Summer SPOTLIGHT 2013 www.wildcoms.org.uk

Newsletter: Number 7.

Spotlight – Monitoring activities in Scotland

Scottish Environment Protection Agency Lipophilic monitoring network

The Scottish Environment Protection Agency (SEPA) is Scotland's environmental regulator. Its main role is to protect and improve the environment. This involves regulating activities that can cause harmful pollution and monitoring the quality of Scotland's air, land and water.

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As part of its remit, SEPA monitors thousands of samples every year from land, water and air to help assess the quality of the Scottish environment. Historically the majority of these samples have been water. However, some contaminants bind to organic matter or readily dissolve in fats and are then absorbed into the fatty tissues of organisms where they can accumulate. These chemicals are therefore often more easily detected in sediments and organisms than in water. The Water Framework Directive is now increasingly driving a requirement for monitoring contaminants in sediments and biota as well as in fresh waters, something that has been a part of routine marine waters monitoring programs for a number of years.

In 2004 SEPA began a project to monitor contaminant concentrations in the tissues of eels (*Anguilla anguilla*) from rivers to get a better understanding of the levels of Persistent Organic Pollutants (POPs), potentially harmful chemicals that stay in the environment for a long time. The concentrations of POPs in water can be minute – often below what can be detected – but over time these tiny amounts can be absorbed into the fatty tissues of living things, where they can build up to measurable amounts. In spring 2011 SEPA published a report on the project, looking forward and considering options for future monitoring. This was quickly followed by the instigation of a "Lipophilic Chemicals Monitoring Strategy" and the roll-out of a small-scale monitoring plan. The current monitoring plan includes sampling sediments, eels and trout (*Salmo trutta)* from a small number of rivers across Scotland to provide more information about the presence of lipophilic contaminants in the Scottish environment.

The **Wildlife Incident Investigation Scheme** operated in Scotland by Science and Advice for Scottish Agriculture (SASA) investigates suspected poisoning of wildlife, beneficial insects, companion animals and livestock in cases where there is evidence that pesticides may be involved. The origins of the scheme lie in concerns about the environmental effects of the use of persistent organochlorine insecticides, especially the effects on egg shell thickness during the late 1960's.

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The scheme, together with similar schemes operating in England, Wales and Northern Ireland, has evolved to encompass a wide range of animals and has been refined to monitor acute toxic effects of most types of pesticides in current commercial use.

The aims of the scheme are two-fold:

- to provide a means of post-registration surveillance of pesticide use throughout the UK by monitoring any environmental effects of pesticide products on wildlife and other animals and identifying risks to animals arising from the approved use of pesticides so that conditions of approval may be amended if necessary.
- to furnish evidence of misuse or deliberate abuse of pesticides that may be used in enforcement legislation.

The analytical strategy employed at SASA is based on 3 multi-residue methods augmented by specific individual residue methods as required. The first two are both multi-residue methods that provide a means for screening for over 120 pesticides, including acaricides, fungicides, herbicides, insecticides, molluscicides, nematicides and other poisons in digestive tract material and or liver tissue. The third method is used routinely to screen liver tissue for the presence of residues of 9 different first and second generation anticoagulant rodenticides. Samples from animals suspected to have been poisoned are examined in addition to samples from all raptors and wild mammals submitted to the WIIS in Scotland.
The results from this monitoring can be found here.

The **Predatory Bird Monitoring Scheme (PBMS)** has been examining pollutant trends in eggs of terrestrial and marine feeding predatory birds from Scotland since the 1970s.

There has been no significant change in the sum concentrations of and polychlorinated biphenyls (PCBs) in merlin (*Falco columbarius*) eggs between 1979 and 2008, or in the eggs of coastal golden eagles (*Aquila chrysaetos*) between 1973 and 2006, although concentrations in eggs from inland golden eagles have declined (Walker *et al*. 2011). Mercury concentrations have also been measured in the eggs of the golden eagles but no temporal trends were found in the eggs of birds, irrespective of whether they were nesting on the coast or inland.

Concentrations of individual PCB congeners and sum PCBs have been measured in gannet (*Morus bassanus*) eggs from Ailsa Craig (1969-2009) and Bass Rock (1973-2006). Concentrations in sum PCB concentrations from Ailsa Craig have declined (Walker *et al*.2011) as have some individual PCB congeners from both colonies, although this decline has not been consistent across all the predominant congeners or necessarily between colonies (Pereira *et al*., 2009). Temporal trends in mercury in gannet eggs also differed between Ailsa Craig and Bass Rock (Pereira *et al*., 2009). Mercury concentrations decreased significantly over time in eggs from Ailsa Craig (1970-2004) but increased marginally in eggs from Bass Rock (Fig 1).

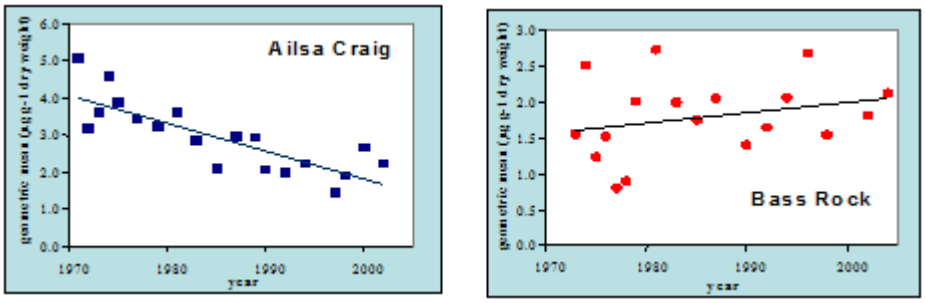

Fig.1. Temporal trends in Hg concentrations (µg g $^{-1}$ dry weight) in gannet eggs from Ailsa Craig and Bass Rock. (Data from Pereira *et al*., 2009).

In conclusion, temporal trends in legacy PCB contamination vary both between and within species and there has not been a consistent temporal decline, despite the ban on the manufacture and use of these compounds in the 1970s. There is similar variation between and within species variation in the amounts of accumulated mercury.

Polybrominated dipehenyl ethers (PBDEs), used as fire retardants, have also been monitored in gannet eggs collected between 1975 - 2008 from Bass Rock and Ailsa Craig. In both colonies, concentrations in gannet's eggs peaked in 1994 and then fell, a pattern similar to that of estimates of PBDE production (Crosse *et al*, 2012).

References

Crosse, J.D., *et al*. (2012). Long term trends in PBDE concentrations in gannet (*Morus bassanus*) eggs from two UK colonies. *Environmental Pollution* **161** 93-100.

Pereira M.G., *et al*., (2009). Long term trends in mercury and PCB congener concentrations in gannet (*Morus bassanus*) eggs in Britain. *Environmental Pollution* **157**, 155-163.

Walker, L.A., *et al*. (2011). Persistent Organic Pollutants (POPs) and inorganic elements in predatory bird livers and eggs 2007 to 2009: a Predatory Bird Monitoring Scheme (PBMS) Report. Centre for Ecology & Hydrology, Lancaster, 30pp.

UK Cetacean Strandings Investigation Programme (UKCSIP) - the Scottish Marine Animal Stranding Scheme (SMASS), in operation since 1992, monitors and collates marine animal stranding data and aims to assess the health of, and threats to, Scotland's marine animal species.

Current work involves collation of data and post-mortem examination of stranded seals, cetaceans, basking shark and marine turtle. This surveillance aims to establish cause of death, identify factors that have potentially contributed to the stranding, and quantify overall disease burden. In addition to gross pathological examination, ancillary diagnostics (bacteriology, histopathology, life history and diet analysis) are usually undertaken. Selected cases are screened for biotoxins and metal pollutants in collaboration with the Sea Mammal Research Unit and the University of Aberdeen, and organic pollutants are monitored as part of a UK-wide CSIP monitoring scheme

Concentrations of organochlorines (OCs) (organochlorine insecticides and PCBs), PBDEs and some metals in harbour porpoises (*Phocoena phocoena*) have been found to be lower in animals from Scotland than in those stranded in England and Wales (Bennett *et al*. 2001; Jepson *et al*. 2005; Law *et al*. 2012). Nonetheless, bottlenose dolphins (*Tursiops truncatus*) and killer whales (*Orcinus orca*) regularly exceed thresholds for PCB toxicity and are still in need of further mitigation to reduce inputs into the marine environment in Europe (Law *et al*. 2012).

Image courtesy of Scottish Marine Animal Stranding Scheme

Recent specific projects have involved investigation of pilot whale mass stranding events in 2011 and 2012 and study of novel trauma (corkscrew) lesions in seals. Investigation of the pilot whale strandings involved collation of information on pathology, toxicology, behaviour, cetacean sightings, marine traffic, acoustics and climate. Multiple detonations of underwater high explosives are believed to be a plausible reason for the 2011 stranding. Investigation of the 2012 mass stranding is ongoing.

With regards corkscrew lesions, over 100 seals have been reported dead since 2008 with this novel and consistent pattern of trauma (a single continuous curvilinear skin laceration spiralling around the body from the head to abdomen, shearing of skin and blubber from underlying fascia and avulsion of one or both scapula). Both harbour and grey seals are affected and there have been several similar cases in harbour porpoise. Corkscrew trauma has previously been attributed to natural predation but pathological data now indicates the likely cause to be anthropogenic and consistent with animals being drawn through the ducted propellers of marine vessels (Bexton *et al.* 2012). There is a low probability that all carcasses wash ashore and reported hotspots within the UK are coincident with areas of regular beach surveillance. This suggests the true incidence is likely higher, and the problem occurs over a larger area, than currently observed.
Further research on this phenomenon is ongoing in collaboration with SMRU.

Image courtesy of Scottish Marine Animal Stranding Scheme

References

Bennett, *et al.* (2001). Exposure to heavy metals and infectious disease mortality in harbour porpoises from England and Wales. Environmental Pollution **112**, 33-40.

Bexton *et al*., (2012) Unusual Mortality of Pinnipeds in the United Kingdom Associated with Helical (Corkscrew) Injuries of Anthropogenic Origin. Aquatic Mammals **38**(3), 229-240.

Jepson, *et al*. (2005. Relationships between PCBs and health status in UK-stranded harbour porpoises (*Phocoena phocoena*). Environmental Toxicology and Chemistry **24**, 238–248.

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.

Cardiff University Otter Project (CUOP)

Contrasting genetic structure of the Eurasian otter (*Lutra lutra*) across a latitudinal divide.
The Eurasian otter (*Lutra lutra*) is recovering from well-documented pollution-induced population declines that occurred during the 20th century but the current understanding of otter genetic structure in Britain is incomplete. We have used otter samples from Scotland, combined with a published microsatellite dataset from the remainder of the UK, to produce the first comprehensive assessment of genetic structure across the entirety of mainland Britain. We have shown a contrast in genetic structure of otters in northern Britain compared to the South. Otter populations in southern Britain appear to be highly genetically fragmented, whereas in the North there is a pattern that suggests much higher levels of gene flow.

These findings suggest a more favourable environment for the Eurasian otter in recent times in the North of the UK, possibly linked to human population density and anthropogenic habitat impacts. Our study therefore provides a complete description of population genetics of the Eurasian otter in the UK, and should allow inference on the relative importance of landscape characteristics on the recovery of otter populations.

The contributors to this study are D.W.G. Stanton, G.I. Hobbs, D.J. McCafferty, E.A. Chadwick, A.W. Philbey, I.J. Sachheri, F.M. Slater, M.W. Bruford

Image courtesy of CUOP

Disease Risk Analysis and Health Surveillance (DRAHS).

Coccidia in reintroduced corncrakes.

In response to cases of coccidiosis in reintroduced corncrakes (*Crex crex)* in England, a study was carried out on the identity and phylogenetics of the parasites associated with disease. Two coccidia, *Eimeria nenei* and *Eimeria crexae* were identified in corncrakes being prepared for reintroduction at the Nene Washes in Cambridgeshire, and also in an extant population of corncrakes on the Isle of Coll, Argyll, Scotland. These are newly described species of *Eimeria*, and the first species described from corncrakes or other species of the Rallidae, closely related to, but distinct from, *Eimeria* spp in cranes (Gruidae). *Eimeria* spp were found at high prevalence in healthy Isle of Coll corncrakes (81%; n=59) irrespective of age. Until the reintroduction programme commenced in 2002, the corncrake had dwindled in the United Kingdom to remnant populations in the Northern and Hebridean Isles of Scotland, on account of changes in habitat and farming practices. The reintroduction programme, which part-sourced corncrakes from Scotland, is a collaborative effort between Zoological Society of London (ZSL), Pensthorpe Conservation Trust (PCT), Natural England (NE) and the Royal Society for the Protection of Birds (RSPB); and disease monitoring is carried out by DRAHS, a WILDCOMS partner.

Image taken by Edmund Flach (ZSL)

References

Jeanes C., *et al*., (2013) Two new Eimeria species parasitic in Corncrakes (Crex crex) (Gruiformes: Rallidae) in the United Kingdom. Journal of Parasitology In-Press http://dx.doi.org/10.1645/12-52.1

Scheme News

WIIS-Scotland. Following analysis undertaken at SASA a gamekeeper was fined a total of £4,450 at Stranraer Sheriff Court after admitting four contraventions of the Wildlife and Countryside Act including poisoning a buzzard in 2012 and possessing illegal pesticides.

The latest positive results for 2013 have been added to the SASA website.

Cardiff University Otter Project (CUOP). The latest research paper by CUOP considers two biliary parasites recently reported in the UK: *Pseudamphistomum truncatum* and *Metorchis albidus* (Trematoda, Opisthorchiidae). The paper examines the associations between both abiotic and biotic factors and the intensity of the parasites in otters. Identifying such associations can give greater accuracy to predictions concerning the distribution and spread of trematodes with future climate change. Published in the International Journal for Parasitology

Animal Health and Veterinary Laboratories Agency (AHVLA) Diseases of Wildlife Scheme. The latest quarterly report of the GB Wildlife Disease Surveillance Partnership is available - please follow the link: http://www.defra.gov.uk/ahvla-en/publication/wildlife-survreports/

Recent publications from the scheme include:

Barlow A; Green P; Banham T; Healy N 2013. Serological confirmation of SBV infection in wild British deer (letter). Veterinary Record 172 (16) 429.

Barlow A; Wills D; Harris E 2013. Enteric nematodes and Sarcina-like bacteria in a brown long-eared bat (letter). Veterinary Record 172 (19) 508. http://veterinaryrecord.bmj.com/content/172/19/508.1.full.pdf+html

Brugman VA; Horton DL; Phipps LP; Johnson N; Cook AJC; Fooks AR; Breed AC. 2013. Epidemiological perspectives on West Nile virus surveillance in wild birds in Great Britain. Epidemiology and Infection 141 (06) 1134-1142.

Horton RA; Wu G; Speed K; Kidd S; Davies R; Coldham NG; Duff JP 2013. Wild birds carry similar Salmonella enterica serovar Typhimurium strains to those found in domestic animals and livestock. Research in Veterinary Science 95 (1) 45-48. http://dx.doi.org/10.1016/j.rvsc.2013.02.008

Disease Risk Analysis and Health Surveillance (DRAHS) recently carried out health surveillance of reintroduced populations of the smooth snake (*Coronella austriaca*), the most rare of Britain's three inidigenous snake species, in collaboration with Amphibian and Reptile Conservation and Natural England. Two populations in Surrey were monitored to assess the effects of reintroduction on health.

Predatory Bird Monitoring Scheme (PBMS)

Science for Environment Policy is a free news and information service published by Directorate-General Environment, European Commission. It has a mailing list of some 6000 people across Europe and aims to help policymakers keep up-to-date with the latest environmental research findings needed to design, implement and regulate effective policies. The latest newsletter has profiled a recent PBMS study (click here) on polybrominated flame retardants (PBDEs) in sparrowhawks, highlighting how our study may help explain why studies report different PBDE levels in sparrowhawks for the same countries and time periods. The source PBMS paper is Crosse *et al*. (2013). Key factors affecting liver PBDE concentrations in sparrowhawks (*Accipiter nisus*). Environmental Pollution 177 171-176. DOI: 10.1016/j.envpol.2013.02.006 and the abstract can be accessed by clicking here.

In a collaborative study, with the Cardiff University Otter Project, the Predatory Bird Monitoring Scheme has recently published its report on flame-retardants in the livers of otters found dead in England and Wales in 2010 and 2011. The report can be downloaded from the PBMS website publications page.

More news items for the PBMS can be viewed on the PBMS website.

WILDCOMS news

The next WILDCOMS partners meeting will take place in London on the 9th and 10th September 2013.

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)