

Qualifying the European conger

Conger conger (Linnaeus, 1758)

as coastal bioindicator

of organic and metallic contamination



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Coast Bordeaux 2017

Study area



Industrialized bay of Fos-sur-Mer

1st French harbour

initiated by local users & stakeholders

concern of local population
lack of data

social & scientific considerations to select the marine bioindication organism

- eaten locally
- low commercial value
- single gestation
- sexual geographic selectivity
- sedentary
- high level predator

consciousness & implication

Fishing involving local fishermen and boaters

Longline fishing of N = 24 European congurs

Jun-Oct 2012 (4-12m deep)

Total length 70 - 140 cm

Preparation

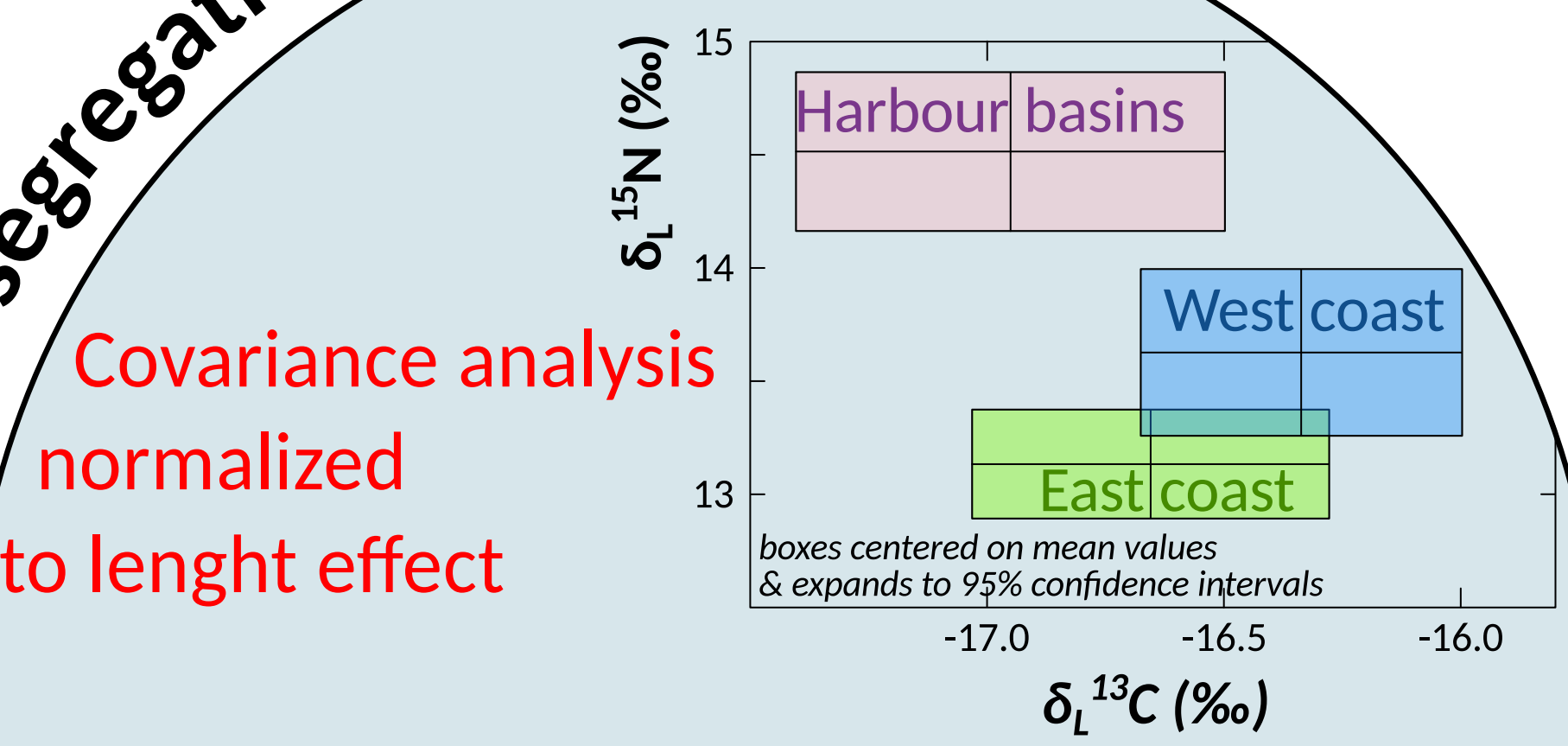
Muscles freeze-dried and ground

Water content 75.8% - Lipid weight < 1.2%

Analyses

- 18 metals (ICP-MS)
- PAH (LC-UV & LC-Fluo) Sarrazin et al. 2006
- PCB & pesticides (GC-ECD & GC-MS) Wafo et al., 2006
- PCDD/F (Wessling)
- Chlorination by-products - CBP (Wessling)
- $\delta^{15}\text{N}$ & $\delta^{13}\text{C}$ isotope ratios (UMR LIENSs)

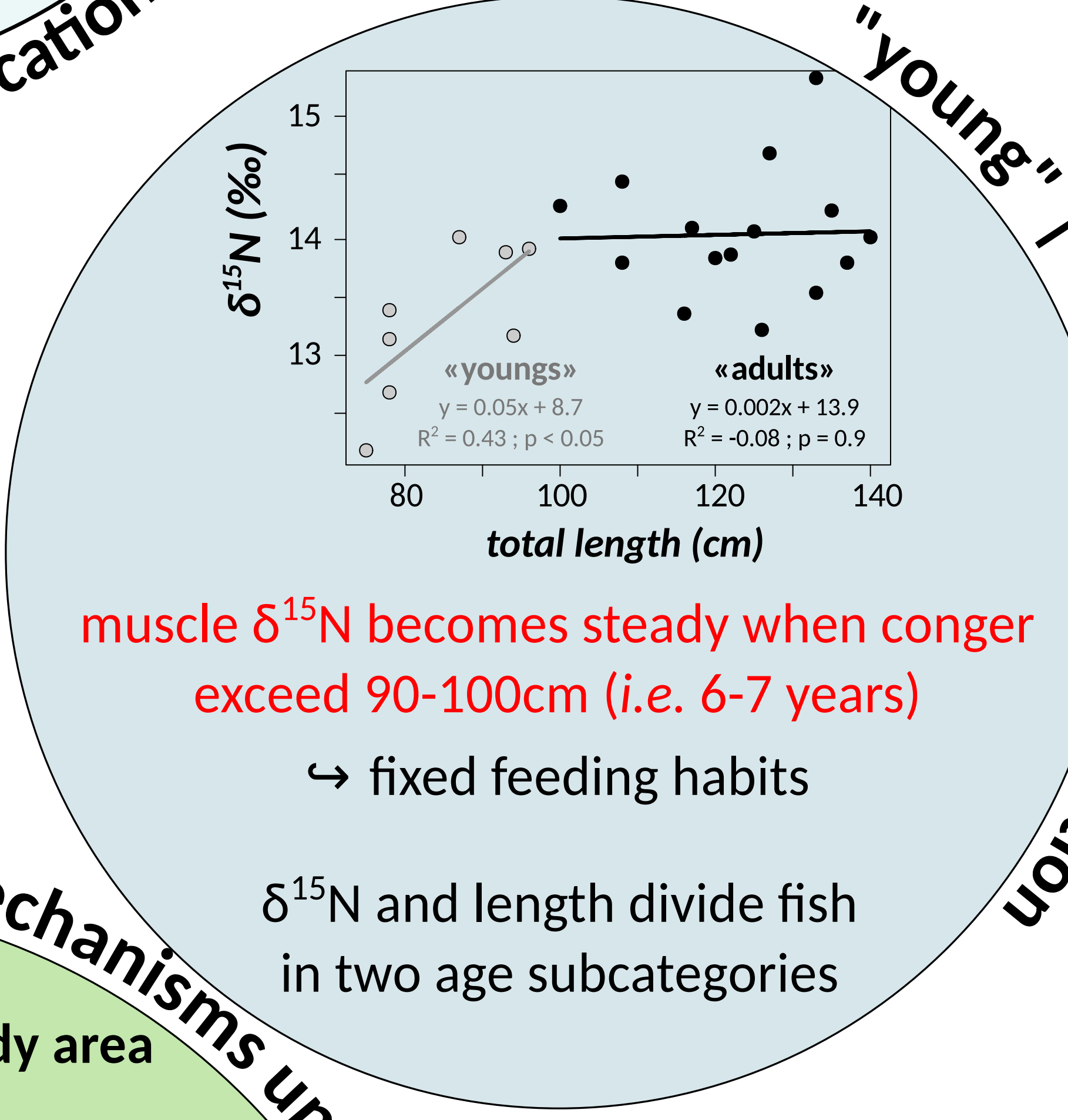
geographic segregation



Covariance analysis normalized to length effect

Clear separation of fish from harbour basins (N = 8)

in a lesser extend between east & west coasts



muscle $\delta^{15}\text{N}$ becomes steady when conger exceed 90-100cm (i.e. 6-7 years)

fixed feeding habits

$\delta^{15}\text{N}$ and length divide fish in two age subcategories

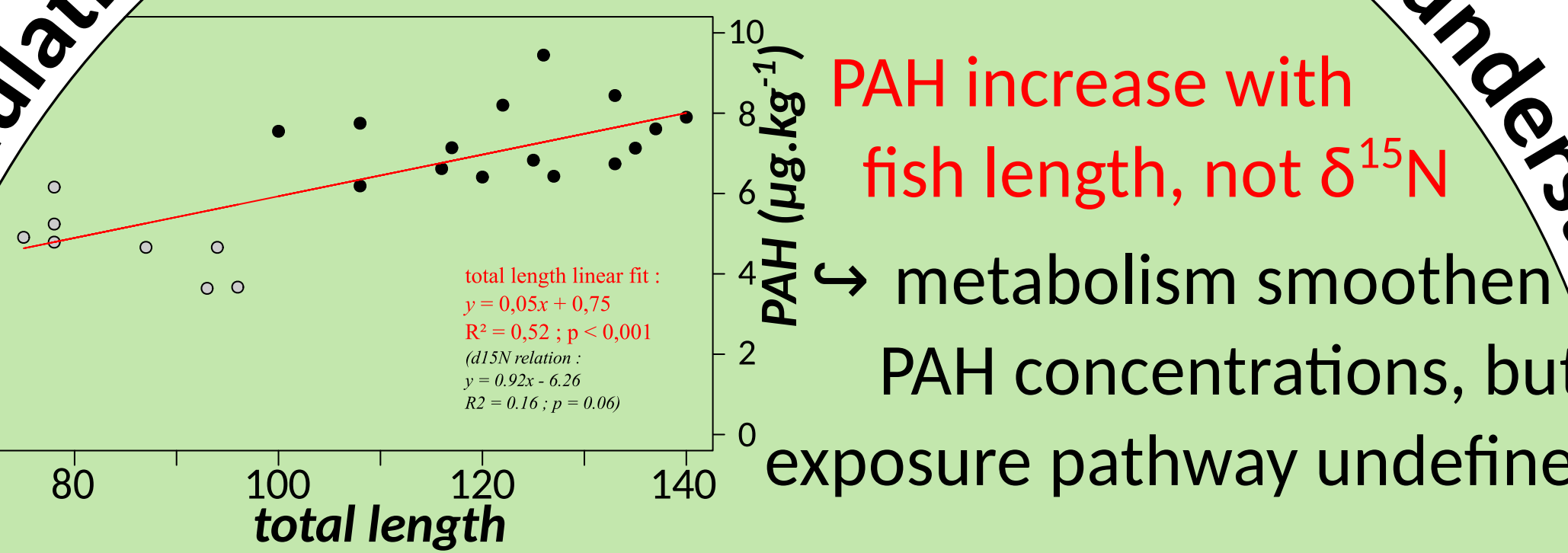
"young" / "adult" differentiation

bioaccumulation representativity & mechanisms understandings

PAH & PCB levels homogeneous across study area

PAH increase with fish length, not $\delta^{15}\text{N}$

metabolism smoothen PAH concentrations, but exposure pathway undefined

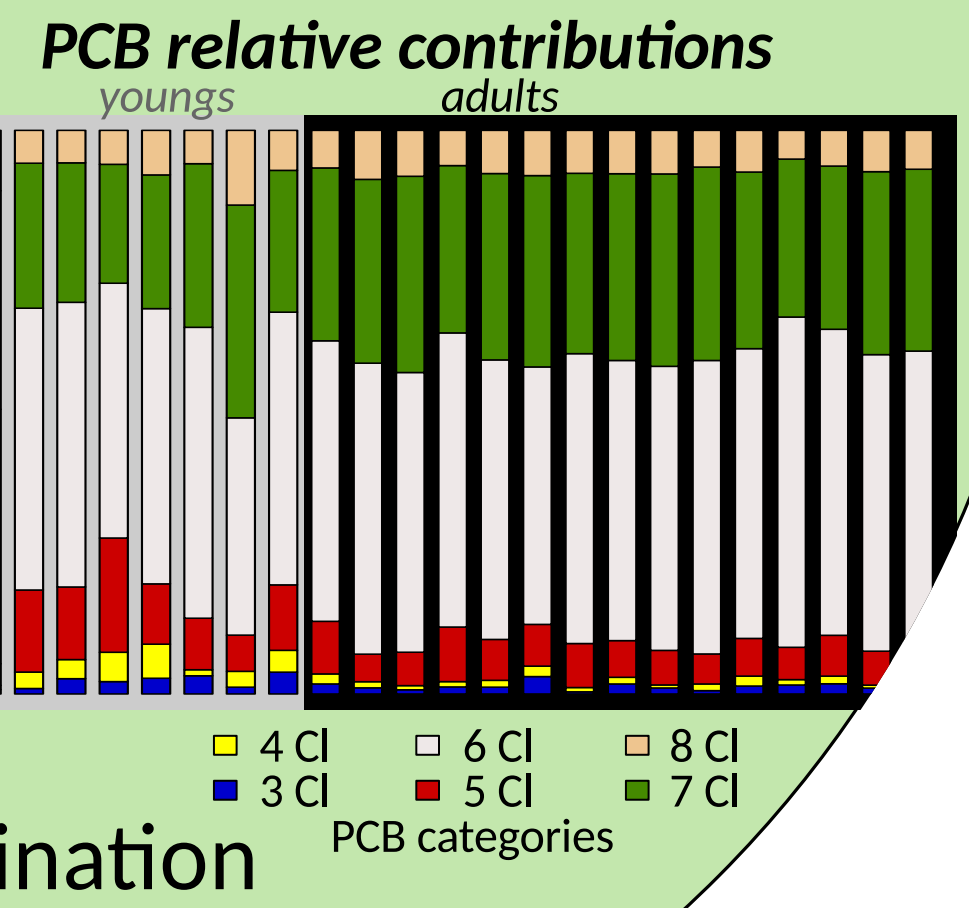


Similar PCB profiles in adults, not youngs

immature metabolism & unstabilized feeding habits

80% from 5-6 CI-PCB

historical electrical transformers contamination homogenously distributed by Rhône river inputs



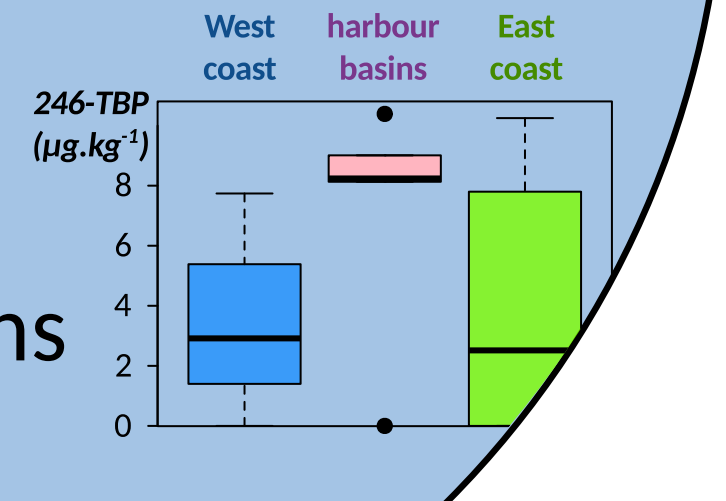
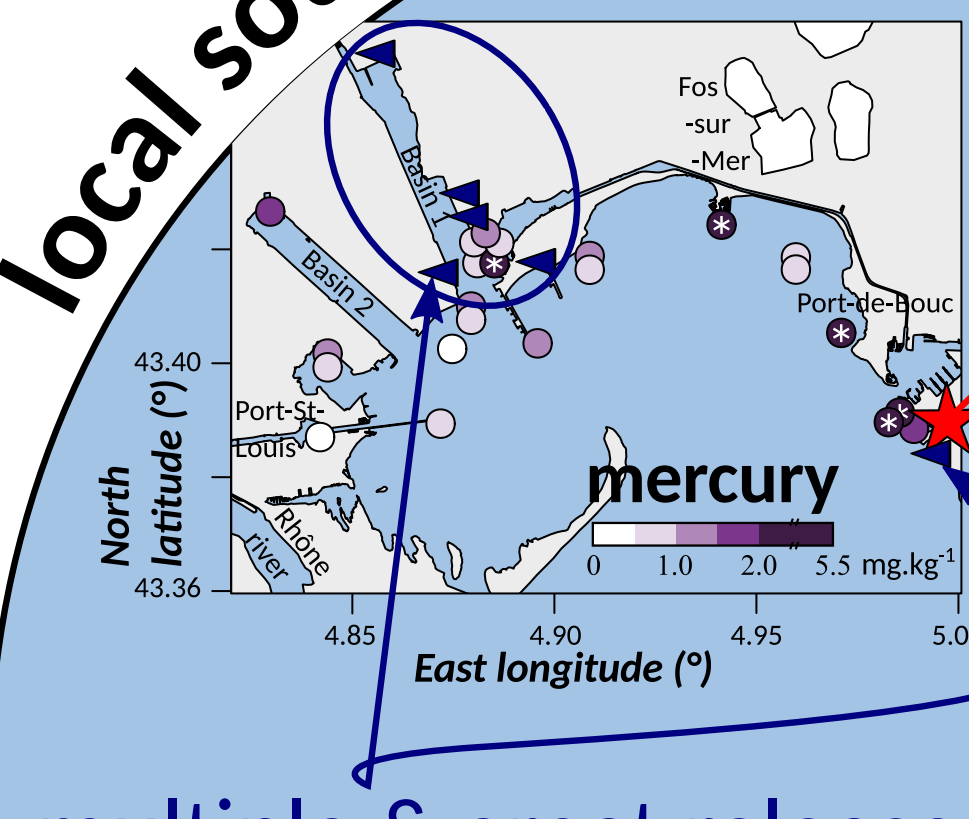
Local sources identification

strong release from industrial Hg electrolysis

Hg & As are high in East coast fish

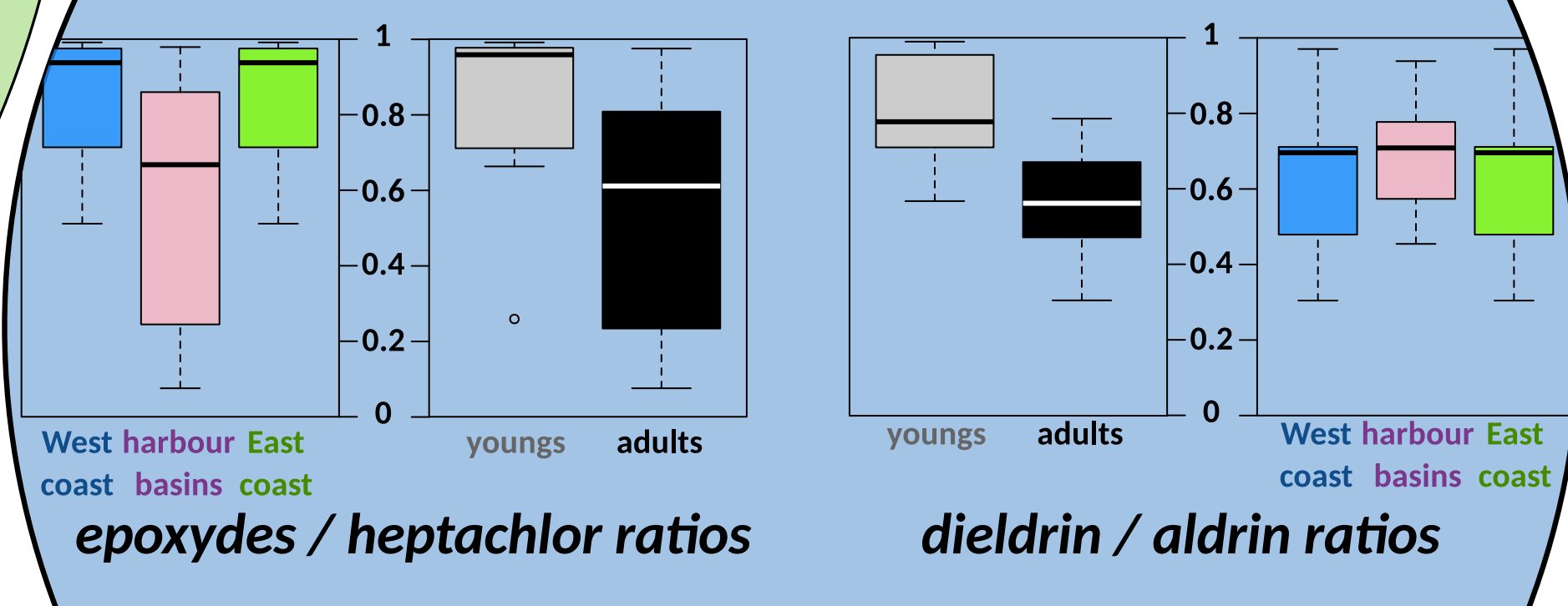
multiple & great releases of chlorinated waters from industrial installations

High tribromophenol in fish from harbour basins receiving the outlets (Boudjellaba et al., 2016)



temporal trends

Heptachlor & aldrin metabolites proportions increase in young fish



decay in the environment identified for heptachlor, aldrin, endosulfan, DDT pesticides

LOCAL IMPLICATIONS

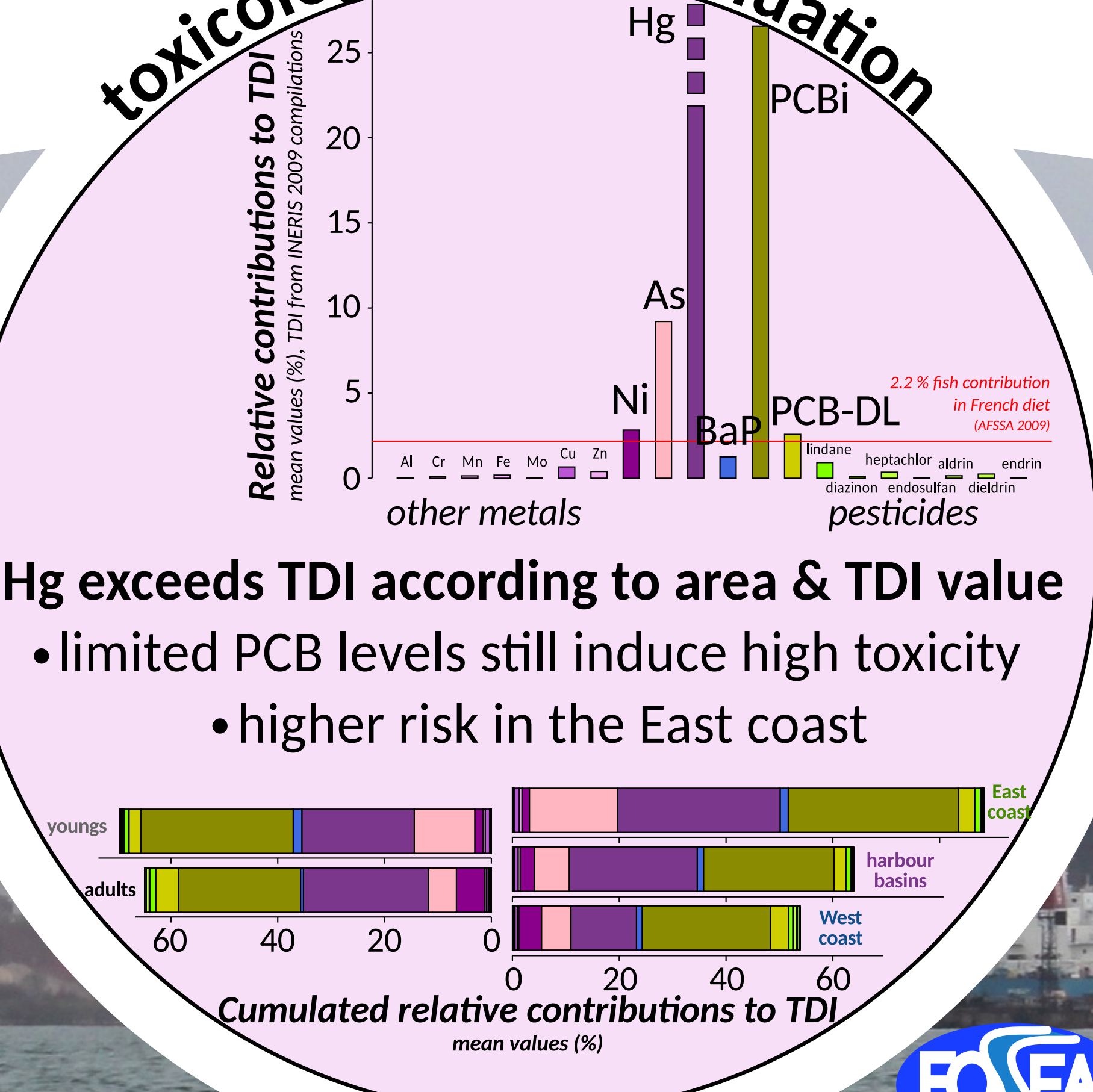
Great results acceptance by population & users

perception changed, seemingly not habits

Local authorities concern

Mediatic curiosity national & regional coverage

toxicological risk evaluation



Hg exceeds TDI according to area & TDI value

- limited PCB levels still induce high toxicity
- higher risk in the East coast

BIOINDICATION PERSPECTIVES

European congurs > 100 cm

reliable bioaccumulation results

representative of local contaminations



European congurs used as bioindicators of chlorination by-products 2016-2020

PACA Region & ANR funded project FOSSEA