





Analytical Methods & Challenges in Identifying Bioaccumulative PFAS in Aquatic Ecosystems

NEWMOA Science of PFAS Conference Presenter: Heidi Pickard hpickard@g.harvard.edu





Finding an extraction method that works is a process



Established tissue extraction methods



Agitation Techniques used: shaker table, rotator, sonication, vortexing, centrifugation

Extraction clean-up methods

Carbon Clean-Up

- Envi-Carb Cartridges
- Dispersive Envi-Carb







Solid-Phase Extraction (SPE)

- Oasis WAX
- Oasis PRiME HLB



- Other Common Clean-Up Steps:
 - Freeze Step
 - Filtration Step (nylon/polypropylene filter)
 - Centrifugation

A toolbox of analytical methods are needed



Applying these methods: Do PFAS precursors that persist in the aquatic environment accumulate in biota?



There are large quantities of PFAS precursors in the environment and some have shown enhanced propensity for food web uptake.

PFAS detected in water are not a good proxy for PFAS detected in fish

- Shorter-chain PFAS are most abundant in water
- Longer-chain PFAS, PFOS, and ECFprecursors are most abundant in fish
- Current regulatory efforts & fish advisories overlook many of these other PFAS found in fish



Field estimated bioaccumulation factors (BAF) suggest that long-chain PFAS and ECF precursors are very bioaccumulative



Pickard et al., In Prep

TOP + Bayesian Inference (BI) shows that ECF precursors are the predominant class in these fish



Pickard et al., In Prep

Short-chain sulfonamide precursors are abundant in some fish, but analytical standards are needed for accurate quantification



Agreement between methods for a LOC 3 fish sample

- Good agreement for C4, C6, C8 ECF precursors
- Precursors identified by suspect screening:
 - FPrSA (C3)
 - FPeSA (C5)

Using a toolbox of analytical methods with optimized extraction procedures can help reduce some of the challenges in identifying/quantifying bioaccumulative PFAS in aquatic ecosystems

 Long-chain PFAA and short-chain sulfonamide precursors (C3-C5) are very bioaccumulative in fish



- Standards are needed to accurately quantify these precursors
- Comprehensive fish advisories are needed for considering potential human exposures to other bioaccumulative PFAS



HARVARD

John A. Paulson School of Engineering and Applied Sciences



Sources, Transport, Exposure & Effects of PFASs UNIVERSITY OF RHODE ISLAND SUPERFUND RESEARCH PROGRAM



Contact Information:

Email: <u>hpickard@g.harvard.edu</u> Website: <u>https://scholar.harvard.edu/hpickard</u> Twitter: <u>https://twitter.com/HeidiPickard</u>

Thank You!





Biogeochemistry of Global Contaminants HARVARD

Co-Author Acknowledgements:

Adela Chovancova Bridger Ruyle Clifton Dassuncao Colin Thackray Jitka Becanova Rainer Lohmann Simon Vojta Elsie M. Sunderland