



UNIVERSITY OF
SOUTH FLORIDA

SEASONAL AND LONGITUDINAL PATTERNS OF PLASTIC POLLUTION IN A SUBTROPICAL URBAN RIVER

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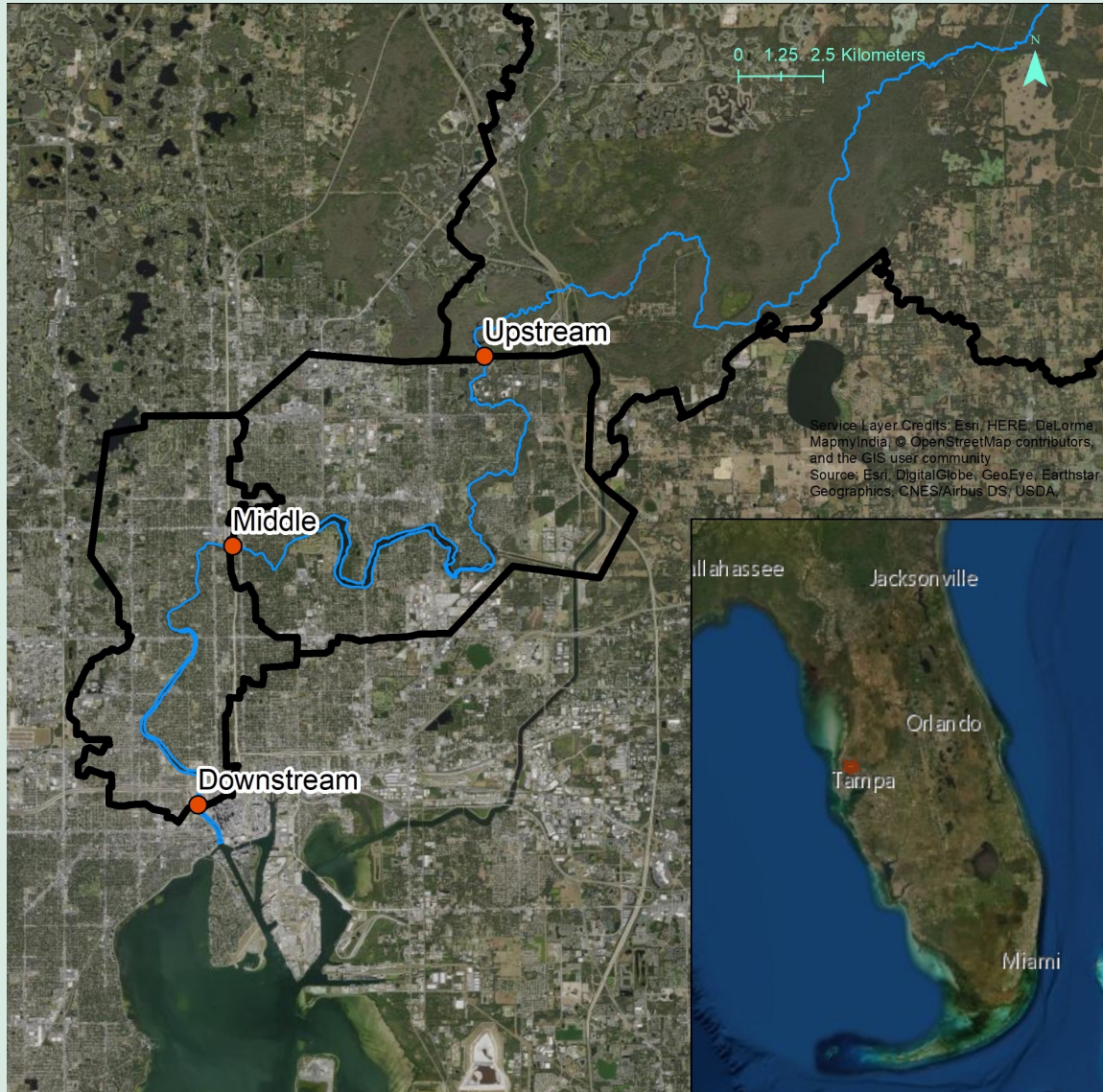


I am Charlotte Haberstroh, Ph.D. candidate at University of South Florida, Tampa, Florida. I have been studying plastic pollution in rivers for the past four years and conducted fieldwork in Florida and Cambodia.

Check out our website <https://www.watershedsustainability.org/river-plastics> or contact me at chaberstroh@usf.edu.



Field Study Hillsborough River in Tampa, Florida



Monthly sampling May 18 - October 19

May-Jul	increasing rainfall
Aug-Oct	wet
Nov-Jan	receding rainfall
Feb-Apr	dry

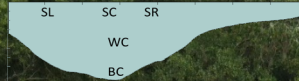
Upstream: baseline site with low human impact upstream

Middle catchment: industrial and residential areas

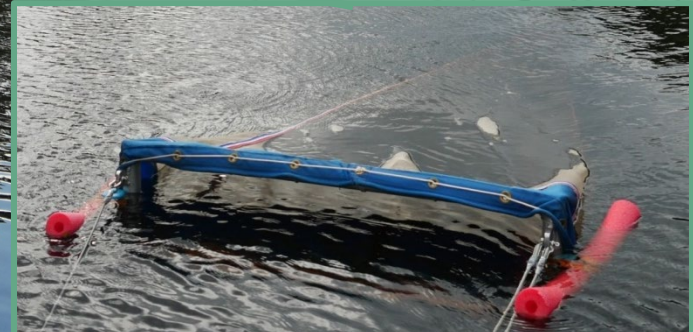
Downstream catchment: built-up and high population density

Field Data Collection

- Five-point sampling (surface and sub-surface)
- Flow measurements (ADCP)



Acoustic Doppler Current Profiler



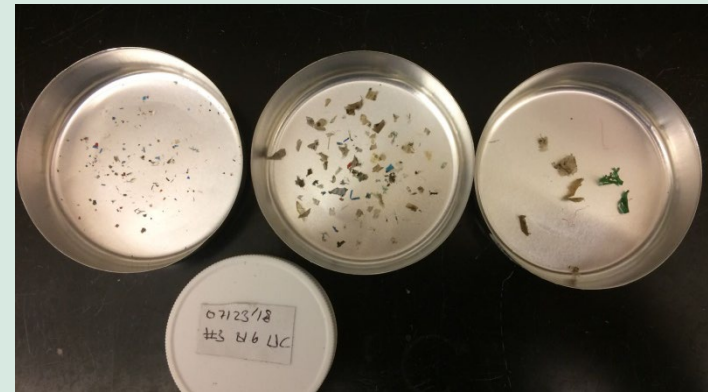
500 µm neuston net

Laboratory Processing & Particle Characterization

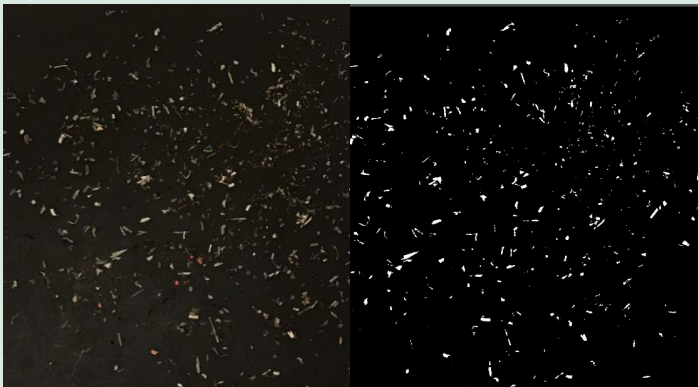
- Sieve (500 μm), dry, sort



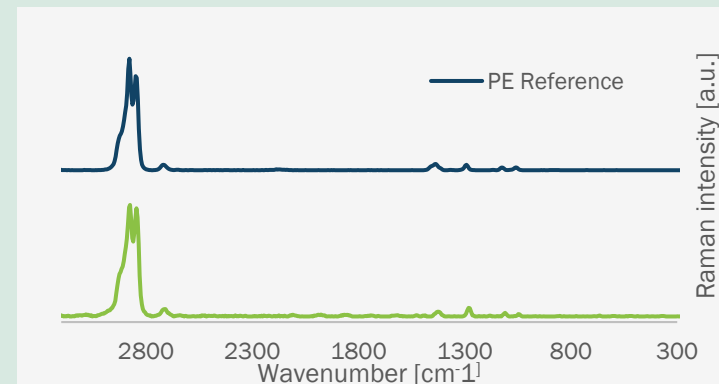
- Classify and weight by size



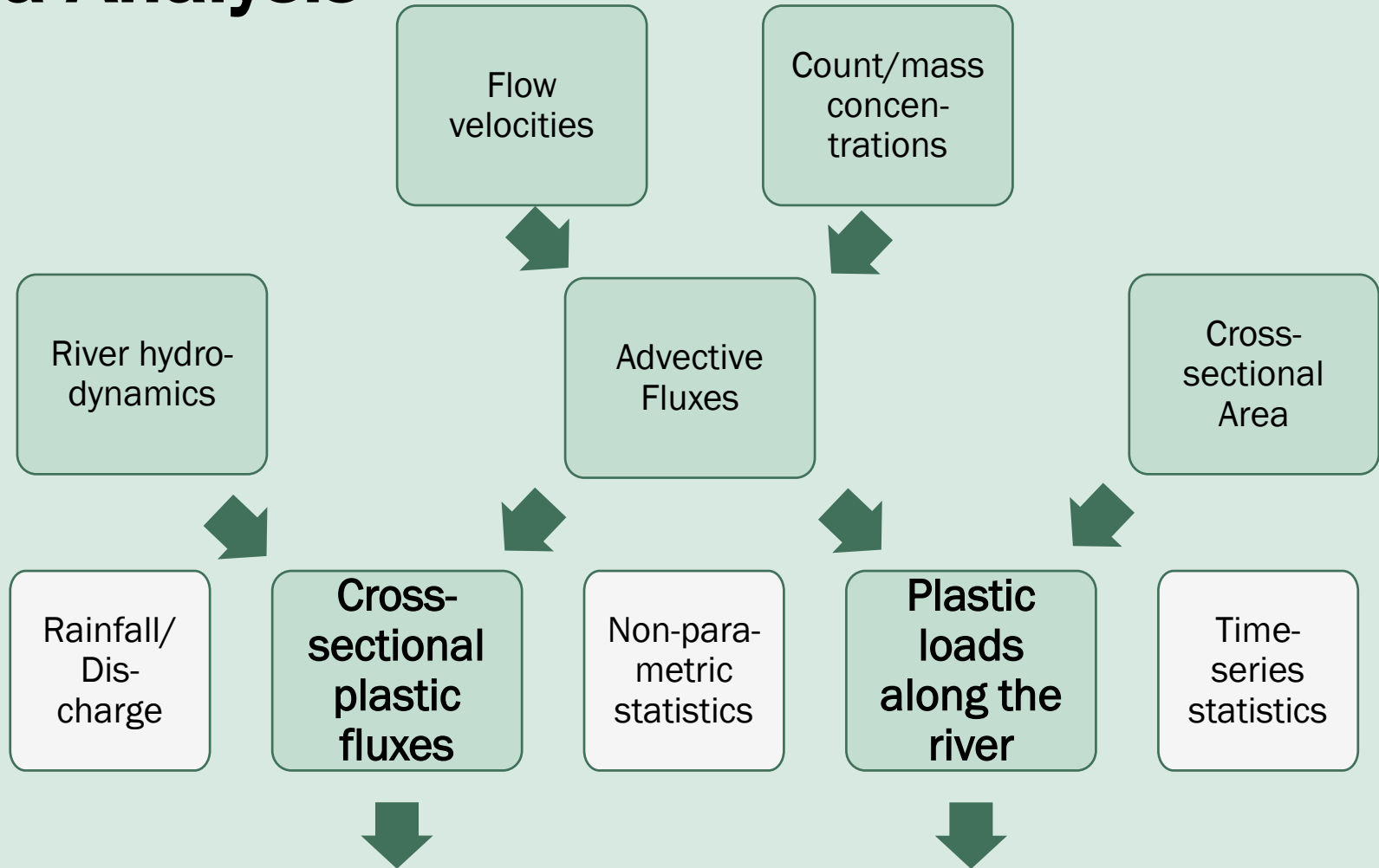
- Image Analysis for count & shape



- Raman Spectroscopy for confirmation & identification



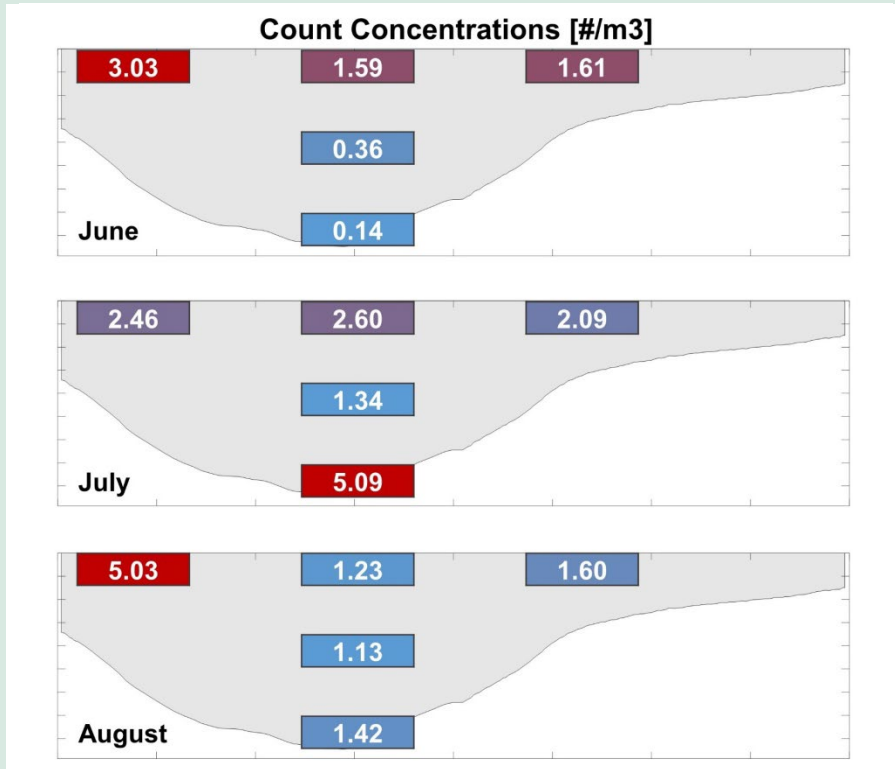
Data Analysis



Research question: How do hydrodynamics, seasonal flows and urban development affect river plastic transport ?

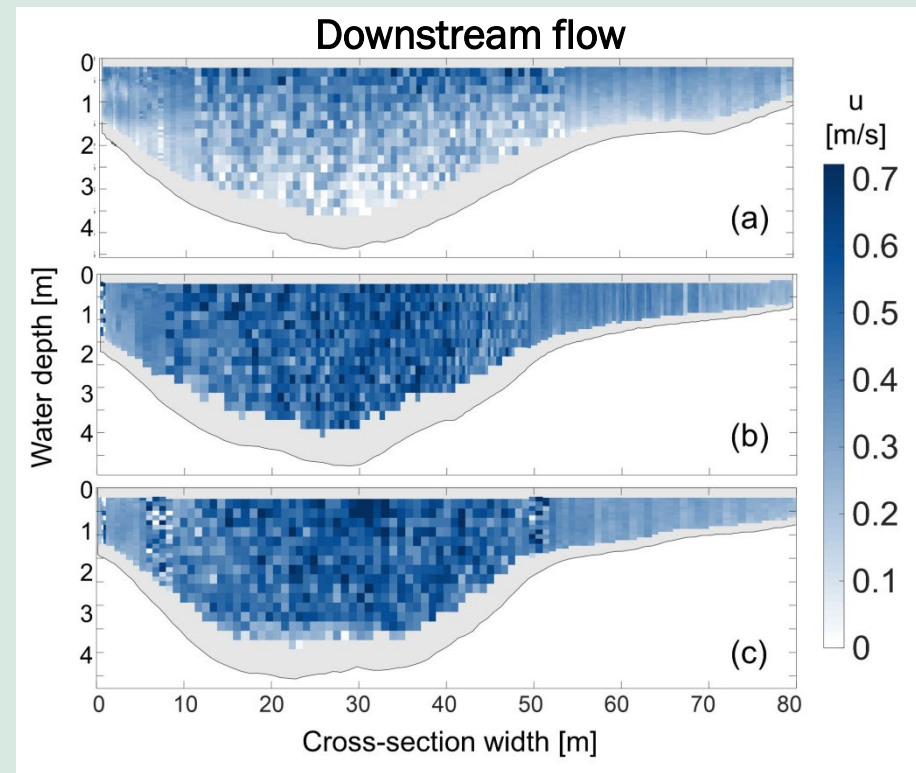
Results

Plastic transport through a river cross-section is non-uniform



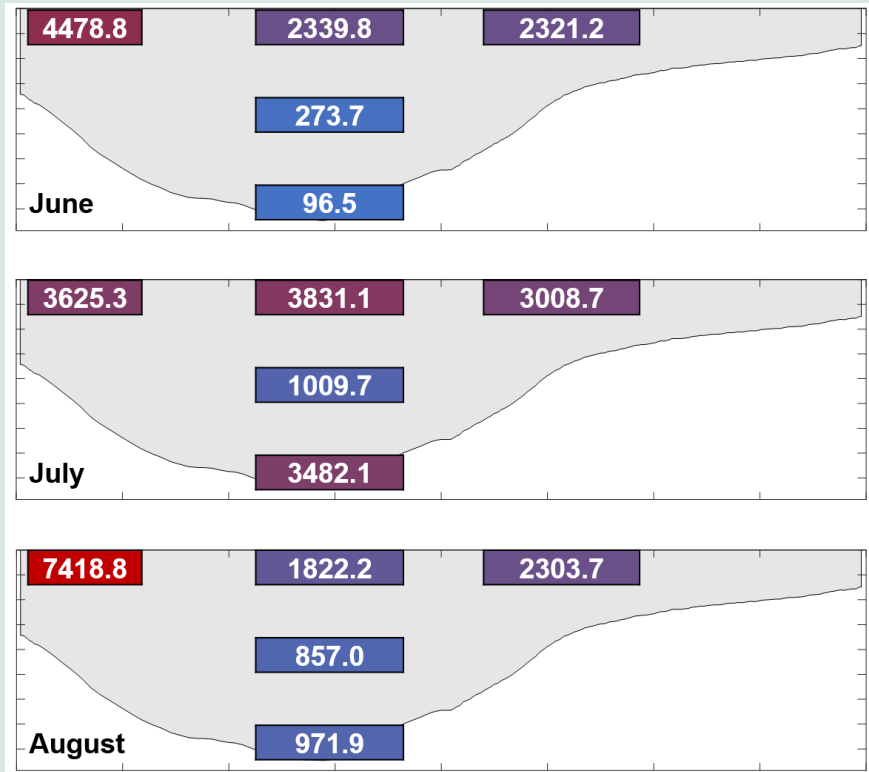
Haberstroh et al, in revision

... and highly dependent on the river hydrodynamic profile

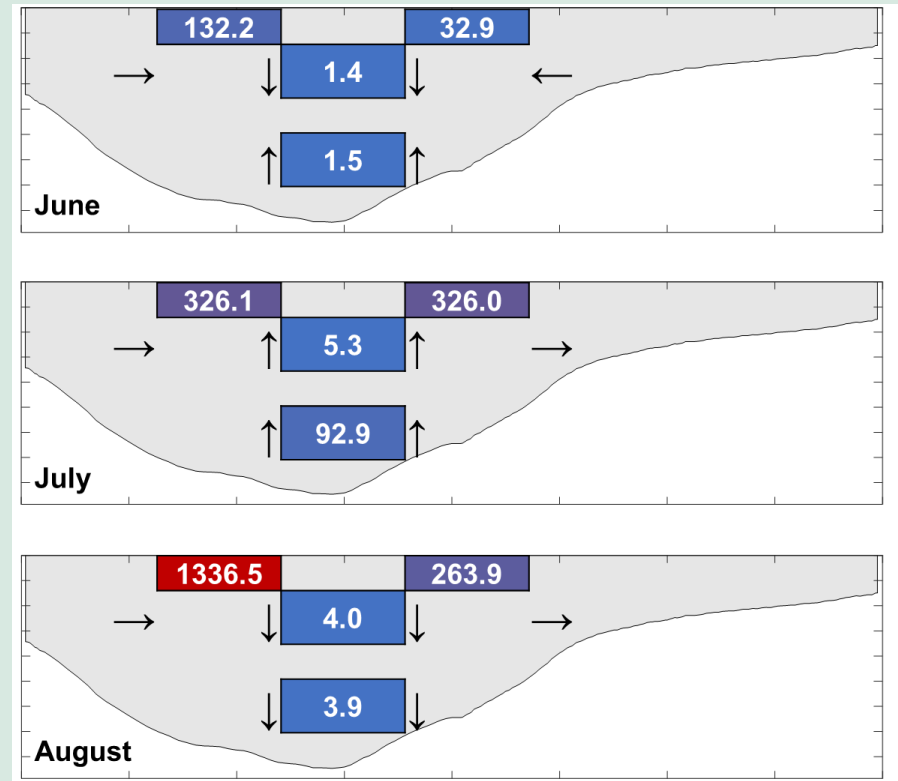


Results

Advective Fluxes [$\#/m^2/hr$]
dominate flows



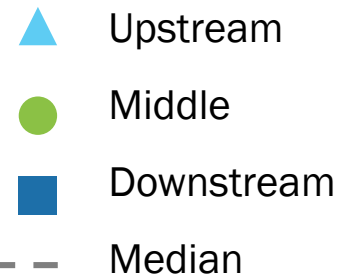
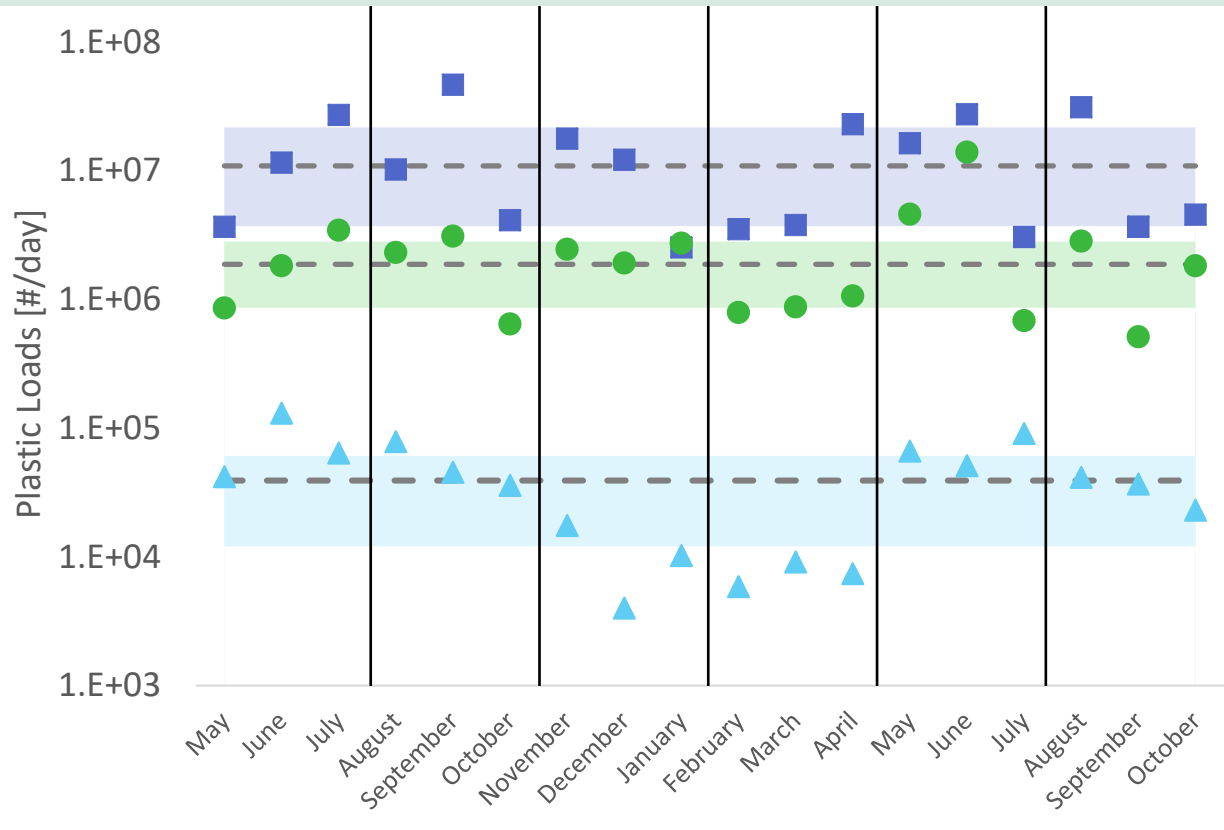
Lateral and vertical fluxes [$\#/m^2/hr$] affect transport under turbulent conditions



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Results

- Plastic loads increase upstream to downstream
- Loads upstream follow rainfall seasonality most closely
- Middle and downstream sites have a base load but fluctuate strongly due to rainfall and other factors



Shades indicate the 25th and 75th percentiles.

Rainfall season

May-Jul	increasing
Aug-Oct	wet
Nov-Jan	receding
Feb-Apr	dry

Findings on river plastic transport

- Flow conditions impact the temporal scale of transport and retention.
- Rainfall seasonality impacts the quantity.
- This affects how we quantify, predict and solve plastic pollution.

Future Research

- Further explore the relationship between plastic loads, concentrations, discharge and rainfalls
- Investigate small-scale impact e.g. of individual rainfall events

Acknowledgements



AIR & WASTE MANAGEMENT
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