Miljögifter i vattendrag nedströms avloppsreningsverk, 2023

Oksana Golovko, PhD

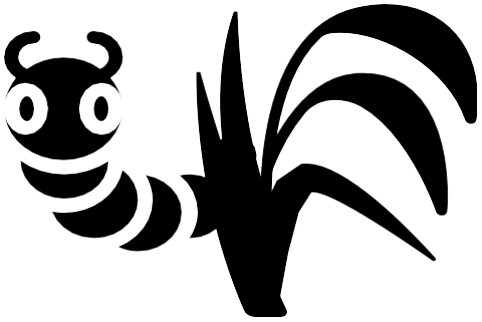
Associate Professor in Environmental Chemistry

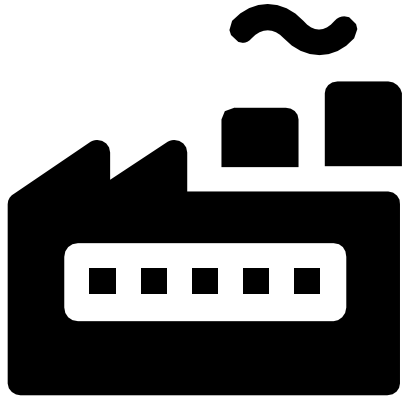
Department of Aquatic Sciences and Assessment

Swedish University of Agricultural Sciences (SLU)

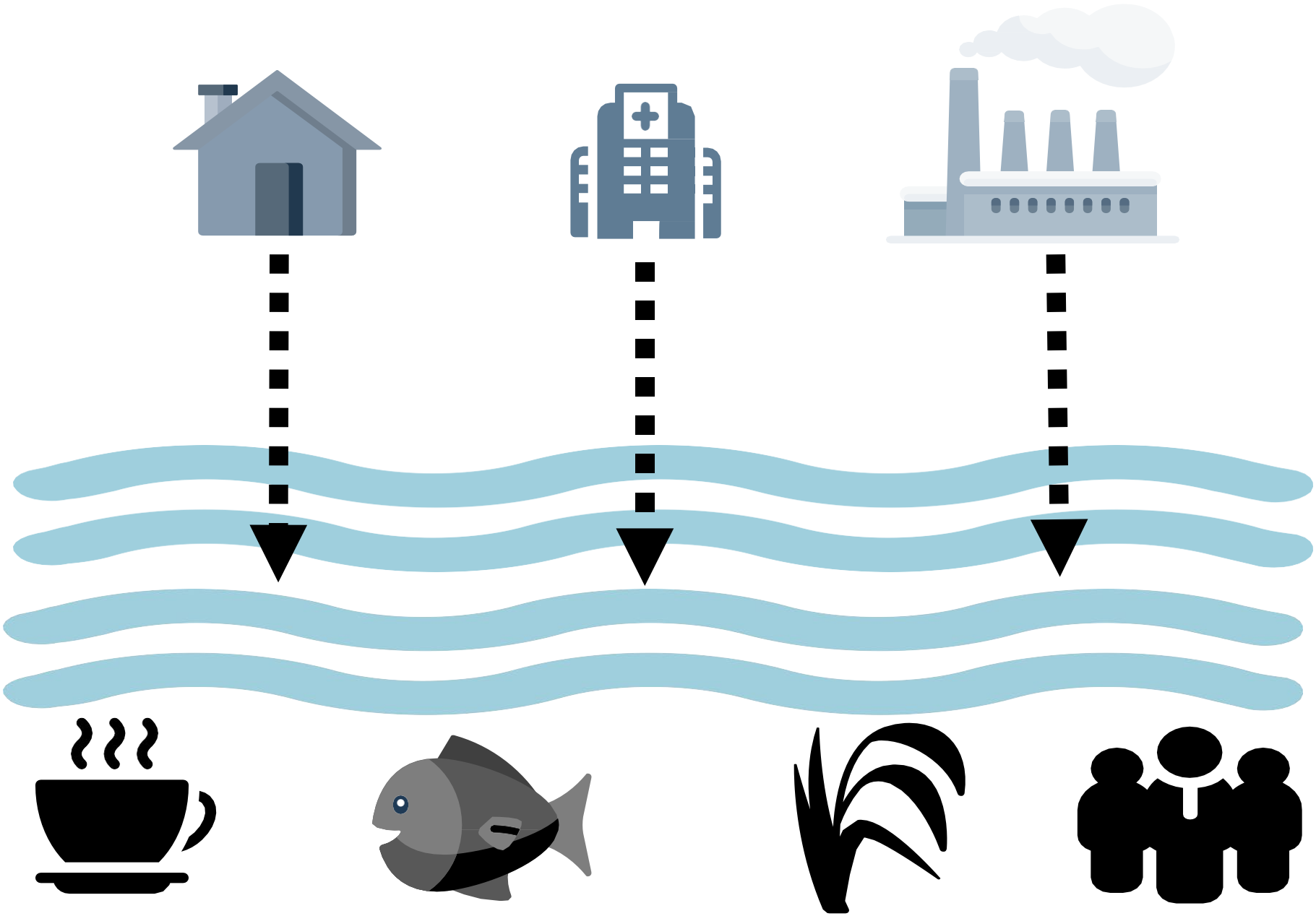
Contaminants of emerging concern

OMPs





Sources of OMPs



Sampling

- Surface water samples at river outlets sites
- Time: May, September, October and November 2023
- Samples collected in September, October and November 2023 are collectively called Autumn samples and are marked with symbol S in figures
- In total, 34 locations and 63 samples were collected
- The monitoring program River Outlet is part of the freshwater program of the Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten) within the national environmental monitoring, and includes the outlets of Sweden's major rivers to the sea.
- The sampling for the current study was an extension of the regular sampling and was conducted by contracted sampling staff.

Occurrence of OMPs in the surface water

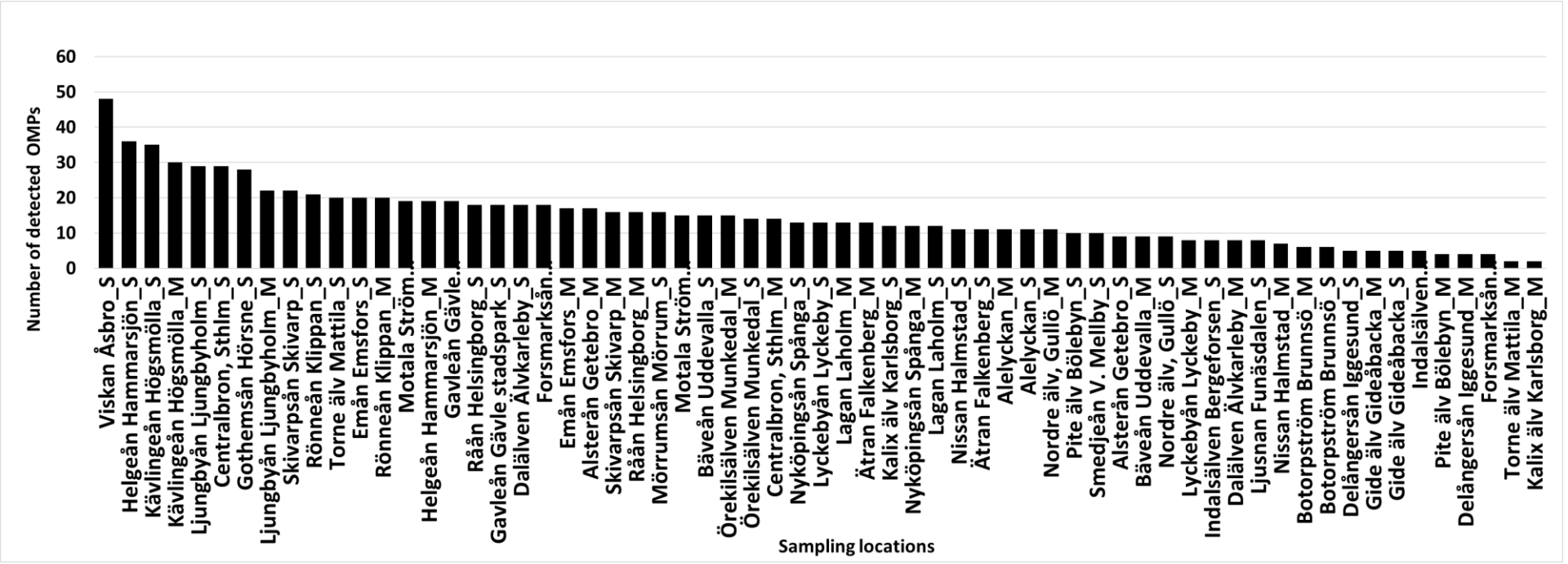


Figure 1. Number of detected OMPs in water samples collected during May (M) and Autumn (S) 2023.
Autumn samples were collected in September (n=21), October (n=11) and November (n=2).

Occurrence of OMPs in the surface water

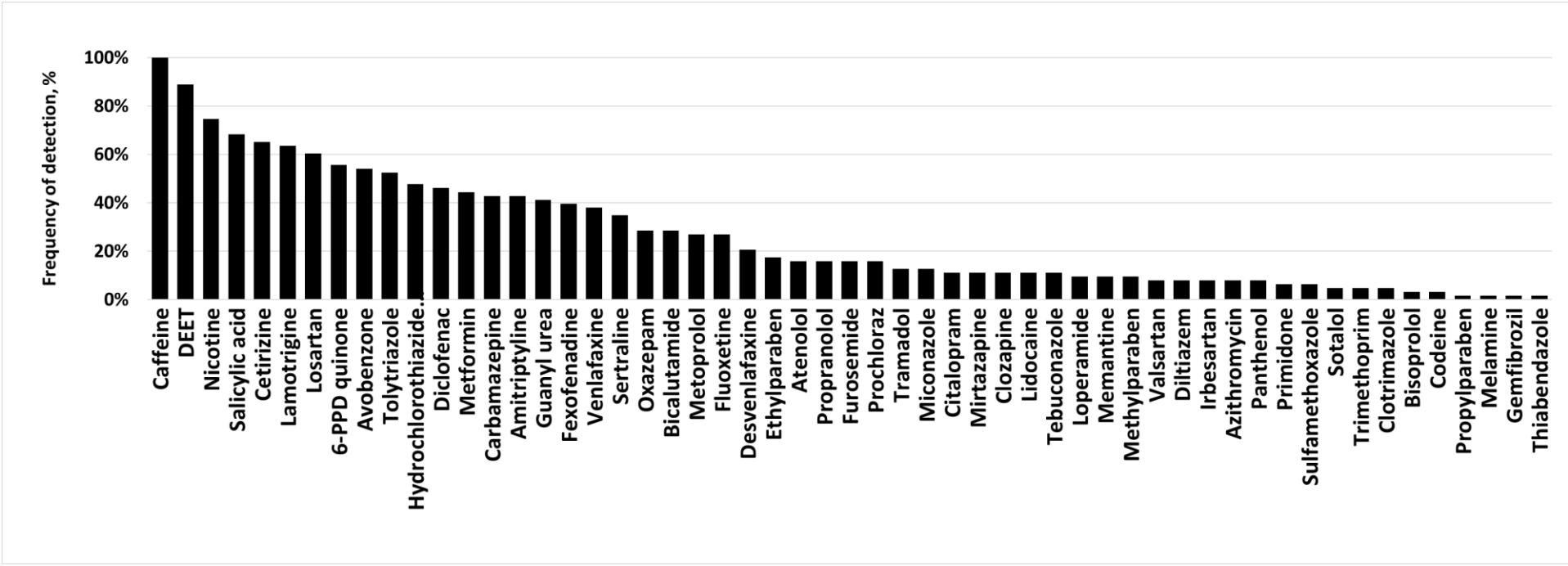


Figure 2. Frequency of detection for studied OMPs in water samples collected during May (M) and Autumn (S) 2023.
Autumn samples were collected in September (n=21), October (n=11) and November (n=2).

Occurrence of OMPs in the surface water

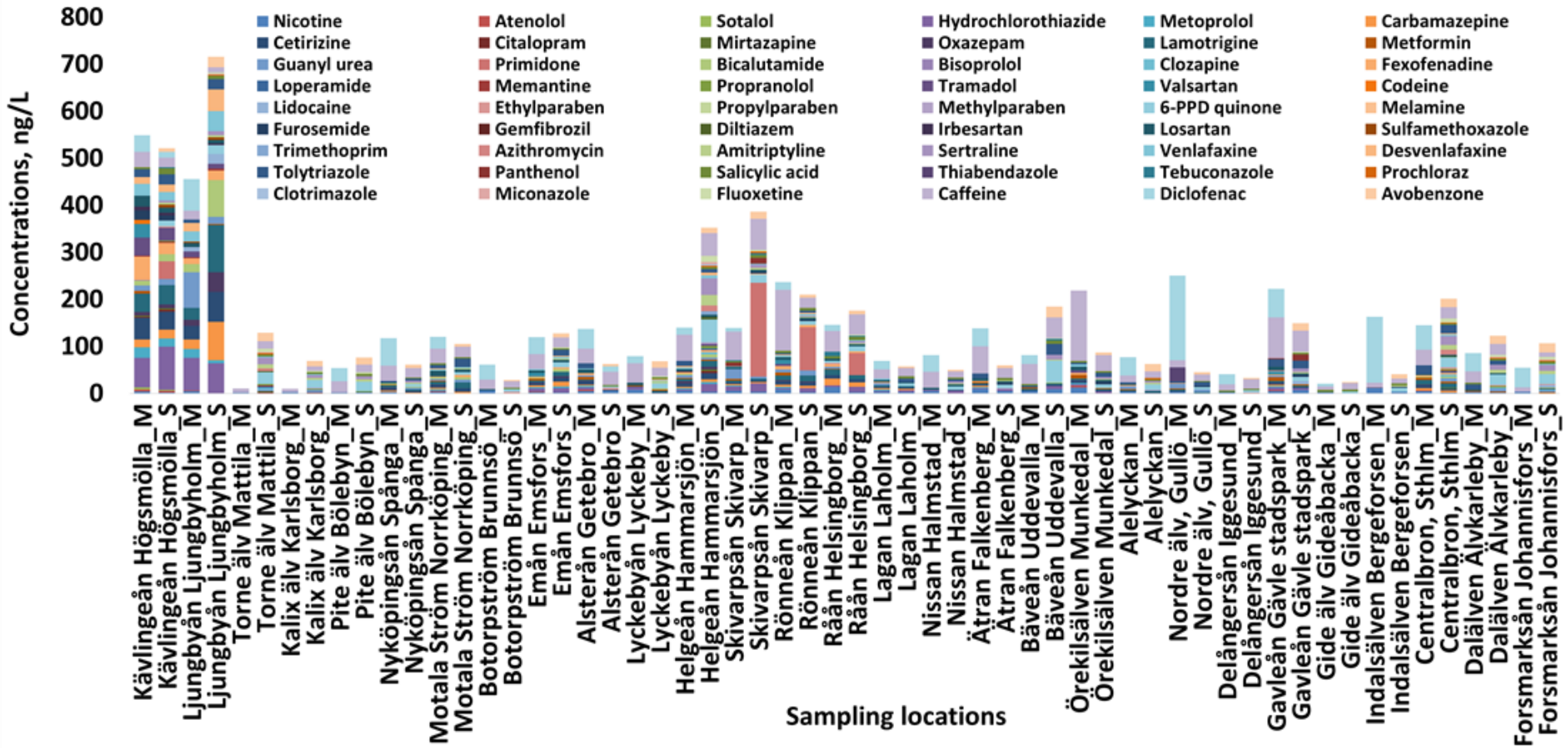


Figure 3. Cumulative concentrations of detected OMPs in water samples collected during May (M) and Autumn (S) 2023. Autumn samples were collected in September (n=21), October (n=11) and November (n=2).

Occurrence of PFASs in the surface water

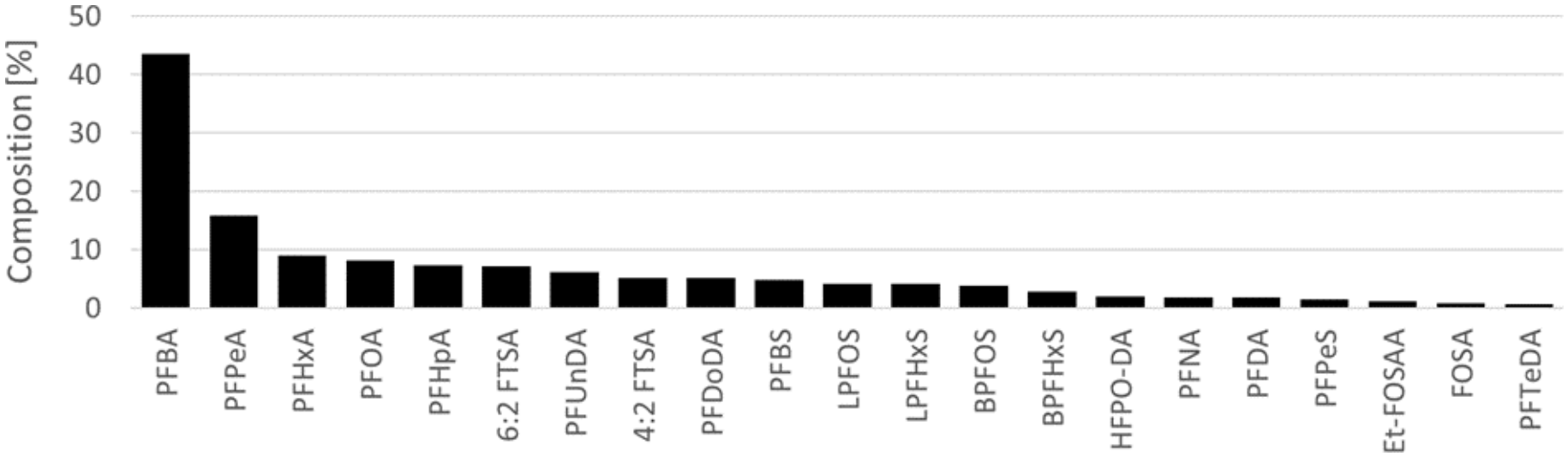


Figure 4. Average PFAS composition [% of ∑PFAS] in water sampled during May and Autumn 2023

Occurrence of PFASs in the surface water

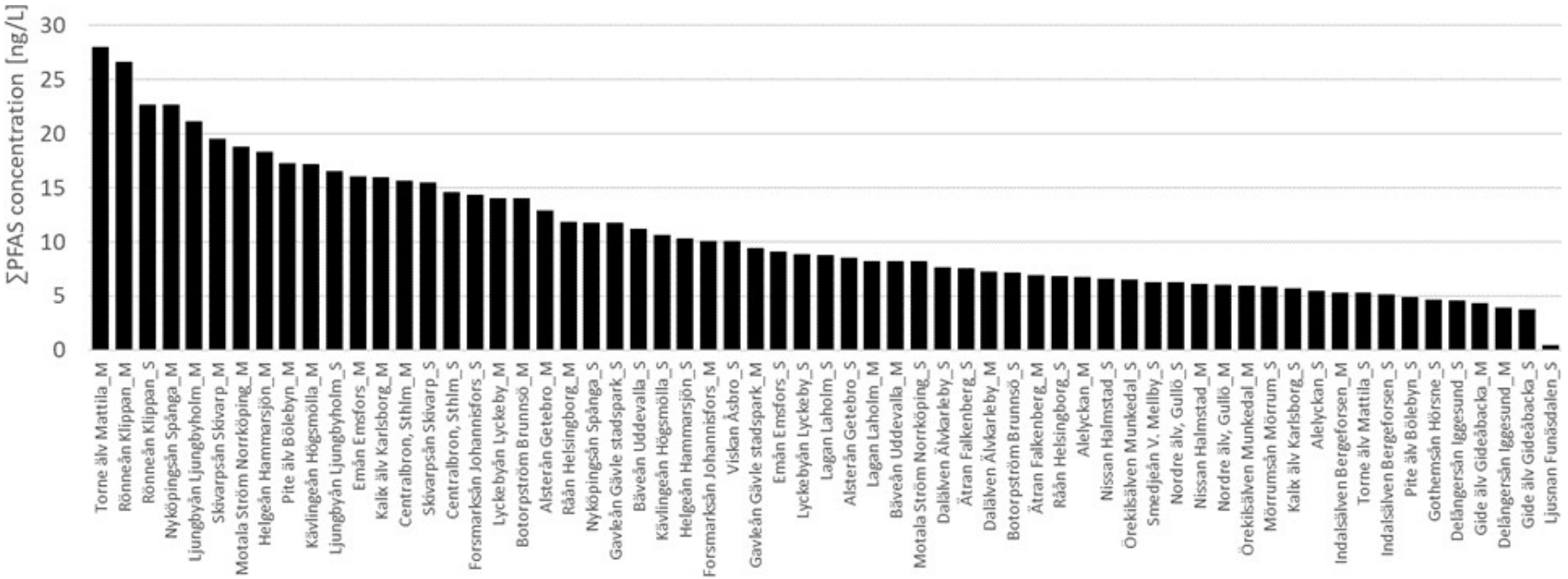


Figure 5. Concentrations of detected ∑PFAS in water sampled during May (M) and Autumn (S) 2023. Autumn samples were collected in September, October or November

Occurrence of pesticides in the surface water

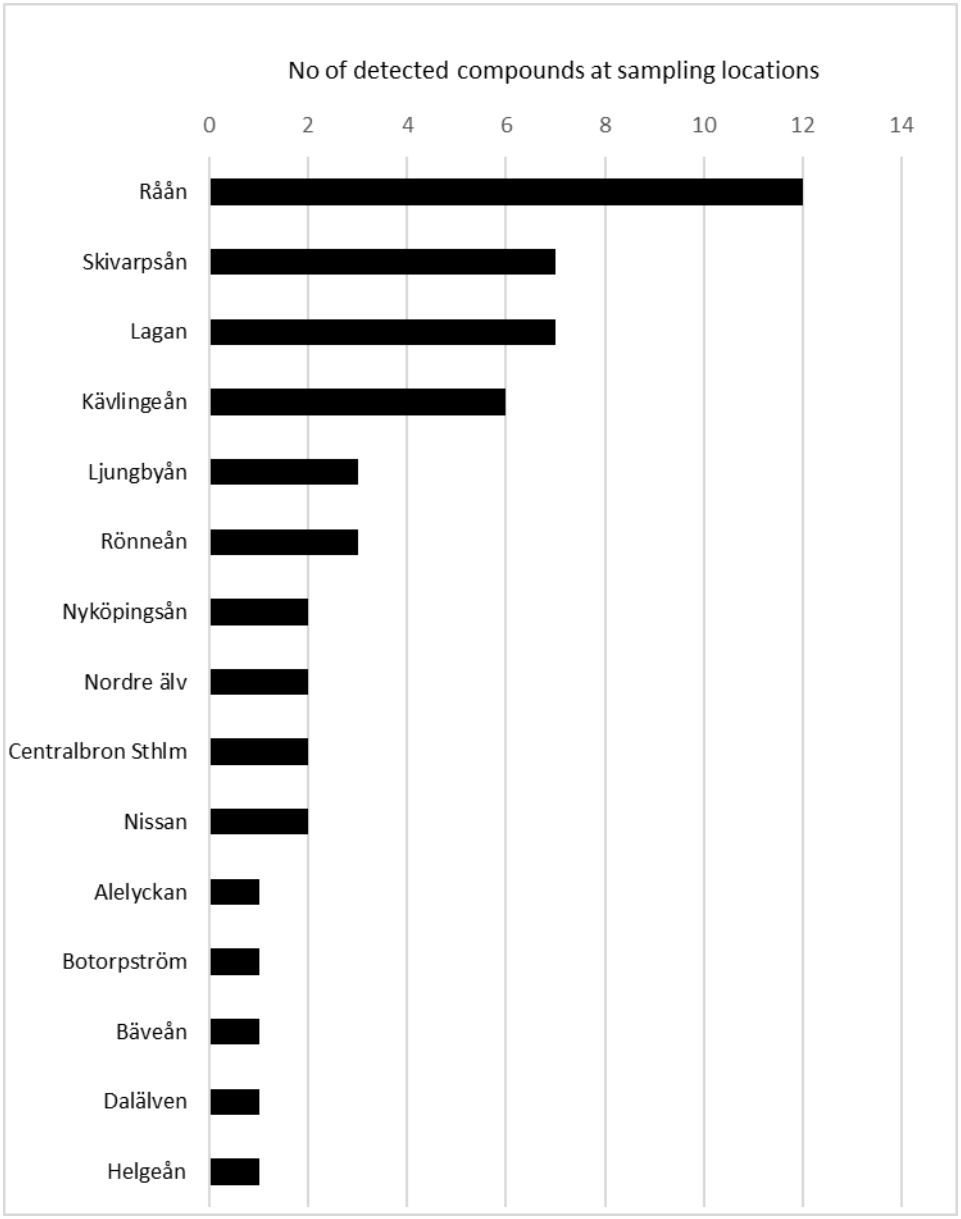


Figure 6. Number of detected pesticides in water samples collected during May 2023.

Occurrence of pesticides in the surface water

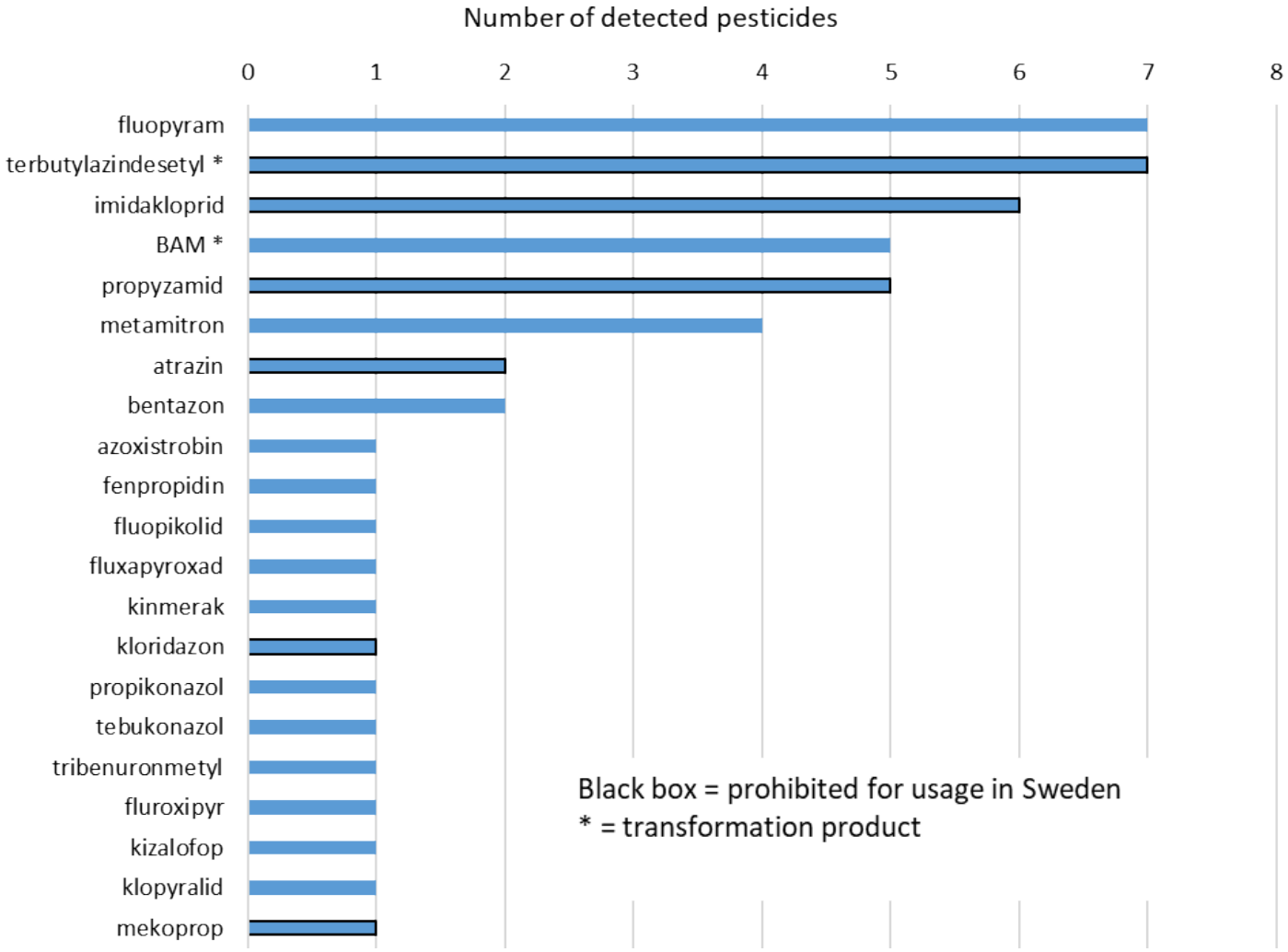


Figure 7. Number of detections of specific pesticides in water samples collected during May 2023.

Occurrence of pesticides in the surface water

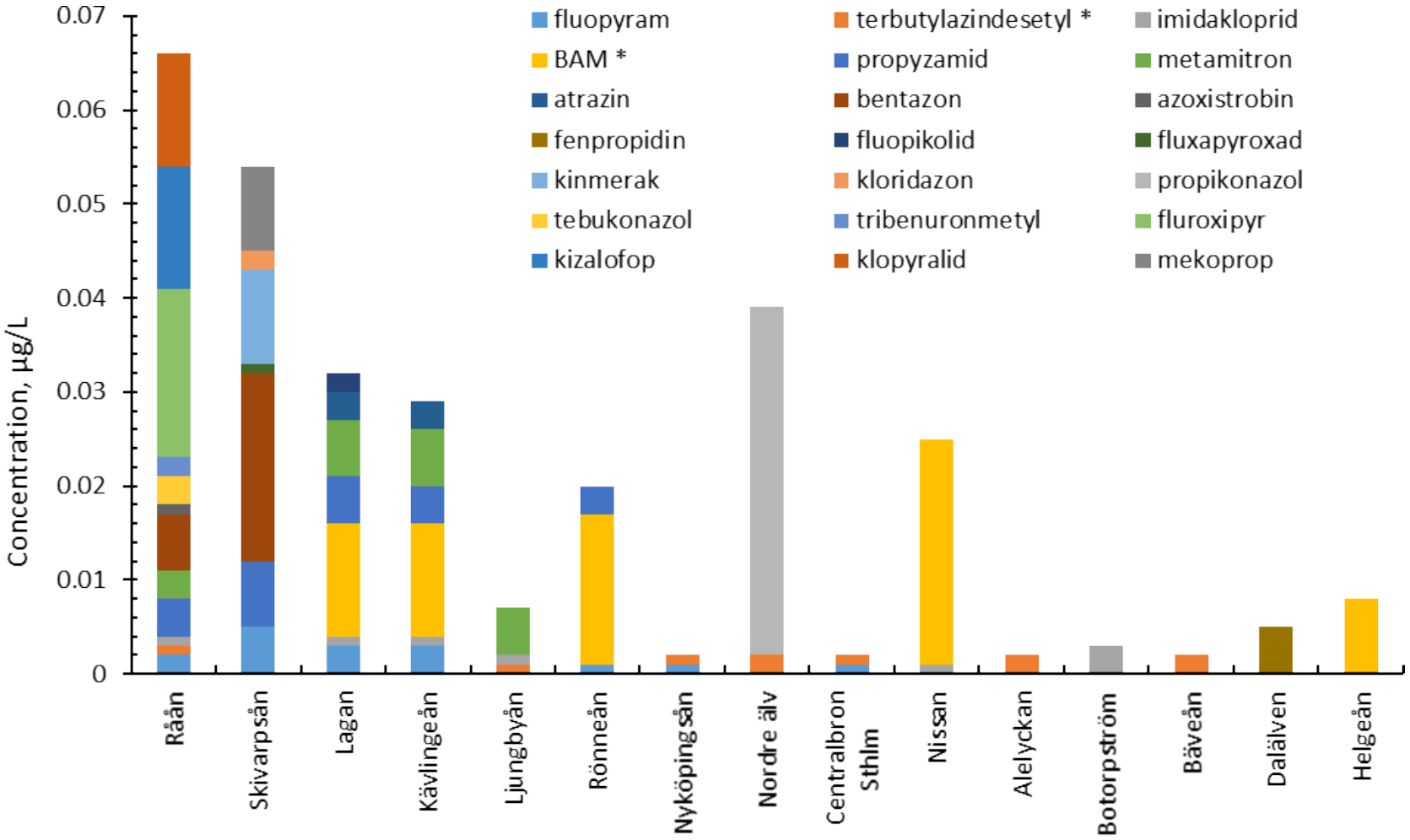
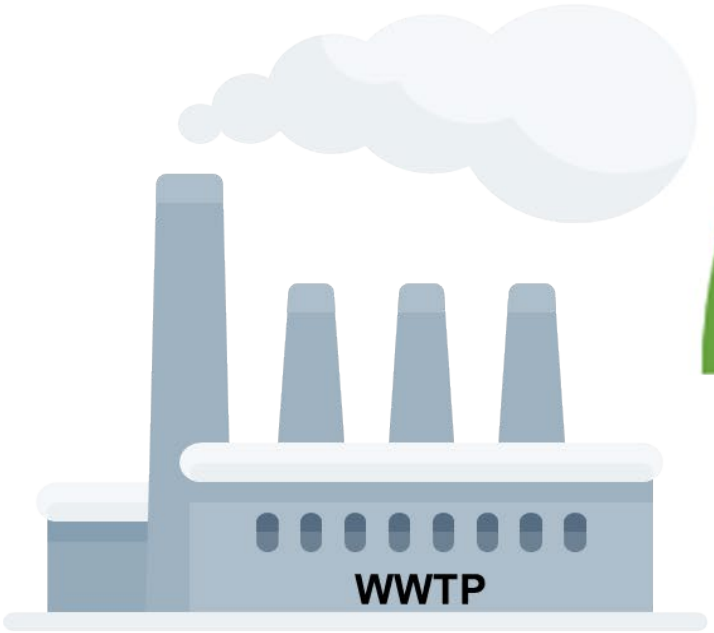
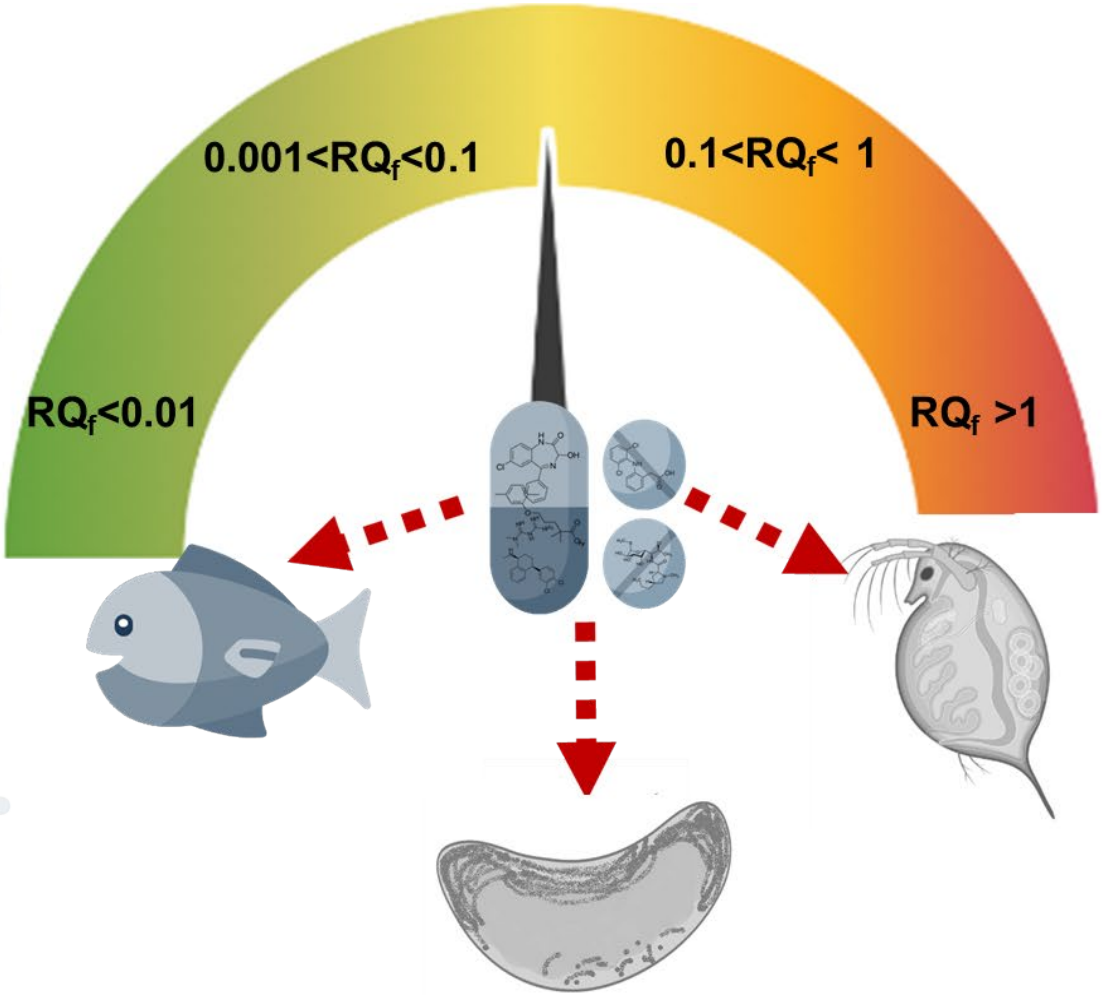


Figure 8. Total concentration of detected pesticides in water samples collected in May 2023.

Effects of OMPs on living organisms





ELSEVIER

Journal of Hazardous Materials
Volume 429, 5 May 2022, 128302

Research Paper

Risk-based screening for prioritisation of organic micropollutants in Swedish freshwater

Romain Figuière [a 1], Sylvia Waara [b], Lutz Ahrens [c], Oksana Golovko [c]

Conclusion

- In total 98 out of 249 different chemicals were found in water samples above LOQs

- The most abundant OMPs were: caffeine (100%), 1,4-dioxane (100%), diethyltoluamide (DEET) (89%), nicotine (75%), salicylic acid (68%), PFOA (98%), PFPeA (97%), BPFOS (95%), PFHpA (94%), PFHxA (89%), PFNA (95%).

- The current annual average (AA) Environmental Quality Standard (EQS) for inland surface waters for:

diclofenac (0.1 µg/L) was exceeded at 2 out of 34 sites.

PFOS (0.00065 µg/L) was exceeded at almost half of the sites (14 out of 34).

Recommendations:

- Continued monitoring and research on OMPs

- Further experimental data is necessary to evaluate the fate of OMPs in both water and sediment

- Comprehensive assessments of the associated health risks

- Managing OMP pollution

SLU

Report | 2023 | Open access

Environmental monitoring of organic micropollutants and PFAS in river outlets

Golovko, Oksana; Skrobonja, Aleksandra; Ahrens, Lutz; Wiberg, Karin

Abstract

Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten) sees a need to increase knowledge about the presence of organic micropollutants (OMPs) in the water environment. The need for monitoring applies particularly to the presence of per- and polyfluoroalkyl substances (PFAS), but also other persistent substances such as drug residues, pesticides and industrial chemicals.

A range of potentially harmful OMPs, such as pharmaceuticals, personal care products, industrial chemicals and pesticides, have been detected in surface water [1, 2]. OMPs detected in the surface water can lead to a variety of concerns for human and ecosystem health, including endocrine disruption, antibiotic resistance, and developmental disorders [2-4].

In Sweden, there are several water bodies where concentrations of PFOS or the sum of 11 PFAS are exceeding current guideline values or environmental quality standards (EQS) (according to HVMFS 2019:25). Therefore, there is a need to perform monitoring of PFAS in Swedish aquatic environment.

The purpose of the current project was to monitor rivers for extended chemical analyzes in order to

- increase knowledge about the presence of OMPs in the water environment, and
- strengthen monitoring resulting from the water management regulation.

Report | 2024 | Open access

Environmental monitoring of organic micropollutants, PFAS and pesticides in Swedish river outlets 2023

Golovko, Oksana; Skrobonja, Aleksandra; Ahrens, Lutz; Jernstedt, Henrik; Wiberg, Karin

Abstract

The Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten) recognizes the imperative to enhance understanding of organic micropollutants (OMPs) within aquatic environments [1, 2]. This necessity for monitoring is particularly pronounced concerning per- and polyfluoroalkyl substances (PFAS), as well as other persistent substances like pharmaceutical residues, pesticides, industrial chemicals and personal care products. Their presence in surface waters poses diverse concerns for both human health and ecosystem vitality [2-4]. The objective of the present project was to conduct comprehensive chemical analyses in rivers, with the aim to enhance comprehension of OMP presence in aquatic environments.

Thank you for attention

Oksana.Golovko@slu.se

https://www.slu.se/en/ew-cv/oksana-golovko/