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Managing Fish Ponds During a Drought

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Drought can have devastating effects on fish ponds if they have not been designed with dry weather in mind. However, several measures can be taken to reduce the effects of drought while waiting for wetter times.

Pond Design Questions

Designing a pond to hold water and keep a high water level involves soils, compaction, watershed area, water source, and pond depth.

Watershed Ponds

1. *Soils for pond construction* - Contain at least 25 percent clay, no gravel or rock out-cropping.
2. *Compaction* - Clay cores for dams must be compacted properly. Pond bottoms should also be examined for sand, gravel, or rock that may promote seepage from the pond.
3. *Watershed area* - Generally, in Georgia, 10 acres of watershed are required for each acre of pond.
4. *Water source* - Supplemental water can be obtained from nearby springs, streams, or wells. Water withdrawal permits may be required.
5. *Pond depth* - Allow for at least two feet of water loss from evaporation and seepage during the drought, and plan on a minimum depth of three feet of water during the drought for a minimum of five feet total depth.

Excavated Ponds

These ponds are dug into the ground to a point below the water table and allowed to fill as the ground water seeps back into the pond. No compaction is practiced when building these ponds. The soils of these ponds usually contain sand or gravel and do not retain water. The water level is determined by fluctuations in the ground water level at the pond location. During a drought, many of these ponds lose most or all of their water. Fish should be harvested before the pond depth falls below three feet. If the pond bottom is too rough to allow seining, harvest the fish by trapping or by hook and line. In some cases, these ponds are dug deeper during dry seasons, but there is a practical limit to deepening a dug pond. Ponds that are excavated to great depths may be hard to approach from the shore, due to steep banks.

Pond Water Level

During a drought, pond water levels continue to drop, exposing the shoreline and reducing pond volume. The combination of these events causes fish crowding and encourages aquatic plant growth. Fish harvest should be increased as the drought begins. If you and your family are not able to make more frequent and longer fishing visits to the pond, invite others to catch fish. Additional fish, particularly catfish, can be caught using traps or trot lines. Your goal should be to remove as many large catfish as possible, catch at least 50 pounds of bream per acre, and catch an additional five pounds of largemouth bass per acre than you would normally.

Aquatic plants begin growth in shallow water. Properly constructed ponds have little, if any, area that is less than thee feet deep. However, drought

conditions create shallow areas where plants can get access to the light they need to grow. Because plants grow quickly in warm water, you should have an aquatic plant management plan in place before the drought progresses very long. If grass carp are not already in the pond, stock at least five per acre using the sterile triploid, in Georgia. As plants begin to grow, contact your local Cooperative Extension Agent for the proper herbicide to control the specific plants.

Aeration and Pond Oxygen

As the drought progresses, the danger of oxygen depletion in the pond water increases. Warm water holds less oxygen than cool water. Algae and aquatic plants become more abundant in warm, low water. Although plants produce oxygen during daylight hours, they consume oxygen at night and during cloudy weather. Sunlight, when intense, may cause algal blooms to die, creating oxygen depletion.

Aeration devices can protect fish in ponds during a drought. The simple solution is to purchase an electric aerator that provides about 3/4 horsepower of efficient aeration per acre of pond area. Operate the aerator as needed or by timer set to operate during the night. Other aeration solutions may include pumps, bush hog mowers, and outboard motors. Pumps can be used to circulate pond water and the water can be splashed over a diffuser to increase the oxygen content. Remember that a drop of at least two feet, from the diffuser to the pond water, is needed to allow time for the water to pick up oxygen from the air. Pumps are efficient in moving water, but usually move less water per horsepower than pond aerators do (a 3/4 HP pump may move 50 gpm but a 3/4 HP aerator may move 400 gpm). So, use a pump to create a sanctuary area for fish to gather rather than to try to aerate the entire pond. Bush hogs and outboard motors can be carefully positioned to stir and splash pond water. However, use these methods only in dire emergency and use safety precautions. Driving boats or jet skis in open water causes less positive effect than operating them in a stationary position.

Warning Signs for Oxygen Depletions

1. Check the pond the first thing in the morning. This is the time of lowest dissolved oxygen.
2. Watch for a change in pond color. A change from green to brown or grey may indicate that the algae has died and an oxygen depletion will occur in 24 to 48 hours.
3. Cloudy weather reduces the amount of light available for oxygen production from plants. Two or three days of cloudy weather may cause an oxygen depletion the following day.
4. High winds may cause shallow ponds to “turn over” and mix low oxygen water throughout the pond water column. This is especially dangerous when dense blooms of algae are present.
5. When fish are being fed a floating pellet, they stop feeding when oxygen is low. Watch your fish feeding behavior for signs of low oxygen or fish disease.
6. Fish will come to the surface in the morning and gulp air when an oxygen depletion is beginning. Take action to aerate the pond immediately.

Muddy Ponds

Wind action creates waves that erode exposed shoreline and mix soil with pond water. Muddy water changes the food web in ponds in a way that reduces the productivity of the pond. Fish that are dependent on the algae bloom will not grow as well in muddy ponds. Dissolved oxygen will be lower in muddy ponds. Ammonia and nitrite may accumulate in muddy ponds due to the absence of algae that use these sources of nitrogen and convert them to a non-toxic form. Bacterial pathogens and protozoan pathogens can use the suspended soil particles as a sheltered place to multiply to levels that may cause fish diseases. Therefore, muddy water should be cleared up, if possible.

Muddy water is caused by suspended clay or silica in most cases. The suspended particles have an electrical charge that keeps them from attracting each other and becoming heavy enough to sink to the pond bottom. Control of muddy water involves the management of the electrical charge on the surface of suspended particles. Alum, gypsum, and organic material have been used successfully to change the pH of water and thereby change the electrical charge on the surface of suspended particles. Agricultural lime and hydrated lime have also been used. More recently, polymers and iron chloride have been used to reduce turbidity. Alum is the best among practical methods for muddy water control in ponds. However, the pond water becomes very acidic, even if temporarily, when alum is added. Therefore, a combination of alum and hydrated lime treatment can be made which allows settling of suspended particles, but also prevents acidic conditions in the pond water. A variety of muddy water treatments are presented in Table 1.

Fertilization and Feeding During Drought

Nutrients added by fertilizer and feeding may increase the danger of oxygen depletion during a drought. Therefore, fertilization programs should be cut back, using care to keep pond visibility just under 18 inches. Restricting feed to fish is helpful to reduce the danger of oxygen depletion. A rule of thumb is to feed less than 30 pounds of feed per acre per day. As pond size and volume become smaller during the drought, remember to cut back on feeding. Also, as fish are harvested, the total weight of fish in the pond is reduced, and the feeding rate should also be reduced. Carnivorous fish will benefit from the smaller pond volume when forage fish become easier to catch. However, if aquatic weeds are allowed to grow, forage fish will be more difficult to catch.

Fish Diseases

Drought conditions increase the danger from some fish diseases. Diseases of warm temperatures include *Columnaris*, *Aeromonas*, ESC, and viral diseases. Any stressor will make these diseases more likely to occur. Parasitic diseases including gill parasites and grubs may become a problem as fish are crowded into smaller pond volumes and predators visit the pond, bringing disease with them.

Columnaris disease is more frequent above 70 degrees F than at lower temperatures. This bacteria is present in the soils of most ponds and becomes pathogenic when fish are stressed or crowded. Pond pH may be increased by liming to make *Columnaris* infections less dangerous. Avoid moving fish in hot weather to prevent stress. If fish must be moved, use calcium chloride, calcium carbonate, or sodium chloride to harden the fish before transport. Feed a medicated feed at the first signs of columnaris infection.

Other soil-borne bacteria belong to the genus *Aeromonas*. This is a disease of overcrowded fish populations and occurs as a result of stress to the fish. A partial oxygen depletion is often the cause for *Aeromonas* infection. If *Aeromonas* is observed in catfish, feed Romet medicated feed immediately, as many Terramycin-resistant strains of *Aeromonas* exist. It is important to feed medicated feeds for the speci-

Table 1. Treatments for muddy pond water.

Substance	Treatment Rate	Comments
Alum + Hydrated Lime	200 lb: 50 lb per Surface Acre	Alum may be expensive and hard to locate. Apply uniformly to pond surface.
Gypsum + Hydrated Lime	500 lb: 50 lb per Surface Acre	Add lime first then gypsum and repeat gypsum application if needed.
Hay bales	500 lb per Surface Acre	Fix bales in place in shallow water and remove after water clears to avoid oxygen depletion.
Cotton Seed Meal	75 lb per Acre-foot of Water	May need to repeat to clear water. **May promote filamentous algae growth or cause oxygen depletion.**
Chicken Litter	2,000 lb per Surface Acre	Repeat to clear water. **May promote filamentous algae growth or cause oxygen depletion.**

Note: *The danger of dissolved oxygen depletion caused by some treatments may prevent their use during a drought, when the danger of dissolved oxygen depletion is already high.*

fied time at a quantity that will deliver the proper dose to the fish. If you are currently restricting feed to your fish, you should increase the feeding rate to the amount that the fish will consume in 20 to 30 minutes when feeding medicated feed.

ESC, or Enteric Septicemia of Catfish, is caused by *Edwardsiella ictalluri*, a bacteria that is carried by most catfish in the U.S. Most ESC infections occur between 75 and 82 degrees F and are the result of a stressor. Common stressors in ESC infections are low dissolved oxygen or a rapid change in temperature. Romet medicated feed may be a possible treatment for ESC, but a new antibiotic, Aquaflor, can be prescribed for this disease in catfish. So far, Aquaflor has had limited use in Georgia to large commercial catfish operations.

Channel catfish virus, like ESC, is carried by most catfish populations in the U.S. However, resistance to the disease has apparently developed over time. It is less common in Georgia than it once was. Now, severe stress to populations of catfish fingerlings may cause the disease. If catfish develop swollen bellies and pop-eyes, you may suspect channel catfish virus. Water temperature above 77 degrees F increase the frequency of channel catfish virus epizootics. Other viruses infect large mouth bass and catfish, but are more uncommon.

Shallow water and crowded fish attract wading birds and other wildlife that may be vectors for diseases. Yellow grub infestations have increased in Georgia over the past few years, possibly due to summer drought conditions. Controlling access to predators and controlling snails in ponds may prevent sever infestation by yellow grub. The practice of including the red ear sunfish as one of the bream species when stocking ponds may help reduce the danger of grub infestation. Red ear sunfish eat snails and other pond invertebrates that are vectors to disease.

Make Careful Observations

Take time to watch your pond on a daily basis, if possible. Drought will cause the pond to change. A quick reaction to the change may allow you to save your fish or reduce the cost of a treatment. Remember that the water will be hot, and heat makes everything happen faster in ponds. Plan ahead so that you know what to do when a problem is identified.

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