Bioavailability of Persistent Organic Pollutants (POPs) in the Western Scheldt Estuary, The Netherlands

Michiel Kotterman[1], JaapJan Zeeberg[2], Ad van der Spek[2], Sytze van Heteren[2] and Pim Leonards[3]

1 IMARES; Institute for Marine Resources and Ecological studies

2 TNO; Geological Survey of the Netherlands

3 IVM; Institute for Environmental Studies

WAGENINGEN UR
For quality of life

TNO

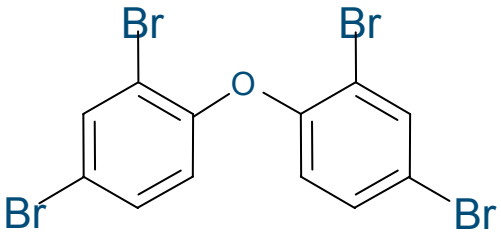
IMARES

Food chain studies

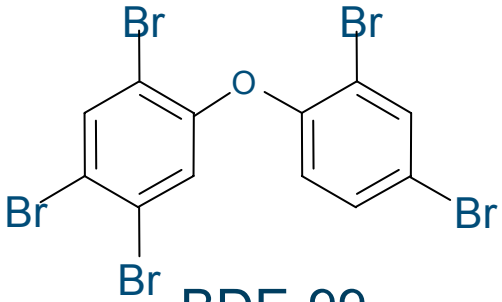
- Exposure assessment throughout food chain
  - Non polar compounds → sediment
- Focus on brominated flame retardants (BFRs) as suspected endocrine disrupters

Brominated flame retardants (BFRs)

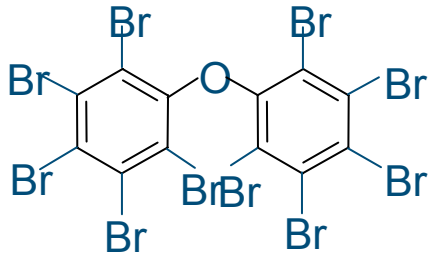
Polybrominated diphenyl ethers (PBDEs)



BDE-47

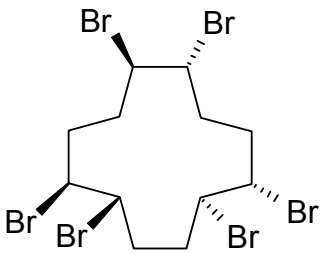


BDE-99

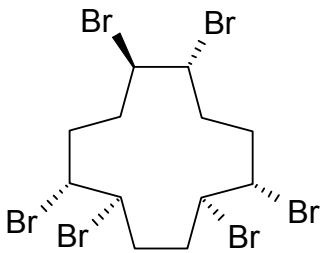


BDE-209

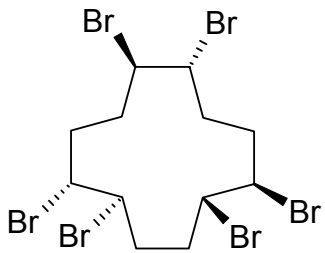
Hexabromocyclododecane (HBCD)



“Alpha”



“Beta”



“Gamma”

WAGENINGEN UR
For quality of life

TNO

IMARES

Risk area identification for estuarine food chain

- Current production area
  - Output limitation standards
  - No or little deposition

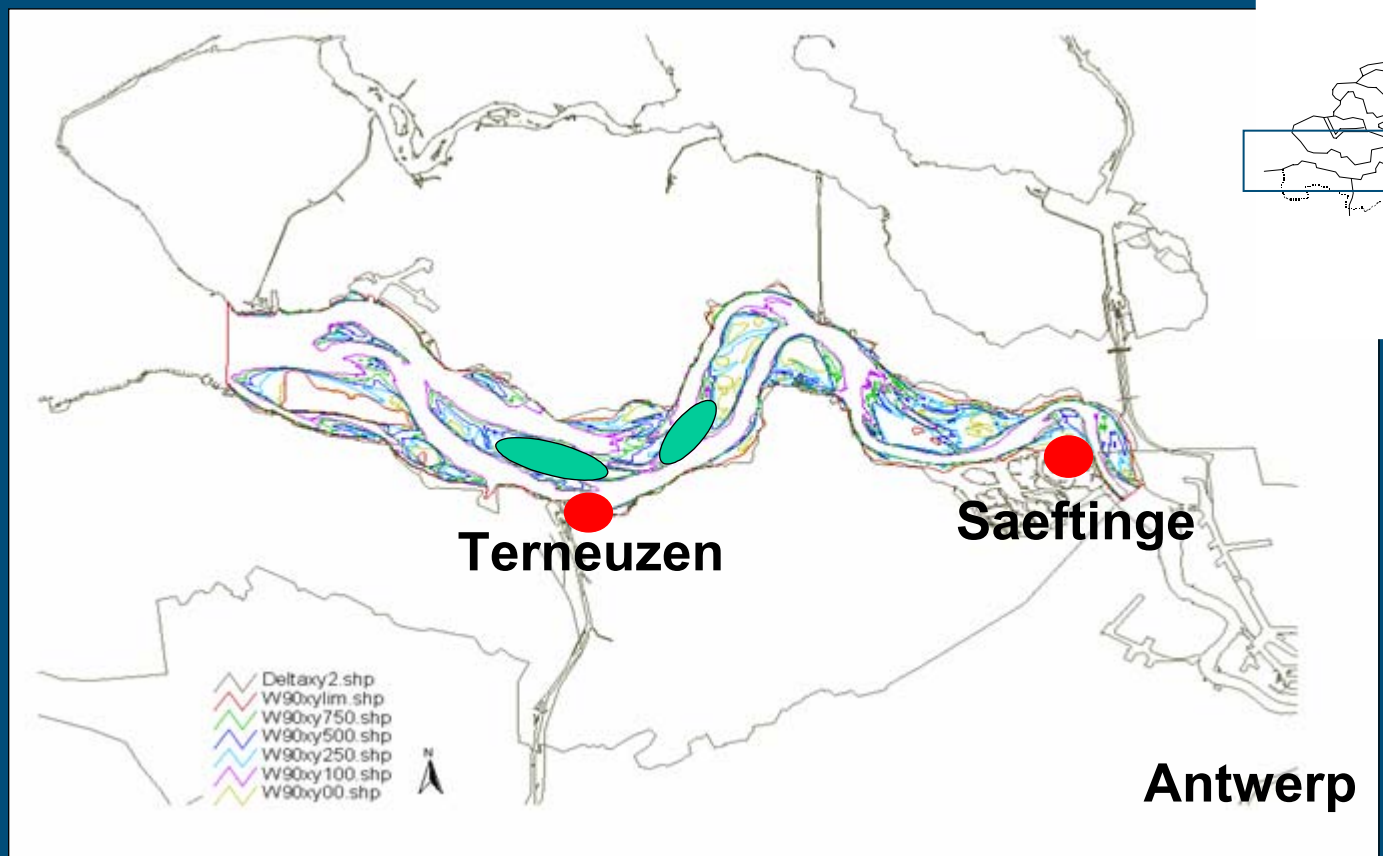
- Food chain Common tern
  - From suspended matter to Tern eggs

WAGENINGEN UR For quality of life

TNO

IMARES

Sample collection Western Scheldt



Common tern colony

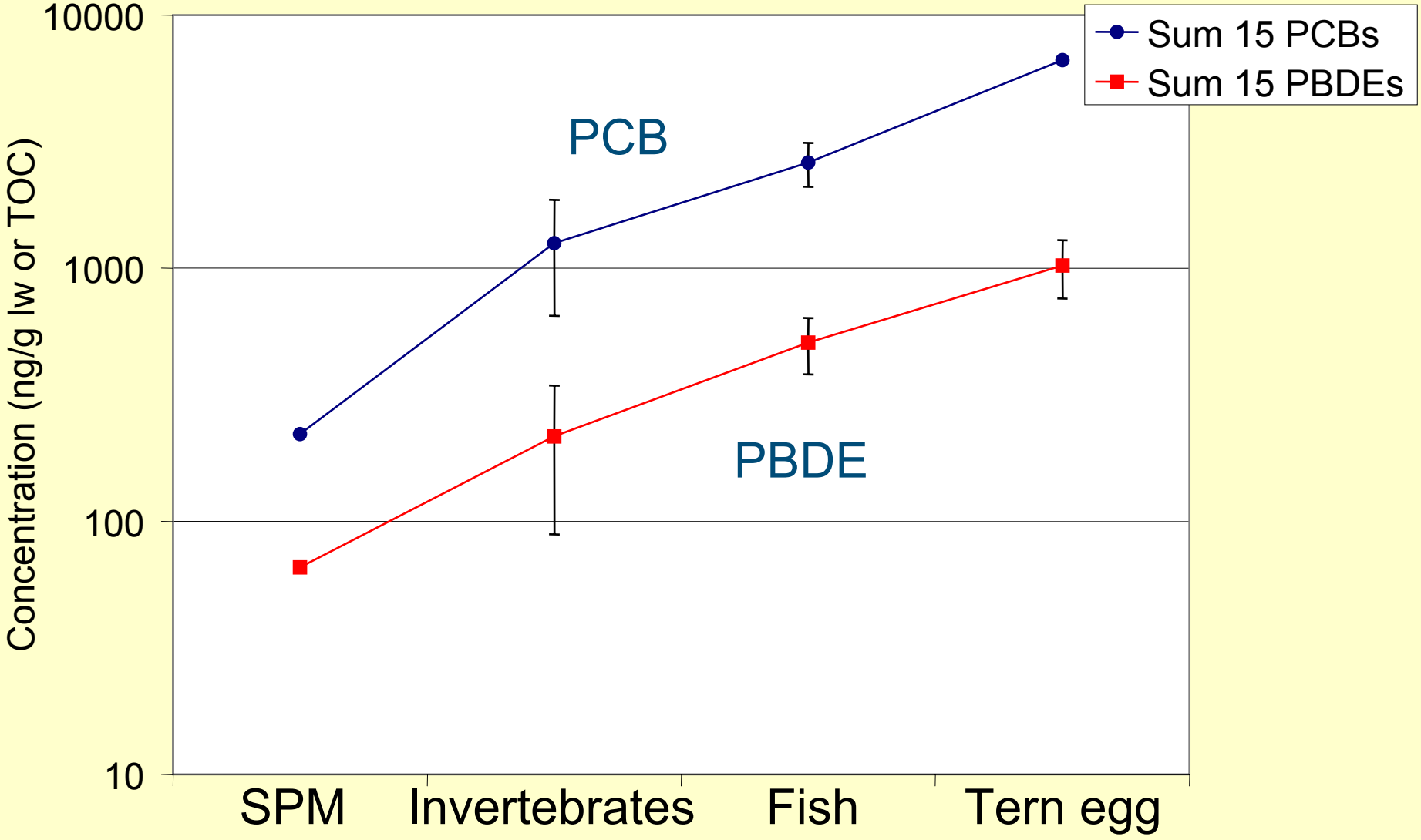
Sampling biota and SPM

WAGENINGEN UR
For quality of life

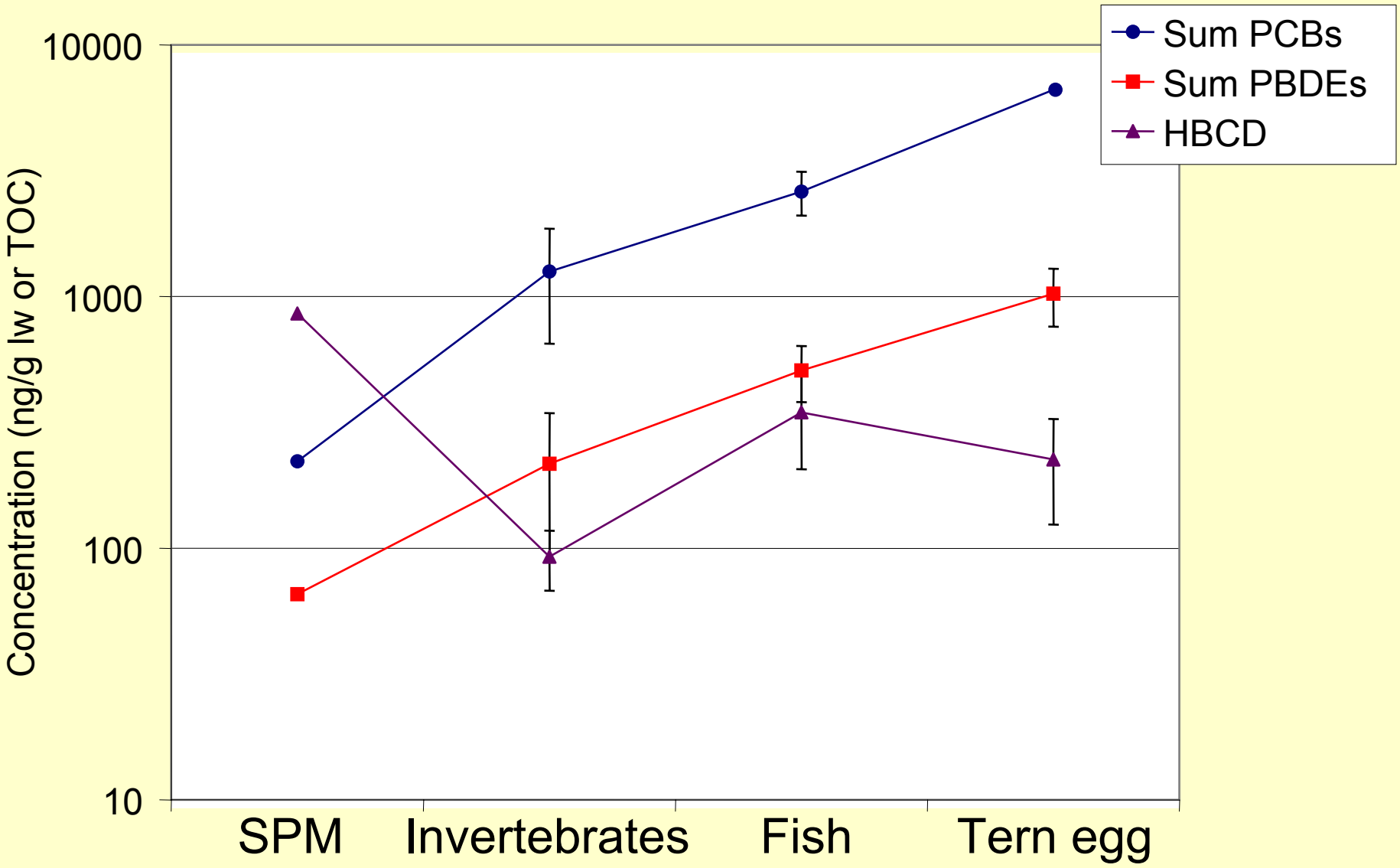
TNO

IMARES

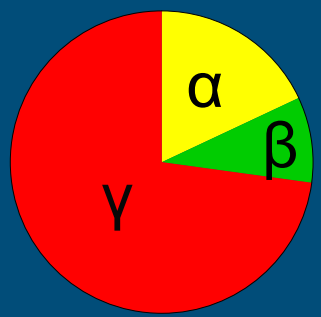
PBDEs and PCBs in tern food chain



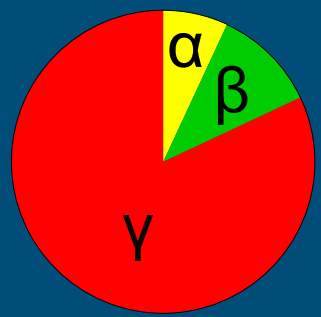
PBDEs, PCB and HBCD in tern food chain



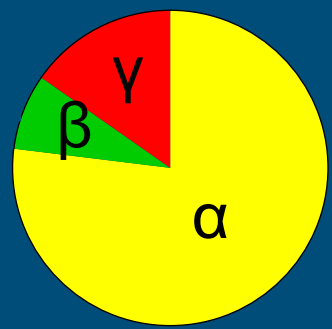
HBCD Composition in Food Chain



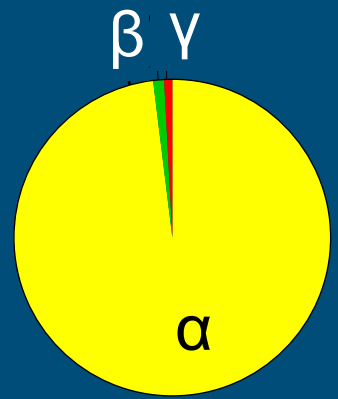
Technical mixture



Sediment SPM

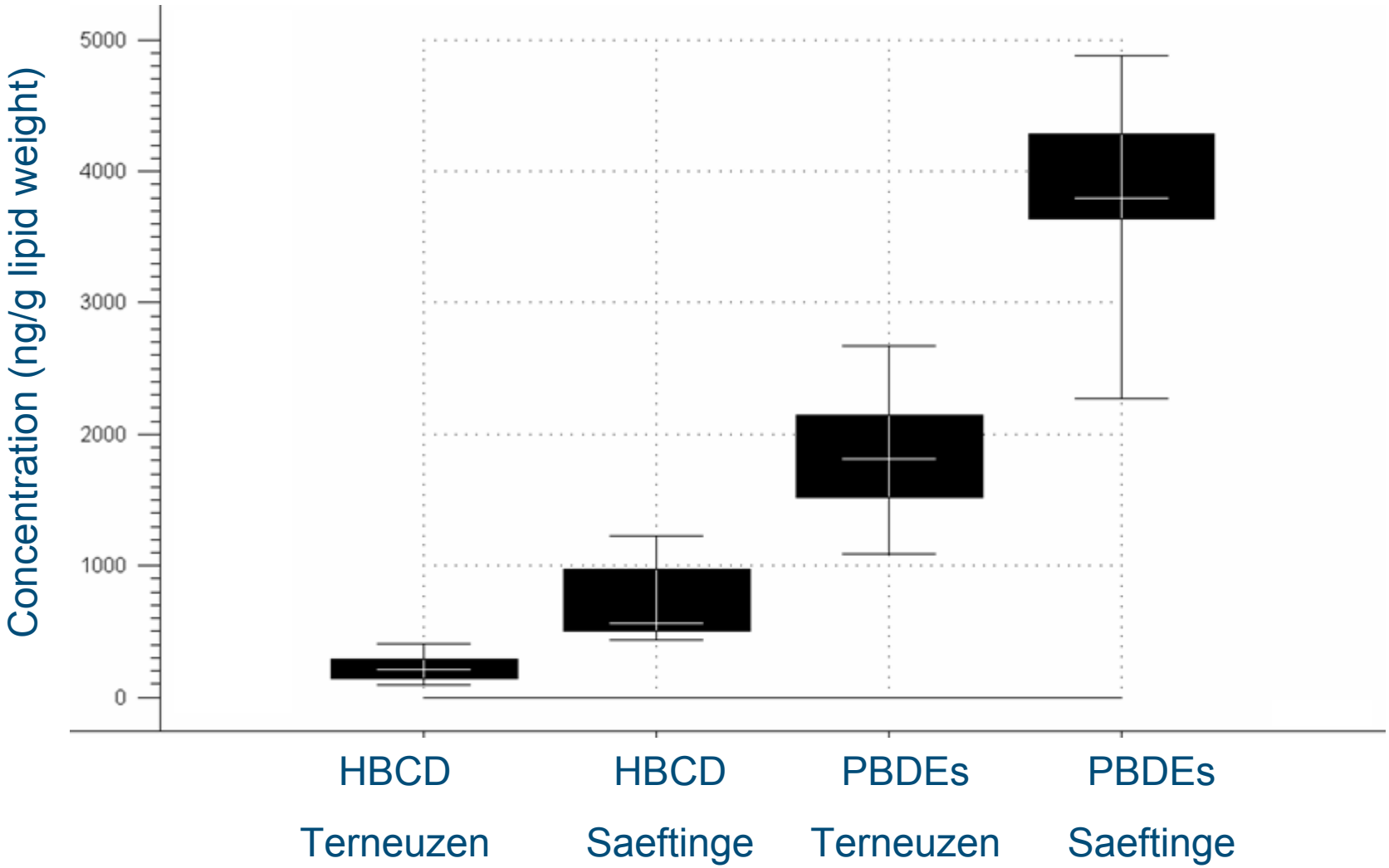


Flounder

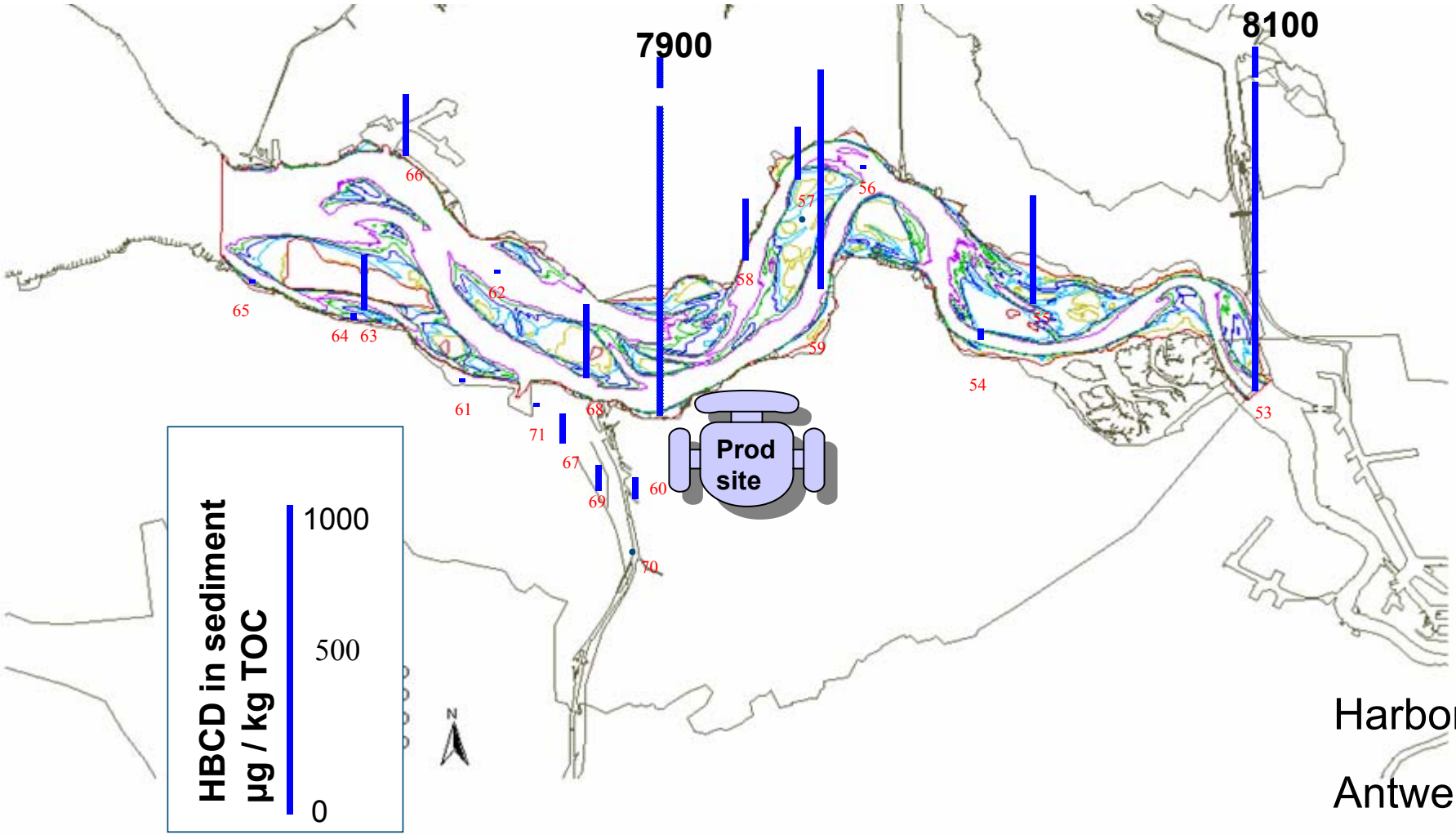


Tern egg
Seal

Tern eggs Terneuzen vs. Saeftinge



Total HBCD in Sediment from the Western Scheldt



WAGENINGEN UR
For quality of life

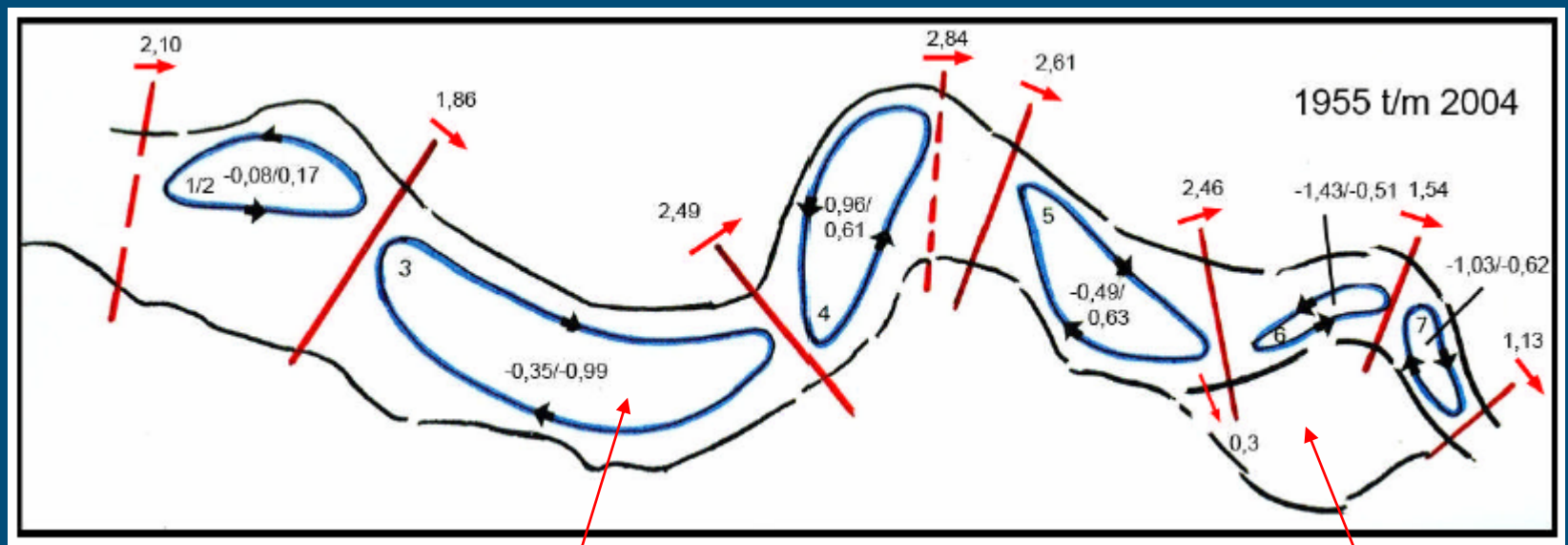
TNO

IMARES

Sediment budget Western Scheldt 1955 – 2004

Source: Actualisatie van de zandbalans van de Westerschelde

Haecon September 2006



'Terneuzen': erosion

'Saeftinghe': deposition

WAGENINGEN UR For quality of life

TNO

IMARES

Conclusions

Food chain studies show high accumulative potential of POP

However, slow uptake of pollutants and preferential degradation may occur

Risk assesment throughout food chain required

Risk areas not always at source of pollution, erosion and sedimentation influence ecotoxicological risk of non-polar pollutants