Water Quality Project Final Report

Field Biology

This report is an individual assignment. It should be written in the PAST TENSE (because you will be completing this report after your project is complete). When you are done, e-mail your work to dan.bregar@corvallis.k12.or.us with the subject line "per *X your name* WQ report".

Introduction:

This section of your report consists of a description of your question and background information about your project. Most of this information should come from your Water Quality Project Proposal.

In one paragraph, explain your "What is the Relationship Between" question. Add some supporting details to clarify the purpose of your study.

In another paragraph, describe the two water quality parameters you included in your question. Explain what each parameter is and why it is important for water quality.

In a third paragraph, describe the second factor in your question. Add supporting information explaining the ecological importance of this factor.

Methods:

This section of your report will contain three step-by-step lists of instructions – one for each water quality parameter in your question and one for the second factor in your question.

Make sure that your instructions are clear, detailed, and describe the actual steps you took to make your measurements.

Results:

This section of your report will describe the information you found and include data tables (NOT graphs!) that summarize the measurements and calculations you made.

In one paragraph, write about the information you found. Describe the water quality data you collected by using averages and totals. Compare the data you collected on different days (if you were able to collect more than one days' worth of data). Be thoughtful about the comparisons and calculations you make – ensure that your summary makes sense both numerically and ecologically.

Also include in this section at least 4 summary data tables. These tables should compare and contrast the water quality parameter measurements you made, the measurements of your second factor, and measurements you made on different days. Some of this

information will overlap with the information you presented in the written paragraph above.

(If time becomes an issue, you can include two rather than 4 summary tables. Make sure to check with your instructor first!)

Discussion:

In this section of your report, you will use your data to answer your question. This section will include graphs that show the trends in your data along with your interpretation of those graphs and an overall critique of your study.

You will need to have two graphs for every day you collected data – one X-Y scatter plot graph for each water quality parameter you tested. These graphs should have your 2nd factor on the X-axis and one water quality parameter on the Y-axis. Use Excel to add a trendline to your data showing the correlation between the water quality parameter and your 2nd factor. You will need to reorganize your data tables in Excel to produce these graphs quickly and easily – use one data table per graph that has two columns: 1st, your 2nd factor; 2nd, ONE of the two water quality parameters you measured. You will also need to replace any category names with numbers (Excel cannot create scatter plots from category names).

For your written analysis, answer the following questions (in paragraph form) for EACH graph:

1. What was the correlation that your data shows – positive (up and to the right); negative (down and to the right); or none (horizontal line)?
2. What does this correlation tell you about the answer to your question for this water quality parameter on this day?
3. What ecological factors do you think might have caused the correlation (or lack thereof) that you see? (If you see the same correlation for the same water quality parameter on different days, you do not have to answer this question twice.)

Your response to these questions should be about one paragraph in length for each graph in your report.

(If time becomes an issue, you can include just two graphs and accompanying paragraphs, rather than 4. Make sure you check with your instructor first!)

Here is an example of what your final report should look like:

Water Quality Final Report – Nitrates, Conductivity, and Animal Waste

Introduction:

The question I asked for my study was "What is the relationship between nitrate levels and the conductivity of the Willamette River and the amount of animal

waste along the shore of the river?" I was interested in seeing if there was any correlation between the amount of visible animal waste and the amount of nitrates (NO_3^-) and the level of conductivity in the Willamette River. Animal waste is rich in nitrogen, so I thought it might increase the amount of nitrogen in the river. I also thought that the salt compounds in animal waste might increase the conductivity of the river water.

Nitrates are compounds of nitrogen and oxygen that are created by biological organisms. Nitrogen is essential for life and is a component of DNA. Animals produce nitrates in their waste as a byproduct of metabolism. Nitrates are considered a fertilizer and a pollutant – they can help plants and other organisms grow, but in high quantities, nitrates can cause bacterial blooms in water that deprive other organisms of oxygen.

Conductivity is a measurement of how much electrical current water can carry. Conductivity is an indicator of other substances in the water: salts (substances that are created when two charged particles bind together electromagnetically). Different salts can have different effects on water quality. Some salts are beneficial for organisms and plant life, and can have a useful nutritional effect on drinking water. However, in high quantities, most salts render water undrinkable and can cause plants and animals to dehydrate. Some salts are also toxic in and of themselves.

Animal waste consists of urine and feces produced by organisms. Urine is generally not visible; however, feces takes a while to decompose so it can be detected for several hours or days after it is produced. Animal waste consists of water, nitrates and other nitrogen compounds, undigested or partially digested foods, and intestinal bacteria. When animals generate waste near a river or lake, there is potential for some of the waste to be washed into the water during rain storms.

Methods:

Nitrates –

1. We collected a small sample of water near the shore of the Willamette River
2. In the lab, we attached a nitrate sensor to a laptop computer
3. We calibrated the sensor by using known solutions of 0 mg/L nitrogen and 10 mg/L nitrogen
4. After calibrating the sensor, we tested our calibration on 0 mg/L nitrogen and 10 mg/L nitrogen solutions
5. Finally, we tested the nitrate levels in our sample and recorded them on our data sheet

Conductivity –

1. We tested conductivity directly in the Willamette River by using a conductivity sensor

2. The sensor did not need to be calibrated, so we simply placed the electrodes in the water and wrote our results on our data sheet.

Animal Waste –

1. At each spot where we collected data, we looked for 10 meters upstream and 5 meters away from the bank for any visible animal waste
2. Any time we spotted animal waste, we estimated the amount (in grams) and tried to identify what kind of animal it came from
3. We spent five minutes searching each site so we had an equal chance of finding animal waste in each spot

Results:

Overall, we saw higher waste, nitrate, and conductivity amounts on 1/6/2010 than on 1/11/2010. Waste amounts in grams ranged from a low of 1 (on 1/11/2010) to a high of 8 (on 1/6/2010). In general, nitrate levels were low – the highest value we recorded was 0.7 mg/L by the shrubby area. Conductivity varied within a narrow range of 0.2 S/m to 0.7 S/m, indicating a relatively low amount of dissolved solids on both days in all the sites we sampled.

The data tables below summarize our findings:

Average Waste (g)	Average Nitrates (mg/L)	Average Conductivity (S/m)	Date
4.67	4.94	0.48	1/6/2010
2.67	4.1	0.35	1/11/2010

Data from 1/6/2010

Animal Waste (g)	*Nitrates (mg/L)*
3	5.6
5	6.23
2	4.5
8	5.7
4	3.4
6	4.2

Animal Waste (g)	*Conductivity (S/m)*
3	0.4
5	0.6
2	0.3
8	0.4
4	0.7
6	0.5

Data from 1/11/2010

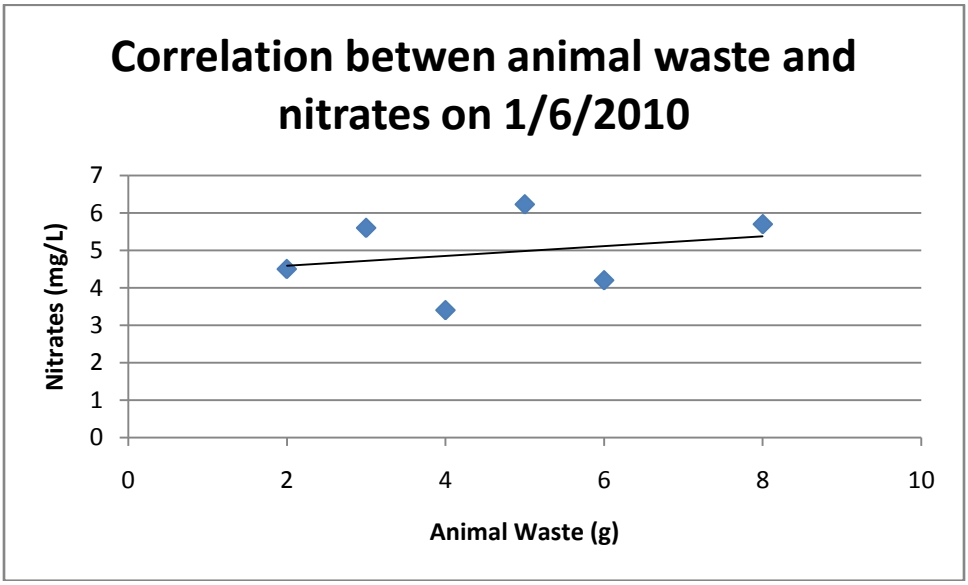
Animal Waste (g)	*Nitrates (mg/L)*

2	3.4
3	3.5
2	2.6
5	4.2
1	5.4
3	5.5

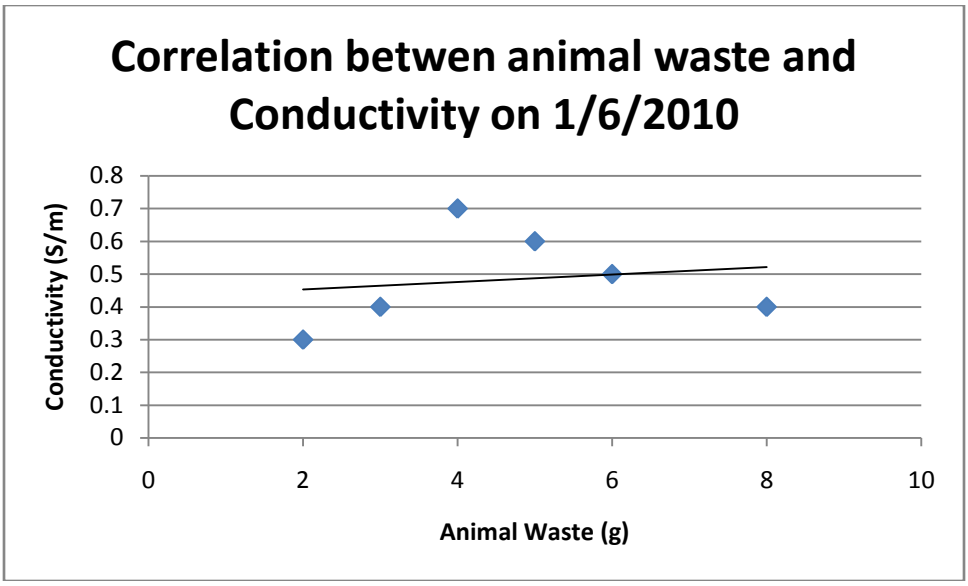
Animal Waste (g)	*Conductivity (S/m)*
2	0.3
3	0.4
2	0.2
5	0.5
1	0.3
3	0.4

Discussion:

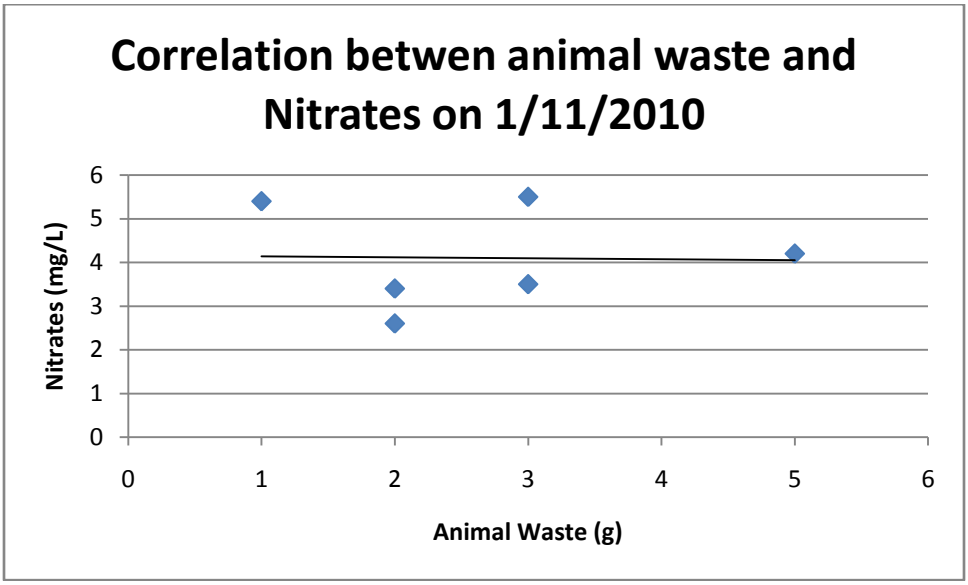
The following graphs show the correlations we observed between the nitrates, conductivity, and visible animal waste.



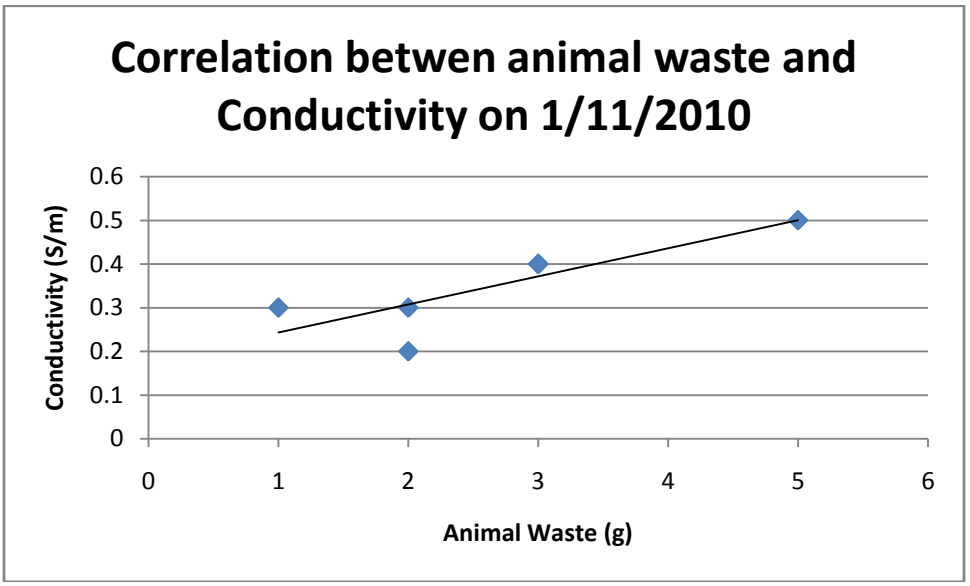
This graph shows that there is a slight positive correlation between the amount of nitrates we measured and the amount of animal waste in each location on this date. This indicates that as nitrate levels increase, the amount of animal waste increases as well. It seems to us that the most likely reason for this is that nitrogen from the animal waste wasted into the river, increasing the nitrate levels in the water.



This graph shows that there is a very slight positive correlation between the amount of conductivity we measured and the amount of animal waste in each location on this date. This indicates that as conductivity increases, the amount of animal waste increases as well. It seems to us that the most likely reason for this is that the animal waste contains chemical compounds that wash into the water, increasing the electrical conductivity of the water.



This graph shows that there is a slight NEGATIVE correlation between the amount of nitrates we measured and the amount of animal waste in each location on this date. This seems to indicate that as nitrate levels increase, the amount of animal waste decreases. This result contradicts our result from the previous date – perhaps indicating measurement error or lack of sufficient data.



This graph shows that there is a steep positive correlation between the amount of conductivity we measured and the amount of animal waste in each location on this date. This reinforces our previous measurement, making it more likely that our results are correct.