Hydroprobe Final Report
Spring 2003

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Introduction

The Lehigh Earth Observatory (LEO) and the Wildlands Conservancy have been monitoring the Lehigh River for 5 years, in order to detect changes in the water quality. It has been a necessary step toward the conservation of the river water because the natural development of the river has been disrupted in the past by such factors as dumping from northern coal mines and the effects brought on by Bethlehem Steel here in the south.

The hydroprobe is an implement that allows us to detect the many changes in the water system and occasionally the source of such changes. The data retrieved form the hydroprobe includes: the temperature of the river water, pH levels, specific conductance, the amount of dissolved oxygen, turbidity, and even the amount of dissolved solids that flow through the river weekly.

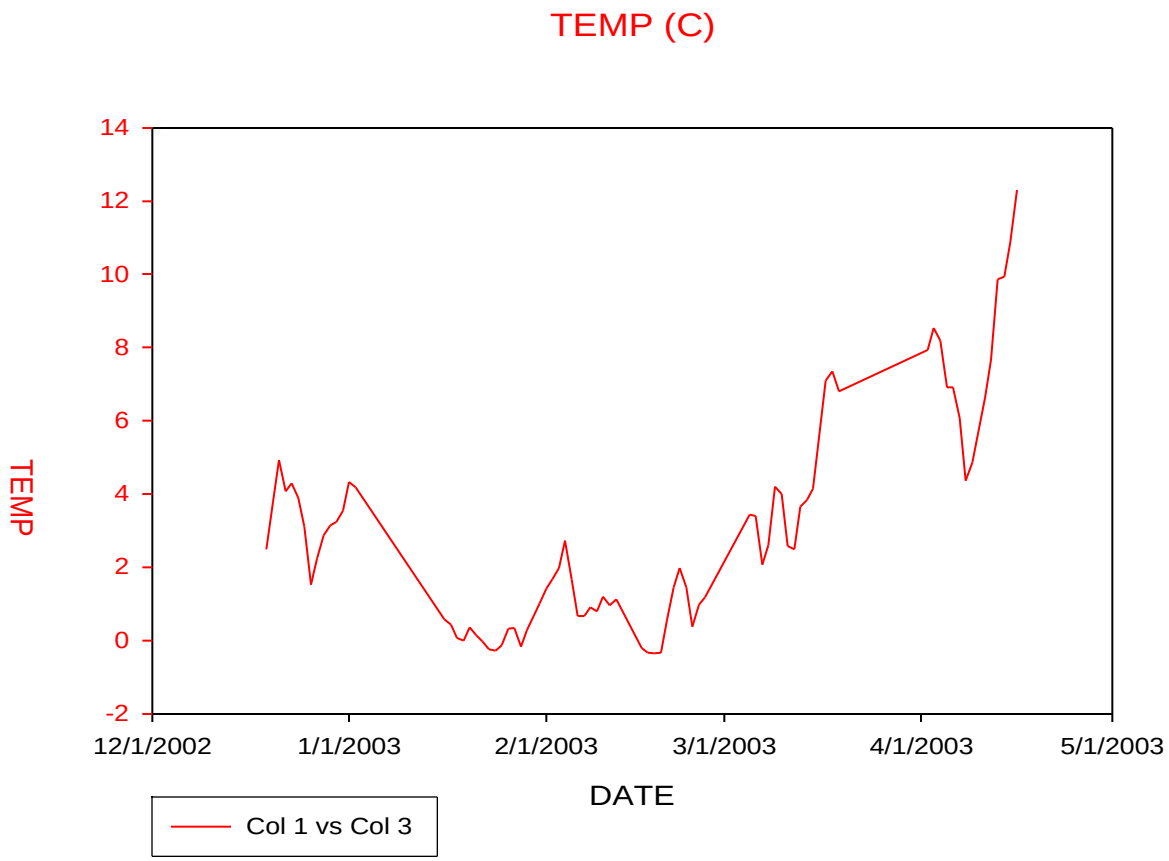
This spring, the hydroprobe has been recording data from approximately 7pm on Wednesday, until around 3pm on the following Wednesday. The data retrieved is downloaded into an Excel file, where we are then able to convert information like the weekly averages to the charts included in this report. There is also a running tally of every semester's collective data.

Data Analysis: Winter/Spring 2003

Temperature

Temperature has had a direct effect on the amount of data collected this spring. During the winter, specifically in December and early January, extremely low temperatures coupled with increased rain fall led to a raise in the water level. The average temperature was 3.02 degrees Celsius, with a few stretches below freezing in both early January and late February.

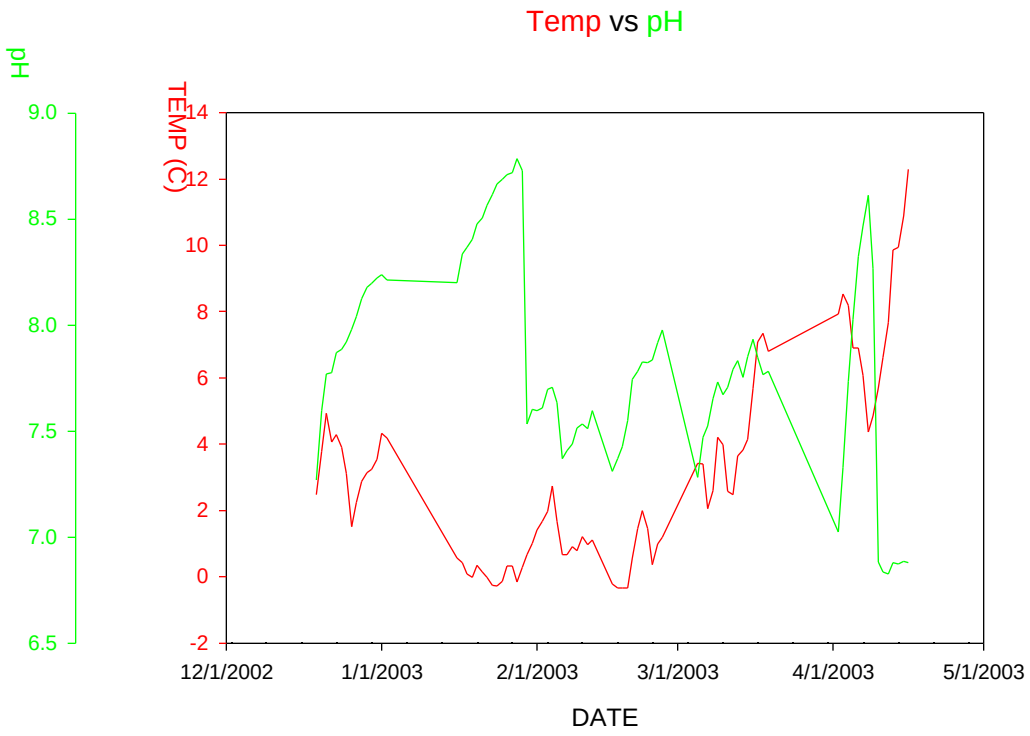
The lowest weekly average for this period was actually during the February stint with temperatures as low as -0.34 degrees Celsius. Although it did warm up considerably in April, there were still many instances of temperature drops and heavy rainfall events.

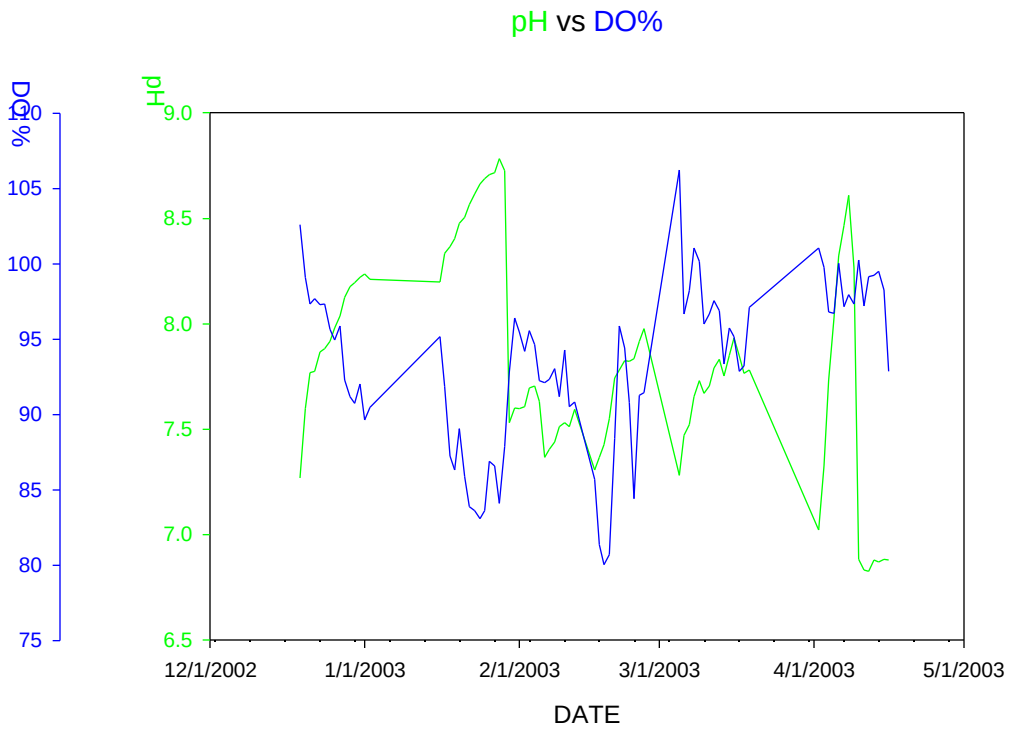


pH Level

Weekly averages ranged anywhere from 6.83 to as high as 8.78. The lows were recorded during mid April and could be due to a problem with the pH sensor itself. The highs however were mostly found during the entire month of January. There were no extreme changes in pH, mostly gradual raises. The lowest pH levels were notably recorded during the weeks with highest temperatures of the spring.

Increases in dissolved oxygen can lead to changes in ph levels. When there is more aquatic life during the warmer months, there is also an increase in DO, which in turn can lower pH levels. Likewise, during the colder period in January, the pH level rose to as much as 8.78.

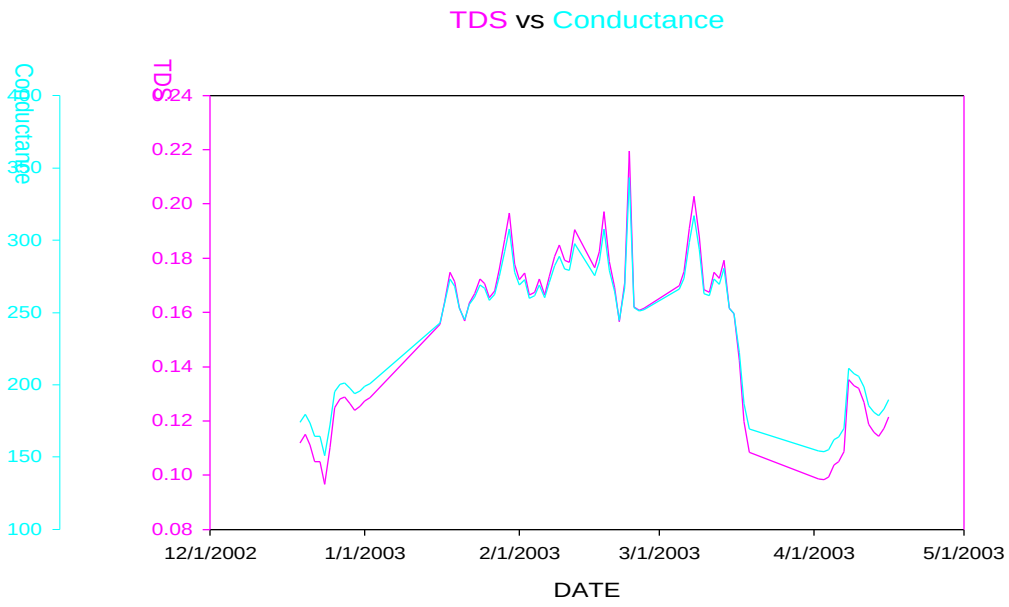




Specific Conductance

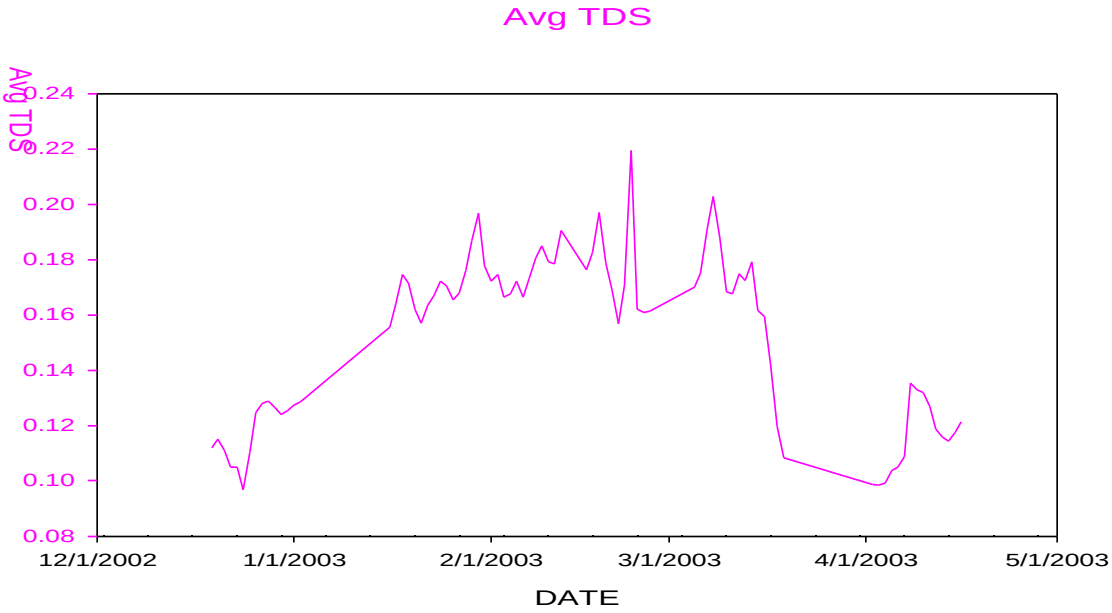
The hydroprobe measures electric conductivity through what is called specific conductivity; this depends on the amount of ions or dissolved salts found in the water. The average specific conductance for December- April was 238.52. The highest reported conductivity was on February 23, at 343.08 uS/cm. This is not alarming, because the amount of total dissolved solids, or TDS, was at it highest on that particular week. Generally, when there is an increase in dissolved solids, there is also a raise in the conductivity of the water.

Because this is still an issue that is to be debated, previous students have recommended other sites that might give an idea as to what safe levels of specific conductance are.



Total Dissolved Solids

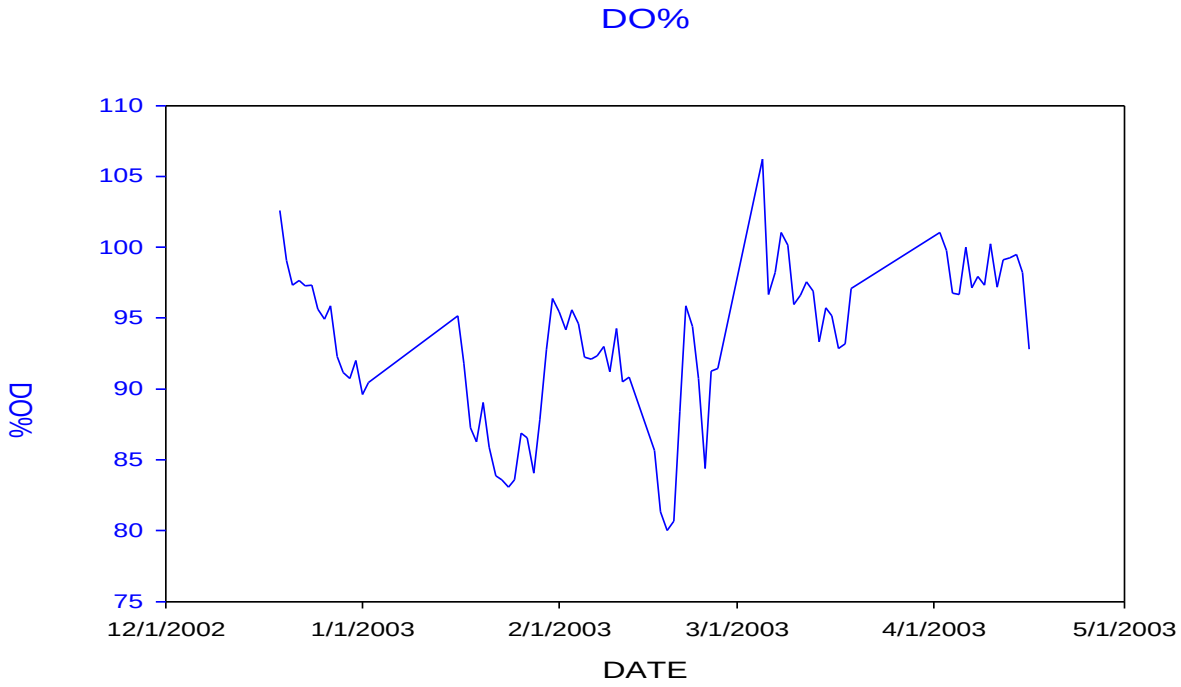
The amount of dissolved solids in a water system can increase for many reasons. During this period, however, the level of dissolved solids was considerably consistent. The average amount was 0.15 Kmg/L, with a range from 0.10 Kmg/L - 0.22 Kmg/L.

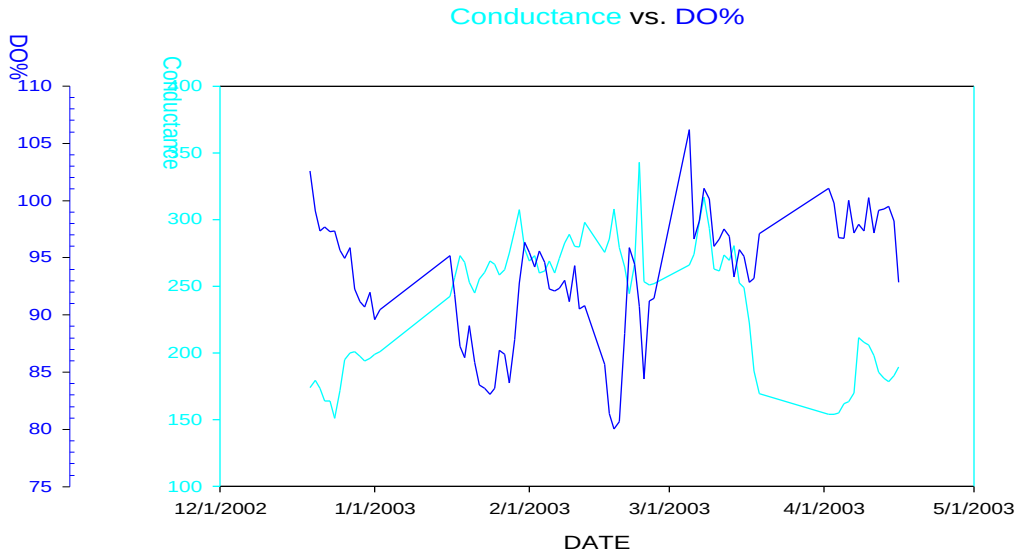


Dissolved Oxygen

As mentioned earlier, temperature and rainfall directly affect the amount of living organisms in the water, thus changing the amount of dissolved oxygen. It is important to monitor the amount of dissolved oxygen because of those aquatic life forms.

There were no significant changes within the data collected for spring 2003.





Conclusions and Recommendations

According to the data retrieved for the spring 2003, everything in the river was at a fairly safe level. Any riffs in the data were most likely caused by an inability to collect data due to an unusual rain or snow event. Temperature rose as the months came to pass, and although there was an unusual cold spell in February, levels within the river itself did not change drastically.

The pH levels and Dissolved Oxygen also seemed to be fairly normal for the spring. There are no further recommendations; all levels seem safe and productive.