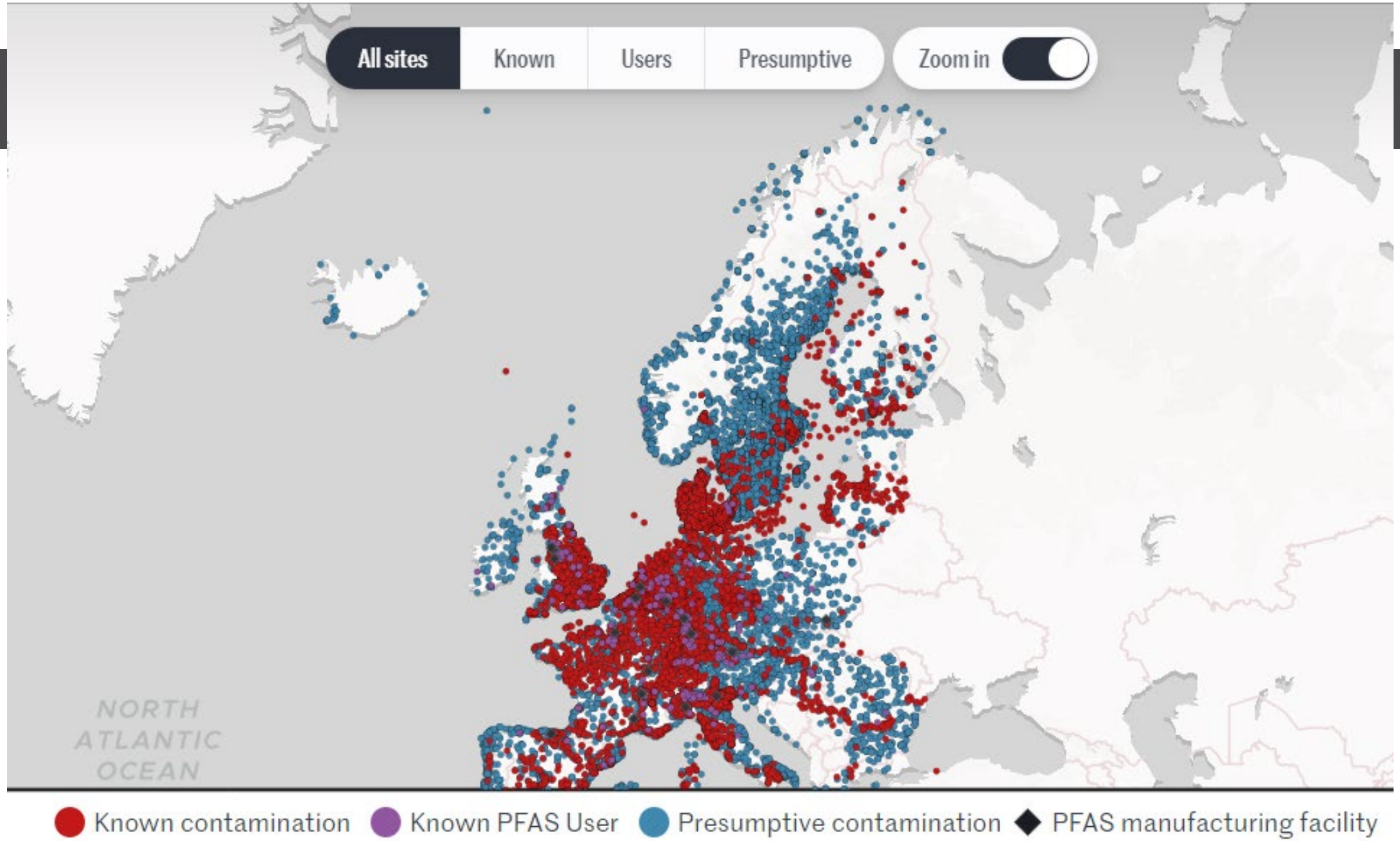


Markus Raudkivi
Szczecin
13.05.2025

The ripple effect: How recent PFAS regulations shape our view of Baltic Sea contamination

Interreg Baltic Sea Region
Co-funded by the European Union
SUSTAINABLE WATERS
EMPEREST
HELCOM
WATER-SMART SOCIETIES


All sites
Known
Users
Presumptive
Zoom in
NORTH ATLANTIC OCEAN
Known contamination
Known PFAS User
Presumptive contamination
PFAS manufacturing facility

HELCOM

Baltic Marine Environment Protection Commission

1974: The Helsinki Convention, signed by the then seven Contracting Parties

1980: Establishment of the HELCOM Secretariat

1992: Ten Contracting Parties
EE, EU, DK, DE, FI, LV, LT, PL, SE, RU

2024: 50 years of the Helsinki Convention



HELCOM tools:
how we get things done



The Helsinki Convention
Instrument of int. law, containing objectives & obligations.
Annexes: technical guidelines and regulations.



Recommendations
on measures to address areas of concern, implementable through national legislation. In total, about 260 recommendations have been adopted so far.



Action plans & projects
Contain actions and measures with such as Baltic Sea Action Plan, Regional Action Plan on Marine Litter, and most HELCOM projects.



Monitoring & assessments
- Indicators (pressures on and state of the environment)
- Thematic assessments
- Holistic assessments



Ministerial Meetings
Set the major strategic directions and provide the necessary political commitment.

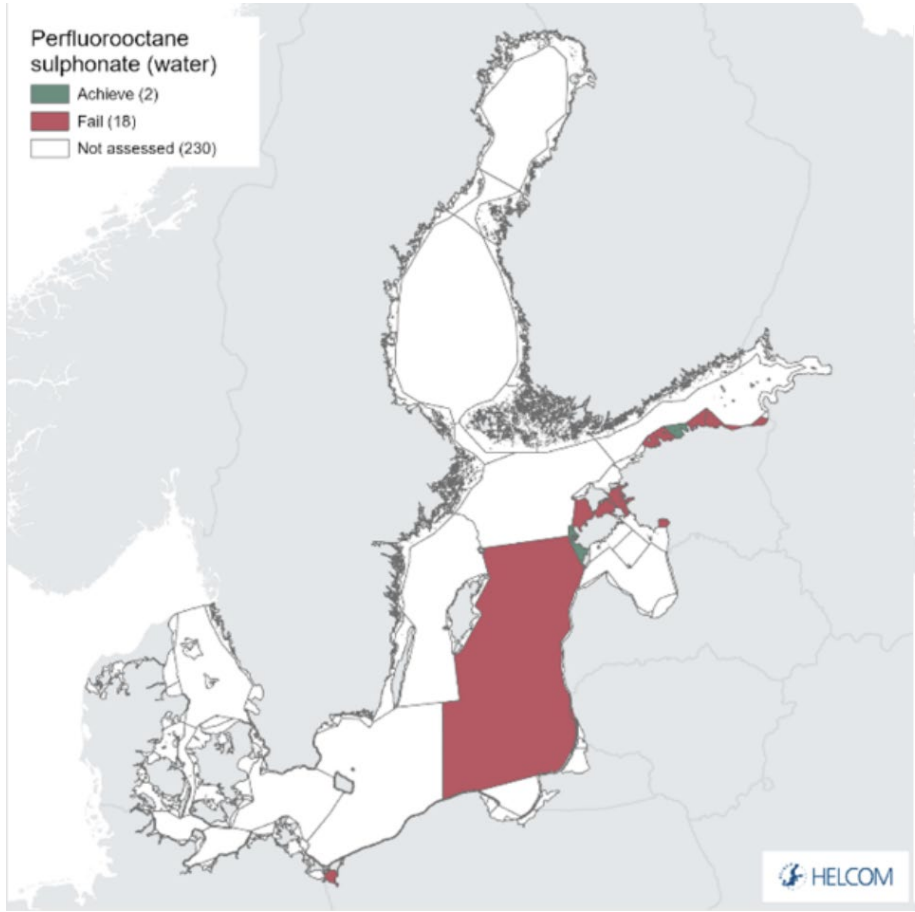
THIRD HELCOM HOLISTIC ASSESSMENT OF THE BALTIC SEA 2016-2021

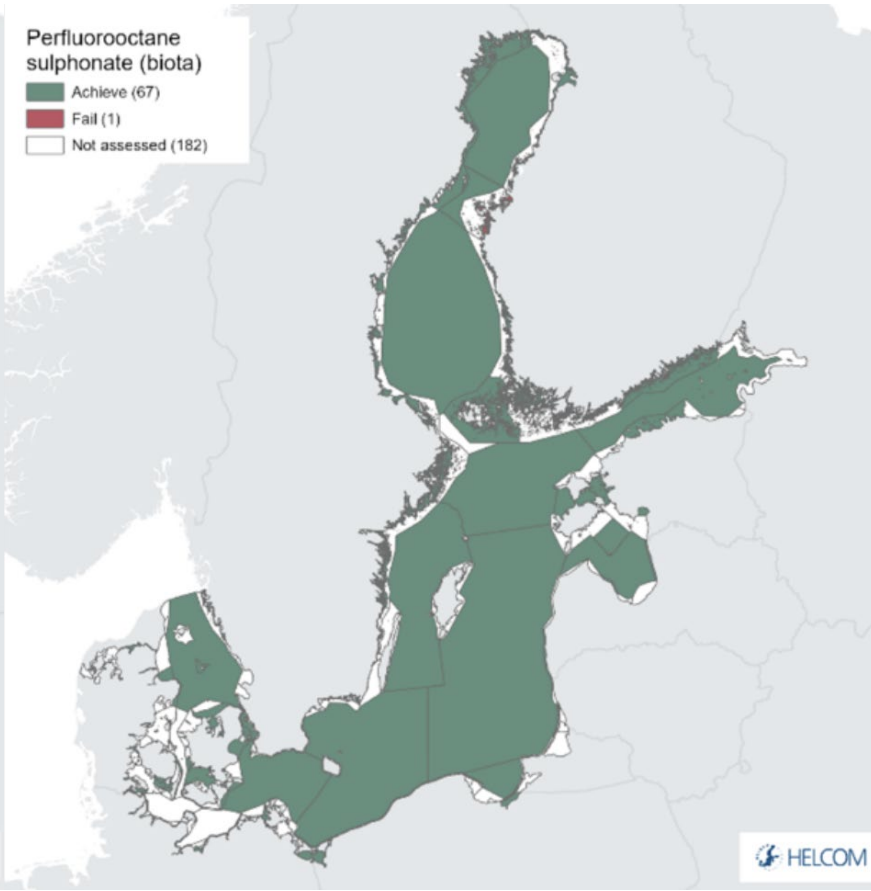
HOLAS 3

HOLAS 3 results were published from April to October 2023

As an indicator, to evaluate the state of the Baltic Sea, HOLAS 3 included PFOS concentrations in both water and biota

- Assessment showed that although some water results for PFOS are showing bad envirionmental status, this effect is not seen in biota





Meanwhile in EU…



As part of the European Green Deal, a Zero pollution action plan was adopted by the European Commission on the 12th of May 2021

New proposals published on the 26th of October 2022, including

- A revision of Urban Wastewater Treatment Directive
- A revision of the Water Framework Directive priority substances list, including a **revision on the Environmental Quality Standards (EQS)** regulation
- New SUM of 24 PFAS limit value, using a relative potency factor (RPF) system
  - Marine waters threshold value would become less strict, **from 0.13 to 4.4 ng/L (PFOA eq)**
  - Marine biota threshold would become much stricter, **from 9.1 to 0.077 µg/kg ww (PFOA eq)**

What does that mean for us? Are PFAS a problem in the Baltic Sea region?



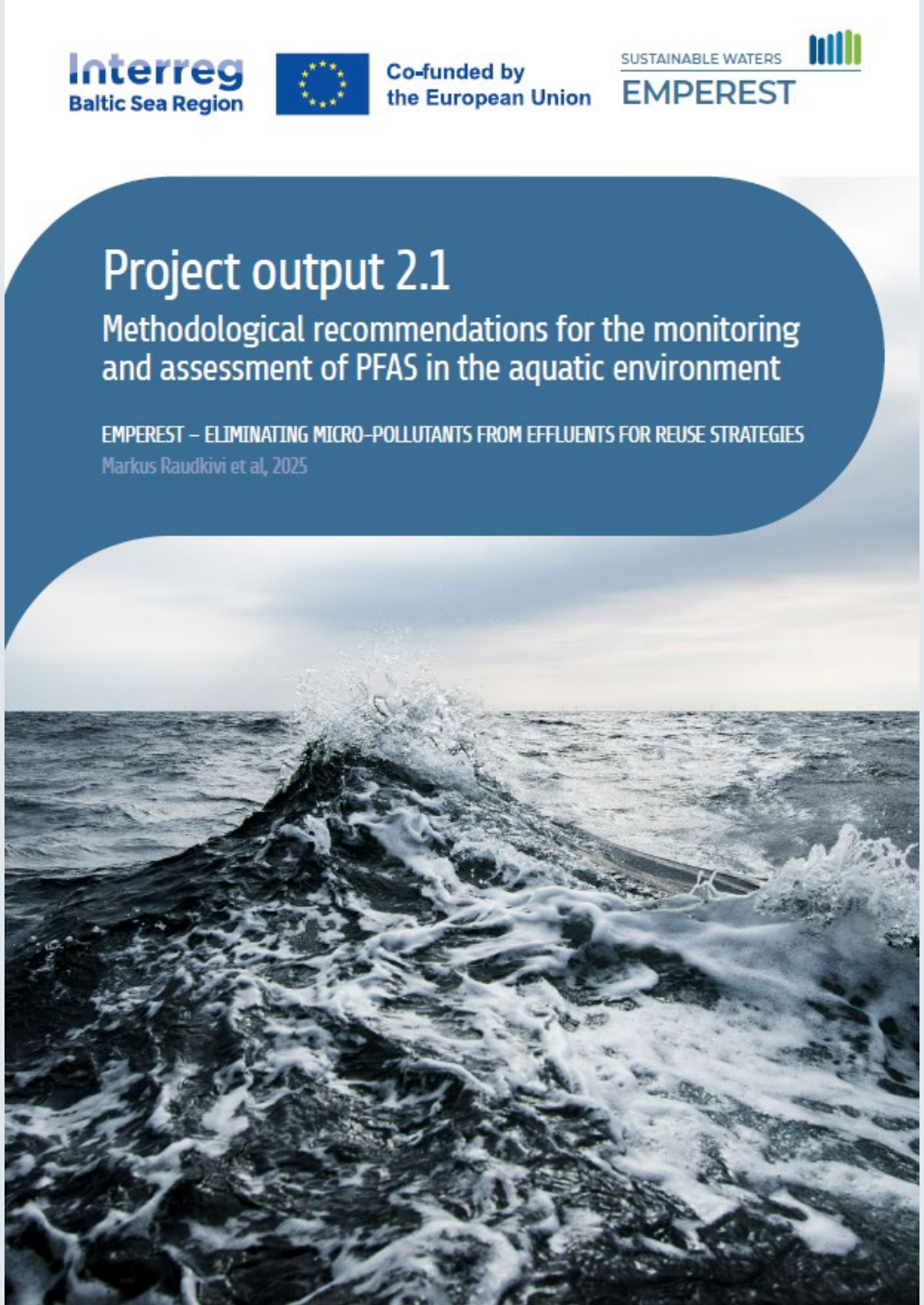
O2.1

Methodological recommendations for **monitoring and assessment** of PFAS in the aquatic environment

Regionally harmonised approach for PFAS monitoring and assessment

- EMPEREST addresses the existing significant gaps in the monitoring and assessment of PFAS with **methodological recommendations** to provide **harmonised guidance** to the Baltic Sea region.
- These recommendations will include **detailed information** on what, when and where to measure and how to assess and use these results.
- The recommendations will be assembled **in cooperation with regional experts and authorities**, to assure their quality and applicability. Through the **science-policy dialogue**, these recommendations are expected to contribute to the development of potential target values and indicators for the regional assessment of the Baltic Sea aquatic environment.

Coordinated by: HELCOM – Baltic Marine Environment Protection Commission



EMPEREST OUTPUT 2.1

- Published online on the 5th of March 2025
  - Final output of the monitoring group of activities
  - Spilt into three main parts
    - PART A – Methodological recommendations
    - PART B – Sample assessment of PFAS in the Baltic Sea region based on new EU proposals
    - PART C – Exploration of gaps in monitoring by EMPEREST piloting universities

EMPEREST Monitoring Data Collection

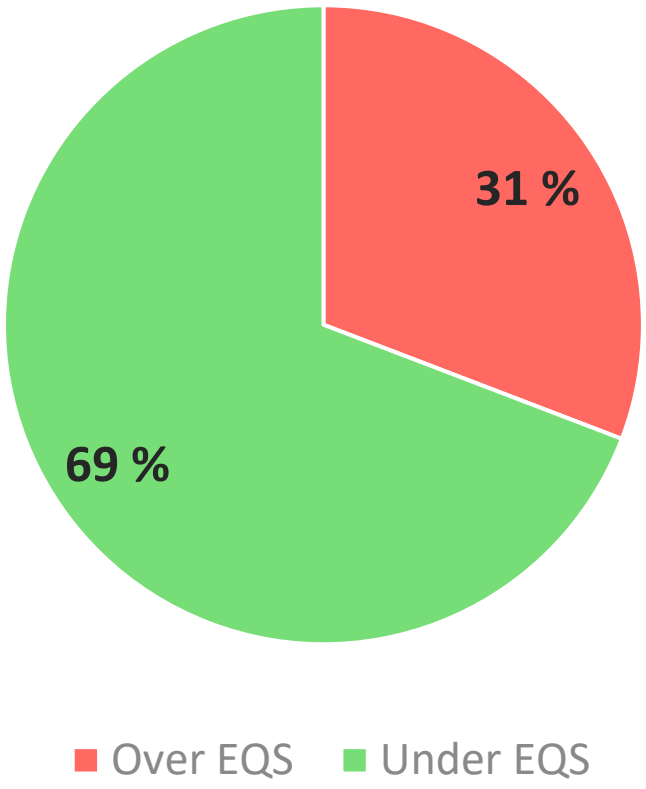
As a part of the EMPEREST project activities, a data call was issued to the Baltic Sea countries to collect PFAS environmental monitoring data

As a result, a database of 140 000 PFAS measurements was established

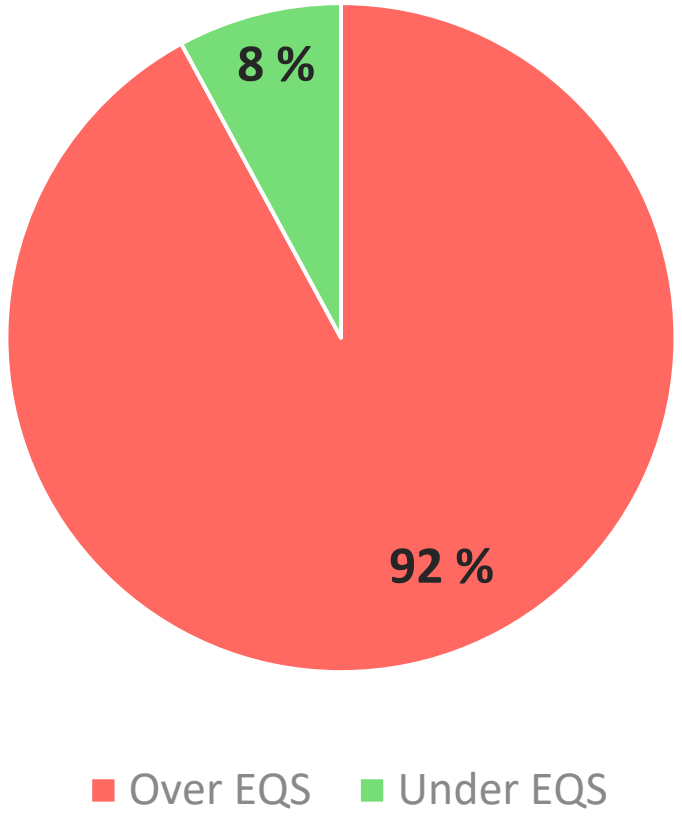
- 3 main matrixes of water, biota and sediment
  - A number of different sub-matrices, including the type of sampling environment, species and analysed tissue (biota)
- 66 individual PFAS are included in the database (27 with isomeric data)
  - About 16 different sum parameters
  - About 19 substances after TOP-assay

Matrices: Water, Biota – Sum of all PFAS

Water
(n = 6,883 samples)

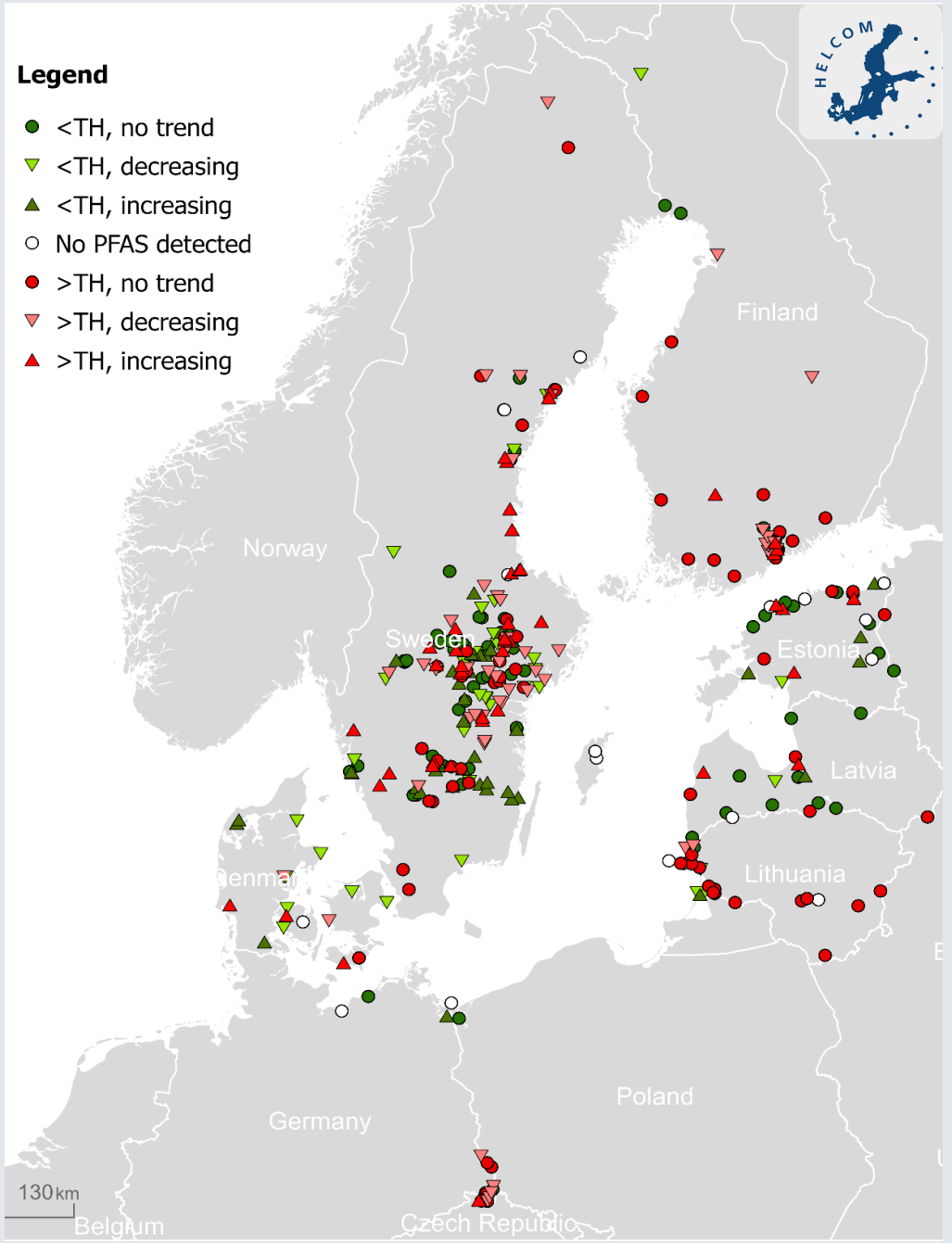


Biota
(n = 2,386 samples)



Compound	Samples measured	Samples >LOQ	Average concentrations (ng/L PFOA)	"Total" TH exceedance (% of TH)	Share from total (%)	Cumulative exceedance
PFNA	3381	965	244.32	5358487.15	**44.88**	44.88
PFOS	5644	2999	50.06	3411748.23	**28.58**	73.46
6:2 FTS	2252	556	81.71	1032574.22	**8.65**	82.11
PFOA	4338	2677	11.10	675554.91	**5.66**	87.77
PFUnDA	2950	191	106.38	461767.36	**3.87**	91.63
PFHxS	2747	1194	14.10	382492.96	**3.20**	94.84
PFDA	3398	370	21.09	177389.02	**1.49**	96.32
PFHpA	2788	1966	3.08	137714.10	**1.15**	97.48
N-EtFOSA	1054	150	40.00	136363.64	**1.14**	98.62
PFHpS	2037	221	4.77	23980.02	**0.20**	98.82

Compound	Samples measured	Samples exceeded threshold	Exceedance frequency (%)	Average concentration (ng/l PFOA eq)	Average TH exceedance amount (%)	Rank
PFNA	3381	497	15	244	5553	**1**
6:2 FTS	2252	346	15	82	1857	**2**
PFOS	5644	867	15	50	1138	**3**
FHxSA	15	15	100	17	379	**4**
N-EtFOSA	1054	150	14	40	909	**5**
PFUnDA	2950	122	4	106	2418	**6**
FBSA	3	3	100	10	227	**7**
PFDA	3398	167	5	21	479	**8**
N-MeFOSE	1054	4	0	208	4725	**9**
PFHxS	2747	216	8	14	320	**10**



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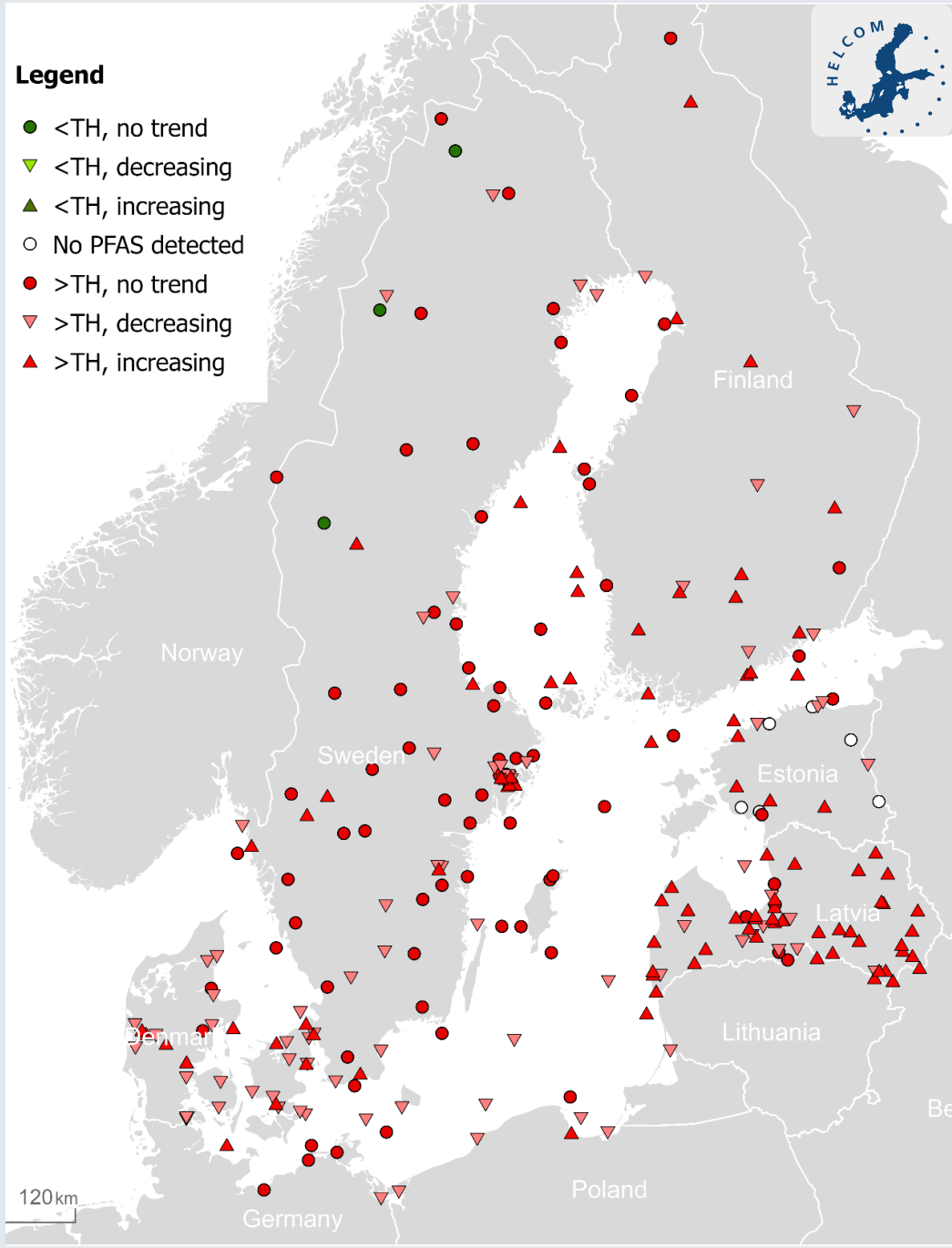


Key message:

Despite some decreasing trends, situation on average is not getting better – new PFAS prominent

Compound	Samples measured	Samples >LOQ	Average concentrations (µg/kg WW)	"Total" TH exceedance (% of TH)	Share from total (%)	Cumulative exceedance
PFOS	3788	3534	4.82	22102519.6	**62.13**	62.13
PFNA	1992	1444	2.00	3753102.25	**10.55**	72.68
PFDA	1994	1613	1.66	3487578.50	**9.80**	82.48
PFUnDA	1976	1589	1.48	3056724.01	**8.59**	91.07
PFDoDA	1584	1227	0.68	1079192.83	**3.03**	94.10
PFTrDA	1336	1166	0.47	710735.83	**2.00**	96.10
PFDS	2165	563	0.51	375401.34	**1.06**	97.16
FOSA	2356	1510	0.18	357367.56	**1.00**	98.16
PFOA	2393	733	0.14	131321.68	**0.37**	98.53
PFHpS	424	126	0.79	129881.34	**0.37**	98.90

Compound	Samples measured	Samples exceeded threshold	Exceedance frequency (%)	Average concentration (µg/kg WW)	Average TH exceedance amount (%)	Rank
PFOS	3788	3302	87.17	4.82	6254.25	**1**
FBSA	18	18	100.00	2.07	2694.14	**2**
PFDA	1994	1543	77.38	1.66	2162.17	**3**
PFNA	1992	1420	71.29	2.00	2599.10	**3**
PFUnDA	1976	1517	76.77	1.48	1923.68	**5**
6:2 FTS	231	42	18.18	1.04	1347.75	**6**
PFDoDA	1584	933	58.90	0.68	879.54	**7**
10:2 FTS	14	1	7.14	22.60	29350.65	**7**
PFTrDA	1336	853	63.85	0.47	609.55	**9**
4:2 FTS	122	16	13.11	0.87	1128.62	**9**



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Key message:

Situation in biota much worse than expected, pollution mainly driven by 6 "older" PFAS

Summary

The Baltic Sea area, including Baltic states are in high risk for PFAS pollution, especially through contaminated biota – animals and fish

For biota samples, the new EU threshold based on human health shows:

- **9 out of 10 fish in the Baltic Sea region would be over the threshold**
- 6 PFAS (PFOS, PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA) are the main drivers, resulting in over 96% of measured pollution

Thankfully, long-time trends are not showing increasing concentrations

- **Water samples often show decreases in the content of PFAS 24, but no change in the sum of PFAS if newer PFAS are included**
  - The PFAS used in industry change so often, we can’t catch up



Thank you for your attention!

Markus Raudkivi
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HELCOM Secretariat
markus.raudkivi@helcom.fi

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Interreg Baltic Sea Region

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