

Monitoring of priority substances in German freshwater fish of different age, size and trophic levels

G. Radermacher¹, H. Rüdell¹, N. Lohmann², P. Lepom³ and A. Duffek³

¹Fraunhofer Institute for Molecular Biology and Applied Ecology IME, Auf dem Aberg 1,
57392 Schmallenberg, Germany

²Eurofins GfA Lab Service GmbH

³German Environment Agency

E-mail contact: georg.radermacher@ime.fraunhofer.de

Beside monitoring of chemicals in the water phase, the European Water Framework Directive (WFD) also requires the quantification of certain priority substances (PS) in fish tissue. With the WFD daughter directive 2013/39/EU additional compounds were categorized as PS and for several of these environmental quality standards (EQSs) for biota have been introduced. This project was initiated to support the implementation of the WFD biota monitoring by comparative investigations and to propose an appropriate fish monitoring strategy which integrates all WFD monitoring requirements (e.g., compliance testing for human health- and secondary poisoning of wildlife-based EQS, comparability of monitoring data between sites and trend monitoring).

To this end a dedicated sampling campaign was designed which covered six different freshwater sites. Fish were caught at sampling sites in the rivers Weser, Havel, Elbe and Moselle, in Lake Starnberg and a lagoon at the Baltic Sea. At each site three of the fish species were sampled that are listed in a German guidance document (RAKON IV.3): bream, chub, perch, roach and whitefish. During each sampling campaign it was tried to obtain twenty fish per species from two different age classes allowing multiple comparisons. Fish were dissected into fillets and carcasses, which were processed separately. Biometric data (e.g. fish size, weight, sex) were documented. Age was determined by examination of scales and trophic position by ¹⁵N/¹³C stable isotope measurements. Total mercury concentrations were determined for both individual fish fillets and carcasses as well as for age-grouped pools of both. Organic PS and fat contents were determined only in the fish fillet and carcass pools. Data are evaluated to derive recommendations for an optimal WFD biota monitoring and reporting. An important aspect is how biota burdens of PS are influenced by sample choice: Which fish species are most appropriate? Which age/size class is appropriate? Which tissue should be chosen? Fish of which trophic level should be caught? In this contribution, influences of these factors on fish levels of PS (e.g., mercury, PFOS, HCB, HBCDD) will be evaluated. It will also be assessed whether the data allow deriving factors for the conversion of whole body to fillet monitoring data and vice versa. Another aspect is to test whether the normalization of biota monitoring data (e.g., lipid normalization, trophic level normalization) enhances comparability.