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**ASPECTS OF PCB LEVELS IN DANISH OTTERS (*Lutra lutra*) AND NOTES
ON THE LEVELS IN STONE MARTENS (*Martes foina*)**

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Abstract: The widespread decline of otters in most of lowland Europe has been linked to bioaccumulating toxic chemicals such as PCBs. The Danish population is become restricted to the North West of the country. Liver samples from otters collected between 1991 and 1994 were analysed for PCB content, and this was compared to levels from stone martens, which are found throughout and beyond the otter range. In general, PCB levels were below that thought to cause reproductive and physiological failures, except around Karup. Concentrations in eels was higher than in other fish sampled, especially in Karup, but were not selectively eaten by otters. A larger PCB survey in the otter range and adjacent catchments should be done to find out if PCB concentrations are preventing southward expansion of the otter population

INTRODUCTION

A number of factors have been linked to the widespread decline of otter populations (*Lutra lutra*) in most of lowland Europe.

The contamination with bioaccumulating toxic chemicals as PCBs are regarded as being at least partly responsible, and will process a continuous thread causing reproductive implications in the remaining otter populations (Mason and Macdonald, 1986; Olsson and Sandegren, 1991) and other mustelids. Information on contaminants in stone martens (*Martes foina*) are scarce (Gutleb and Leonards, 1991). The Danish otter population became restricted during the last decades to the north western parts of the country which now holds a thriving population mainly around the western Limfjord (Madsen *et al.*, 1992).

METHODS

From otters collected between 1991 and 1994 32 liver samples were selected for analysis from animals representing three areas, marine around the western Limfjorden, and two freshwater systems Skals and Karup Stream (Figure 1).

A small number of fish and spraints were collected at locations representing the three areas. 10 spraints from each locality were combined to one sample. Fish samples were made up by muscle tissues from 3-4 individuals, eel samples from the freshwater catchments 10.

Additionally two stone martens found within the distribution area of otters in Denmark were analysed. Levels of 26 PCB congeners were determined on a GC-ECD Hewlett-Packard 5890 A against individual PCB standards. Reported are the preliminary results on the total PCB concentration (sum of 26 congeners).

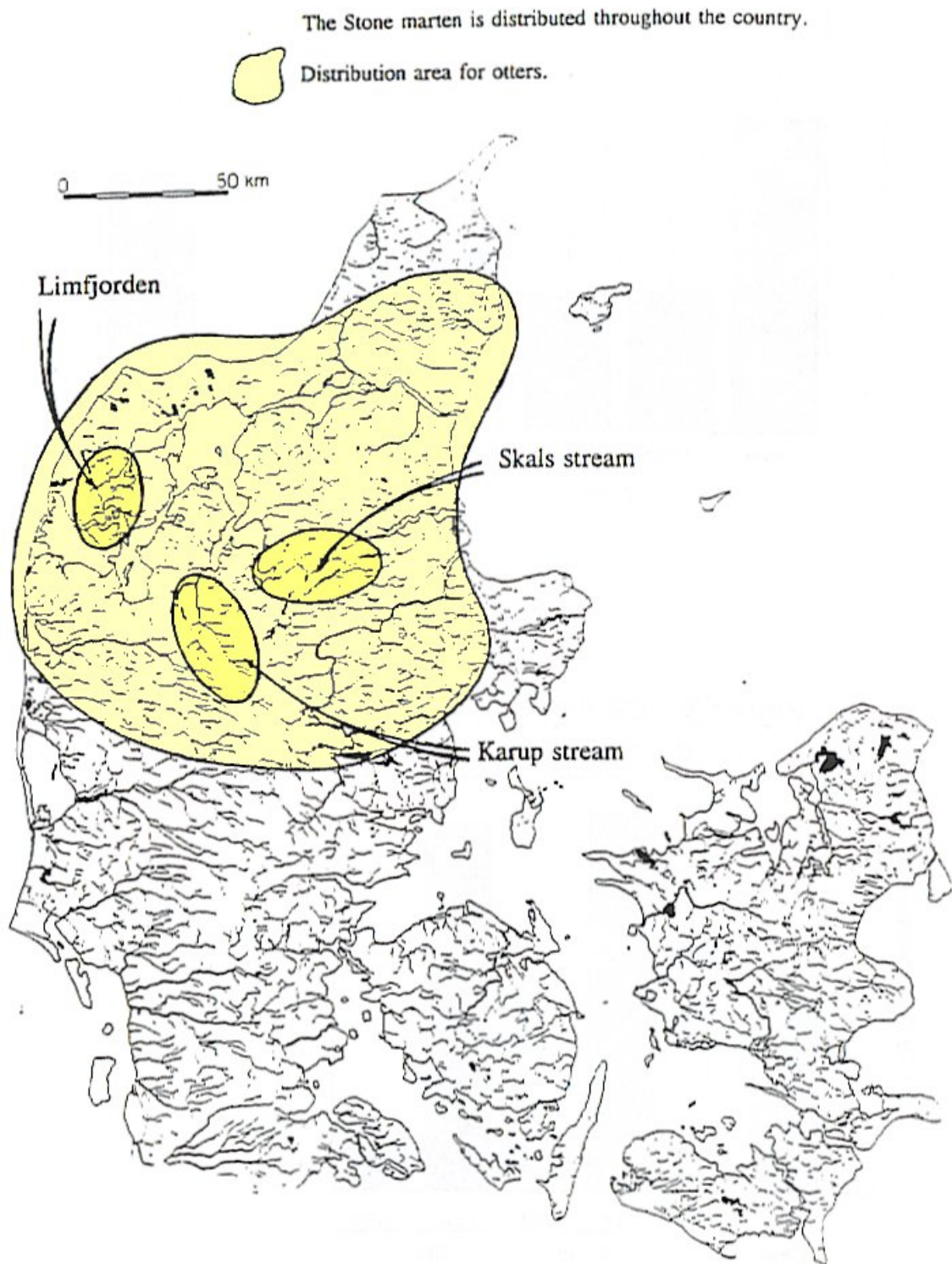


Figure 1. Catchments in Denmark from which samples were obtained

RESULTS AND DISCUSSION

Otter

The concentrations in otters (1.2-32.8 mg/kg lipid weight, see Figure 2) correspond with the reported generally low levels of PCBs in Danish otters collected from 1980 to 1990 and with levels in other stable European populations (Mason and Madsen, 1993; Olsson and Sandegren, 1991).

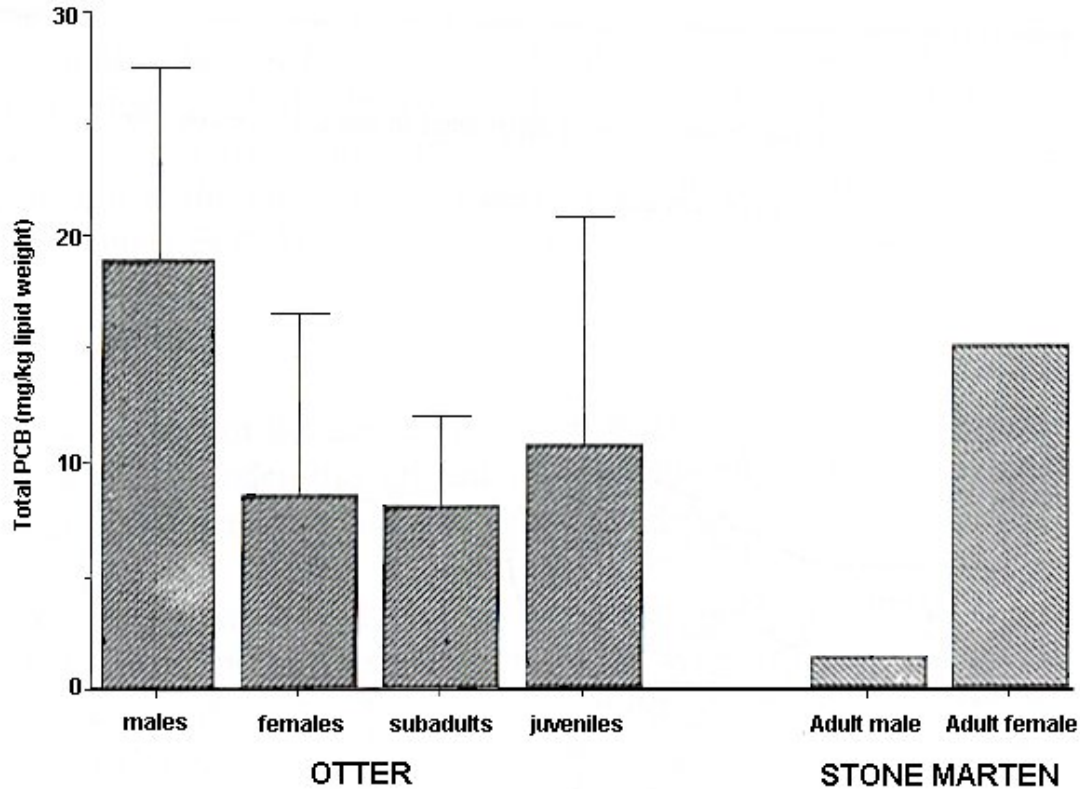


Figure 2. PCB levels in otter and stone marten

An annual decline in the PCB concentrations reported by Mason and Madsen (1993) is not evident in this study, but the total mean is lowered compared to the mean from otters collected in the 1980's. 47 % of the otters analysed in this study had concentrations greater than 10 mg/kg lipid weight the proposed no effect level (70 % in Mason and Madsen, 1993).

Only one otter not included in Figure 2 showed a PCB concentration exceeding the critical concentration 50 mg/kg (18 % in Mason and Madsen, 1993) used assessing threats to otter populations (Olsson and Sandegren, 1991). This was an adult male in very poor body condition with an exceptional high PCB burden of 225.36 mg/kg (lipid weight). It suffered hepatic disorders, with a liver weight at 10 % of the total body weight skinned (Henriksen, National Veterinary Laboratory, pers. comm.).

Fish

The most important fish species show PCB levels below the no effect reproduction level of 0.025 mg/kg fresh weight in food for mink (*M. vison*) (Den Boer, 1984). PCB contamination in eels from the freshwater catchments Skals and Karup streams exceeds this level.

Figure 3 showed a higher level of PCBs in eel than roach or trout from the same area. Otters show no food preferences eating up to 10 % eels only in the surveyed catchments, hence the average PCB concentrations in food below must be considered under the no effect level.

On the islands in the southern part of Denmark where otter populations expired in the 1980's, higher levels of PCBs have been measured in fish (Anderson *et al.*, 1986).

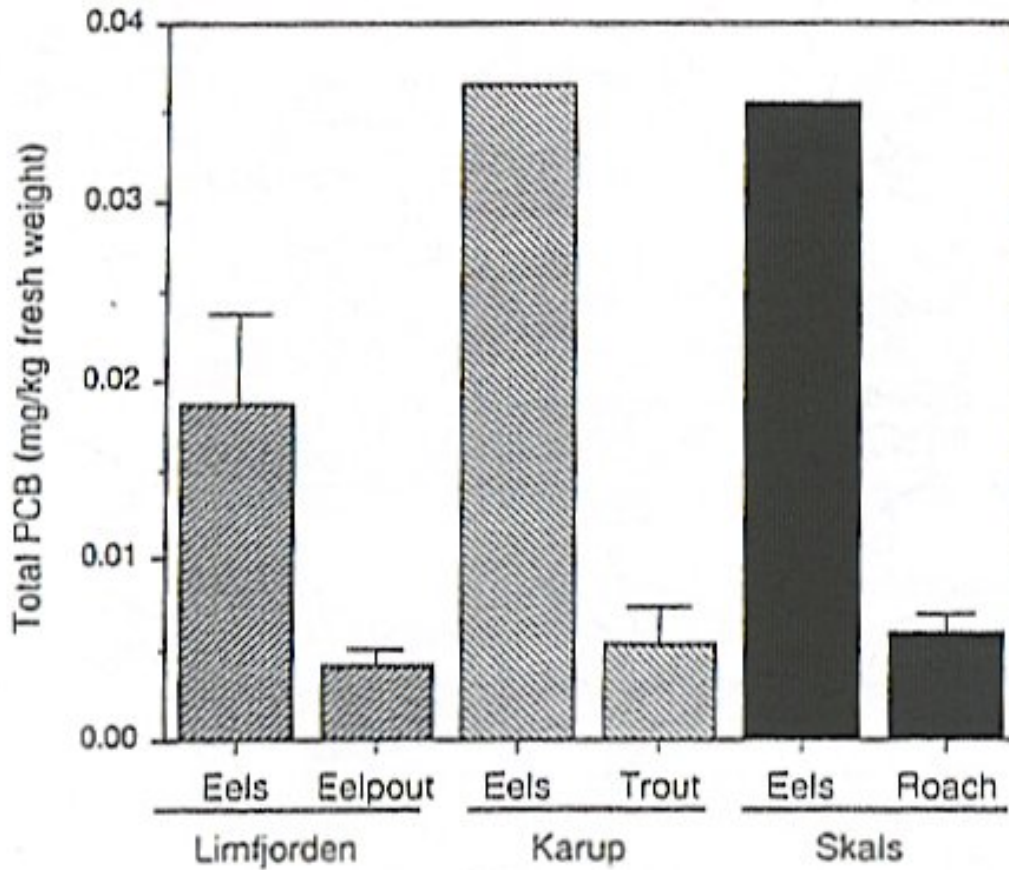


Figure 3. PCB levels in fish from different areas

Sprints

In 71 % of the sprints from the stronghold of the Danish otter population around the western Limfjord, the PCB concentrations were below the proposed no effect level of PCBs of 4 mg/kg lipid weight (Figure 4). None were above the level of concern at PCB concentrations higher than 9 mg/kg lipid weight proposed by Mason and Macdonald (1993), which are used as guidelines for levels in sprints. The sprints from the southern most site in this study Karup all exceeded this latter level.

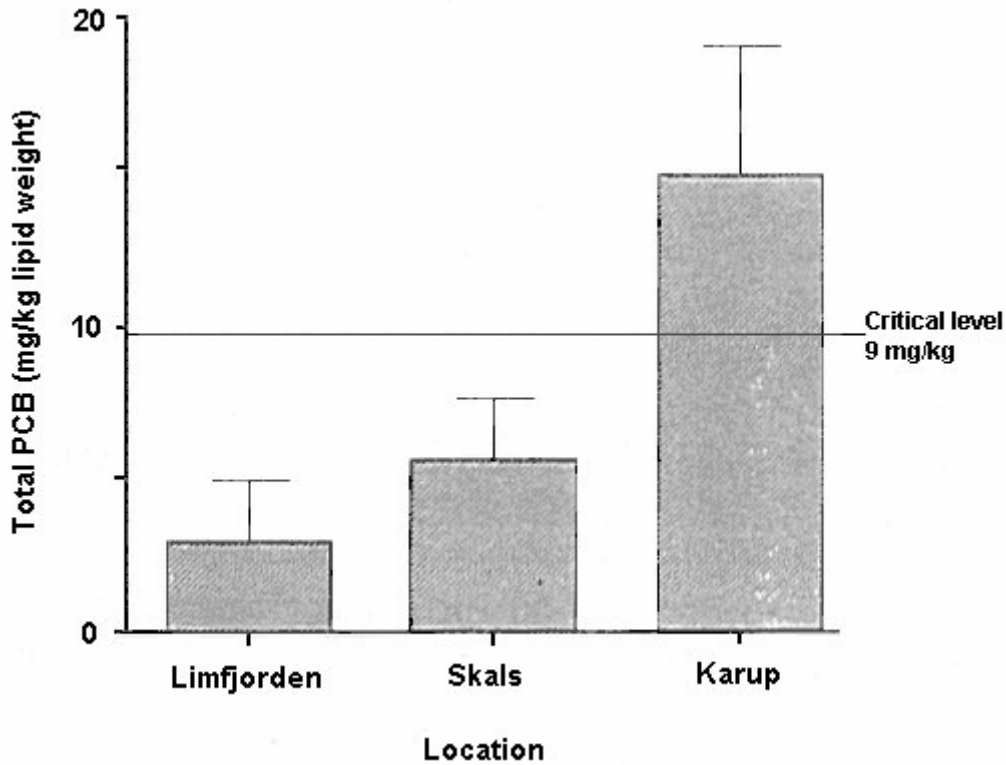


Figure 4 . PCB levels in spraints

Stone Marten

Gutleb and Leonards (1991) reported PCB concentrations in Austrian stone martens just below the no effect level for mink (3.9 to 9.0 mg/kg lipid weight). Low concentrations should be expected in stone martens due to their terrestrial habits. As shown in Figure 2, the male had a low PCB level at 1.3 mg/kg (lipid weight) but surprisingly high concentration of PCBs was found in the liver of a lactating female, 15.1 mg/kg. It had drained most of its fat deposits but with a body weight on 1.4 kg it must be regarded as in generally healthy condition. Identical concentrations were seen in subcutaneous fat from the male and mammary glands in the female (0.42 mg/kg lipid weight). The high PCB concentrations in the liver of the female reflects a higher metabolism and recirculating of the PCBs stored in the body fat and a differential distribution of PCBs among organs during reproductive stages as demonstrated in mink by Patnode and Curtis (1994).

The lipophilic character of PCBs allows them to be efficiently excreted during the lactation through the milk, as illustrate by a female otter killed together with her 3-4 month old cub (PCB concentrations 1.2 mg/kg; 5,7 mg/kg respectively) (Figure 5). A subadult male killed at the same location (11,8 mg/kg) and a juvenile from the Karup catchment had relatively high levels of PCBs, 27.7 mg/kg, indicating that young animals experience high PCB stress; 1. because of a relative higher PCB contamination in the milk, and 2. because of a limited elimination through anal gland secretion (Leonards *et al.*, 1994).

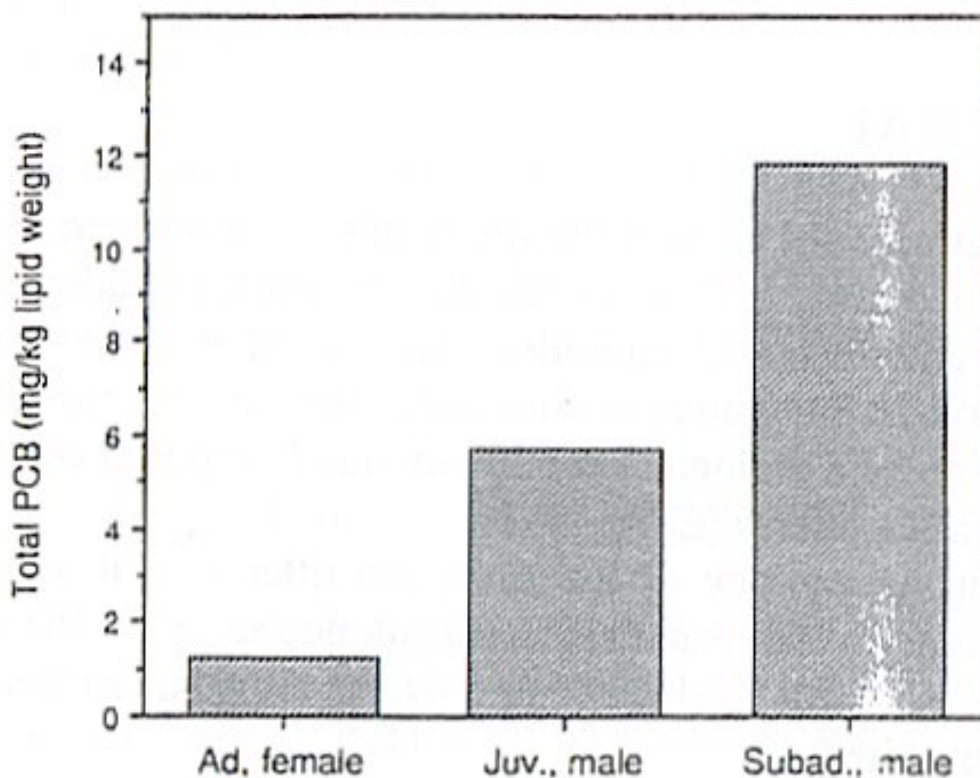


Figure 5 . PCB levels in mother and cub.

CONCLUSIONS

The general picture of the contamination of PCBs in Danish environment must be regarded as low, under the critical reproduction level to the remaining otter population in Denmark (and indeed other mustelids).

More research should be focused on a larger survey of PCB levels in spraints and the contamination in fish from different water systems where the otter is already resident and in adjacent catchments to determine the importance of PCB in inhibiting the Danish otter population from expanding further south.

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