

2023 Analysis of Chlorophyll in Bed Sediments within Urban Bays of Washington



Eva Marino, Mentor: Julie Masura

Introduction

Phytoplankton are the base of the marine food web, providing energy for the rest of the ecosystem to prosper. It is of vital importance to study phytoplankton and understand what affects them so as to understand what affects marine ecosystems more broadly. Phytoplankton are chlorophyll producing organisms and that chlorophyll can be detected even after the death of the creature. By testing for chlorophyll in bed sediments, further analyses can be done in comparing other environmental conditions and the phytoplankton present. This analysis is a continuation on preliminary work that began in Spring of 2023.

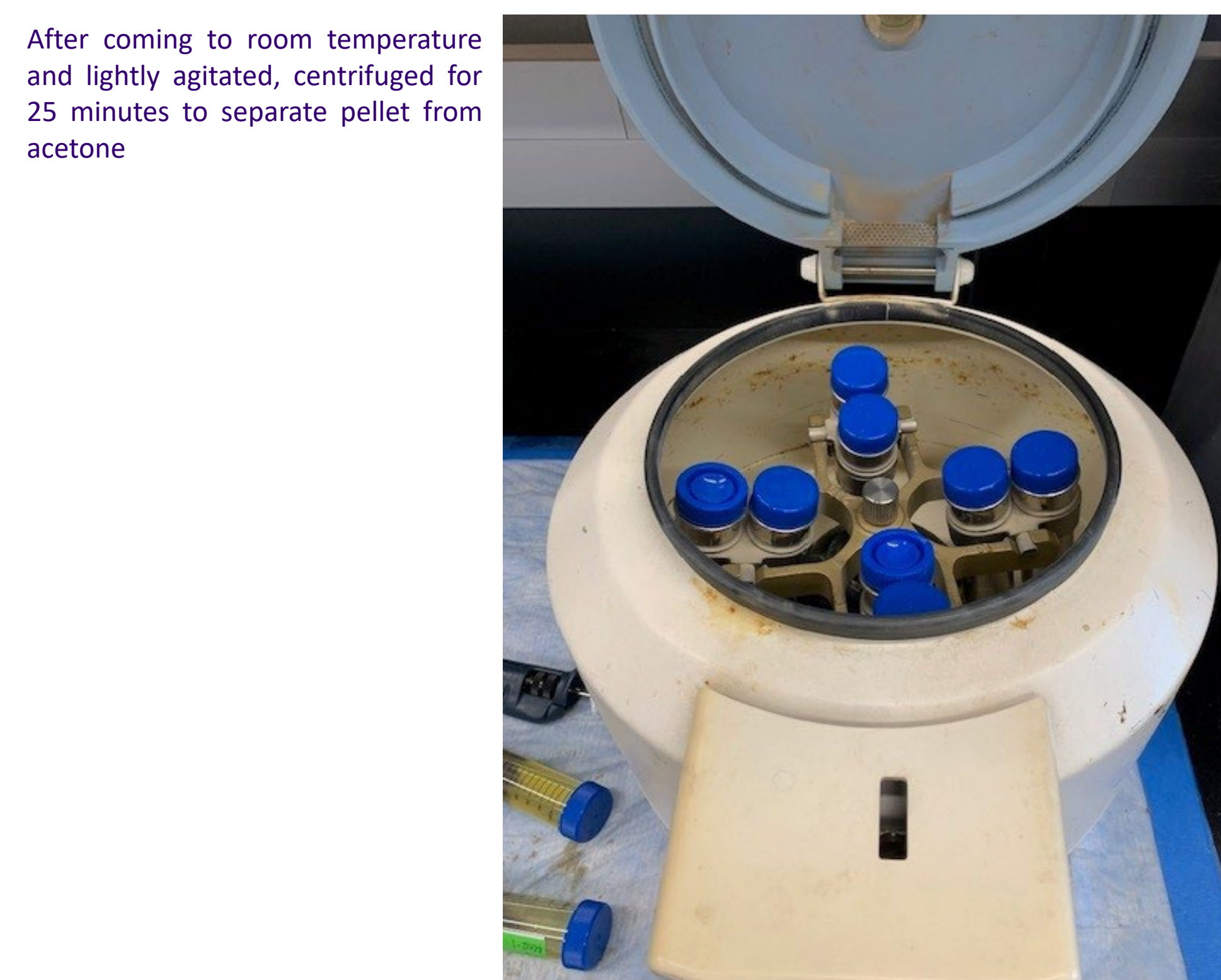
Methods

Used protocol developed by Nguyen & Narayan 2023

- Analyzed each location in triplicate
- Added 90% Acetone to 5 mL of sediment
- Minimum of 12 hours at 4 degrees Celsius
- Measured using Fluorometer Turner Trilogy Module CHL-A Acid before and after acidification
- Used data to calculate the Chlorophyll (ug) / L of bed sediment



Samples after 12 hours at C. They need to come to room temperature before the next step



After coming to room temperature and lightly agitated, centrifuged for 25 minutes to separate pellet from acetone



Fluorometer used to measure chlorophyll

Results and Discussion

Liberty Bay had the highest chlorophyll concentration out of the other bays samples. Liberty Bay is an incubator bay, meaning it is shallow and warm.

Elliot Bay, the Sinclair Inlet, and Port Orchard all had similar chlorophyll concentrations

One study found a negative correlation between median grain size and chlorophyll concentrations (Cahoon et al. 1999). However, this study found no relationship between median grain size and chlorophyll levels (see Micheal Paszek for PSA).



Figure 1: Map of the chlorophyll in the provided bed sediments. Liberty Bay had the highest. All locations had at least some presence of chlorophyll.

QUICK FACTS

- Chlorophyll can be used as an index for the amount of phytoplankton in an area
- Phytoplankton are extremely important as the base of the marine ecosystem
- The highest chlorophyll was detected in bed sediments from Liberty Bay

Future Work

It would be beneficial to establish long term trends with this chlorophyll analysis to provide researchers with another way of monitoring and understanding the phytoplankton communities within the Puget Sound.

Other analyses should include access to environmental data, such as the temperature in the water column, the chlorophyll in the water, salinity, etc. This data is more informative for phytoplankton's life cycle than the sediment data.

Credits and References

Thanks to King County's Marine Monitoring Program and the Department of Ecology for providing the bed sediments samples.

