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Fisheries Survey Report for Peach Creek Crossing Prepared by Matthew Ward and Keith Kutac

This is the summary and analysis of the fisheries survey we conducted at Peach Creek Crossing on the 20th of October, 2009. The pond we surveyed was quite shallow with a maximum depth of six feet. Electrofishing revealed three species of fish: bluegill, hybrid bluegill, and largemouth bass. Generally speaking the lake is overpopulated with thin bass. Vegetation coverage was excessive with large mats of water primrose extending across the pond.

Observations:

During our visit the pond was about 20 inches low having dropped 20 inches in less than a week. We were also informed that the pond had been a total of about five feet low during the summer drought. Using sonar and a long pole we surveyed the depths of the lake and produced a rough sketch of your pond (see figure 1). Aerial map surveys revealed the pond to be 1.1 acre in size (when full).

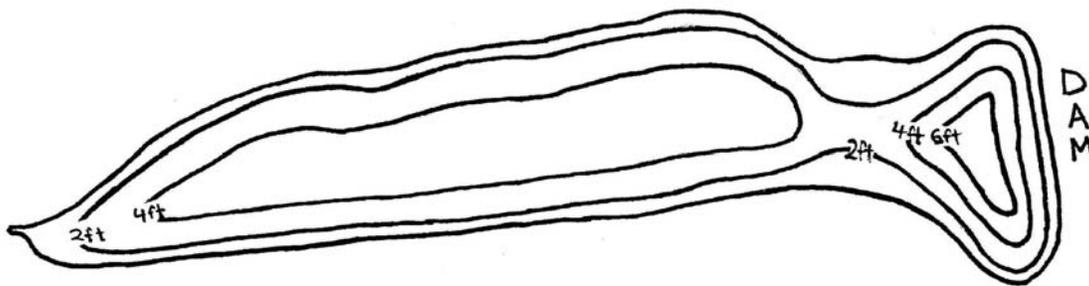


Figure 1: Depth contour chart of Peach Creek Crossing's community pond

Water quality analysis was conducted as part of our survey. pH, alkalinity, and phosphate readings were taken (see table 1).

Table 1: Water Quality Analysis

Parameter Measured	Value Obtained
<i>pH</i>	7.5
<i>alkalinity</i>	50 ppm
<i>phosphate</i>	.9 ppm

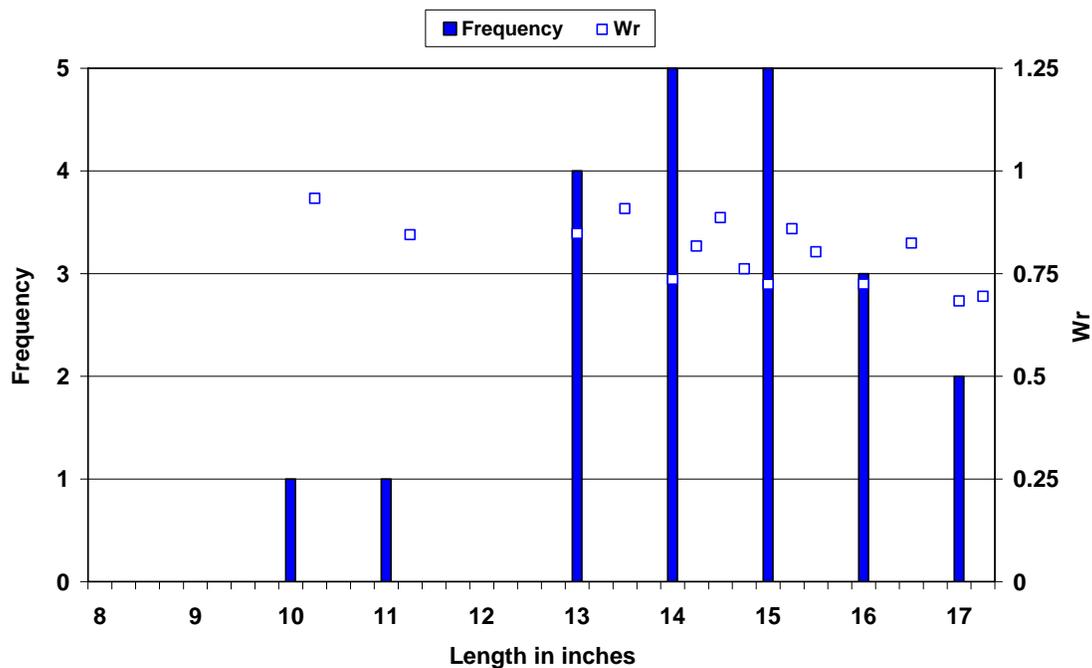
At the time of our survey your lake was experiencing a significant planktonic bloom with visibility at 20 inches. The water color observed also indicated the presence of some tannic acid (generated from vegetation decomposition).

Vegetation coverage was in excess of 20%. Vegetation observed included water primrose and duckweed.

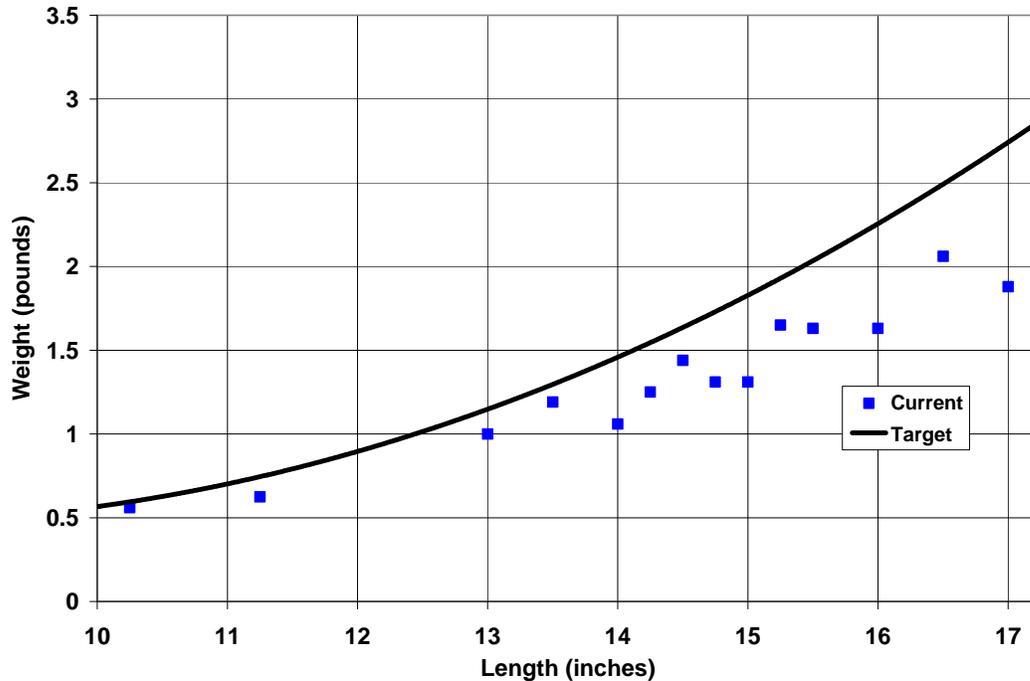
Baitfish populations were generally low and consisted solely of two species of sunfish. Hybrid sunfish were generally large (greater than 4" in length). Bluegill were generally smaller with individuals of up to 4" observed.

Our survey yielded 21 bass to 17.25" in length. During our survey we recorded weights and lengths on all bass captured and determined the bass Wr's. Wr, or relative weight is the weight of a given bass of determined length divided by the weight of an ideal bass of the same length. Wr is used to determine the relative health of your bass. A Wr of 1.0 means that a given fish is exactly the weight it should be. A Wr of 0.8 means that a given bass weighs just 80% of what it should. In other words this bass is 20% underweight. Your bass' average Wr is 0.8 meaning your fish are 20% underweight. Graph 1 shows bass length frequency and Wr for each length class measured. Graph 2 shows weights and lengths of your bass as compared to ideal values of the same. We did not find any catfish during our survey. This being said, our equipment is not designed specifically for shocking catfish and so some catfish may still exist in the pond.

Graph 1: Large Mouth Bass Frequency with Wr



Graph 2: Largemouth Bass Length vs. Weight Distribution



Analysis and Recommendations

The rapid pond level drop that is experienced after your pond fills following a heavy rain is not due to evaporation. During the hottest part of the year, evaporation occurs to the tune of 0.25 inches per day. The rapid 18-24 inch drop your pond experiences, is due to some form of leakage. There are several different ways that your pond could be losing water. The most obvious is a leak on the backside of the dam. We walked around on the backside of the dam and looked for any obvious wet spots or clumps of aquatic vegetation that would indicate a perpetually wet area. We did not find either of these. An additional source of leakage could come from leakage through sand that may have been used as a foundation for the concrete spillway. Sand should not have been used for this purpose but it could have been. We did not see any evidence that this was the case but careful observation of the underside of the spillway as the pond begins its rapid drop would enable you to eliminate this possibility. Another source of leakage could be through porous soils that would run from some undetermined part of the lake and go through the surrounding land eventually leading the water to the surface at some point downstream or even into the water table. A final possibility would be that there is a spring in your pond that has fixed head pressure. When the rains come and fill your pond the water level then drops as the head pressure from the additional surface water forces the reversal of the spring allowing your pond's water to seep into the ground then maintaining the level of the lake when the spring's head pressure equalizes. If the problem is a sand vein, you could till bentonite into the soil to seal the leak. It would take between 4-6lbs of bentonite per square foot to seal the soil. Bentonite runs around eight dollars per 50lb sack. Alternatively there are companies that specialize in large scale application of bentonite and could give you a bid on the job. The problem is that if you cannot specifically locate the porous soils, you would need to till bentonite into the soil all the way around the pond. Generally speaking Peach Creek Crossing's pond is much shallower than is ideal for a healthy fishery. We strongly recommend that you deepen your lake. The most cost effective manner for deepening the lake would likely be

to dig out the lake with a backhoe. The only problem is that additional problems may arise should you dig through a well sealed portion of the bottom of your pond cutting into a sand vein and effectively draining your lake. The best way to assure success would be to work with a reputable contractor that was familiar with your soil type and potential problems you may encounter.

Jim Wall with Advantage Excavation is an expert in this area. His phone number is 979-820-0777 if you would like to contact him to develop a plan for sealing your lake.

Water quality analysis indicates good water quality as it relates to pH and alkalinity. pH is nearly neutral and alkalinity is sufficient to buffer natural pH fluctuations that can cause increased stress to your fish. Phosphate levels are an indicator of the nutrient load in your water column. Our sample result was 0.9 ppm which is higher than ideal and indicative of a eutrophic (nutrient rich) pond. Phosphate levels likely spike after rains and then taper off as the plankton and plants in your pond consume the phosphate. Methods for reducing nutrient loads are described in the following paragraphs as they relate to plankton, dissolved oxygen, and vegetation.

Planktonic blooms are important to the health of your pond, as they provide nutrition for your very smallest fish which in turn feed your larger fish. Unfortunately excessively heavy blooms can be a danger to your fish as these blooms tend to reduce dissolved oxygen during the wee hours of the morning potentially leading to fish kills. Currently your lake's bloom does not appear to be of danger to your fish. This being said blooms can develop very rapidly. Blooms develop due to the availability of nutrients suspended in the water column. Nutrients in the pond are likely due to runoff from the subdivision lawns. Though fertilizer is generally needed to keep lawns green and healthy it would be worthwhile for residents of Peach Creek Crossing to attempt to use less fertilizer within the watershed of the pond and to try not to put out fertilizer right before heavy rains appears in the forecast. The presence of tannic acid is not of concern and requires no further action on your part. The only time tannic acid can be a problem is when its levels are so high it substantially changes the pond's pH, to keep it well below neutral (pH 7), thus increasing stress on your fish. This is not the case with your pond.

To further improve nutrient load management, aeration would be very helpful. Increasing dissolved oxygen helps your pond to process nutrients more efficiently (through bacterial aerobic respiration) and to protect your fish against oxygen related fish kills. Aeration would not prevent fish kills completely but would reduce the likelihood of their occurrence. Due to the shallow nature of your pond, fountain based aeration is the only viable aeration option. You could install up to three fountains along the length of the pond. To provide an accurate quote we would need to know which fountain you were interested in and the distance from the power source to the fountain. Finally, vegetation would need to be carefully monitored and weed treatments conducted to prevent your fountains from becoming clogged with vegetation. As an aside, subsurface aeration would be an option should the pond be deepened to 10 ft or more.

Vegetation also plays an important role in nutrient load management as plants take up nutrients which would otherwise go to feed blooms. Water primrose is a generally beneficial aquatic plant in limited quantities. Excessive water primrose can clog your waterway making angling difficult and detracting from the aesthetics of your pond. Duckweed in small amounts are not detrimental to your pond though steps should be taken to kill off your duckweed should coverage exceed 5% of your ponds surface.

Excessive duckweed aside from reducing the aesthetic value of your pond can sufficiently cover a pond or lake to the point that dissolved oxygen levels are greatly affected and fish kills result. Currently, water primrose coverage is excessive. In the future, steps should be taken to prevent its expansion to the current extent. As the weather continues to cool, your water primrose will likely die back reducing the need for a weed treatment this fall but treatments should be planned if and when primrose returns next spring. An additional option for managing vegetation and nutrient loads would be to plant desirable vegetation that could add to the aesthetics of the pond. Should you choose to plant some additional vegetation there are several different plants from which to choose. Planting would be conducted in spring. Unfortunately any treatments of nuisance plants may negatively impact the desirable plants you will have established. Another problem your pond may experience is that widely fluctuating water levels can make it difficult to establish aquatic plants. If this option is of interest to the subdivision we can discuss specifics in terms of goals and methods for achieving those goals.

Baitfish populations are low due to excessive bass stocks and any attempt to establish higher populations of baitfish would need to be accompanied by selective harvest of your overpopulated bass. This harvest would create better survival rates for newly hatched fish fry. The most important baitfish that you could add to the pond, would be redear sunfish. Redear feed mostly on shelled invertebrates and so play an important role in an aquatic ecosystem. In particular they help to regulate the snail population, which in turn controls populations of parasites which spend a portion of their life cycle in snails. Redear would also make up an additional food source for bass. You could also stock threadfin shad though your pond is not deep enough or large enough to make threadfin thrive. Golden shiners are also a good baitfish. Unfortunately golden shiners are egg-eaters and so you should try to rebuild your sunfish populations before stocking golden shiners. Finally, you could begin to feed your baitfish with pelleted fish food. Fish food can be dispensed by hand or the subdivision could purchase an automatic feeder. If you choose to feed your fish, you should do so twice a day from March through November. Feed your fish as much food as they eat in a two minute feeding. This avoids over feeding and thus nutrient overloading.

To improve your bass Wt's you will need to harvest your smaller bass. We recommend harvesting 30 bass, up to 16" in length, by the fall of next year. In addition to these 30 bass any noticeably thin bass, of any length, should be harvested when caught. As you reduce your bass population, individual bass will have less competition and will begin to put on weight.

If you wish to stock catfish you could stock up to 200 channel catfish. These fish will thrive and grow more quickly if fed a floating diet of fish food. Do not expect catfish to reproduce in your lake. Consider them as a put and take fishery. Periodic stockings of catfish may be necessary to maintain a good catfish fishery especially if residents regularly harvest them.

Mussels are present in the lake (per observation by residents of the subdivision) but pose no threat to the lake. Mussels are naturally occurring and provide some limited food your fish.

Turtles are naturally occurring and pose no significant threat to your fish. Most aquatic turtle diets consist mainly of aquatic plants. Additionally, turtles will consume some aquatic insects and any dead fish that they encounter.

Snakes are really not all that common and poisonous snakes even less so. If you want the least amount of snakes possible, excessive vegetation along the perimeter of the lake should be kept to an absolute minimum and the grass surrounding the pond regularly cut.

A couple of other things to keep in mind are that you should never plant any trees along your dam (trees can weaken the integrity of your dam). Also willows can transpire large amounts of water should they be planted along the edge of your pond. Bald cypress' are far better choices and would have no significant impact on the water level of your pond.

Cost Estimates for Management:

- Fountains range in price based on length of cord from the power source to the fountain, size of the fountain, and pattern produced by the water sprayed out by the fountain. Patterns vary widely from those that are primarily for aeration purposes and move large volumes of water to those that are more for aesthetic purposes and move less water. When choosing a fountain pattern for aeration purposes, be sure to note the gallons per minute (gpm) for each pattern. If choosing a fountain for aeration, the higher the gpm the better.
- 250, 1-3" redear sunfish would cost \$0.50/each plus delivery.
- 200 8-11" channel catfish would cost \$1.25/fish + delivery.
- Vegetation treatments vary on types and quantities of vegetation sprayed. A thorough treatment of water primrose as it currently presents cost around \$500.
- We offer a monthly retainer service for which we will maintain your pond and associated feeders, fountains, etc. This service costs \$250 per month. This fee will cover labor, delivery, basic installation of fountain (s) and feeders, and maintenance of fountain (s) and feeders, monthly checkups and herbicide applications as needed. The retainer does not include products including feeders, fountains, fish, feed, herbicide, etc. For example, under a retainer program the cost of the above vegetation treatment would become less than \$100 + the retainer fee. Delivery costs which are \$120 per trip would be included in the retainer as well. We do ask that if you choose the retainer option that you commit to the program for at least one year.

Questions and answers Stemming from our survey and report

Q-lake is currently down approximately 3 feet (and was full 2-3 weeks ago, after our last big rain). Seems to be leaking even more quickly than normal. Would suggested fish stockings endanger fish population during periods of peak stress (IE, in summer, when pond is maximum 2-3 feet deep)? Just want to confirm that we can move forward stocking redear and catfish with confidence that we're not exacerbating our known summer problem.

A-Any additional fish will technically stress the system regardless of the lake size and shape. As lake manager you will always be balancing options and trying to make the best possible decision given the factual parameters you are presented. Adding the catfish and even the redear will stress the lake a bit more than it currently is. It is possible that stocking these fish will increase the likelihood of a fish kill in the summer should the water level be a maximum of 2-3 feet deep. Ideally the ponds water level issues should be addressed prior to an aggressive stocking program.

Q-what are fish take recommendations for hybrid and regular bluegill (not sure of the former reproduce, but I know the latter do, and given the current situation of excess bass, should the foundational bluegill not be taken until the bass population is under control?)

A-You are welcome to harvest hybrid bluegill of any size or large bluegill (> 6"). Though these larger sunfish have larger spawns, they also consume many of their own kind. Smaller sunfish will provide enough reproduction.

Q-water-clearing additives-what are our options, and approximate cost? One of our members was wondering what cost would be. I think the idea was that some of the associations around town have blue water, etc.

A-At the time of our survey the majority of your water turbidity was due to plankton and decomposing vegetation. To clear your water you will need to control your nutrient load. One option would be to carefully control as much aquatic vegetation as possible all year long. This will reduce the amount of decomposing vegetation over the course of a couple of seasons. In addition to this you could add a bacterial product to your pond to help process nutrients and again this would require continued monitoring and use. Cost of the bacterial product would be about \$250 for the first month and then half that for the following few months reducing to even less after that. If we were to put the product out, there would be additional fees. On another note a monthly service contract with us may serve you well for your ponds care and maintenance in general. Bacterial products would be of little benefit until spring when their use should be begun. Use of these products may be discontinued when the water clarity improves but may need to be re-started if and when turbid conditions return. As for making your water blue, you would need only add dye. Dye would cost about \$80 initially with additional dye needing to be added every time rain flushes dye from the lake. Dye will turn your water blue immediately. Dye shades out the blue light spectrum that plants need for photosynthesis and therefore retards some plant growth in deeper water. Unfortunately it also reduces your ponds primary productivity for your fish.

Q-spillway heightening options/cost-is it desirable given leak? What would cost be? Would it do anything to help the pond?

A-A dirt contractor would have to give you a specific bid for heightening the spillway. We can put you in contact with a contractor if you wish. Heightening the spillway would serve no purpose unless the pond leak were also sealed at that time. This would be worth discussing with a dirt contractor when you obtain a bid.

Q-suggested fountain for our pond-need an approximate cost of the low range to high range; and whether it is recommended given fact pond gets so low in summer. How would we manage (IE, have to turn off if less than X feet of water)?

A-The cheapest fountain I would consider installing would be a ½ horsepower Aquaseries. Cost would be approximately \$2000 though power location will effect installation cost. This fountain would operate in only 18" of water or deeper. The ideal fountain for your pond would be a 2 hp Sunburst. This fountain (without lights) would cost around \$5500. Again power location would effect installation cost. This fountain will operate in 30" of water or deeper. If you add lights this fountain would need 40" of water to operate.

Q -- the quote we got for draining and putting bentonite in the pond is \$175K-\$200K. Are there any other options (IE, purchasing a liner, packing with clay, etc.)? Abandonment isn't an issue given our limited acreage.

A-Contact Jim Wall with Advantage Excavation. He is the areas expert in how to best solve your leak problem. He could evaluate your soils through core samples to determine if sufficient clay is close by that could be used to seal the pond. Jim's number is 979-820-0777. Email is jimw@txcyber.com.

Q-feasibility/desirability (or lack thereof) of using pond to irrigate surrounding commons area. Assuming this wouldn't be desirable given chronic water problems we have in pond, but the question was surfaced.

A-This should not be a problem for your pond other or your surrounding vegetation other than the water loss problem which is significant. We will also need to be sure to coordinate irrigation with our herbicide treatments. Some of the treatments we may use would require no irrigation for a period of days to weeks depending on the product and quantity.

Q-I guess here is the home run question, "Knowing what you know about our pond, and knowing that it isn't feasible (IE, draining and lining pond won't happen given exorbitant cost), what would Total Lake Management suggest we do with the pond?" Please include what you would suggest in terms of fish stocking and any improvements to make the pond more practical/functional. We have approximately \$3,000 available to spend. Any suggestions costing more than \$15K-\$20K probably aren't feasible. Options include your thoughts on how to maximize fish/use potential given current state; any improvements which might yield an improved health of our pond (IE, overflow heightening, cutting the pond in half and making two smaller ponds (in hopes of isolating one part that leaks), etc.); abandonment of the pond.

A-First of all I don't think you will get anything accomplished through dirt work for approximately \$3000. If someone says they are offering a dirt work solution for \$3000, they are likely out to take your \$3000 with no regard for solving your problem. If I were in charge of making the decisions, I would do the following:

1. Consult with Jim Wall regarding long term repair of the pond. I realize that your budget does not allow for repairs to be made at this time though through your contact with Jim you could determine what needs to be done and get an idea as to what the cost would be. Then your neighborhood could decide if you want to save or borrow the money for a long term solution to water retention.
2. In the mean time, I would control aquatic vegetation and manage your water quality through use of bacteria and / or aeration.
3. Enjoy the fish currently present. I would also begin feeding by hand (when it is warm – March through November) daily to maximize production of existing fish.
4. Stock 50, 8-11" channel catfish. You can always add more later if water level and quality improve. This way you don't have much invested in your fish should you experience a fish kill.
5. I would accept that as long as the budget does not exist to solve all of the problems with the pond, fish kills and extremely shallow water are potential problems. Should a fish kill occur, wait for conditions to improve and re-stock with 50 channel catfish, feed and enjoy these while they last.
6. Important facts to know:

- a. Fish should not be stocked in hot weather.
- b. If fish stop feeding, some stress is causing it and daily feeding should be temporarily discontinued.
- c. Excessive vegetation or plankton bloom reduces oxygen levels which can lead to fish kills.
- d. Killing vegetation or plankton bloom also reduces oxygen levels which can lead to fish kills.
- e. Killing portions of your ponds vegetation at a time is ideal for lessening the risk to your fish though it also increases the cost for the treatment.