304

# Persistent Organic Pollutants in harbour porpoises (*Phocoena phocoena*) stranded in the Portuguese coast


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## INTRODUCTION

- The Iberian harbour porpoise population is small and under serious conservation distress.
- In Portugal, the population status was recently updated to Critically Endangered.
- High porpoise mortality is associated with fisheries bycatch, but contaminants may play a role in the Iberian porpoise population decline.
- Despite the legally enforced bans, POPs (Persistent Organic Pollutants) are persistent and small cetaceans may bioaccumulate high concentrations due to their trophic position.

## OBJECTIVE

To assess traditional POP concentrations in **harbour porpoises** stranded in **Portugal**

## METHODS

The north coast strandings network (north Portugal) collects and necropsies stranded marine mammals. All samples are archived at the Marine Animal Tissue Bank (@ECOMARE)

The study included the following steps:

1. Sample selection: 42 porpoises (23 males; 19 females) stranded from 2005 to 2013
2. Age: growth layers in teeth
3. Reproductive status: gross and histological gonad analyses
4. POP concentrations: 21 compounds assessed by GC-ECD and GC-MS in blubber samples after lipid content determination
5. Statistical analysis (in R v.4.2.2): Linear models (excluding <1yr old porpoises) with Gaussian distribution (assumptions of normality, homogeneity and independence checked) [C]

Linear models evaluated:

- the influence of sex on POP concentrations in mature animals (n = 17)
- the influence of maturity state on males' POP concentrations (n = 19)

## RESULTS

- PCB 153 > PCB 138 > PCB 180 (representing 91,4% of the detected ∑PCB)
- highest ∑PCBs and ∑DDTs concentrations: 2 mature males (33.91 and 10.08 µg/g lw respectively)
- 8% of porpoises (excluding <1yr old individuals) exceeded the 17µg/g lw PCB toxic threshold (PCB Aroclor equivalent)
- p,p'-DDE/∑DDT > 0,6

Table 1 - Mean (±SE) ΣPCBs, ΣDDTs and ΣDrins concentrations (ug/g lw) in blubber samples of harbour porpoises stranded in the Portuguese coast.

| | Sex | | Maturity | | |
|---|---|---|---|---|---|
| | Males | Females | Mature | Immature | All[1] |
| | n = 19 | n = 17 | n = 17 | n = 19 | n = 42 |
| **∑PCBs** | 6.47 ± 1.79 | 5.70 ± 1.89 | 6.50 ± 2.02 | 5.75 ± 1.67 | 5.77 ± 1.12 |
| **∑DDTs** | 2.73 ± 0.60 | 1.41 ± 0.32 | 2.58 ± 0.63 | 1.68 ± 0.38 | 2.02 ± 0.32 |
| **∑drins** | 0.62 ± 0.17 | 0.37 ± 0.08 | 0.67 ± 0.19 | 0.35 ± 0.06 | 0.49 ± 0.09 |
| **∑HCH** | 0.03 ± 0.003 | 0.04 ± 0.01 | 0.04 ± 0.01 | 0.03 ± 0.003 | 0.04 ± 0.01 |

[1] including <1year old porpoises

- For ΣPCBs, ΣDDTs and Σdrins:
  - Mature porpoises: males have higher concentrations than females
  - Female porpoises: no differences between immature and mature individuals
  - Male porpoises: mature individuals have higher concentrations than immatures

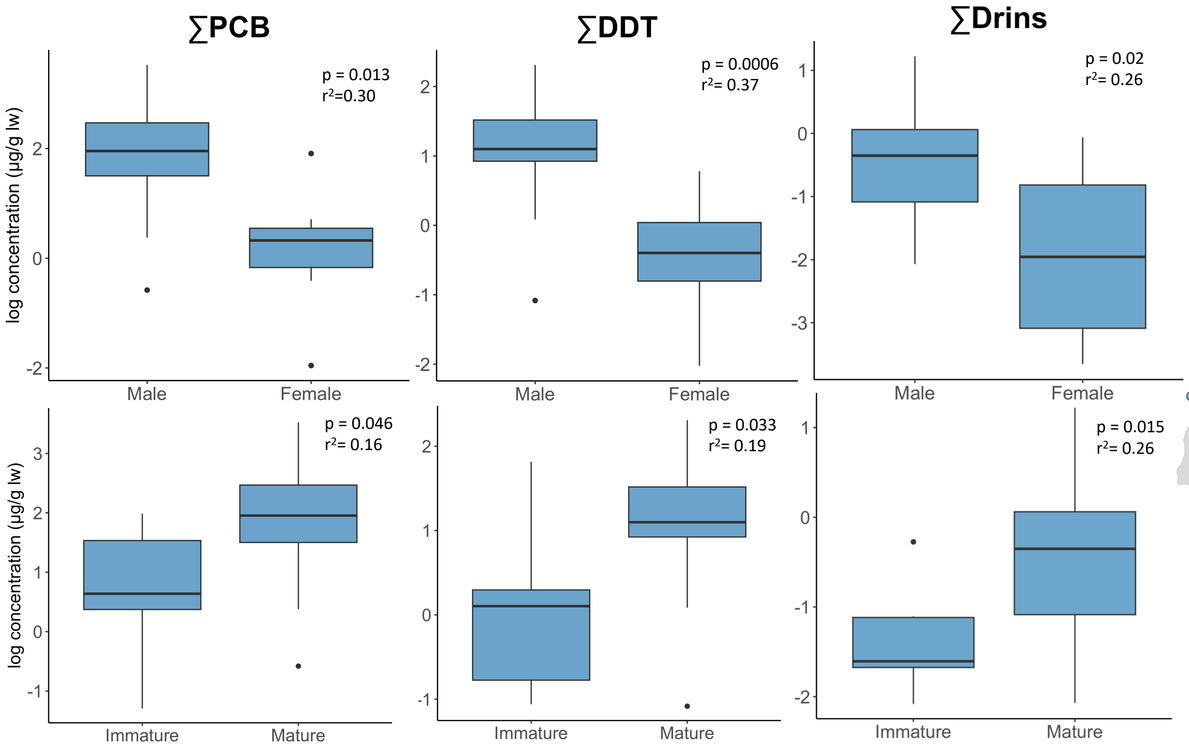


Fig 1 - ΣPCBs, ΣDDTs and ΣDrins concentrations (ug/g lw) in blubber of mature (above) and male (below) harbour porpoises stranded in the Portuguese coast (<1 year-old porpoises excluded). Median (horizontal lines), 1st to 3rd quartiles (boxes), min-max (bars) and extreme values (dots) are shown.

## CONCLUSIONS

- Predominant PCB congeners contain ≥ 6 chlorines, and concentrations are in accordance with other close-by areas [A,B]
- Differences are explained by bioaccumulation in males and contaminant transfer in mature females through placenta and lactation
- p,p'-DDE/∑DDT ratio confirms previous environmental contamination
- Further porpoises should be scanned for a wider range of traditional and emergent pollutants


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