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Mapping of Microplastics in Surface Sediments of Puget Sound to Determine Impacts on Benthic Communities from 2014-2021

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MAPPING OF MICROPLASTICS IN SURFACE SEDIMENTS OF PUGET SOUND TO DETERMINE IMPACTS ON BENTHIC COMMUNITIES FROM 2014-2021

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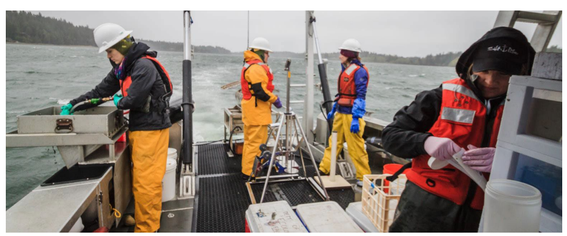
MICROPLASTICS PROBLEM

In 2018, 359 million tonnes of plastics were produced worldwide, with 59% being common polymers (i.e., polyethylene, polypropylene, polyvinyl chloride; PlasticsEurope 2019). The rate of input of ocean plastic is estimated to be approximately 9.5 million tonnes per year. Primary plastics are those manufactured at size for making larger plastics, and secondary plastics are those that have broken down in the environment. Size-categories for plastics are macroplastics (> 5 mm) and microplastics (< 5 mm).

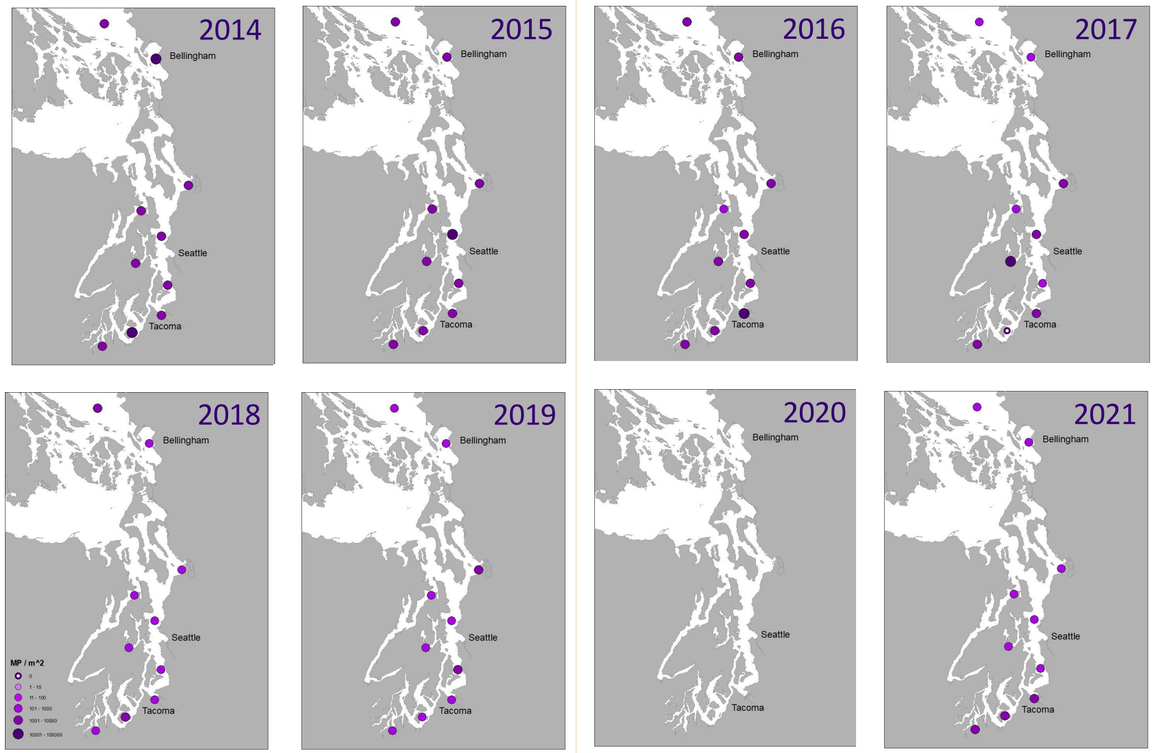
RESEARCH PARTNERSHIP

This project explores microplastics in sediments collected throughout the Puget Sound from 2014-2021 to create baseline observations and determine if plastic pollution in sediments have changed over time. Washington State Department of Ecology's Marine Sediment Monitoring Group has provided sediment samples to analyze for microplastics since 2014. Ten long-term stations have been sampled using a 0.1 m^2 stainless steel Van Veen grab sampler to recover 2-3 cm of the top sediment from the seabed.



DEPARTMENT OF ECOLOGY State of Washington

https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Sound-science/Marine-sediments



Time series of microplastics per square meter at 10 long-term stations in the Salish Sea.

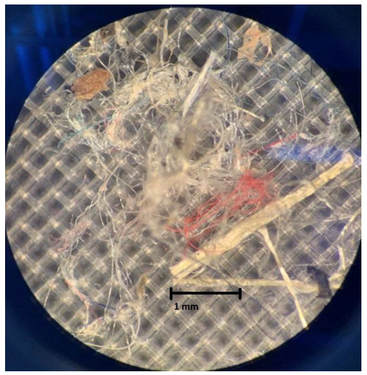
UNDERGRADUATE RESEARCH

Each year the sediment samples are processed by undergraduate researchers for grain-size distribution, total organic content percentage, harmful algae abundance, and microplastic concentration as part of a summer research experience. Microplastics were processed and analyzed through a series of density separations, sieving, and manual extractions. Each piece was characterized by type, color, and size.

MaggieJo Baer inspecting sieves for microfibers.

UWT MICROPLASTICS QUICK FACTS

- > Minimum 0 MP/m^2 in 2017
- > Mean ~3500 MP/m^2
- > Maximum ~27,000 MP/m^2 in 2017
- > Lowest Yearly Average ~681 MP/m^2 in 2019
- > Highest Yearly Average ~7357 MP/m^2 in 2014
- > No samples collected in 2020 due to pandemic



Tangle of microfibers from a 2018 sediment sample.

STUDENT CONTRIBUTORS

2021 – Erin Campion, Celine Jolibois
2019 – Abby Deaton
2018 – Brenda Solano Jimenez
2017 – Amy Self
2016 – Roger Change
2015 – Ashley Fowler
2014 - Shannon Wacholz

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