Wildlife Disease & Contaminant Monitoring & Surveillance Network

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The WILDCOMS newsletters report recent newsworthy items and publications from its member partners

WILDCOMS Scheme news

Scottish Raptor Health Study

Assessing the health of individuals is important when monitoring endangered wildlife populations; the health of certain species can be used as an indicator to evaluate the wider ecosystem health and this has proven of great value for environmental conservation. Atypical disturbances to the regulatory processes that maintain an ecosystem in a dynamic balance can be detected faster on smaller populations that can be closely monitored. The Scottish Raptor Health Study are currently conducting research with a view to using golden eagles as one such indicator species for Scotland. The use of biochemical and haematological parameters is a common tool to assess health of individuals, and although these reference ranges are well known for domestic species, they are often not available for wild animals. The study is in the process of establishing biochemical and haematological reference ranges for wild Scottish golden eagle chicks across 29 blood parameters. So far 30 blood samples taken under Home Office licence from 3-8 week old nestlings across Scotland in 2017 have been analysed and more will be collected this summer. These parameters will be prepared so they can be used to examine health trends of the golden eagle population across the Scottish landscape.

Images courtesy of Gaby Peniche (above left) and Jon Brain (right).

WIIS-Scotland

The results from WIIS-Scotland are published quarterly. The results for incidents from quarter four of 2017 have been added to the SASA website at: http://www.sasa.gov.uk/document-library/wiis-quarterly-reports-2017.

A recent publication describing a modification to SASA's anticoagulant rodenticide method can be accessed via: https://doi.org/10.1016/j.mex.2018.02.001 and Taylor et al., 2018 (below).

PBMS

New study on long-term increase in rodenticides in European polecats

Polecats (*Mustela putorius*), like red kites, are particularly at risk of exposure to rodenticides because they feed directly on rats. A study, conducted by PhD student Katie Sainsbury and co-supervised by the University of Exeter, the Centre for Ecology and Hydrology (CEH) and the Vincent Wildlife Trust and part supported by the People's Trust for Endangered Species, has shown that 79% of European polecats in England and Wales are currently exposed to second generation anticoagulant rodenticides (SGARs). This rate of exposure is 1.7 fold higher than in the 1990s. The study

demonstrated that feeding strategy (likelihood of feeding on rats), geographical location, habitat type (pastoral vs arable landscape) and age of animal influences the extent of exposure in polecats. The PBMS contributed to this study by managing the collection of polecat carcasses found by members of the public. Analysis of SGAR residues were conducted in the CEH Analytical Chemistry Laboratories. See Sainsbury et al., 2018 (below).

PBMS contributes to EU raptor monitoring initiative

Professor Richard Shore, lead scientist for the PBMS, attended last week's meeting of the COST (European Cooperation in Science & Technology) Action funded European Raptor Biomonitoring Facility (ERBFacility). Using raptors as sentinels for persistent, bioaccumulative and toxic (PBT) compounds, the ERBFacility network aims to develop a monitoring framework that will help answer: (1) is legislation effective in reducing environmental exposure to contaminants across Europe; (2) what are the environmental risks of specific chemicals; (3) are there emerging contaminant problems needing remedial action? Richard leads the working group on monitoring environmental trends in industrial pollutants using raptors. He commented "The first full meeting of the ERBFacility network has got off to a flying start, with the delegates full of enthusiasm to develop the pan-European raptor monitoring framework. Opportunities for PhD students and early career researchers to undertake scientific studies in cooperating laboratories, where they will work on aspects of the ERBFacility network, will be advertised in the next two months. Interested candidates can find out more by looking at the ERBFacility on the COST website http://www.cost.eu/COST_Actions/ca/CA16224 and we will provide more details on the PBMS website news in due course."

New book on anticoagulant rodenticides and wildlife published

This new book consists of 14 chapters covering all aspects of the interactions between anticoagulant rodenticides and wildlife. It is a state-of-the-art comprehensive and authoritative overview of the scientific advancements in the assessment of exposure, effects and risks that currently used rodenticides may pose to non-target organisms in the environment. The book was co-edited by Richard Shore who is the Principal Investigator for the PBMS, along with colleagues from Canada, the Netherlands and the USA. Richard lead-authored a chapter in the book on primary exposure in wildlife and there is also an excellent chapter on secondary exposure (which is relevant to the PBMS's work on barn owls) by Jhon López-Perea and Rafa Mateo. See Van den Brink et al., 2018 (below).

PBMS presents work on rodenticide exposure in wildlife at the 28th Vertebrate Pest Conference

Richard Shore was recently invited to present a paper at the 28th Vertebrate Pest Conference in Rohnert Park, California. Richard presented work, to be published in the conference proceedings, on the comparative accumulation of liver SGAR residues by different birds of prey and what this can tell us about relative risk to different species. The work was conducted in collaboration with PBMS partners in the WILDCOMS network.

Garden Wildlife Health

Health hazards to wild birds and risk factors associated with anthropogenic food provisioning

A recent collaborative study, published in *Philosophical Transactions of the Royal Society B*, used 25 years of surveillance data to investigate the occurrence and impact of diseases of garden birds in Great Britain, focusing on finch trichomonosis, Paridae pox and passerine salmonellosis. While there are benefits to providing wild birds with supplementary food, researchers found that this practice can facilitate the transmission of infectious diseases. Proposed mechanisms for this include: encouraging species mixing and the congregation of large numbers of birds, as well as poor feeder hygiene that allows food waste and droppings to accumulate, contaminating the local environment. The findings enable scientists to provide best practice advice for supplementary feeding to help safeguard the health of wild birds, and highlight the importance of citizen science as a tool for wildlife disease surveillance. See Lawson et al., 2018 (below).

National Fish Tissue Archive

Recent Fish Archive publication on Radio 4's "Costing the Earth"

If you heard Radio 4's Environmental program "Costing the Earth" on March 28th, you may have heard Alice Horton from CEH talking about microplastic particles (defined as <5mm in size) she found in the guts of fish from the Thames. Although Alice only made a fairly brief appearance from minute 7 onwards, the rest of the program is also worth listening to and is still available on BBC i-Player (http://www.bbc.co.uk/programmes/b09wsfnf). Alice refers to a recently published study on fish stored in the National Fish Tissue Archive run by CEH (freely available, see Horton et al, 2018 (below)). Following on from a previous study of sediments of the river Thames and its tributaries (http://dx.doi.org/10.1016/j.marpolbul.2016.09.004), where plastic was commonly found, it was decided to look at some of the recently archived roach from the river Thames to see whether they had ingested microplastics. Microplastics were found in one third of the fish gut contents analysed, and three quarters of the plastic particles found were synthetic fibres most likely from textiles.

GB Wildlife Disease Surveillance Partnership

Please find below a link to the 2017 quarterly reports produced by the GB Wildlife Disease Surveillance Partnership: https://www.gov.uk/government/publications/wildlife-disease-surveillance-reports-2017. Previous reports are available (2016, 2015, 2014 and archived AHVLA web pages on the National Archive website).

The GB Wildlife Disease Surveillance Partnership is made up of the Animal and Plant Health Agency (APHA), Scotland's Rural College (SRUC), Institute of Zoology (IoZ), National Wildlife Management Centre of APHA, the Centre for Environment, Fisheries and Aquaculture Science (CEFAS), The Wildfowl and Wetlands Trust (WWT), Natural England (NE) and Forestry Commission England (FCE).

Disease Risk Analysis and Health Surveillance (DRAHS)

A study (see Molenaar, et al., 2017 (below)) published last autumn on poisoning in red kites in Britain in the European Journal of Wildlife Research received media interest with an article on the BBC website (http://www.bbc.co.uk/news/science-environment-42097801) and a radio interview with BBC Wales. It also generated online activity with reactions from the general public including blogs and tweets about the findings. Image courtesy of Libby Barnett Wildlife Incident Investigation Scheme (WIIS)

The Disease Risk Analysis and Health Surveillance (DRAHS) partnership (Zoological Society of London/Natural England) are currently carrying out comprehensive disease risk analysis for the forthcoming conservation translocations of the pine marten (*Martes martes*) to England and the water vole (*Arvicola amphibious*).

A review of hazel dormice (*Muscardinus avellanarius*) submitted for post-mortem examination to ZSL was performed for individuals with signs of haemorrhagic enteritis as part of a Disease Risk Analysis for adenovirus. Intestine samples from 15 of these were submitted to the APHA in March 2018 and four (one free-living dormouse, and three in quarantine at ZSL prior to release) were confirmed to be positive for adenovirus by PCR. Adenovirus infection associated with enteric disease and mortality is recognised in red squirrels (Sainsbury et al., 2001) and has been implicated in disease outbreaks in captive and translocated red squirrels (Everest et al., 2014). However, adenovirus antigen has also been detected in red squirrels without enteric abnormalities suggesting subclinical infections may be widespread within wild British populations of red squirrels (Everest et al., 2014). We do not have confirmation of adenovirus infection being associated with clinically significant disease in dormice, but it should be assumed that adenoviruses can be pathogenic in dormice in certain circumstances (e.g. when stressed). Follow up research will aim to determine if the strains detected in captive bred dormice are novel (alien, non-native) adenoviruses, or similar to those found in free-living wild dormice and other wild rodents in England.

References: Everest et al., 2014. Adenovirus: An emerging factor in red squirrel Sciurus vulgaris conservation. *Mammal Review*, **44**(3–4): 225–233 and **Sainsbury et al., 2001**. Isolation of a novel adenovirus associated with splenitis, diarrhoea and mortality in translocated red squirrels, Sciurus vulgaris. *Verhandlungsbericht des Erkrankungen der Zootiere*, **40**: 265–270.

Cardiff University Otter Project

Cardiff University Otter Project were recently 'species champions' for the Eurasian otter in the Sanger Institute 25genomes competition (https://25genomes.imascientist.org.uk/) and were thrilled to win the public vote in the relevant 'zone' (https://floundering25.imascientist.org.uk/2017/12/13/thank-you-from-the-floundering-zone-winner-eurasian-otter/). Having the whole genome sequence will provide a goldmine of information, which is likely to contribute to understanding of health and adaptations to contaminants. The work will be a collaboration between Cardiff University (Dr E Chadwick and Dr F Hailer) and the Sanger Institute. The Project has also recently been awarded funding for a PhD studentship from the Freshwater CDT (http://www.gw4fresh.co.uk/). The studentship, starting in autumn 2018, will explore antimicrobial resistance in freshwater ecosystems, and is supervised in a new collaboration between Cardiff University (Dr E Chadwick and Dr F Hailer), CEH (Prof A Singer), CEFAS (Dr Craig Baker-Austin) and Uppsala University (Dr Josef Jarhult).

New publications from the WILDCOMS schemes

Horton et al., 2018. The influence of exposure and physiology on microplastic ingestion by the freshwater fish *Rutilus rutilus* (roach) in the River Thames, UK. Environmental Pollution, 236: 188-194. Doi:http://dx.doi.org/10.1016/j.envpol.2018.01.044

Lawson et al., 2018. Health hazards to wild birds and risk factors associated with anthropogenic food provisioning. Philosophical Transactions of the Royal Society B, 373(1745). doi: 10.1098/rstb.2017.0091.

Lawson et al., 2018. Salmonella Enteritidis ST183: emerging and endemic biotypes affecting western European hedgehogs (*Erinaceus europaeus*) and people in Great Britain. Scientific Reports, 8(1):2449. doi:10.1038/s41598-017-18667-2.

Molenaar et al., 2017. Poisoning of reintroduced red kites (Milvus milvus) in England. European Journal of Wildlife Research 63 94. https://doi.org/10.1007/s10344-017-1152-z

Sainsbury et al., 2018. A long-term increase in secondary exposure to anticoagulant rodenticides in European polecats *Mustela putorius* in Great Britain. Environmental Pollution 236 689-698, doi:https://doi.org/10.1016/j.envpol.2018.02.004

Shore, 2018. Rodenticides: The Good, the Bad, and the Ugly. In The Encyclopedia of the Anthropocene, vol. 5: Elsevier, Oxford, pp. 155-160, doi: https://doi.org/10.1016/B978-0-12-809665-9.09993-6

Shore and Coeurdassier, 2018. Primary exposure and effects in non-target animals. In Anticoagulant rodenticides and wildlife. Springer International Publishing, pp. 135-157. ISBN: 978-3-319-64377-9, doi:https://doi.org/10.1007/978-3-319-64377-9

Taylor et al., 2018. Multi-residue determination of anticoagulant rodenticides in vertebrate wildlife and domestic animals using Ultra (High) Performance Liquid Chromatography Tandem Mass Spectrometry. MethodsX. 5:149-158, doi:https://doi.org/10.1016/j.mex.2018.02.001

Van den Brink et al., 2018. Anticoagulant rodenticides and wildlife. Springer International Publishing, pp 398. ISBN: 978-3-319-64377-9, doi:https://doi.org/10.1007/978-3-319-64377-9

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