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PCDFs/PCDDs and dl-PCBs in fish from the Sulejów Reservoir, Central Poland: contamination levels, trends and species specific accumulation

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Introduction

The primary objective of this research was to determine the polychlorinated dibenzo-*p*-dioxins (PCDD), polychlorinated dibenzofurans (PCDF) and dioxon-like polychlorinated biphenyls (dl-PCB) concentrations in bream (*Abramis brama*) and roach (*Rutilus rutilus*) muscle tissues collected from the different sites along Sulejów Reservoir (Central Poland). Both fish species are common in European freshwaters and represent major fish resources for recreational and commercial fisheries in eutrophic lowland waters. The distribution of PCDDs/PCDFs and PCBs congener were compared between the samples and discussed with respect to fresh and dry matter content, lipid content and possible sources of contamination and life-trait strategies of the two species. To our knowledge, no data on levels of PCDD/PCDF and dl-PCB concentrations in this region are present in literature.

Study area and Sampling

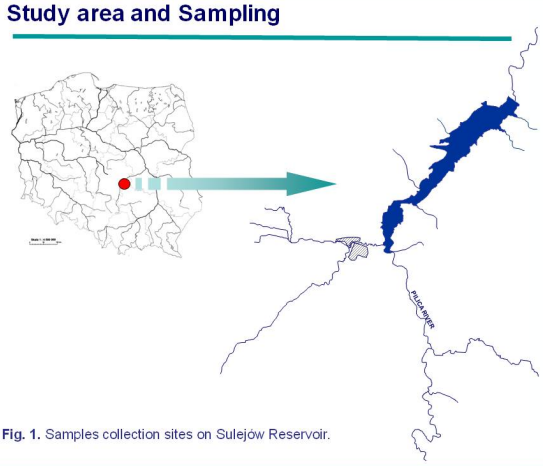
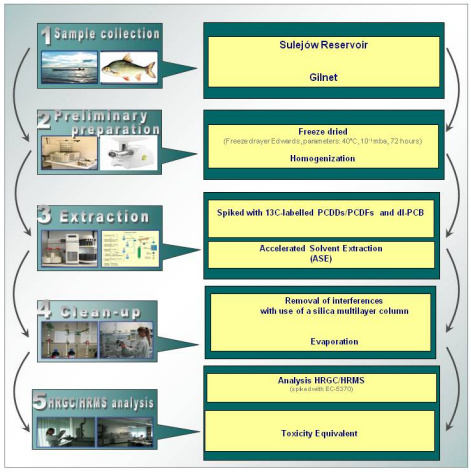


Fig. 1. Samples collection sites on Sulejów Reservoir.

Methods



Results

Bream (*Abamis brama*)

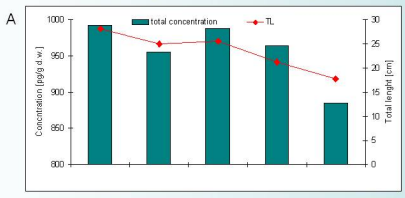


Fig. 2. Total concentration of PCDD, PCDF and dl-PCBs (A) and toxic equivalent quantities (WHO-TEQ) (B) compared with the total lenght (TL) of analyzed bream.

Roach (*Rutilus rutilus*)

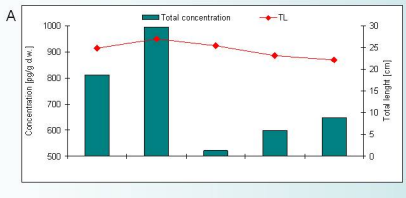


Fig. 3. Total concentration of PCDD, PCDF and dl-PCBs (A) and toxic equivalent quantities (WHO-TEQ) (B) compared with the total lenght (TL) of analyzed roach.

Discussion and Conclusions

- Total concentrations of PCDDs/PCDF and dl-PCBs ranged from 885.43 to 988.71 pg/g of d.w. for roach (*Rutilus rutilus*) and from 521.69 to 994.94 pg/g of d.w. for bream (*Abramis brama*) (Fig. 2a and 3A);
- Toxic equivalent quantities (WHO-TEQ) ranged from 1.58 pg of WHO-TEQ/g of d.w in roach to 1.94 pg of WHO-TEQ/g of d.w. in bream. The WHO-TEQ values calculated to fresh fish weight varied between 0.23 – 0.28 pg of WHO-TEQ/g of f.w. for roach; and 0.17 – 0.27 pg of WHO-TEQ/g of f.w. for bream (Fig. 2B and 3B);
- Obtained values did not differ statistically and were several times lower then the WHO-TEQ limits stated by Commission Regulation (EC), no 199/2006 of 3 February 2006;
- Both species are eurytopic, tolerant fish and generally compete for similar food resources what would explain similar levels of tissues contamination. Observed small differences in WHO-TEQ levels (average values: 0.22 and 0.24 for bream and roach respectively) could be related to small diet shifts or age of sampled fish. Roach mostly feeds on molluscs (*Dreissena polimorpha*) and on soft submersed macrophytes (genus *Elodea* or *Ceratophyllum*) while bream tends to utilize insects larvae especially *Chironomidae*. Bream grows more rapidly then roach, which specimens (average TL - 22.7 cm) were 2-3 years longer exposed to the contamination than bream (average TL - 23.7 cm).

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