2024 Analysis of Grain Size and Total Organic Content Analysis of Bed Sediment from Bellingham Bay, Salish Sea, Washington

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Introduction:

This research is part of a longitudinal study by the Puget Sound Ecosystem Monitoring Program and partners. It provides rich temporal data on urban bays within the Puget Sound region. This research aims to add to the wealth of data by conducting total organic content (TOC) and particle size analysis (PSA) on bed sediments for 2024. This data can be used to better understand the environmental conditions at the bottom of the bay. These conditions include the overall energy of the water and the presence and accumulation of organic matter.

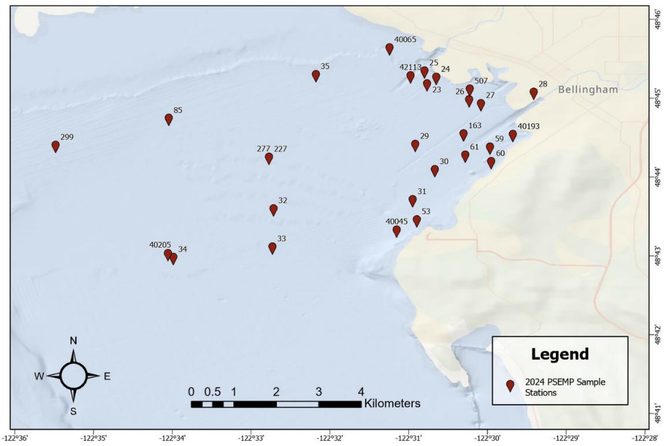

Figure 1. Sampling station locations.

Previous Work:

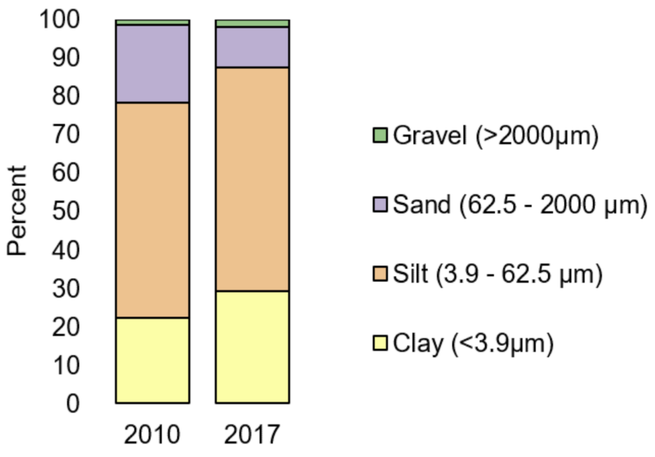

Figure 2. 2010 and 2017 Bellingham Bay. (WADOE)

Purpose Of The Study:

To analyze TOC and particle size data over decades in order to give insight to the environmental conditions of the sampled area.

Methods (Field):

- Samples collected by the Marine Sediment Monitoring Team from the Department of Ecology
- Samples collected using a Van Veen grab sampler at 29 stations

Methods (Laboratory):

- Particle size analysis performed using a Beckman-Coulter LS 13 320 Laser Diffractometer
- TOC was analyzed using the loss on ignition technique to determine percentage carbon content
  - 5 ml subsample mass taken before and after two heating stages one at 105°C for five hours (removing water) and the second at 650°C for eight hours (burning off carbon)

Results:

(Across all stations)

- PSA 37% clay, 58% silt, and 6% sand across all stations
- TOC (wet) about 4%
- TOC (dry) about 9%
- Ternary plot of PSA shows silty clay classification

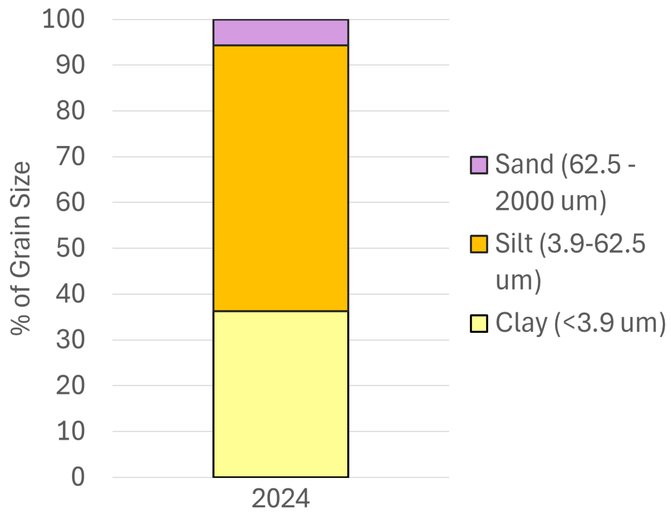

Figure 3. 2024 grain size distribution in comparison to 2010 and 2017 from WADOE.

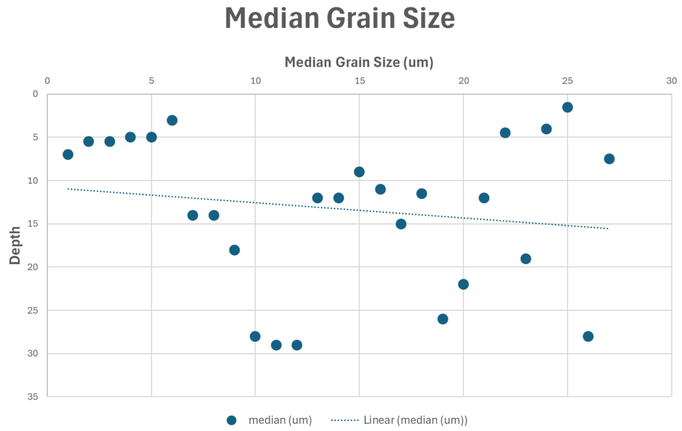

Figure 4. Station depth related to median grain size.

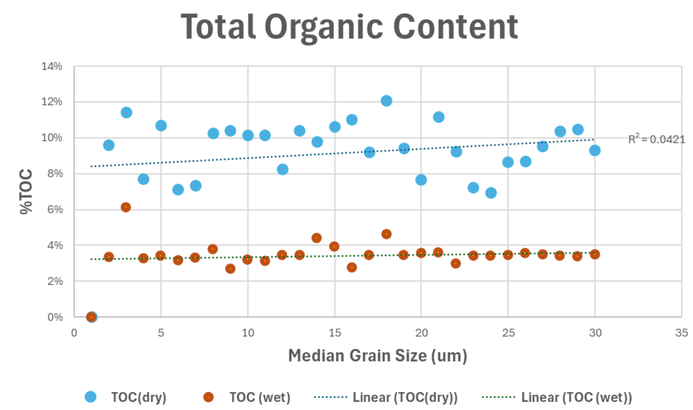

Figure 5. Median grain size related to TOC percentage.

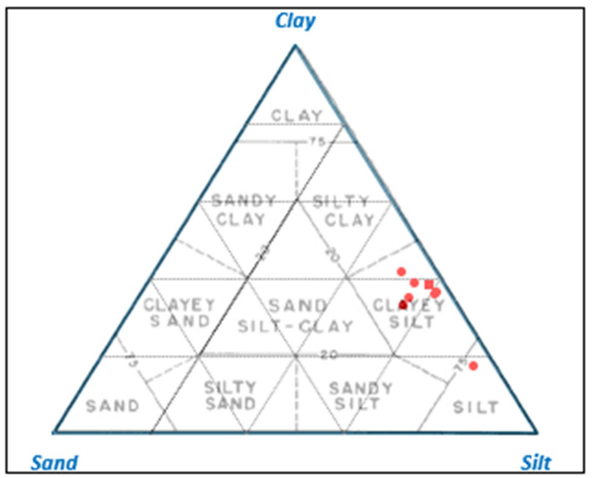

Figure 6. Ternary plot of average particle size across all stations .

Research Significance:

In this case the results show a low energy environment with high organic content. This data can help define the environmental conditions to correlate the presence of microplastics, harmful dinoflagellates, and chlorophyll concentration.

References: