

# POLYBROMINATED DIPHENYL ETHERS IN THE BLUBBER OF HARBOUR PORPOISES STRANDED OR BYCAUGHT ON THE COASTS OF ENGLAND AND WALES

by Robin Law, Colin Allchin, Moira Bennett, and Steven Morris

## Introduction

Polybrominated diphenyl ethers (PBDEs) are commonly used as flame retardants. These compounds are persistent, and are now widely distributed in the environment. A survey in 1995-96 demonstrated their presence in both sediments and fish downstream of sites of manufacture and use in the UK<sup>1</sup>.



Porpoise stranded at Bradwell, Essex.

Blubber samples were extracted using Soxhlet extraction with *n*-hexane for 4 hours, and extracts cleaned up and fractionated using alumina and silica column chromatography. BDE congeners of tribromo- to heptabromo-substitution were determined (congener numbers 28, 47, 66, 71, 75, 77, 85, 99, 100, 119, 138, 153, 154 and 190) and chlorobiphenyl congener CB198 was used as a quantification standard (Figure 2).

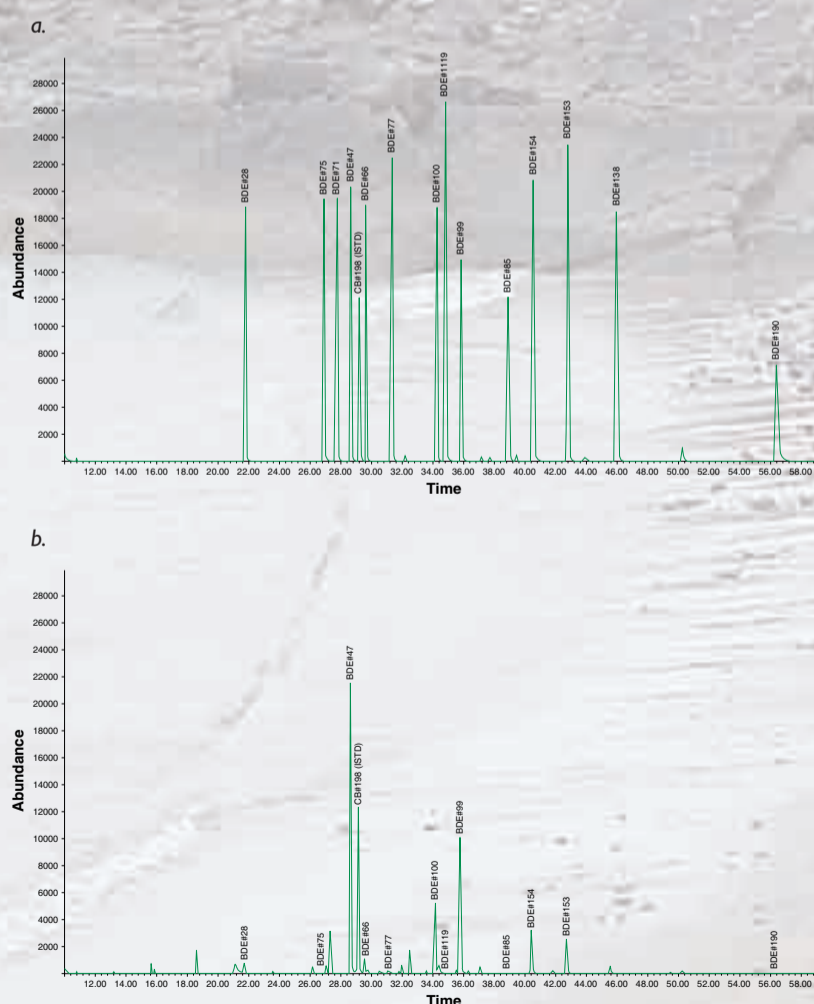


Figure 2. Ion current chromatograms (79 + 81 + 428 Da) for (a) a mixed congener standard solution, and (b) a blubber extract from porpoise reference number SW1999110, which stranded at Druridge Bay, Northumberland, on 17 January 1999.



Figure 1. Sampling locations.

We have now analysed blubber from 61 porpoises (marine top predators) stranded or bycaught between 1997 and 1999 around England and Wales (Figure 1). Only blubber from animals which were assessed as freshly dead following *post-mortem* study were sampled for analysis. We determined 14 BDE congeners using GC-NICIMS, and all analyses were undertaken within strict AQC protocols.

$\Sigma 14$ BDE concentrations ranged from not detected to 6,900  $\mu\text{g kg}^{-1}$  wet weight, in animals from Mablethorpe in E England and Tynemouth in NE England (body length 111 cm; a juvenile animal) respectively (Figure 3).

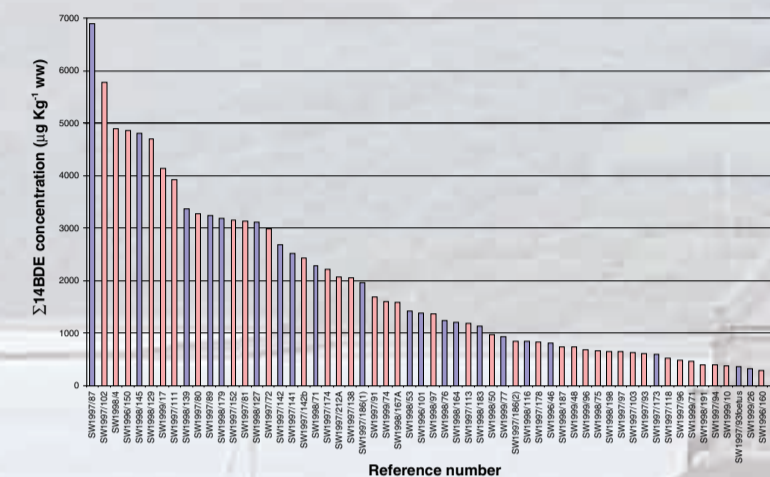


Figure 3. Porpoises ranked by blubber  $\Sigma 14$ BDE concentration (males in blue, females in pink).

BDE47 contributed 39-88 % to the  $\Sigma 14$ BDE concentrations, though with no apparent relation to the total burden (Figure 4). Thirty-four animals gave  $\Sigma 14$ BDE concentrations > 1,000  $\mu\text{g kg}^{-1}$  wet weight.

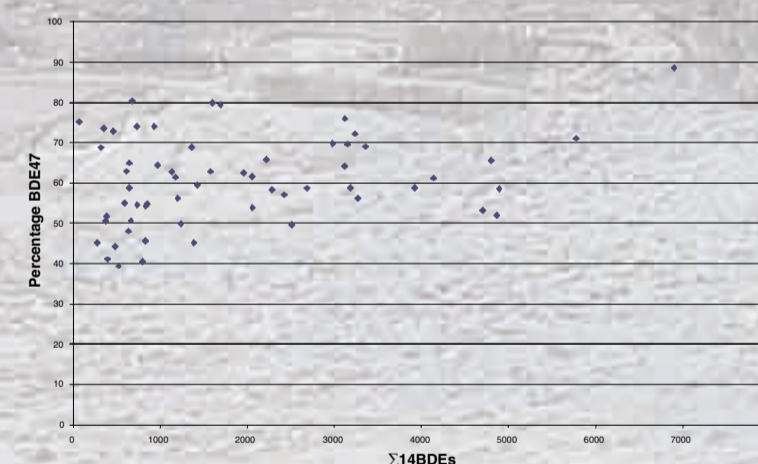


Figure 4. Percentage BDE47 against  $\Sigma 14$ BDE concentrations.

## Acknowledgements

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Concentrations of both CBs and BDEs were much higher than those seen in cormorants, fish-eating birds which feed both in estuaries and inland waters (Figure 5)<sup>2</sup>. Despite their widespread distribution, no comparable data for porpoises from other areas could be found in the literature.

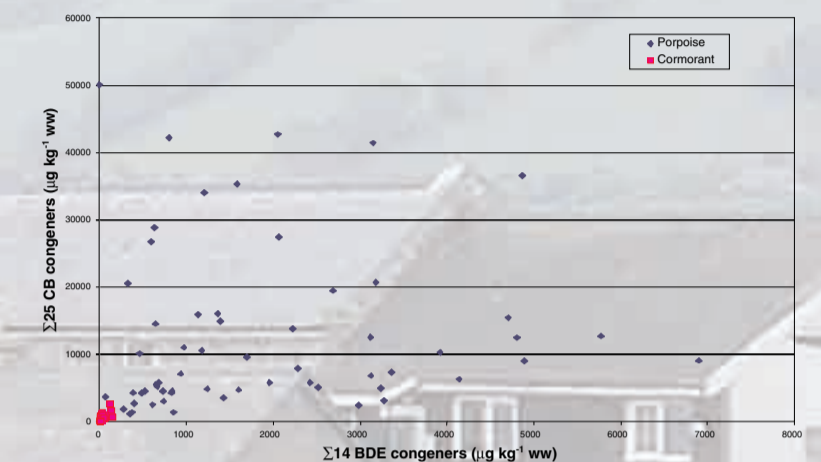


Figure 5.  $\Sigma 25$ CBs and  $\Sigma 14$ BDEs in porpoises and cormorants.

## Conclusions

- BDEs have also been detected in a range of baleen (fin & minke) and toothed (beaked, pilot, sperm and pygmy sperm) whales feeding in deep offshore waters off northern Europe<sup>3,4,5</sup>
- This highlights the widespread distribution of BDEs, and their bioaccumulation via marine foodchains
- The long term toxicity of BDEs to marine mammals is not fully understood, but changes to the balance of their endocrine systems seem to pose the most serious risk<sup>6</sup>
- Further studies of both distribution and effects are needed so that we can assess the potential impact of BDEs on marine mammals if use and discharge continues.

## References

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