

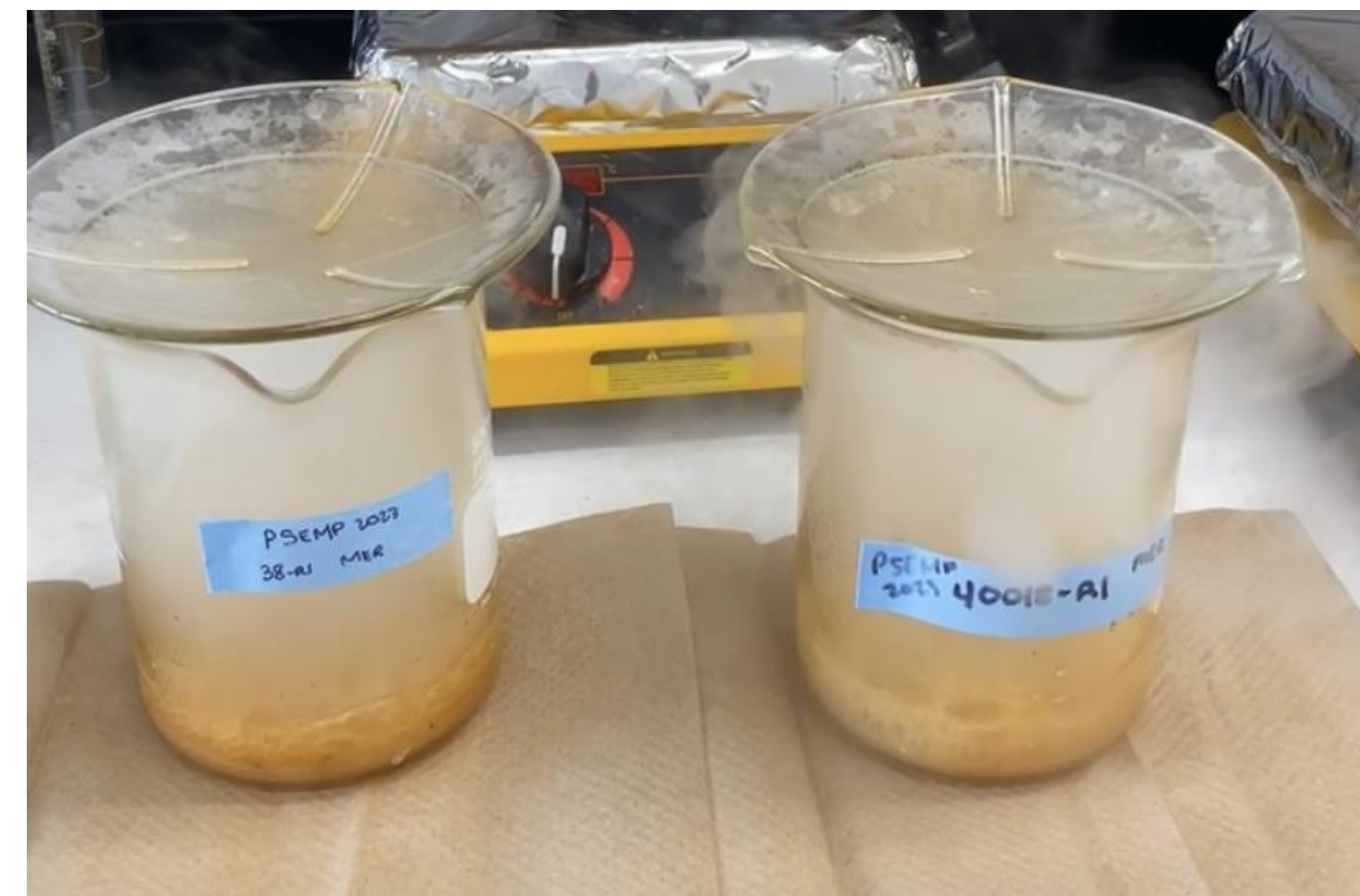
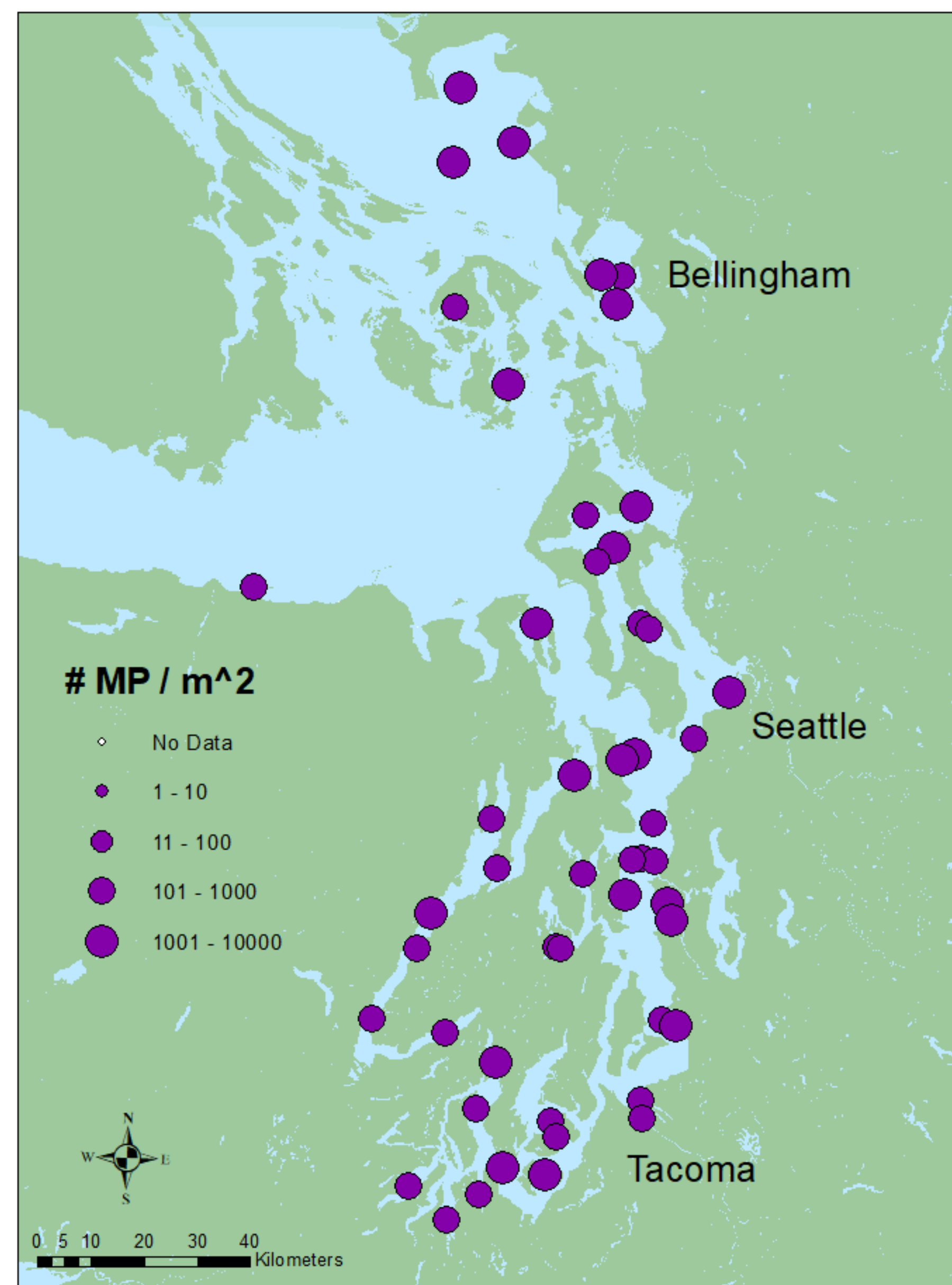
2023 Analysis of Microplastics in Bed Sediments of the Salish Sea in the Puget Sound



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Introduction

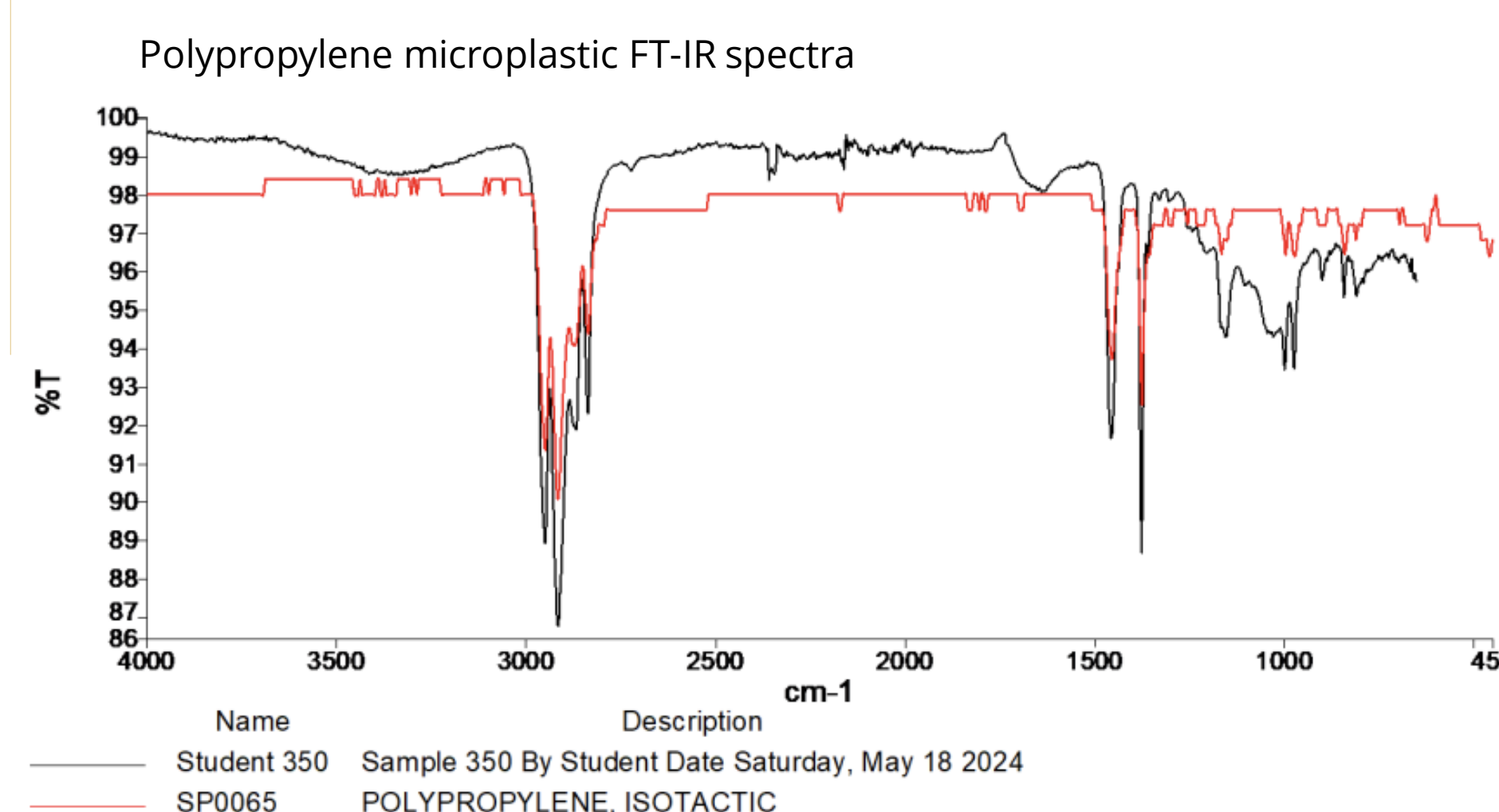
Pollution of bays and estuaries by microplastics is an increasingly pressing concern, especially in bodies of water surrounded by cities and densely populated areas. Higher levels of human activity and anthropogenic consumption lead to discarded plastics that degrade over time and become microplastics, a plastic piece smaller than 5mm. Microplastics can enter oceans and streams by way of stormwater runoff or other routes and can be ingested by organisms, eventually being transferred to other organisms that eat them. The extent of the harm microplastics may cause is not yet fully understood. In partnership with PSEMP, quantifying the number of microplastics in the Puget Sound can give a clearer picture of the scope of this issue.



Samples boiling during wet peroxide oxidation (WPO) step of processing.

Methods

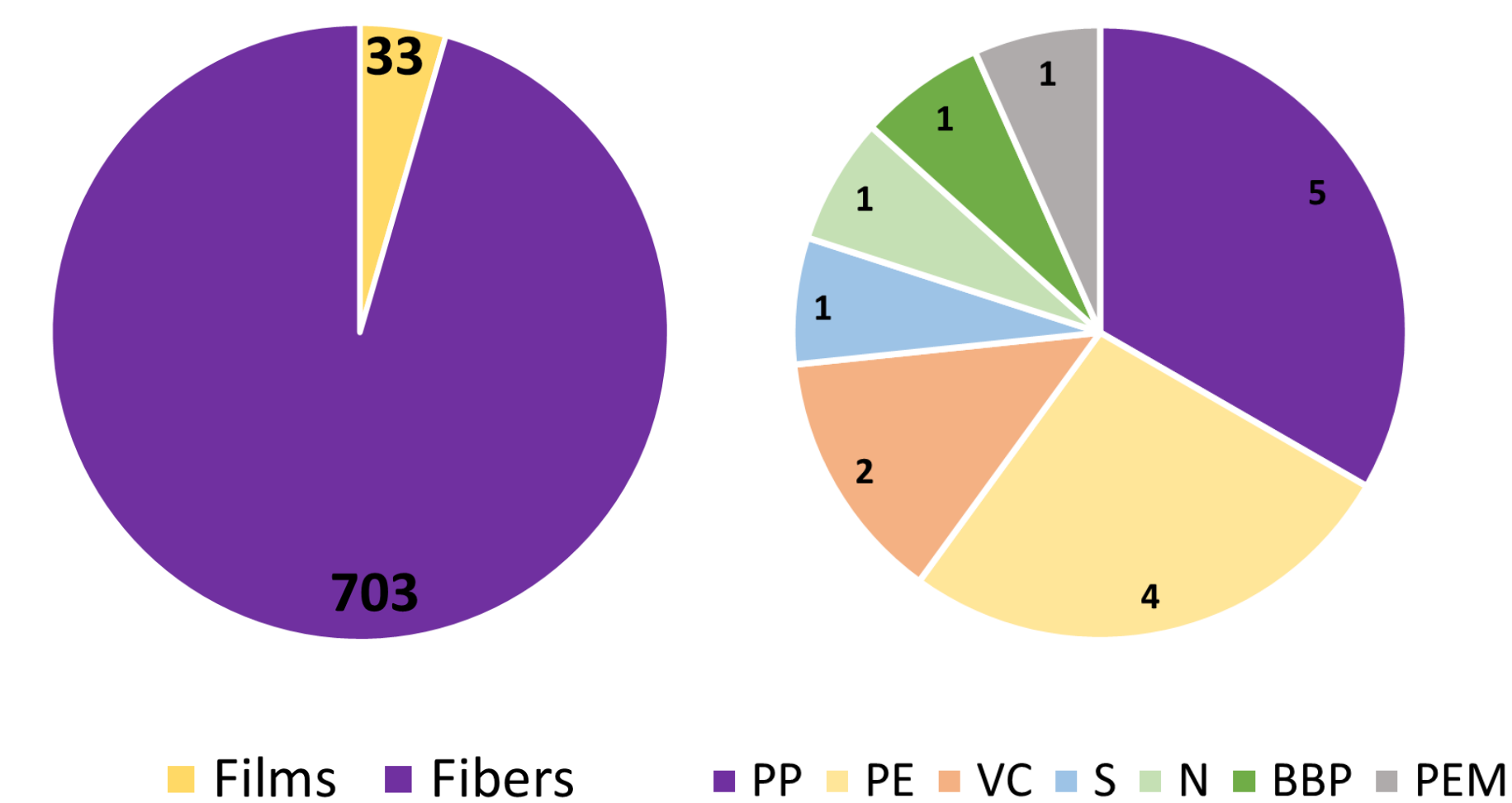
- Collection: Samples were collected at 50 stations in the Puget Sound.
- Disaggregation: Potassium metaphosphate solution was added to sediment and stirred.
- Density Separation: Lithium metatungstate was added for separation.
- Oxidation: Fe (II) solution and 30% hydrogen peroxide were added to samples to boil off organic material.
- Density Separation: Salt was added. Solution was transferred to density separator and floating solids collected.
- Microscope Analysis: 20x magnification was used to collect MP.
- IR: Plastics from five sieves were analyzed by FT-IR to validate plastics.



Results

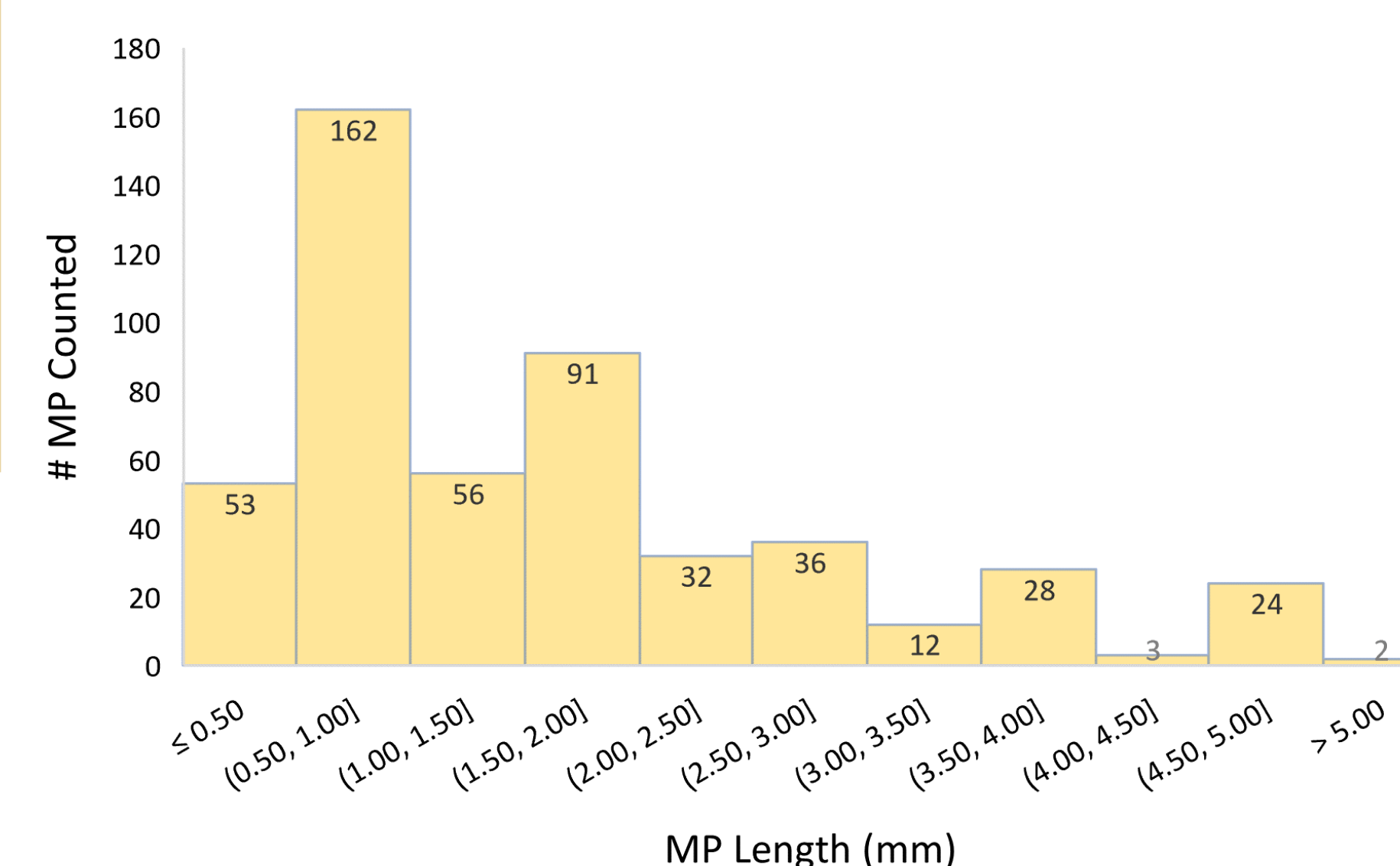
- 736 microplastics were counted in 50 samples.
- 95.5% of plastics found were fibers.
- Remaining 4.5% were films.
- Average length = 1.72 mm.
- 66.3% of plastics were clear.
- 1/3 of plastics analyzed by FT-IR were polypropylene. The next most abundant was polyethylene, and then vinyl chloride. Styrene, nylon, BBP, and poly ethyl methacrylate were also found.

Plastic Type



Top left: Plastics characterized by light microscopy (Fibers, films, fragments, etc.). 703 of 736 plastics were fibers, and the remaining 33 were films.
 Top right: Plastics characterized by FT-IR spectroscopy. Five of 15 were polypropylene, 4 were polyethylene, 2 were vinyl chloride, and one styrene polymer, nylon, BBP, and poly ethyl methacrylate were found.
 Below: Length distribution of microplastics.

Plastic Length



Film microplastic recovered from 0.33 mm sieve

Future Work

Additional samples will be collected from the 50 stations in the Puget Sound for further comparative analysis of microplastics and other contaminants over time.

Microplastic data taken from these stations will contribute to the monitoring of environmental health and inform stakeholders and policymakers.

References

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Plastic fibers on 0.33 mm sieve.