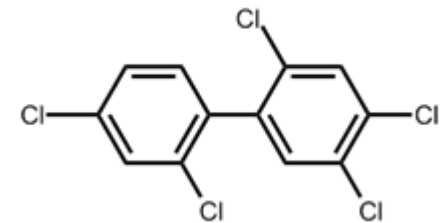
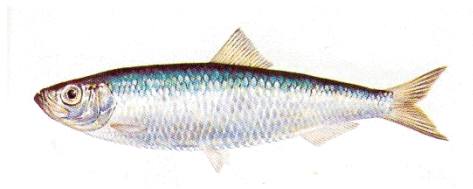


Monitoring of PCBs in Swedish aquatic biota and human milk, 1969-2014



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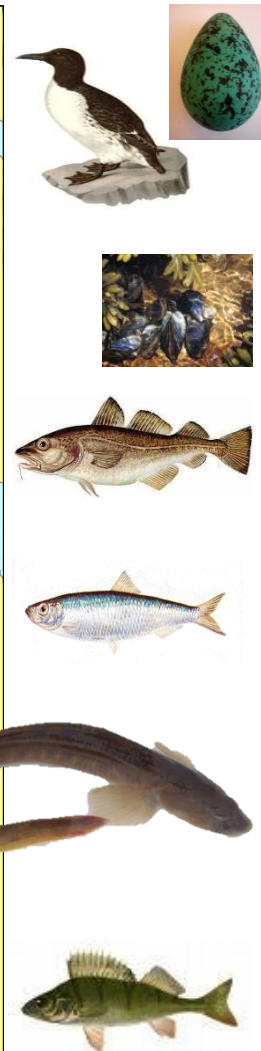
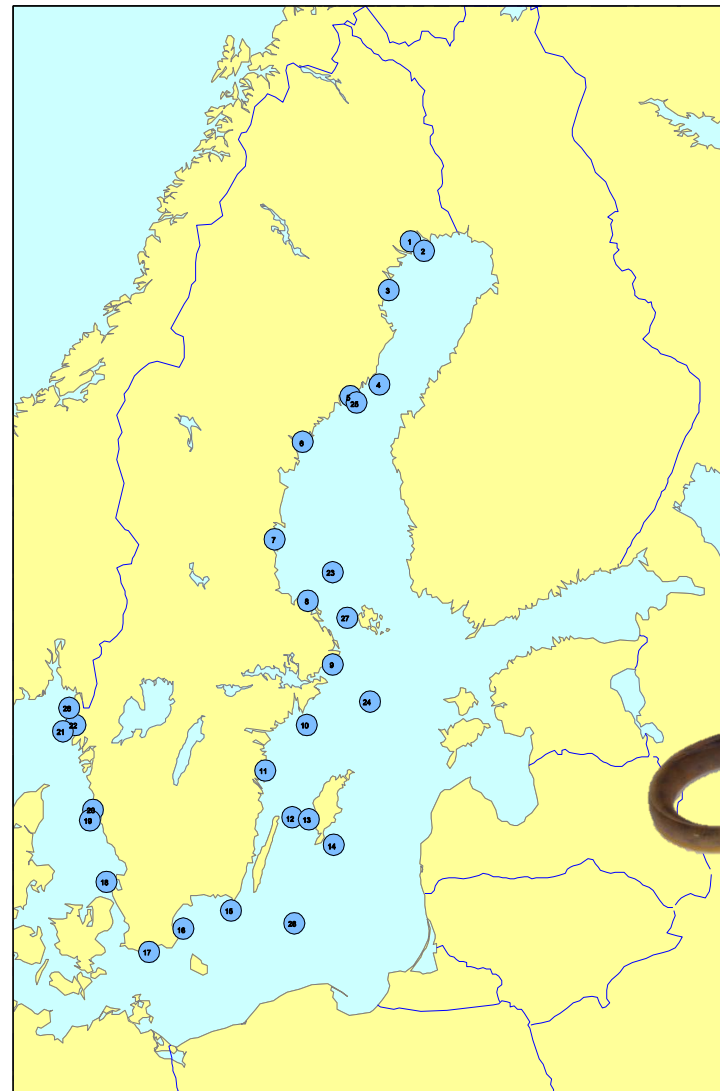
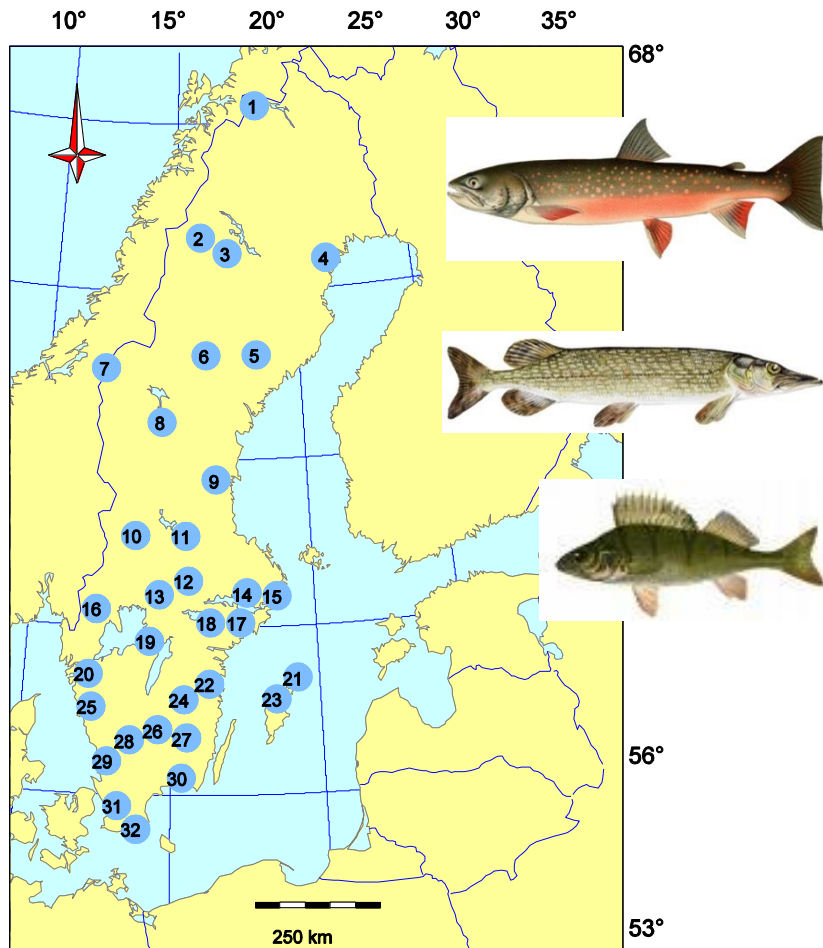
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- Background
- National monitoring programs
 - freshwater
 - marine
 - human health
- Results – temporal and spatial

- The Baltic Sea polluted by e.g. PCBs, HCHs, HCB and DDTs in the 1960s
- Adverse effects in Baltic biota e.g. seals and white tailed sea eagle
- Ongoing monitoring programme for contaminants in biota at reference stations



Malformed WTS, 1978



- To describe the general environmental contaminant load and to supply reference values
- To monitor long term time trends and to estimate the rate of changes found
- Assessment against environmental target values (compliance checking)
- To indicate large scale spatial differences

- Systematic sampling since 1967
 - healthy
 - non-smokers
 - first baby
 - born in Sweden
 - sampling first three months after delivery
- 2003 – present, samples from the Mothers Milk Centre, Stockholm

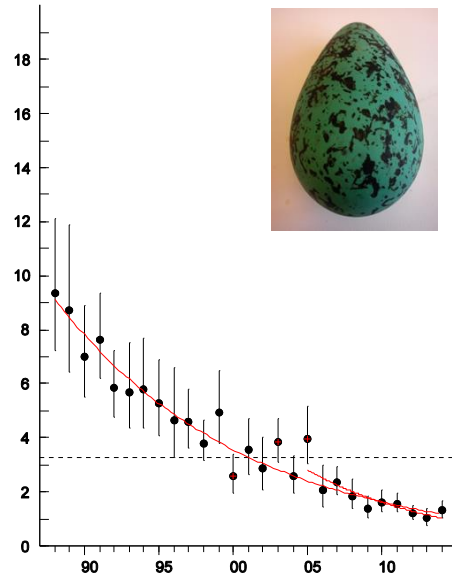


CB-153 - temporal trends

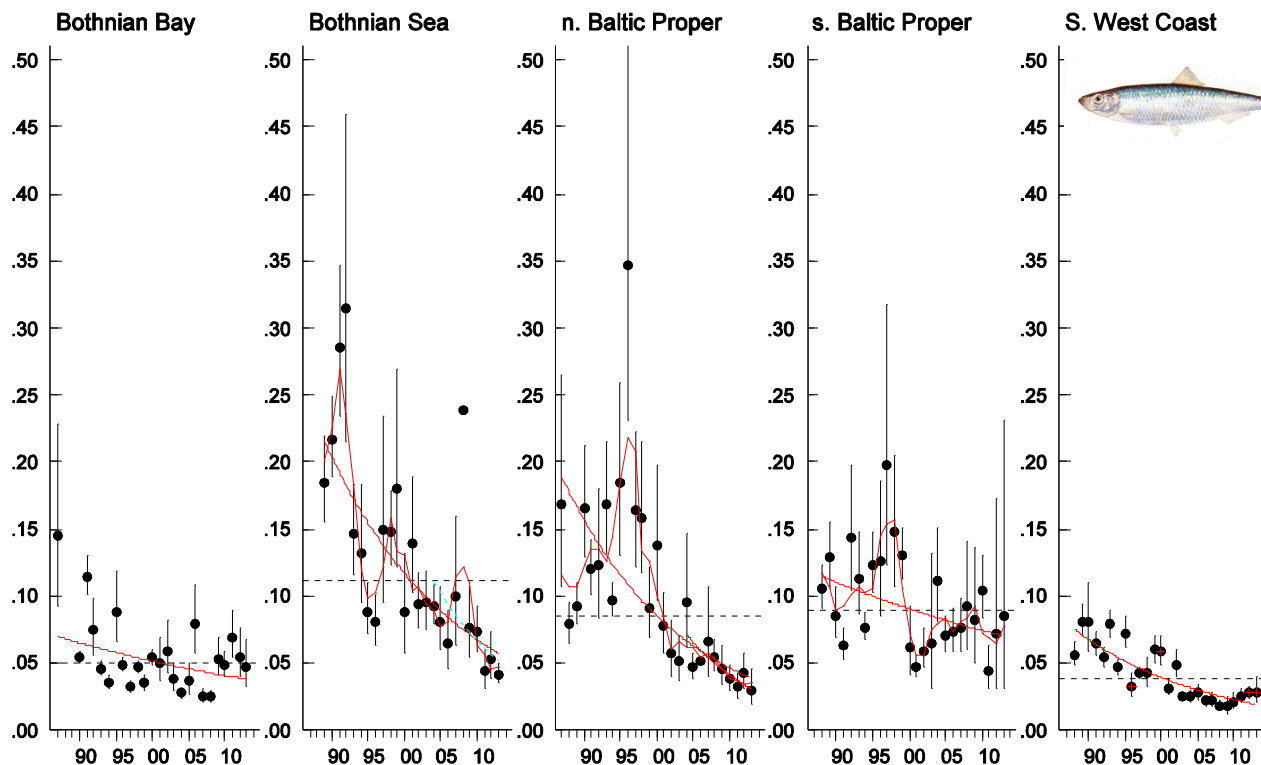
— $p < 0,05$
— $p = 0,05-0,1$
- - $p = 0,05-0,2$

CB-153, $\mu\text{g/g}$ lipid w., guillemot egg

St Karlsö



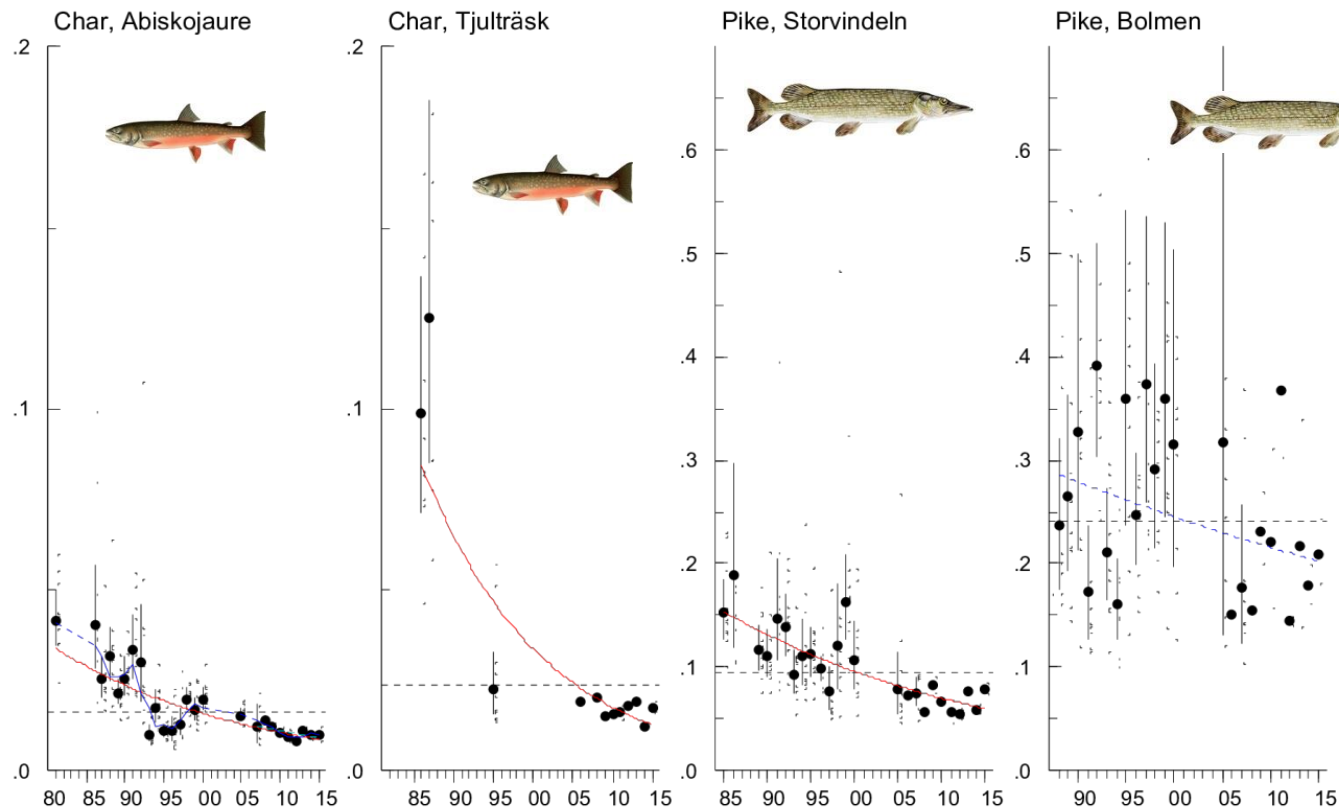
CB-153, $\mu\text{g/g}$ lipid w., herring muscle

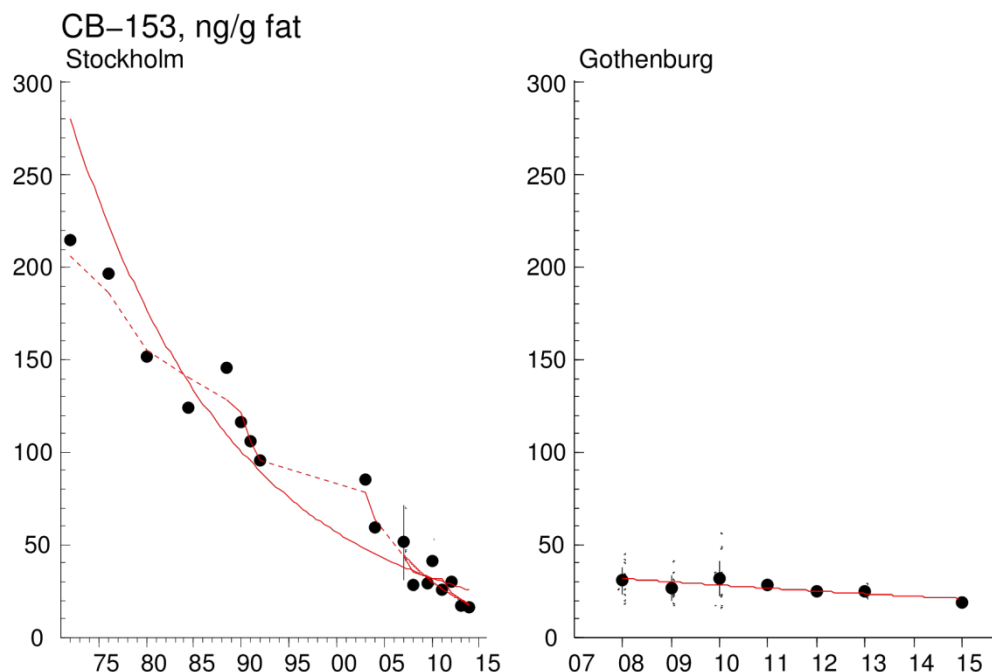


Figures from: **Nyberg E., Faxneld S., Danielsson S., Eriksson U., Miller A., Bignert A. 2015.** Temporal and spatial trends of PCBs, DDTs, HCHs, and HCB in Swedish marine biota 1969-2012. *Ambio* 44, 484-S497.

— $p < 0,05$
— $p = 0,05-0,1$
- - - $p = 0,05-0,2$

CB-153 $\mu\text{g/g}$ lipid w., muscle



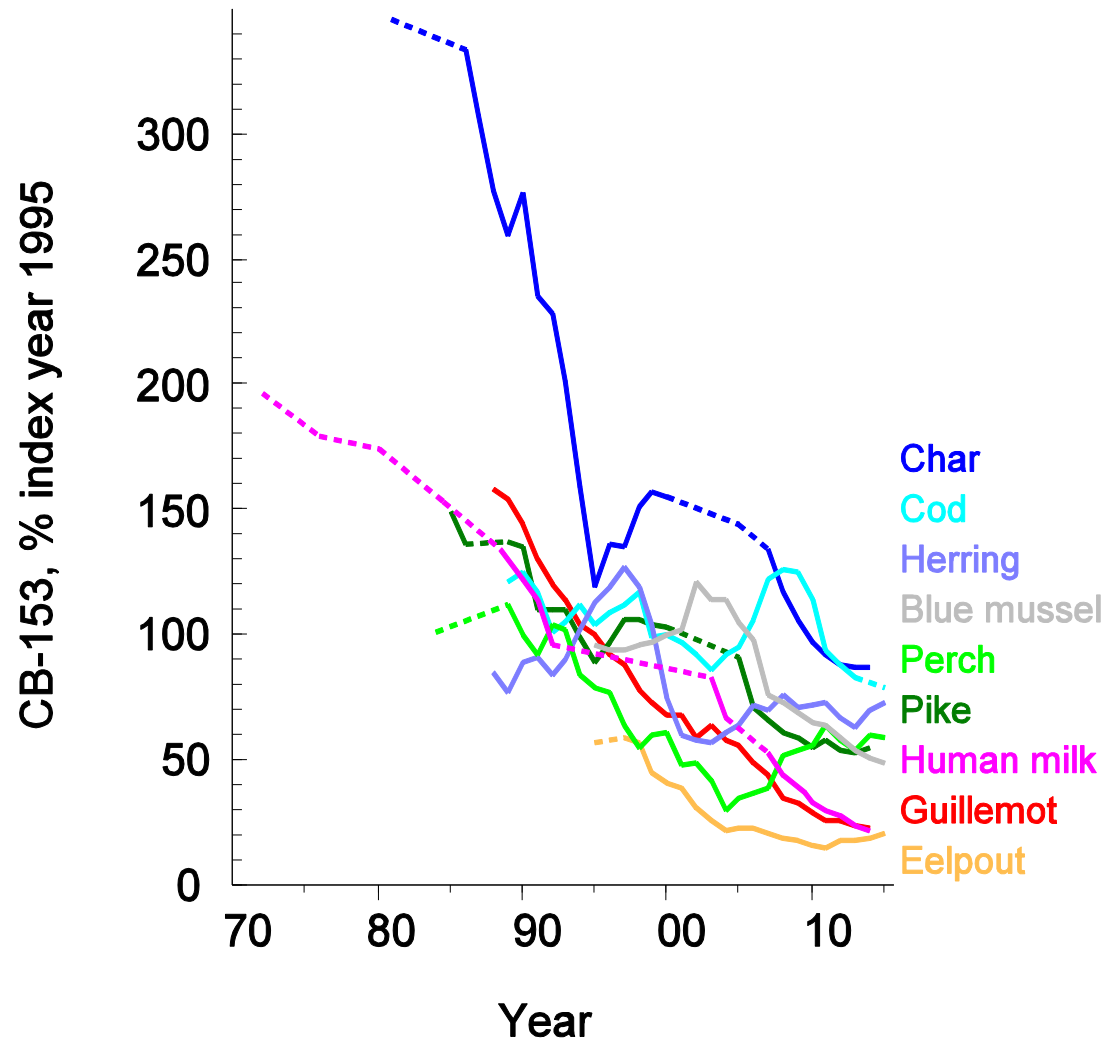


- Stockholm (2014) – 25.5 ng/g fat
- Gothenburg (2015) – 20.8 ng/g fat
- Uppsala (2012) – 22 ng/g fat

Data from: **Fång J., Nyberg E., Winnberg U., Bignert A. & Bergman Å. 2015.** Spatial and temporal trends of the Stockholm Convention POPs in mothers milk – a global review. *Environ Sci Pollut Res*, 22, 8989-9041.

Lignell S., Aune M., Glynn A., Cantillana T. & Fridén. 2014. Levels of persistent halogenated organic pollutants (POP) in mother's milk from first-time mothers in Uppsala, Sweden: results from year 2012 and temporal trends for the time period 1996-2012. Report to the Swedish EPA (the Health-Related Environmental Monitoring Program). Livsmedelsverket, Uppsala

CB-153 - temporal trends



CB-153 - spatial trends

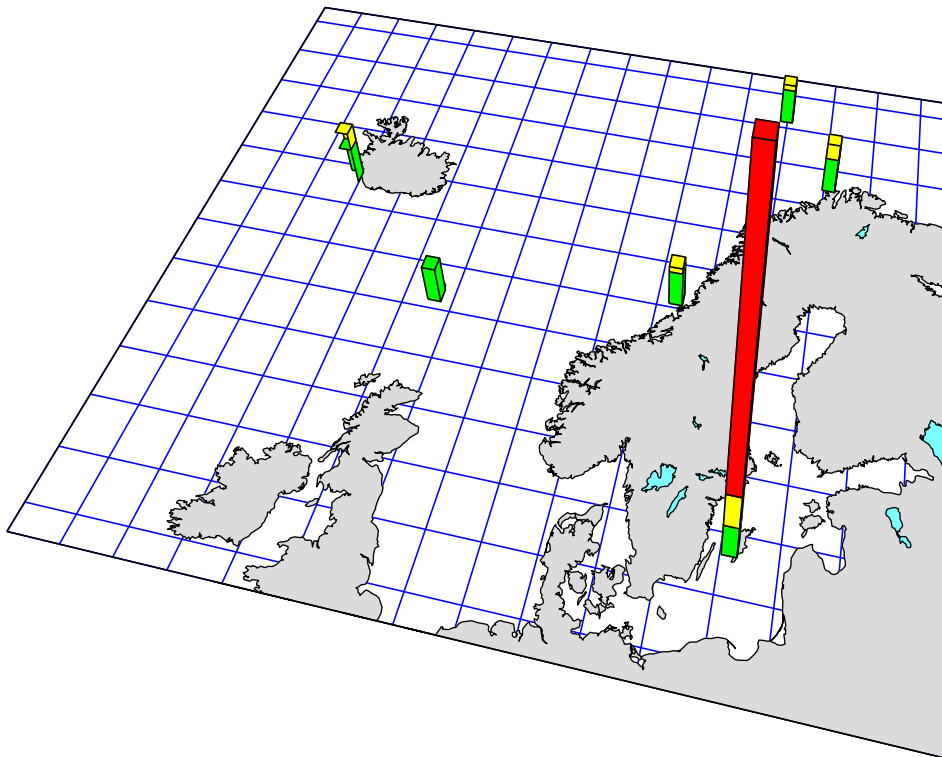
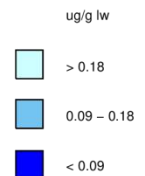
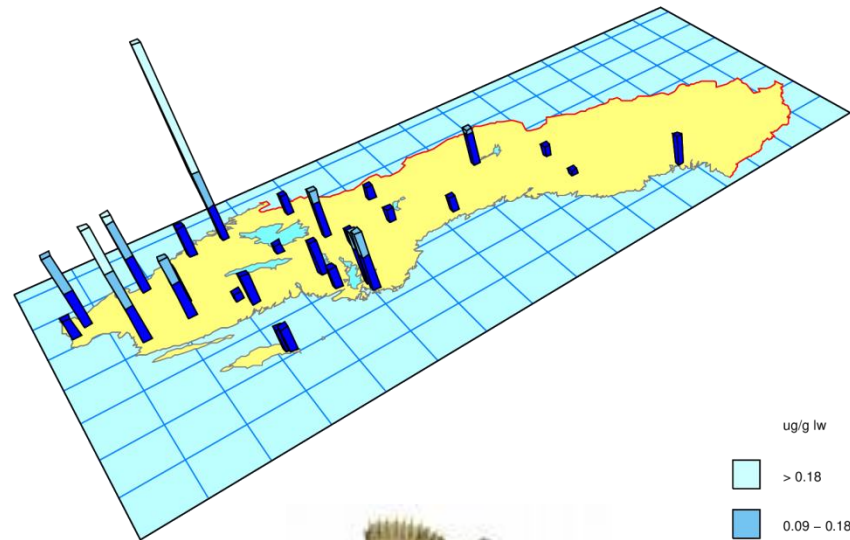
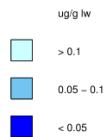
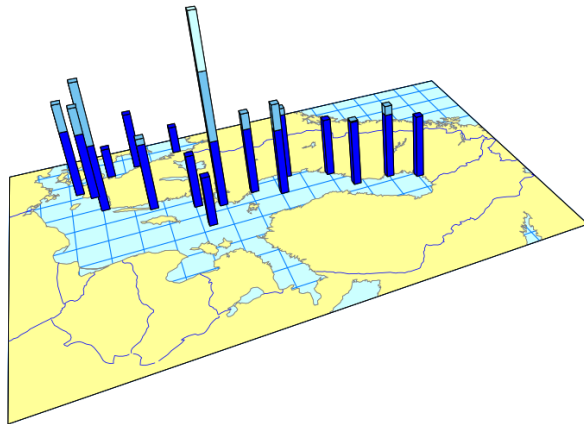
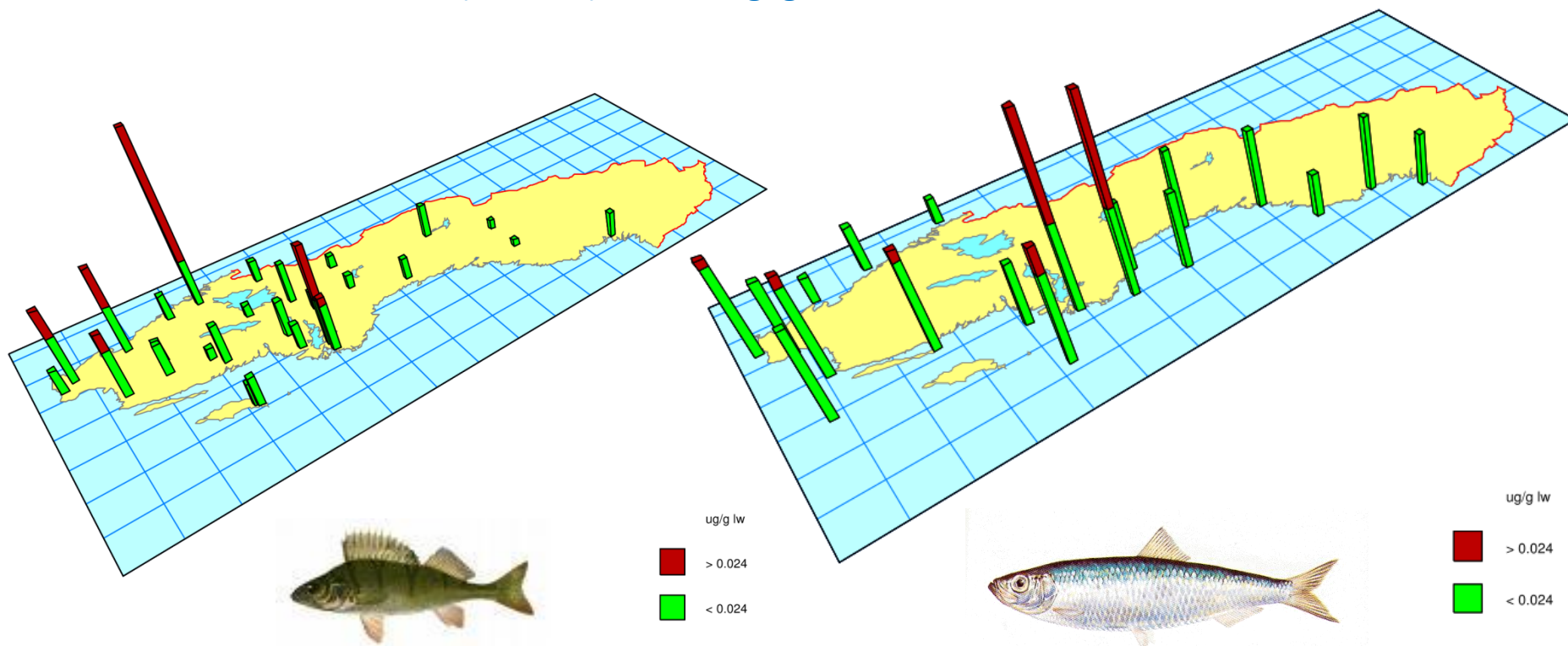


Figure from: Jörundsdóttir H, Bignert A, Svavarsson J, Nygård T, Weihe P & Bergman Å. 2009. Assessment of emerging and traditional halogenated contaminants in Guillemot (*Uria aalge*) egg from North-Western Europe and the Baltic Sea. *Science of the Total Environment* 407, 4174-83.

CB-153 - spatial trends



OSPAR EAC (CB-118) - 0.024ug/g lw



- Measures taken to reduce the concentrations of PCBs have had an effect
- The levels are still elevated in the Baltic Sea and CB-118 is above the target value at some sites and in some species both in the marine and the freshwater environment
- Human milk also show decreasing concentrations and the levels are similar in different regions
- Different species show relatively large between species variation

Thank you!!!

- Acknowledgements
 - Thanks to the Swedish Environmental Protection Agency (Naturvårdsverket) that has funded the monitoring.