

From Cloudy to Clear: An Investigation into Water Quality at FDR Park, Philadelphia

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Introduction

Franklin Delano Roosevelt Park (or FDR Park for short) is located in Philadelphia, PA on Broad St and Pattison Ave. This park is one of the largest parks in Philadelphia and one of the largest urban parks in the United States.

There are various organisms in lakes that are a good indicator of pollution in lakes and the overall habitat quality of the environment. Some help filter out pollution and are extremely tolerant to this pollution in these lakes. Some of these organisms that fall under this category would be: water boatman, aquatic worms, bloodworm midge larva and a plethora of other organisms.

There is a lot of eutrophication that occurs in the Edgewater Lake, which is the largest lake in FDR Park. Eutrophication occurs when high nutrient inputs produce excessive plant growth, decomposition, and low dissolved oxygen which results in low habitat quality. Eutrophication is caused by an excess of nitrogen and phosphorous, the building blocks of DNA. The plants that contribute to this process would be algae, duckweed, and various other plant life in the lake. If these plants get too much nitrogen and phosphorous, they prevent the life around them from flourishing which can ultimately destroy a habitat.

Our project is to gather information for the Fairmount Park Commission on the effectiveness of a new aerator installed in Edgewater Lake. We are doing a water quality assessment on the lake to determine the positive effect of the aerator on the quality of the water for them which we hope will lead to an improvement in the quality of the water and the habitats surrounding the lake; this water quality assessment will help measure the effectiveness of the aerator that is being installed.

Methods

We used a YSI Pro20 dissolved oxygen meter to take water quality measurements at FDR Park at Edgewater Lake on Wednesday, May 30, 2012. In order to do this, we dipped the sensor into the water and waited for the results to appear on screen. These measurements were taken near the dock and at the beach. To measure the phosphorus, we mixed the water sample with a solution that had molybdenum in it. When the phosphorous binds with the molybdenum, it turns to a blue color. The intensity of the blue color is proportional to the amount of phosphorous was the water. We put a portion of each sample into the spec-20 spectrophotometer, which gave us a value for how much light of wavelength 880nm was absorbed. We used a standard calibration curve to convert the absorbance to a concentration. Dr. Dennis Gray, a research scientist, conducted the analysis of the nitrogen in the water for us.

To test the invertebrate community, we captured them in containers, organized them based on their names, counted how many there were, and prepared a table based on pollution tolerance. These invertebrates were taken on Wednesday, May 13, 2012 around 2 to 3pm at FDR Park near the edge of Edgewater Lake.

Data

Species	Pollution Tolerance (extreme/moderate/low)	Population
Water Boatmen (Corixidae)	Moderate	36
Left-handed Snail (Physidae)	Extreme	6
Bloodworm/Midge Larvae (Chironomidae)	Moderate	3
Nematode (Nematoda)	Extreme	13
Water Snipe Fly Larvae (Athericidae)	Low	1
Unidentified Organisms	Unidentified	29
Adult Beetle (Coleoptera)	Unidentified	1

Table 1: Invertebrate Species Found in Edgewater Lake

Based on our collected data we found more species that are moderately pollution tolerant in the lake, and so far we only found one low tolerant organism. According to the statistics, high tolerant species, such the Water Boatmen, outnumbered those that are lowly tolerant in the lake. Surprisingly, our recorded phosphorus level was extremely low, less than 5 PPM. Overall, the difference between the oxygen level at the surface and the bottom was extremely drastic. The oxygen level in the surface was 73%, in contrast to the bottom of the lake, which was 26.4%. Moreover, the pH was basic, regardless of the water's depth. And lastly, the temperature in the water's surface and the bottom of the lake were both 28.1 degrees Celsius.

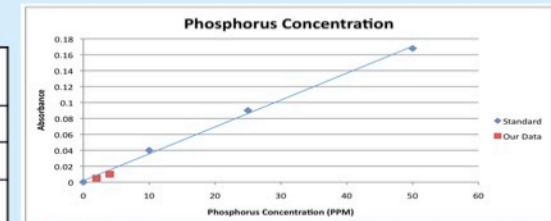


Figure 1: Phosphorus level in Edgewater Lake

Water Quality:	Surface	Bottom
Oxygen level:	73% 5.7mg/L	26.4% 2.02mg/L
pH level:	8.17	7.55
Temperature:	28.1 degrees Celsius	28.1 degrees Celsius

Table 2: Water Quality Measurements at Edgewater Lake



Discussion

According to table one, our observation suggested that water quality in FDR lake is low, since there were minimum species highly sensitive towards pollutants. We found one organism that is pollution sensitive, which imply that the pollution level is not entirely severe. Unfortunately, we might have misidentified the organism. If so, then our assumption of the water quality would be slightly inaccurate. Additionally, our results are limited due to the testing area of the experiment. We collected water samples from the shore, instead of the pelagic area of the lake. To obtain more substantial data, we will collect water samples more than once, including data from the pelagic area of the lake.

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