

2024 Analysis of Microplastics in Bed Sediment of Bellingham Bay



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Introduction

Microplastics (MP) are a prevalent byproduct of the weathering, physical erosion, chemical reduction, and disposal of plastic products which have been incorporated into almost every facet of human consumption. This research aims to capture timely data of the abundance and locations of microplastics in the bed sediment of Bellingham Bay in Northern Puget Sound. In doing so, we hope to add to the body of work of previous data samples as well as make observations from this data regarding future research.



Fig. 1. Microplastics under a microscope showing all types such as fibers, pellets, and filaments (films).

Quick Microplastic Facts:

- Found in humans (Bridget, 2024).
- Found in the surface water of the ocean and the sediment of the deepest trenches (Tsuchiya et al, 2024).
- Classified into five types; Fibers, films, pellets, foam, and fragments (Ziani et al, 2023).
- Classified between 100nm and 5mm (Ziani et al, 2023).
- Bioaccumulate in shellfish and other organisms (Claessens et al, 2013).

Methods

- Samples collected by Marine sediment monitoring team from Department of Ecology
- Various locations/depths in Bellingham Bay
- Van Veen grab sampler used for collection
- Calculation: microplastics/ m^2 of seafloor sediment.
- Control of study: Bellingham Bay
- Variables of study:
 - total amount of MPs
 - type of MP (fiber/film/pellet)
 - size of MP
 - MP color
- Possible errors:
 - multiple people counting, no consistency
 - missing data from lab transfer

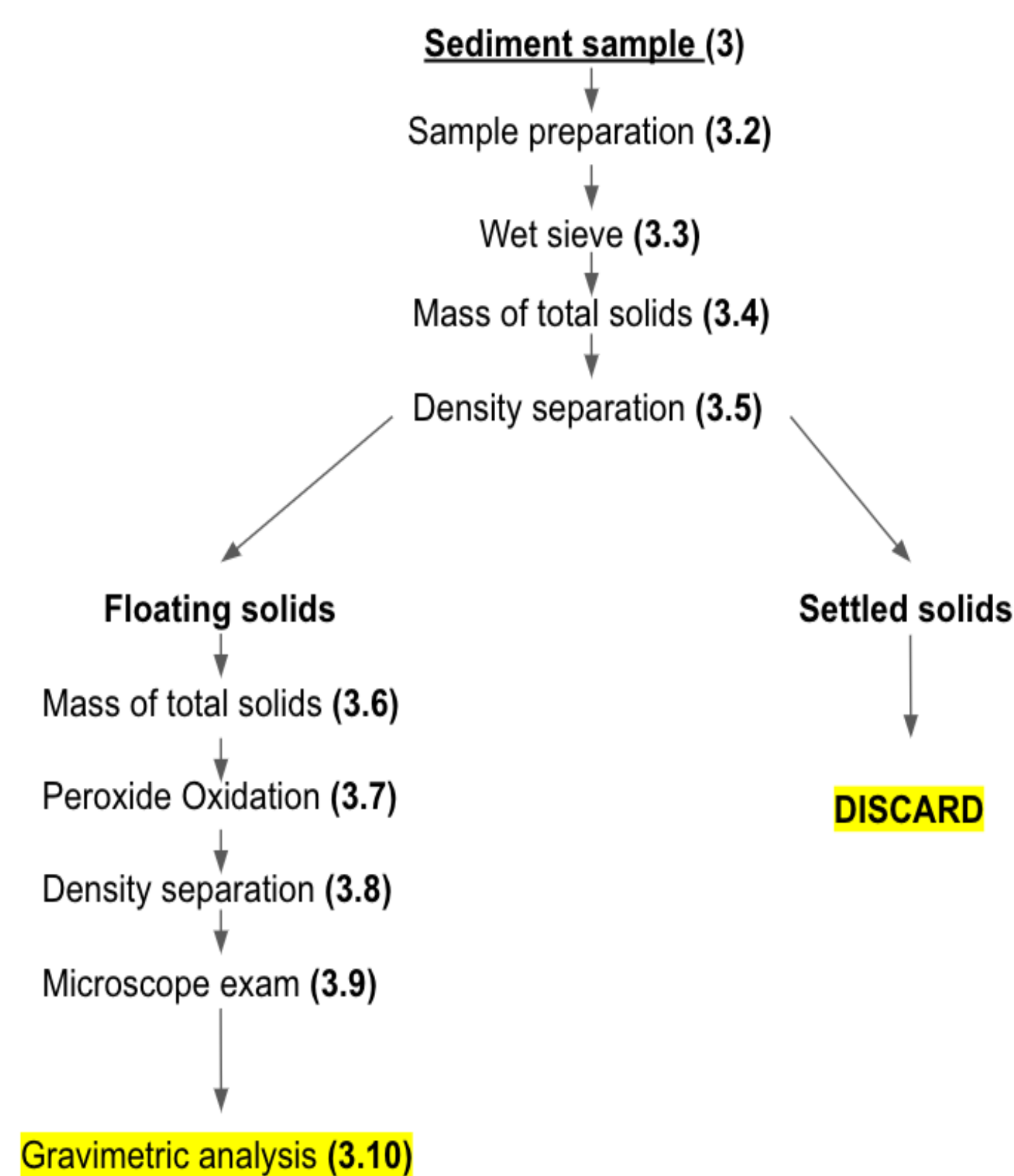


Fig. 2. Flow diagram for the analysis of microplastics in bed sediment

Results

- A large majority of the microplastics are fibers (92.1%).
- Colors for most of the microplastics was clear (67.7%) or white (13.2%) with a smaller percentage of microplastics with varying colors.
- $R^2 < 0.1$ for wet and dry samples, thus no correlation between microplastics and grain size.
- Due to a school-wide power outage in Summer 2024, there were limited samples provided resulting in unofficial data for all samples provided by the Department of Ecology.

Distribution of Microplastic by Type

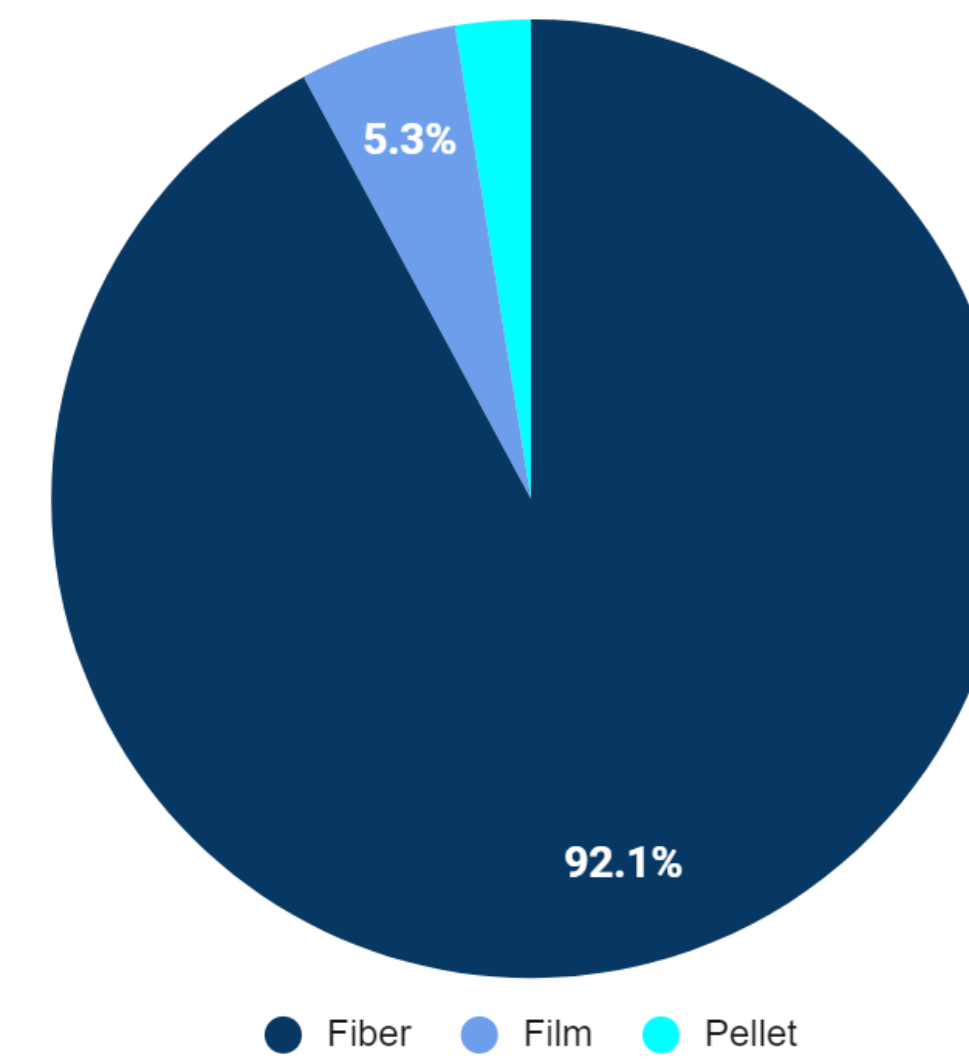


Fig. 3. Fifteen students counted their own samples under a microscope, separating each MP into three different categories (fiber, film, and pellet)

Distribution of Microplastic by Color

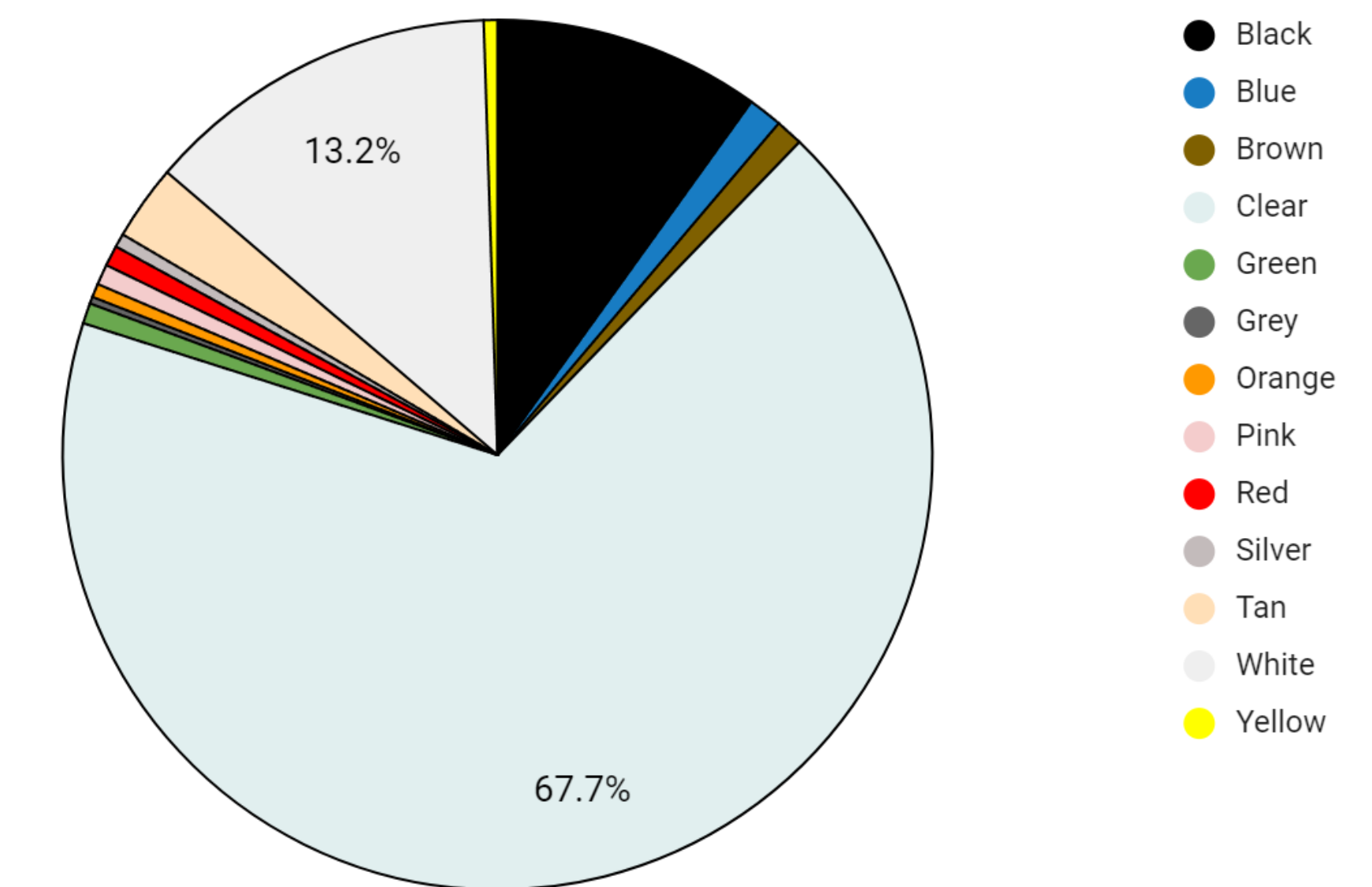


Fig. 6. Fifteen students counted their own samples under a microscope, separating each MP based on color.

2024 Bellingham Bay Microplastics/ m^2 Wet

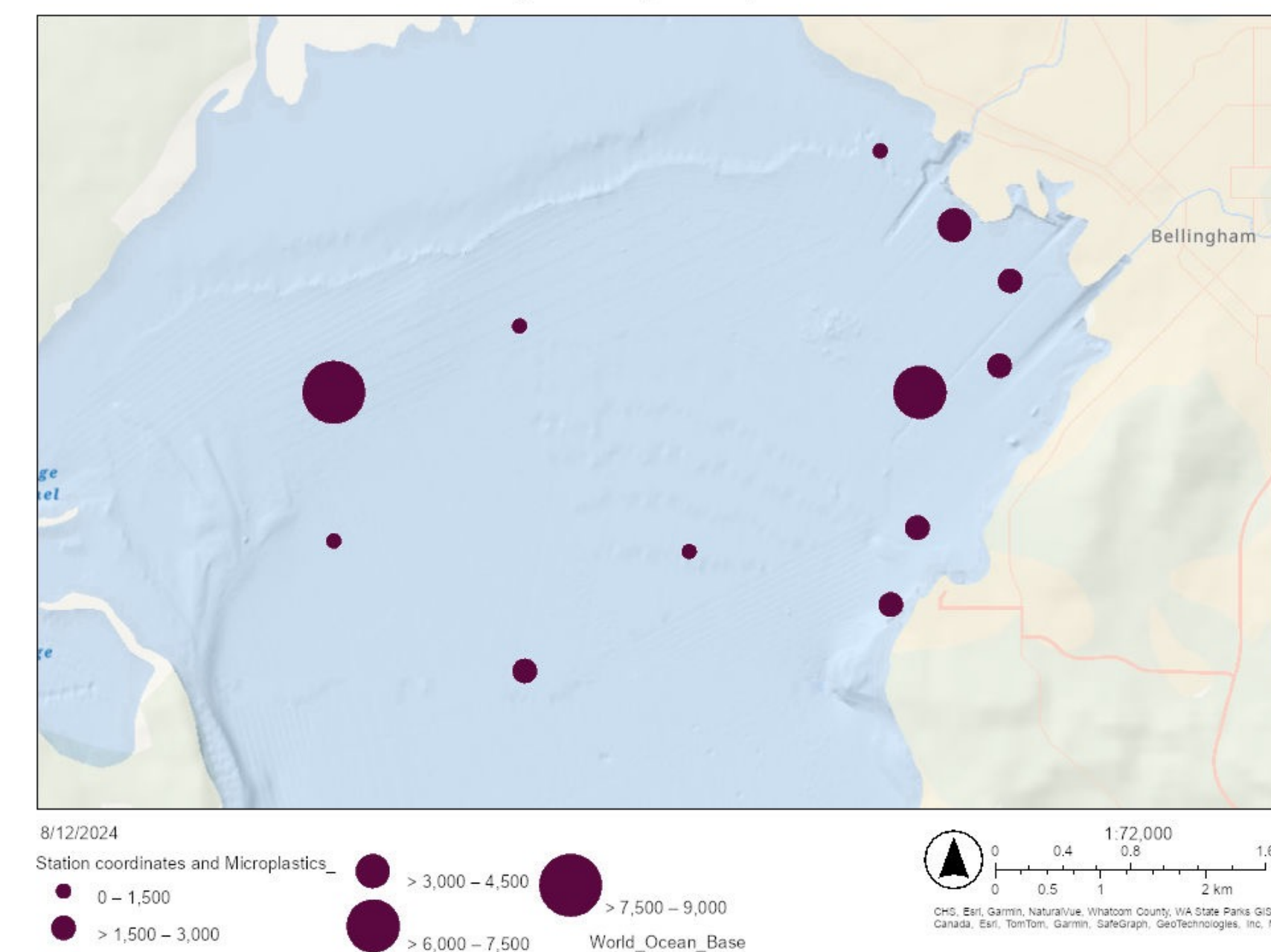


Fig. 4. Microplastic abundance count per square meter of wet sediment. Divided into five classes, the groups represents a range of 0-9000 MPs/ m^2 .

2024 Bellingham Bay Microplastics/ m^2 Dry

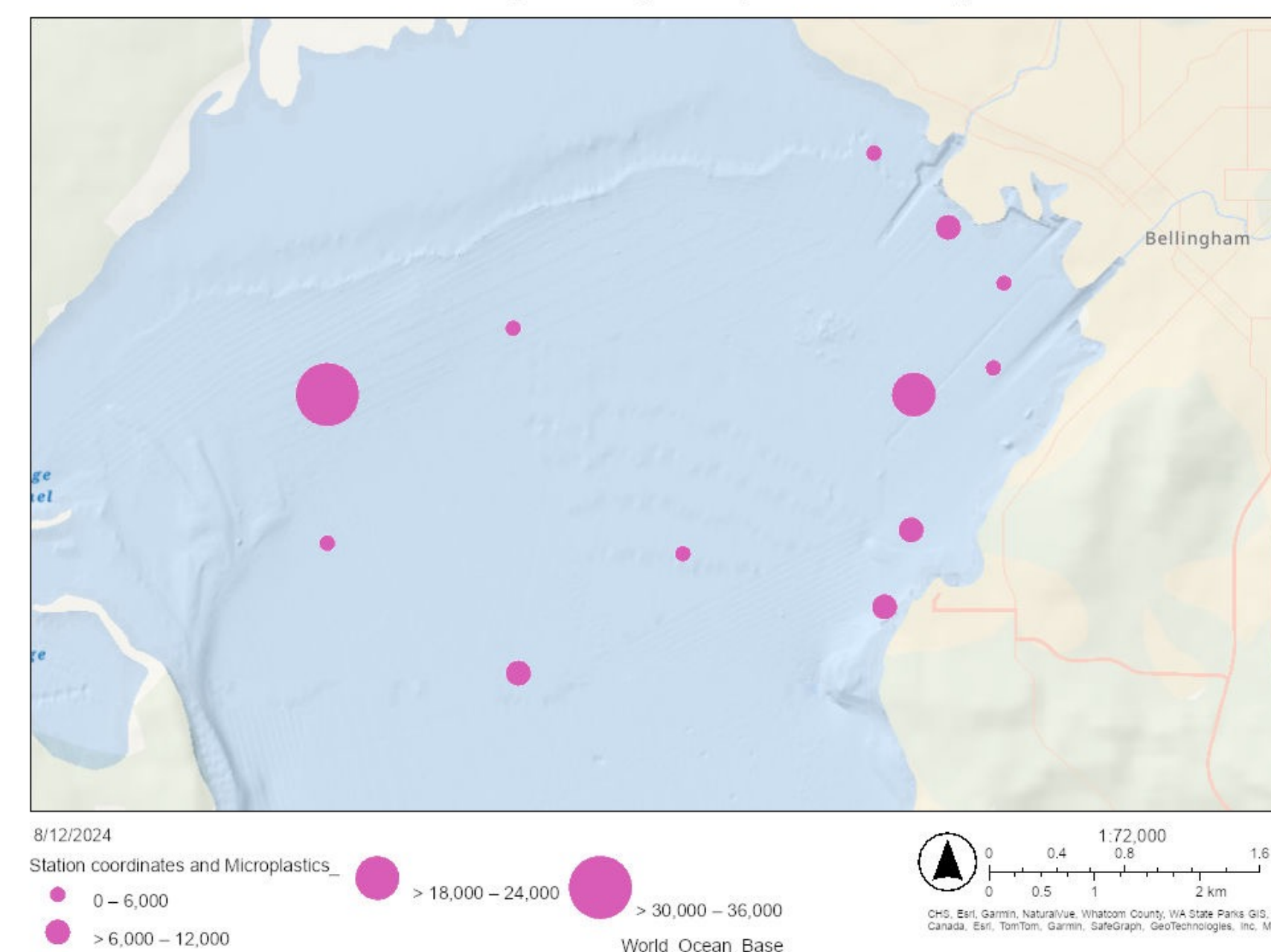


Fig. 5. Microplastic abundance count per square meter of dry sediment. Divided into five classes, the groups represent a range of 0-36000 MPs/ m^2 .

Conclusion

Microplastic abundance is typically uniform with certain stations finding more MPs than others. This can be attributed to water currents and atmospheric transportation. This information can be paired with consecutive annual data collection and oceanographic data to further assess the source and behavior of Bellingham Bay waters correlating to neighboring bays along Puget Sound. Future work can be done by:

- Finishing the analysis of the remaining samples.
- Comparing this data to previous annual data to track a change in abundance (D'Angelo, 2023).
- Translate the type of plastics found to their source.
- Contribute to the work of Puget Sound and the greater area of the Salish sea.

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References:

