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 phosphorus, 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 phosphorus, 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 water quality for 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 to measure the effectiveness of the aerator and that it is being installed.

Methods
We used aYSI 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 phosphorus in the water. We got 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 nutrients 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 30, 2012 around 2 to 3 pm at FDR Park near the edge of Edgewater Lake.

Data

<table>
<thead>
<tr>
<th>Species</th>
<th>Pollution Tolerance (extreme/moderate/low)</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Boatmen (Corixidae)</td>
<td>Moderate</td>
<td>36</td>
</tr>
<tr>
<td>Left-handed Snail (Physidae)</td>
<td>Extreme</td>
<td>6</td>
</tr>
<tr>
<td>Bloodworm/Midge Larvae (Chironomidae)</td>
<td>Moderate</td>
<td>3</td>
</tr>
<tr>
<td>Nematomode (Nemastoda)</td>
<td>Extreme</td>
<td>13</td>
</tr>
<tr>
<td>Water Snipe Fly Larvae (Athericidae)</td>
<td>Low</td>
<td>1</td>
</tr>
<tr>
<td>Unidentified Organisms</td>
<td>Unidentified</td>
<td>29</td>
</tr>
<tr>
<td>Adult Beetle (Coleoptera)</td>
<td>Unidentified</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1: Invertebrate Species Found in Edgewater Lake

Phosphorus Concentration

![Figure 1: Phosphorus level in Edgewater Lake](image)

Table 2: Water Quality Measurements at Edgewater Lake

- Water Quality: Lutrition
- Oxygen level: 5.79 mg/l
- pH level: 8.17
- Temperature: 28.1 degrees Celsius

Discussion

According to 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. Based on the statistics, high tolerant species, such as 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 9.7%, in contrast to the bottom of the lake, which was 26.4%. Moreover, the pH level 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.

Acknowledgments
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