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in the environment



MERCURY CONTAMINATION AS A LEGACY OF CHEMICAL PRODUCTION IN THE CEE REGION

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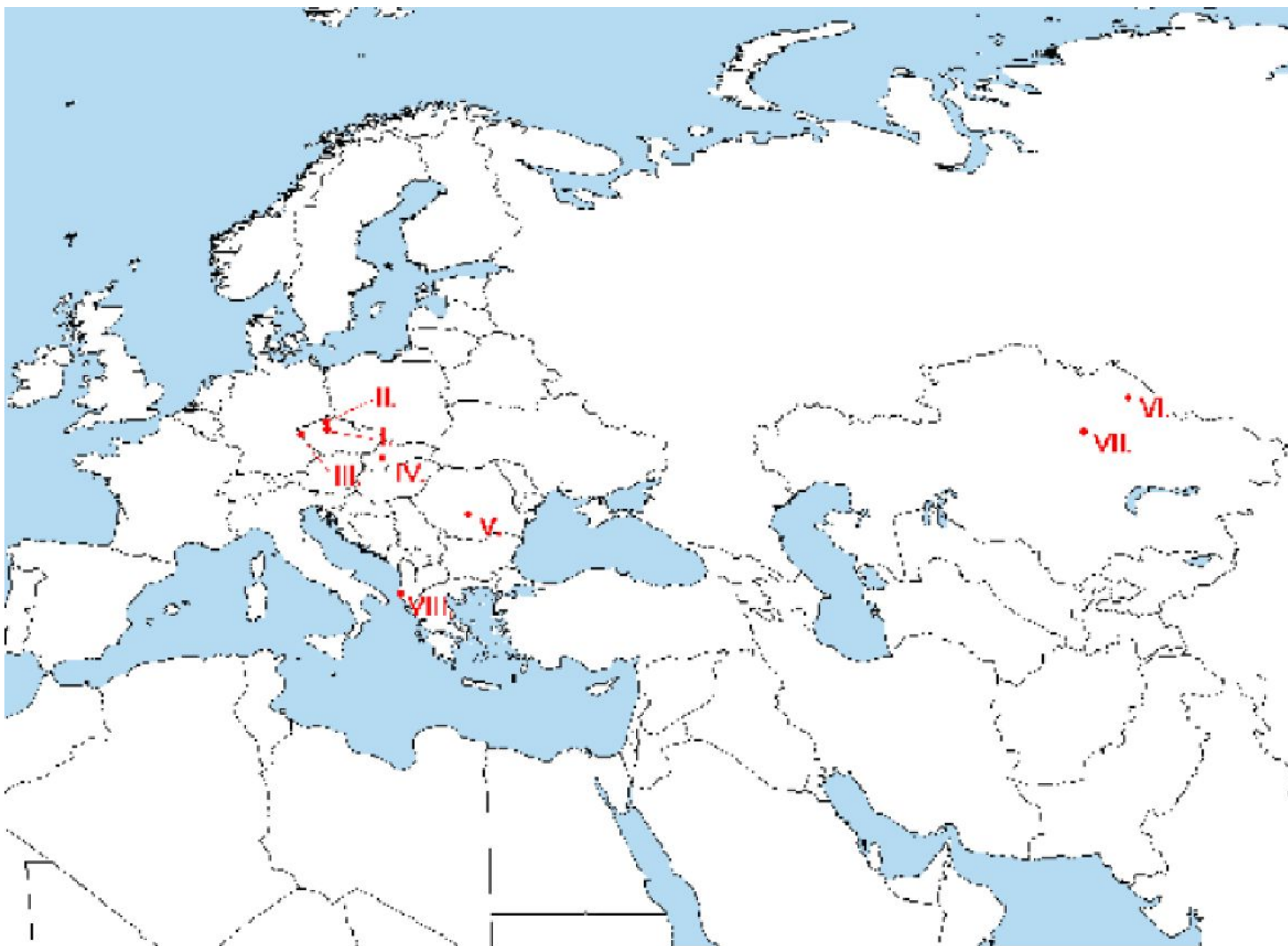
INTRODUCTION

- Minamata convention (2013)
- Processes subject to Article 5: Manufacturing processes in which mercury or mercury compound are used
 - mercury-based chlor-alkali production (2025)
 - sodium and potassium methylate or ethylate production using mercury cell electrolysis
 - vinyl chloride monomer, acetaldehyde, and polyurethane production using mercury as a catalyst

MATERIALS AND METHODS

- 8 case studies focused on contamination with mercury
- former or recent chemical factories as a source of mercury pollution
 - some remediated, some of them remain contaminated
- CEE and CIS countries
- focus on fish
- based on previous large report

LOCALISATION OF CASE STUDIES



I. Spolana Neratovice, Czech republic

II. Spolchemie in Ústí nad Labem,
Czech republic

III. Former Marktedwitz Chemical
Factory, Germany

IV. Fortischem in Nováky, Slovakia

V. Oltchim in Râmnicu Vâlcea,
Romania

VI. Former Chemical Complex in
Pavlodar, Kazakhstan

VII. Former chemical factory Karbid
in Temirtau, Kazakhstan

VIII. Former Soda PVC Plant in Vlora,
Albania

MERCURY CONCENTRATION IN SEDIMENTS IN WATER BODIES AROUND CHEMICAL PLANTS

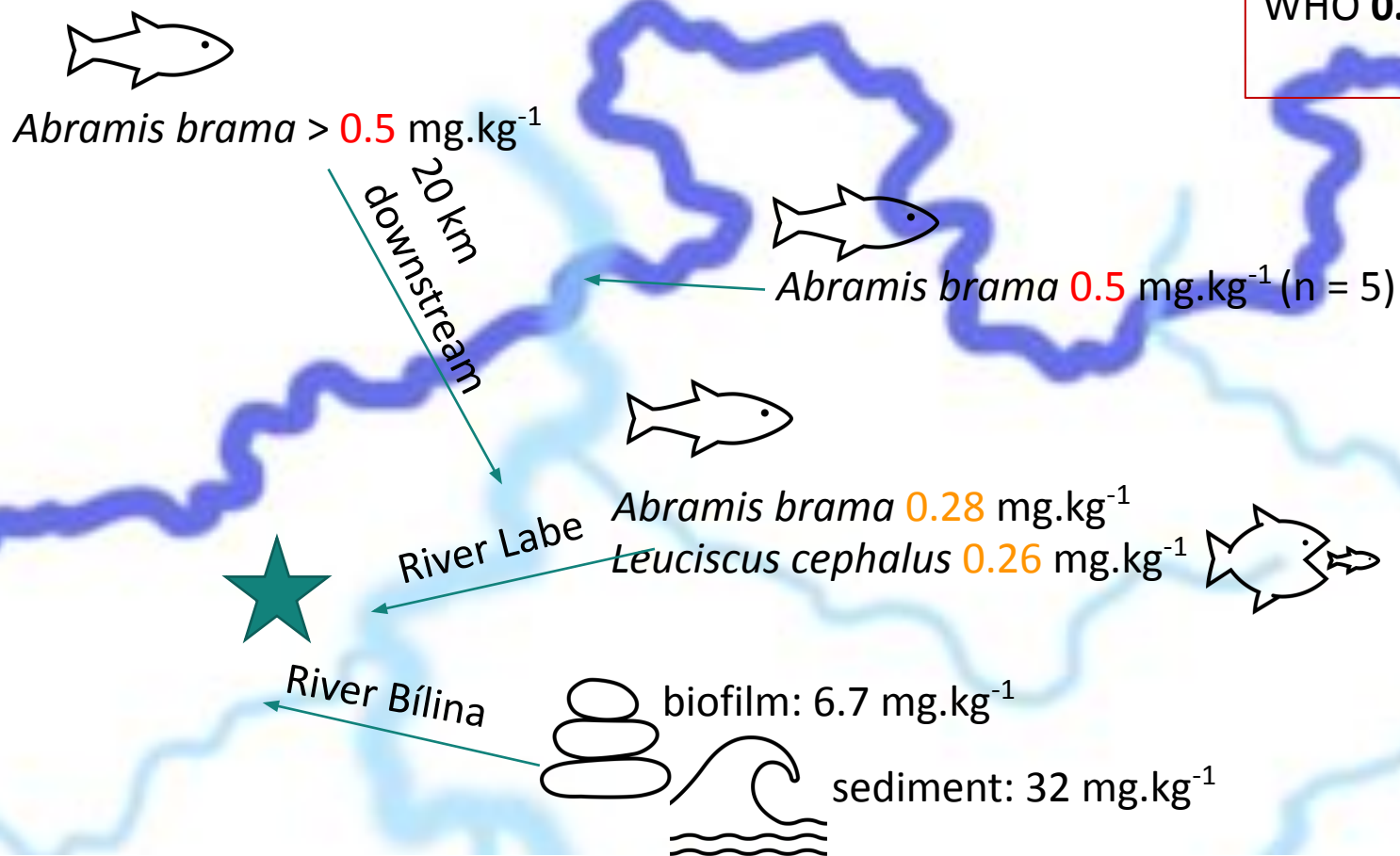
Chemical factory	locality	mg/kg	notes
Spolchemie in Ústí nad Labem	River Bílina	32	6.7 mg/kg in biofilm
Marktrechwitz Chemical Factory	Kössein water stream	269	maximum, ethyl-mercury + methyl-mercury
	River Reslava	435	highest concentration from 1983
	Skalka Reservoir	12.9	456,000 m ³ of sediment
Fortischem in Nováky	discharge to River Nitra	131	112 µg/l in wastewater
Fortischem in Nováky	lagoon	197	
Oltchim in Râmnicu Vâlcea	Babeni Reservoir	0.8 - 6.6	5,8 mg/l in surface water
Chemical Complex in Pavlodar	Lake Balkyldak	1500	*first 9 km
Karbid in Temirtau	River Nura	150-240	in 25 km after discharge

SPOLCHEMIE IN ÚSTÍ NAD LABEM



SPOLCHEMIE IN ÚSTÍ NAD LABEM

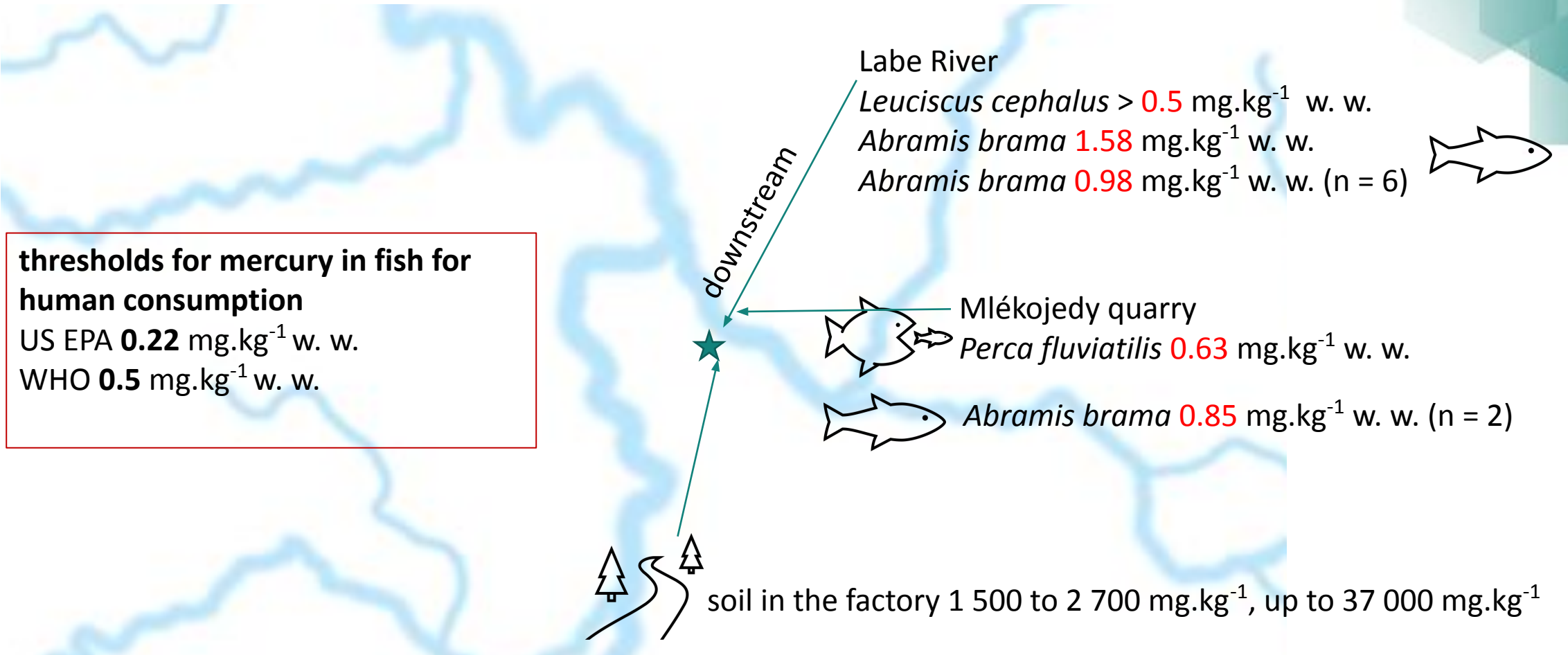
thresholds for mercury in fish for
human consumption
US EPA **0.22** mg.kg⁻¹ w. w.
WHO **0.5** mg.kg⁻¹ w. w.



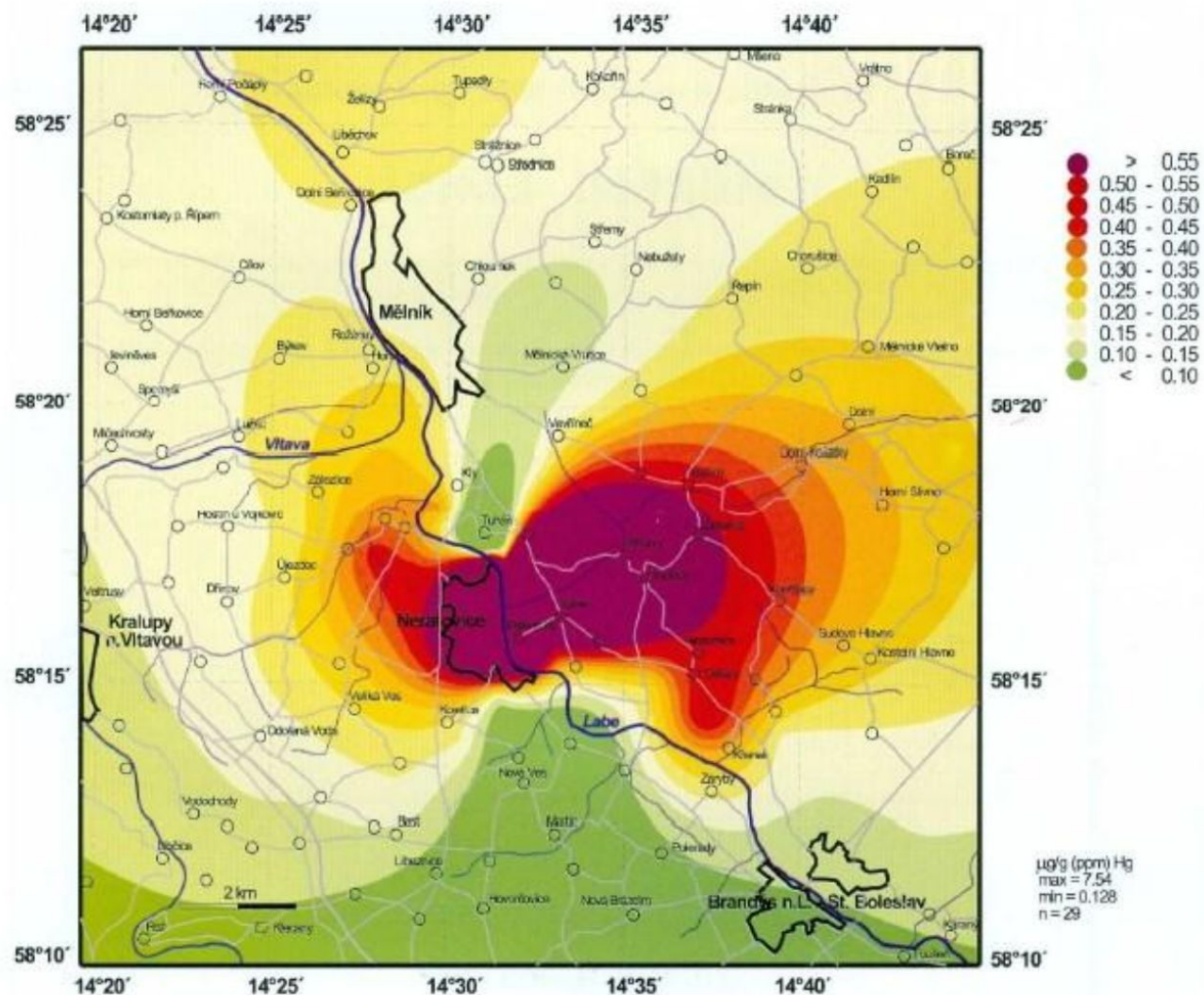
SPOLANA NERATOVICE I



SPOLANA NERATOVICE II

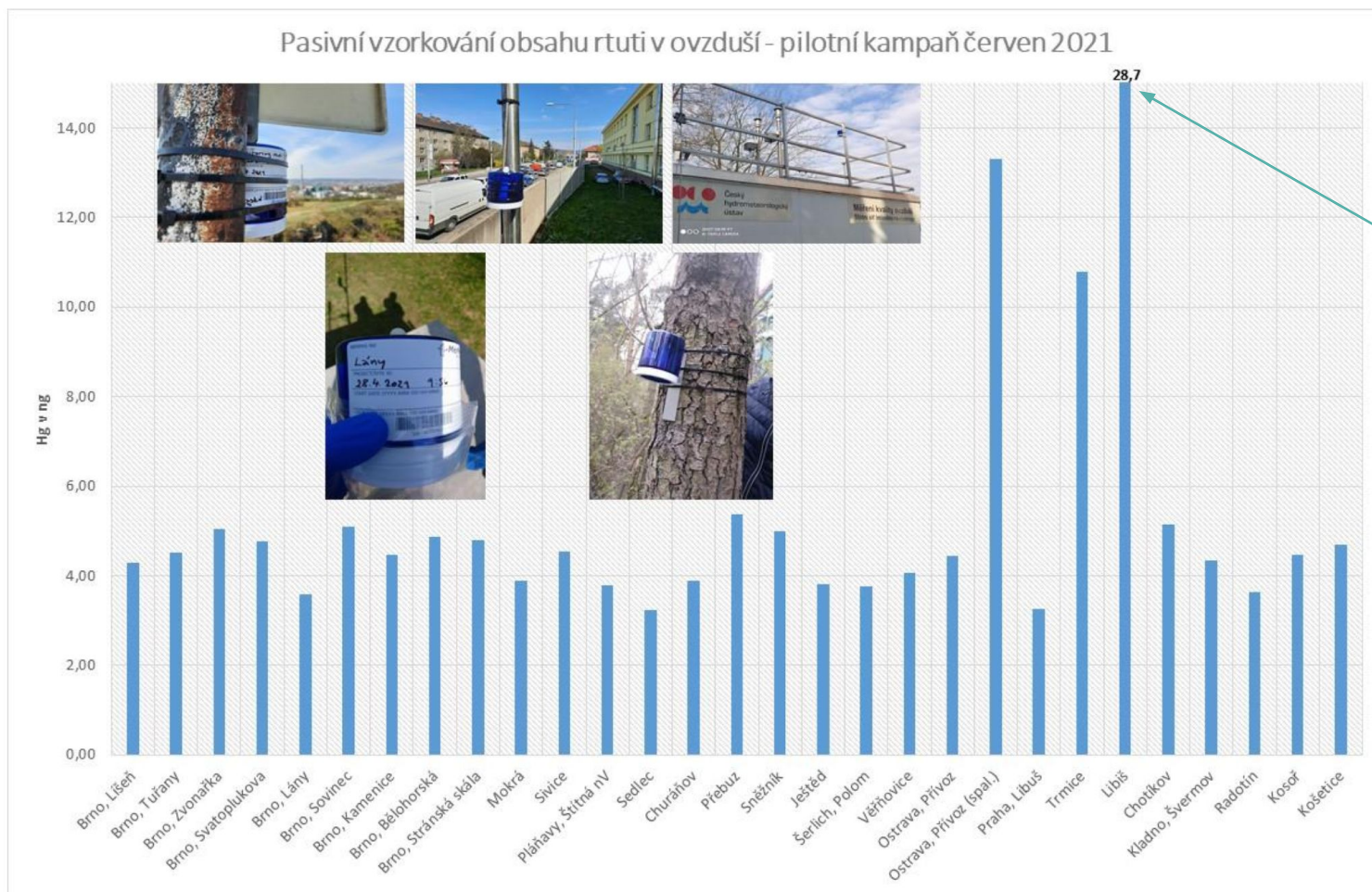


SPOLANA NERATOVICE III



Determined and interpolated mercury concentrations in oak bark in $\mu\text{g. g}^{-1}$

SPOLANA NERATOVICE IV



28,7 ng.m⁻³

MARKTREDWITZ CHEMICAL FACTORY

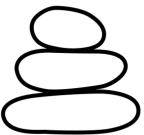


MARKTREDWITZ CHEMICAL FACTORY

thresholds for mercury in fish for
human consumption

US EPA **0.22** mg.kg⁻¹ w. w.

WHO **0.5** mg.kg⁻¹ w. w.

Reslava River 
sediment 269 mg.kg⁻¹ (435 mg.kg⁻¹ during flood)
water 0.2 µg.l⁻¹ (1.22 µg.l⁻¹ during flood)




Reslava River

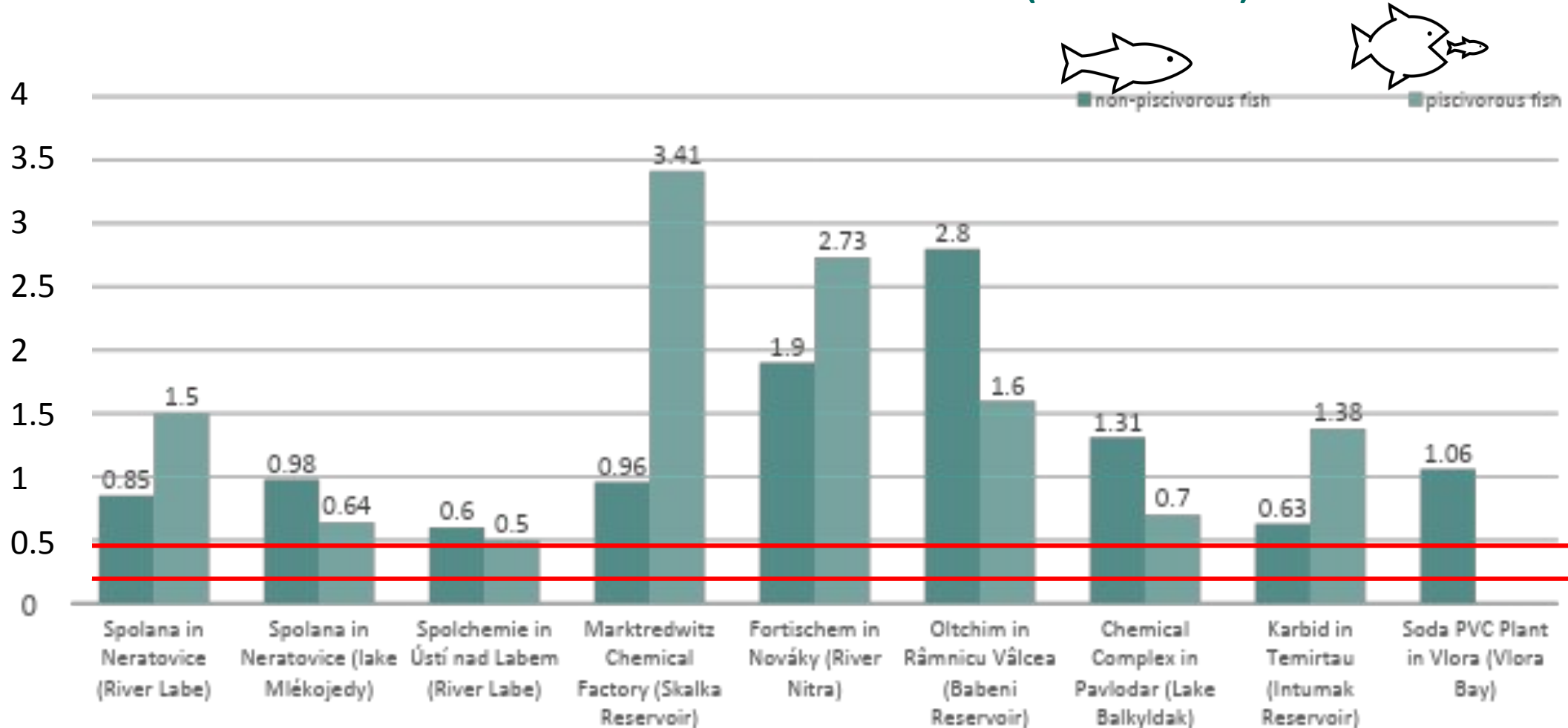
Skalka Reservoir

sediment 12.9 mg.kg⁻¹ (456 000 m³)

 *Abramis brama* **0.96** mg.kg⁻¹ w. w. (n = 8)

 *Aspius aspius* **3.41** mg.kg⁻¹ w. w. (n = 4)

MEAN LEVELS OF MERCURY IN THE MUSCLE OF FISH ON CONTAMINATED SITES (MG.KG⁻¹)



0.5 WHO
0.22 US EPA

DISCUSSION AND CONCLUSION 1/2

- long lasting use of mercury on sites -> exceeding limits of mercury for human health in fish (US EPA, WHO)
- cases demonstrate complexity of contamination inside as well as outside of chemical factories (sediments)
- some of the sites mentioned were (fully or partly) remediated, however with continuing contamination by mercury or PCBs in sediments
 - Skalka (Marktreidwitz chemical plant)
 - Nura (karbid in Temirtau)
- observed simultaneous contamination by POPs in some cases
 - PCDD/Fs in case of chlor-alkali plants
 - PCBs (Nura River)
 - HCHs, HCB (sediments, fish; Vlora, Albania or Spolchemie, Czech republic)

DISCUSSION AND CONCLUSION 2/2

- IPEN developed basic guidance for identification, management and remediation of contaminated sites (mainly for developing countries or countries with economies in transition) in finding solutions for such sites
 - previous version included basic technologies for POPs contaminated sites
 - this document later became basis for development of guidance adopted by the Conference of Parties to the Minamata Convention
 - this document (as well as Technical Guidelines for mercury waste) does not suggest waste incineration as environmentally sound management for treatment of wastes with mercury, but indirect thermal desorption as the most suitable way for mercury and POPs



THANK YOU FOR YOUR ATTENTION

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