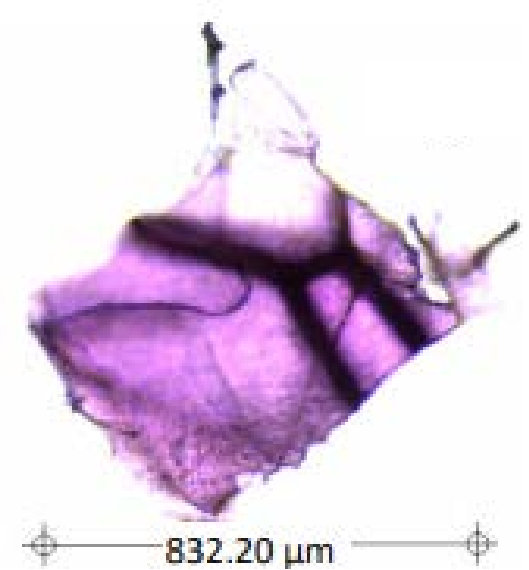
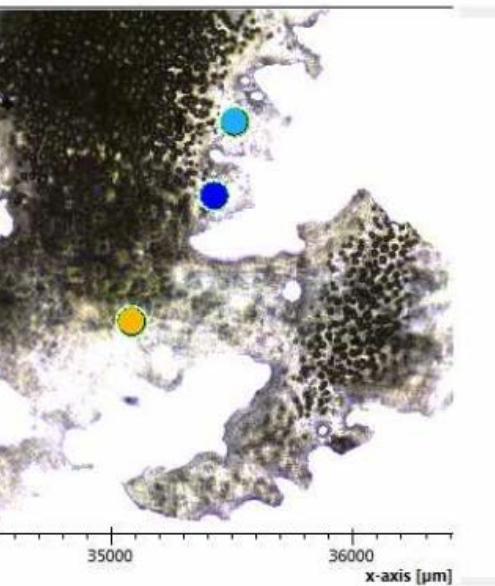


Microplastic research in the Fahrenfeld Lab

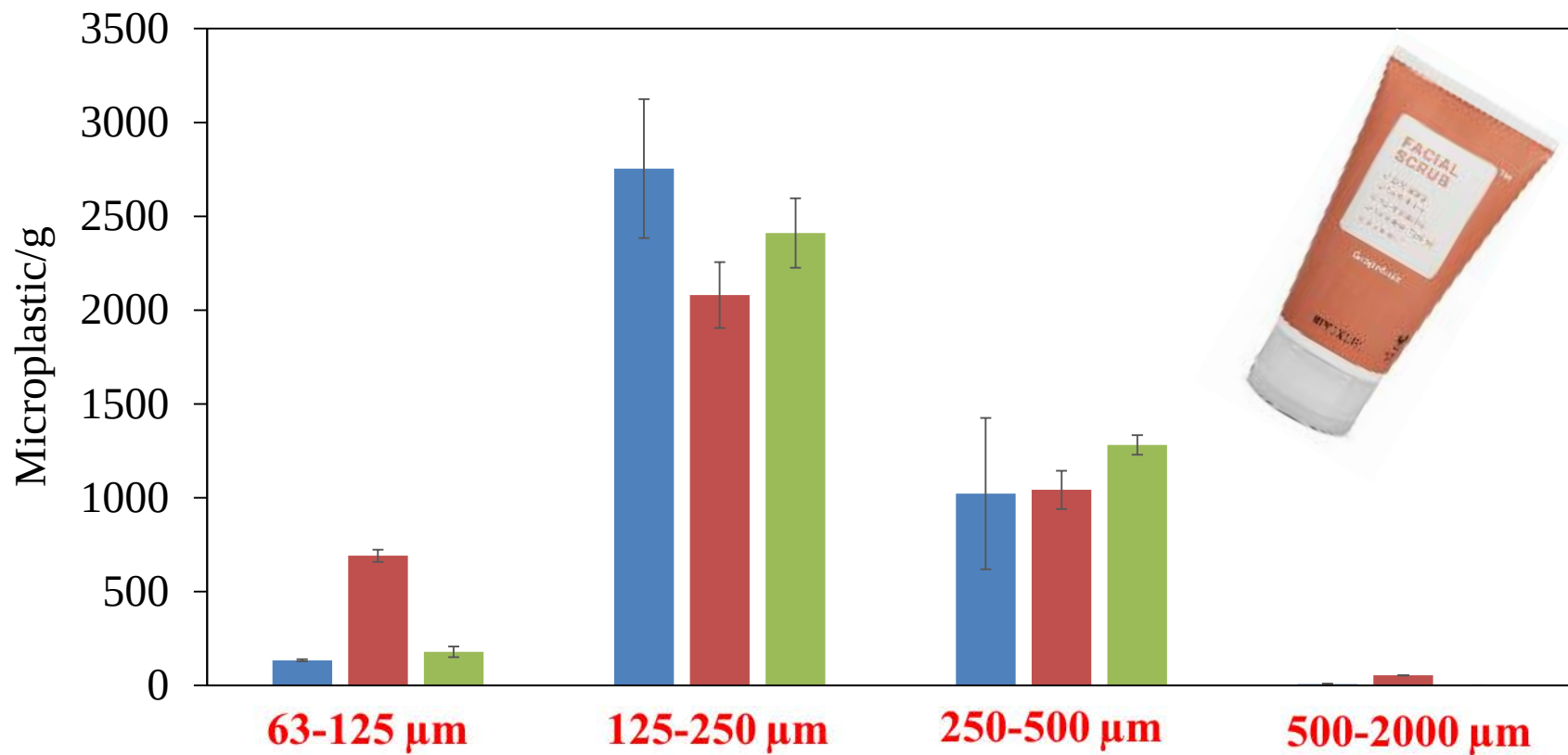


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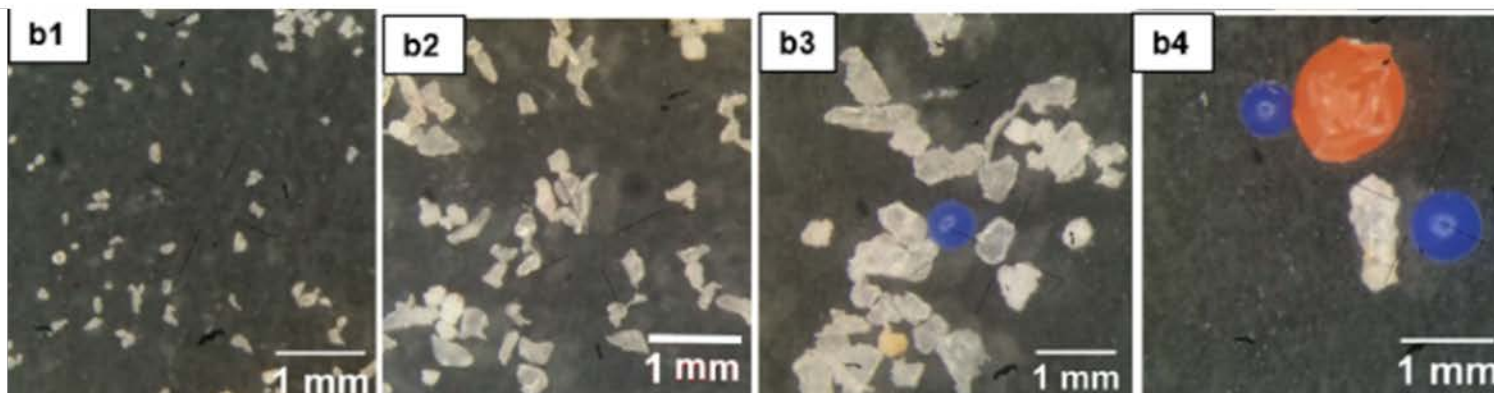


2013

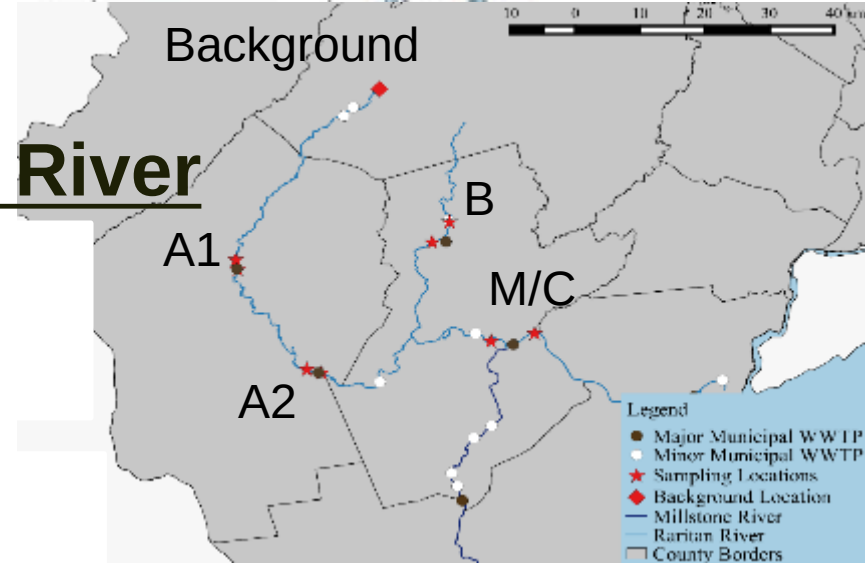
- Can we find microplastics in fresh water?
- What are the sources?
- What types of polymers are prevalent?
- Do the biofilm on MP present a unique hazard?



Personal
care
product

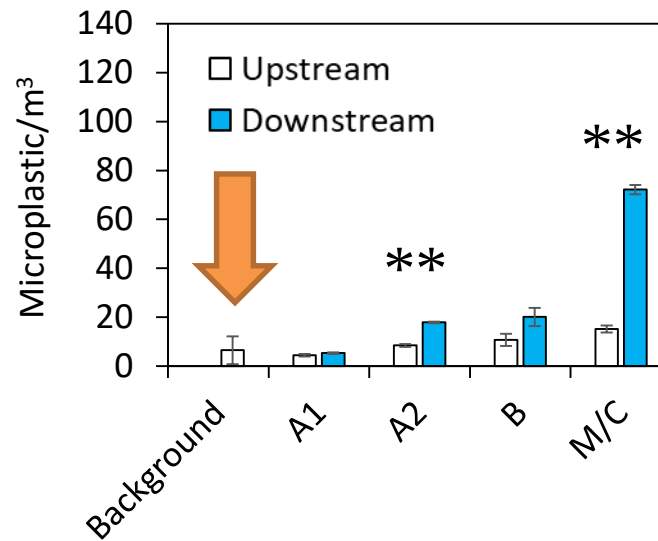


2015 Survey of the Raritan River

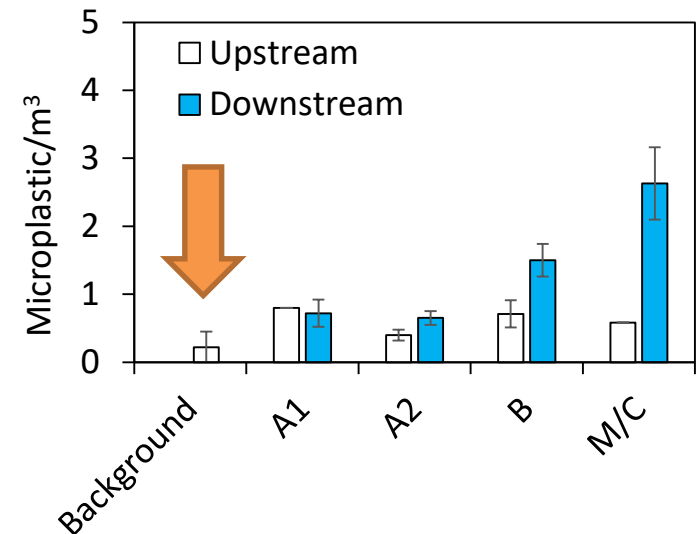


** $p < 0.01$

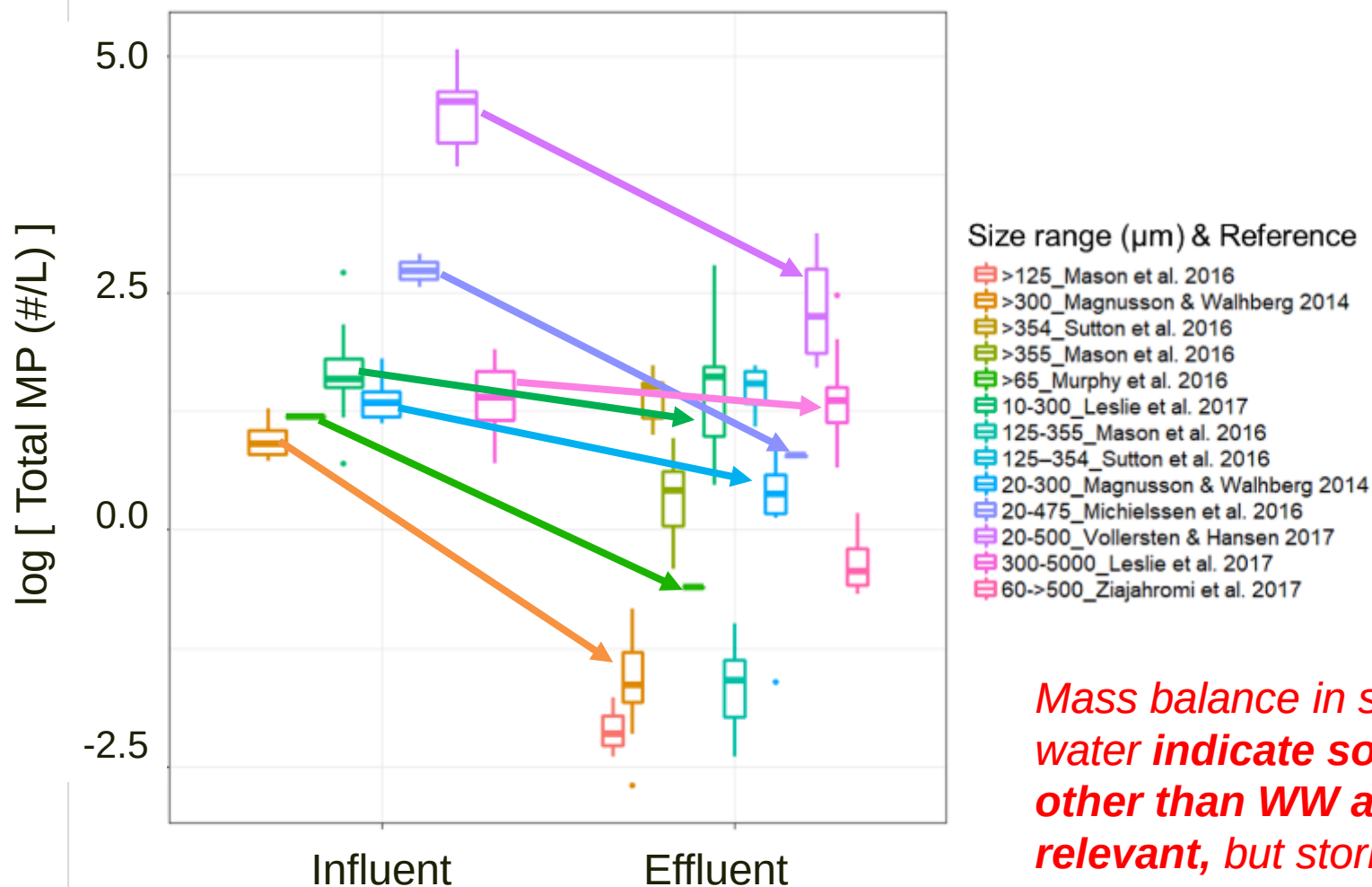
250-500 μ m



500-2000 μ m



Literature review: WWTP are removing MP, removal rates varies by processes used



Mass balance in surface water indicate sources other than WW are relevant, but stormwater, sediments, etc. are not well studied!

Inaccuracy of visual identification motivates use of chemical methods



Single reflection diamond
attenuated total reflectance (ATR)

- + fast
- can crush specimens



microFTIR in transmittance mode

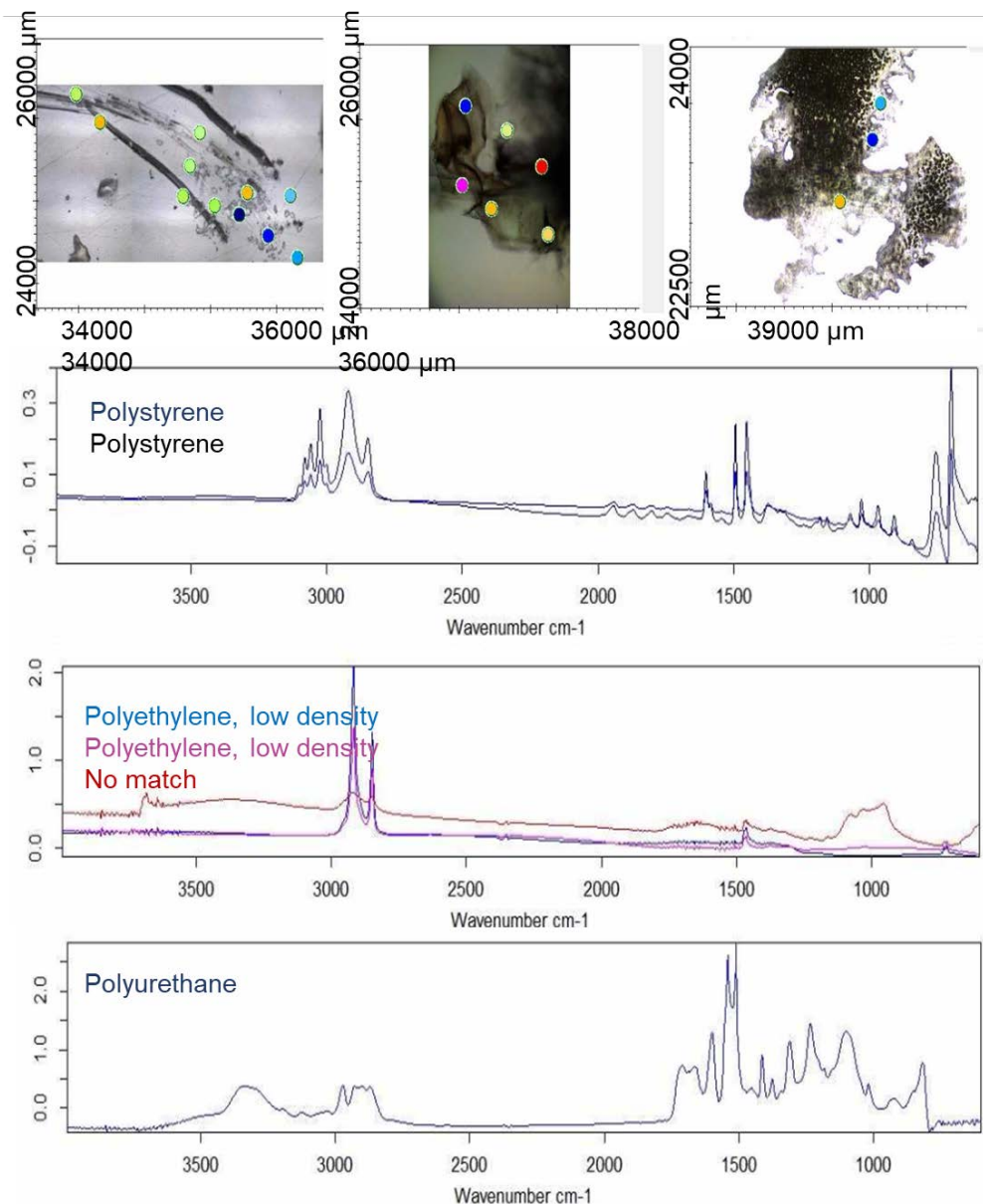
- + microscope images
- slower

FT-IR analysis to confirm polymers observed



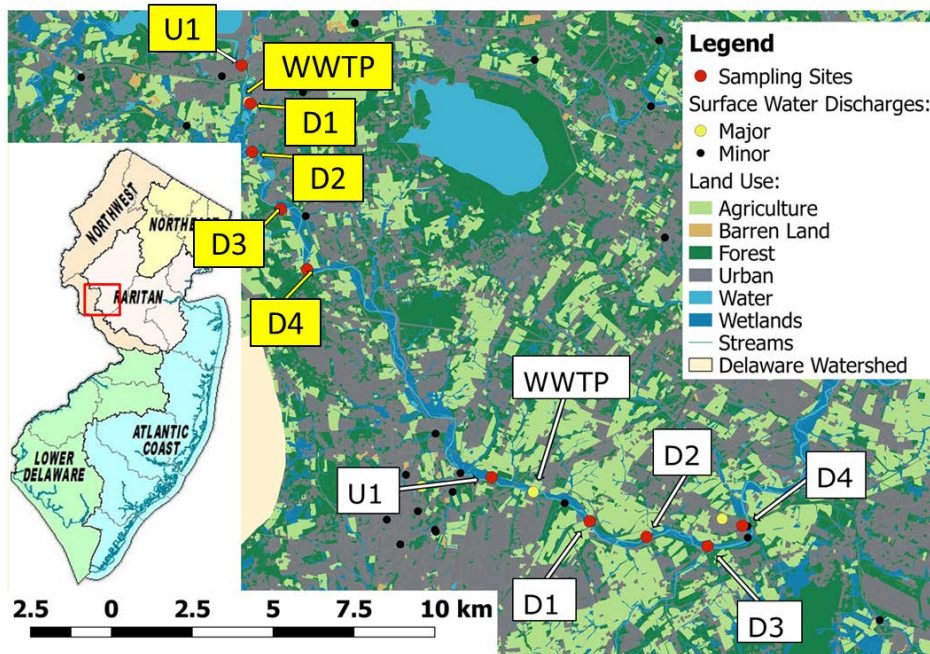
Georgia Arbuckle-Keil
Rutgers, Camden

Arbuckle-Keil and Fahrenfeld. (in prep).



I. Polymers observed in the Raritan River

250-2000 μ m



Water (10-40% of scans)

- Polyterpene (Rubber)
- Polyethylene
- Polyurethane
- Polystyrene

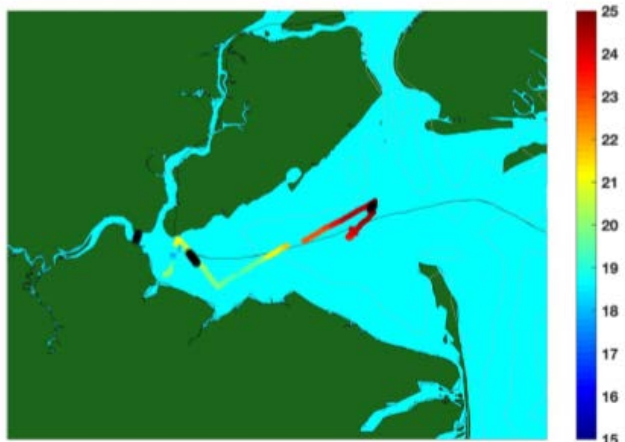
Sediment (0-35% of scans)

- Polyethylene
- Polypropylene
- Other

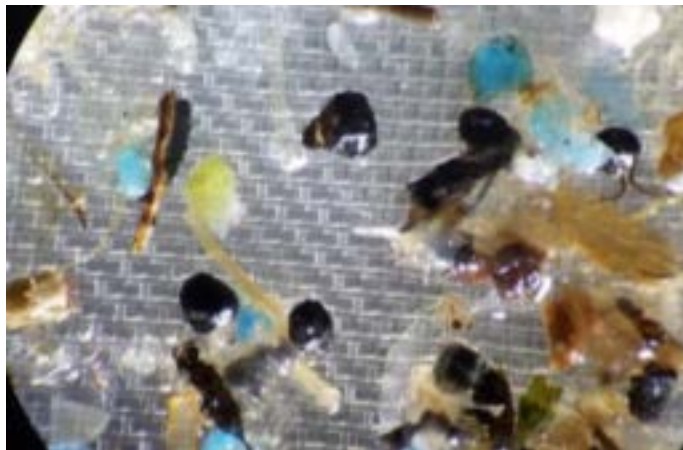


II. Polymers observed in Raritan Bay

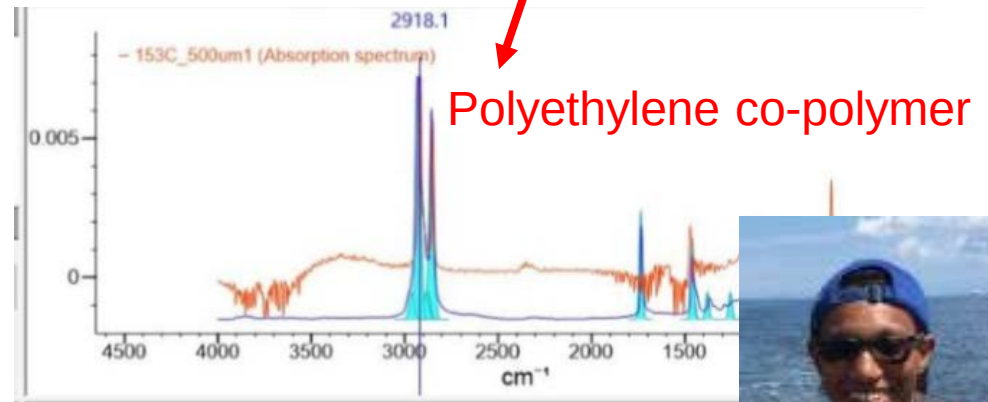
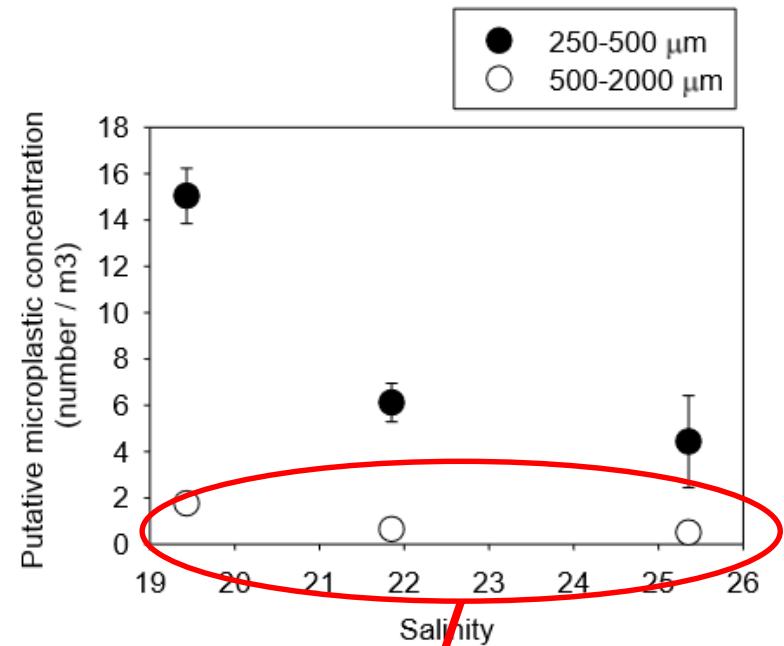
250-2000 μm



Ship track, color represents surface salinity, black dots = sampling sites



Samples on mesh filter

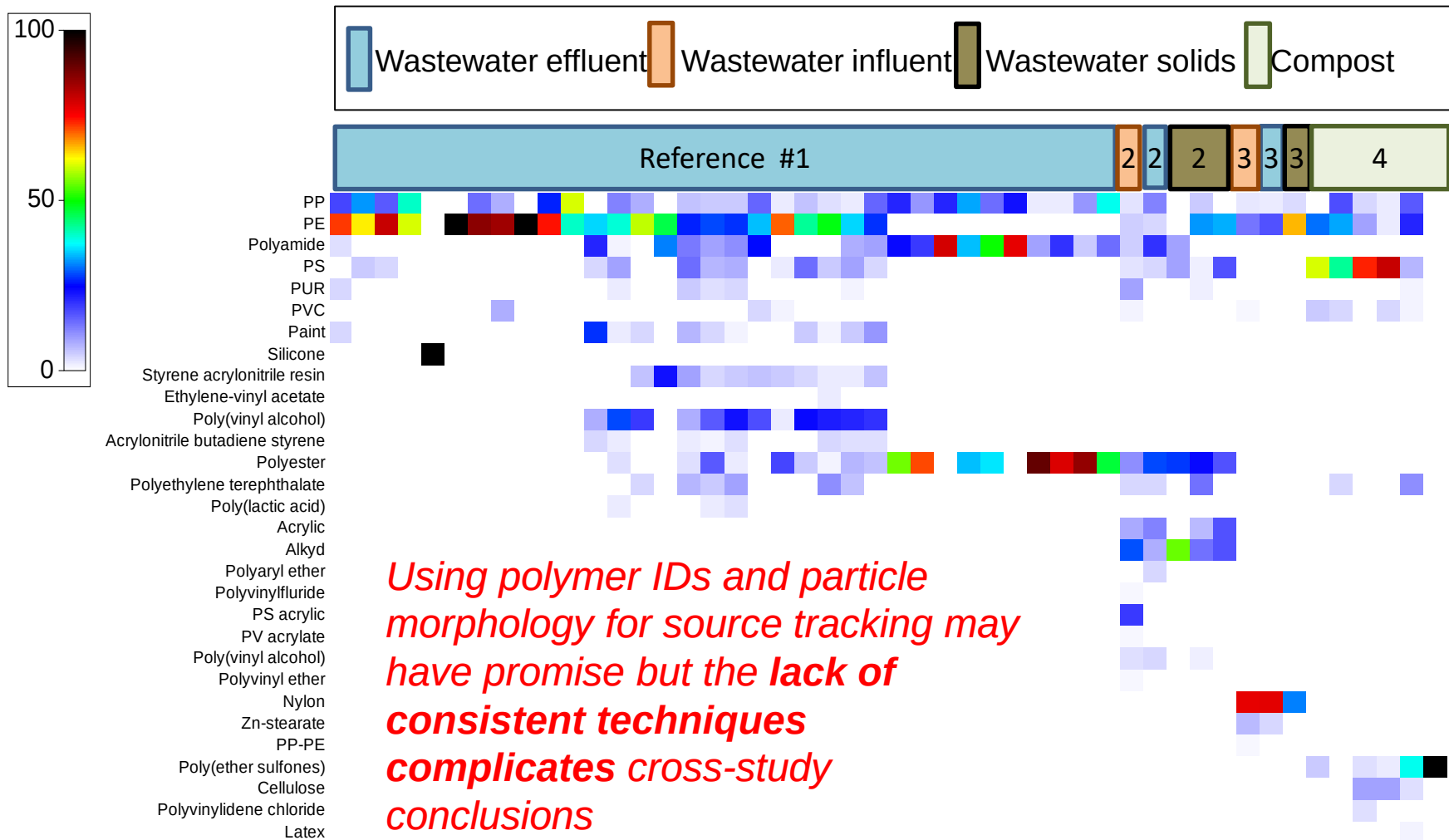


Bailey, Chant, Saba, Arbuckle-Keil, & Fahrenfeld. (in prep).



Literature review:

Polypropylene, polyethylene, polyamide, polyester



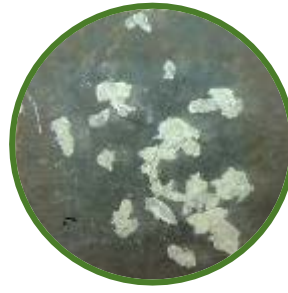
Microplastic biofilm



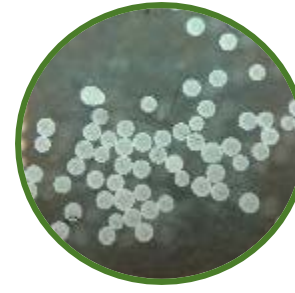
Glass
microbeads



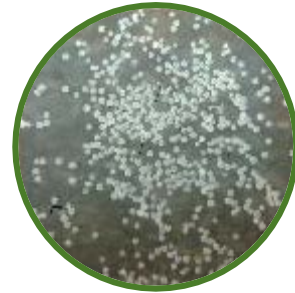
Large
Polyethylene



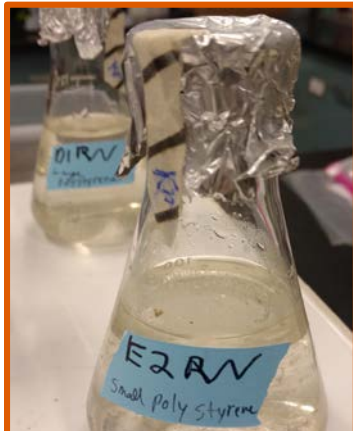
Small
Polyethylene



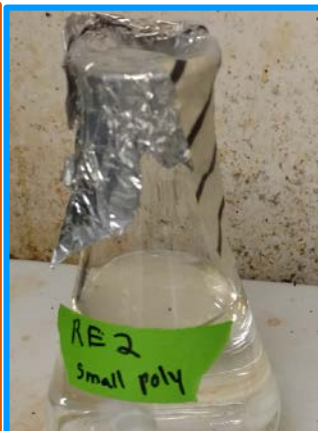
Large
Polystyrene



Small
Polystyrene



WW Influent

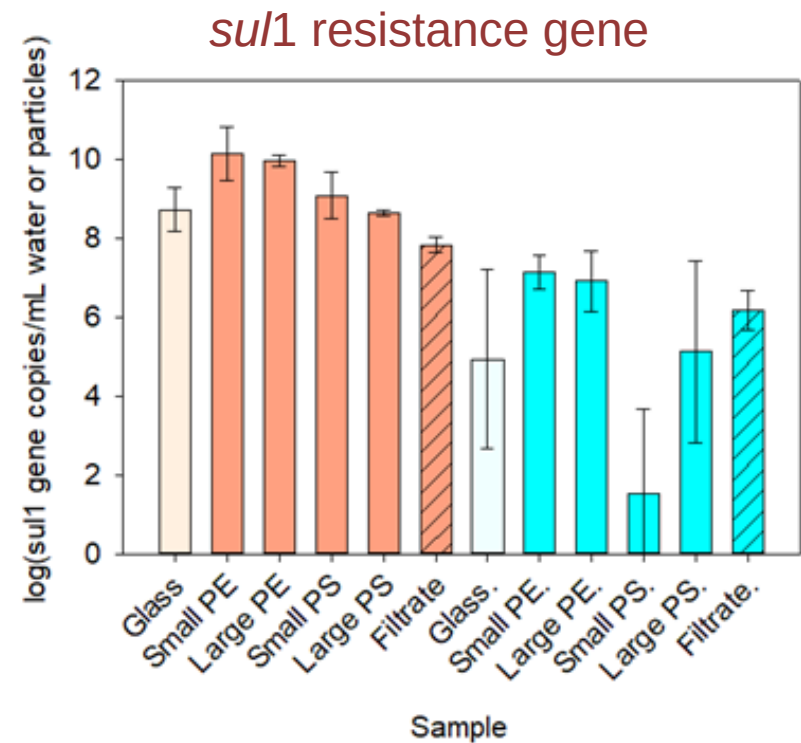
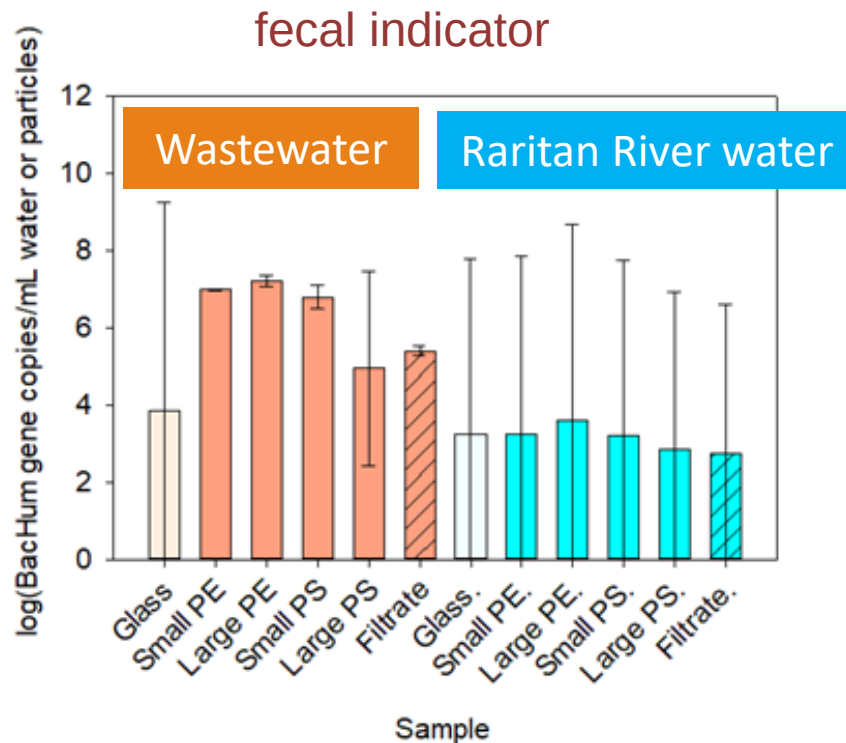


Raritan River

qPCR for 'pathogen' markers

*Amplicon sequencing to describe microbial
community structure*

No differences in 'pathogens' between materials or compared to filtrate



Community structure varied by morphology and water source > size or material

Learn more about our work!



Environmental Science Water Research & Technology



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Cite this: DOI: 10.1039/c8ew00712h

Microplastic biofilm in fresh- and wastewater as a function of microparticle type and size class†

Kathleen Parrish and N. L. Fahrenfeld *



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Source tracking microplastics in the freshwater environment

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Influence of wastewater treatment plant discharges on microplastic concentrations in surface water

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Lessons learned

- Can we find microplastic in fresh water? **Yes!**
- What are the sources? ***In progress!***
- What types of polymers are prevalent? ***PE, Other, Rubber, PP, PS...***
- Do the biofilm on MP present a unique hazard? ***Not necessarily, maybe if transported without weathering?***

Acknowledgements

Collaborators

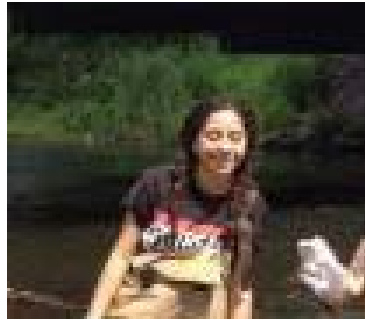
Georgia Arbuckle Keil, Bob Chant, Grace Saba, Shannon Bartelt-Hunt,
Karli Sipps



Shirin
Estahbanati



Kathleen
Parrish



Sheri Elsaker



Kris
Parker



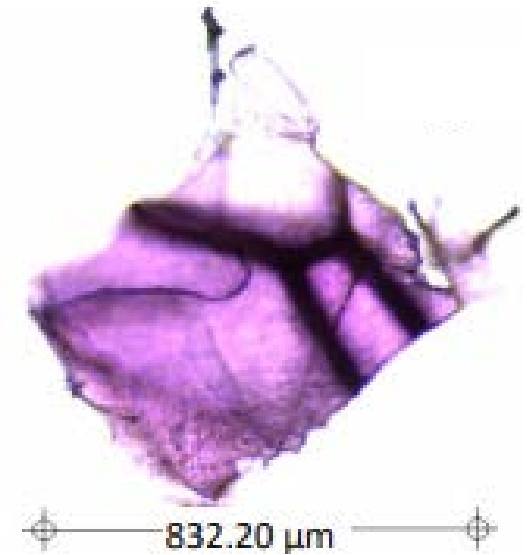
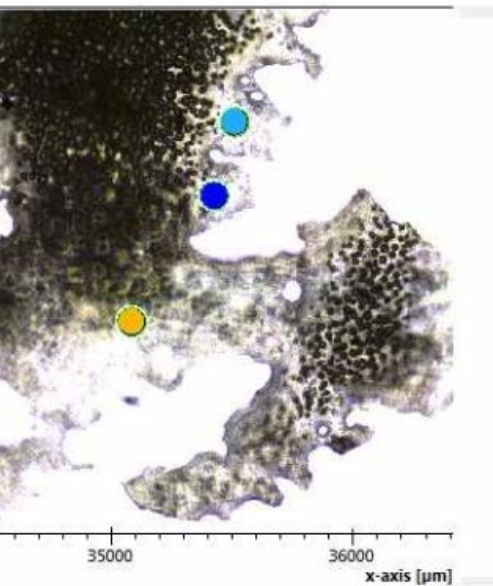
Kendi
Bailey

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Rutgers Aresty Project
Rutgers Sustainable Raritan River
Initiative
NOAA NJ Sea Grant



Microplastic research in the Fahrenfeld Lab



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Microplastic biofilm communities

