Under the High Patronage of His Majesty King Mohammed VI

International Water Resources Association
IWRA

XIX WORLD WATER CONGRESS
International Water Resources Association (IWRA)
Marrakech, Morocco| 1 - 5 December 2025

Kingdom of Morocco
Ministry of Equipment and Water

How effectively do filters reduce the release of microplastics into Oregon (USA) waters?

Kervelle Baird
Portland State University
2 December 2025

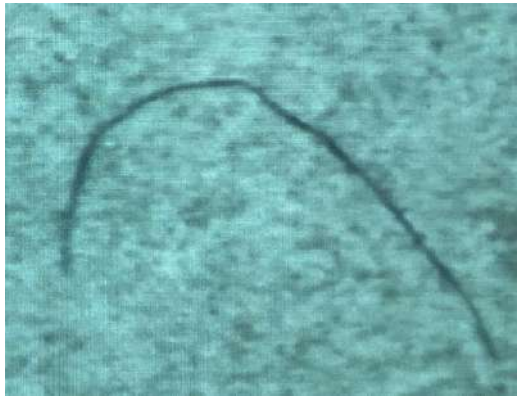
Co-authors:
Dr. Elise Granek: Portland State University
Dr. Susanne Brander: Oregon State University
Dr. Cara Poor: University of Portland
Dr. Tala Navab – Daneshmand: Oregon State University

Contents

Image Credit: Dr. Elise Granek

Background

- Weathering and runoff release MPs (Andrady, 2011).
- Wind & water transport microplastics (MPs) across ecosystems (Thompson et al., 2024).
- Wastewater treatment plants release plastic microfibers (Kapp and Miller, 2020).
- Humans ingest and inhale MPs (found in various organs) (Thompson et al., 2024).
- MPs stunt growth, hinder reproduction, and cause death (Chartres et al., 2024).
- ~ 5 MPs/L of stormwater sampled in North Portland (Wolfand et al.,2023).
- Seasonal variation in MP concentrations (Talbot et al., 2022).



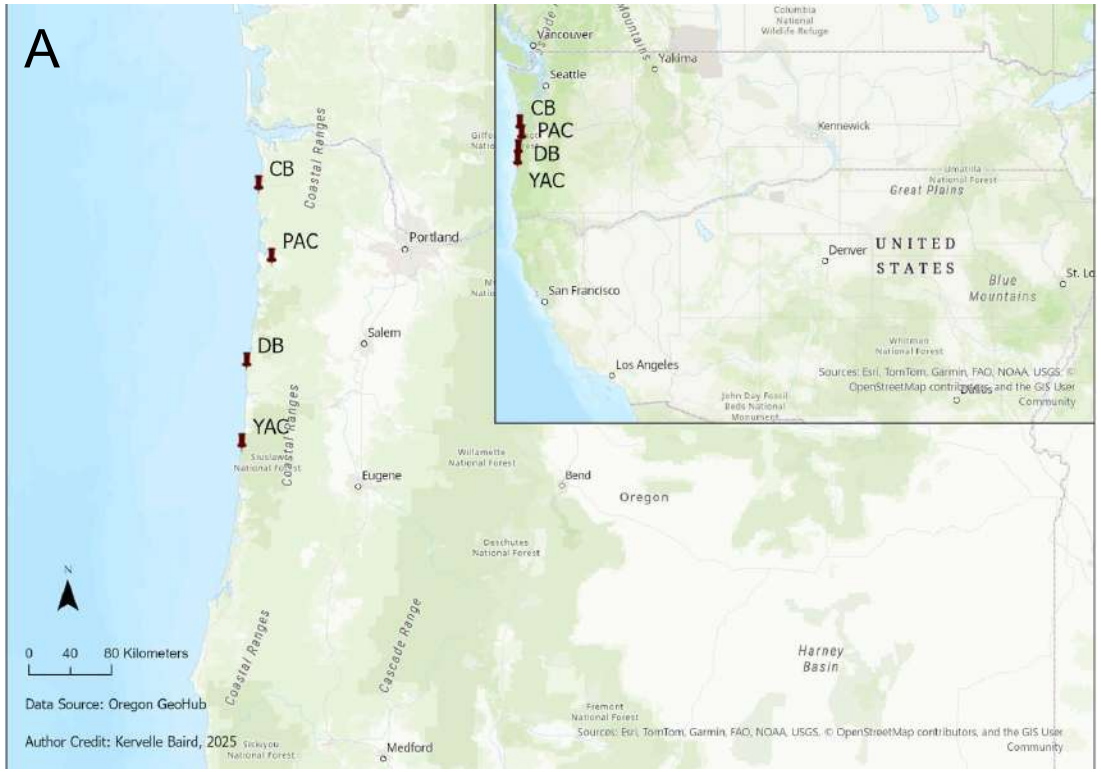
Magnification x12

Image Credit: Kervelle Baird

Study Design

Study Sites

A



Study Design

B

Wastewater Intervention	Stormwater Intervention: Yes	Stormwater Intervention: No
No	YAC	PAC
Yes	CB	DB

Image Credits: Kervelle Baird

Overview of Methodology

Sample Collection	Sample processing	Sample Analysis
• Filter 6 L of stormwater from drains and outfalls at 4 study sites in Spring, Fall, Winter • Air fall control • Triplicate at one drain or outfall per location	• Evaporation • Density Separation • Multi-step Filtration	• Microscopy • Microscope- Fourier Transform Infrared Spectroscopy

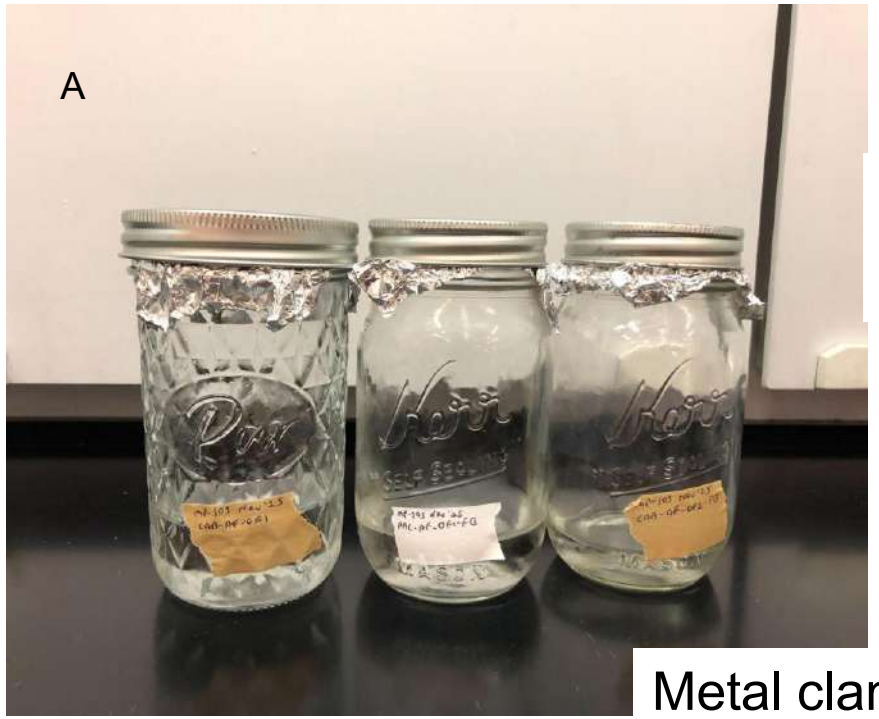
Sample collection: outfalls and storm drains

Season	Baseline	Post-Installation
Spring	2024	2026
Fall	2024	2025
Winter	2025	2026

Image Credit: Dr. Susanne Brander

Image Credit: Kervelle Baird

Evaporation and density separation



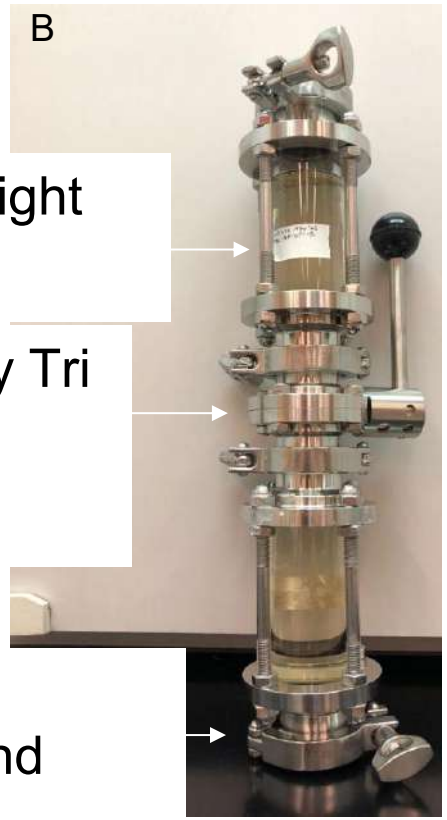
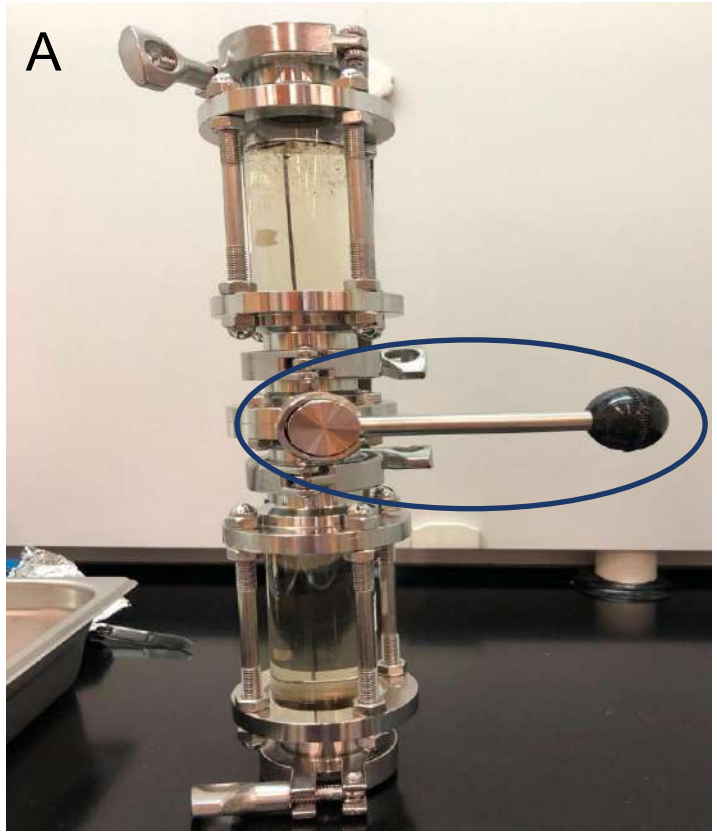


Image Credits: Kervelle Baird

Multi-step filtration



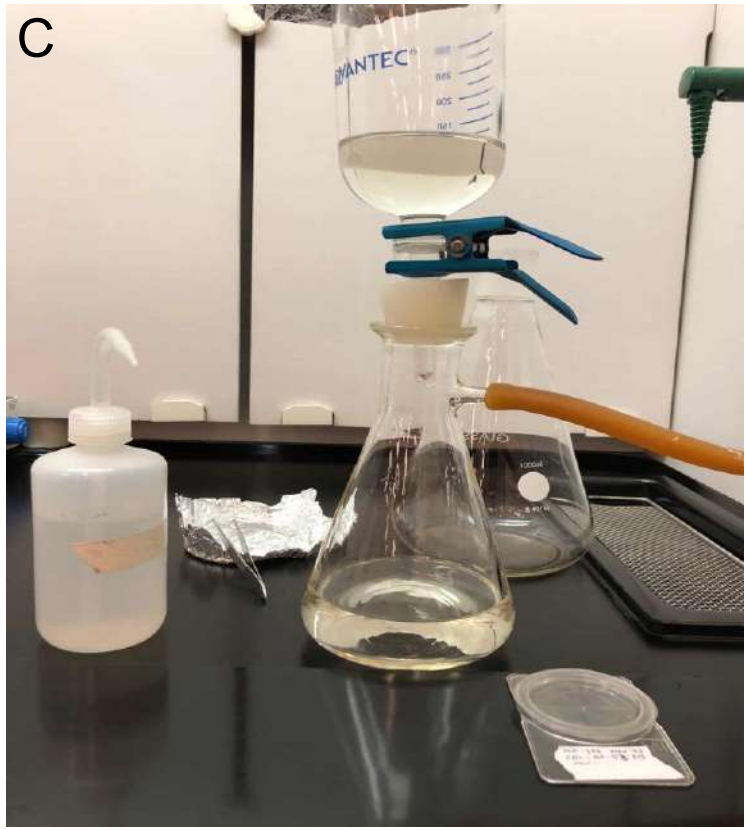
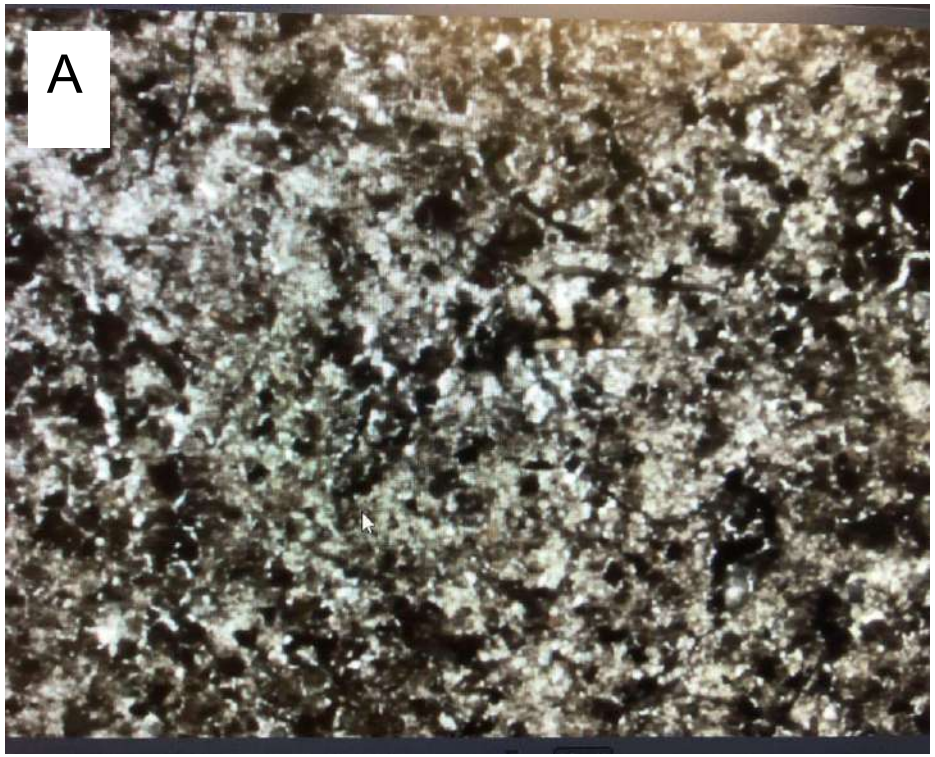
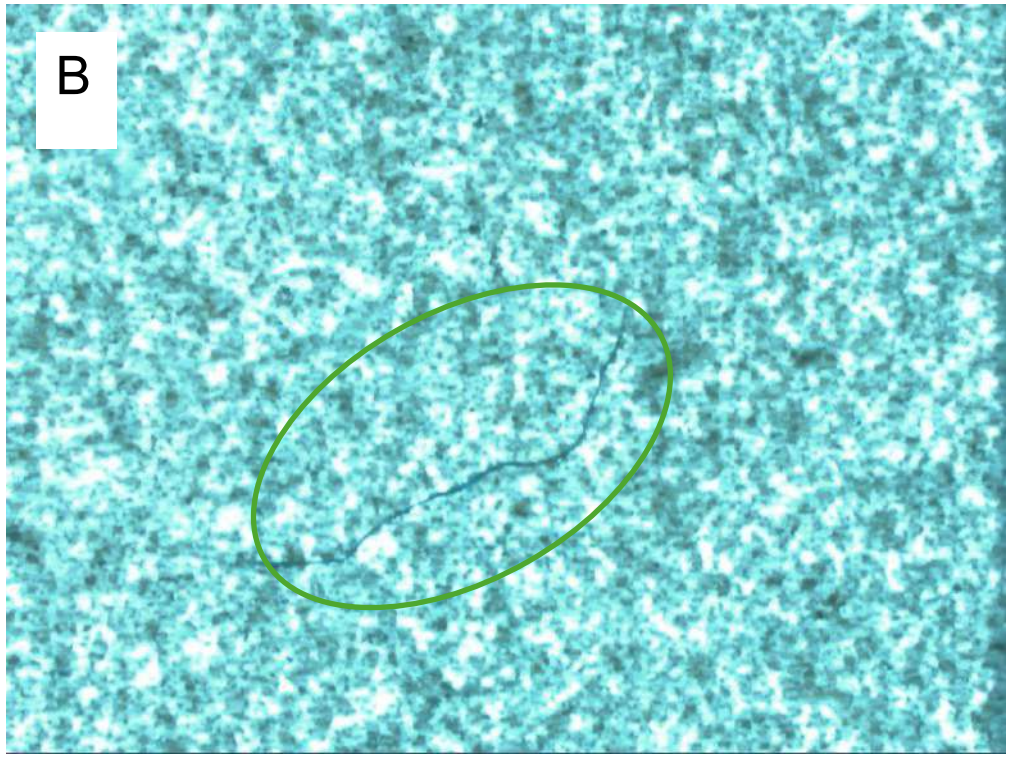


Image Credits: Kervelle Baird

Microscopy

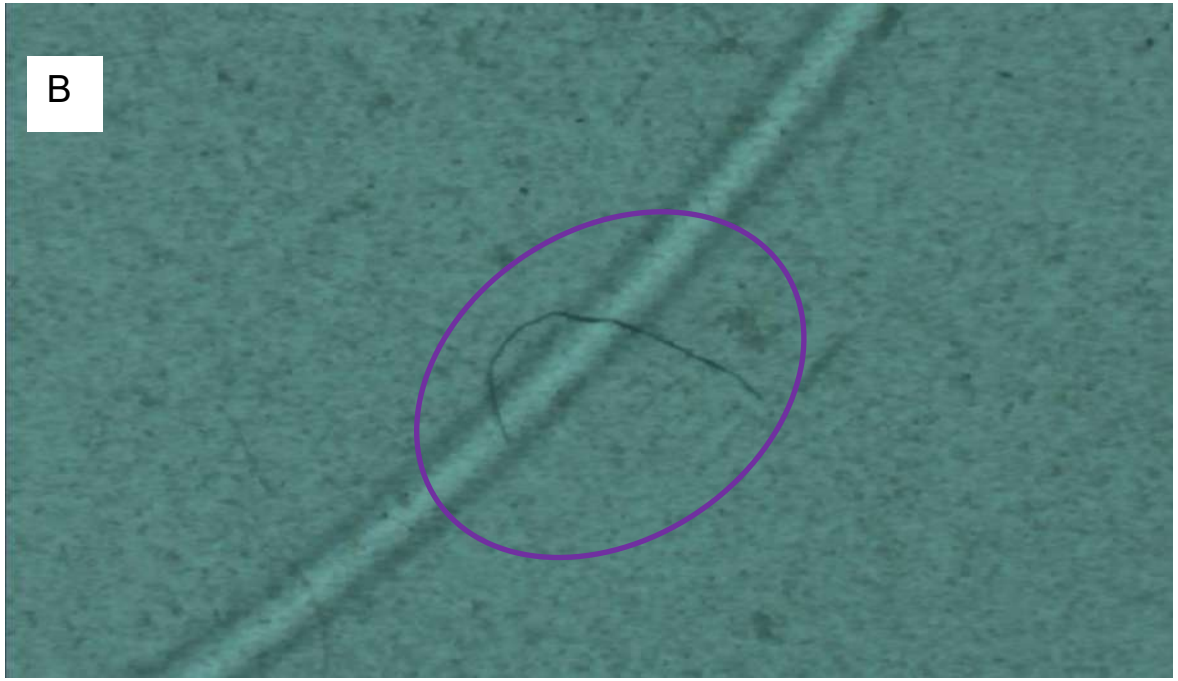




Magnification: 20x

Image Credits: Kervelle Baird

Microscope – Fourier Transform Infrared Spectroscopy



Magnification: 20x

Image Credits: Kervelle Baird

Storm drains filter

March 2025

November 2025

Image Credits: Kervelle Baird

Preliminary Results

- ★ Attitudes and perceptions about the storm drain filters were variable.
- ★ Flooding has not been reported.
- ★ No maintenance has been required.
- ★ The filters appear to have reduced particles entering the storm drains

Acknowledgements

Dr Elise Granek

Dr. Susanne Brander

Dr. Cara Poor

Dr. Tala Navab-Daneshmand

Tracy Crews

Dr. Stacey Harper

Dr. Britta Baechler

Minal Mistry

Dr. Angee Doerr

Cait Goodwin

Steve Rumrill

Kellie Teague

Dr. Allie Tissot

Jazmine Compton

Amanda Gannon

Emily Hink

Katherine Evans

Lina Maruca

Wise Datsomor

Rebecca Talbot

Dr. Clarissa Raguso

Patrick Reese

Lauren Kashiwabara

Citlali Madrigal

Keria Moritsugu-Vandehey

Naomi Hemstreet

Ava Imbert- Diaz

Quincy Tacker

Rose Tucker

Jasper King

Anna Marks

Onyx Brisbois

Drake Scrafford

Carly Chan

Bryce Dunn

Libby Spruell

Kelli Ennis

Dr. Catherine de Rivera

Rebecca Wilson-Ounekeo

References

- Andrady, A. L. (2011). Microplastics in the marine environment. *Marine Pollution Bulletin*, *62*(8), 1596–1605. https://doi.org/10.1016/j.marpolbul.2011.05.030
- Chartres, N., Cooper, C. B., Bland, G., Pelch, K. E., Gandhi, S. A., BakenRa, A., & Woodruff, T. J. (2024). Effects of Microplastic Exposure on Human Digestive, Reproductive, and Respiratory Health: A Rapid Systematic Review. *Environmental Science & Technology*, *58*(52), 22843–22864. https://doi.org/10.1021/acs.est.3c09524
- Kapp, K. J., & Miller, R. Z. (2020). Electric clothes dryers: An underestimated source of microfiber pollution. *PLOS ONE*, *15*(10), e0239165. https://doi.org/10.1371/journal.pone.0239165
- Thompson, Richard C., Winnie Courtene-Jones, Julien Boucher, Sabine Pahl, Karen Raubenheimer, and Albert A. Koelmans. "Twenty Years of Microplastic Pollution Research—What Have We Learned?" Science 386, no. 6720 (September 19, 2024): eadl2746. https://doi.org/10.1126/science.adl2746.
- Wolfand, J., Poor, C. J., Taylor, B. L. H., Morrow, E., Radke, A., & Diaz-Gunning, E. (2023). Microplastics: The Occurrence in Stormwater Runoff and the Effectiveness of Bioretention Systems for Removal. *Journal of Environmental Engineering*, *149*(11), 04023078. https://doi.org/10.1061/JOEEDU.EEENG-7285
- Talbot, R. (2022). *Spatial and Seasonal Variations of Microplastic Concentrations in Portland's Freshwater Ecosystems* [Master of Science in Geography, Portland State University]. https://doi.org/10.15760/etd.7789

References and Brochure

Under the High Patronage of His Majesty King Mohammed VI

XIX WORLD WATER CONGRESS
International Water Resources Association (IWRA)
Marrakech, Morocco | 1-5 December 2025

Thank you!

kervelle@pdx.edu

Trapping Tiny Plastics
Instagram

www.worldwatercongress.com

International Water Resources Association
IWRA

WWCongress | wwcongress | worldwatercongress

Kingdom of Morocco
Ministry of Equipment and Water