



Wildlife Disease & Contaminant Monitoring & Surveillance Network

NEWLETTER: Number 6

Spring SPOTLIGHT 2013

Mercury (Hg)

The **Predatory Bird Monitoring Scheme (PBMS)** has monitored total mercury concentrations in a range of species that inform our understanding of exposure levels in different habitats and food chains. The longest running dataset that the PBMS holds is for Hg residues in the livers of sparrowhawks, *Accipiter nisus*, because they have a wide distribution across the Britain and can be used as a sentinel species for the terrestrial environment. Currently Hg liver concentrations were below those thought to have an adverse effect on individual birds.

Mercury can affect embryo development and egg hatchability. Therefore, the PBMS has monitored Hg concentrations in the eggs of a range of species including those of conservation concern, such as golden eagle, *Aquila chrysaetos*, and the re-introduced white-tailed sea eagle, *Haliaeetus albicilla*, and merlin, *Falco columbarius*, that hunts in upland habitats. Currently Hg residues are also monitored in the eggs of northern gannet, *Morus bassanus*, which is used as a sentinel for the marine environment. The residues measured in the eggs of golden eagle and gannets collected between 2007 and 2009 (the most recent data we have) were below those thought to have an adverse effect, but some residues in individual merlin eggs were above no effect concentrations proposed for birds generally. Few white-tailed sea eagle eggs are received for analysis by the PBMS but many of the eggs that have been analysed contain Hg concentrations above levels associated with adverse effects on bird embryos and hatching success.

Evidence for changes over time in mercury concentrations in predatory birds or their eggs is inconsistent across the species monitored. Where a decline has been detected, it has occurred before approximately 1990 and has remained largely unchanged since then.

As part of the collaboration between the **PBMS** and **Cardiff University Otter Project (CUOP)**, liver Hg concentrations were analysed in a stratified sample (stratified by Defra region, age class and sex) of 157 Eurasian otters (*Lutra lutra*) that had been found dead across England and Wales between 2007 and 2009. Mercury was detected in 99% of the otters analysed and concentrations did not vary between different regions of England and Wales and were higher in adults than juveniles. Overall, the median liver total dry weight Hg concentration was 4.96 g/g and the maximum was 50.3 g/g; these concentrations were equivalent to 1.53 µg/g wet weight and 15.4 µg/g wet weight. Mercury liver concentrations of >25-30 µg/g wet weight have been proposed as indicative of likely adverse effects on survival and reproduction in mammals. These concentrations are an order of magnitude and two-fold lower, respectively, than the proposed liver concentrations associated with adverse effects. These data suggest that current exposure of otters to mercury in England and Wales is unlikely to cause any acute toxic effect.

CSIP has studied liver concentrations of Hg (and other contaminants) in UK-stranded and by caught cetaceans (primarily harbour porpoises, *Phocoena*

Scheme News

WIIS - A 49-year-old pigeon fancier from Sunderland pleaded guilty to three charges of illegally using and storing the banned pesticide, Carbofuran, and fined a total of £600. This outcome followed a collaborative investigation between WIIS, Northumbria Police, the RSPB and FERA. Carbofuran is a poisonous substance which was banned in 2001. It is highly toxic to animals and humans - breathing its dust, swallowing it or contact with it can be extremely dangerous. [Link to full article.](#)

WIIS-Scotland. The latest positive results for 2012 have been added to the [SASA website](#)

CUOP have recently published a paper examining the seroprevalence of *Toxoplasma gondii* in the Eurasian otter. Infection with *T. gondii* was found to be common and widespread. There was significantly more infection in the east than in the west of the UK and there was an increase in seroprevalence with age. [Link to journal](#)
In addition, the project has recently published a report in collaboration with CHEMTrust that aimed to assess whether otter health indicators correlate with levels of thirteen frequently occurring persistent organic pollutants. The report was featured on the BBC's Countryfile programme and in other national and international media. [Link to report](#)

Animal Health and Veterinary Laboratories Agency (AHVLA) Diseases of Wildlife Scheme. The latest AHVLA Diseases of Wildlife Scheme [quarterly report](#) has been published.

Suspected ethanol toxicity in juvenile blackbirds and redwings (Duff, J.P., Holmes, J.P. and Streete, P. (2012)

phocoena) that died between 1991 and 2006. The median liver wet weight Hg concentration was 7.0 g/g and the maximum was 589 g/g. This concentration, and the next highest (480 g/g wet weight), were in adult bottlenose dolphins (*Tursiops truncatus*). These highest concentrations would likely kill a human but cetaceans have evolved a slow mineralisation and detoxification process which leads to Hg being deposited as pure mercuric selenide in the livers. These particles are not attacked by proteolytic enzymes and so are inert. As Hg intake proceeds, additional Selenium is also accumulated in a molar ratio of 1. (Figure 1). This mechanism is thought to be the means by which cetaceans can tolerate very high liver concentrations. Full details of the results of the study can be found in the paper by Law *et al.*, (2012), Contaminants in cetaceans from UK waters: status as assessed within the Cetacean Strandings Investigation Programme from 1990 to 2008. Marine Pollution Bulletin 64: 1485-1494.

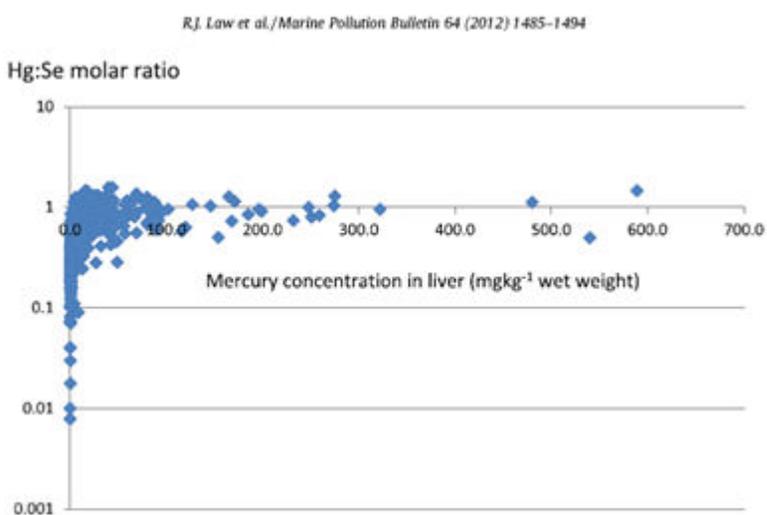


Figure 1. The Hg:Se molar ratio as a function of mercury concentrations (mg kg⁻¹ wet weight) in livers of 492 UK marine mammals of 18 species (mainly harbour porpoises *n*=436, but also including other cetacean and seal species).

Mercury in fish muscle. The upper 95% confidence limit concentrations for 2010 were in the range of 49-463 µgkg⁻¹ wet weight, with levels at most sites above the Background Assessment Concentration (BAC) and below the EC food limit value. Slightly elevated concentrations were found in the Eastern and Western Channel, whereas more elevated concentrations were recorded in the Tyne, Humber and Irish Sea areas ([link to report](#)). The sampling station at Cardigan Bay however, recorded an upper 95% confidence limit concentration of 564 µgkg⁻¹, which is above the EC food limit value. No temporal trend was observed for Hg in fish muscle over the studied period. The concentrations of Hg in fish muscle are found to be more elevated in some industrial estuaries, although overall there do not appear to be risks to human health. Monitoring should be maintained in areas where elevated concentrations have been found, especially in the Cardigan Bay area.

As part of the **CSEMP** programme, aiming to deliver OSPAR and EU directive requirements, sediment and biota samples are analysed for metals and other POPs in the UK marine area. In general it is still above Effects Range – Low (ERL) in sediments and below EC food limits in biota. The Hg originates from historical industry and domestic coal-burning, which has released many tonnes of Hg into the marine environment over several decades. In addition to this, the sediments in the industrialised estuaries are also contaminated with Hg and other contaminants from dockyards, shipping, chemical works, waste, oil refineries and sewage works.

Veterinary Record;171:453 doi:10.1136/vr.e7322) has been described by the AHVLA Diseases of Wildlife Scheme. Affected birds found in Cumbria, August 2011 had consumed Rowan and Holly berries. Click [here](#) for access.

DRAHS, in collaboration with the Institute of Orthopaedics, recently investigated the death of a satellite-tracked hen harrier on a grouse moor in Yorkshire. DRAHS determined, via a new forensic technique using a scanning electronmicroscope equipped with an energy dispersive x-ray analyser, that there was a high probability that the bird had been shot. The work received coverage in [The Independent](#), The Financial Times and BBC News On-line.

PBMS. The latest research paper from the PBMS 'Key factors affecting liver PBDE concentrations in sparrowhawks (*Accipiter nisus*) was recently featured by [Chemical Watch](#) and by [Planet Earth Online](#). The paper by Crosse, J.D. *et al.* was published in Environmental Pollution 177, 171-176, doi:10.1016/j.envpol.2013.02.006.

WILDCOMS news

The **WILDCOMS** network has been highlighted by Defra as one of the indicator tools to assess the UK's sustainable use of pesticides. The UK National Action Plan for the Sustainable Use of Pesticides (Plant Protection Products) published by [Defra](#) can be downloaded from gov.uk website, Publications tab [here](#).

The **WILDCOMS** network has been featured in the News and Events pages of the [The British Society for Parasitology](#) website. To see the article, click on the [link](#).

CONTACT US:

If you would like to see a particular topic in the "spotlight" section of the WILDCOMS quarterly bulletin, or would like to contact us about other WILDCOMS related matters, please e-mail the WILDCOMS coordinator, Dr Gloria Pereira (mdgds@ceh.ac.uk)