

NEWSLETTER

LIFE APEX



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Determination of 56 per- and polyfluoroalkyl substances in top predators and their prey from Northern Europe by LC-MS/MS

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<https://doi.org/10.1016/j.chemosphere.2021.131775>

Telegram

- +++New Life Apex publication on 56 PFAS in top predators and their prey+++
- Presentation of detected compounds for Tier 2 time-trend analysis (2000-2018)
- PFOS time trends in selected apex predators show declining trends, especially after 2010
- Presentation of final sample selection of Life APEX Tier 3
 - Wide spatial coverage of available samples
- Eurasian Otters showed highest PFOS residues across Europe
 - Presentation of PFAS contamination per country
- Presentation of applied prioritisation strategies for detected compounds
- Demonstrator 3 on the use of chemical monitoring data from buzzards to assess the impact and effectiveness of risk management measures at national and European scale Sample selection across Europe

TOPIC 01

- Results from the latest publication
- Novel results for Life APEX Tier 2 (time-trend analysis)

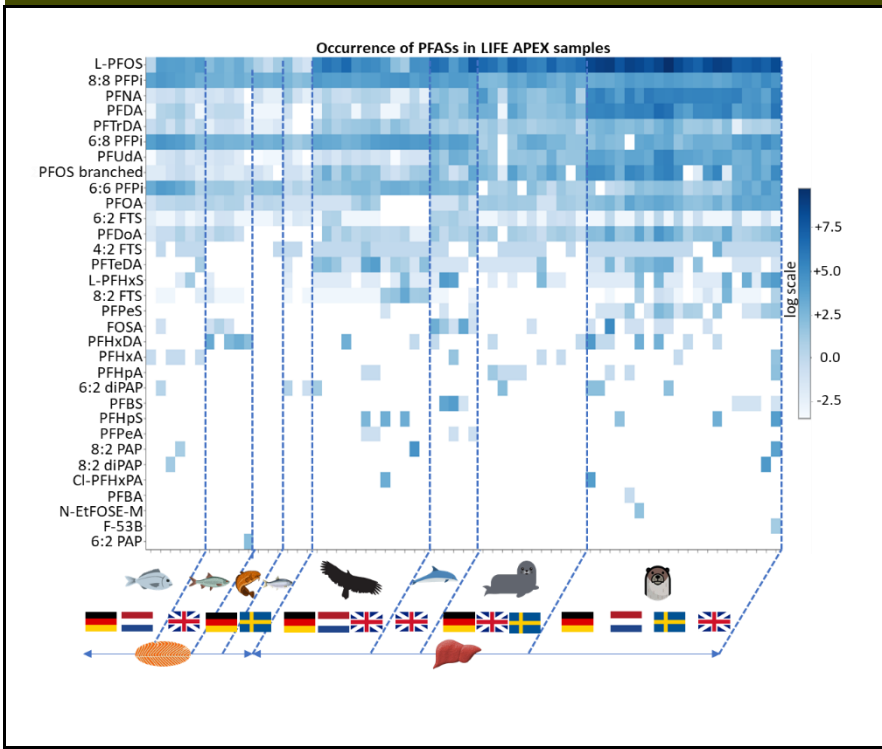
TOPIC 02

- Life APEX Tier 3 results (EU-wide)
- PFAS in otters

TOPIC 03

- Prioritisation strategy of detected compounds
- Demonstrator 3 on assessing the impact of risk management measures

01: LIFE APEX TIER 1 PUBLICATION: DETECTION OF 56 NOVEL PFAS



Published in Chemosphere:

- The analysis included apex predators and their prey (fish) from United Kingdom, the Netherlands, Sweden and Germany
- Concentrations were one to four magnitudes higher in top predators compared to their prey!
- ΣPFAS concentrations were highest in Eurasian otters
- First report of F-53B in Eurasian otters
- <https://doi.org/10.1016/j.chemosphere.2021.131775>

Heat map:

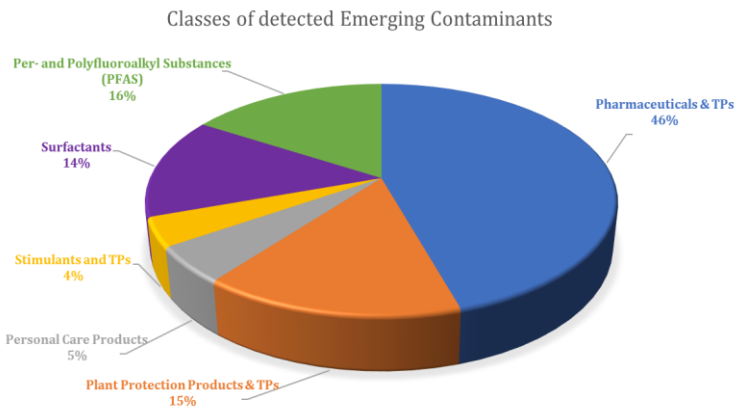
- Concentration levels in ng g⁻¹ wet weight
- Analytes sorted based on their FoA
- Clear white colour represents values <MDL for the respective analyte

01: LIFE APEX TIER 2 (TIME-TREND ANALYSIS)

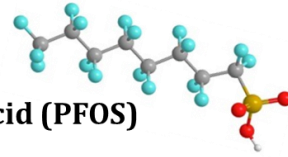
Results from wide-scope target analysis in **Tier 2** LIFE APEX samples.

- ✓ In total, **99 ECs** were detected in LIFE APEX samples (Tier 2)
- ✓ **Pharmaceuticals & TPs** → **46%**
- ✓ Per- and Polyfluoroalkyl Substances (PFAS) → **16%**
- ✓ Plant Protection Products & TPs → **15%**
- ✓ Surfactants → **14%**
- ✓ Only **10 ECs** were detected with **% frequency of detection > 60**

→ difficult task → time trend analysis using biota samples



Tier 2: time-trend analysis



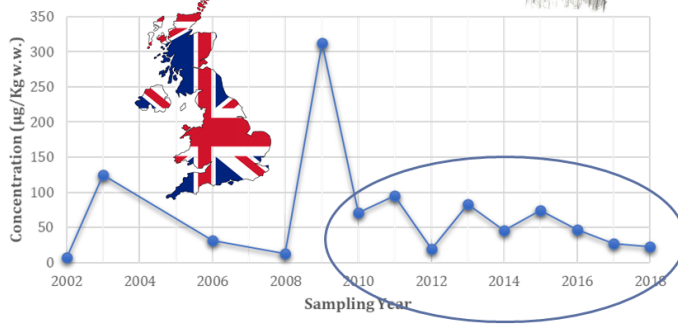
The case of Perfluorooctanesulfonic acid (PFOS)

2010-2018 → **trend** to lower concentrations of PFOS

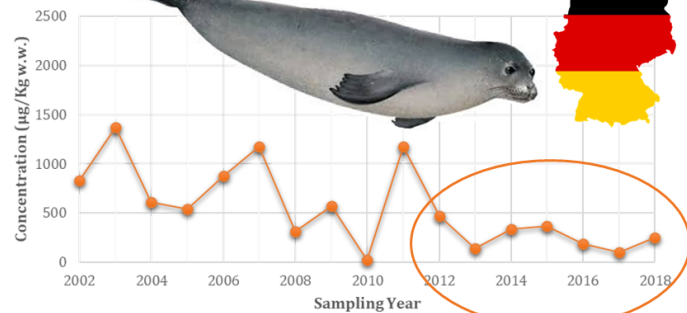
Attributed to PFOS replacement compounds (GenX, ADONA)?



Perfluorooctanesulfonic acid (PFOS)
common Buzzards (UK)

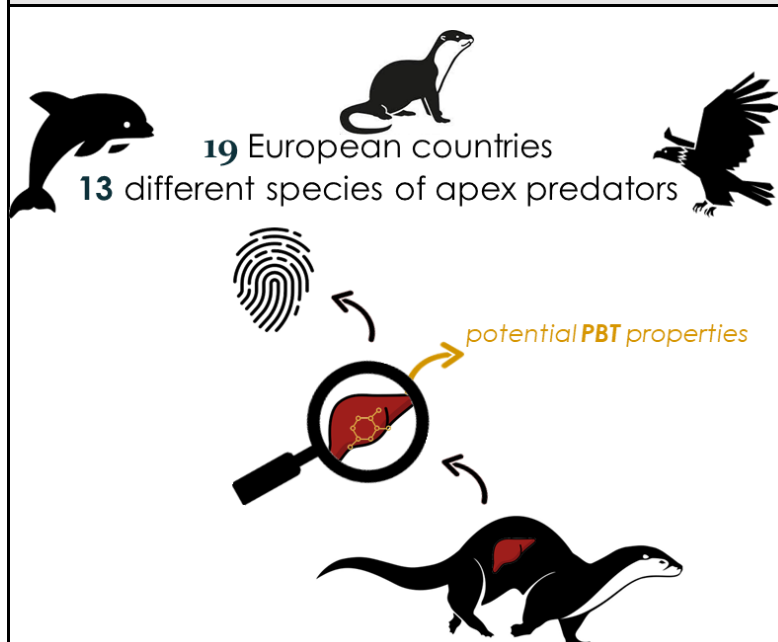


Perfluorooctanesulfonic acid (PFOS)
Harbour Seals (GE)

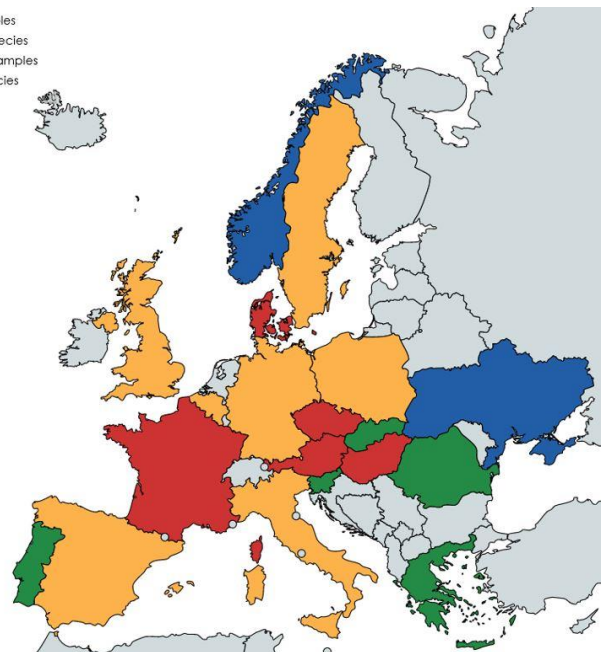


02: LIFE APEX TIER 3

Revealing the chemical fingerprint of apex predators in a pan-European level

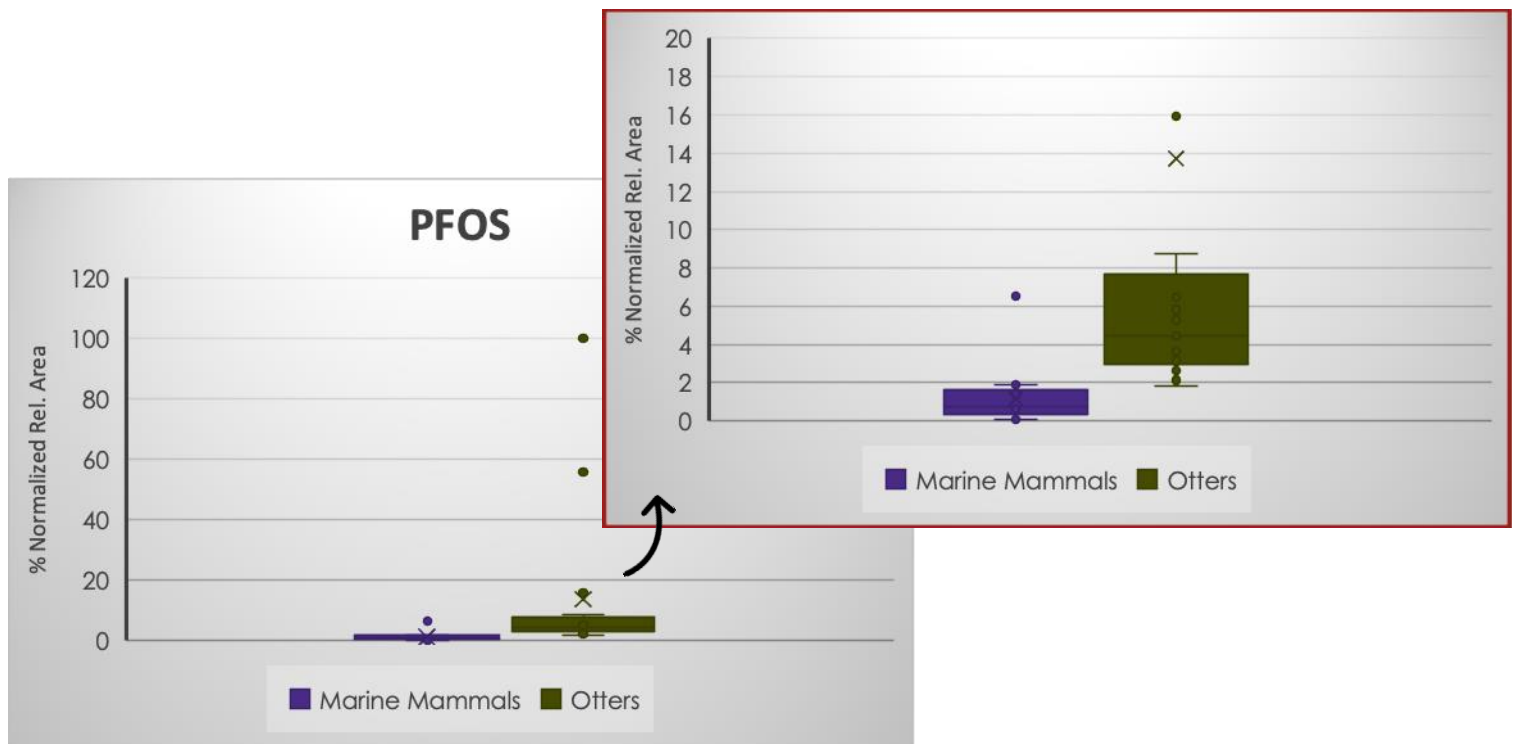


- eurasian otter samples
- marine mammal species
- common buzzard samples
- more than one species



PFOS

Otters vs marine mammals

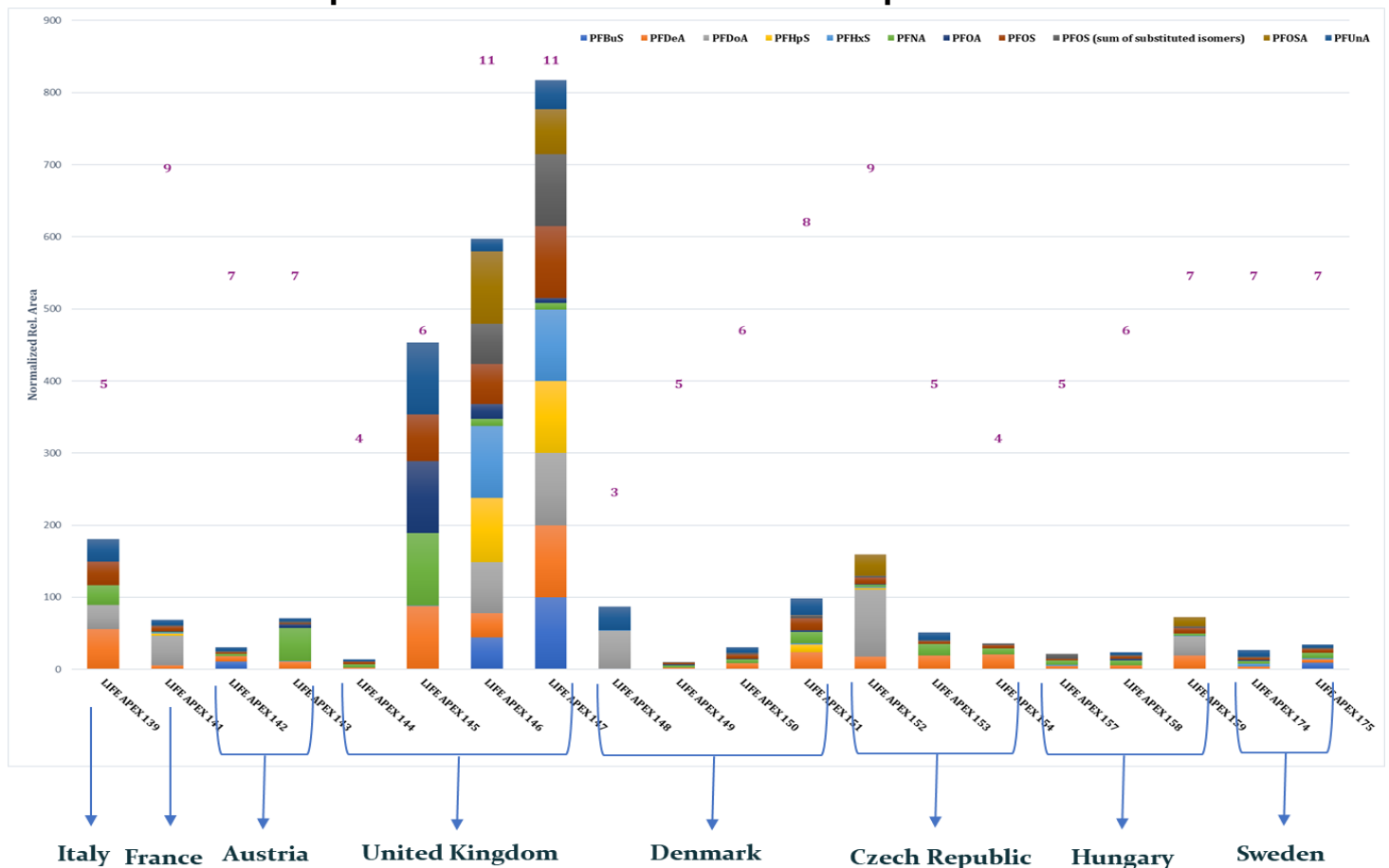


higher intensities of PFOS in **otters**

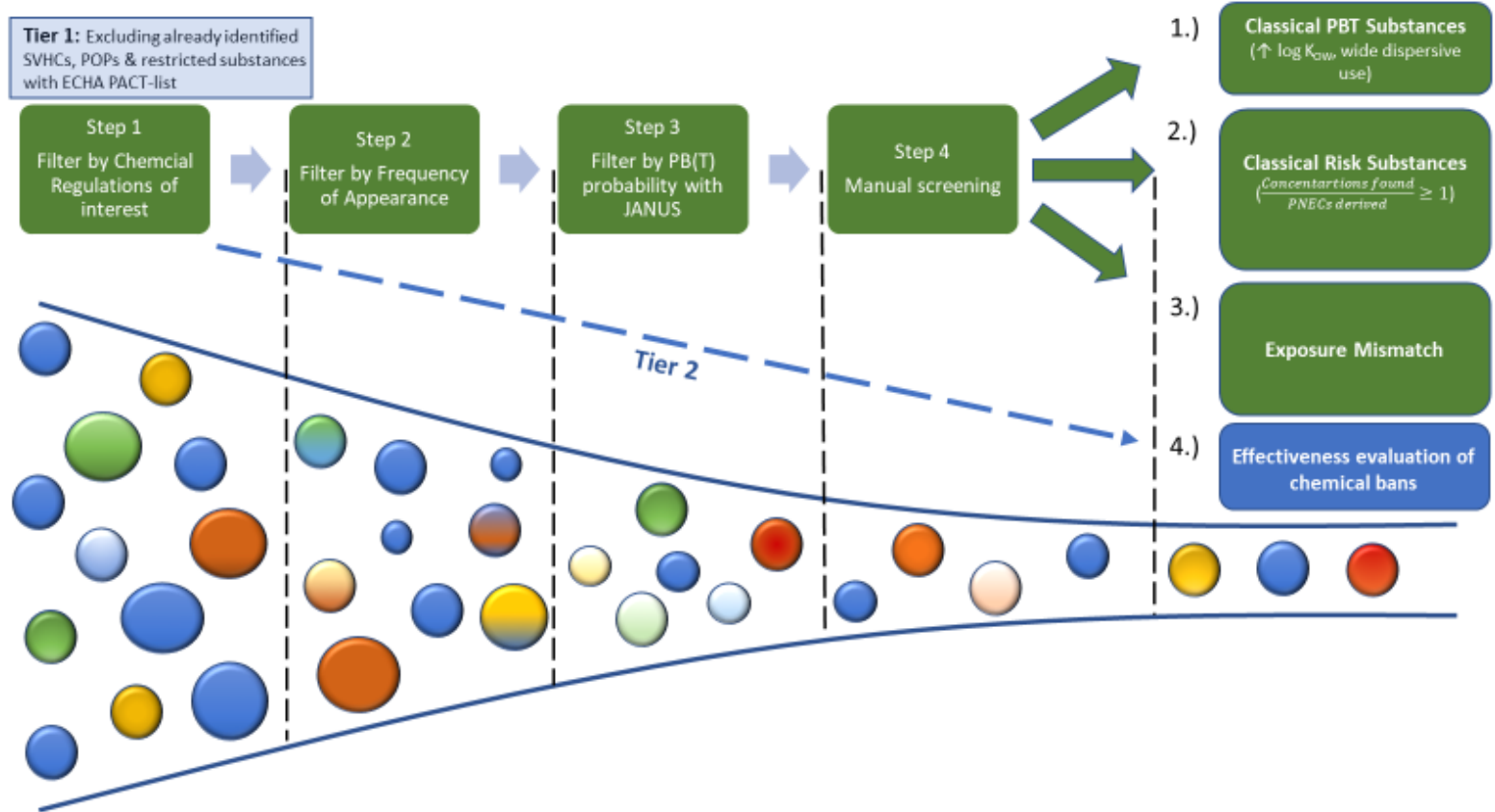
in agreement with Tier 1 & 2 results



Spatial distribution of PFAS in European otters



03: PRIORITISATION OF DETECTED COMPOUNDS



Strategy for prioritizing the Life Apex substances (236 target & 534 suspected target substances, total = 770):

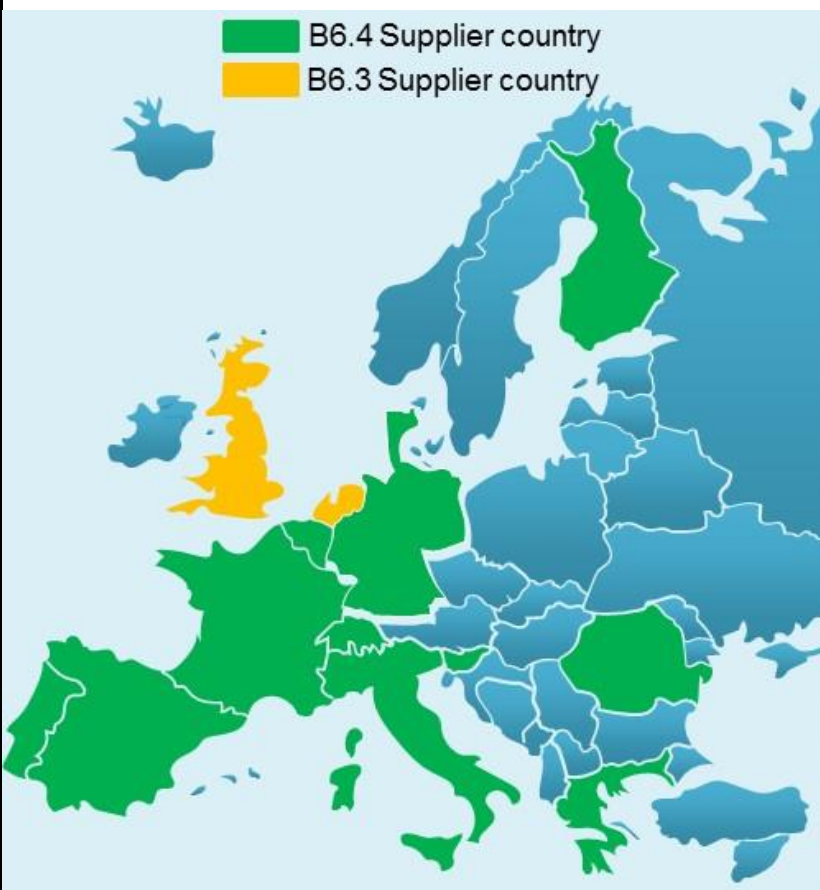
1. **Filter by Chemical Regulations of Interest**
2. **Consideration of frequency of appearance: substances present in at least 10% of samples**
 - Exclusion of point sources and coverage of wide/spatial distribution
 - Identification of relevant contaminants that are not covered by current assessment methods (e.g. binding to proteins, mobile properties) or would need to be subjected to a risk-based assessment
3. **Applying the JANUS tool**
 - Exclusion of substances that are certainly not PBT (PBT score 0-0.3), focus on substances with unclear (PBT score 0.35 - 0.7) and high PBT probability (PBT score > 0.7)
4. **Manual PBT screening of non-regulated REACH chemicals**
 - Exclude substances already regulated (i.e. identified as SVHC, POP, restricted (Tier 1))
 - Manual screening of substances with high PBT JANUS score with regard to intrinsic substance properties as well as uses and exposure information
 - Use of PBT screening criteria according to REACH Annex XIII in REACH dossiers
5. **Manual PBT screening biocides (PPP & Pharmac.: If desired, not filtered in step 1)**
 - PBT screening of PPPs, Pharmac. & biocides with input from other departments at UBA

03: Prioritisation of detected compounds (continued)

6. **Result: The entire substance lists were reduced to substances that might need regulatory follow up and can be divided into three categories**

- 1.) Classical PBT Substances
- 2.) Classical Risk Substances (PEC/PNEC > 1)
- 3.) Exposure Mismatch (predicted vs detected levels)

03: DEMONSTRATOR 3



Use of raptor chemical monitoring data to assess impact and effectiveness of risk management measures at national and European scale

This LIFE APEX Action is examining how sample pooling affects the power to detect declining contaminant concentrations in apex predators following chemical risk management measures (e.g. restrictions). The Action involves national-scale studies for the UK and Netherlands, and a European-scale study, covering the period 2000-2021. The study species is the common buzzard (*Buteo buteo*), which represents a widespread scavenging raptor across Europe, and the chosen matrix is liver.

03: DEMONSTRATOR 3 (continued)

In the national-scale study, UK samples (n=64) have been analysed at UKCEH for mercury (Hg) and Second Generation Anticoagulant Rodenticide (SGARs), while Dutch samples (n = 64) have been analysed at the University of Florence for PCBs, PDBEs and Dechlorane Plus (DP). These substances have all been subject to restrictions over recent decades. Analytical results are being used to simulate the impact that within-year pooling of samples has on the provision of representative country-scale data for the detection of changes, over time, in average residue concentrations, with a view to assessing the power of monitoring with pooled samples. This can inform the design of cost-effective monitoring, using raptor tissues, of the effectiveness of chemical risk management measures. A poster was recently presented at SETAC 2021 on the simulation using the analytical results for the Dutch samples and work is ongoing on the simulation using the analytical results for the UK samples.







Work is also now well advanced on the European-scale study. This involves analysis of over 70 pooled samples (each pool = 2 livers) from 10 countries, for the same substances as those studied in the national scale study. The samples were sourced in collaboration with the COST Action *European Raptor Biomonitoring Facility*. Analyses should be completed by end 2021. The results will then be analysed to explore the magnitude of changes in contaminant tissue concentrations over time (2000-2021) as well as variations in space across Europe.

03: ONGOING NETWORKING ACTIVITIES

- Check out the [LIFE APEX Twitter account](https://twitter.com/LIFEAPEX) as well as www.lifeapex.eu for regular project updates
- Life Apex presentations at **regulatory forums**:
 - ECHA PBT Expert Group: EU LIFE APEX Project: *Prioritization of chemicals for PBT-Assessment*
- Life Apex presented at **scientific forums**:
 - Poster SETAC 2021: Use of raptor chemical monitoring data to assess effectiveness of EU chemical management measures; the impact of pooling liver samples on power to detect change in contaminant concentrations at country scale



Project Partners

 <p>Environmental Institute</p>	 <p>German Environment Agency</p>	 <p>Naturalis Biodiversity Center</p>	 <p>National and Kapodistrian University of Athens</p>
 <p>UK Centre for Ecology & Hydrology</p> <p>UK Centre for Ecology & Hydrology</p>	 <p>Università degli Studi di Firenze</p>		

IMPRINT

Project Coordinator

Jaroslav Slobodnik is the director of Environmental Institute. Among his specialisations are environmental science-to-policy interactions, development of monitoring strategies and environmental analytical chemistry. He is frequently responsible for the design of environmental information and data management systems.



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Project Manager

Natalia Glowacka is the project manager of LIFE APEX. She got her PhD degree in environmental management. She has more than five years of experience in the field of administration and management of national and international environmental projects in Environmental Institute.



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Newsletter Editor

Alexander Badry is an early career researcher in the field of environmental toxicology. He is working as research assistant at the German Environment Agency and is doing his Doctorate at the Leibniz Institute for Zoo and Wildlife Research on contaminants in birds of prey.



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