A Changing Climate, and the Waters of Whatcom County

JJ M, MJ B, Owen S
Geology 100

Research Question & Background

Our initial research leads us to believe that as the temperature of a body of water rises, the pH will lower, which in turn means the water will be more acidic and less hospitable for its inhabitants.

If this is true, then as the climate continues to warm it will create an environment that is unsustainable for the current aquatic ecosystem. *1

What is the relationship between pH and acidity?

pH is a measure of how acidic or basic water is. The range is 0-14, with 7 being neutral. pH less than 7 indicates acidity, whereas a pH greater than 7 is basic. *2

The average healthy body has a pH of 6-8

As the pH approaches 5, non desirable species of plankton and mosses begin to invade, and populations of fish such as small mouth bass disappear

Below a pH of 5, fish populations begin to disappear, the bottom is covered with undeclared material, and mosses may dominate nearshore areas. Below a pH of 4.5, the water is essentially devoid of fish. *4

Methodology

Gather approximately 200 mL of water from three different sources around Whatcom County. (Bellingham Bay, Lake Samish, and Lake Padden)

Record initial temperature and pH level before testing (See figure 1)

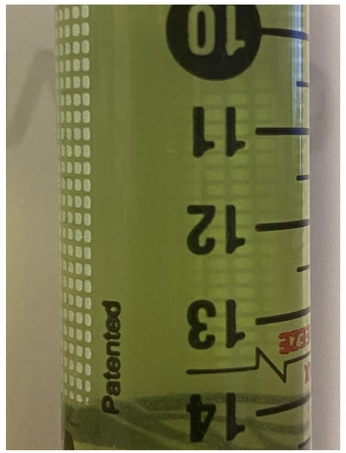
Raise temperature of sample #1 by roughly 25° F and re-test pH

Raise temperature of sample #2 by roughly 50° F and re-test pH

Record and analyze results

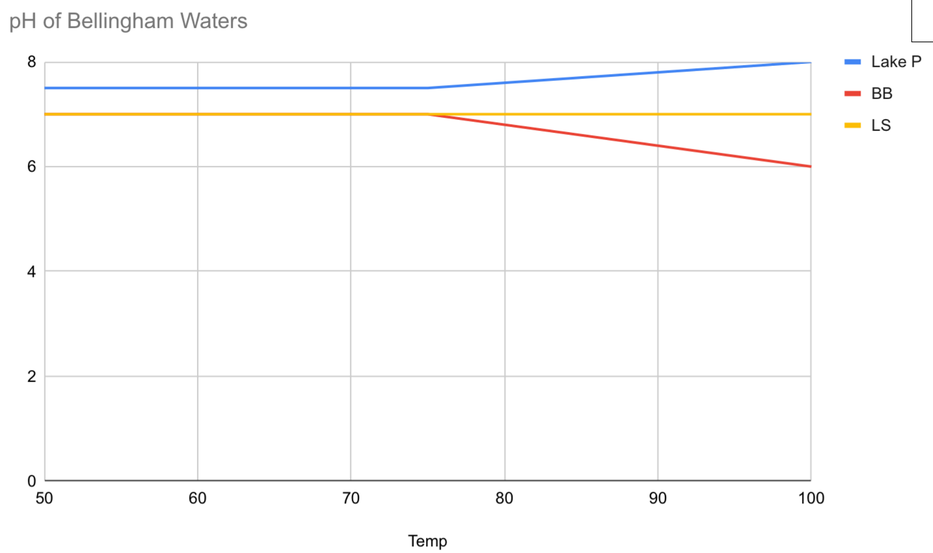
Bellingham Bay (48.731396, -122.503221)

Initial Test



Final Test

(figure 1. Results from Bellingham Bay at initial and final tests)



(figure 2. Results showing pH levels across all testing locations, pre and post-temperature shift)

Data collection locations:
Bellingham Bay
Lake Padden
Lake Samish

Analysis of Data

It doesn't appear that the pH has shifted by one whole level (ie. 7 → 6), though there has been a clear shift in the color being represented by our tests. What this tells us is that our results are inconclusive, and would require further testing to better examine these effects. In one result, we see pH rising with temperature, in another we see it lowering, and in one we see no change throughout (figure 2).

What we can extrapolate from this data is that our worries about how our shifting climate will affect our waters are likely still warranted. It may take a catastrophic change in temperature to reach this point, but if we don't address the issues we're facing with our climate today, then it's highly likely we will see disastrous consequences in the future.

Acknowledgements

Thank you, Professor Kraft, for all your assistance with your feedback, and expertise.

Works Cited

1* Brundage, R. (2021, September 7). *How temperature affects pH measurements*. pHionics. https://www.phionics.com/2021/09/07/how-temperature-affects-ph-measurements/
2* Westlab. (2023b, May 1). *How does temperature affect pH?*. How Does Temperature Affect pH? https://www.westlab.com/blog/how-does-temperature-affect-ph
3* *The pH describes the acidity of an aqueous liquid.* The pH describes the acidity of an aqueous liquid. | U.S. Geological Survey. (n.d.). https://www.usgs.gov/media/images/ph-describes-acidity-aqueous-liquid
4* *Water treatment solutions*. Lenntech Water treatment & purification. (n.d.). https://www.lenntech.com/aquatic/acids-alkalis.html