PFAS Bioaccumulation in Fish

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

THE UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY

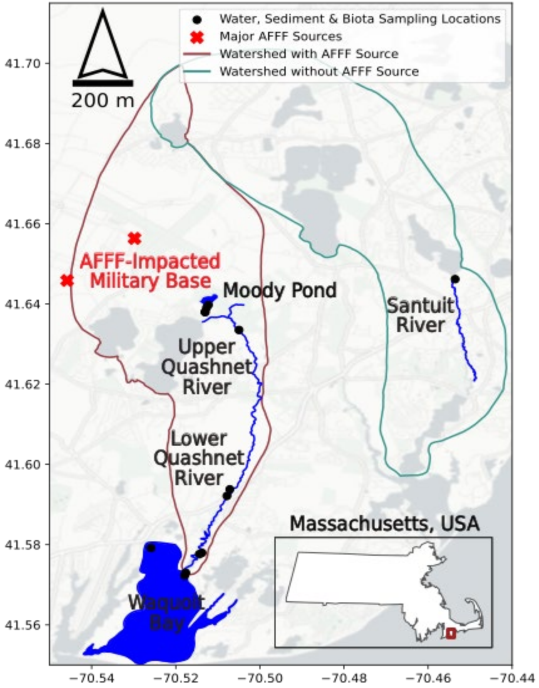
HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

SILENT SPRING INSTITUTE Researching the Environment and Women's Health

NIH National Institute of Environmental Health Sciences *Superfund Research Program*

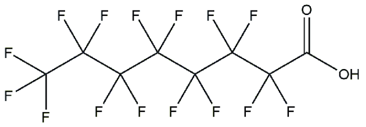
SERDP DOD · EPA · DOE

ESTCP

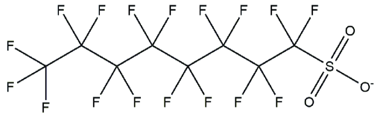


PFAS = Per- and Polyfluoroalkyl Substances

PFAS contain **at least one fully fluorinated methyl or methylene carbon atom**
- any chemical with at least −CF3 or −CF2− group



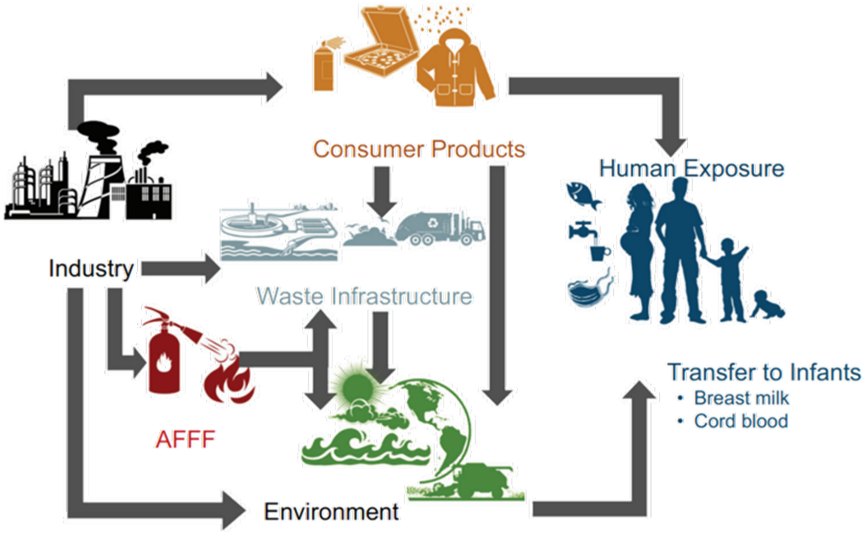
Perfluorooctanoic acid (PFOA)

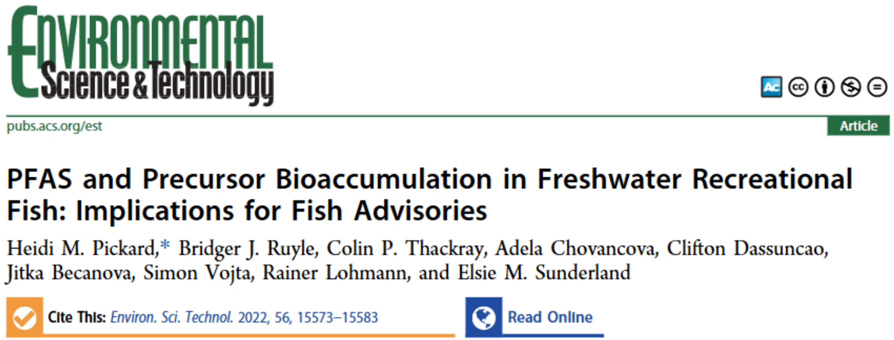


Perfluorooctane sulfonate (PFOS)

December 2023 - IARC classified PFOA as carcinogenic to humans (1) and PFOS as possibly carcinogenic to humans (2B)

April 2024 - Final PFAS National Primary Drinking Water Regulation (4 ppt for PFOS or PFOA, 10 ppt PFHxS, PFNA or GenX)





Environmental Science & Technology

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Article

PFAS and Precursor Bioaccumulation in Freshwater Recreational Fish: Implications for Fish Advisories

Heidi M. Pickard,* Bridger J. Ruyle, Colin P. Thackray, Adela Chovancova, Clifton Dassuncao, Jitka Becanova, Simon Vojta, Rainer Lohmann, and Elsie M. Sunderland

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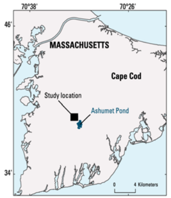
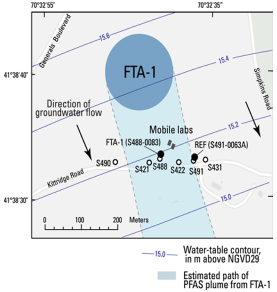
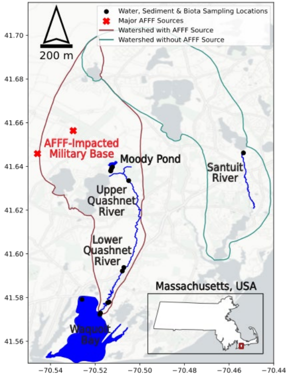
Read Online

OECD *Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance*. Series on Risk Management No. 61. **2021**
Sunderland, E. et al. *A review of the pathways of human exposure to poly- and perfluoroalkyl substances (PFASs) and present understanding of health effects.* Journal of Exposure Science & Environmental Epidemiology, **2019**

Mobile Fish Lab and Freshwater Fish on Cape Cod

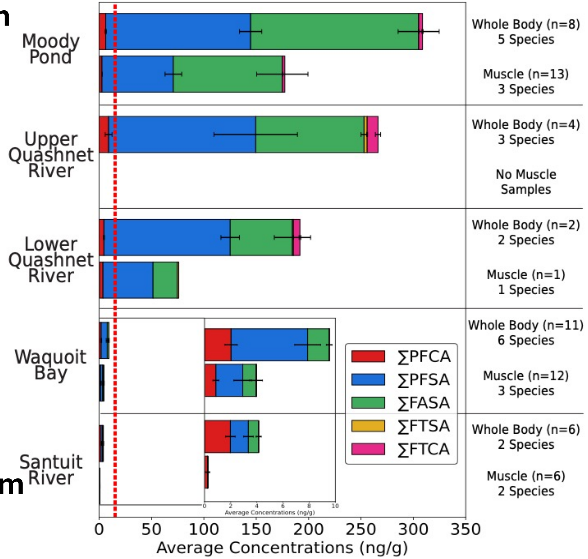


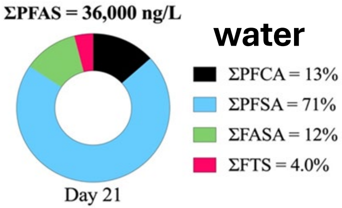


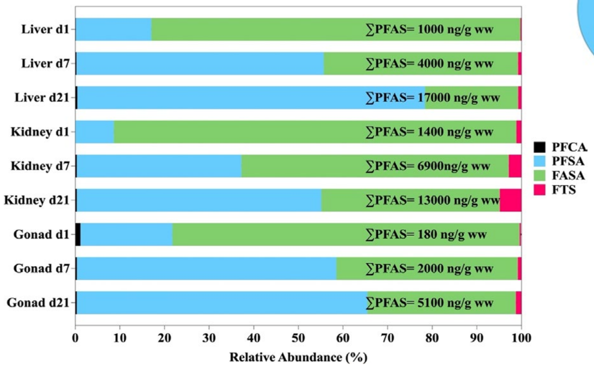


Upstream AFFF Source

Downstream Non-AFFF







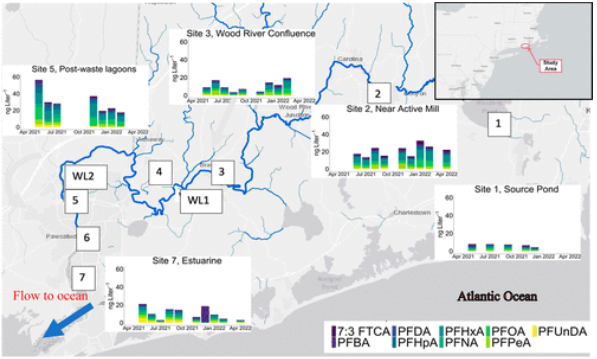
Rapid PFAS uptake (within days) by fish – implications for **trout stocking practices**

All fish from freshwaters **> 8 km downgradient of AFFF source zones** exceed 1 meal per month fish consumption guidelines for PFOS (15 ppb in MA)

Hill N, et al *Bioconcentration of Per- and Polyfluoroalkyl Substances and Precursors in Fathead Minnow Tissues Environmentally Exposed to Aqueous Film-Forming Foam–Contaminated Waters.* ET&C, **2024**
Pickard, H. et. al *Characterizing the Areal Extent of PFAS Contamination in Fish Species Downgradient of AFFF Source Zones.* Environmental Science & Technology **2024**

PFAS in RI Freshwater and Estuary

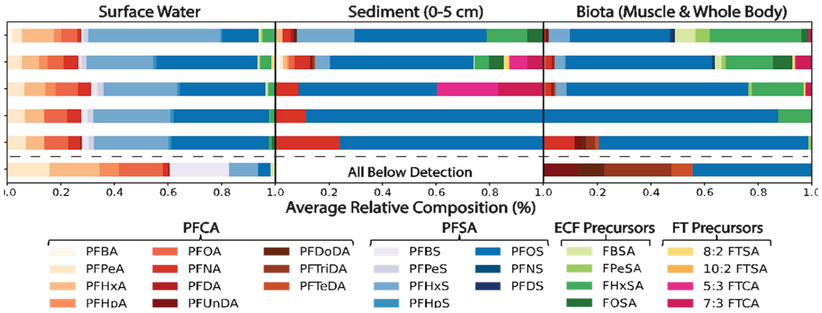
- Characterization of PFAS sources in RI (e.g., closed and active textile mills)
- Freshwater fish advisories issued in RI (e.g., Grills Preserve Ponds – *Do Not Eat*, Pawcatuck River – *One Meal/Month*)
- No consumption advisories for marine species (e.g., oysters, mussels, marine fish)



Dunn, M. et al. Unregulated Active and Closed Textile Mills Represent a Significant Vector of PFAS Contamination into Coastal Rivers. *ACS EST Water* (**2023**).

FUTURE

- Are there still unidentified major PFAS sources in RI?
- Water/sediment monitoring not reflect PFAS levels in biota — need for targeted fish biomonitoring (Which species? How often?)
- Consumption advisories based on general population - higher-risk communities?



Pickard, H. et al. in preparation (**2025**)