

INTRODUCTION

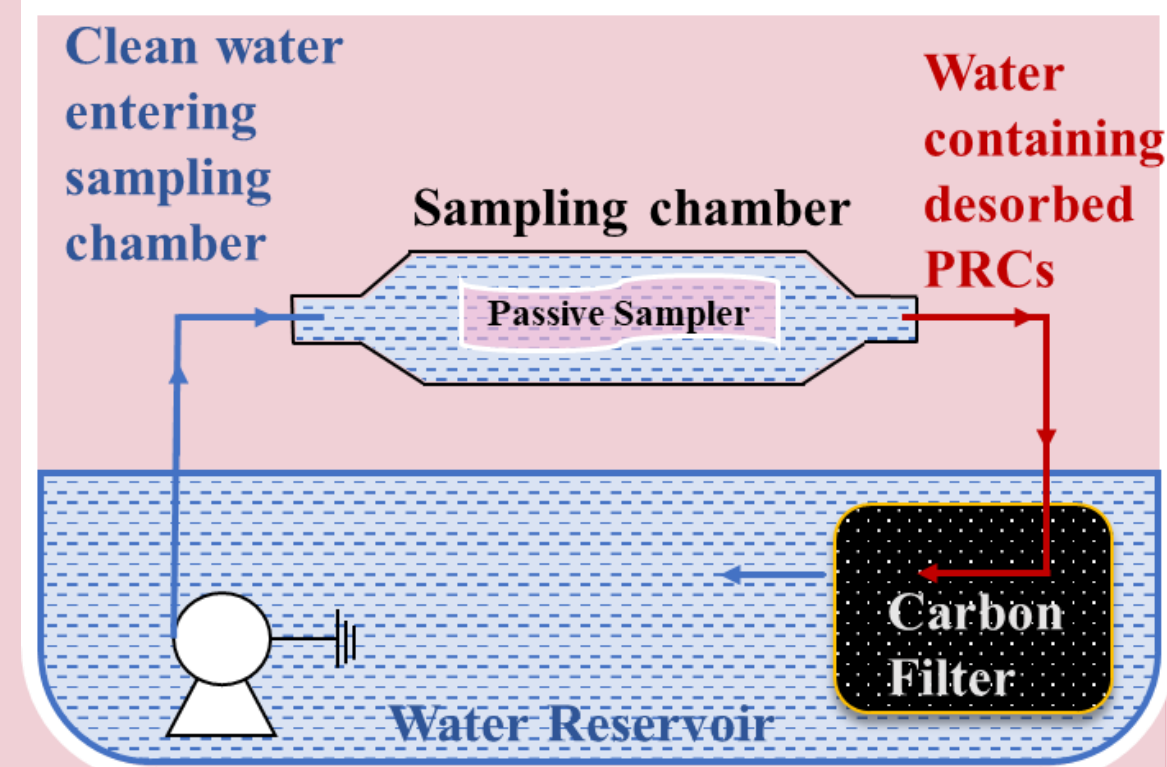
- Passive sampling has been extensively explored for **long-term integrated measurements**; useful in ecological risk assessment.
- Short-term measurements (1-2 days)** are needed to assess impacts from episodic events like storm flows into surface water.
- Equilibrium passive sampling has not been explored for short-term measurements in water.

OBJECTIVE

Optimizing equilibrium passive samplers (LDPE sheet and PDMS coated SPME fibers) for short-term measurements of PCBs in surface water.

APPROACH

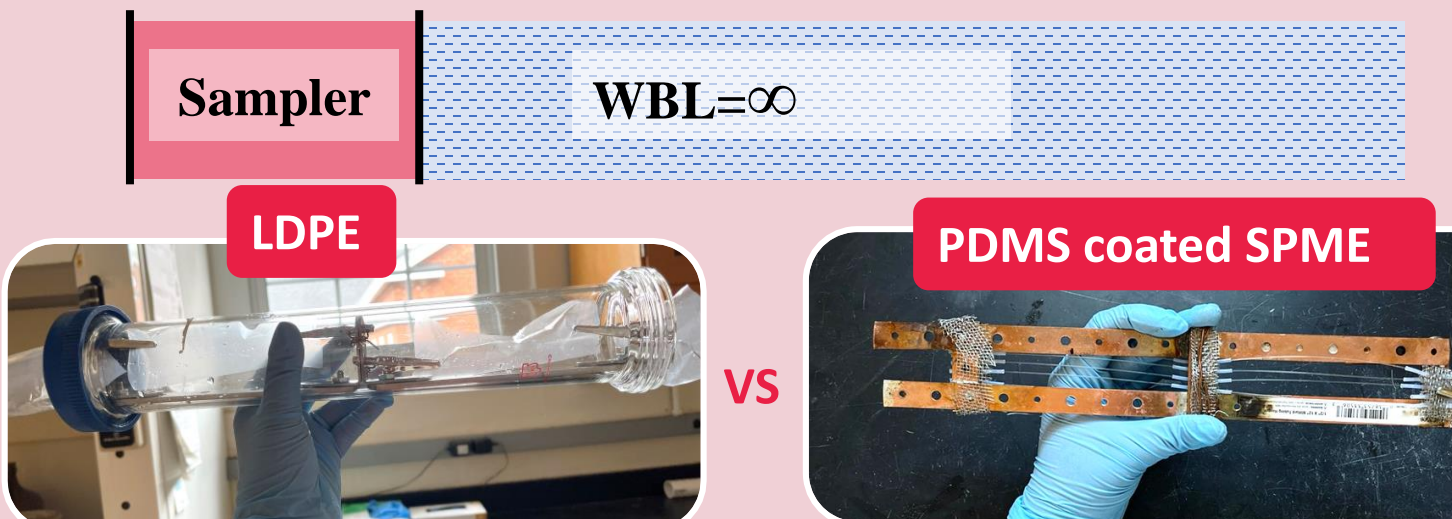
ARTIFICIAL FLOW CHAMBER (AFC)



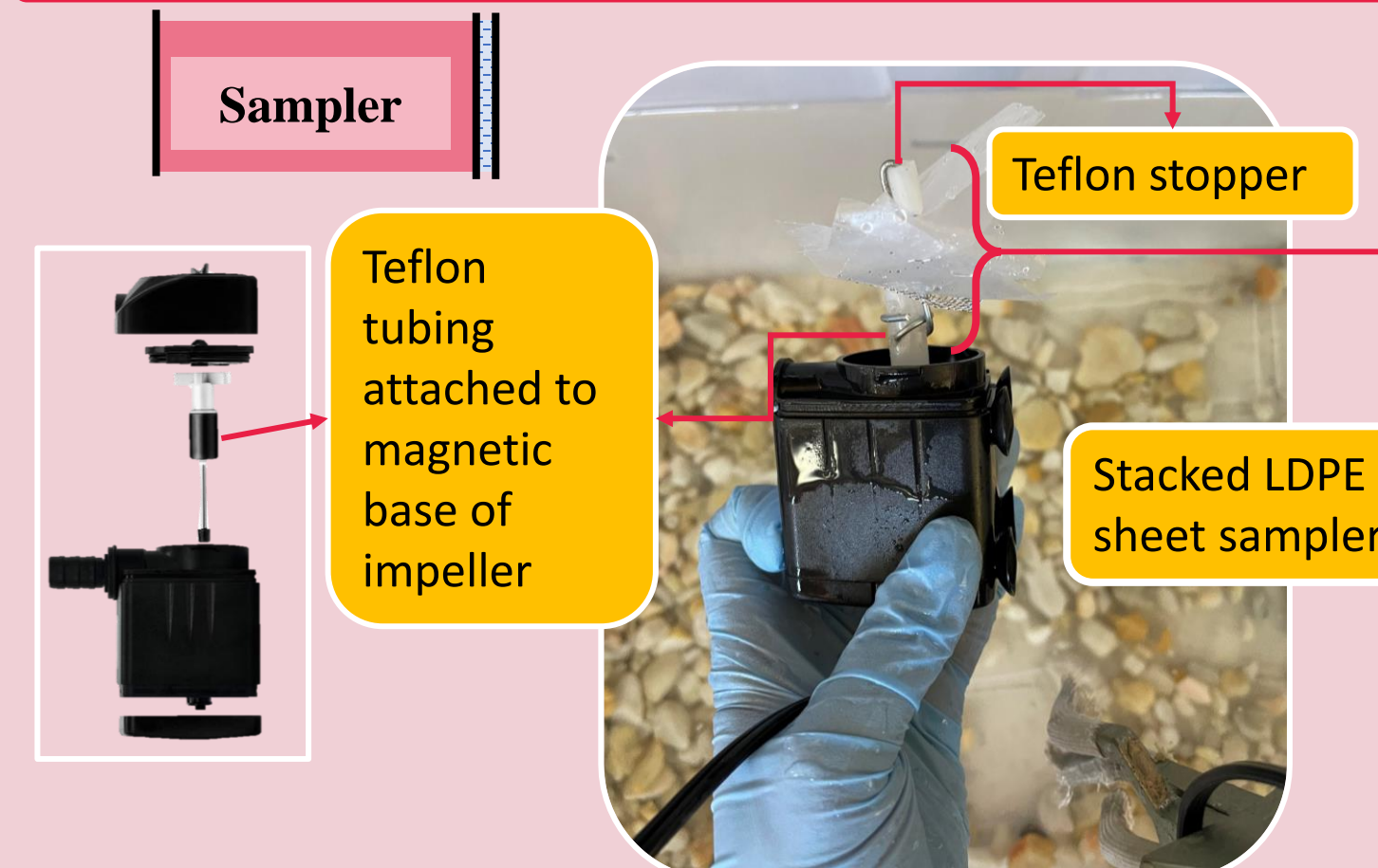
River-like **FLOW** conditions (water velocity: 5-30 cm/s) inside actual sampling chamber



Pond-like **UNMIXED** conditions inside water reservoir



WELL-MIXED conditions with LDPE-on paddle attachment

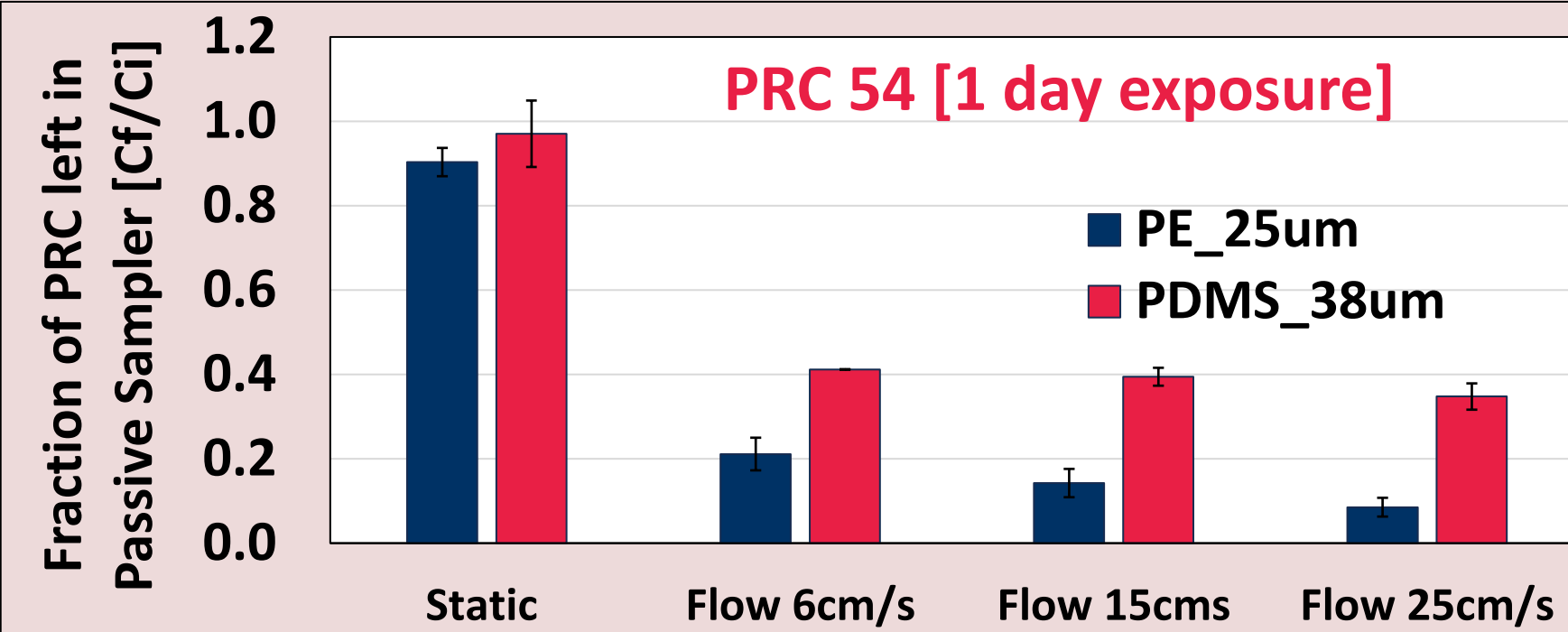


Thin sheet sampling device for **FIELD APPLICATIONS**

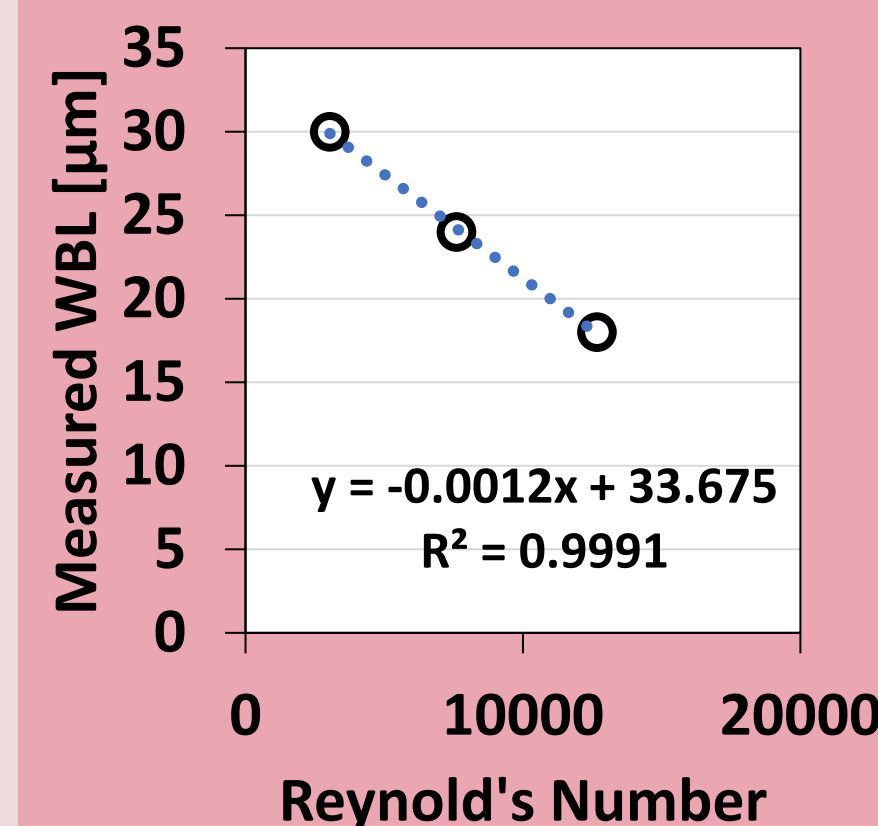
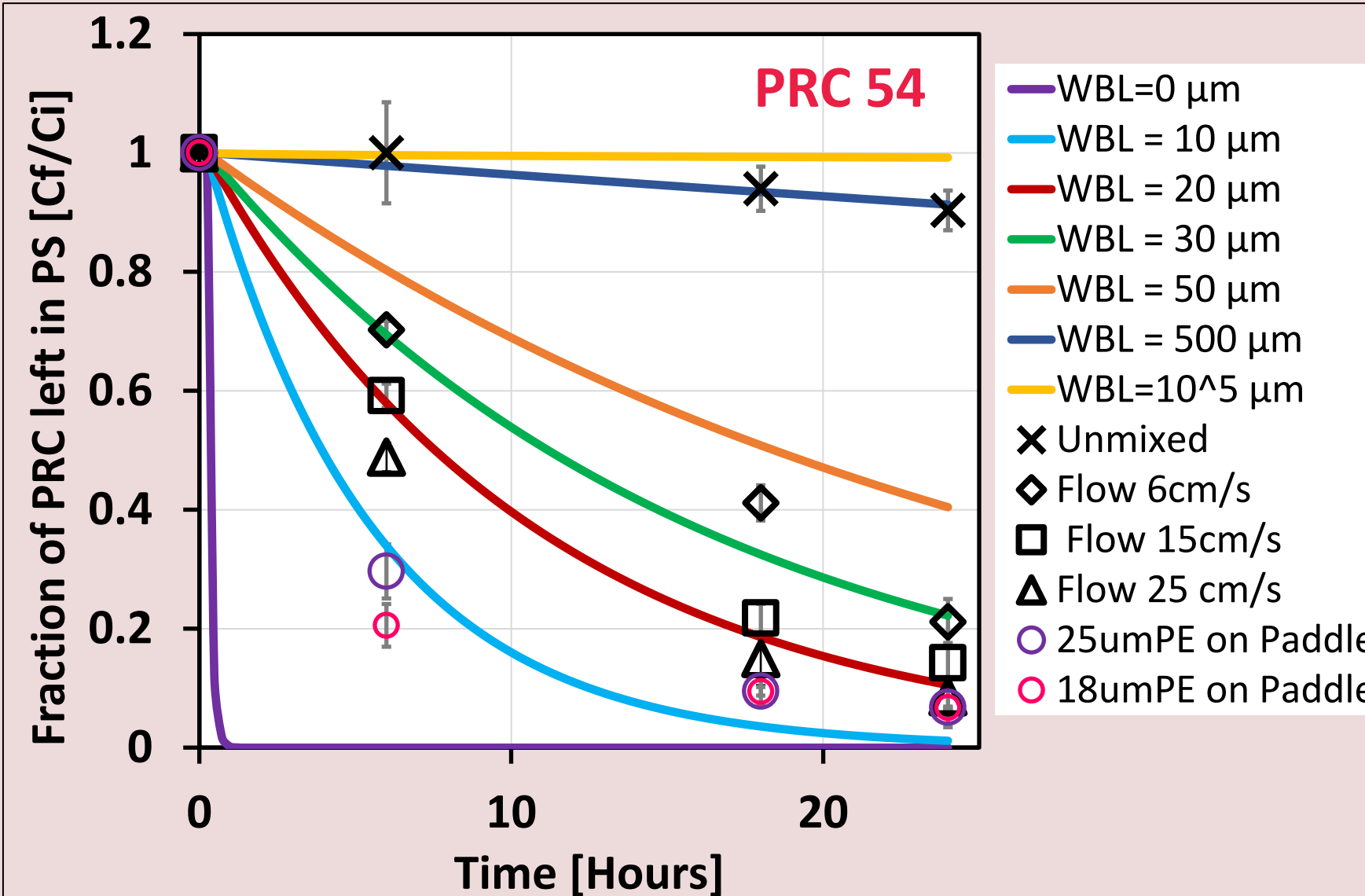


RESULTS

Laboratory-scale design optimization



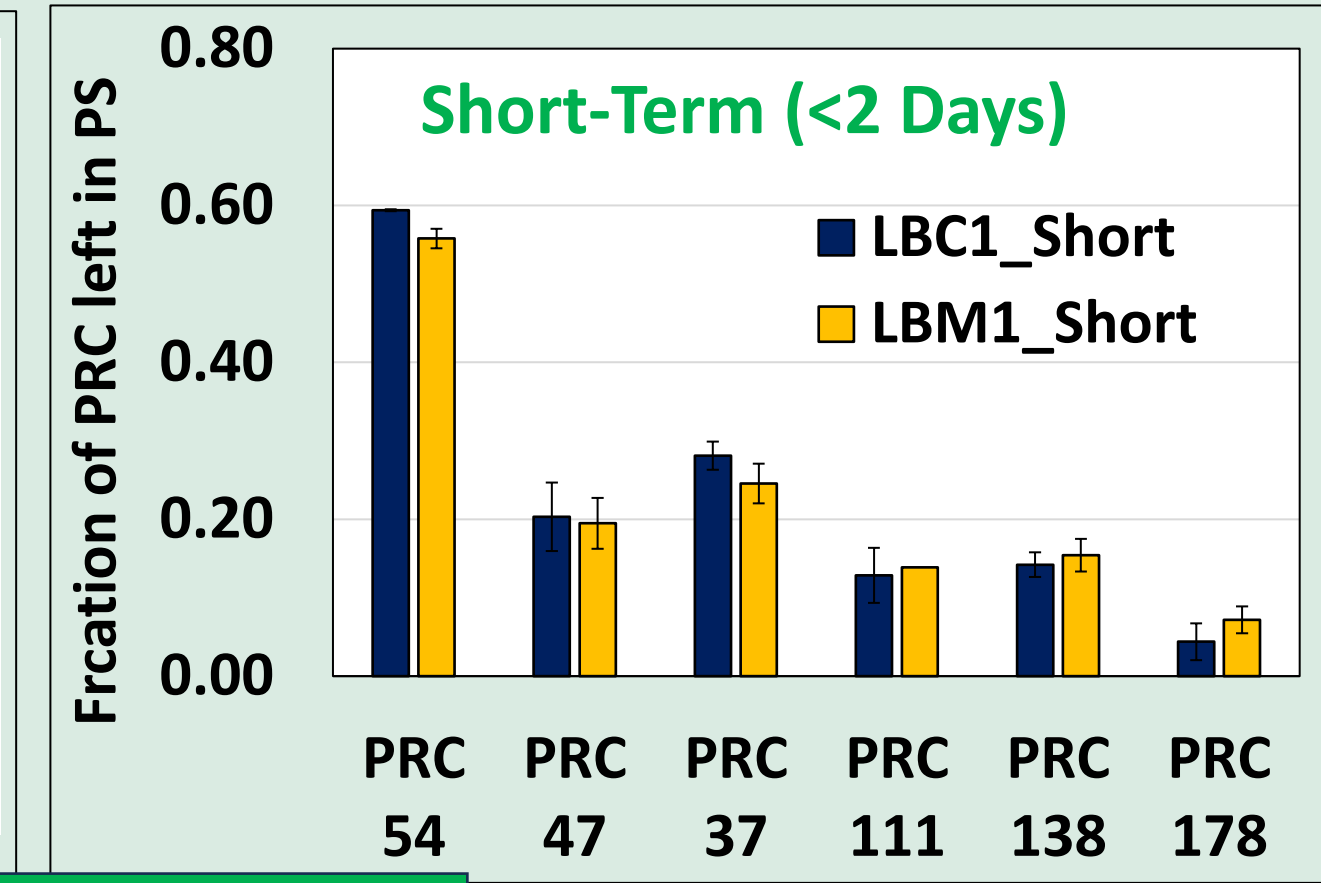
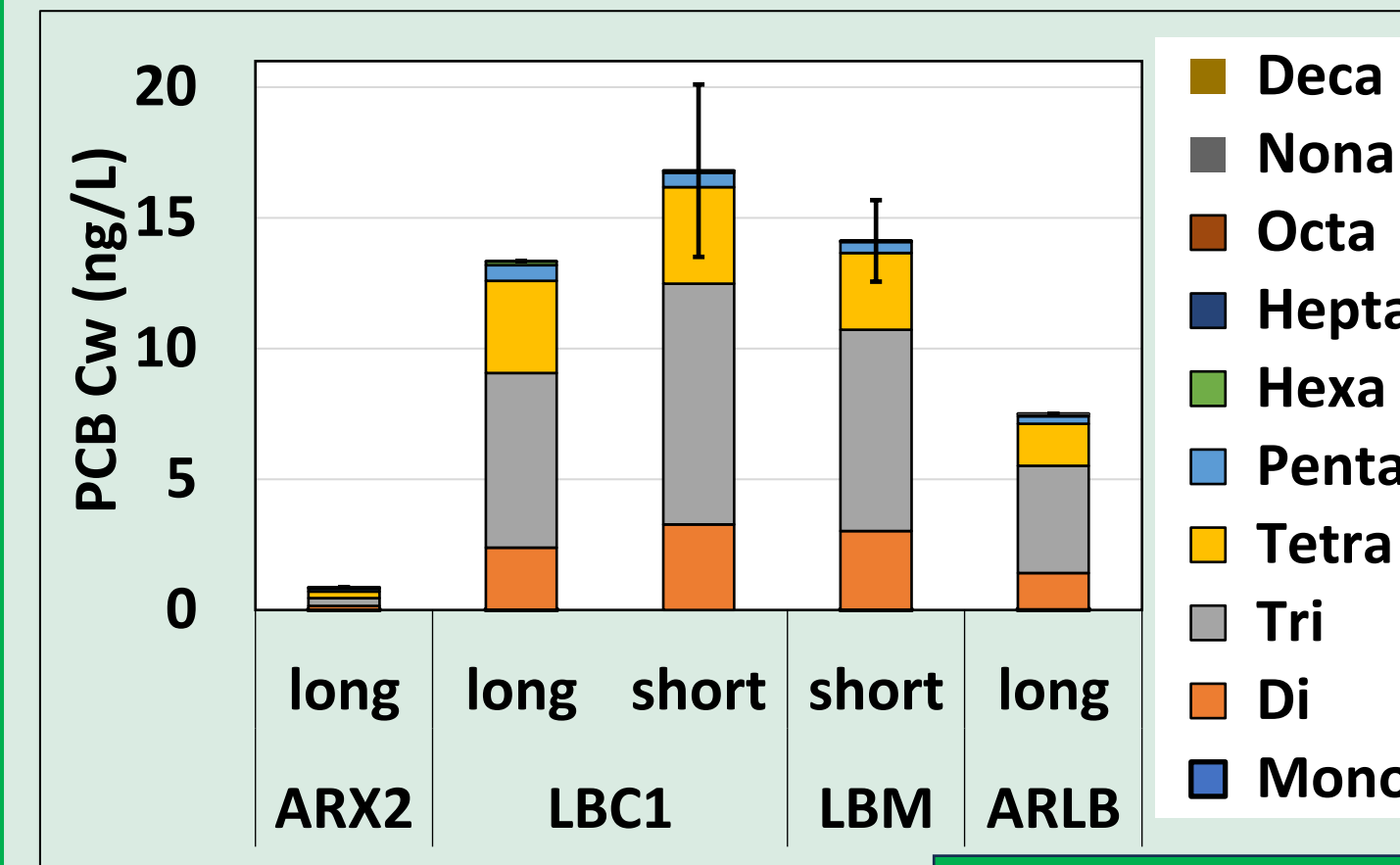
Exchange kinetics in 25µm PE faster than 38µm PDMS in Stagnant and Flow conditions



- Reynold's Number calculated corresponding to water velocities 6, 15, 25 cm/s.
- WBL thickness estimated from model fitting of measured fractional loss of PRCs
- Correlation is unique for a non-rigid sheet sampler like PE.

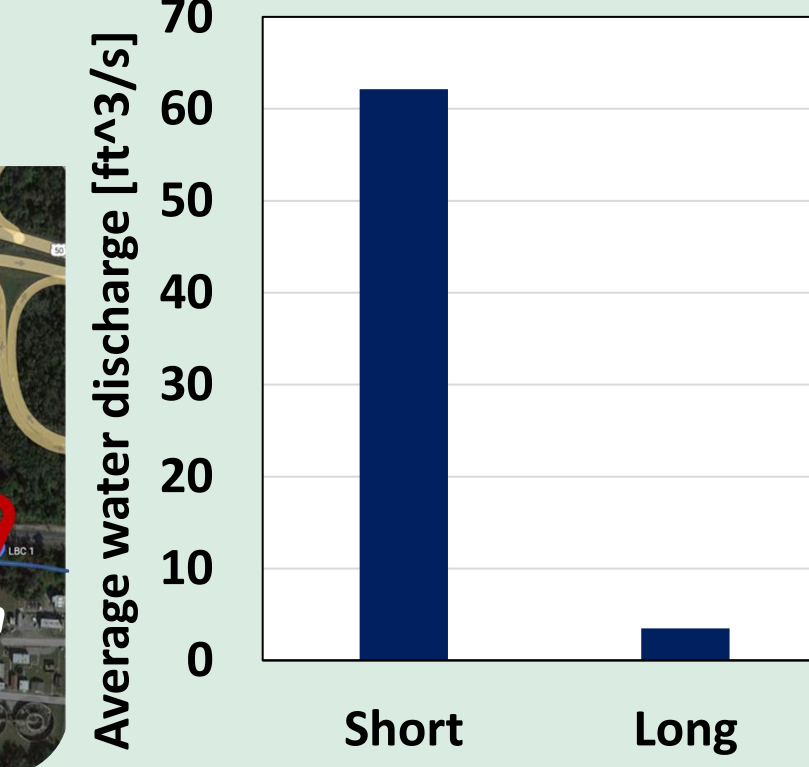
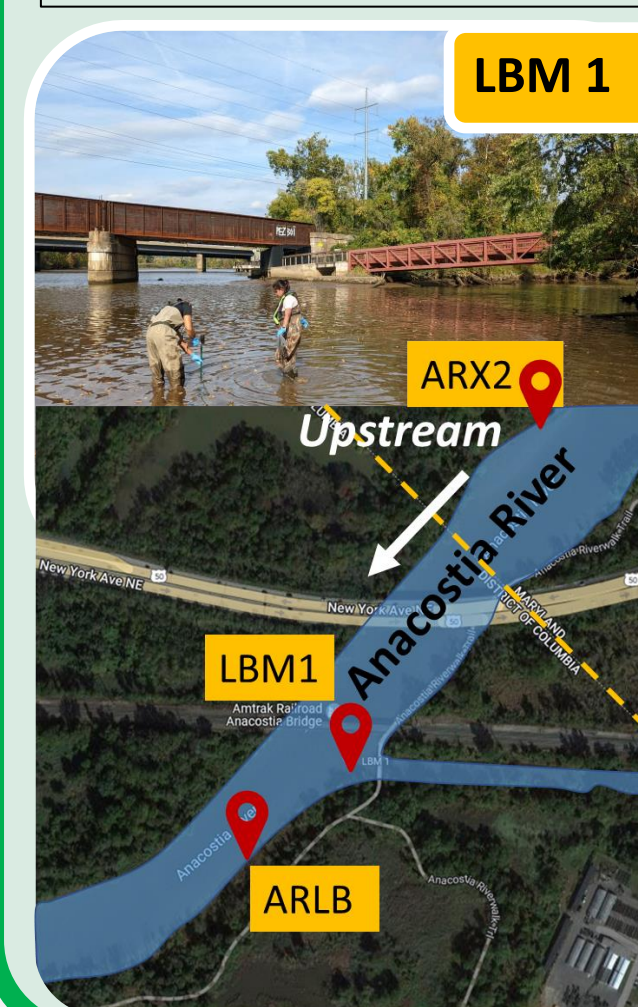
RESULTS

Field application of optimized sampling device



Sampling Times:

Short-term: 12 Oct -14 Oct 2022 (43 hours)
Long-term: Sept-Dec, 2021 (4 months)



- PRC loss: 40% PRC 54 (Log Kow =5.2) – 5.5% PRC 178 (Log Kow=7.1)
- Average short-term storm water velocity ~ 16X average long-term velocity.
- PCB concentration in LBC not diluted by high discharge

CONCLUSIONS

- Short-term passive sampling is possible within 1-2 days in **high flow** conditions using **thin PE** samplers.
- Field deployment** of optimized passive samplers demonstrates the **feasibility of short-term sampling** during storm flow .
- Paddle attachment** can be used for short-term measurement in **baseflow conditions**.
- Correlation between WBL and Re** can be used to **estimate anticipated equilibrium within short sampling times** before field application, to make **informed decision about sampler choice**.

ACKNOWLEDGEMENTS