St. Petersburg’s Retention Water Analysis

Artur Lysenko
Sponsored Faculty: Dr. Pandey, Madhu
Department of Science
Undergraduate Research CHM4970

Introduction

Saint Petersburg is known to have an average of 51 inches of rain per year. This creates a substantial amount of attenuate surface runoff during rainfall events. In order to avoid city flooding's retention ponds are scattered all around.(see figure 1).

The initial question that was asked is, *What is in that water?*

The focus of this undergrad research was to investigate any difference in physical properties within the surrounding area of University of South Florida St. Petersburg (USFSP).

Currently, there is a rising concern of what kind of contaminants are carried from urban roads and stormwater runoff that is collected in storm drains and retention ponds(Hyun-Min, 2016). The initial goal of this water analysis was to assay the metal content of samples. Additionally, the physical properties of collected water samples were compared:

- Specific Conductivity
- Total Dissolved Solids (ppt)
- RDO Saturation (%Sat)
- pH

Using standard analytical techniques and equipment such as *VuSitu Water Probe* four (4) water samples were studied located roughly within a three (3) mile radius around USFSP campus (Figure 1).

Research Objectives

- Find differences among water samples concerning Specific Conductivity, Total Dissolved Solids, RDO Saturation and pH
- Determine reasons for any differences found during research

Methods

Water Collection
After objectives have been determined, location and collection of water samples were the next step. With the assistance of Google Maps, four (4) distinct locations were identified that would be ideal representation of retention ponds with potential water runoff. Using a 500 mL glass bottle, each water sample were individually collected and labeled. The samples were filtered using a gravity based technique.

Water Testing
Each water sample were transferred into their own 500 mL beaker, just enough to cover the *VuSitu Water Probe* tip. Using the specialized app for the phone, all status of probe can be seen. After several calibration sequences, the probe was put into each beaker. A total of 10 data points were collected for each water sample. Probe was auto zeroed after each test. Data was then organized into Excel.

Results and Discussion

Figure 1. Visual Representation of water sample locations (Image credit: Google Maps).

Figure 2. Aerial view of Mirror Lake (Point 2 of Figure 1) Photo credit and rights: Bronson Cheeks

Each sample collected were from distinct retention pond collection centers. Sample 1 was collected from Booker Creek Park. Sample 2 was collected from Mirror Lake. Sample 3 was collected from Bartlett Park. Finally, sample 4 did not have any land mark reference but was a short walk from Brooker Creek Park.

An average of ten data points were used to produce the results seen within Table 1. However, one outlier within the data sets for samples 1, 2 and 3 was noticed and excluded within average calculation. One of the immediate visual difference was seen within sample 3 during specific conductivity analysis. Which was found to be roughly 44 times higher than compared to the other samples. Specific conductivity in water is the measure of how well an electrical current may be conducted. Higher level of conductivity indicates increasing amount and mobility of ions. This might also explain why sample 3 would have a higher level of dissolved solids. Finally, it was interesting to find that water sample 1 was more basic than compared to other samples.

Table 1. Each water sample collected were tested for the following properties: Specific Conductivity, Total Dissolved Solids, RDO Saturation and pH

	Sample 1	Sample 2	Sample 3	Sample 4
Specific Conductivity (µS/cm)	504.53	310.52	17619	415.17
Total Dissolved Solids (ppt)	0.3318	0.2021	11.45	0.2698
RDO Saturation (%Sat)	82.94	84.82	86.68	92.21
pH (pH)	8.24	7.78	7.29	7.86

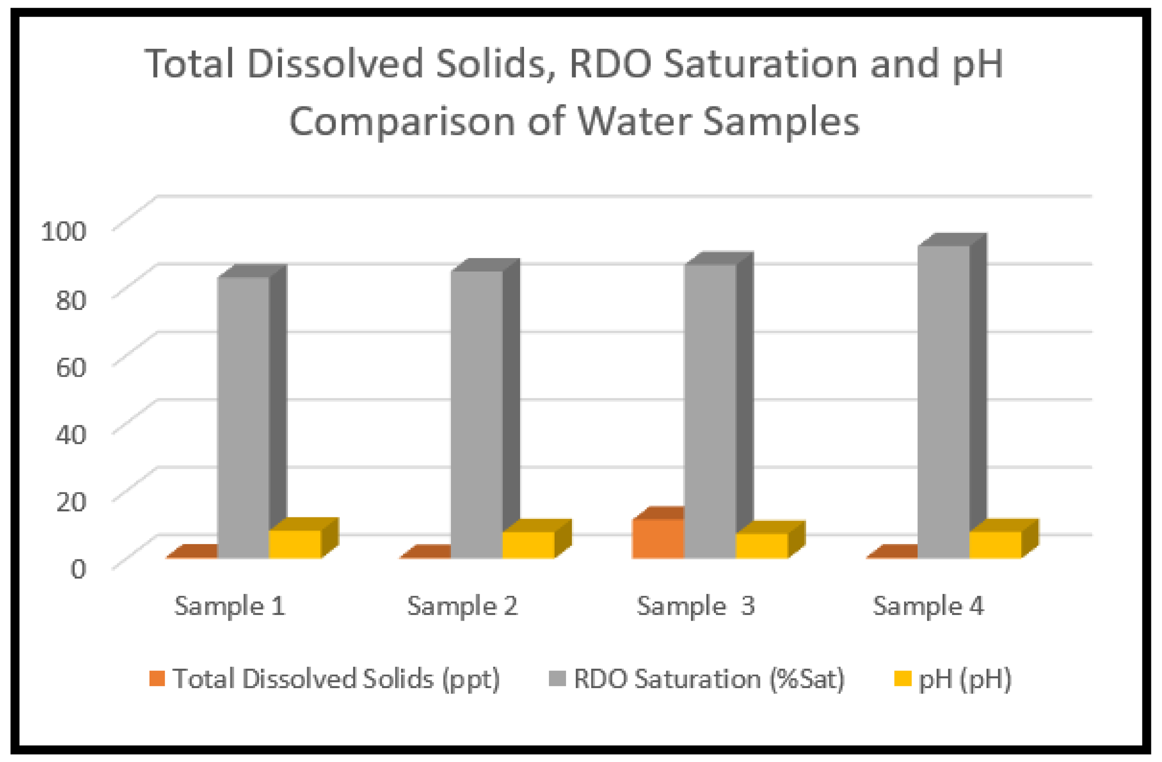

Figure 3. Visual representation of Total Dissolved Solids, RDO Saturation and pH for each water sample collected.

Conclusions

At first glance, a retention pond may seem surreal with an abundance and variety of Floridian wild life. Fish, birds and more often than not people come to enjoy the wonderful views that these sites may have to offer. However, not every thing on the surface holds true to what lies within. Based on the results collected, it can be concluded that there is more than just “Water” in these accumulation centers

Overview of Table 1 and Figure 3:

- Sample 3 provided the most outstanding results relating to Specific Conductivity and Total Dissolved Solids
- Sample 1 demonstrated the most basic result relating to pH while Sample 3 remained to most neutral
- Sample 4 reveled the highest RDO Saturation (Dissolved Oxygen) compared to the other water samples
- Sample 2 provided the least outstanding results relating to all fields that were examined.

Final Thoughts:

Modern day life will always be bustling with high activity. Vehicle end products, pesticides and agricultural techniques may be the direct contribution towards these abnormal results found during this analytical analysis of water samples around USFSP. However, not all retention ponds are the same. Some accumulation areas may be equipped with simple filtration mechanisms similar to the fountain seen within figure 2. When looked at surface value it provides an appealing aesthetic value to the area. But, what the fountain is really doing is recirculating the water that prevents it from turning stagnant. Additionally, the pumping process that the water may follow could also be cured and filtered by various means. In conclusion, it is important to monitor what exactly is released into the environment and further investigation may be required for areas with abnormal results.

References

Hyun-Min Hwang, Matthew J. Fiala, Dongjoo Park & Terry L. Wade (2016) Review of pollutants in urban road dust and stormwater runoff: part 1. Heavy metals released from vehicles, International Journal of Urban Sciences, 20:3, 334-360, DOI: 10.1080/12265934.2016.1193041

University of South Florida St. Petersburg. (2020). USFSP Student Research Symposium. Retrieved from https://digital.usfsp.edu/student_research_symposium/