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Passive sampling in support of chemical monitoring in biota

Case study in Joint Danube Survey JDS4

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Objectives

- Compare levels of hydrophobic organic substances (HOC) in aqueous passive samplers and biota on lipid basis
- Show dependence of the level in PS and biota on hydrophobicity
- Indicate effect of trophic level on HOC levels in biota
- Demonstrate applicability of a tiered approach for EQS_{biota} compliance

Passive sampling in Joint Danube Survey JDS4



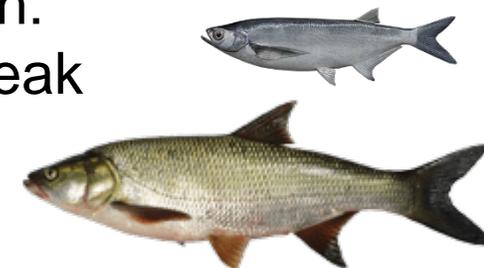
9 supersites in the Danube

Deployment: May-August 2019

Stationary deployment

Hydrophobic compounds:
silicone sampler

Sampled fish:
Common bleak
Asp (site 2)



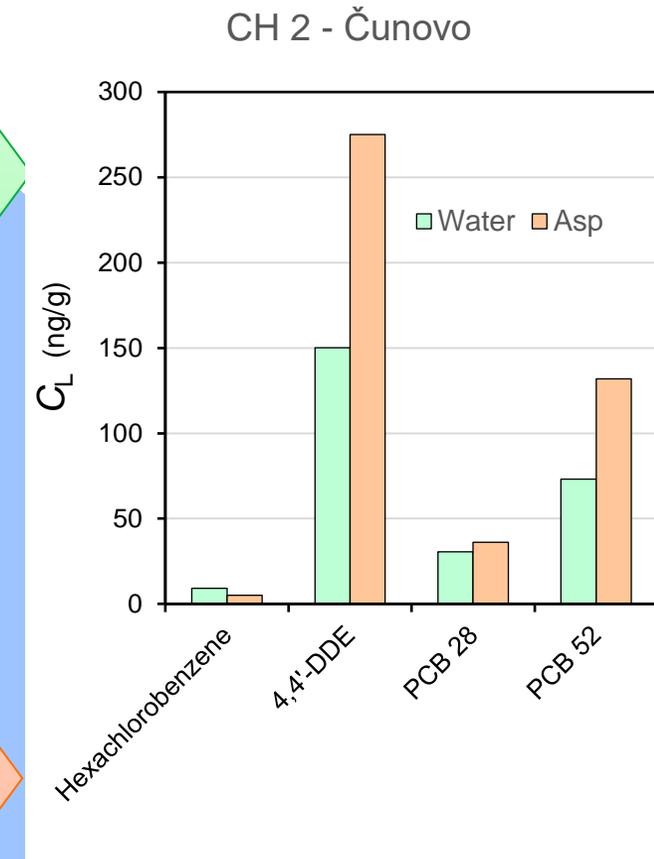
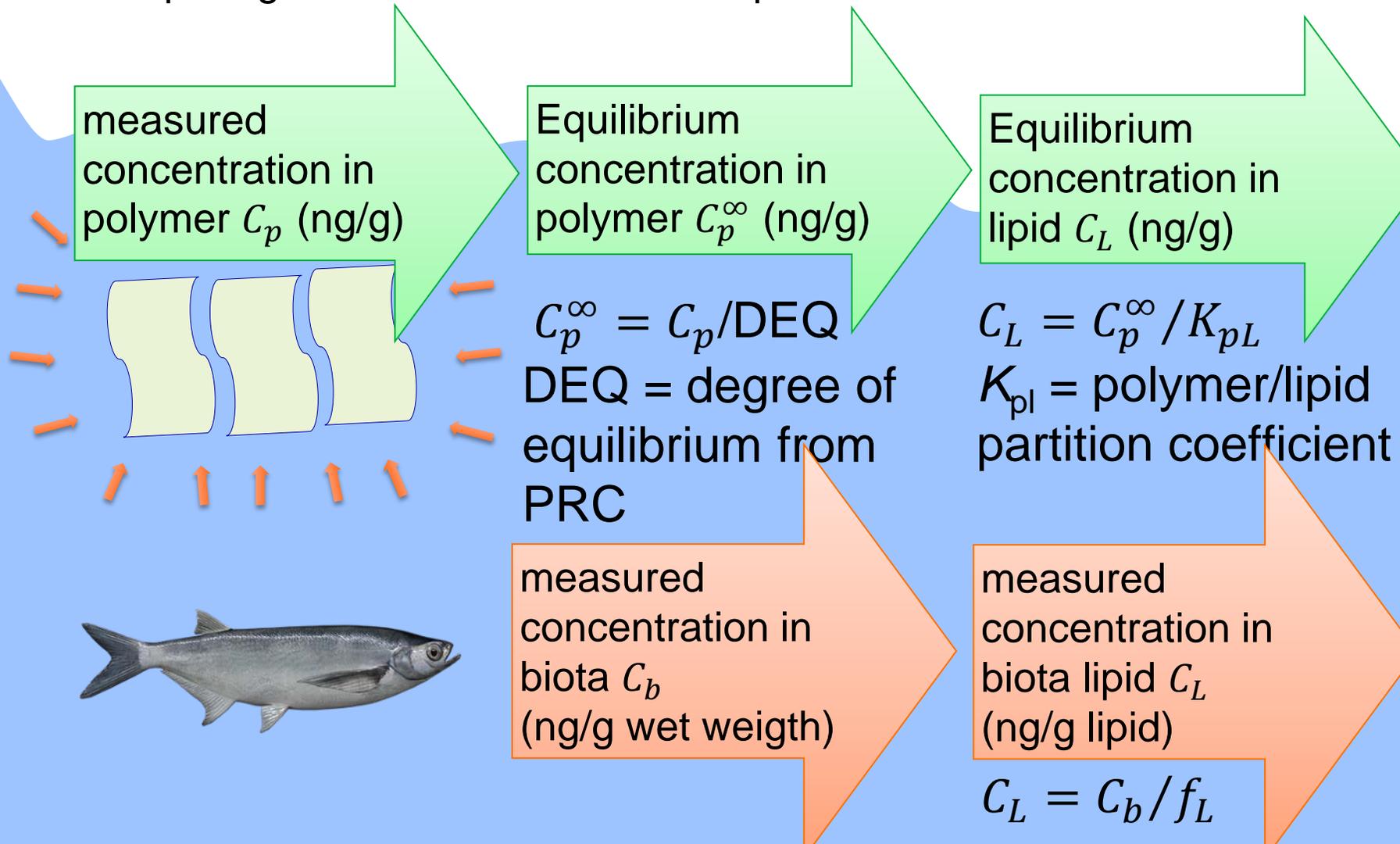
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Passive sampling



Hydrophobic substances in passive samplers and biota

Comparing data after conversion to lipid basis

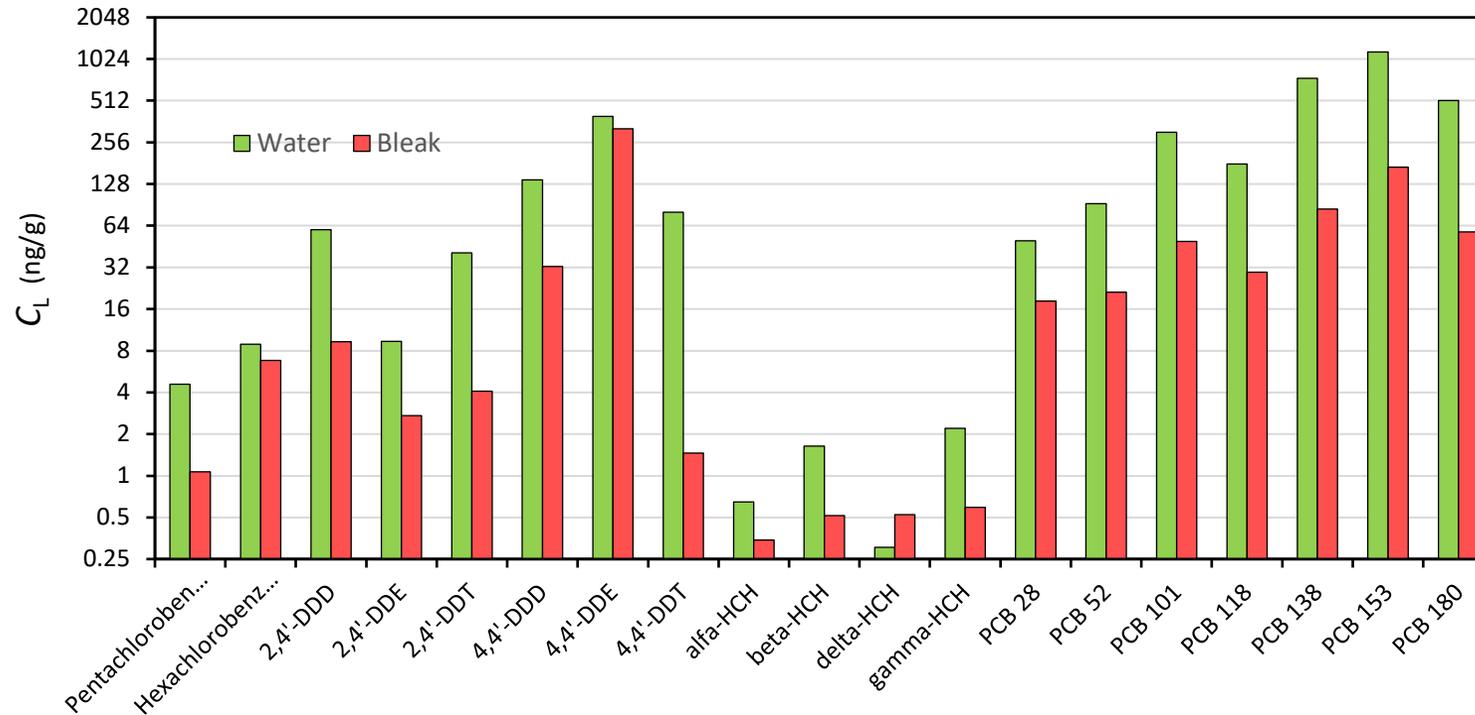


Comparing passive sampler and fish on lipid basis



Bleak, Trophic Level : 2.7 ± 0.29 se

CH 3 - Budapest downstream

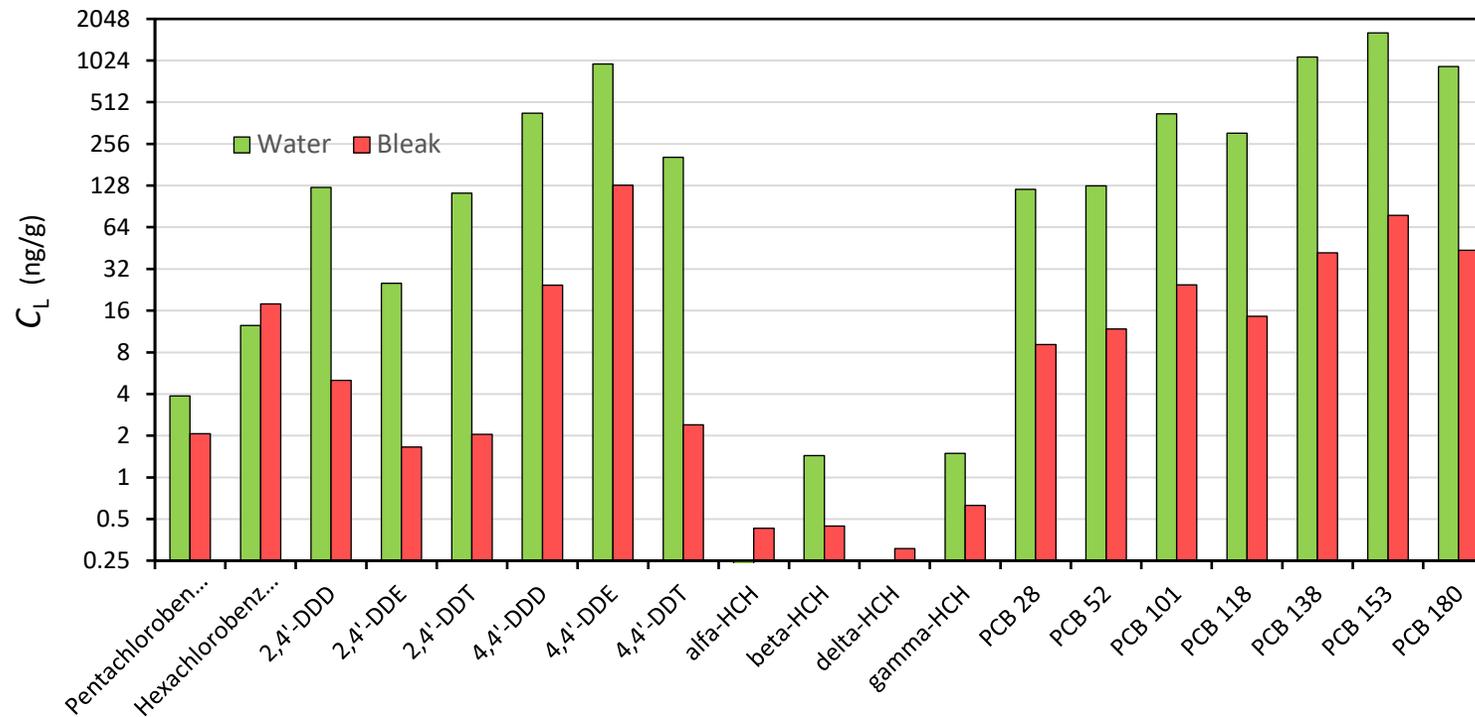


Comparing passive sampler and fish on lipid basis



Bleak, Trophic Level : 2.7 ± 0.29 se

CH4 - Hercegszanto / Batina / Bezdán

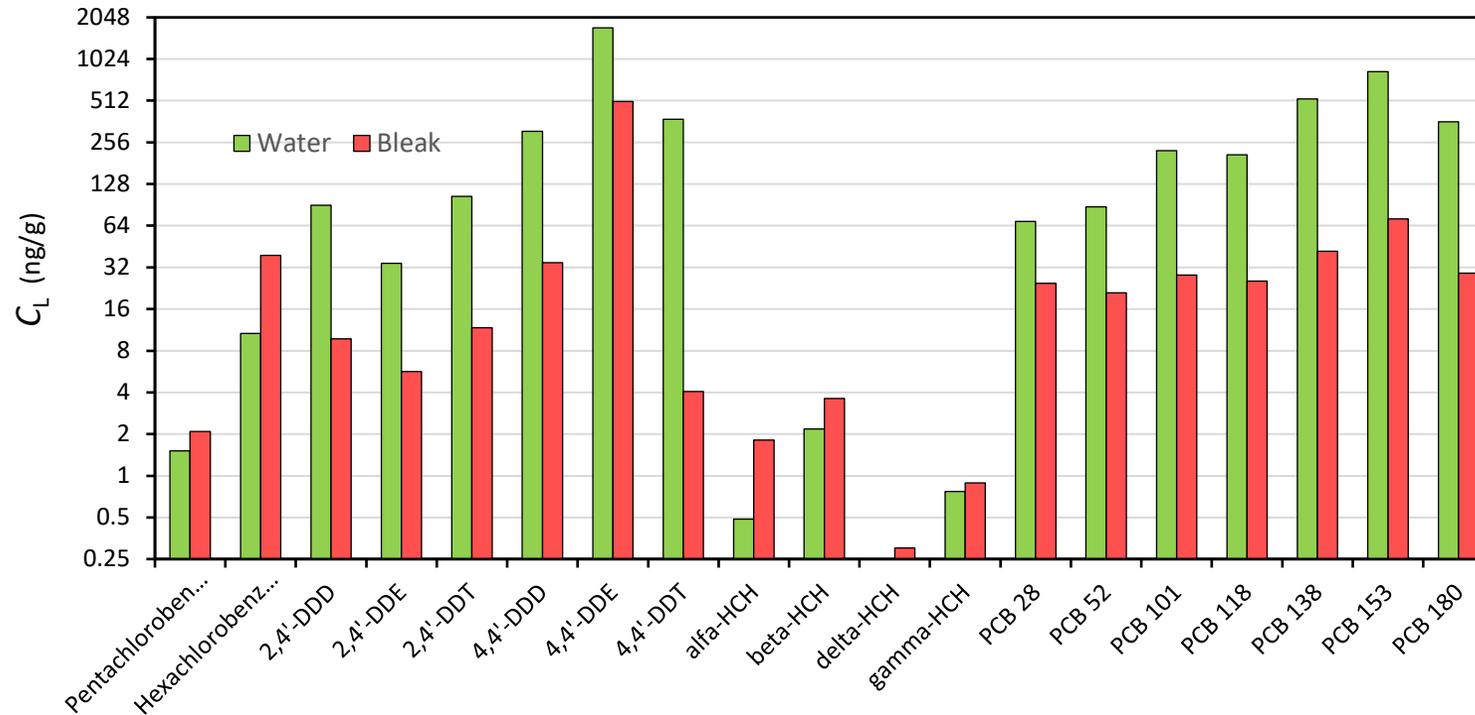


Comparing passive sampler and fish on lipid basis



Bleak, Trophic Level : 2.7 ± 0.29 se

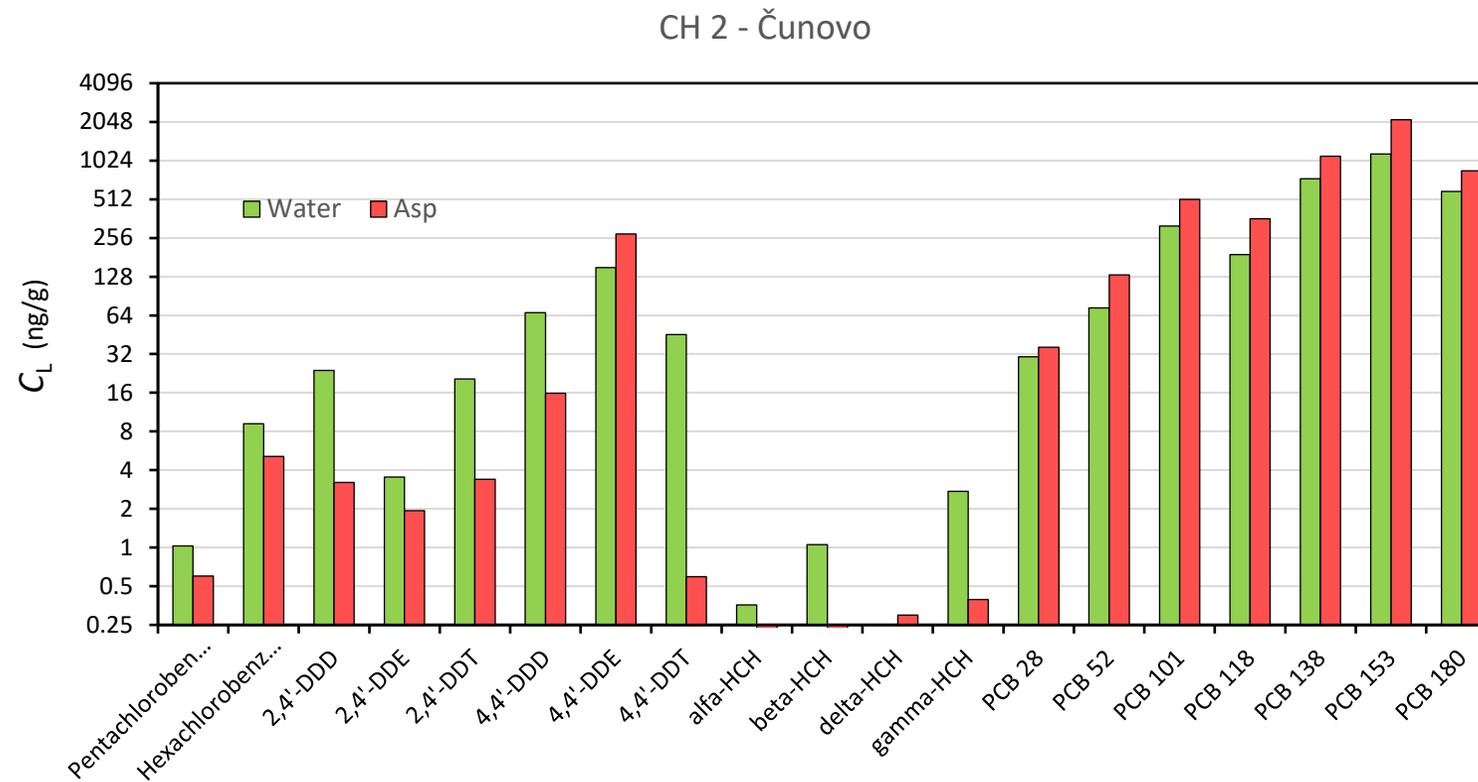
CH 9 - Downstream Ruse/Giurgiu (Marten)



Comparing passive sampler and fish on lipid basis



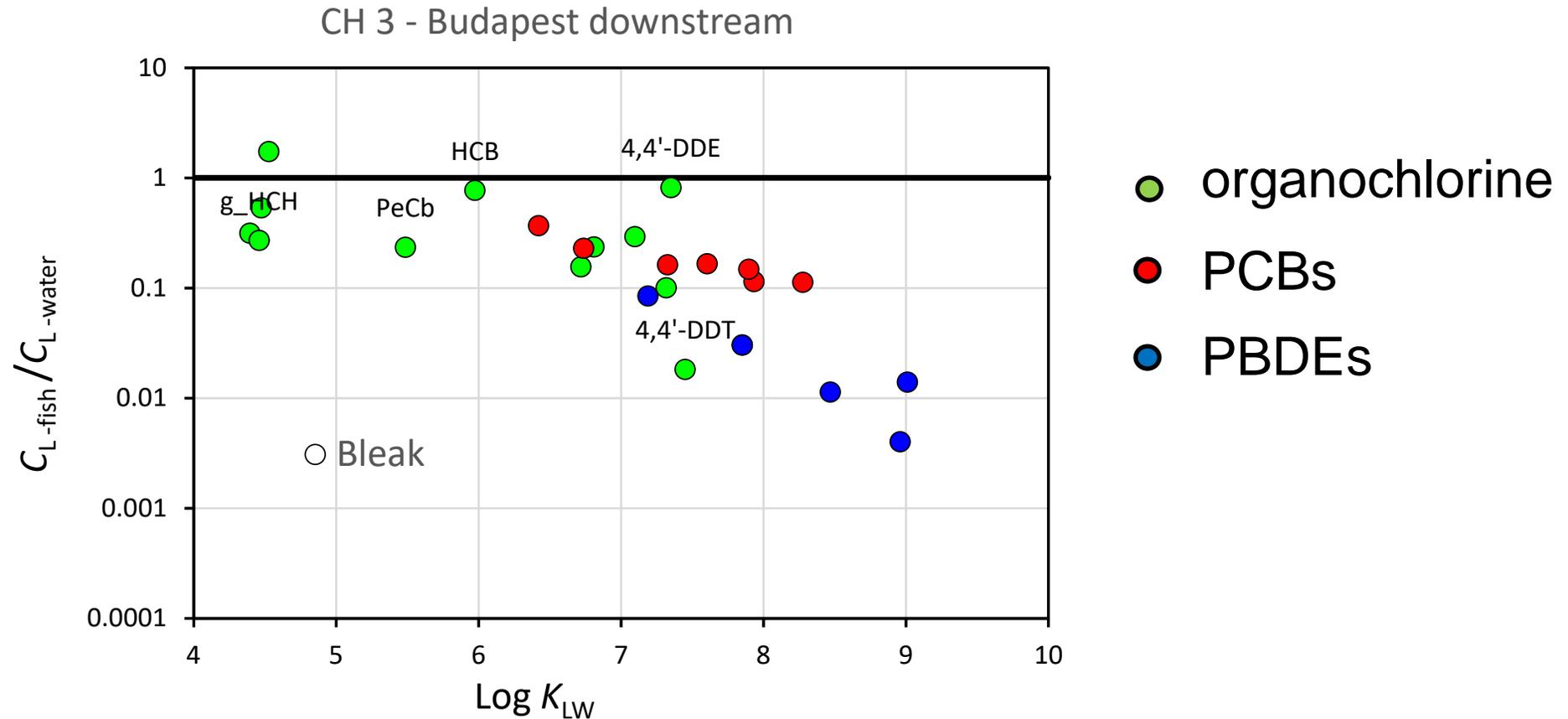
Asp, Trophic Level : 4.5 \pm 0.80 se
www.fishbase.se



Ratio fish/passive sampler as a function of hydrophobicity



Bleak, Trophic Level : 2.7 ±0.29 se

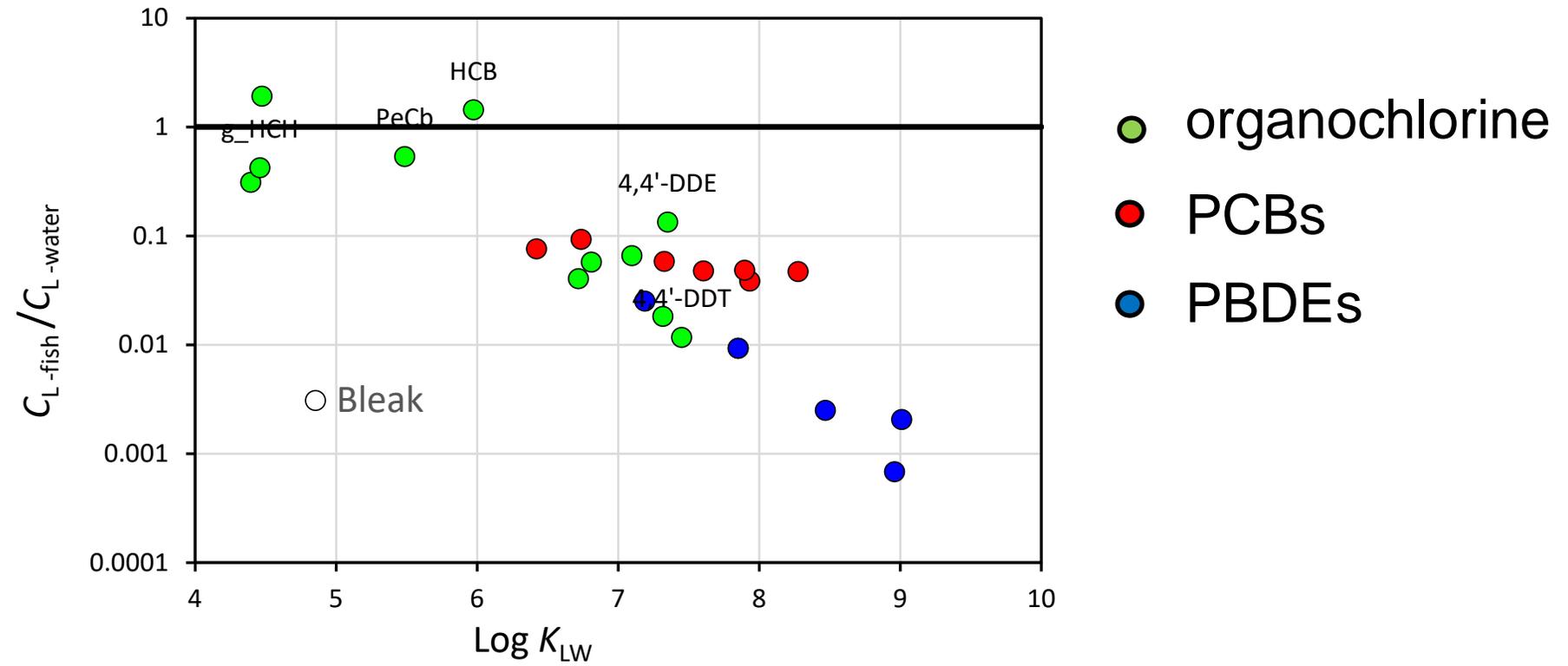


Ratio fish/passive sampler as a function of hydrophobicity



Bleak, Trophic Level : 2.7 ± 0.29 se

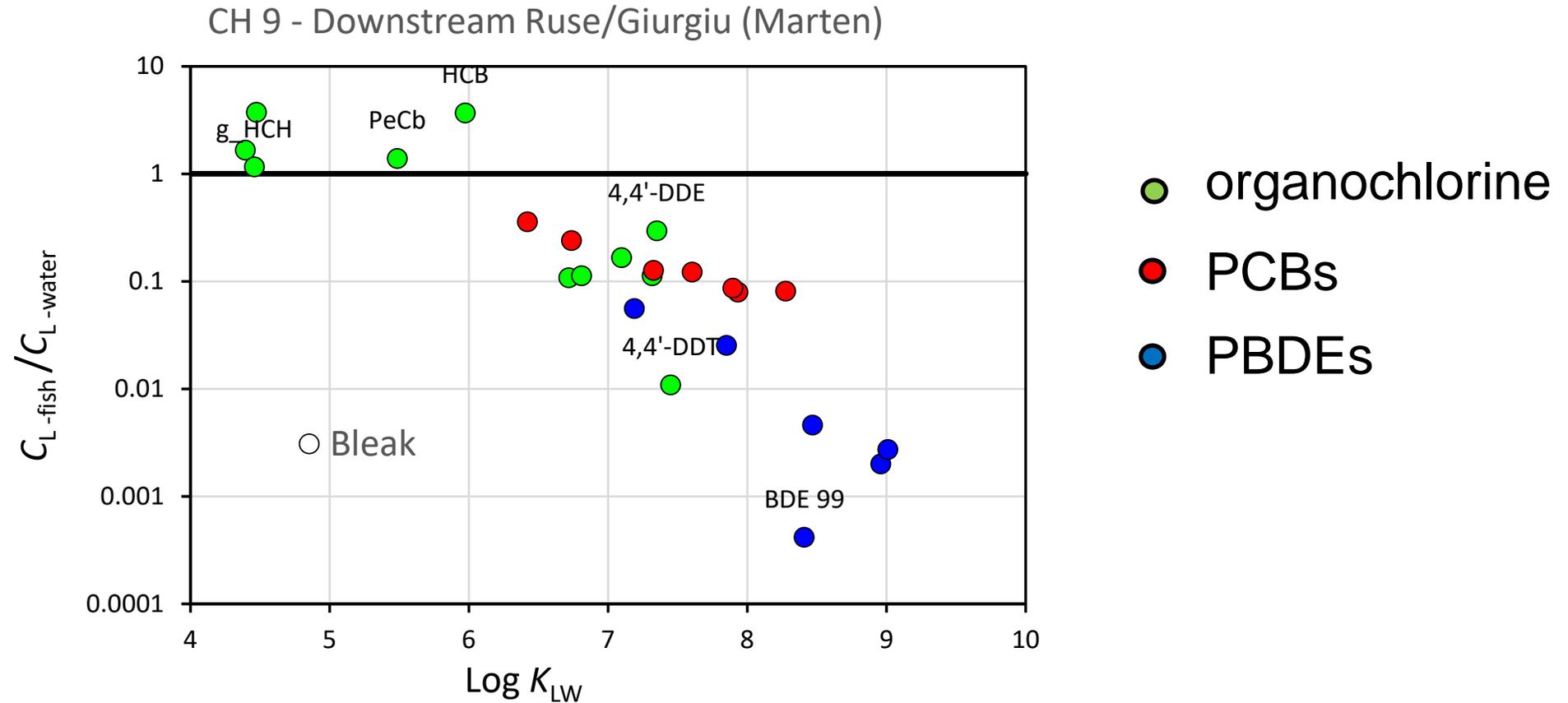
CH4 - Hercegszanto / Batina / Bezdán



Ratio fish/passive sampler as a function of hydrophobicity



Bleak, Trophic Level : 2.7 ± 0.29 se

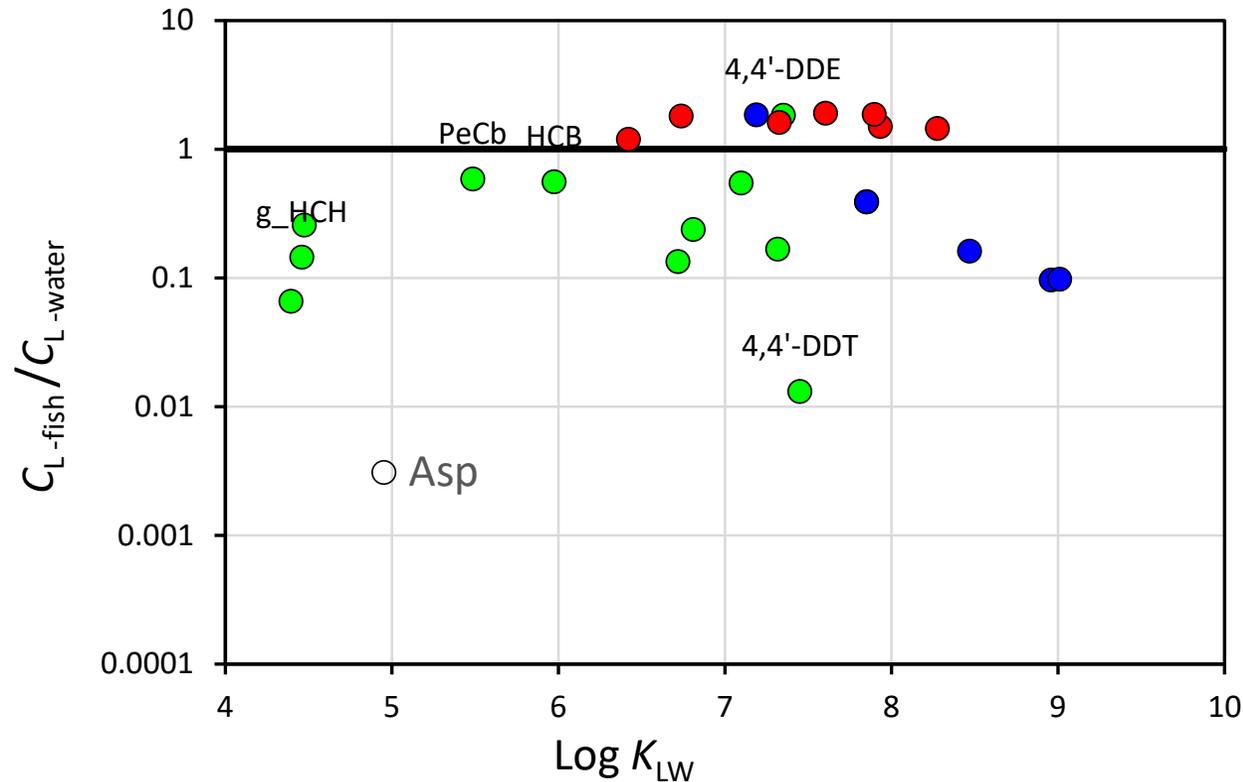


Ratio fish/passive sampler as a function of hydrophobicity



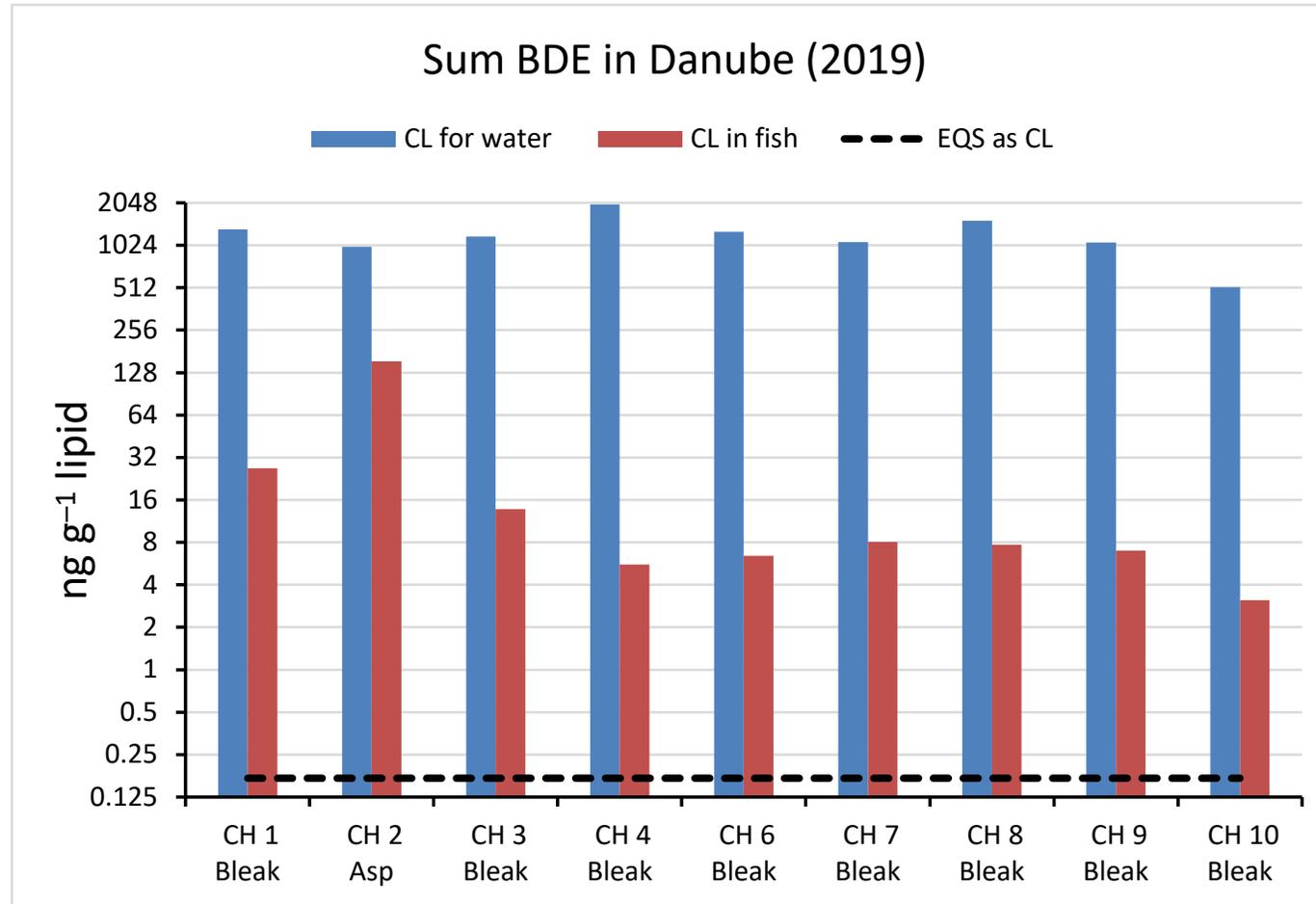
Asp, Trophic Level : 4.5 \pm 0.80 se
www.fishbase.se

CH 2 - Čunovo



A tiered approach to EQS_{biota} compliance assessment

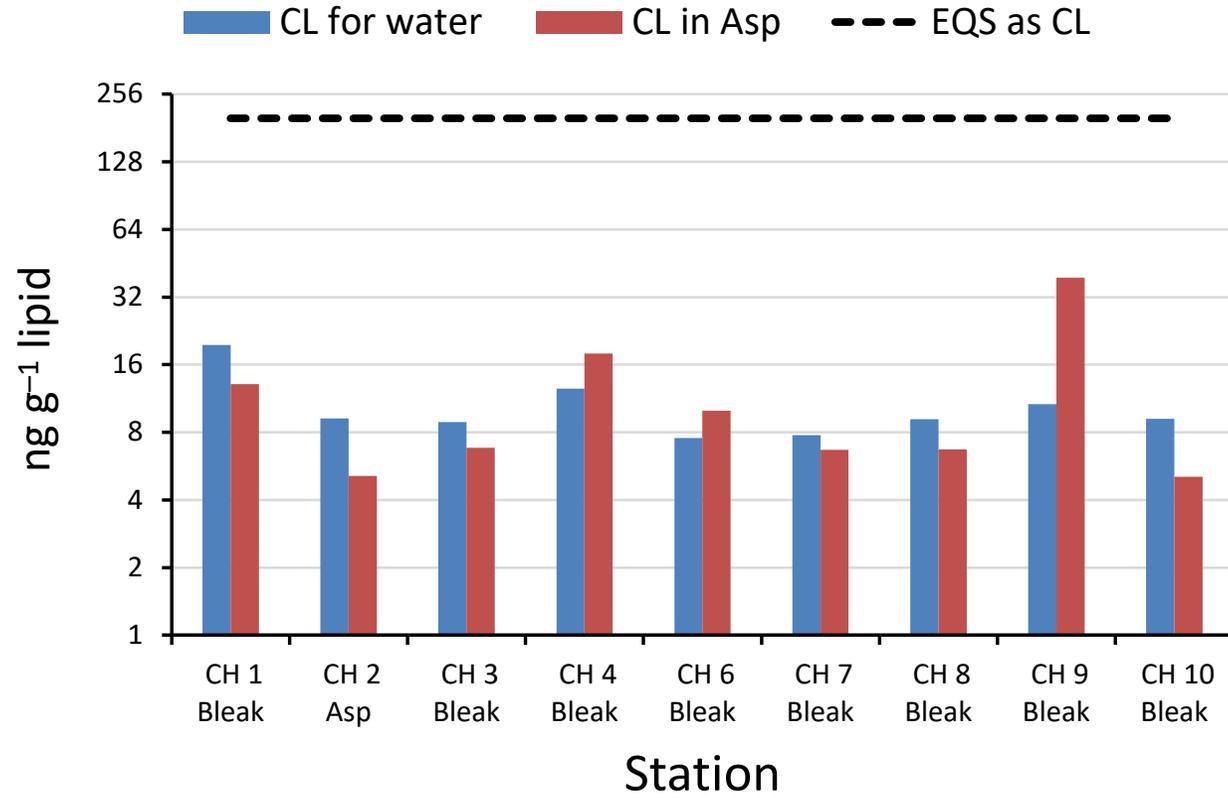
Conversion of EQS_{biota} from wet weight to lipid basis, taking 5% lipid in fish



A tiered approach to EQS_{biota} compliance assessment

Conversion of EQS_{biota} from wet weight to lipid basis, taking 5% lipid in fish

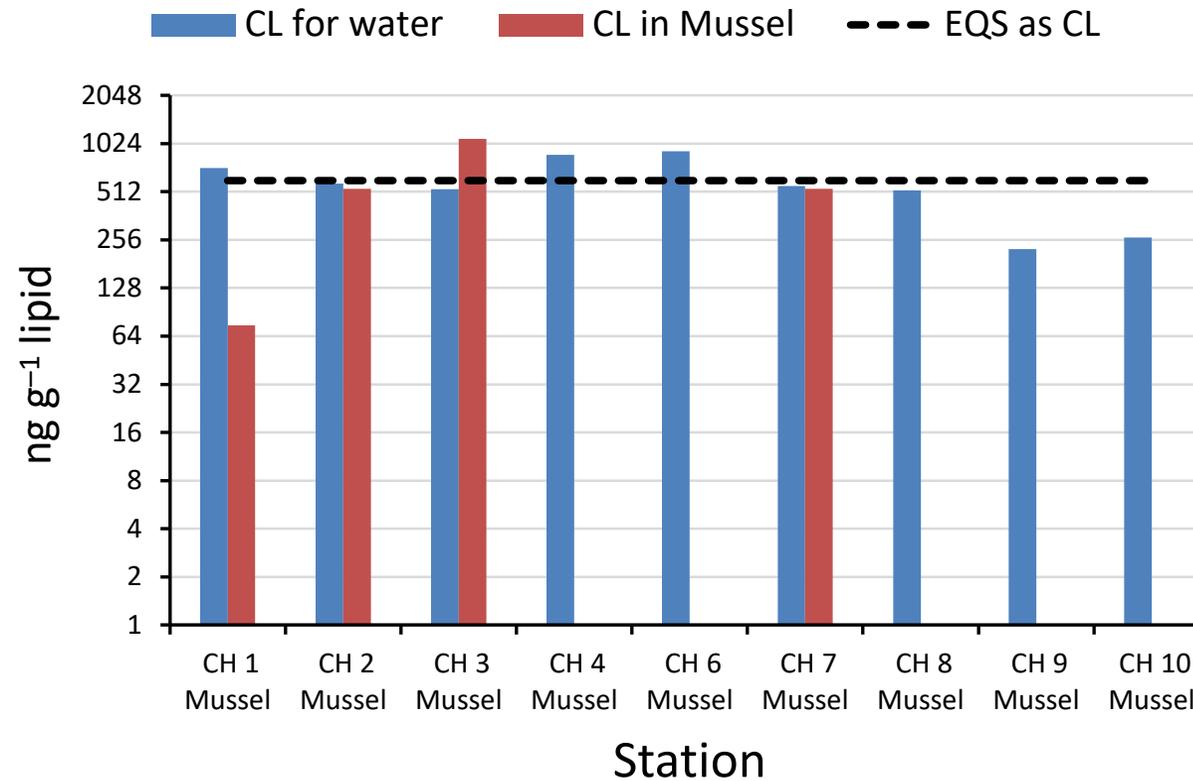
Hexachlorobenzene in Danube (2019)



A tiered approach to EQS_{biota} compliance assessment

Conversion of EQS_{biota} from wet weight to lipid basis, taking 1% lipid in molluscs

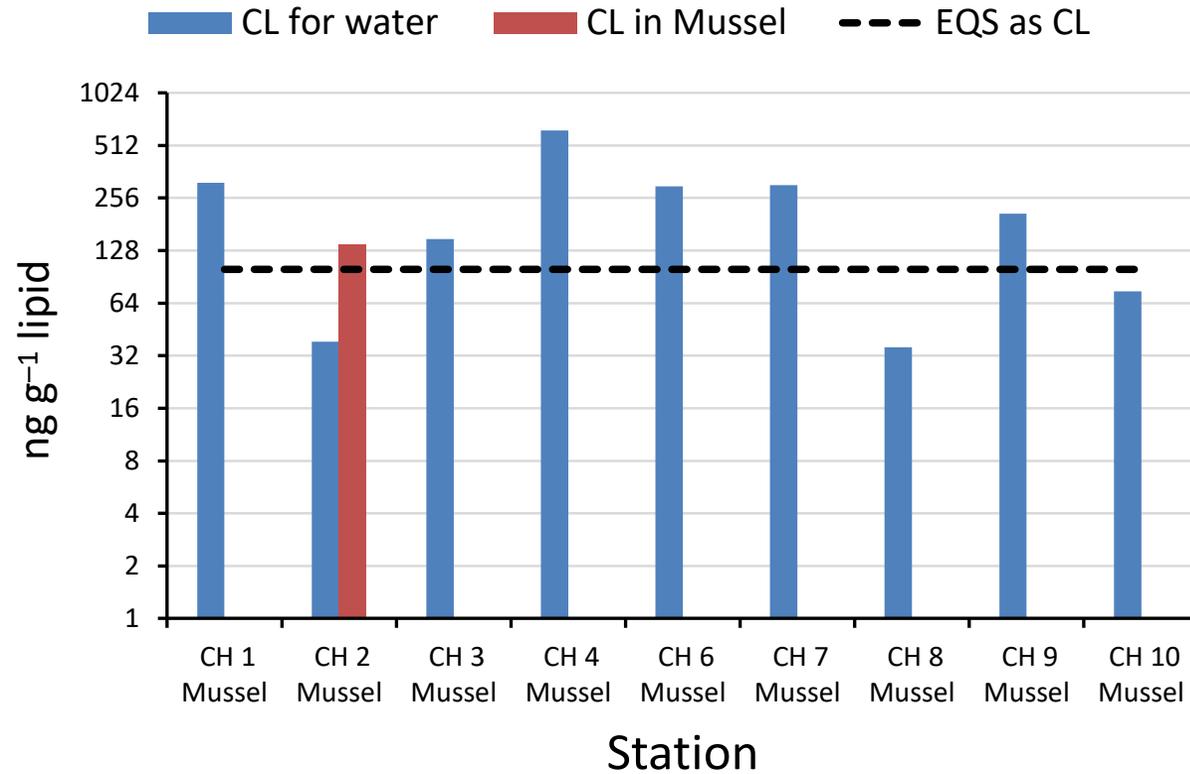
Fluoranthene in Danube (2019)



A tiered approach to EQS_{biota} compliance assessment

Conversion of EQS_{biota} from wet weight to lipid basis, taking 1% lipid in molluscs

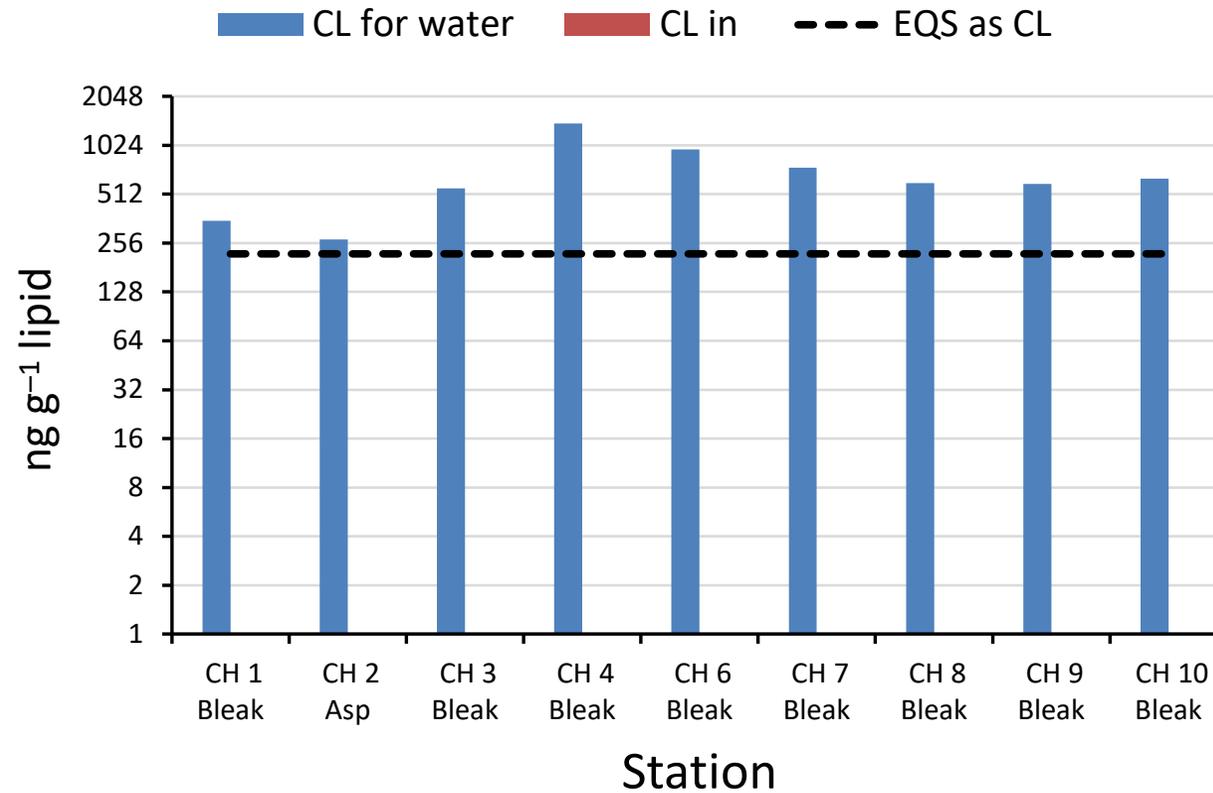
Benzo[a]pyrene in Danube (2019)



A tiered approach to EQS_{biota} compliance assessment

Conversion of EQS_{biota} from wet weight to lipid basis, taking 1% lipid in molluscs

Indeno[1,2,3-cd]pyrene in Danube (2019)



Conclusions

- Levels of OCPs, PCBs, PBDEs in water comparable or higher than in sampled fish
- The difference between levels in Danube water and fish
 - Increases with hydrophobicity
 - Decreases with increasing trophic level
- Passive sampling measurements indicated EQS_{biota} exceedance according to **precautionary principle**



Special thanks to:

Roman Prokeš, CZ

Jakub Vinkler, CZ

Karin Deutsch, AT

Manfred Sengl, DE

Elena Elexová, SK

Tóth György István, HU

Igor Stanković, HR

Momir Paunović, SRB

Mina Asenova, BG

Florentina Soare, RO

Stefan Miron, RO

and many more...

PCB 153 in Danube (2019)

