



2018 ANALYSIS OF CONCENTRATION OF CHLOROPHYLL IN BED SEDIMENTS FROM THE SALISH SEA

Iyesha Narayan and Julie E. Masura

TESC 499

Introduction

Recent studies have found evidence that climate change can affect lower to upper trophic organisms in ecosystems. The aim of this study was to explore the impact of climate related factors on primary producers within the Salish Sea. These organism use chlorophyll-a to produce energy through photosynthesis. For this project chlorophyll-a was measured in sediments from basins within the Salish Sea. This study found that there is a moderate correlation between chlorophyll-a and environmental conditions. By using a modified method developed by Nguyen & Narayan (2023), chlorophyll detection in bed sediments will provide further evidence of environmental impacts on ecosystems.

Methods

Modified protocol developed by Nguyen & Narayan (2023)

- Samples analyzed in triplicate for reliability (almost 20 locations for this project)
- 5 mL of sediment combined with 40 mL of 90:10 acetone to solubilize the cells (fig. 1&2)
- Solution frozen in the dark for a minimum of 12 hours
- Supernatant analyzed for chlorophyll-a concentration using a Trilogy Laboratory Fluorometer (fig. 3)
- Results express as ug/mL of chlorophyll for each station

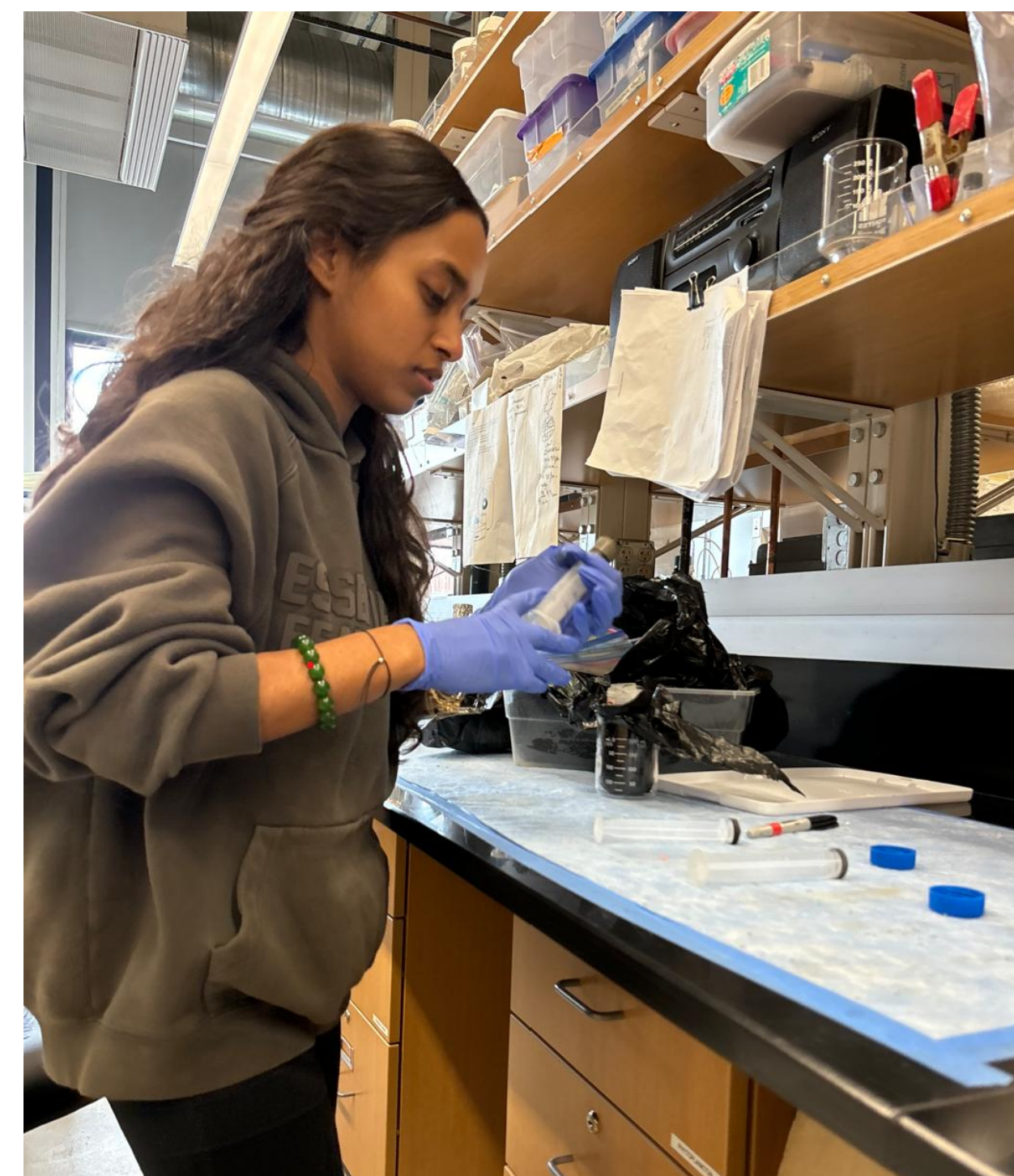


Figure 1: Sub-sampling sediments to be promptly frozen and analyzed after 12 hours (Photo credits to Meryke Blunt)



Figure 2: Sediment samples with acetone at 0°C after 12 hours, samples were thawed before proceeding with further processing (Photo credits to Eva Marino)

Figure 3: Centrifugation after thawed (25 minutes at 3000 RPM), to then be processed with the fluorometer (Photo credits to Eva Marino)



Results and Discussion

- The minimum chlorophyll-a concentration was 42.34 ug/mL, maximum was 152.71 ug/mL, and the average was 89.57 ug/mL
- Chlorophyll-a & Pheophytin were compared with the surface water temperature (fig. 4 & 5).
- There were no significant correlations between neither the chlorophyll-a nor pheophytin with surface water temperature on the day of sampling

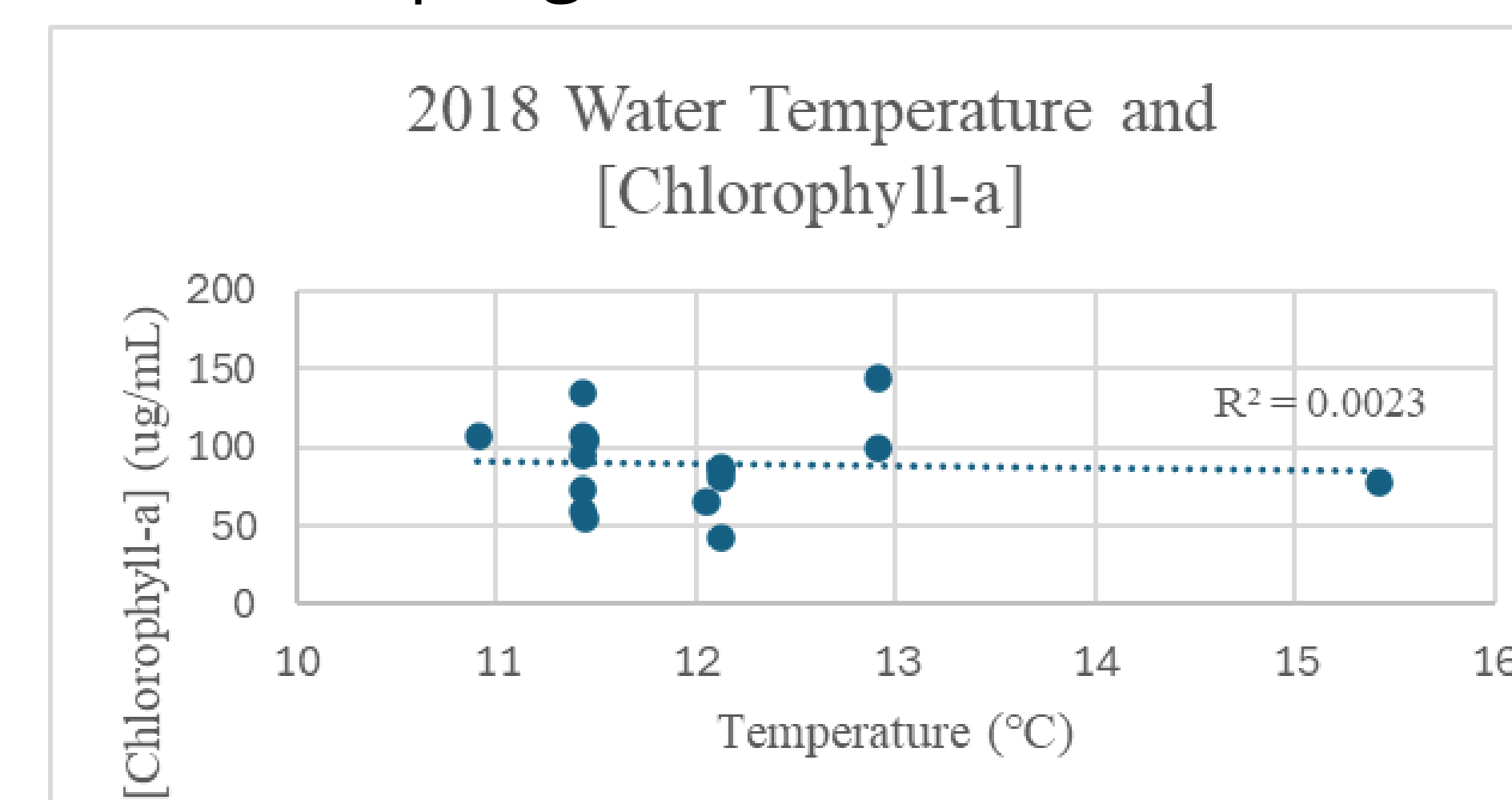


Figure 4: Relationship between water temperature (°C) and chlorophyll-a concentration (ug/mL) in the Salish Sea during June 2018. No significance between the two variables can be made.

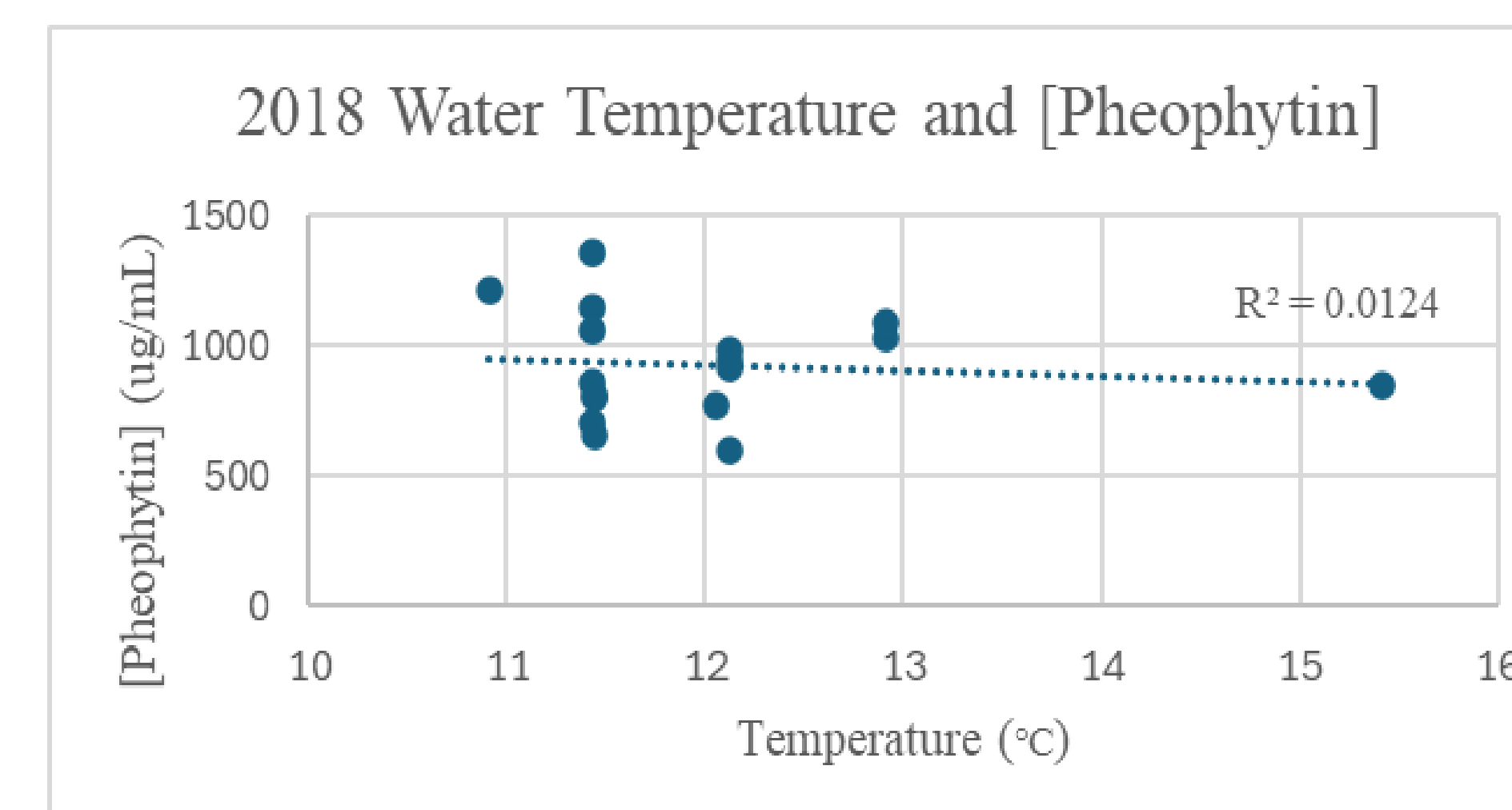


Figure 5: Relationship between water temperature (°C) and chlorophyll-a concentration (ug/mL) in the Salish Sea during June 2018. No correlation between the two can be made as indicated by the low R^2 value.

QUICK FACTS

- Phytoplankton productivity may be influenced by climate change
- Chlorophyll-a concentration analysis can be used as an indicator for primary productivity
- Pheophytin is created when chlorophyll-a is ingested by consumers.

Future Work

This project is an extension of a partnership with the Department of Ecology's Marine Sediment Monitoring Group from 2014. Sediment samples have been archived will be used to look at temporal trends of chlorophyll abundance in the Salish Sea. Preliminary work has shown that concentrations have indeed changed over the years and are noted to change as sea surface temperatures fluctuate in response to heat waves. Continued investigations will continue with sample sets from other years.

Credit

Thank you to Eva Marino, Litesh Narayan, and Jonah Nguyen for setting the foundation of this research.

