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Water Quality Assessment and Measurements Memo

Introduction:

Our Engineering 115 group analyzed water quality samples from three distinct sources on the campus of Humboldt State University. Samples were taken from upstream of Fern Lake, in Fern Lake near the outlet, and within Jolly Giant Creek just upstream of the dorms. From each of these samples we conducted tests to analyze the levels of dissolved oxygen (mg/l), temperature of the water (degrees C), alkalinity and acidity levels, as well as turbidity (NTU), to determine the impact that HSU has on the water quality.

Materials and Methods:

Each of these water quality tests was performed by each of us at least once, and each test (other than temperature) was done no less than three times at each site. The dissolved oxygen test required the use of the YSI model 55 dissolved oxygen meter to measure the amount of oxygen present per liter of water. To conduct this test, we had to calibrate it by instructions on the lab manual. Afterwards, the probe was inserted into the water, slightly moved through the stream until a steady measurement of the dissolved oxygen levels were acquired. Temperature was determined simply through a built in thermometer in the DO meter. Our next test consisted of testing the pH levels in the three sample locations. To do so, a small bottle was placed in the stream and filled with stream water. This bottle was then connected to the pH meter, which automatically determined the concentrations of hydrogen within the sample. The fourth and final test was for turbidity. A small glass bottle was filled with stream water and placed into the instrument which used infrared light to determine the amount of undissolved particles within the water.

Results:

Dissolved Oxygen, a measurement of the amount of oxygen in milligrams per litre of the sampled water is often used as an indicator for plant health, harmful algal blooms, and excessive decomposition within the water body. Upstream of Fern Lake yielded 10.74 mg/L, while near the outlet of the lake yielded 7.23 mg/L, and Jolly Giant Creek upstream of dorms yielded 10.15 mg/L.

Temperature is another measurement of health within the water bodies. Temperatures that are too high or too low can put stress on plants and animals within the body of water. Upstream of Fern Lake yielded 12.0 degrees C, Fern Lake near the outlet yielded 15.5 degrees C, and Jolly Giant Creek upstream of dorms yielded 12.0 degrees C.

The pH is the concentration of positive hydrogen ions within a solution. pH can indicate the sediments or chemicals within a body of water as well as their possible toxicity to the

environment. Upstream of Fern Lake yielded a pH of 6.1, Fern Lake near the outlet yielded a pH of 5.7, and Jolly Giant Creek upstream of dorms yielded a pH of 5.9.

Turbidity is a reading in NTU's for the amount of sediments within the sample. It may also be known as a rating for the clarity of a solution. Too many sediments can place stress of aquatic animals and is also an indicator of water quality. Upstream of Fern Lake Yielded 2.44 NTU's, Fern Lake near the outlet yielded 2.95 NTU's, Jolly Giant Creek upstream of dorms yielded 1.10 NTU's.

Discussion:

The water quality data that was gathered shows that the water bodies within Humboldt State University are currently in moderate to good health. In comparison to the free flowing stream of Jolly Giant Creek, the Fern Lake was slightly less healthy, as the D.O. levels were lower and the temperature was higher, which would be expected in a still lake compared to a flowing stream. The stream which flows into the Fern Lake was slightly healthier than the location of Jolly Giant Creek where our samples were taken. This area of sampling was at a higher elevation, and therefore further up the watershed. The pH levels of the Jolly Giant Creek, the Fern Lake, and the stream feeding Fern Lake show that Fern Lake is slightly more acidic than Jolly Giant Creek, and the stream feeding Fern Lake is less acidic than Jolly Giant Creek. Overall, the turbidity which was the highest (having the most suspended particles) was the turbidity of Fern Lake, near the outlet. The streams were less turbid, particularly upstream of Fern Lake. There is a direct correlation between the health of the water samples and the levels of turbidity, dissolved oxygen, and pH in our data. Our data shows that higher turbidity corresponds to lower dissolved oxygen and higher pH. In comparison to data collected by a previous class in November of 2015, our data indicated better DO conditions, better temperatures, lower pH, and much better turbidity. It is important to note that while this appears to suggest that the streams are improving, the data from 2015 was taken from a seperate creek on campus, rather than the same locations where our data was collected. This means that you cannot draw conclusions from this comparison, because the quality of College Creek was never determined by our group. Also, this could be a result of the fact that College Creek runs directly through campus while the locations where our group took samples were further up the watershed.

Conclusion:

As predicted, the data shows that the further upstream we tested, the healthier the stream. The pH levels of the three creeks show that the stagnant water was more acidic, as predicted, and the flowing streams were less acidic. The stream which feeds in to Fern Lake, being further up the watershed than the Jolly Giant Creek had the lowest acidity and was closest to ideal pH for healthy stream organisms. Also, dissolved oxygen was lower and at a less desirable level in the Fern Lake, but higher at the inlet into the lake from the stream which feeds the lake. The stream with the healthier measurements was further up the watershed than the less healthy streams, and therefore further from campus. This means that while the effects are small, the HSU campus does have a negative impact on the watershed. Given the data from

previous samplings of College Creek, the stream water sampled within campus itself showed even less healthy readings than those sampled by our lab, further supporting our conclusion.