



# SCIENCE FOR ENVIRONMENT POLICY

## Identifying chemicals of emerging concern in the marine environment, Germany



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**Contact:**

[annette.fliedner@ime.fraunhofer.de](mailto:annette.fliedner@ime.fraunhofer.de)

**Contamination of the marine environment is an issue of growing concern. In the EU, Member States are required to monitor contaminant levels in their marine region, and to support efforts to achieve and maintain the good environmental status of marine waters under the Marine Strategy Framework Directive.** A study using samples of mussels and fish has explored which chemicals of emerging concern (CEC) are relevant in the German coastal environment and identified a need for greater monitoring of emerging flame retardants and long-chain perfluoroalkyl substances in the North and Baltic Seas.

Marine environments are contaminated by substances such as industrial chemicals, pesticides, pharmaceuticals and heavy metals. The [International Council for the Exploration of the Sea \(ICES\)](#) recently identified eight substance groups of emerging concern based on their toxicity and tendency to persist and bioaccumulate in the marine environment.

These groups comprise Dechlorane Plus and alternative brominated flame retardants (aBFR) (used as flame retardants (FR) in consumer products and building materials), organo-phosphorous flame retardants (OPFR), antifoulants, per- and polyfluoroalkyl substances (PFAS) (some used for over 60 years for a range of purposes including in industrial coatings and as stain repellants), benzotriazoles (chemicals used in products such as washing and cleaning products), siloxanes (used in many industrial, biomedical and cosmetic applications) and anticorrosion agents. These substances enter the marine environment during their production, use and disposal in various ways, largely via wastewater and atmospheric transport.

This study used biota samples and existing analytical data held by the [German Environmental Specimen Bank \(ESB\)](#) to determine concentrations of four of these groups: dechloranes (including Dechlorane Plus (DP) and Dec 602 and 603), 10 alternative brominated flame retardants, 38 PFAS and three cyclic volatile methyl siloxanes (D4, D5 and D6). The latter compounds are mainly applied in the production of siloxane polymers, while the intentional use of D4 and D5 in wash-off cosmetics has been restricted in the EU since January 2020.

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### Identifying chemicals of emerging concern in the marine environment, Germany (continued)

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The biota samples were from blue mussels (*Mytilus edulis* Complex) and eelpouts (*Zoarces viviparus*) collected at coastal sampling sites in the Lower Saxony Wadden Sea, the Schleswig-Holstein Wadden Sea, and the Baltic Sea Bodden National Park as part of the routine ESB sampling programme over periods of up to 30 years. As benchmarks, the study also included the structurally related compounds 1,5-DPMA, Dec 604 and the DP-degradation products Cl10-antiDP and Cl11-antiDP; TBA, a fungal metabolite of the FR intermediate and fungicide 2,4,6-tribromophenol; the legacy substances perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA); and six polybrominated diphenylethers (PBDEs; old FRs listed, like PFOS, as priority substances under the [Water Framework Directive](#)).

The results showed that, among the emerging FRs, only Dec 602 was detected in all samples, and many others were constantly below the study's limit of quantification. Despite being restricted worldwide since 2009, the legacy compounds PFOS and PBDEs still dominated in most of the samples. PFAS concentrations were usually higher in samples from the North Sea sites compared to samples from the Baltic Sea. While temporal trends were weak, and not always steady, increasing trends over time were detected for three polyfluoroalkyl substances, PFNA, PFDA and PFDoDA, at some sites. Concentrations of PFUnDA were higher in recent years, but the data were not sufficient for a proper trend analysis.

Based on the results, the researchers suggest that the emerging flame retardant Dec 602 and four long-chain PFAS (PFNA, PFDA, PFUnDA and PFDoDA) should be further considered for regional and sub-regional monitoring in the North and Baltic Seas.

1. Commission Regulation (EU) 2018/35 of 10 January 2018 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards octamethylcyclotetrasiloxane ('D4') and decamethylcyclopentasiloxane ('D5'). Official Journal of the European Union L 69/7-12: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0035&from=DE>