# 2010 GRO Internship Final Report

## Charles and Mystic Watershed Real-Time Buoy Monitoring

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My internship project in the EPA Region 1 Laboratory, North Chelmsford, MA, considered the Charles and Mystic Rivers, and closely relates with past and future work in the Lab's Ecosystem Assessment Unit. These watersheds are highly populated and have experienced recreation cancellations and visitor warnings because of disturbances in the water quality readings. The project supervisor, Tom Faber, environmental engineer, has done several other projects in these watersheds dealing with monitoring and setting standards for water quality parameters in recreational areas. Many other employees of the Region1 Lab also pursue projects in water quality, measuring various parameters, such as dissolved metals, surfactants, and pharmaceutical contaminants.

The purpose of the project was to further the research and make data open to the public via a real time monitoring website. A YSI water quality sonde was deployed in both the Mystic River at Wedge Pond in Winchester, MA and Charles River at Community-Boating in Boston, MA. The sonde measured dissolved oxygen, pH, turbidity, temperature, phycocyanin, and chlorophyll. These two sites were picked to further EPA's mission to help in protecting human health by monitoring and safeguarding these recreational areas. By implementing these instruments a buoy could be used to hold, store, and maintain the sonde so that accurate data readings could be displayed on the Internet for public knowledge.

The website can display charts to correlate specific parameters and better prove that increasing temperatures causes an increase in phycocyanin cell counts. With taking data every 15 minutes from early June to late September, a trend can be seen in results to better get an understanding of the rivers' cycles and decrease blue-green algal blooms. If these blooms are decreased properly, the river can become swimmable again. Data show that the Charles was/is more polluted than the Mystic on almost every scale. The employees of the Mystic River Watershed Association (MRWA) treated Wedge Pond with copper sulfate halfway through data collection. While the results did not change dramatically following the treatment, this yearly maintenance of the pond could account for some of its better readings compared to the Charles River. Other reasons could be that Wedge Pond is not as heavily used or populated as the Charles. More people live on and near the river in Boston and all through the day motors are expelling their pollutants into the water body Wedge Pond was only being used to swim in at the many visits to the site. Although the Mystic's water was more stagnant and had a similar temperature to the Charles River, it lacked the "nutrients" from boats and human use to feed algal blooms.

Few challenges were faced with the YSI sondes. The system set in place to connect the buoy readings to a wireless connection for the public to instantly view the data being collected was not connecting with certain sonde models. Several phone calls were made and sondes were swapped out of the buoy. It was settled that a device in the sonde was damaged. The big challenge is trying to make the real-time monitoring site (YSI EcoNet) public. EPA requires the site meet certain "look and feel" regulations that can't be met because of EcoNet's format. Several meetings and emails have been exchanged to overcome this problem. The biggest candidate is setting up a link on the EPA's website with a disclaimer that it is not a government site and the public can access it via the link.

I learned or improved skills in several areas of water quality sampling. I learned the importance of SOPs and how to read through them as a guide book in sampling methods for different

projects. I learned to be aware of clean hands, wearing gloves, and maintaining sterile conditions when sampling. I used small skills, such as the ability to make a checklist so objects weren't forgotten. Being prepared for all scenarios is important in packing for the field. The importance of proper calibration, maintenance, logging samples, recording observations, and sampling technique variations was highlighted and improved on. Dealing with unfavorable working conditions, considerations of costs, and maneuvering around obstacles in obtaining results or sampling areas were also skills I picked up. I will continue to use these skills and techniques in future careers and classroom settings.

I used several pre-existing skills in the laboratory for field preparation and calibrations of the instrument, including analytical procedures such as rinsing and properly using volumetric glassware when making dye solutions. My experience with Excel helped in creating electronic spreadsheets for recording calibration results and readings out in the field. I also made good field observations and field recordings, which were helpful in keeping an accurate log book. Having some previous knowledge of water quality calibrations helped me maintain the multi-parameter sondes and calibrate the probes weekly. I found that communication was a major skill I used when working with others to place the right people in projects pertaining to their interest in certain areas and assure the projects were carried out correctly.

My overall impression of the EPA is that it has great employees who are very passionate about their work. All the supervisors had interesting projects that deal with big environmental issues. The projects keep in mind the EPA's mission and are important to the surrounding communities and human health.

Through the summer experience I learned that I'm a very hands-on person and love to be involved in science. I missed being in the lab and not able to analyze the collected samples. If I could have helped in more of the sampling process from start to finish the job would have been more rewarding. I'm great at getting tasks done on time and feeling comfortable with new projects day to day. My internship was an exciting, rewarding job where at the end of the day I could feel accomplished by knowing I was one step closer to improving community health. The internship helped in advancing my career goals and put a new shift in my academics towards environmental management to have a hand in more of the end process of EPA's mission along with being out in the field!

My overall impression is that this summer internship was a great experience that would very well prepare anyone for a future career. I'm forever thankful for the experience. Through the 12 weeks I learned a lot about myself, my interests, and the areas of my academic career and future that I can expand upon. I'll truly appreciate this experience after graduation when searching for a career or continuing my education with having a better idea of what's ahead. Employees and other interns were passionate about their careers and it made the working environment rich in knowledge and opportunity. Being in a new place let me get out and explore on the weekends. The weekend trips not only kept me busy but I learned a lot about myself too. The project I was on also brought attention to other interests I had and wanted in the future.

My advice to next year's GRO interns is to be aware of the opportunities that come to them outside of their projects that they should take advantage of. Other supervisors took me to various streams testing for water quality parameters or local outcrops saturated with harmful pharmaceuticals. If you want to be on a project, volunteer for it. People in the EPA are there because they have similar passions to yours and that makes working together a very easy task. The employees are very willing to get interns out or working with what they are doing; you just have to show an interest. Not only did the internship expand my academic education it expanded how I adjusted to new surroundings. The more I took part in what was going on around me the more I grew to know myself!