the sectional or spot treatment mentioned for summer applications if fish are an important resource. Also, never use a herbicide that does not have a label for aquatic use, as this can further complicate matters.

(5) OVERFEEDING/OVER FERTILIZATION-Occasionally ponds become “too rich” due to an overabundance of nutrients available for excessive phytoplankton growth. The sources of these nutrients are usually waste products from the fish, over-fertilization, and/or decaying uneaten feed. A deep green or blue-green color often develops as a result. To prevent overfeeding, give the fish 3% of their body weight per feeding. If this cannot be easily calculated, feed only what the fish will clean up in 15 minutes (not to exceed 15-18 pounds of feed/surface acre). A floating ration is recommended throughout the year so observation of the fish during feeding is possible. On days when fish are “off feed” (due to weather changes, etc.) a small portion of feed can be applied to determine if feeding will take place. If no feeding occurs, feed is not wasted and water quality deteriorated.

Rapid growth of phytoplankton can result from nutrient overabundance, but the sudden die-off of these plants (often due to cloudy weather conditions) will remove oxygen from the water similar to the decay of herbicide-treated aquatic plants. The resulting removal of oxygen is often great enough to cause fish die-offs.

So, how do you correct for low oxygen? Here are some suggestions from Dr. Billy Higginbotham, Extension Fisheries Specialist with Texas A&M AgriLife Extension Service:

- 1) Reduce the fish load present to well below 1,000 lbs of fish/acre,
- 2) Aerate by backing a boat on a trailer into the pond and running the motor in a fixed position to circulate the water and increase oxygen,
- 3) Add fresh well water, but aerate it well before it enters the pond, and
- 4) Circulate water with a pump, but set the intake near the pond surface (pumping water off the pond bottom and spraying it back over the surface only compounds the problem!).