MEMORANDUM

TO: DUSTIN POPPENDIECK
FROM: JOHN HUNTER, JON BRITO, JOSEPH JUDGE III, AND HECTOR HERNANDEZ
SUBJECT: FISH HATCHERY
DATE: 2/19/2010

Introduction

The purpose of the fish hatchery lab was to become more familiar with the factors that influence water quality. In the lab we became affluent with the instruments that record pH, turbidity, dissolved oxygen and temperature. With this data recorded in three separate locations of the fish hatchery plant, we were able to analyze the factors that might contribute to the change in water quality; which include pH, turbidity, dissolved oxygen and temperature. In doing this, we were able to gain a better understanding of how water quality can be altered.

Procedure

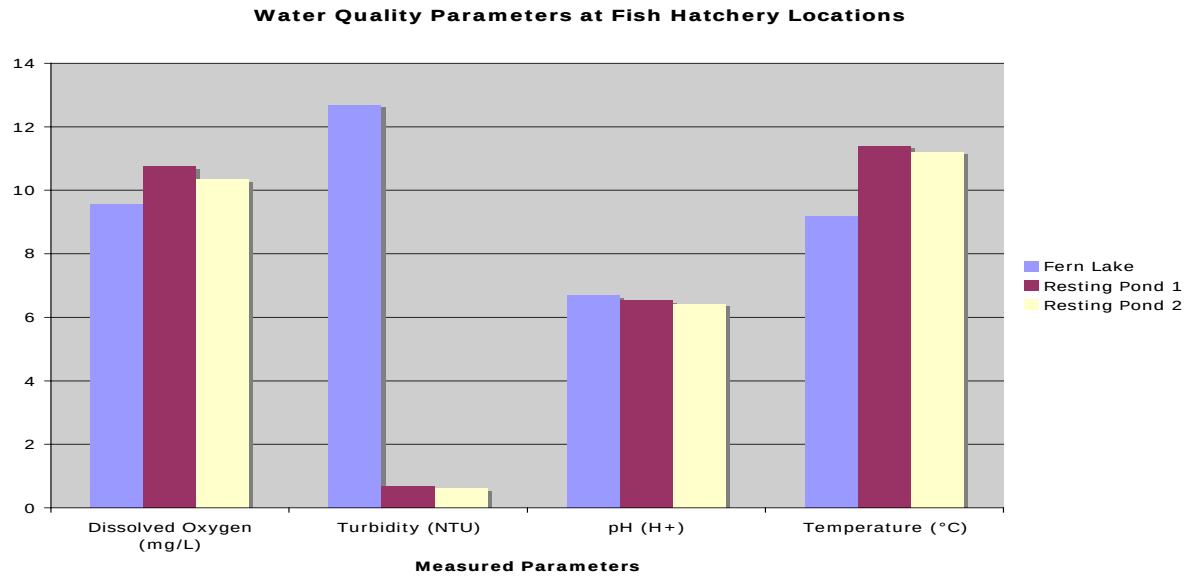
In retrieving the data we used pH, turbidity, dissolved oxygen and temperature reading instruments. The data was collected from three different locations: fern lake, resting pond one, and resting pond two. From the data that we gathered, we took the average in order to get a more accurate result. While collecting the data at fern lake we chose to go out to the middle of the lake to get a stagnate area indicative of the whole pond. While collecting the data from the areas within the fish hatchery facility we collected a sample in a bucket and ran the tests. We then poured the collected water on the ground to prevent contamination, from instruments, to the water in the fish hatchery.

Results

This section depicts the findings corresponding to the specified parameters of dissolved oxygen, turbidity, pH, and temperature as measured at Fern Lake, resting pond one and resting pond two; collected 11February2010 at 1100.

Table 1 and Graph 1: Average Values of Water Quality Data for Specified Locations

Location	Dissolved Oxygen (mg/L)	Turbidity (NTU)	pH	Temperature °C
Fern Lake	9.57	12.68	6.68	9.2
Resting Pond 1	10.74	0.69	6.53	11.4
Resting Pond 2	10.34	0.61	6.42	11.2



Discussion

As a group we were able to learn a significant amount just from some basic water quality tests. Our initial assumptions about the changes in quality of water as it flowed through the fish hatchery system were moderately accurate. We thought that from Fern Lake to resting pond one the pH, turbidity, and temperature would decrease and dissolved oxygen would increase. We figured that the cooling towers would decrease temperature and increase dissolved oxygen due to the exposure to air. We thought the pH and turbidity would decreases because of the filtration as the water first enters the fish hatchery area from Fern Lake. As the water moved from resting pond one to resting pond two we thought that temperature, turbidity and pH would increase and dissolved oxygen would decrease. The reason for the increase in temperature was that the movement of water would have some loss to heat flowing into the system from friction. We felt that the fish would cause a decrease in pH and turbidity due to their excretion. For the dissolved oxygen we assumed that it would decrease due to the fishes consumption of oxygen and there creation of BOD.

A few nuances were able to throw off our predicted values of the water quality. The dissolved oxygen (D.O.) concentration peaks at the first (RP1) resting pond and then somewhat decreases within resting state two (RP2). This is due to the increased oxygenation of the water as it flows from Fern Lake to RP1.During its transition between locations more surface area is exposed allowing for oxygenation of the water. During the transfer process from the lake to the hatchery, the water is trickled down a cooling tower, which breaks up the water into small droplets, allowing for better O_2 absorption. D.O. levels from RP2 are less than that of RP1 due to the water being consumed by the fish, BOD and the decrease in the disturbance of water that causes oxygen to dissolve.

Turbidity had the most drastic change of all parameters measured. This dramatic decrease results from the filtration process that occurs prior to the channeled water entering the resting ponds, where the readings for the second and third locations were taken. The readings of turbidity between the two ponds were very similar due to the lack of any further filtration once the water entered the hatchery.

The pH remained relatively the same although a slight decrease as we go through the system. This slight decrease is pH does not correspond accordingly to the chemical change that occurs with the excretion of ammonia causing high abundance of hydroxide ions and should therefore increase pH. There is a possibility that the water is buffered and prevents any noticeable change in pH due to the increase of hydroxide ions.

The temperature in the hatchery is higher due to the movement of water. This resulted in an overall increase in temperature between the measurements at RP1 and RP2 relative to Fern Lake. The slight temperature decrease in RP2 from RP1 is caused by the decrease in the flow of water.

In comparing our results with other water sources we were able to find similar results. The Turbidity between Fern Lake and the Coal River Dam are relatively the same which makes sense because they are both relatively non-moving bodies of water. Resting ponds one and two have a much lower turbidity then the Nile River. A reason for this is there is an actual process in the fish hatchery that is filtering out particles in the water for the fish while in the Nile River, Australia there isn't any process to filter anything out so the particles will remain suspended in the water. Also in a climate with a higher temperature the dissolved oxygen is more likely to evaporate with the water. Comparing Humboldt to Southern California there is a big change. This can be explained by the different geography, with Fern Lake being in Humboldt where it is cooler and the San Diego River and Pala Reservation Lake being in a place much further south and warmer which would heat the water. The two southern bodies of water have a more acidic pH than the northern ones because the fish hatchery has a high concentration of fish that are releasing ammonia that make the water more basic because of the hydroxide ions. See Appendix Table 3.

Conclusion

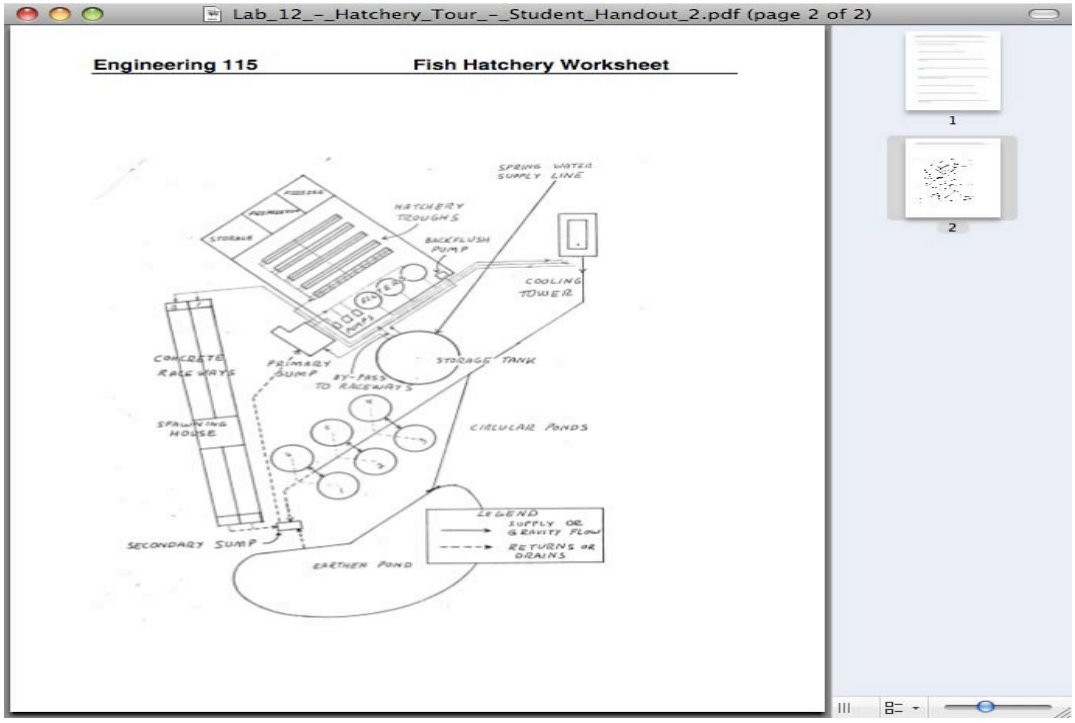
From this experiment we were able to learn how to effectively determine the water quality and how it can be altered by being processed. From Fern Lake to the hatchery the turbidity and pH decreased and the D.O. and Temperature increased. Subtitle changes occurred in the hatchery but are not significant compared to the changes from Fern Lake to the hatchery

Appendix

Table 2: Raw Data and Average Values of Water Quality Parameters for Specified Locations

	Dissolved O_2 (mg/L)	Temperature (^oC)	Turbidity (NTU)	pH
Fern Lake				
1	9.43	9.3	12.66	6.50
2	9.75	9.1	12.68	6.55
3	9.53	9.2	12.70	6.69
Average	9.57	9.2	12.68	6.68
Resting Pond 1				
1	10.86	11.3	0.64	6.51
2	10.72	11.4	0.76	6.50
3	10.64	11.5	0.68	6.59
Average	10.74	11.4	0.69	6.53
Resting Pond 2				
1	10.42	11.2	0.68	6.44
2	10.28	11.2	0.69	6.43
3	10.32	11.2	0.45	6.40
Average	10.34	11.2	0.61	6.42

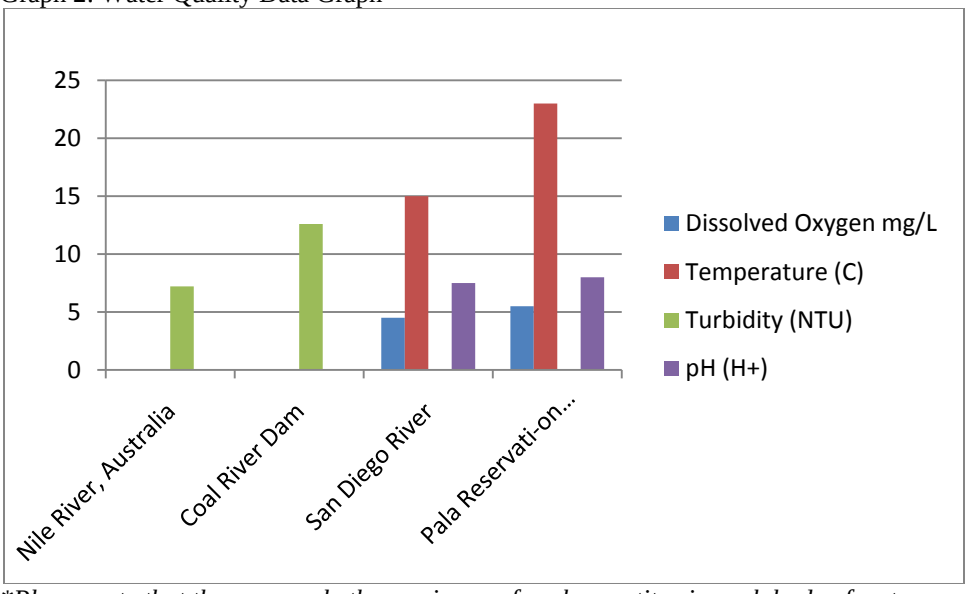
Figure 1: Map of Humboldt State University's Fish Hatchery



*Map courtesy of Dustin Poppendie

Below is data from other water sources and is used in comparasion in the dicussion.

Graph 2: Water Quality Data Graph



**Please note that these are only the maximum of each quantityy in each body of water*

Table 3: Water Quality Data Table

Location	Dissolved Oxygen mg/L	Temperature (C)	Turbidity (NTU)	pH (H+)
Nile River, Australia			7.2	
Coal River Dam			12.6	
San Diego River	4.5	15		7.5
Pala Reservati-on Lakes	5.5	23		8

This data was taken from two site http://www.sdcwmc.org/assets/data/WWMD_06datainterpretation.pdf *and* http://soer.justice.tas.gov.au/2009/table/81/index.php