**Engineering Water Quality Lab**

**TO:** Professor Sintana Vergara

**FROM:** David Topete, Grace Johnson, Broderick Gwathney, and Karly Johnson

**SUBJECT:** Engineering 115

**DATE:** September 20th, 2018

**CC:**

**Introduction:**

In this lab, our goal was to compare our understanding of water quality based on assumption to real data sets. We started by stating our hypotheses regarding the DO, Temperature, pH, and Turbidity of four different water sources along a single water path that passes through one major water body. After group analysis of our sample zones and our hypotheses we went out to our locations to collect data regarding our previously stated water quality variables. After our field work we partook in group analysis where we compared hypotheses and true data to gauge our understanding of water quality, and to hopefully further our understanding of water quality to better equip us when making generalizations about a water source.

**Materials & Methods:**

Materials used in our group were a turbidity meter HI93703, a dissolved oxygen meter YSI model 55, and a pH meter. We used the turbidity meter to measure how much light is scattered from particles as a light beam passes through our water sample. While using the turbidity meter we noticed that our measurements for 10 NTU's were inaccurate. For example, a reading had 2.4 NTU. As for dissolved oxygen, it was more straightforward. However, we ran into a problem where we were measuring in percentage instead of mg/L. This meant we needed to convert our percent to mg/L. Our dissolved oxygen meter gave us the temperature of water which made the process faster. A method we used to save time was where each one of us had an assigned tool where we alternated between location and collected data at the same time. For the first location, it took us a long time because the spot we choose was mainly for one person. There may have been a couple of mistakes as we have mentioned before such as not working at the same time and collecting data at the same time.

**Results:**

| Location | DO (mg/L) | Temp (℃) | pH | Turbidity Reading with 10 NTU Sample | Turbidity Reading from site (NTU) |
|---|---|---|---|---|---|
| **College Creek** | 7.42 mg/L | 16.6 ℃ | 7.08 pH | 9.94 NTU | 4.08 NTU |
| **Upstream Fern Lake** | 10.4 mg/L | 11.8 ℃ | 6.98 pH | 10.02 NTU | 6.37 NTU |
| **Fern Lake Outlet** | 7.75 mg/L | 14.3 ℃ | 6.93 pH | 4.30 NTU | 1.40 NTU |
| **Jolly Giant Creek** | 10.6 mg/L | 11.6 ℃ | 6.94 pH | 2.45 NTU | 5.29 NTU |

This data table shows all our measurements from every location we measured. We walked to four different locations on campus and took measurements at each one including dissolved oxygen, temperature, pH level, turbidity reading with 10 NTU sample, and turbidity reading from each site.

**Discussion:**

1. Some of the measurements we recorded agreed with our hypothesis, but not all of them. For example, our recorded pH values across the board were relatively neutral with all recorded values being between 6.9-7.1pH. This greatly disproved our hypotheses regarding the pH at College Creek, Fern Lake (outlet), and Jolly Giant Creek, since we assumed they would all have low pH due to the buildup of Redwood Tree organic matter which is acidic by nature. Along with our pH contrast, our temperature results were also different than expected. We recorded higher water temps between 14-16℃ at College Creek and Fern Lake (outlet) and lower temps at our other two locations, both sitting at roughly 11℃. These results differ greatly with our hypotheses due to a general misjudgment of the amount of DO present within each water source, thus also putting our temperature judgement askew due to their known inverse relationship. Finally, our turbidity readings were a bit cleaner than expected with most sitting at below 10 NTU, with our initial hypothesis stating that all water sources would have an average NTU referring to a 15-20 NTU.
2. After recording all of our data from the four water points, our water temperature seems to be average with all samples sitting between 11-17℃, which is comparable to the 10.5-17℃ average for Humboldt County freshwater source temperatures for the month of September (). Along with our water temperatures sitting at an average point, all of our pH samples were neutral with readings from 6.9-7.1pH and in comparison to the humboldt

average of a neutral 7 pH is pretty similar (Stillwater Sciences, 2009). Our turbidity recording ended up reading between 1.40 NTU's and 6.37 NTU's which is. Finally, for our DO measurements we recorded DO being between 7.42 mg/L and 10.6 mg/L which is high compared to the 5 mg/L to 7 mg/L average during the summer (Stillwater Sciences, 2009).

3. Our data ended up containing several errors due to misinterpretations and problems with the instruments being used. Firstly, measuring our first turbidity reading in college creek ended up being incorrect. We measured our turbidity in three different spots along the first creek instead of measuring in one direct spot. This would explain why our measurements are, 2.22 NTU, 2.47 NTU and 7.54 NTU. After realizing our mistake, we measured from the same exact spots for the next three locations. Now although we did collect samples from the same three spots to correct our mistake, we still found problems with our turbidity data. Something happened during our recordings to cause the 10 NTU readings to progressively decrease from 9.94 NTU all the way down to 2.45 NTU by the final location.

**Conclusion:**

Our measured pH values across the board were relatively neutral with all recorded values being between 6.9-7.1pH. We recorded higher water temps between 14-16℃ at College Creek and Fern Lake outlet, and lower temps at our other two locations, both at roughly 11℃. We recorded DO being between 7.42 mg/L and 10.6 mg/L. Most of our 10 sample turbidity readings sat below 10 NTU's, with the one from upstream of Fern Lake reaching 10.02 NTU's. Our turbidity ended up reading between 1.40 NTU's and 6.37 NTU's.

**Appendix:**

Water Quality Lab Raw Field Data

| Location | DO (mg/L) | Temp (℃) | pH | Turbidity Reading with 10 NTU Sample | Turbidity Reading from site (NTU) | Notes |
|---|---|---|---|---|---|---|
| College Creek | 7.42mg/L | 16.6℃ | 7.08pH | 9.94NTU | 2.22NTU<br>2.47NTU<br>7.54NTU | We calculated the turbidity in different spots along the creek. |
| Upstream Fern Lake | 10.4mg/L | 11.8℃ | 6.98pH | 10.02NTU | 5.59NTU<br>6.80NTU<br>6.73NTU | |
| Fern Lake Outlet | 7.75mg/L | 14.3℃ | 6.93pH | 4.30NTU | 1.02NTU<br>1.79NTU<br>1.40NTU | Turbidimeter began to give odd readings. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Jolly Giant Creek | 10.6mg/L | 11.6℃ | 6.94pH | 2.45NTU | 8.12NTU<br>4.94NTU<br>2.80NTU | More inconsistent readings. |

**Works Cited:**

Stillwater Science, Dam Removal and Klamath River Water Quality, March 9th, 2009
http://www.stillwatersci.com/resources/2009klamathWQsynthesis.pdf