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## INTRODUCTION

During this lab, the group analyzed dissolved oxygen (DO), turbidity, pH and temperature at different locations around HSU. The objective of this lab was to learn more about water quality and possible impacts the university has on local waterways. Hypotheses were formed as to what water the quality measurements might be at several different locations. After hypotheses were recorded, water quality samples were taken at four different locations. While taking measurements, each group member traded off using the different measurement instruments.

## MATERIALS AND METHODS

The YSI model 55 dissolved oxygen (DO) meter was used to measure dissolved oxygen.. After calibrating it, the probe was inserted into the sample and a reading was taken in mg/L while agitating the probe in the sample. An HI93703 meter was used to take the turbidity reading. The group first checked the turbidity using the 10 NTU standard solution in the first cuvette, then agitated the sample to ensure it was adequately mixed. The second cuvette with the sample (allowing air bubbles to escape) was filled and the glass was wiped off to remove any fingerprints or excess sample/dirt. Readings for turbidity were taken in NTU's. The pH meter had been calibrated prior to class. The probe was at least 1.5 inches under the top of the sample and it was agitated in the water to measure the pH accurately. The group also took the temperature of the water using this tool.

## RESULTS

In Fern Lake near the outlet, the water had a much lower DO level of 8.05 mg/L than the water at the other sites. The DO of the water in the fish hatchery and at the other sites ranged from 10.40 mg/L to 10.75 mg/L. The temperature of the water in the fish hatchery was measured at 13.2 C while the other temperatures ranged from 11.0 C to 11.8 C. The water upstream of Fern Lake had the most acidic water with a pH of 5.86 while water tested at the fish hatchery had the most basic level with a pH of 7.60. The sample from Fern Lake near the outlet and in Jolly Giant Creek upstream of the dorms both had pH levels close to 6.0. Turbidity in Fern Lake near the outlet had the highest turbidity reading of 41.24 NTU. Upstream of Fern Lake and the Jolly Giant River gave similar turbidity readings of 11.00 NTU and 11.54 NTU respectively.

## DISCUSSION

According to the Week 4 Water Quality PowerPoints for a healthy lake ecosystem, the average DO levels should be greater than 4mg/L, and the average temperature should be less than 20 C (Cashman, E. 2016). According to *Fundamentals of Environmental Measurements*, average pH levels should be between 5 and 6 (PH of Water, 2016). According to the PowerPoint, the average turbidity should be less than 25 NTU.

Due to the controlled environment in the fish hatchery, a higher pH level and temperature reading is observed. The higher temperature is necessary in the hatchery because bacteria is used to control the levels of ammonia and is used to clean the water of byproducts from the fish. The bacteria need warmer water to assist with water quality management. Many types of trout and salmon, like the kinds in the hatchery, require these lower temperatures to sustain life. It was expected that the water in the fish hatchery would be cooler, however, due to the needs of bacteria, the temperature is kept slightly higher.

The turbidity estimates in the lake are higher than expected. It was expected that the turbidity measurements would have less variance than what was found. It was raining when the samples were taken and this could have affected the acidity because rain is typically close to the pH level that was found. As the water moves into more populated areas with more human activity, it becomes polluted with suspended solids, which is reflected by the turbidity readings. The dissolved oxygen is being used up while the water sits in Fern Lake. The water is also warmed when it's collected in one spot with less agitation and lower flow rates. However, the temperature drops and the dissolved oxygen is replenished once the water exits Fern Lake and returns to the Jolly Giant Creek. This is due to evaporation cooling the water and a larger surface area where oxygen can be reabsorbed. One possible error is that the instruments were not calibrated correctly.

## CONCLUSION

The surface area and flow rates of water have a huge impact on many water quality measurements, especially temperature and dissolved oxygen. If BOD levels were to be taken in the lake, there likely would have been higher BOD levels since the DO levels were significantly dropping there. This makes sense because of the large amount of biodiversity surrounding Fern Lake. It is also suspected that the human activity in the Fern Lake area increases the amount of turbidity and total dissolved solids from pollution and foot traffic.

Appendix:

A1:

Location	DO (mg/L)	Temperature (C)	pH	Turbidity Reading with 10 NTU sample	Turbidity reading from site (NTU)
Fish Hatchery	10.40 mg/L	13.2 C	7.60	8.63 NTU	5.09 NTU
Upstream of Fern Lake	10.40 mg/L	11.3 C	5.86	10.63 NTU	11.00 NTU
In Fern Lake near outlet	8.05 mg/L	11.8 C	6.00	10.63 NTU	41.24 NTU
In Jolly Giant Creek upstream of dorms	10.75 mg/L	11.0 C	6.07	10.63 NTU	11.54 NTU

A2:

## References

Cashman, E. (2016). Water Quality. [Powerpoint]. Retrieved from Humboldt State University ENGR 115 Moodle Site.

"PH of Water." *Fondriest.com*. U.S. EPA, 10 Feb. 2015. Web. 19 Feb. 2016.