Sustainability of a Largemouth Bass Population in Lake Archer

DELAWARE VALLEY UNIVERSITY 1896

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Abstract

Even though Largemouth bass (*Micropterus Salmoides*) can live in almost any body of fresh water, they have a very limited population in Lake Archer. The purpose of this project is to first find out why the population of Largemouth bass is so small, and then to grow a population using a rearing tank attached to the lake with pumps. Once the fish are large enough, they will be released into the pond to see if their population is sustainable. Before we can grow fish, we need to see if the chemical and physical properties of Lake Archer can support a population of Largemouth bass. This can be done by averaging weekly water testing values and comparing it to a healthy pond ecosystem. We also need to ensure there is a proper food supply for the bass. This is done by using traps to catch fish and other inhabitants of the pond. This will allow us to conduct a population survey and estimate. Furthermore, a map of the bottom of Lake Archer is in the process of being created. So far, we have found that the chemical and physical properties of Lake Archer can support largemouth bass.

Background

Lake Archer is a 1-acre man-made pond located on the campus of Delaware Valley University. Lake Archer has lots of organisms living within it, yet a very limited number of largemouth bass. This could be due to a few different factors. It has been reported that Lake Archer is overrun with an invasive population of crayfish, known as the rusty crayfish. If this is true, the crayfish are likely consuming plant matter that is vital to the survival of largemouth bass. This is why it is vital to have an accurate population survey and estimate of Lake Archer. Largemouth bass also have specific water quality requirements, this is why it is important to conduct weekly tests on the water as well as creating a map of the bottom by depth. Largemouth bass have a 5-stage life cycle. The first stage is the larvae stage, followed by fingerling, fry, juvenile, and adult. Each stage represents different ages, sizes as well as different food requirements.

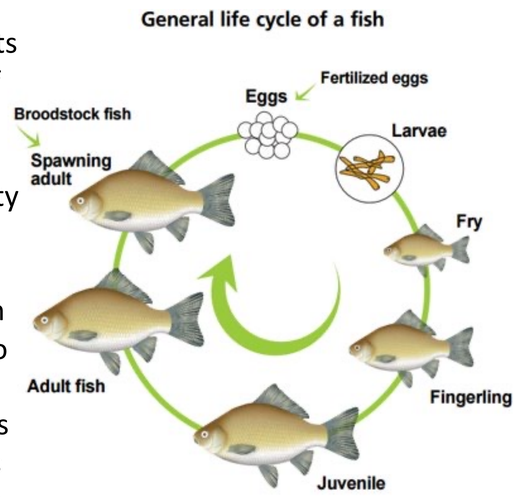

Figure 1 shows the General life cycle of a fish. This chart Shows the growth of the fish from the egg stage to the Spawning adult phase

Results

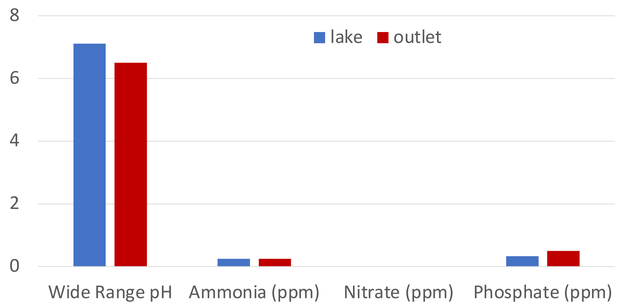

Figure 6 shows the relationship between the pH and levels of ammonia, nitrate, and phosphate in the pipe water and the pond.

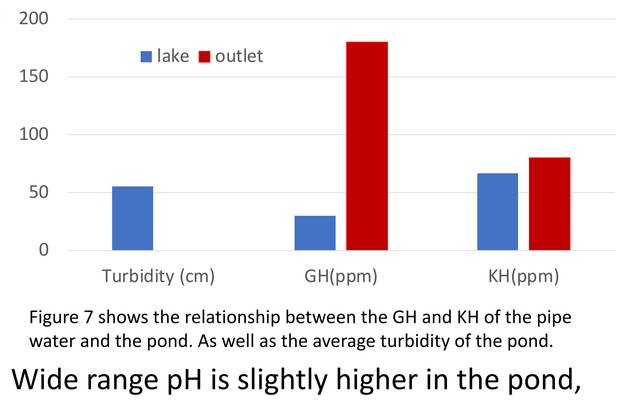

Figure 7 shows the relationship between the GH and KH of the pipe water and the pond. As well as the average turbidity of the pond.

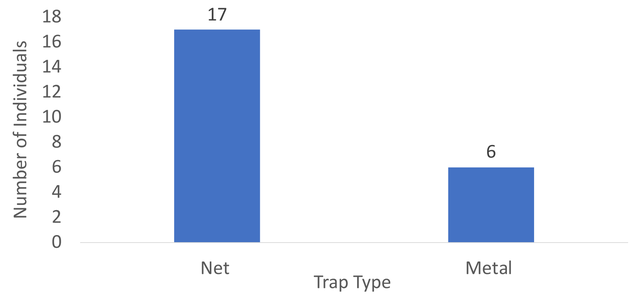

Figure 8 shows the number of bluegill caught per trap type.

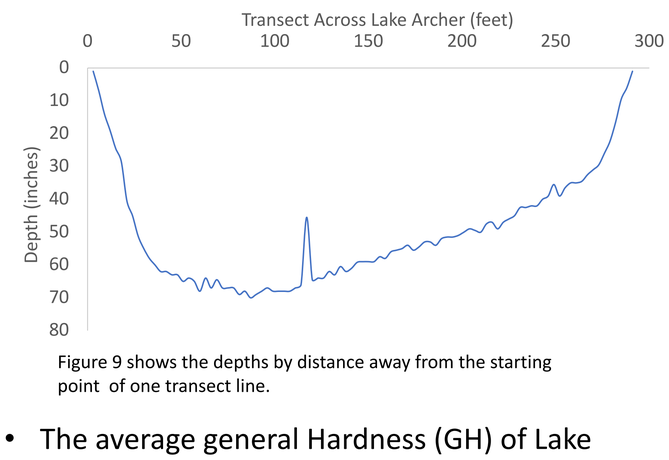

Figure 9 shows the depths by distance away from the starting point of one transect line.

- Wide range pH is slightly higher in the pond, 7.11, than the pipe water.
- Ammonia levels in the pond and the pipe water are both 0.25 ppm.
- Nitrate levels in the pond and the pipe water are both 0.0 ppm.
- Phosphate levels are slightly higher in the pipe water than in the pond. The pond has an average phosphate level of 0.33 ppm.
- The average turbidity of Lake Archer is 55.39 cm.
- The average general Hardness (GH) of Lake archer is 30 ppm, less than the pipe water at 180 ppm.
- The average carbonate hardness (KH) of Lake Archer is 66.67, less than the pipe water at 80 ppm.
- Blue gill were the only species caught so far and the net trap appears to be more effective.
- The deepest point of this transect line was 70 inches deep. There is a depth anomaly.

Methods

5-in-1 Test Strip conducted weekly on the pond water throughout the semester. The water that flows into the pond from a drainage pipe. Tests included: pH, GH, KH, Nitrate, and Nitrite.
Chemical Tests for wide range pH, nitrate, ammonia, and phosphate levels were conducted weekly. Inflow was also tested.
Turbidity: was measured using a turbidity tube that allowed for determination of clarity up to 120 cm.
Trapping: A metal trap and a net trap were used to begin a diversity survey and population estimate. Traps were placed in randomly chosen locations across the pond using a grid system. Different baits and lengths of submergence time were used. The species and number of individuals were recorded each time a trap was pulled up.
Bathymetry: The dept was recorded every 3 feet along a transect. Transects are 6 feet apart.

Figure 2 shows a wide range pH test compared to the color key.

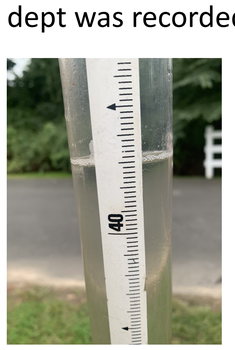

Figure 3 shoes a turbidity tube reading at about 43 cm.

Figure 4 shows a large bluegill caught in the net trap. The bait used was wet cat food.

Figure 5 shows the bathymetry process being conducted on Lake Archer

Discussion

- All chemical factors are currently suitable for sustaining a population of largemouth bass. Testing will continue to capture seasonal changes.
- The pH falls within the ideal range for a pond which is between 6.8-8.2.
- A pond should have an ammonia value no greater than 0.50 ppm to be healthy.
- A healthy pond should have little to no nitrate and phosphate. The nitrate levels in Lake Archer are acceptable for largemouth bass but the phosphate is relatively high, yet still acceptable for Largemouth bass, but should be monitored.
- GH varies by region and pond and KH varies by water source. Both GH and KH of the pond are acceptable.
- Blue gill is an important food source for juvenile and adult largemouth bass. In the spring we hope to catch a larger diversity of fish and crayfish.
- The depth of Lake Archer is conducive to the largemouth bass life cycle. The depth anomaly may be due to a submerged object.

Next Steps

Continuing the bathymetry process, water testing and trapping. A population estimate of species caught will be conducted. We will begin to set up the breeding tank at the Lake and prepare it for the largemouth bass fry that will be added towards the end of the spring semester.

References

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Acknowledgements

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