

Whatcom

COMMUNITY COLLEGE

Water Chemistry In Lakes and Their Proximity to Infrastructure Across Whatcom County

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Discussion

Introduction

The importance of freshwater lakes cannot be overstated. They provide our drinking water, are hosts of biodiversity, and even regulate our climate. Human infrastructure such as cities, parks, roads, and neighborhoods can alter the lake's water chemistry, potentially harming wildlife and overall reducing the water quality. Our study involves three lakes in Whatcom County: Lake Whatcom, Lake Padden, and Baker Lake (Fig. 1) By comparing the pH, dissolved oxygen, and nitrate content of the lakes with different surrounding levels of infrastructure, we aim to evaluate how human infrastructure (or other factors), may influence the water chemistry in each of the lakes. Baker lake's pH specifically is affected by the sediments in glacial melt (Bortleson et. al 1977). The sediments reduce the lake's carbonate ion concentration, making it more acidic.

Methodology

Location & Process

- In the field, we tested for pH, dissolved oxygen (DO), nitrate/nitrite, and phosphate at each location (Fig's 2A-2E show the collection process).
- Later, we used probes to test for pH and nitrate content.
- To collect our data, we took water samples at each of the three lakes and tested them with dip sticks. We then brought each of the samples to WCC to test them with probes.
- We collected samples from Lake Padden and Lake Whatcom on 5/19 and collected our Baker Lake sample on 5/23.

Next steps

- Test for iron, specifically in Baker Lake
- Testing each lake at different seasons to record differences
- Analyze Lake Whatcom in the context of it being the source of Bellingham's drinking water.
- Re-test with probes on site to ensure more accurate and precise results.



Fig 1: Locations of samples collected

Research question: Does a lakes proximity to human infrastructure affect its water chemistry?

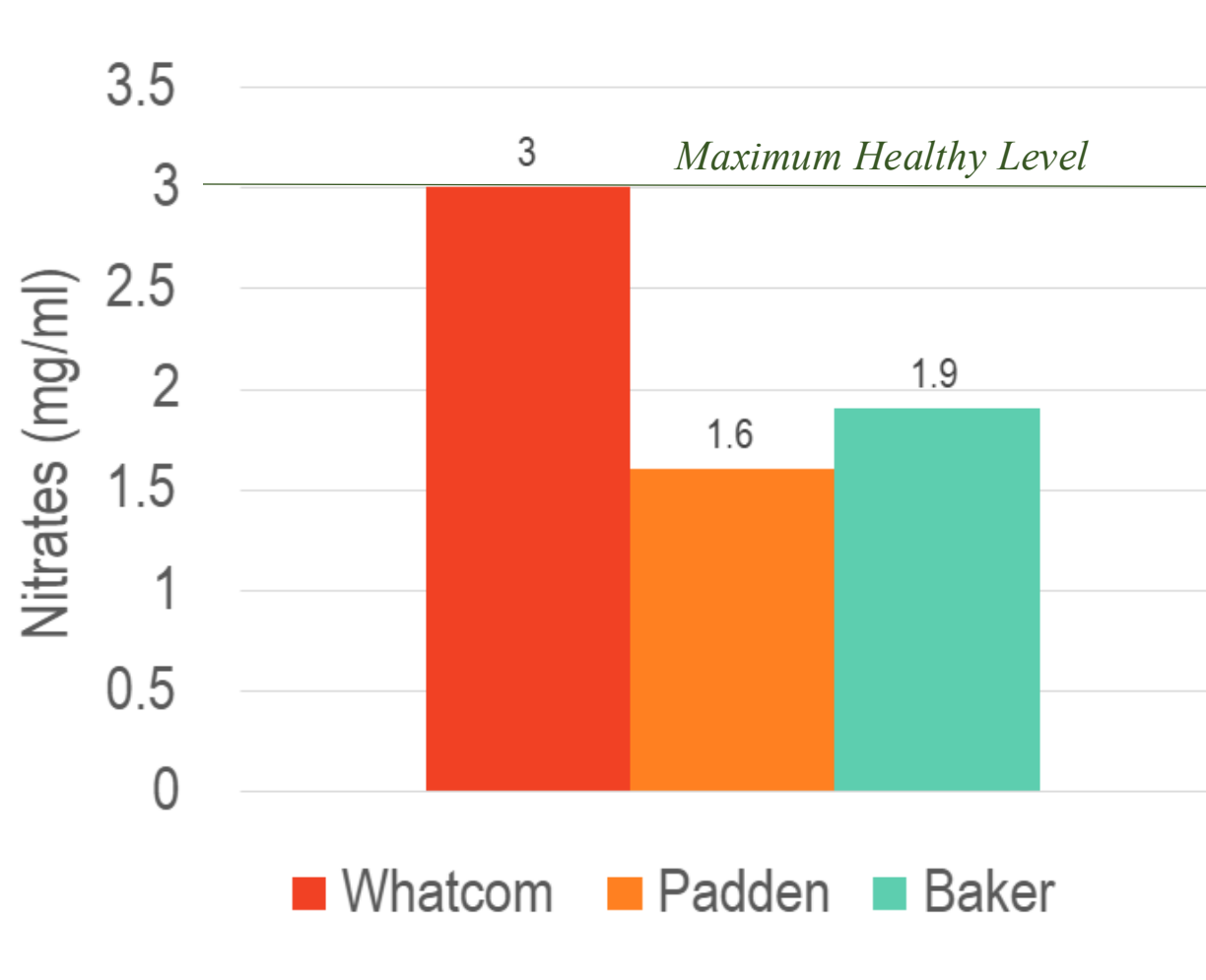


Table 1. Average nitrate content (mg/ml) of each sample.

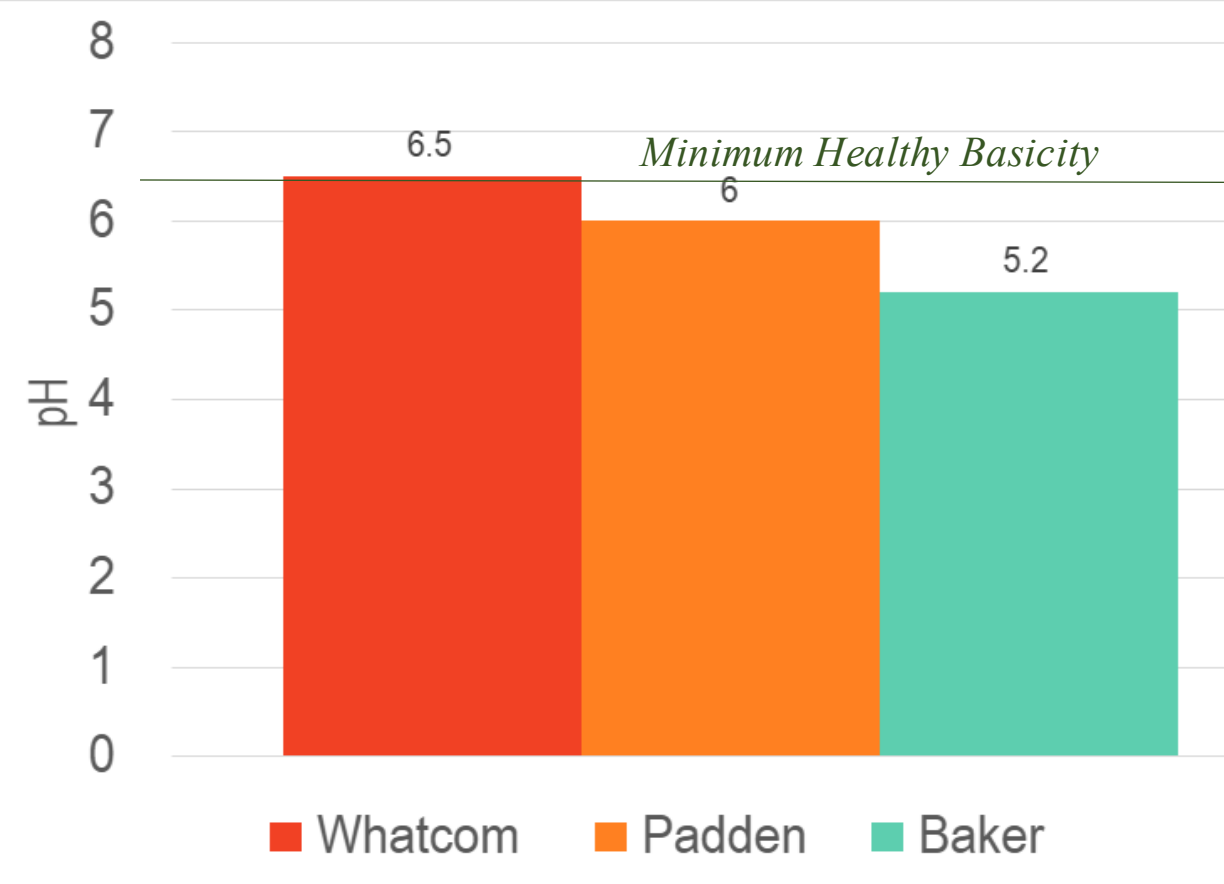


Table 2. Average Recorded pH value of each sample.

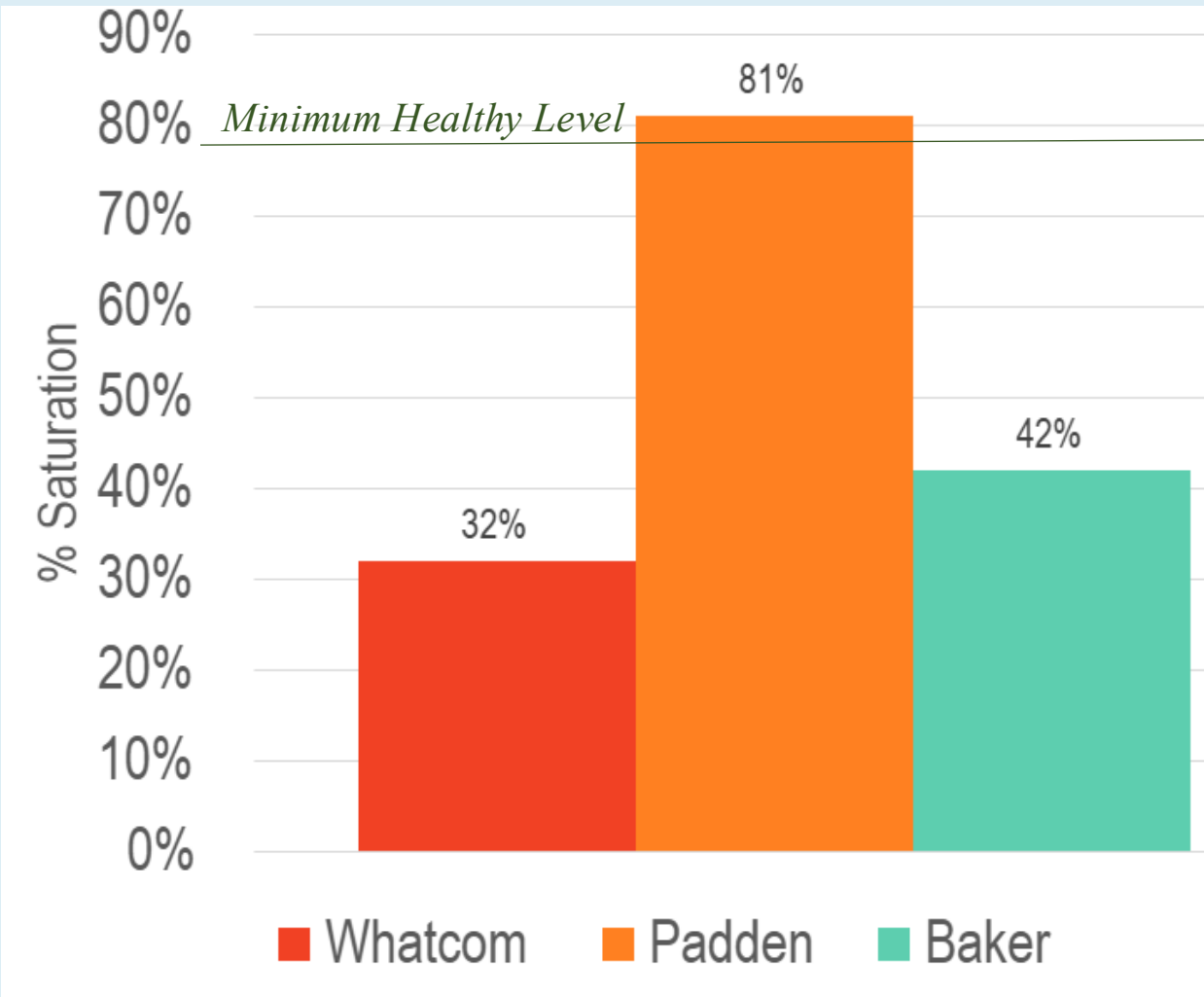


Table 3. Average % Oxygen Saturation of each sample



Fig. 2A Carter testing a water sample at Lake Padden



Fig. 2B: Water sample & dissolved oxygen vial at Lake Whatcom



Fig. 2C: Kaylee testing pH and temp at Baker Lake



Fig. 2D: Dark water at Lake Padden surrounded by vegetation



Fig. 2E: Jake and Kaylee testing water at Lake Whatcom

- Lake Whatcom is surrounded by houses and urban infrastructure, Lake Padden is in a popular park, and Baker lake is by far the most remote of the three, with the closest town being 30 minutes away.
- Baker lake has geologic elements affecting the pH. due to sediments in the glacial melt from Mount Baker collecting in the lake (Bortleson et. al 1977), the water is more acidic.
- Padden has the highest % of dissolved oxygen (81%) and second lowest pH (6.0) out of the three lakes. This could be for a few reasons. We collected our samples in late afternoon in spring, which is when dissolved oxygen levels peak, but we collected both Padden's and Whatcom's samples around the same time. Padden's pH could be explained from algae in the water performing photosynthesis, which raises carbonic acid levels (Majeskie et. al 2012). Additionally, it could be explained by the decompression of the plants in the lake.
- Lake Whatcom has the lowest % of dissolved oxygen (32%) and highest nitrate content (3.0 mg/ml) of the three. Lawn care products, fertilizers, and septic systems can both lower the dissolved oxygen and increase the level of nitrates. Our hypothesis is that its water chemistry is directly affected by its proximity to human dwellings.
- Initially we were planning on using our probe results for our pH data, but upon further research we learned that pH fluctuates wildly depending on the age of the sample, and we waited about a week and a half to use the probes. The data used in the graphs was collected from on-site testing kits. Additionally, we did not test at high depths and only tested at one location per lake.
- So, does a lakes proximity to human infrastructure affect its water chemistry? In Lake Whatcom's case, it is extremely likely. In Lake Padden's and Baker Lake's case, other natural factors (algae blooms, glacial sediments) influence the water chemistry far more, but that could be due to both lakes being more remote.



Group picture at Baker Lake



#commitment

Acknowledgements

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Work Cited

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