

PFASs – emissions, detection and monitoring

Wageningen Food Safety Research (WFSR)



Introduction

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- Senior scientist
 - Detection
 - Human exposure
 - Circular economy



Contents

- Emissions and sources
- The PFAS detection toolbox
- Occurrence



PFAS in the News

PFAS is contaminating our drinking water and harming our health. Please pass H 4486, "An act to protect public health from PFAS," filed by Sen. Cyr and Rep. Hogan

EDITORIAL The Boston Globe
Massachusetts should ban PFAS in consumer products

wbur LOCAL COVERAGE
Soaring PFAS levels force a reckoning for worried Hyannis residents

MASS LIVE
'It's completely man's fault'; here are the hotspots of PFAS contamination in the Pioneer Valley

Sentinel & Enterprise
Editorial: Removing forever chemicals' toxic grip must be a priority

CAJ
More Cape Cod wells shut down over PFAS, water quality concerns

CAPE COD TIMES
'The word is scary.' Hyannis residents learning of prior PFAS exposure from blood tests

Remarket Week today
PFAS levels make fish in Long Pond unsafe to eat

MASS LIVE
Thousands are suing PFAS manufacturers, including the Massachusetts AG and the city of Westfield

CommonHealth
Firefighters sound the alarm on PFAS chemicals

MEDICALNEWS TODAY
High seafood diets linked to exposure to 'forever chemicals,' study finds

THE HILL
The impacts of toxic 'forever chemicals' aren't the same for women, men

wbur LOCAL COVERAGE
New Englanders, with their love of seafood, may be at higher risk for PFAS exposure

BOSTON.COM
DPH warns against drinking bottled water from Mass. company due to PFAS contamination

WESTERN MASS NEWS
Officials issue fish consumption advisory after PFAS found at 2 local state parks

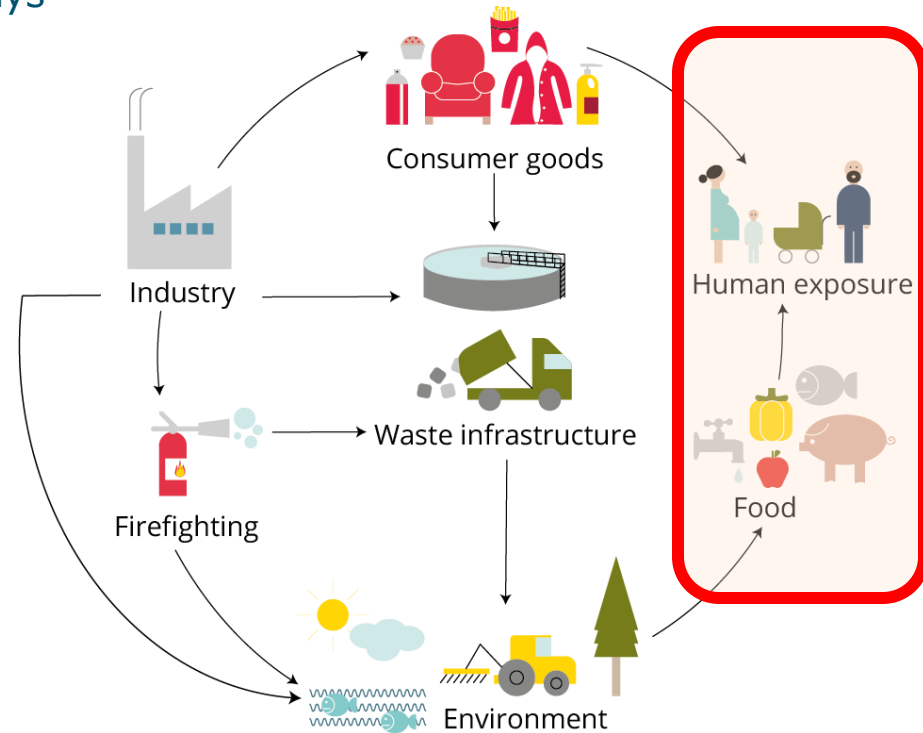
METROWEST DAILY NEWS
Wayland is latest municipality to file federal lawsuit over PFAS in groundwater

The Boston Globe
When organic is toxic: How a composting facility likely spread massive amounts of 'forever chemicals' across one town in Massachusetts

The Guardian
Toxic PFAS absorbed through skin at levels higher than previously thought

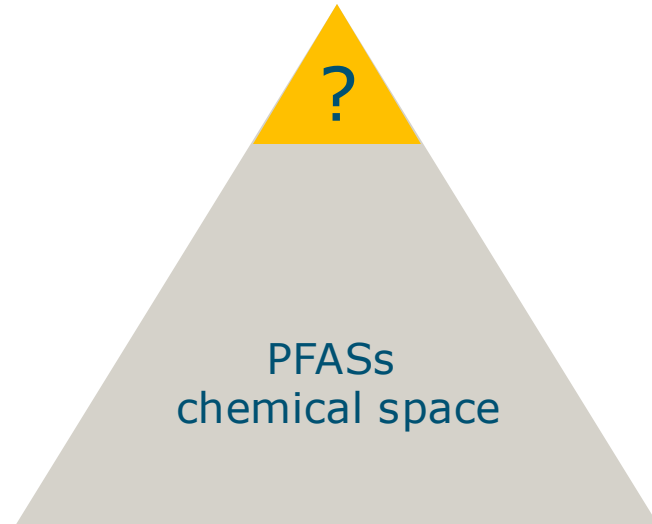
PFASs emissions and exposure

- PFASs enter the environment in various ways
- PFASs are/were in a range of products:
 - Pans
 - Fire fighter's foam
 - (Water-proof) make-up
 - Sunscreen
 - Food contact materials
 - Rain gear
 - Aluminum foil and baking paper
 - Etc...
- Human exposure through many pathways

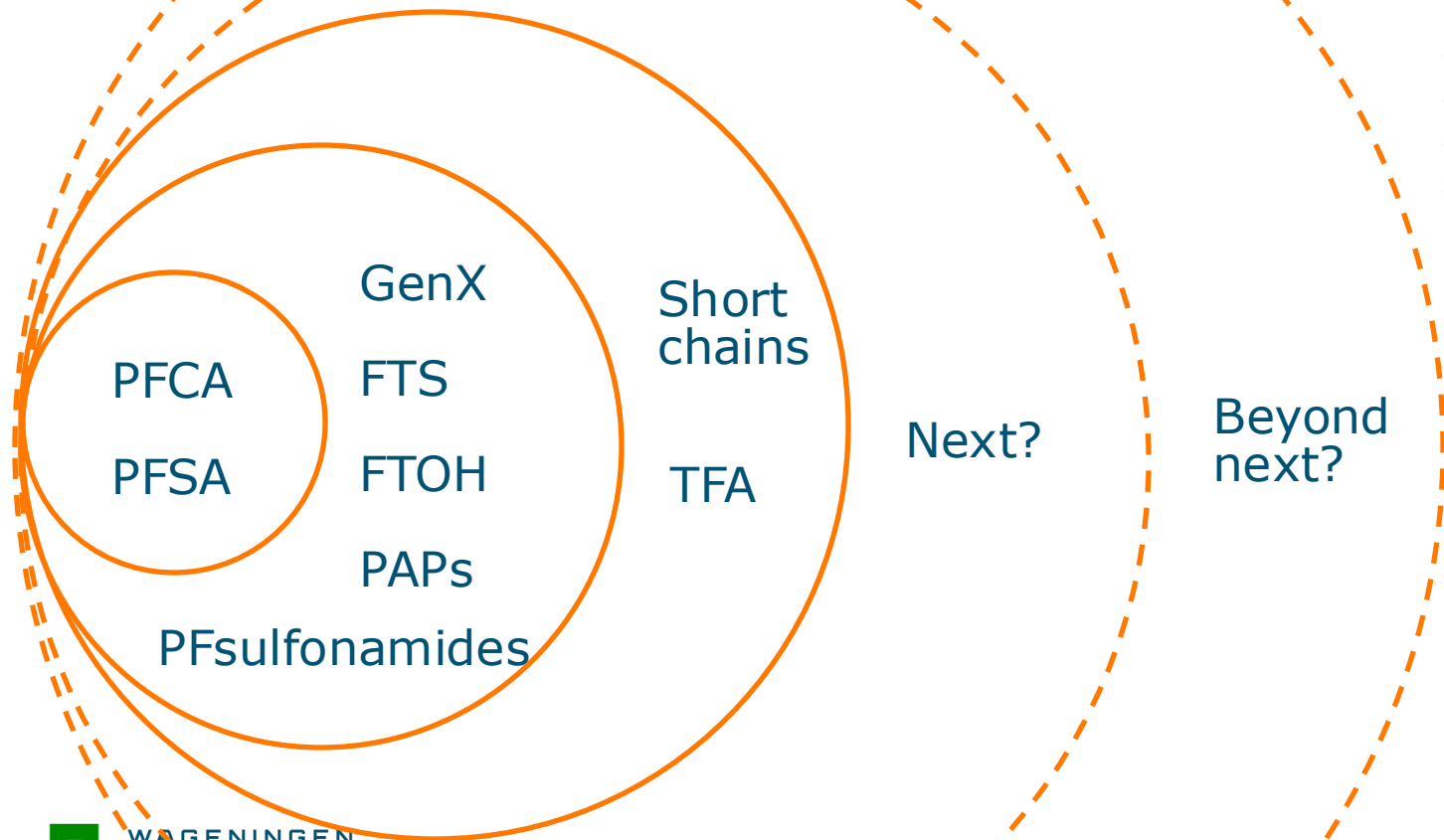


How much PFASs substances?

- Inventories show large numbers..
 - OECD: 4700 compounds
 - US-EPA DSS Tox: 14,735 compounds
 - PubChem: >6 million compounds
 -
- Are we studying only a small selection of PFASs?



Compound list expands



“legacy-PFAS”
“EFSA-4-PFAS”
“ultra-short chain-PFAS”
“precursor-PFAS”

Need for detection approaches

- To study human and environmental exposure
- To study fate in the human food chain
- To study environmental fate
- To study if risk reduction measures are effective
 - Limit values in food, feed and water
 - Removal from wastewater, drinking water



Detection toolbox 1 – targeted analysis

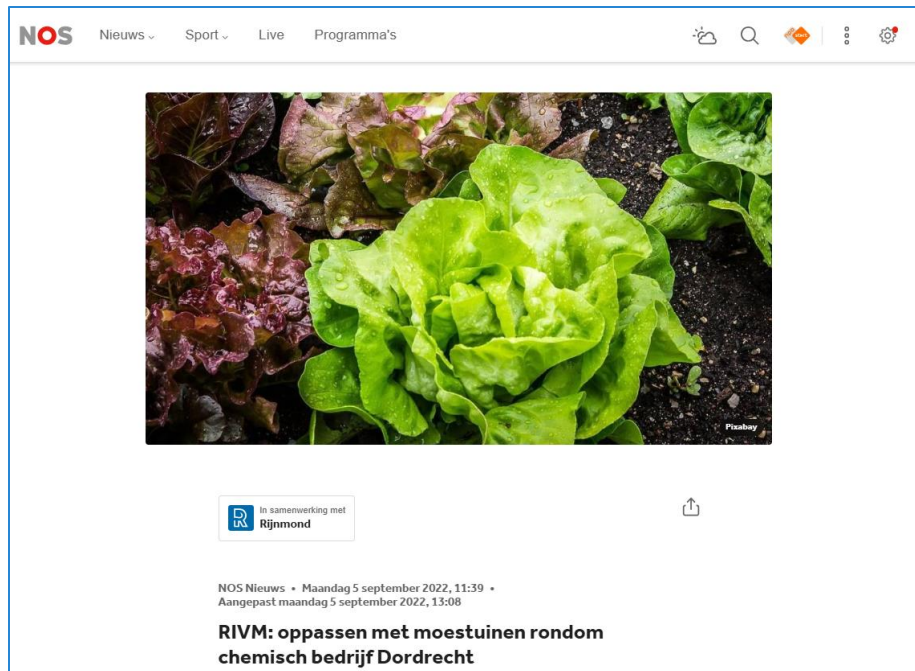


- Reliable and quantitative detection
- Method: UPLC-MS/MS
 - Very selective
 - Very sensitive
 - Routine
- 20-30 PFASs compounds in single run



ISO-17025
accredited

Example - PFASs exposure study close to Dordrecht



- Methodology applied for homegrown vegetables from allotment gardens



Detection toolbox 2 – chemical screening

Total (organic /
extractable) PFAS

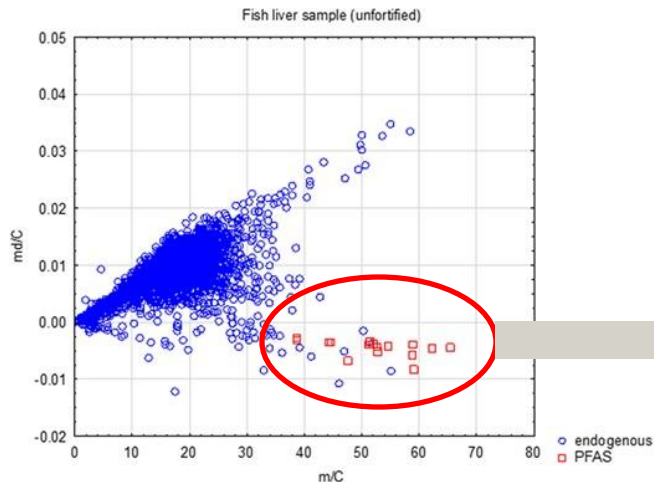


- Chemical screening for PFASs
- Method: Combustion Ion Chromatography
- To answer questions like:
 - Total amount of PFASs in a sample or extract
 - Mass balance studies
 - Screening for presence, or absence of PFASs

PFASs detection toolbox 3 – non-targeted analysis

Non-target
analysis

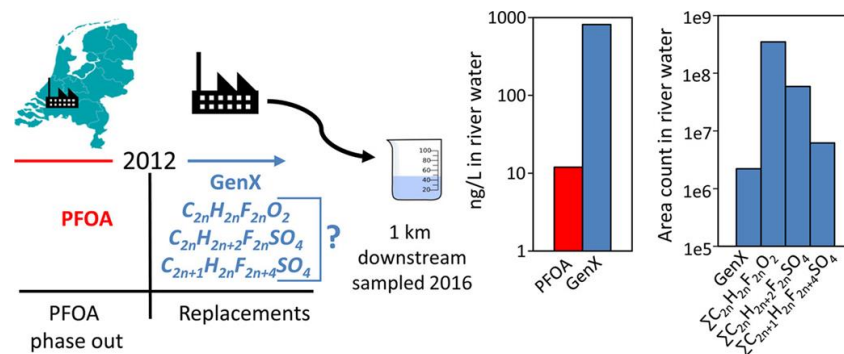
- Identifying unknown PFASs
- Method: High Resolution Mass Spectrometry, with advanced data filtering



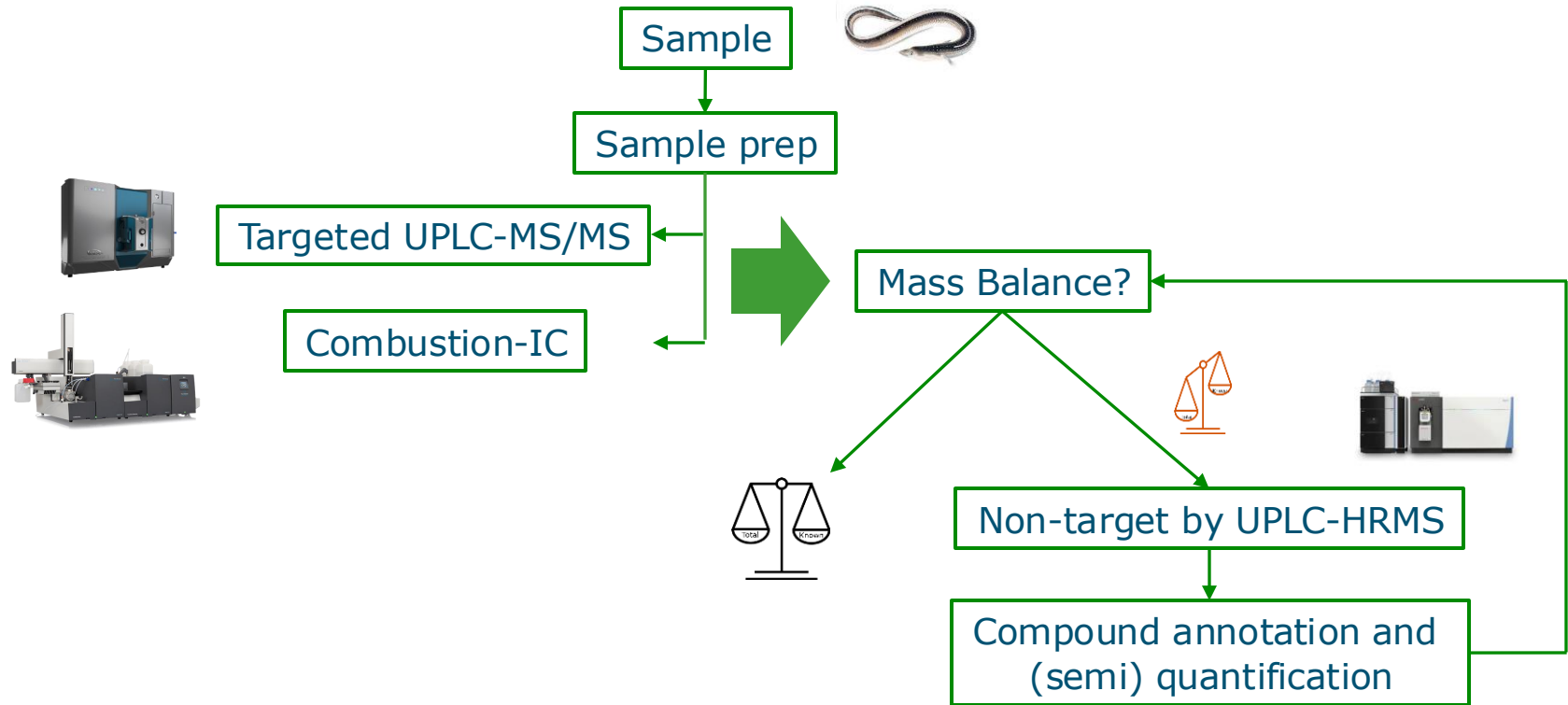
Chemical structure and
identity of the PFASs,
where possible.

Example: identification of unknown PFASs

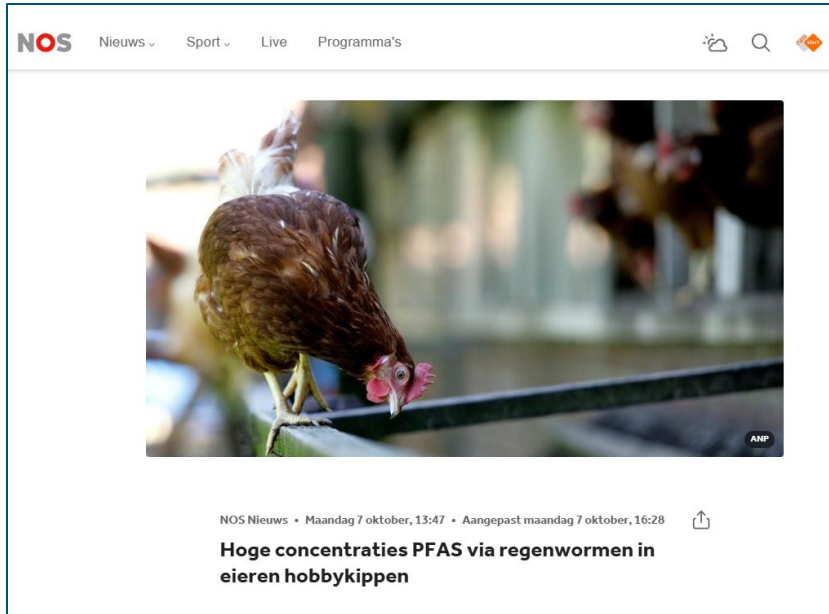
- Identification of new, unknown PFASs in river water and drinking water close to a factory.



The strength of combining 3 approaches



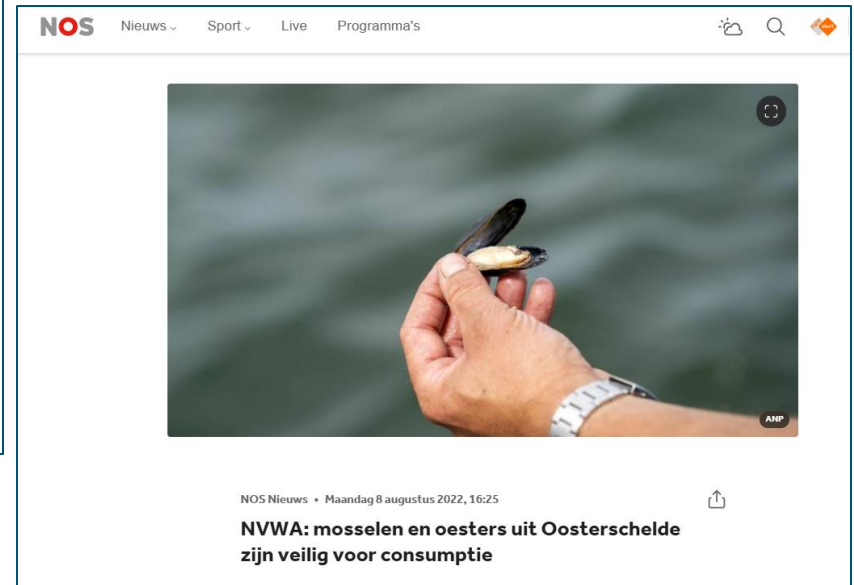
Examples recent monitoring



The screenshot shows the NOS news website interface. At the top, there is a navigation bar with 'NOS' and menu items for 'Nieuws', 'Sport', 'Live', and 'Programma's'. Below the navigation bar is a large image of a brown chicken perched on a metal railing. The image is credited to ANP. Below the image, the text reads: 'NOS Nieuws • Maandag 7 oktober, 13:47 • Aangepast maandag 7 oktober, 16:28' followed by an upload icon. The main headline is 'Hoge concentraties PFAS via regenwormen in eieren hobbykippen'.

NOS Nieuws • Maandag 7 oktober, 13:47 • Aangepast maandag 7 oktober, 16:28

Hoge concentraties PFAS via regenwormen in eieren hobbykippen



The screenshot shows the NOS news website interface. At the top, there is a navigation bar with 'NOS' and menu items for 'Nieuws', 'Sport', 'Live', and 'Programma's'. Below the navigation bar is a large image of a hand holding an open mussel shell over a body of water. The image is credited to ANP. Below the image, the text reads: 'NOS Nieuws • Maandag 8 augustus 2022, 16:25' followed by an upload icon. The main headline is 'NVWA: mosselen en oesters uit Oosterschelde zijn veilig voor consumptie'.

NOS Nieuws • Maandag 8 augustus 2022, 16:25

NVWA: mosselen en oesters uit Oosterschelde zijn veilig voor consumptie

Take home message

- Detection toolbox fulfils the need for reliable data
 - Reliable quantitative data
 - Chemical PFAS screening and mass balance
 - Identification of (yet) unknown PFASs
- Use detection methods for:
 - Monitoring PFASs in food, feed & drinking water
 - Effectiveness of pollution reduction approaches
 - Study fate of PFASs in the environment
 - ...

Thank you for your attention

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