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## Abnormal Salinity and Temperature Profiles: Conditions of Plankton

Ayesha Toor  
*Everett Community College*

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## Introduction

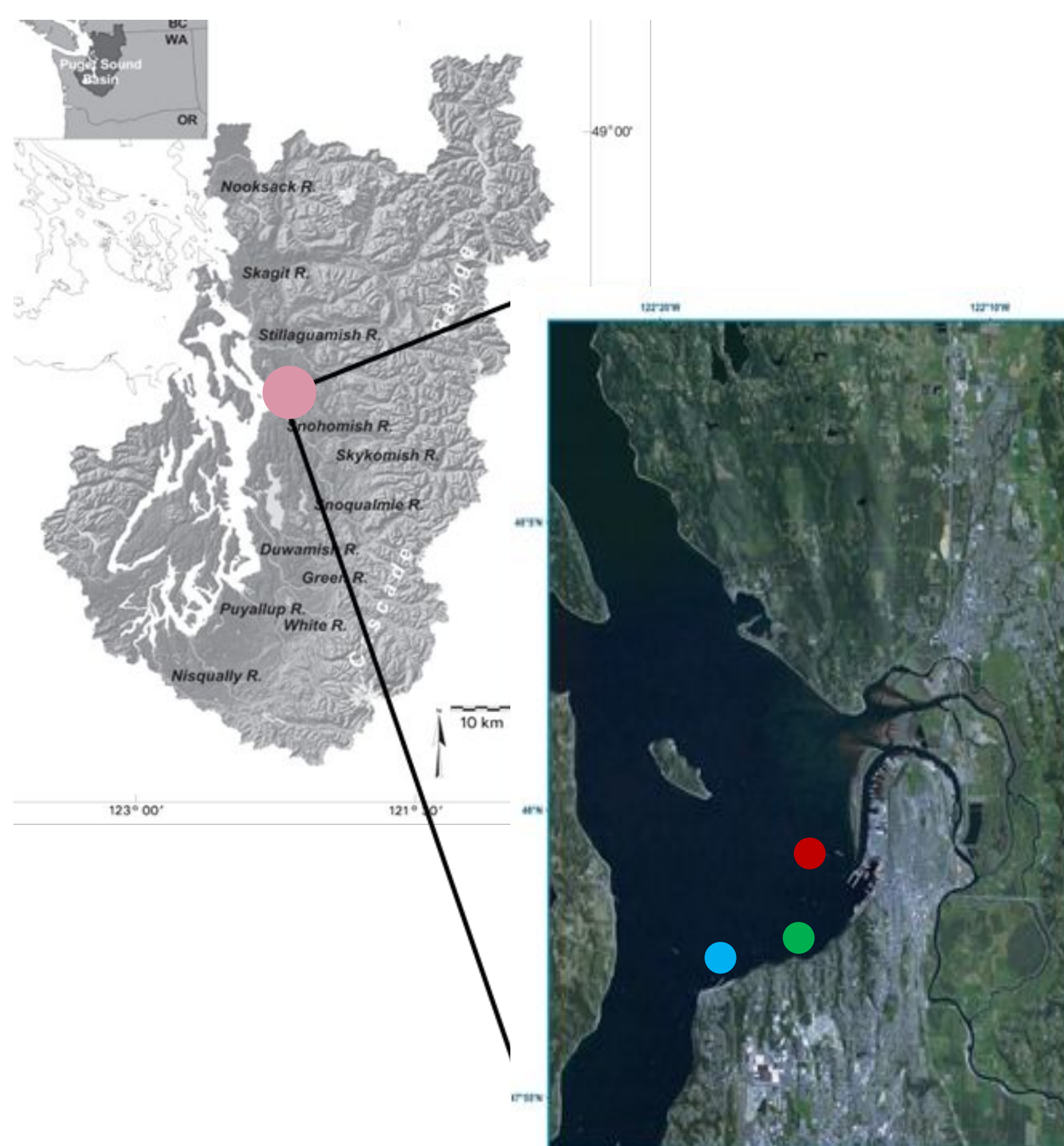
In the past, plankton has been used as a constructive management tool for the health of an ecosystem and an indicator of environmental fluctuations<sup>1</sup>. When looking into what factors are most connected to plankton populations, salinity comes out on top, followed by temperature. Salinity is so impactful that in a low salinity environment, the slightest

increase in salinity can reduce the diversity of specific types of plankton<sup>2</sup>. Given the direct relationships between salinity, temperature, and plankton, observed in other marine environments and highlighted in previous studies or papers written before, this study tests that relationship in the Possession Sound estuary in order to determine if it is present.



1. Henraj, Devesh, Afzal Hossain, Qifeng Ye, Jiaqiang Qin, and Sophie Leterme. "Plankton Bioindicators of Environmental Conditions in Coastal Lagoons." Research @ Flinders. Elsevier, January 5, 2017.  
2. Mo, Yuanyuan, Feng Peng, Xiaofei Gao, Peng Xiao, Ramiro Logares, Erik Jeppesen, Kexin Ren, Yuanyuan Xue, and Jun Yang. "Low Shifts in Salinity Determined Assembly Processes and Network Stability of Microeukaryotic Plankton Communities in a Subtropical Urban Reservoir - Microbiome." BioMed Central. BioMed Central, June 3, 2021.

## Study Site



**Fig. 1** Map showing Puget Sound (bottom) with Possession Sound marked by an orange circle. The close up of the Snohomish River Estuary system in Possession Sound (top) shows the three study sites: Buoy ●, Howarth Park ●, and MBT ●.

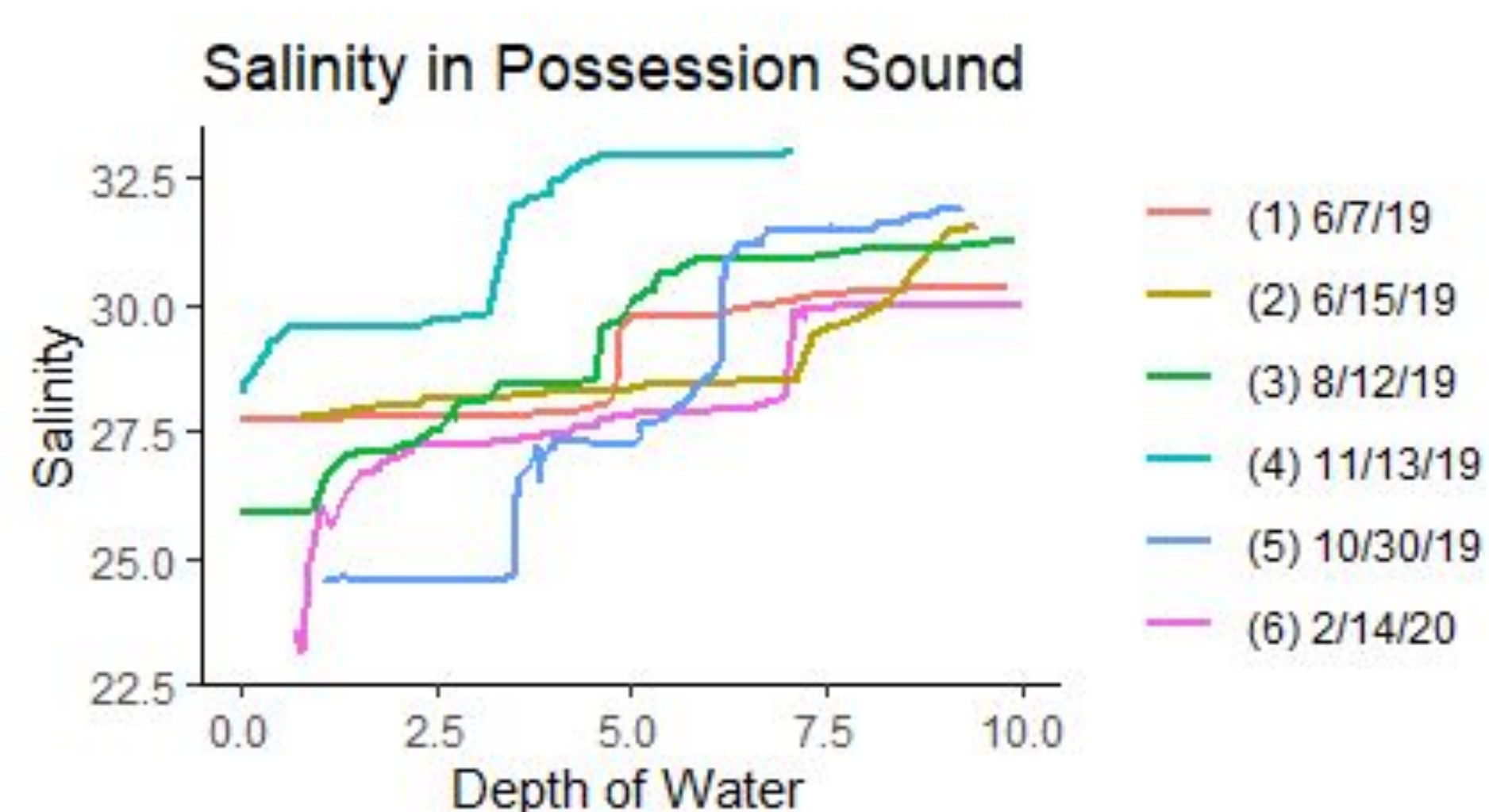
## Methods

The data used for this research was taken from EXO data and plankton tows coming from SOPS cruises around Possession Sound conducted by the Ocean Research College Academy. The sites used for data collection were Buoy, Haworth Park, and MBT over six examination days.

## ORCA

The Ocean Research College Academy is a dual enrollment program where high school juniors and seniors experience innovative, interdisciplinary and student-centered learning. A longitudinal study of the local estuary forms the backbone of the first-year experience, and leads students to conduct independent research in their second year of the program. ORCA has received grants for a research lab, research vessel, and summer research funded by the National Science Foundation.

## Results



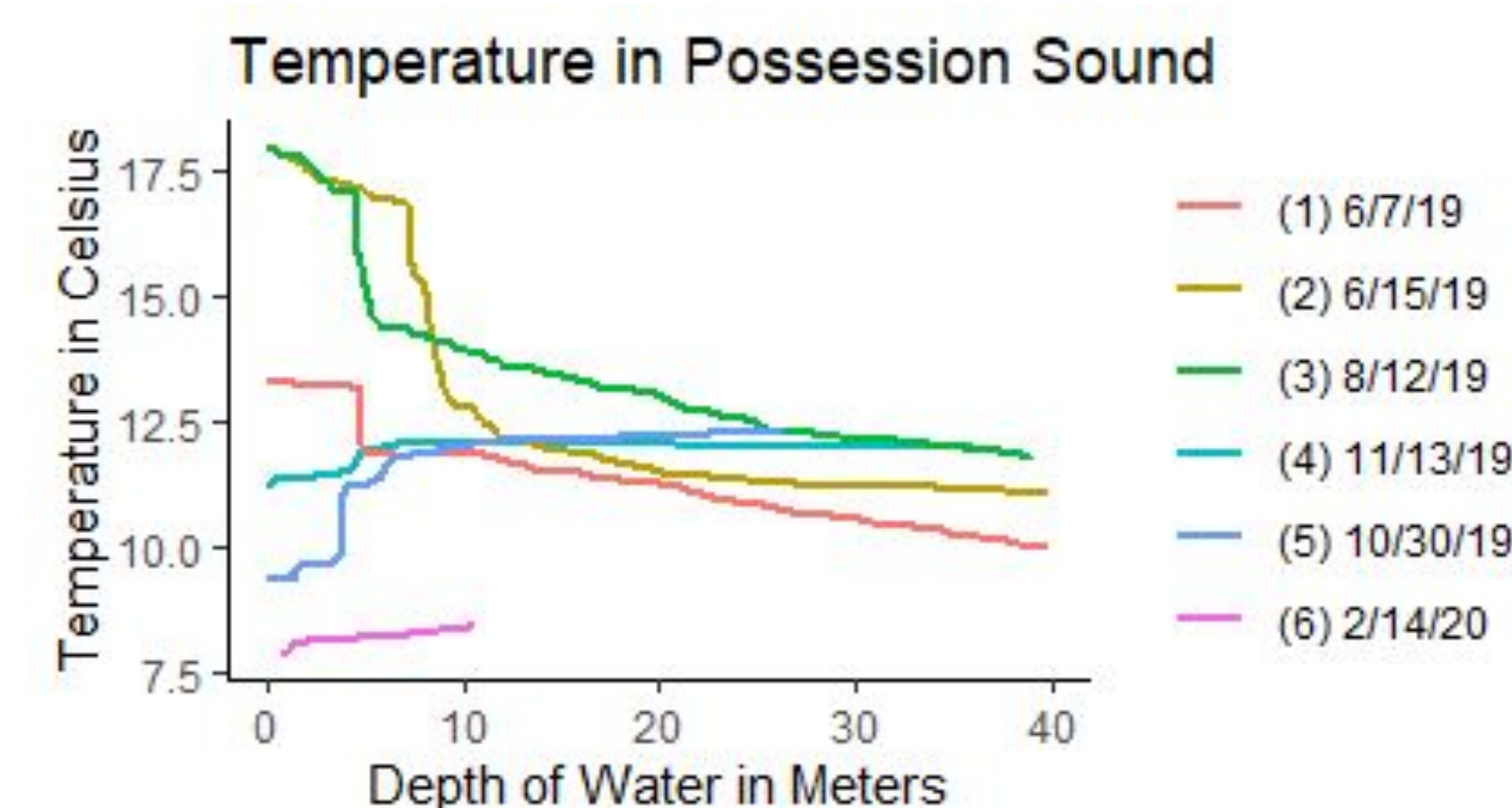
**Fig. 2** Graph showcasing the varying salinity levels over different depths during the observations days. Number rankings on the legend indicate the plankton counts, with (1) showing the day with the most plankton counted.

Salinity did not show much correlation between itself and plankton over the days observed for this research. The day with the highest amount of plankton collected and counted by students, June 7th, 2019, had salinity values between 27.5 ppt and 30.0 ppt, keeping it in the mid-range for salinity values over the observation period. The day with the least amount of plankton counted, February 14th, 2020, also remained in the mid-range of salinity values.

Temperature seemed to show more of a pattern.

Although the day with the highest amount of plankton fell in the mid-range of temperature values, the rest of the days seem to follow a pattern, where the day with higher temperatures also had higher plankton counts.

The only day where this does not seem to be the case is June 7th, 2019.



**Fig. 3** Graph showcasing the varying temperatures over different depths during the observation days. Number rankings on the legend indicate the plankton counts, with (1) showing the day with the most plankton counted.

## Conclusions

When looking at the findings thus far in the research, there only seems to be a probable connection between temperature values and plankton. Higher water temperature days in Possession Sound correlated with days where higher amounts of plankton were counted in the water. Salinity did not show any such pattern, or seemingly any pattern at all

over the observation period in connection to plankton counts. However, the reason for that may be that enough days were not observed. To further prove such patterns in Possession Sound, more data needs to be analysed. Continuing this work, I would like to look into these factors over the course of multiple years.