HSC 2025

HELCOM Stakeholder Conference 2025
A 'one Baltic' approach towards a sea unaffected by hazardous substances
31 March 2025

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

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SUSTAINABLE WATERS EMPEREST

What are PFAS?

- PFAS – per- and polyfluoroalkyl substances
- Large group of manmade chemicals, also called “forever chemicals” due to almost no biodegradability
- Invented in 1938, widescale use since the 1950s
- First evidence of toxicity from 1955 (buried)
- Patented in AFFFs (fire-fighting foams) in 1967
- Toxicity starts to become known wide-scale since 1998
- Worldwide restriction of PFOS production and use in 2009 (Stockholm convention)

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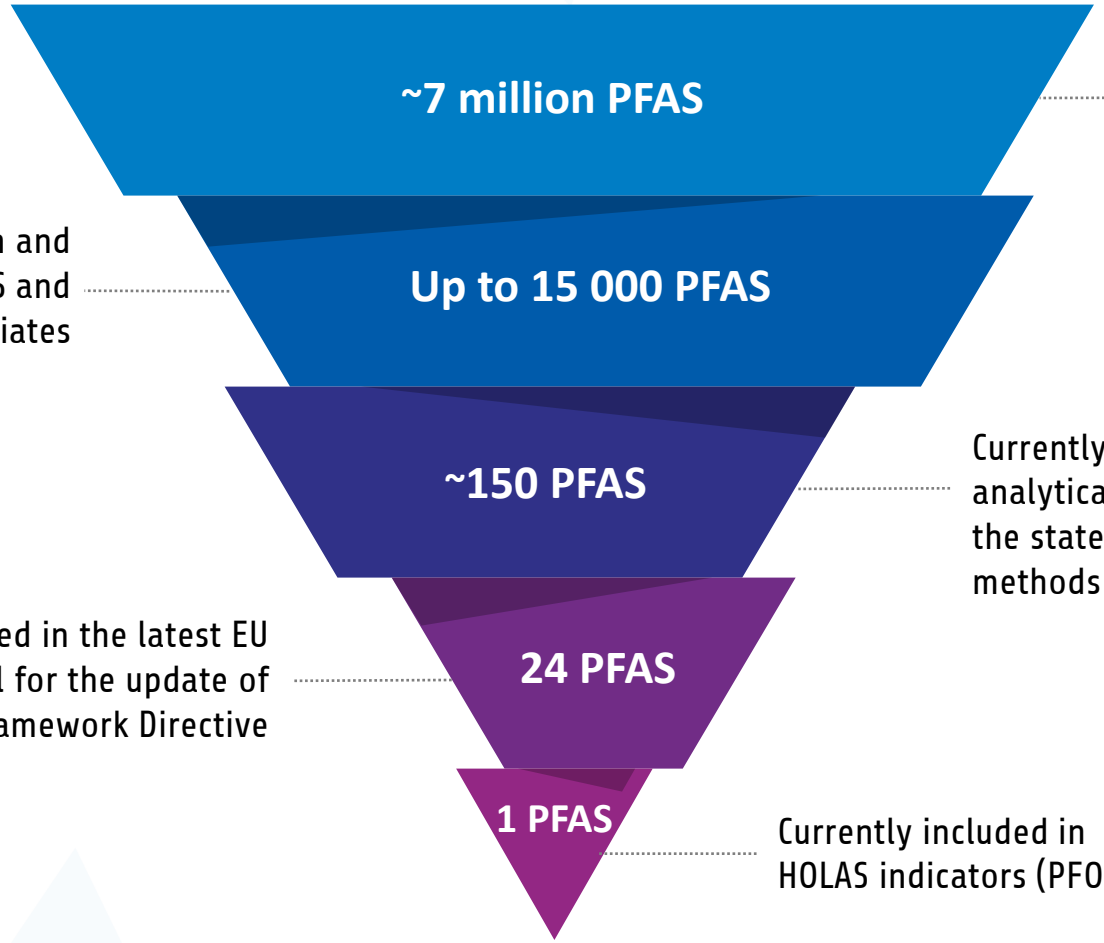
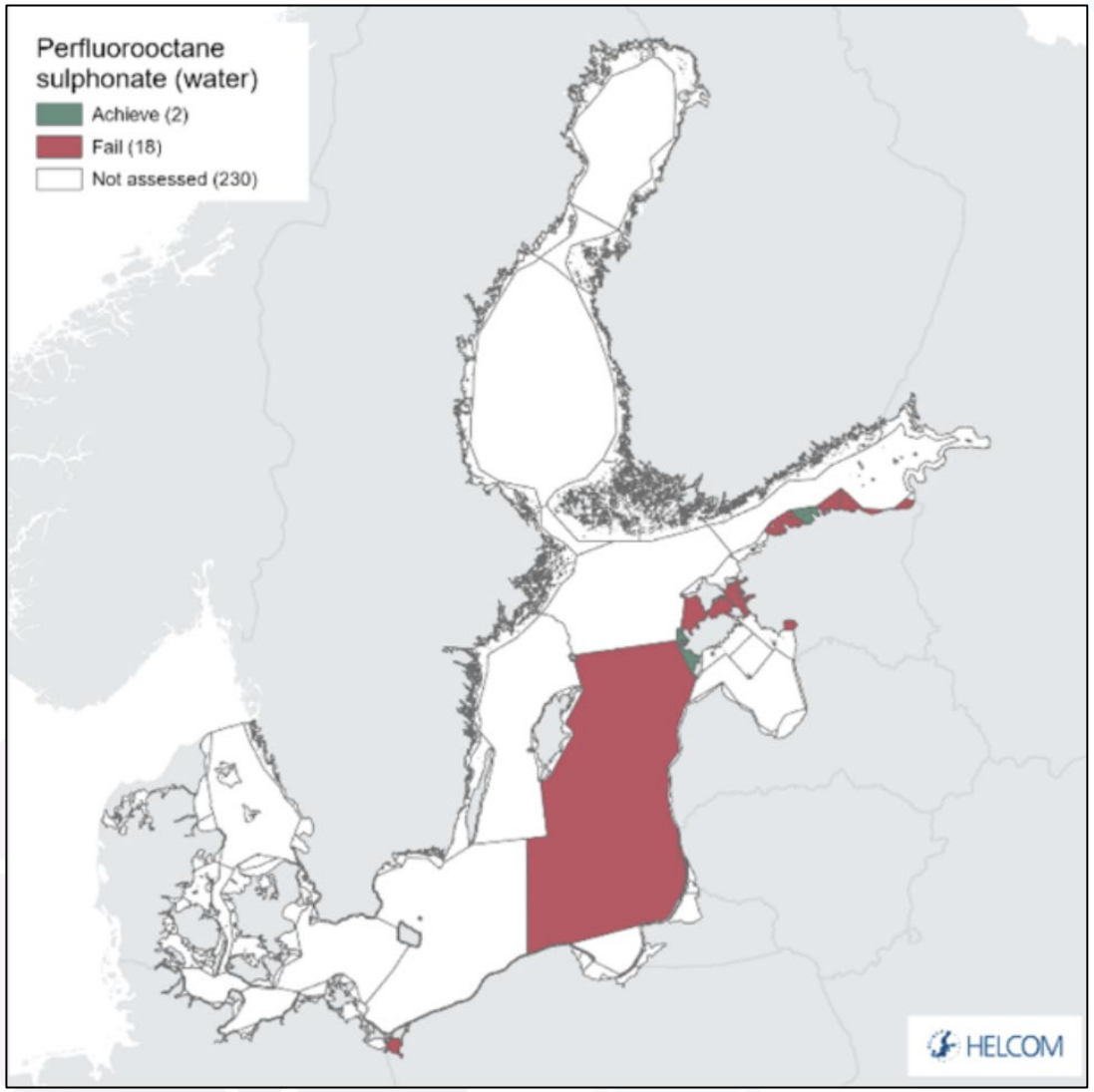
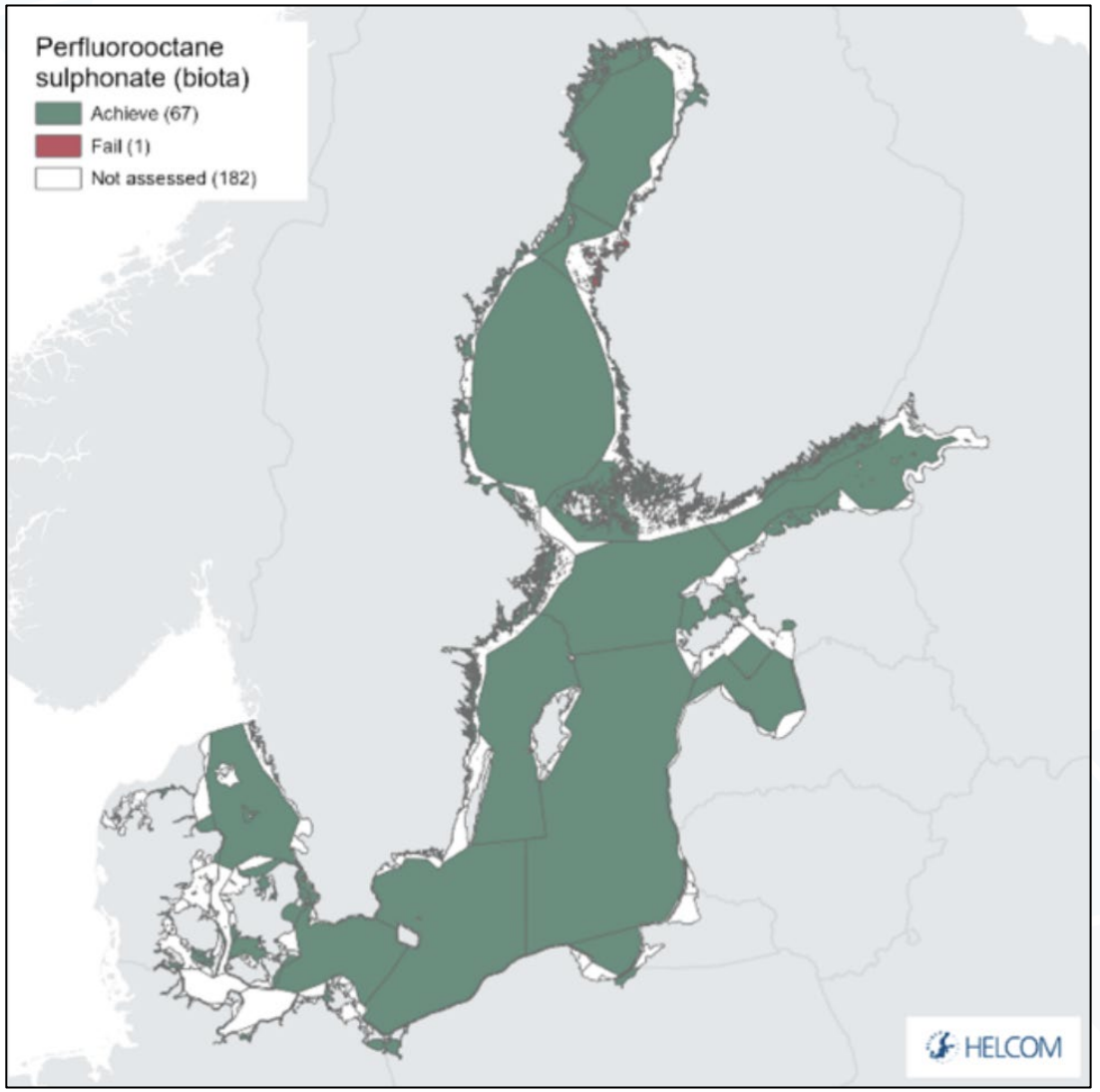



Perfluorooctane sulphonate (water)
Achieve (2)
Fail (18)
Not assessed (230)
HELCOM


Perfluorooctane sulphonate (biota)
Achieve (67)
Fail (1)
Not assessed (182)
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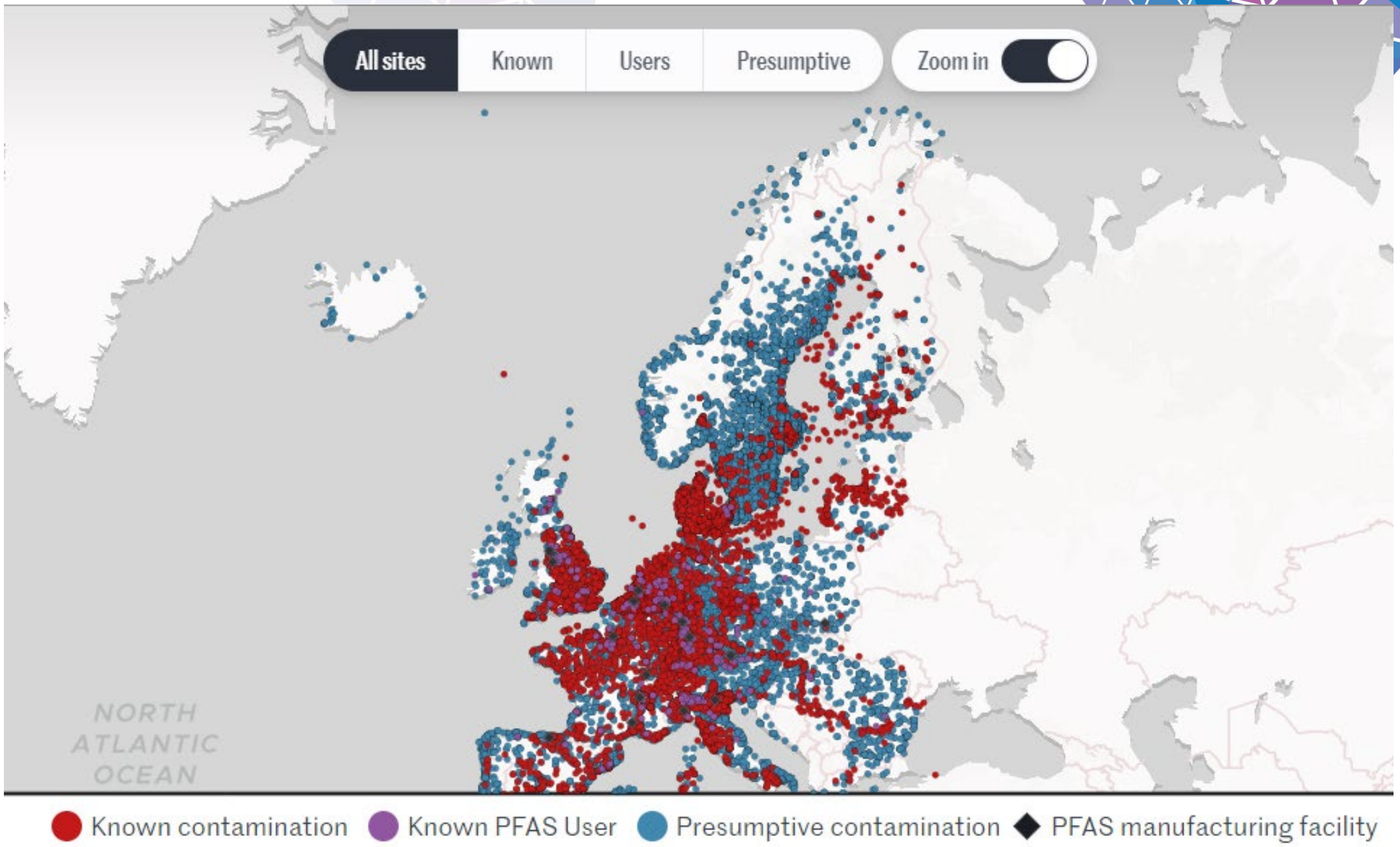
All sites
Known
Users
Presumptive
Zoom in
NORTH ATLANTIC OCEAN
Known contamination
Known PFAS User
Presumptive contamination
PFAS manufacturing facility

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
  - Threshold value for water would become less strict, **from 0.13 to 4.4 ng/L (PFOA eq)**
  - Threshold for biota would become much stricter, **from 9.1 to 0.077 µg/kg ww (PFOA eq)**

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How would these new pending thresholds change our perspective?

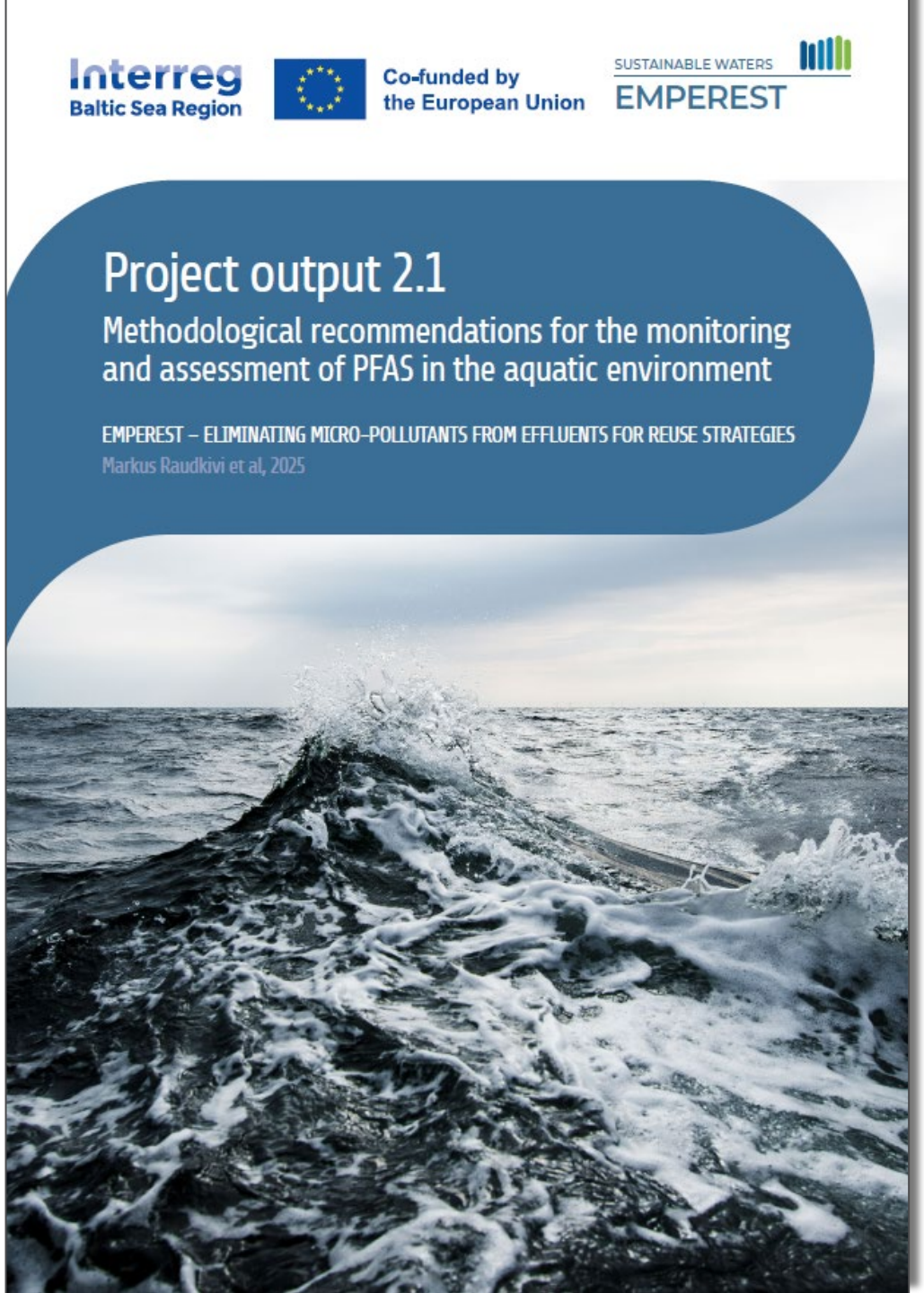
O2.1

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

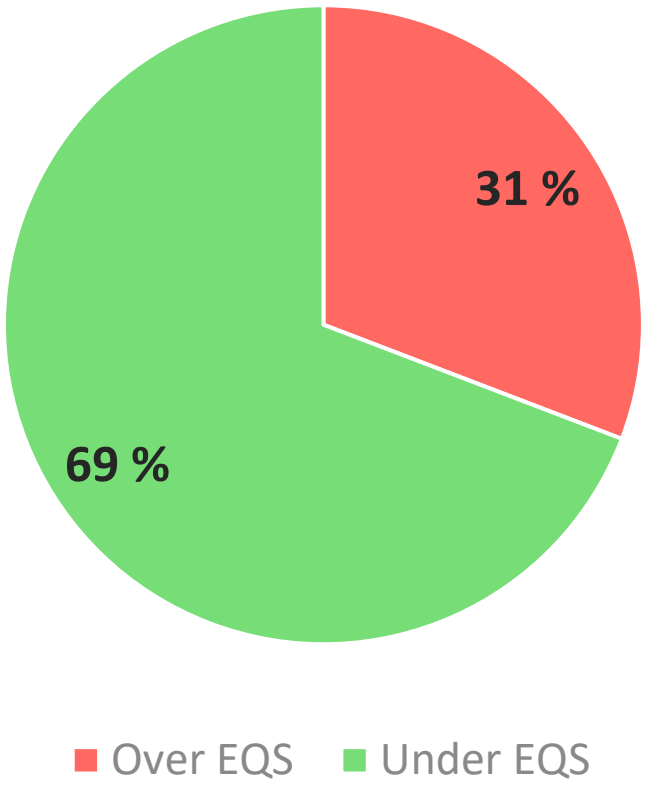
As a part of the EMPEREST project activities, a data call was issued to the Baltic Sea countries to collect PFAS environmental monitoring data

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

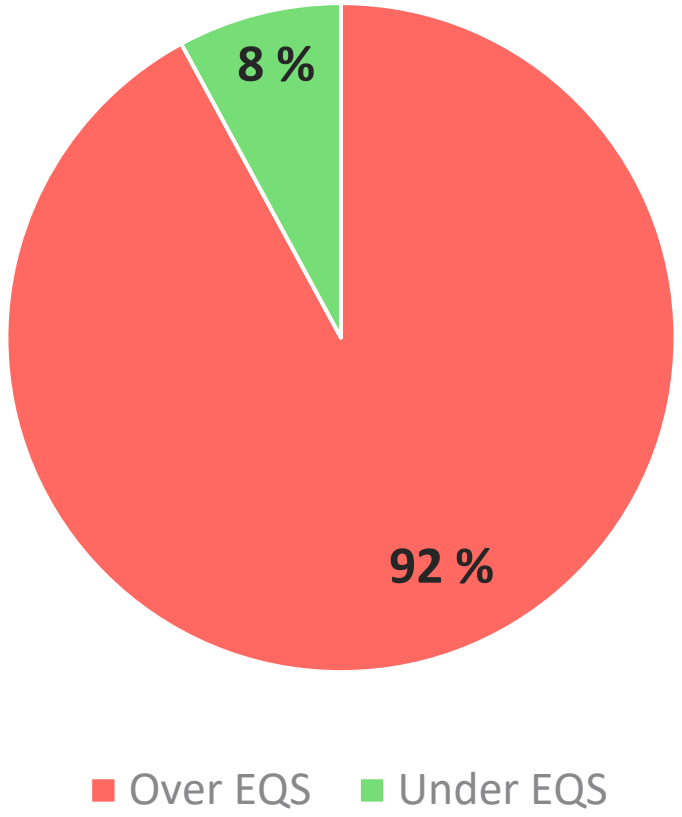
- 3 main matrixes of water, biota and sediment
  - Not only marine samples, but also **data from rivers and lakes**
- 66 individual PFAS are included in the database
  - Precautionary potency values estimated for all through literature review and expert consultations

Matrices: Water, Biota – Sum of all measured PFAS

Water
(n = 6,883 samples)

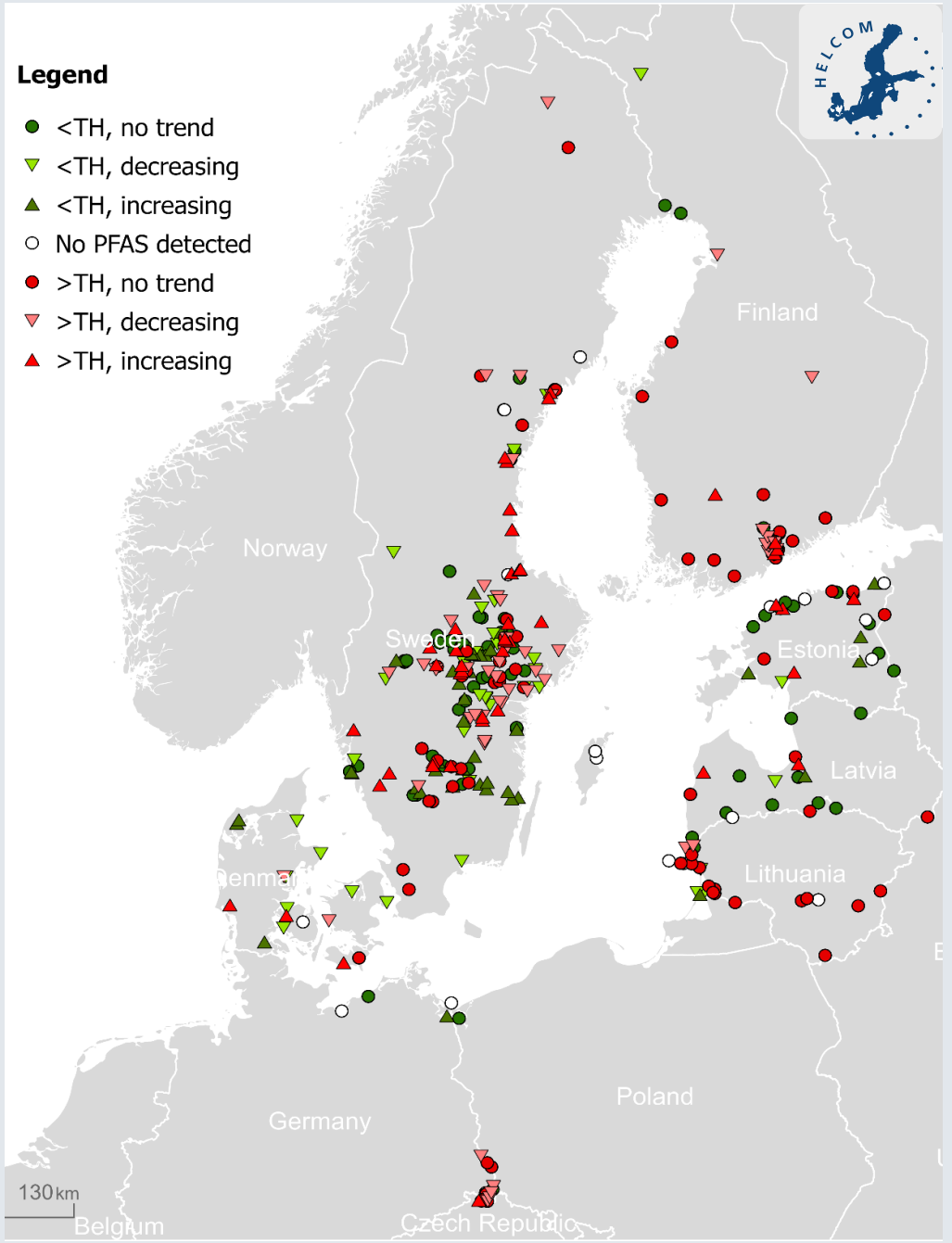


Biota
(n = 2,386 samples)



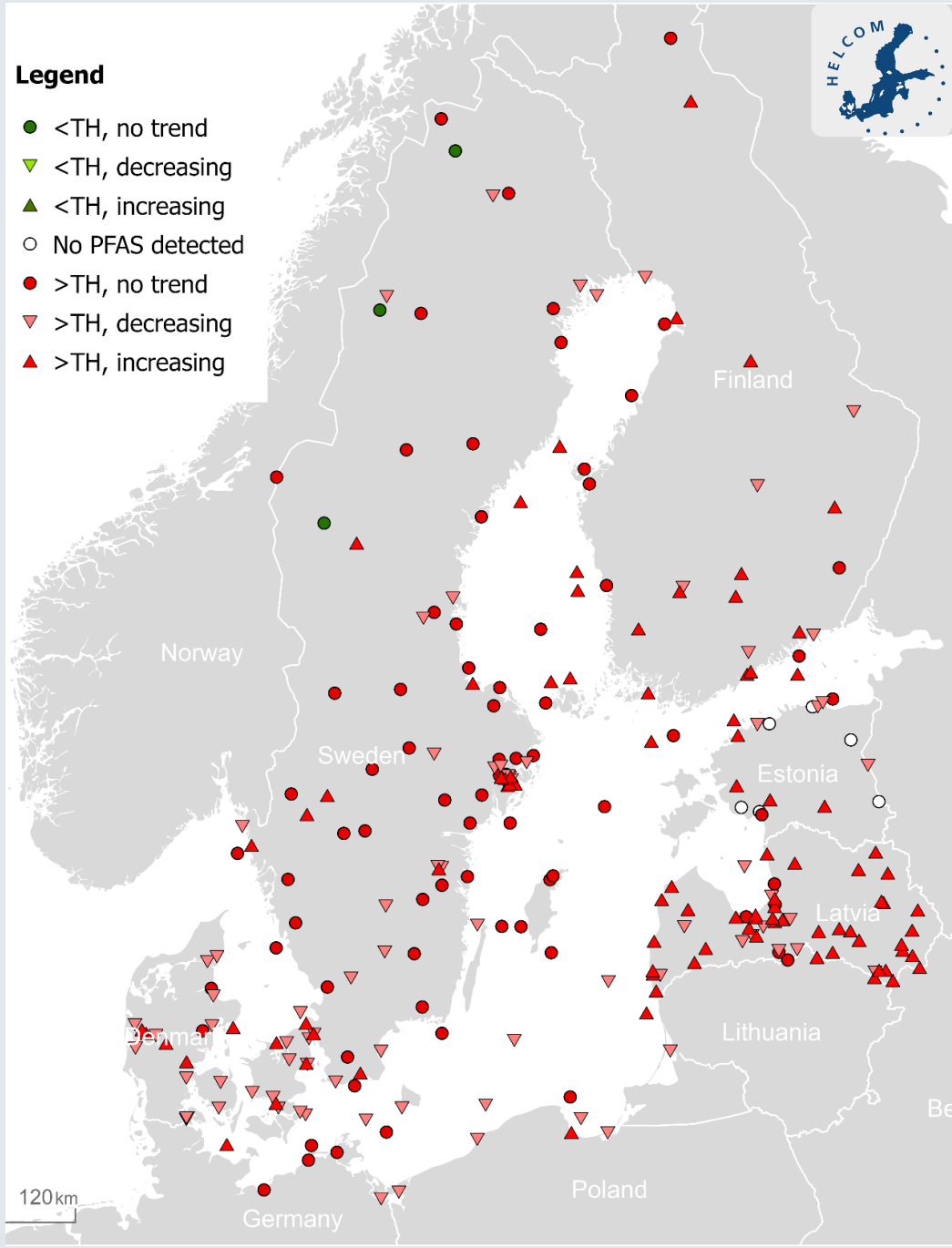
Compound	Samples measured	Samples >LOQ	Average concentrations (ng/L PFOA)	"Total" TH exceedance (% of TH)	Share from total (%)	Cumulative exceedance
PFNA	3381	965	244.32	5358487.15	**44.88**	44.88
PFOS	5644	2999	50.06	3411748.23	**28.58**	73.46
6:2 FTS	2252	556	81.71	1032574.22	**8.65**	82.11
PFOA	4338	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**



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**



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

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Thank you for your attention!

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