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Temporal variability of phytoplankton communities in Padilla Bay, Washington

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Temporal variability of phytoplankton communities in Padilla Bay, Washington

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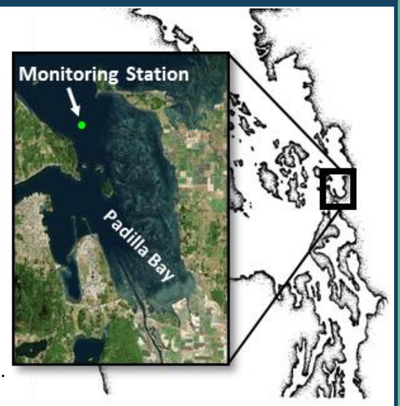
Background

The Padilla Bay National Estuarine Research Reserve (NERR) conducts long-term monitoring of water quality and zooplankton communities. Since 2016, in-situ chlorophyll *a* and phytoplankton sampling have become a part of this monitoring program.

Why is monitoring phytoplankton important?
Phytoplankton are a critical component of marine food webs and shifts in community composition may indicate ecosystem changes, such as nutrient availability or grazing pressures.

Monitoring Objectives:
- Determine temporal variability of phytoplankton abundance and community composition
- Investigate possible drivers of phytoplankton community dynamics

Methods

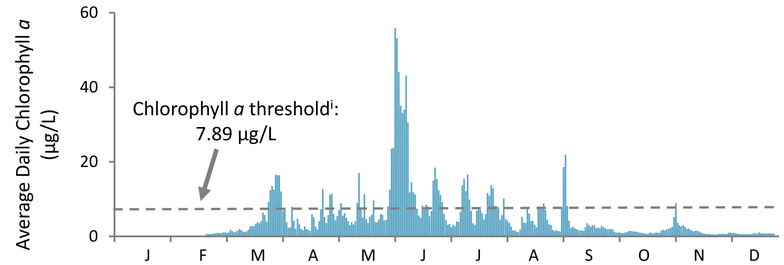


Monitoring station at Gong buoy (above) and location in the Padilla Bay NERR (right). Base map by Marice Callewaert.

Monitoring Station at Gong Buoy

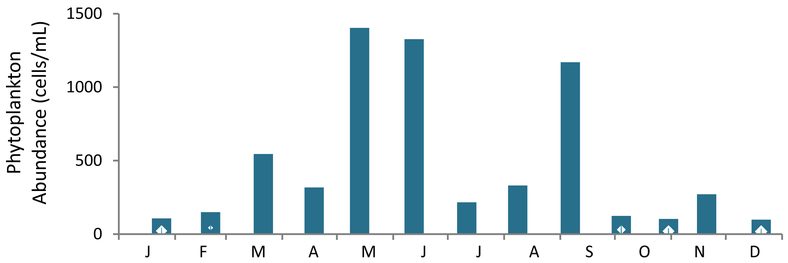
- Continuous in-situ chlorophyll *a* (YSI EXO total algae sensor, 15 minute intervals)
- One 2-liter whole water sample collected at surface monthly. Phytoplankton identified to genus and enumerated using a 100 µL Palmer-Maloney chamber
- Timing of the spring bloom determined as the date when daily average chlorophyll *a* surpassed the 1.5x the annual average[i]

Chlorophyll *a* and Phytoplankton Abundance



Average daily in-situ chlorophyll *a* at Gong monitoring station in 2019. Chlorophyll *a* threshold value determined as 1.5x the annual average[i]. Data missing 1/1/19-2/21/19.

Chlorophyll *a*
- Spring bloom began 3/27/19
- Greatest in June
- Decreased after early Sept



Phytoplankton abundance of whole water samples collected monthly at Gong monitoring station in 2019.

Phytoplankton Abundance
- Greatest in May, June, and Sept
- Decreased in July and August
- Low abundance in Jan, Feb, Oct-Dec

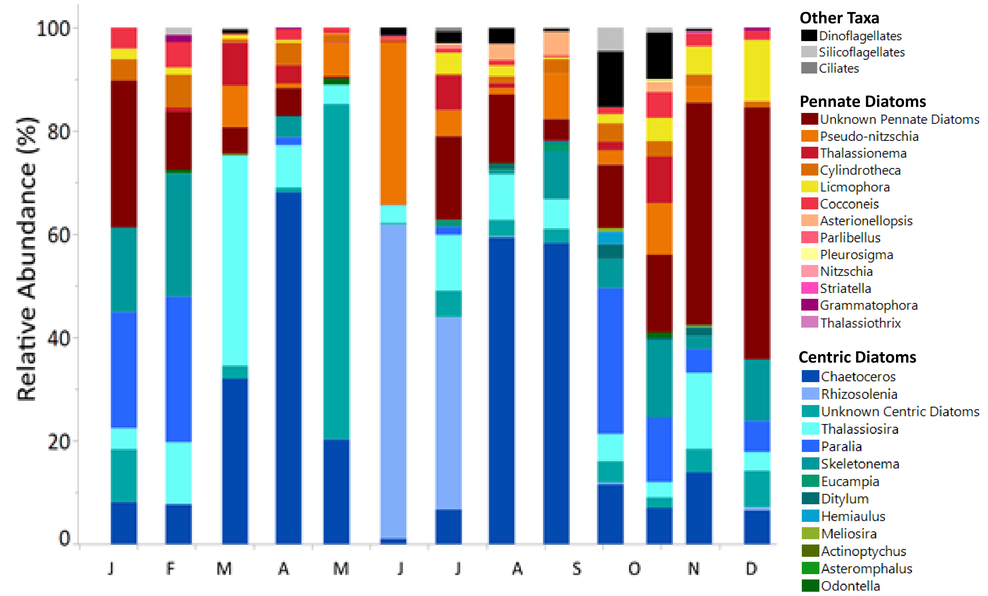
Key Take Aways

- Chlorophyll *a* and phytoplankton abundance varied seasonally
- Centric diatoms were the most abundant genera throughout the year
- 2019 data demonstrated that the Padilla Bay phytoplankton community was very dynamic
- Continued monitoring of phytoplankton, combined with other abiotic or ecological parameters, can improve our understanding of these communities as indicators of ecosystem change

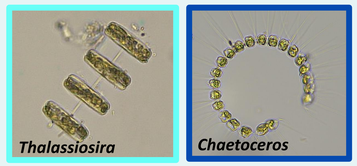
Next Steps

- Explore temporal relationships between phytoplankton and water quality parameters
- Are top-down or bottom-up controls driving phytoplankton communities in Padilla Bay?

Phytoplankton Community Composition

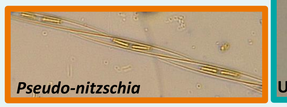


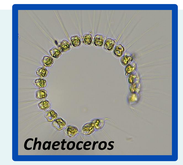
Relative abundance of the phytoplankton community by genera from samples collected monthly at Gong monitoring station in 2019.



March & April:
Thalassiosira and *Chaetoceros* initiated the spring bloom

May - July:
- An unknown centric diatom was dominant in May
- *Rhizosolenia* was dominant in June and July
- *Pseudo-nitzschia* was also dominant in June





August & September:
Chaetoceros made a comeback

Acknowledgements:
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References:
[i] Tommasi, D, Hunt, B, Pakhomov, E, Mackas, D. 2013. Mesozooplankton community seasonal succession and its drivers: Insights from a British Columbia, Canada, fjord. Journal of Marine Systems. 115-116: 10-32.