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## DECLINE IN PCB LEVELS IN OTTERS (*LUTRA LUTRA*)

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### ABSTRACT

A decline in total PCB levels in tissues of otters (*Lutra lutra*) from England and Wales, averaging 8% per year over the period 1983-1992, is reported. Mean PCB levels are now unlikely to pose a threat to otter populations. ©1998 Elsevier Science Ltd

### INTRODUCTION

The otter has declined over much of its European range over the last 40 years and is now extinct in some countries [1,2]. Bioaccumulating contaminants, especially PCBs, are considered to be the main cause of the decline [2]. Populations of otters which are endangered or in decline have mean PCB levels greater than 50 ppm, those which have remained stable or are increasing have mean PCB levels lower than 50 ppm [3]. Concentrations of PCBs greater than 50 ppm have been associated with reproductive problems in experimentally dosed mink (*Mustela vison*) [4].

The otter population of England and Wales went into rapid decline from the late 1950s but it began to slowly recover from the early 1980s [5], a process which has accelerated in the 1990s [pers. obs.], suggesting that adverse factors are no longer operating on the population. This paper presents evidence of a steady decline in PCB levels in otters from England and Wales since the early 1980s.

### METHODS

Analyses of PCBs were conducted on the livers (or occasionally thigh muscle) of a total of 32 otters found dead in England and Wales between 1983 and 1992. Concentrations in these two tissues have previously been shown to be comparable [6]. Sample preparation and analysis have been described elsewhere [7,8].

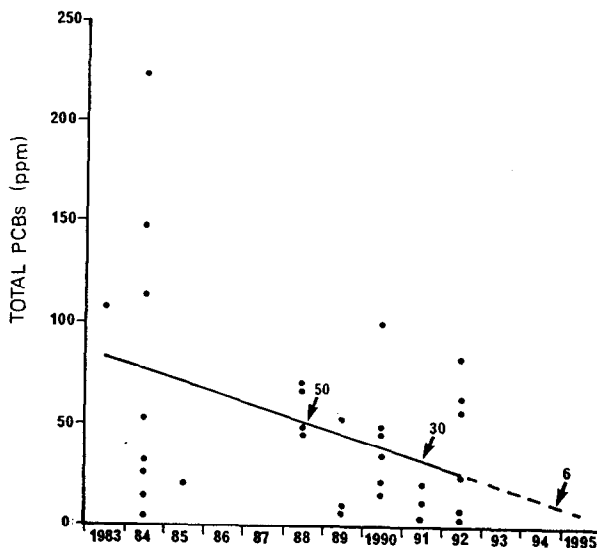


Fig.1. PCB concentrations ( $\text{mg kg}^{-1}$  lipid) in tissues of otters collected between 1984 and 1992. Arrows indicate standards (see text).

## RESULTS

There is considerable scatter in the data, especially in earlier years, which is characteristic of environmental samples. Nevertheless, despite the relatively small sample, the trend of decline in PCB concentrations in otter tissues from England and Wales between 1983 and 1992 is significant (Fig. 1), and can be described by the regression equation:

$$[\text{Total PCB}] = -5.83 [\text{year}] + 564 \quad (t = -2.22, P < 0.05)$$

The rate of decline averages 8% per year, similar to the 7% per year described for Danish otters, which are also expanding in range [8].

It has been suggested that otters are less sensitive to the effects of PCBs than mink [9]. However, recent studies have shown a strong negative relationship between vitamin A levels in livers, expressed as TCDD equivalents, and PCB concentrations. The incidence of disease in Danish otters increased with PCB burden and the concentration at which these effects were measured were similar to effects levels in mink [10]. Several environmental standards to protect otters against PCBs have been proposed. The mean PCB level in English and Welsh otters fell below the 50 ppm level, causing health effects in mink, in 1988 (Fig.1). A more stringent standard of 30 ppm, based on the precautionary principle [3], was passed in 1991, while a more stringent standard still of 6 ppm, based on dose effects levels on vitamin A deficiency [10] would have been

passed by 1994 if the regression line in Fig. 1 is extrapolated forwards. These results suggest that mean PCB levels no longer pose a threat to otter populations in England and Wales and that the current re-colonization of the species' former range should continue.

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