

**Various Parameters of the Hudson River in Relation to EPA Standards**

**Mickey Quinn, Josh DeNyse, Chelsea Naylor, Chelsea Schadewald, Lisabeth Kelly, and Cody Rogers**

**October 12, 2007**

## **Abstract**

The purpose of this study was to determine whether the recent pollution from various sources is still affecting the Hudson River Estuary. Our results lead us conclude it is not affecting it in an adverse way now, as our tests on water samples from the river adhered to the EPA standards for the parameters measured.

## **Background**

The Hudson River runs through New York and New Jersey, is 315 miles long, and is allegedly full of pollution. The General Electric Company has dumped between 209,000 and 1.3million pounds of polychlorinated biphenyls into the river from its Hudson Falls and Fort Edward manufacturing plants, according to the US Environmental Protection Agency. There is a 200-hundred mile portion of the river that has been declared 'the Hudson River PCB Site' by the EPA. In 1976, recreational and commercial fishing in the upper river, and commercial fishing of specific species in the lower river was banned because of concern stemming from contaminated fish being consumed by humans. The upper Hudson ban was later lifted. "The Hudson River is an important source of hydroelectric power, public water supplies, transportation, and recreation. The Cities of Waterford, Poughkeepsie, and Rhinebeck, as well as the Highland and Port Ewen Water Districts obtain their water supplies directly from the Hudson River." (EPA Report ID#: NYD980763841, "Hudson River PCB's")

## **Introduction**

The purpose of this study is to discover how the pollution affects the river even now based on several parameters. On Snapshot Day 2007, students up and down the Hudson River Estuary, where the sea flows into the river mixing salt water with fresh water, will take and test numerous water samples to collect data on parameters such as dissolved oxygen, temperature, specific conductance, turbidity, fish,

Macroinvertebrates, pH, nitrates, and phosphates. These parameters are relevant to the subject of pollution because parameters like dissolved oxygen and temperature effect what kind of organisms can exist within the river's ecosystem, which greatly impacts it. Nitrates, pH, and phosphates help us discover what kind of or how much pollution is in the estuary. The EPA provides standards for all of these parameters, and by checking our data against their standards, we will be able to decide whether or not the river is really polluted in a way that effects the ecosystems in an around it. Because so many programs have been put in place to cleanse the river of pollutants, the river is most likely polluted, but not in a way that still has an impact now.

### **Methods**

The information that was used with these methods was gathered from a past snap shot day of the years 2003-2006, parameters that were created in a stream lab, information on the Hudson from Mayor Tutunjian, and information gathered on the present day snap shot of 2007. For measuring pH hydroid paper from the pH Chemits Kit by taking a piece of paper and dipping it into the water for a small amount of time until it changed color then comparing it to a key. For measuring the water temperature, a Springfield thermometer was used by placing it in the water. Nitrates in the water was measured by a LaMotte Nitrate Kit, which needed a sample of water from the river, then added a nitrate tablet and waited until it dissolved, then compared with a scale of 1 to 10, depending what color is changed. Phosphate was measured with a K-8510 Chemits kit, with the same method as nitrates. These both included filling a small beaker with 25 mL of water from the river then breaking the tip of a small needle then letting it sit until it changed a shade of blue that was measured on a 1 to 10. Turbidity was measured with a tube that you poured water into and poured out until you see the bottom which was called secchi disk.

## Graphs and Discussion

### Snapshot Day 2007 Data Summary

	1	2	3	4	5	6	7	8	9	10	Average
pH (meter)	6.37	6.37	7.2	6.3	7	7.04	6.27	<b>6.9</b>	6.95	6.90	<b>6.73</b>
pH (strip)	6.5	6	7	7	6.95	7	7	<b>7</b>	7	7	<b>6.845</b>
Phosphate	2.5mg/L	.5ppm	1ppm	1ppm	.1ppm	1ppm	0ppm	<b>.2 ppm</b> <b>200 µg</b>	0.1ppm	0ppm	<b>.64 ppm</b> <b>640 µg</b>
Temperature	21°C	20	20°C	21°C	20°C	22 C	20C	<b>19</b>	19°C	21°C	<b>20.3</b>
Turbidity	36cm	85.4	38cm	32cm	40.2cm	60cm	54cm	<b>68cm</b> <b>9.0 FTU</b>	26cm	36cm	<b>47.56</b> <b>9.9 FTU</b>
D. Oxygen	8mg/L	10mg/L	12ppm	6ppm	9ppm	10 mg/L	7ppm	<b>10 mg/L</b>	7ppm	8g/ml	<b>8.7</b>
Percent saturation	85%	85%	130%	65%	100%	84%	80%	<b>100.25 %</b>	80%	85%	<b>89.425 %</b>
Nitrate	4.4ppm	.5ppm	1ppm	2ppm	1.5ppm	2ppm	0ppm	<b>4.4 ppm</b> <b>4.4 mg/L</b>	1ppm	1ppm	<b>1.78 ppm</b> <b>1.78 mg/L</b>
macros	None found	None found	None Found	None found	2 lung snails	None found	None Found	<b>None found</b>	None Found	None found	<b>None found</b>

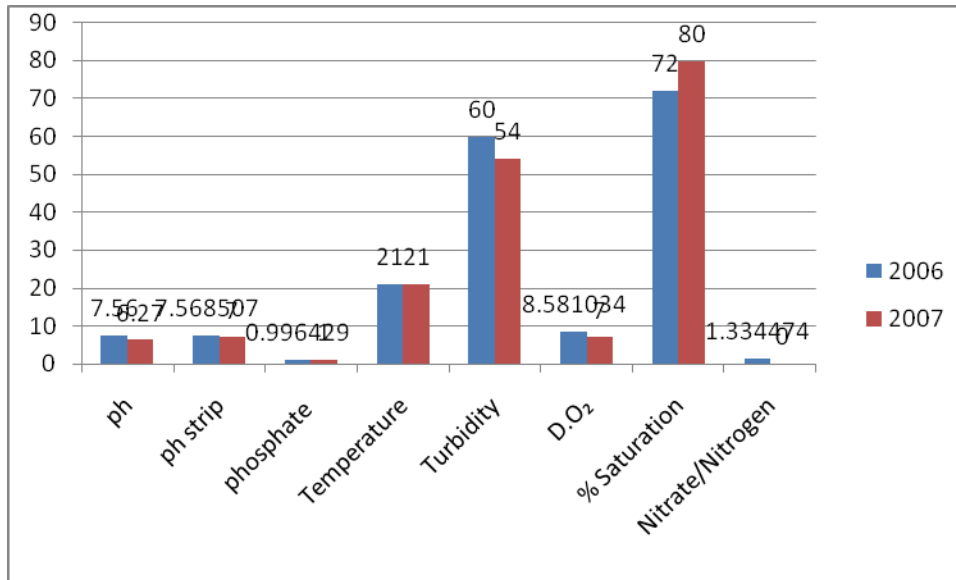


Figure 1: Comparison of Snapshot Day 06 and 07

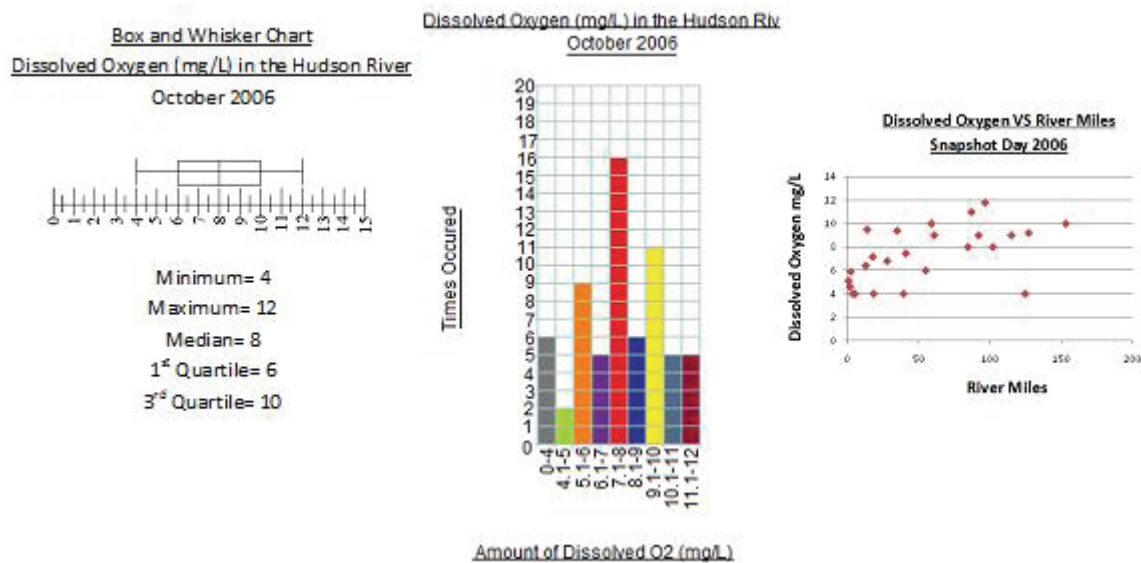


Figure 2: Dissolved oxygen trends 2006

### Conclusions

In relation to the hypothesis, the results were nearly perfect. Phosphorus, pH, Dissolved Oxygen, Temperature, and Turbidity all stood up to the EPA standards for each respective category. The only

value which was tested which didn't stand up was the Nitrates. While it did in fact hold up for Group 7, because the recommended amount was below .38 ppm, and G7 got 0 ppm, the other group's findings were not as ideal. Initially, since Group 7 never received a packet of directions, the results might have been skewed due to improper testing. However, after comparing with the results of the other groups, Group 7 appears to have carried out most of the tests in an acceptable manner. Since the river appears to be healthy, no recommendations or proposal to change it could be reasonably made at this time for the parameters measured. Compared to the data taken by USGS, the temperature of the Spring Water is somewhat higher than the temperatures taken in general by the entire TVHS class. The fact that the temperature is higher may also lead to the conclusion that the turbidity of the spring is higher, since higher turbidity can sometimes lead to a rise in temperature. Since the turbidity levels the class collected were extremely varied, it's hard to make any conclusions about the infiltration or runoff to the river. Since the air temperature and water temperature were fairly close, the air, clouds and wind probably affected the water temperature. It also interesting to note that there is a relationship between river mile and dissolved oxygen, where the farther you go from the ocean, the more dissolved oxygen in the water.

## References

1. USGS Real-Time Water Data. 7 July 2007. Sep. 2007  
<[http://waterdata.usgs.gov/nwis/uv/?site\\_no=01372058&](http://waterdata.usgs.gov/nwis/uv/?site_no=01372058&)>.
2. Data.htm. Sep. 2007 <<http://www.ideo.columbia.edu/edu/k12/snapshotday/Data.htm>>.
3. EPA Water Standards. Chart. . EPA. Sep. 2007 <<https://nthls-6.nthls.com/TVHS/10-Courses/Environmental%20Analysis/LP74YNZ6.nsf/0/35043386784a8ac38525731700508f52/Body/0.164C?OpenElement&FieldElemFormat=gif>>.
4. Adair, John R., Dennis Rigosu, Vincenzo Popilizio, and Richard H. Rapp. "Albany County Sewer District Report." . 2006. Sep. 2007
5. "New York and Adjacent States, 1992-95." Water Quality in the Hudson River Basin. 1998. USGS. Sep. 2007.
6. "Hudson River PCB's." U.S. Environmental Protection Agency. 21 Sep. 1984. EPA. Sep. 2007 <<http://www.epa.gov/Region2/superfund/npl/0202229c.pdf>>. Appendices

### Appendix I: EPA Recommendations

Parameter	EPA Guidelines for Healthy Surface Waters	Notes
Dissolved oxygen (mg/L)	At least 8	For no impairment of macro-invertebrates and spawning fish
pH	6.5 to 8.5	
Total nitrogen (mg/L)	No more than 0.38	
Total phosphorus (µg/L)	No more than 10	
Temperature (C°)	17	Weekly average maximum temp for spawning of largemouth and smallmouth bass (Spawning happens in the spring)
	29	Weekly average maximum temp for growth of largemouth and smallmouth bass (Growth happens throughout the year.)
Turbidity (FTU)	No more than 1.3	
Turbidity (clarity) (cm Secchi)	No more than 100 cm	Water clarity is highly variable and does not tell anything about the content to the particles.
Total Suspended Solids (mg/L)	No EPA standard	(Over 100 mg/L is considered high by some scientists.)
Chlorophyll <i>a</i> (µg/L)	No more than 0.63	
specific conductance (uS/cm)	No more than 767.9	350 mg/l TDS is the standard, converted with 10% error using: TDS = 0.935 x Sp.C. -368
fecal coliform bacteria	No more than 200 colonies/100 mL	for human contact recreation