

Science for Environment Policy

Effects of organochlorine pollution on animals take a long time to wear off

Populations of otters, grey seals and sea eagles are slowly recovering in Sweden, which is likely to be thanks in part to a ban on organochlorine chemicals, such as PCBs and DDT, in the 1970s, according to a new study. However, the research shows that negative effects of these chemicals on the reproductive health of female animals persisted for more than 15 years after the ban was introduced.

In Sweden, and elsewhere in Europe, otter, grey seal and sea eagle populations declined from around 1950 owing to what is referred to as 'depressed reproduction', leading to low birth rates. Although evidence was limited, it was assumed that the reproductive health of all three had been affected by high environmental concentrations of organochlorine chemicals, such as polychlorinated biphenyls (PCBs) and the pesticide dichlorodiphenyltrichloroethane (DDT). For example, in the 1970s, studies identified disease symptoms that affected the wombs of a large number of female seals. The disease was assumed to be caused by contamination of the animals' feed with the chemicals.

The new study by Swedish and Danish researchers lends further support to the theory that PCBs and DDT caused populations to decline. The researchers collated data from the last four decades to show that improved reproduction in otters, grey seal and sea eagles is related to annual decreases in concentrations of organochlorine chemicals in the environment.

The researchers studied the carcasses of female otters and grey seals found and collected in Sweden from between 1970-2010 for signs of pregnancy and, in the case of seals, diseased uteruses. They also studied used bird monitoring data on sea eagle fledglings on the Swedish Baltic coast, as well as eggs that were collected from abandoned nests. Concentrations of PCBs and DDT in eggs and tissue samples from the dead animals were measured.

Organochlorine concentrations declined steadily over the 40-year study period. Meanwhile, signs of reproduction increased from 2% to 67% in the otter population. The rate of uterine disease in grey seals fluctuated between 0% and 100%, but eventually fell to 0% in the 2000s, with pregnancy rates rising to 100% by 2010. Until the early 1980s, only around one in three sea eagle pairs were producing a fledgling each year. Since the 1990s, the average has been closer to one fledgling per pair each year. In addition, the researchers found that prior to the 1990s eggshells were more likely to break before hatching.

The recovery in otters, grey seals and sea eagles started at around the end of 1980s. Currently, grey seals are no longer on the Swedish red list for threatened species, sea eagles have been reclassified from 'vulnerable' to 'near threatened', and otters may soon be reclassified in the same way. Although this is a positive trend, the researchers highlight the fact that the effects of contamination are long-term and cannot easily be reversed. This study thus serves a reminder that recovery from environmental contamination can take many years.

The EU banned PCBs and DDT, classified as persistent organic pollutants (POPs), under the 1978 Directive (79/117/EEC) prohibiting the use of certain active ingredients plant protection products¹ and, later, regulations to align European legislation with international conventions on POPs².



22 November 2012
Issue 307

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Source: Roos, A.M., Bäcklin, B.-M.V.M., Helander, B.O., Rigét, F.F., Eriksson, U.C. (2012). Improved reproductive success in otters (*Lutra lutra*), grey seals (*Halicoerus grypus*) and sea eagles (*Haliaeetus albicilla*) from Sweden in relation to concentrations of organochlorine contaminants. *Environmental Pollution*. 170: 268-75. DOI: 10.1016/j.envpol.2012.07.017

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Theme(s): Biodiversity, Chemicals, Marine ecosystems

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To cite this article/service: "Science for Environment Policy":

European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

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