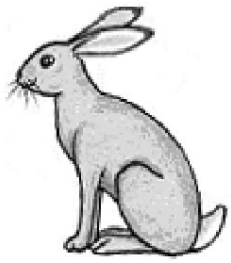
GB Wildlife Disease Surveillance Partnership quarterly report

Disease surveillance and emerging threats



Volume 32: Q1 – January-March 2021

Highlights

- ***Sarcocystis wobeseri*-like parasites in a white-tailed sea-eagle (page 20)**
- **Systemic aspergillosis in a golden eagle (page 24)**
- **Bsal surveillance and eradication of non-native species (page 32)**

Contents

Introduction and overview

The GB Wildlife Disease Surveillance Partnership comprising the Animal and Plant Health Agency (APHA), Scotland's Rural College (SRUC) Veterinary Services, Institute of Zoology (IoZ), the Centre for Environment, Fisheries and Aquaculture (CEFAS), the Wildfowl and Wetlands Trust (WWT), Natural England (NE), the Forestry Commission England (FCE) and the Garden Wildlife Health (GWH) project produces the GB Wildlife Disease Surveillance Partnership Quarterly Reports: https://www.gov.uk/government/publications/wildlife-gb-disease-surveillance-and-emerging-threats-reports

A full explanation of how data is analysed is provided in the annexe available on GOV.UK https://www.gov.uk/government/publications/information-on-data-analysis

Issues and trends

The highly pathogenic avian influenza virus (HPAIV) outbreak in wild birds in Great Britain appears to be 'tailing off', in terms of cases becoming increasingly sporadic. In other years in the past decade, when there has been a severe winter mortality in wild birds due to HPAIV, the disease is less prevalent after the winter migrants, in particular waterbirds, leave the UK to migrate to their breeding ranges near the Arctic. However, occasionally, the epidemics have had a thin 'tail' of sporadic cases extending beyond the winter months. Should cases occur all-year round, this may possibly lead to a degree of 'endemicity' of the viral infection in wild birds, however this scenario seems very distant at present.

This summer we should be aware of the possibilities of Usutu virus recurrence and West Nile virus (WNV) incursion. Surveillance will be directed in wild birds for both these diseases.

Notifiable diseases

Avian Influenza (AI) Virus

Great Britain AI Wild Bird Surveillance (AIWBS)

Total wild bird surveillance

The number of new HPAI H5 wild bird positive cases in the UK has decreased this quarter, with early spring being the time that most of the eastbound migratory wild fowl have either left or are about to leave the UK.

The risk to the UK is now more likely to arise from residual, but diminishing, virus infectivity remaining in the environment from wild bird faeces and carcases from wild birds which have died following infection. Increasing daylight hours and warmer ambient temperatures will accelerate inactivation of the virus in the environment, thereby further reducing the risk of HPAI virus infections. Some risk of infection spread also remains through bridging species (sedentary wild birds e.g. raptors, corvids and swans) which may still be harbouring infection and could also play a role in fomite transmission; however this risk is also diminishing as the environmental viral contamination pressure decreases.

At the end of Q1 it was considered that as the risk of infection to both wild birds and poultry was continuing to decline, the risk of HPAI H5N8 incursion in wild birds would be reduced to **LOW** (from MEDIUM) as a country-wide assessment. Regional variations are in place e.g. areas based in close proximity to aquatic habitats may still have a MEDIUM uncertainty.

In Europe HPAI H5 positive cases in wild birds are still very high in northern Europe and the Baltic countries i.e. Germany, Denmark, Poland and Latvia, with relatively few in southern and central Europe. However, at this time of year these birds are very unlikely to move west from continental Europe back to the UK.

During the first quarter of 2021, a total of 627 birds were tested under the Avian Influenza Surveillance scheme, with 21 samples testing positive for Influenza A.

Table 1 - Number of wild birds tested and results in GB – 1st Quarter

Surveillance activity	Number of birds tested*	Positive AI virus result and species of bird	Comments
Found dead/injured	627 *(134)*	21 Common Buzzard (Buteo buteo) [n=2] Mute Swan (Cygnus olor) [n=11] Peregrine Falcon (Falco peregrinus) Red Kite (Milvus milvus) [n=2] Unspecified Buzzard Unspecified swan Knot (Calidris canutus) [n=3]	Scanning surveillance All-year-round

*Number of birds tested: figures for January-March 2020 are shown in brackets.

Table 1 shows the number of wild birds tested under the Avian Influenza surveillance scheme. The number of birds tested under the Avian Influenza in the first quarter (January – March) of 2021 was 627 as compared with 134 for the same period in 2020. Scanning surveillance continues year-round and all birds tested were found dead or injured.

Since 1st March, the sensitivity of the surveillance scheme in England, measuring cases of avian influenza in dead wild birds collected, was increased back to its original threshold of testing single dead wild birds found. This was after a period of reduced sensitivity, when a group of at least three carcases found together was required to trigger collection in England only. Collection of single dead wild bird have remained throughout the period for Scotland and Wales.

Members of the public are asked to remain vigilant and report findings of target species in addition to mass mortality incidents to the **Defra Helpline: 03459 33 55 77**. The criteria for a mass mortality incident are five or more wild birds, of any species, at any location, (irrespective of county) in England, Scotland and Wales.

Warden Patrol Scheme

The main emphasis of the warden patrol scheme is on AIWBS in found dead wild birds, including mass mortality incidents, and patrols of designated reserves by skilled wild bird ecologists and wardens. These Warden Patrols continue all-year-round, but are also seasonally targeted in the winter and spring periods (October to March) each year.

During the period 1st January to 31st March 2021 (Q1-2021), a total of 331 Warden Patrols were performed at sites across GB. This compares with a total of 346 Warden Patrols performed during the same period in 2020 (Q1-2020) in GB. During Q1-2021, most Warden Patrols were performed by Natural England and the Wildfowl and Wetlands Trust. In total during Q1-2021, 41 wild birds were reported found dead under the Warden Patrol Scheme, of which 33 were tested, with no AI detections. This compares with a total of 68 wild birds found dead, of which 63 were tested during Q1-2020, with no AI detections.

In Q1-2021, Coots (8) were the most common target species found, and birds were most commonly found in the South West region (17), with the lowest numbers in the Midlands (0) and the East (0). In Q1-2020, Whooper swans (13) were the most common target species found and birds were most commonly found in the South West region (25), with the lowest numbers in the Midlands (0) and Wales (0).

Current EU situation

The current EU and UK outbreak situations can be found here:

https://www.gov.uk/government/publications/avian-influenza-bird-flu-in-europe

APHA, in collaboration with Defra, monitors the international situation and distribution of avian influenza detections:

https://www.gov.uk/government/collections/animal-diseases-international-monitoring.

Current UK Situation

The Avian Influenza Prevention Zone (AIPZ) which came into force on 11th November 2020 remains in force (but will be lifted midday on the 15th May 2021) and it is still a legal requirement for all bird keepers to follow enhanced biosecurity measures, in order to limit the spread of and eradicate the disease under these strengthened biosecurity requirements. However, the AIPZ housing order restrictions, which legally required all bird keepers to keep their birds housed and separated from wild bird contact, was lifted from 11:59pm on 31 March 2021.

High standards of biosecurity remain essential as infection may still be present in the environment. Outside range areas need to be prepared before birds are released after they have been housed.

It is also a legal requirement to keep free-ranging birds within fenced areas. Ponds, watercourses and permanent standing water areas must also be fenced off to avoid direct contact with wild water fowl.

Similar AIPZ rules apply in England, Scotland Wales and Northern Ireland.

In Q1 of 2021 there have been six confirmed cases of Notifiable Avian Disease in GB.

Four involving HPAI H5N8 as follows:

- One case in Wales involving captive pheasants
- Three cases in England. One involving Free range (but housed) broilers; one Commercial egg layer and one case in captive falcons

There was also one case of HPAI H5N1 in rearing pheasants in Scotland, and one case of LPAI H5N3 in commercial turkey breeders in England.

At the end of Q1 the risk of exposure of poultry across the whole of GB is deemed to be LOW (for poultry premises with stringent biosecurity) to MEDIUM (for poultry premises with biosecurity gaps) (MEDIUM uncertainty). The AIPZ is in place, and personnel should be taking appropriate biosecurity measures.

At all times, poultry keepers should maintain robust biosecurity measures, be vigilant for clinical signs of disease and promptly report suspected cases of notifiable avian disease in poultry to APHA:

- In England – call the Defra Rural Services Helpline on 03000 200 301. The Helpline is open Monday to Friday, 8.30am to 5pm and there is an out of hours facility on the same number for reporting suspicion of disease in animals.
- In Wales, the helpline number is 0300 303 8268.

- In Scotland, contact your local APHA Field Services Office: https://www.gov.uk/government/organisations/animal-and-plant-health-agency/about/access-and-opening

Further information regarding avian influenza in poultry and wild birds is also available:

- Avian influenza guidance: https://www.gov.uk/guidance/avian-influenza-bird-flu
- When and how to register your poultry flock, and which species must be registered in Great Britain: https://www.gov.uk/guidance/poultry-registration.
- Information about the chargeable testing scheme offered in GB by APHA, that enables veterinarians to request 'Testing for Exclusion of notifiable avian disease' in chicken and turkey flocks, in circumstances that would not require the implementation of statutory disease control measures (Gibbens and others, 2014): http://apha.defra.gov.uk/vet-gateway/tte/nad.htm

References

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915180/poa-avian-influenza-H5N8-russia-Sep20.pdf

https://www.gov.uk/guidance/avian-influenza-bird-flu

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/608529/ai-birdflu-factsheet-170413.pdf

https://www.gov.uk/government/publications/avian-influenza-in-wild-birds

Gibbens N, Brown IH, Irvine RM. Testing for exclusion of notifiable avian disease. *Veterinary Record* 2014;**174**:534-535. http://dx.doi.org/10.1136/vr.g3412

Joanna Tye- DES, APHA Weybridge
Vivien Coward, Lévon Stephan, Rowena Hansen - Avian Virology, APHA Weybridge

Wildfowl and Wetlands Trust's (WWT) role in GB Avian Influenza Wild Bird Surveillance (AIWBS)

Summary: Threats - HPAIV, targeted active surveillance of wetland birds

Throughout this first quarter of 2021, WWT continued to carry out passive surveillance of avian influenza across the reserves. Between January and April 2021, 42 dead wild birds were found across eight WWT sites located in Gloucestershire, West Sussex, Tyne and Wear, Greater London, Lancashire, Carmarthenshire, Somerset and Dumfries and Galloway. Of the birds found, 34 were sampled for avian influenza virus, with eight carcases being too heavily predated or in advanced decomposition to swab.

14 priority target species were sampled during this quarter. These included species of swan, geese, ducks, gulls and rails.

No Influenza A viral RNA was detected via PCR in the 34 samples that were sent to the laboratory for testing. During this quarter, swabs collected were refrigerated and sent in weekly batches, in order to comply with Covid-related regulations.

For further details of HPAI surveillance from across Great Britain, please refer to the APHA report for this quarter.

Rosa Lopez, Veterinary Officer (Conservation), Wildfowl & Wetlands Trust (WWT)

Zoonotic Diseases

APHA Diseases of Wildlife Scheme (DoWS); Salmonellosis in wildlife

Threat: Zoonotic, farmed and pet animal risk

There is no routine monitoring of *Salmonella* in wild birds or wild mammals. Therefore, all isolates are usually from clinical cases, although *Salmonella* may often not be the primary cause of disease. Occasionally it is isolated from small-scale surveys.

There were two detections of *Salmonella* in wildlife in Q1 of 2021; *Salmonella* Typhimurium phage type 193 from a grey heron (*Ardea cinerea*) and *Salmonella* Typhimurium phage type 193 from wild garden birds in Wales.

The grey heron was submitted under the Avian Influenza in Wild Birds Surveillance Scheme after having been found dead at a canal in the Midlands. It was in poor body condition with a large liver lobe, which had fine pale speckling throughout the parenchyma. The cloaca was distended and everted with many large yellow crystals on the mucosa. The gizzard was partially impacted (Figure 1). Salmonella Typhimurium phage type 193 was isolated from the liver and histology showed severe acute multifocal necrotising hepatitis and the cloaca showed severe diffuse chronic fibrinonecrotising cloacitis. Further analysis of the isolate may help clarify host associations more clearly.

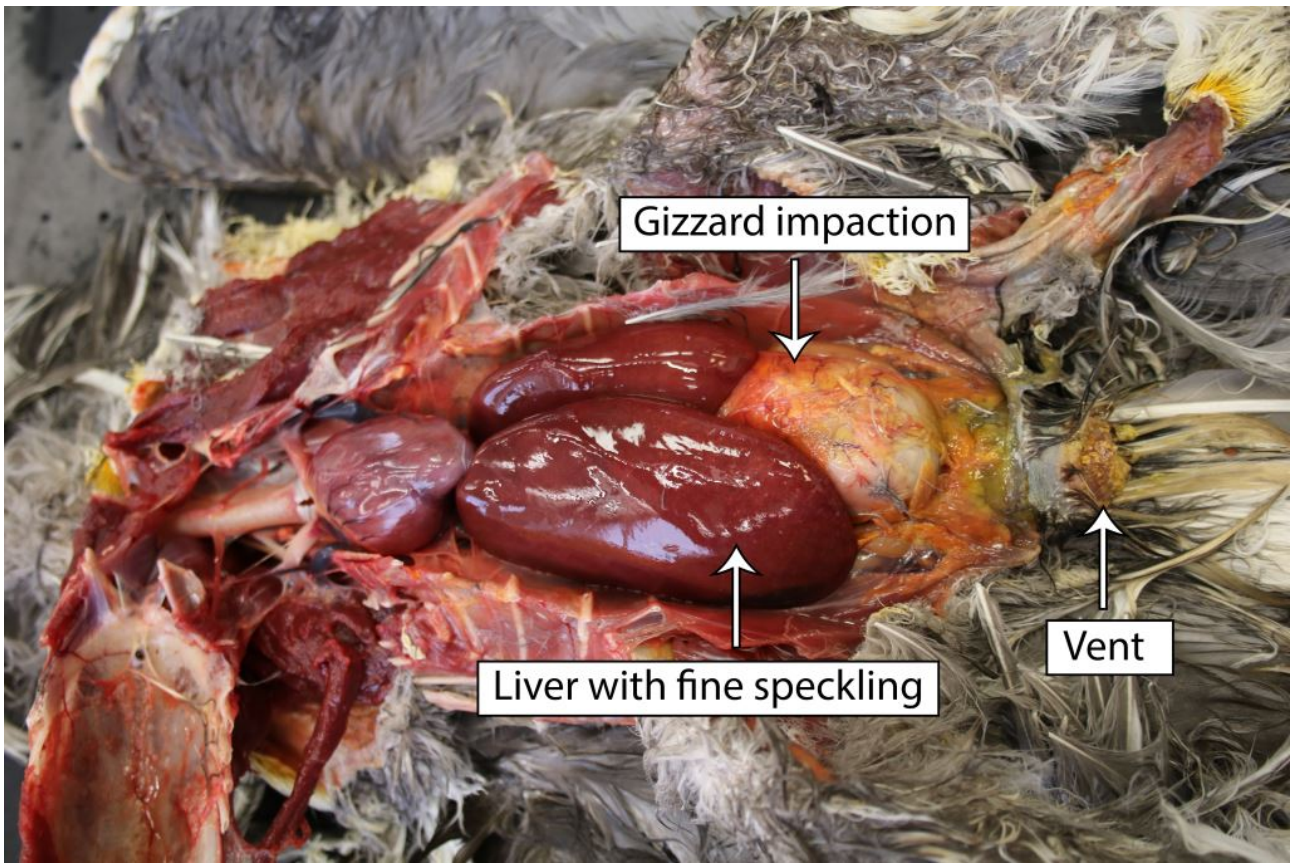


Figure 1 - Salmonellosis in a grey heron

Salmonellosis in wild garden birds

A goldfinch (*Carduelis carduelis*) and a chaffinch (*Fringilla coelebs*) were submitted to Carmarthen Veterinary Investigation Centre, from a wildlife rescue centre that frequently submits to DoWS, to investigate illness followed by death. The birds were part of a wild population and were the only two noted to be affected. Sunflower hearts were fed in a feeder and mixed bird seed was fed by scattering on the ground. A bird bath filled with rainwater was available.

The birds were seen in separate locations within a private garden; they were fluffed up, unwilling to move with fast breathing and died shortly afterwards. One dropping was noted to be watery.

At postmortem examination of the goldfinch:

- The liver was brown with multiple pale foci
- The spleen was enlarged and red with multiple pale yellow foci
- The small and large intestines were dilated with dark red-brown content
- The faeces were thick, brown and liquid.

Postmortem examination of the chaffinch was unremarkable although the proventriculus and gizzard were empty apart from a few small grits.

Salmonella Typhimurium Copenhagen Phage type 193 was isolated from both birds. Antimicrobial sensitivity testing found the isolate to be fully susceptible.

Salmonellosis is a recognised cause of non-specific clinical signs and death in garden birds including finch species. Advice was provided to the submitter on the zoonotic potential of all Salmonellae and on cleaning feeders and bird baths.

Quality statement regarding these data: - UK data and the output of ad-hoc data retrieval from APHA FarmFile database. These figures are provisional. Research project and routine game bird isolates were excluded. All are from England and Wales.

Natalie Jewell, APHA Carmarthen and Catherine Man, APHA Diseases of Wildlife Scheme

Report from Wildlife Zoonoses and Vector Borne Disease Research Group

Summary - Zoonotic, farmed, pet animal and international trade risk

Passive surveillance for lyssaviruses in UK bats

Twenty four bats were tested for lyssavirus under passive surveillance during this quarter. All were negative.

Five zoo bats and one bat, as an illegal landing in UK, were tested in this quarter for lyssaviruses. All were negative.

Rabies diagnosis

Six dogs that died in quarantine were tested for rabies with negative results.

Rabies surveillance in terrestrial wildlife

The head of one fox showing neurological signs suspicious of rabies was submitted from DAERA in Belfast but tested negative for Lyssavirus.

West Nile virus surveillance and Usutu virus surveillance in wild birds

Brain and kidney tissue samples from 34 raptors collected during 2020 and submitted under the Predatory Bird Monitoring Scheme, as well as samples from 2 wild birds

collected during 2020 and submitted under ZSL garden bird health scheme, were tested for both WNV and Usutu virus with negative results.

West Nile virus surveillance in Equids

No equine sera were submitted for WNV testing during this period.

Paul Phipps, Wildlife Zoonoses and Vector Borne Disease Research Group, APHA Weybridge

Ongoing new and re-emerging diseases, unusual diagnoses and horizon scanning

Wildlife Diseases, horizon scanning; news items associated with wildlife populations and wildlife disease. Very brief summaries are given, including possible wildlife disease threats to human, livestock and biodiversity health

1. Could there be a potential risk to UK foxes (Vulpes vulpes) from Brucella canis infection?

   Background information: Middlemiss C. Brucella canis in dogs in the UK. Veterinary Record 2021;188 (4):155 https://doi.org/10.1002/vetr.227.

2. SARS-COV-2 virus infection in a pet ferret, Slovenia. No reference, pers comm.

3. SARS-COV-2 virus infection in captive gorillas (Gorilla gorilla) in the USA.

   Reference:https://apnews.com/article/gorillas-test-positive-coronavirus-728944350363be5d4b0bc907f31f3b8d and ProMED article.

4. Novel arterivirus associated with encephalitis in hedgehogs (Erinaceous europaeus). WQR and APHA collaborative publication.

   Reference: Dastjerdi A, Inglese N, Partridge T, Karuna S, Everest DJ, Frossard JP, Dagleish MP, Stidworthy MF. Novel Arterivirus Associated with Outbreak of Fatal Encephalitis in European Hedgehogs, England, 2019. Emerg Infect Dis 2021;2:578-581 https://doi.org/10.3201/eid2702.201962

5. US Congress agree $55 million re-build of National Wildlife Health Centre in Wisconsin. No reference, pers comm.

Garden Wildlife Health summary

The Garden Wildlife Health project (GWH) has continued to conduct scanning disease surveillance of garden birds, hedgehogs, reptiles, and amphibians.

Table 2 shows the numbers of Garden Wildlife Health disease incident reports submitted during Q1 2021

Taxon	No. of disease incident reports (No. of sites)	Total No. of animals observed (sick/dead)
Amphibians	125 (65)	486 (108/378)
Birds	1904 (685)	2485 (1886/600)
Hedgehogs	38 (15)	40 (8/32)
Reptiles	1 (1)	1 (0/1)
Total	**2068 (742)**	**3012 (2002/1011)**

Table 3 compares the numbers of Garden Wildlife Health disease incident reports for Q1 2020 and 2021

Taxon	No. of disease incident reports in Q1 (no. sick/dead) - 2020	No. of disease incident reports in Q1 (no. sick/dead) - 2021
Amphibians	75 (52/227)	125 (108/378)
Birds	1195 (1299/391)	1904 (1886/600)
Hedgehogs	28 (2/27)	38 (8/32)
Reptiles	4 (0/4)	1 (0/1)
Total	1302 (1352/649)	2068 (2002/1011)

Figure 2 - Graph showing the number of Garden Wildlife Health avian disease incident reports allocated suspect diagnoses

Figure 2 compares the numbers of Garden Wildlife Health avian disease incident reports allocated suspect diagnoses for Q1 2020 and 2021, with the category of 'other' mostly comprising reports of nestling mortality, trauma (e.g. window collision), predation or cases of birds exhibiting non-specific signs of ill health (e.g. fluffed-up plumage, lethargy). Further information on avian pox, finch leg lesions and trichomonosis is available by following the respective links.

Institute of Zoology (IoZ)

Mammal reports

Wild mammal reports from Scotland

Salmonella Bovismorbificans, ST377 (2, 59, 23, 64, 38, 61, 122) was isolated from the faeces of a month-old male grey seal (*Halichoerus grypus*) which showed diarrhoea, lethargy and depression while in a wildlife hospital. *S.* Bovismorbificans is a common Salmonella isolate from grey seals but is also frequently found in cattle, with some concern that it may be circulating between the two species.

Two young Eurasian otter cubs (*Lutra lutra*) from the same litter died due to cardiac or vascular rupture. Right ventricular wall rupture and haemopericardium were seen in a young female cub which was one of three small (under 500g) cubs found near Inverness. The smallest was found dead five days later despite nursing. At necropsy, there were three fresh haemorrhages on the epidcardium over the right ventricle. The right half of the brain was extremely congested. Histopathology found that a section of the right ventricular

wall appeared torn or disrupted, with blood in the resultant spaces and over the epicardium. The myocardium appeared viable with no evidence of necrosis, inflammation or fibrosis. The wall was concave below the clot on the epicardial surface. The brain showed engorgement of the meningeal vessels on the right but no haemorrhage or inflammation, and it was suspected that this was a terminal event. SRUC VS reported the cause of death as perforation of the right ventricular wall, with haemorrhage into the pericardial sac. There was insufficient haemorrhage for haemopericardium to be the cause of death - the ventricular breakdown may have disrupted the heart rhythm. There was no evidence of chronic cardiac insufficiency in the liver or lungs. A congenital weakness in the ventricular wall was suspected.

The second cub died almost three weeks later. Weaning had begun, and the remaining cubs showed good appetite and growth, before one presented with weight loss, progressing over four days to lethargy and death. At necropsy, body condition was suboptimal and the stomach and proximal small intestine were distended by partially clotted milk. Similar undigested material was present in the rectum. No physical obstruction was present. A large blood clot was found under the caudal projection of the right cerebrum, between the cerebrum and the cerebellum below. Neuropathology found that the clot, located in the sub arachnoid space, was pressing down on the brain causing an indentation. There was no evidence of underlying inflammation. SRUC VS noted that in a cub of this age, a congenital abnormality causing an aneurysm or other weakness in a vessel appeared the most likely cause. The history of a litter mate with a weakness in the wall of the right ventricle was thought to increase the interest of this already rare case. It was noted that this could be coincidence, but it is also possible that a genetic link to vascular weakness could be present in the litter.

Significant residues of brodifacoum (0.749 mg/kg) and bromadiolone (0.509 mg/kg), and a low residue of difenacoum (0.010 mg/kg), were detected in liver tissue from a year-old male Eurasian otter. The otter appeared at a camera-monitored holt, where it displayed weakness and coughing before death. At necropsy, body condition was very poor and the gastrointestinal tract was almost empty. In the absence of any internal haemorrhage, anticoagulant rodenticide poisoning was not thought to be the cause of death, which was recorded as starvation. However, the case was of interest due to the demonstration of accumulation of rodenticide in an apex species.

Reference:

Baily JL, Foster G, Brown D, Davison NJ, Coia JE, Watson E, Pizzi R, Willoughby K, Hall AJ, Dagleish MP. Salmonella infection in grey seals (Halichoerus grypus), a marine mammal sentinel species: pathogenicity and molecular typing of Salmonella strains compared with human and livestock isolates. *Environ Microbiol.* 2016;18(3):1078-87 https://doi.org/10.1111/1462-2920.13219

Caroline Robinson, SRUC Veterinary Services

Wild mammal reports from APHA DoWS

Enteric digenean trematode infestation in a Soprano pipistrelle (*Pipistrellus pygmaeus*)

Significance – potential biodiversity threat and endemic disease in this species

A soprano pipistrelle was found in a house with no known roost on 14/12/20 in Leicestershire. It was taken into care as underweight and due to the time of year. It never ate very much and died on 02/02/21 of no obvious cause. The body was immediately frozen and submitted to WNDS on 22/02/21.

Figure 3 - The carcase of a soprano pipistrelle bat (fixed) 04/03/2021

Figure 4 - The carcase of a soprano pipistrelle bat (fresh)

No gross lesions or abnormalities were identified either in the fresh carcase or after fixing in 10% formalin. However, on histological examination of the small and large intestines a number of clumps of helminth eggs, probably from digenean trematodes, were seen in both the small and large intestines. The trematode bodies are not obviously apparent possibly due to autolysis or removal during sectioning. In two sections of gut, cross-sections of probable digenean trematodes were also seen.

Apart from autolytic changes there were no other histopathological changes seen in the rest of the tissues examined.

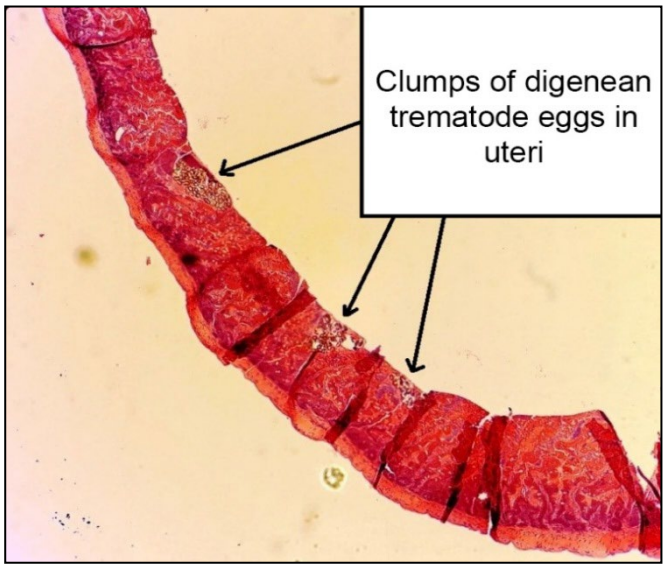


Figure 5 - Photomicrograph showing clumps of digenean trematode eggs

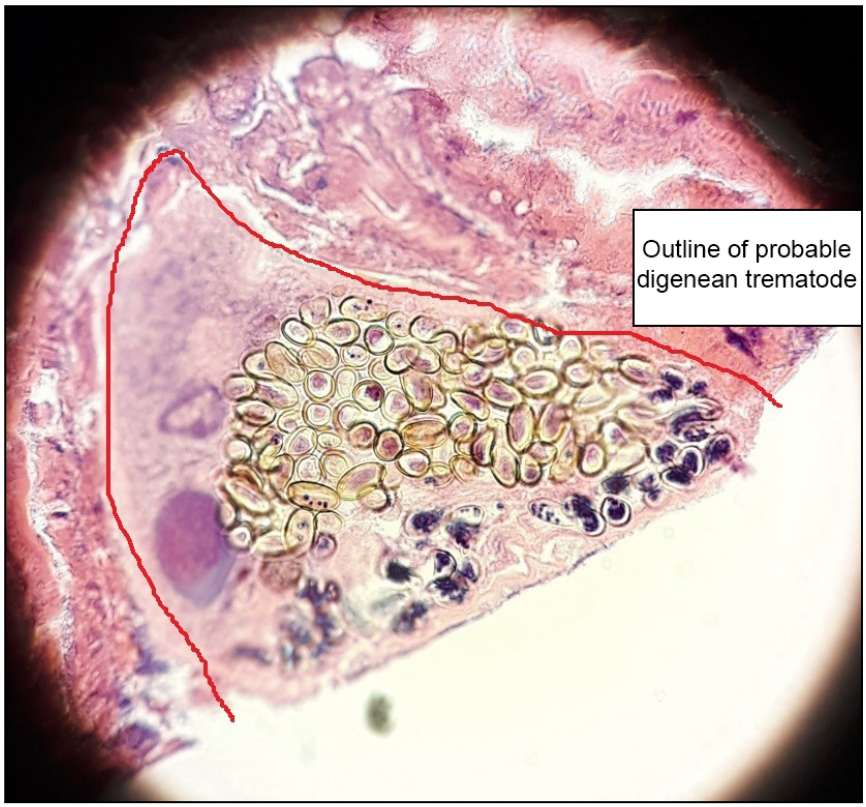


Figure 6 - Photomicrograph showing the possible outline of a digenean trematode

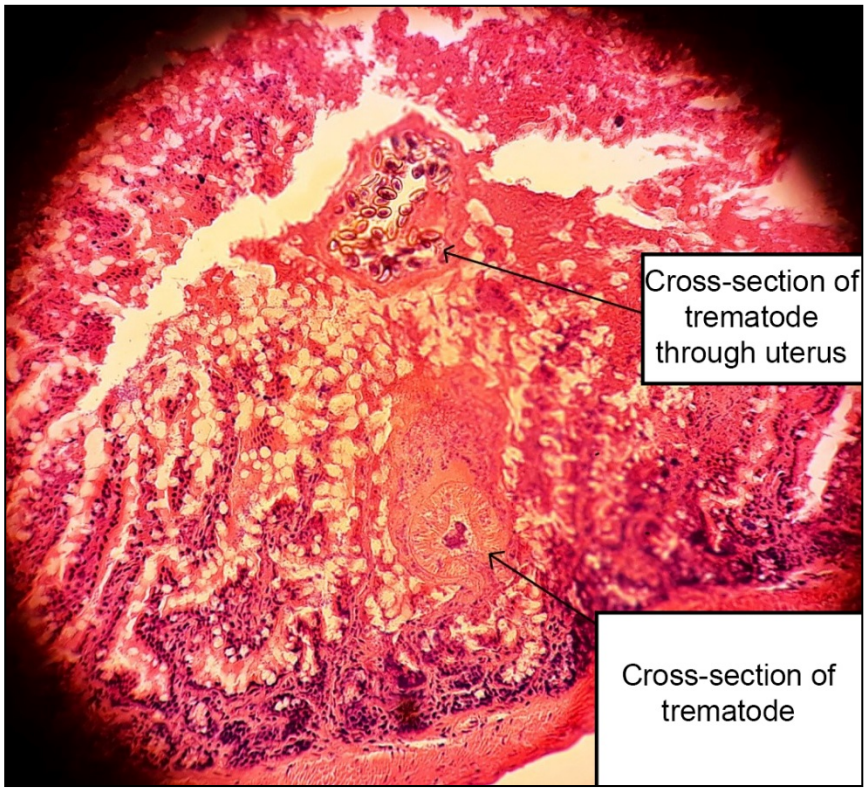


Figure 7 - Photomicrograph showing cross sections of digenean trematodes

The helminths were presumptively identified as digenean trematodes, as research by Lords and others (2012) found that pipistrelle bats in the UK have a high prevalence of infection with digenean trematodes rather than other helminths. Most studies on intestinal trematodes of bats have concentrated on species identification, numbers and prevalence. The author is not aware of any detailed investigations as to the ultimate clinical significance of these endoparasites. Although Warburton and others (2016), in a study of big brown bats (*Eptesicus fuscus*) in the USA, found that body condition is a good indicator of the level of digenean trematode infestation.

As there were no other significant findings, the level of digenean trematode infestation may be of some significance.

References:

Lord JS, Parker S, Parker F, Brooks DR. Gastrointestinal helminths of pipistrelle bats (Pipistrellus pipistrellus/ Pipistrellus pygmaeus) (Chiroptera: Vespertilionidae) of England. *Parasitology* 2012:**139**: 366 – 374 https://doi.org/10.1017/S0031182011002046

Warburton EM, Pearl CA, Vonhof MJ. Relationships between host body condition and immunocompetence, not host sex, best predict parasite burden in a bat-helminth system. *Parasitol. Res* 2016:**115**:2155 https://doi.org/10.1007/s00436-016-4957-x

Alex Barlow, Wildlife Network for Disease Surveillance (WNDS); Peter Proudlove, Rescue Centre (Leicestershire and Rutland Bat Group).

Suspected white-nose syndrome in a brown long-eared bat

Significance – of biodiversity interest primarily, EBL excluded

A single, adult, brown long-eared bat (*Plecotus auritus*) was found dead in a house in East Anglia and was submitted to DoWS, as it had white fungal-like lesions around the face typical of white nose syndrome, a fungal infection caused by *Geomyces destructans.* This disease is currently causing pandemic mortality in several bat species in North America. Tests for European bat lyssavirus (EBL) were negative, and postmortem examination and histopathology indicated aspergillus infection of the skin; *Aspergillus* sp. was also cultured. However, there was no cellular inflammatory response to the aspergillus hyphae and while it seems more likely that this fungus was a postmortem invader, there remains the possibility that infection may have occurred when the animal was alive and hibernating. During hibernation, it is now established that the bat immune system is significantly reduced; effectively ‘turned off’ during torpor, thus infection during hibernation may not illicit an immune response. Nematode worms were found in the intestine but could not be retrieved to allow identification. This bat species, in particular, is known to be frequently infested with nematodes, large relative to body size of the bat, but of unknown clinical significance. We could not therefore establish a cause of death for this animal.

Suspected white-nose syndrome in a Brandt's bat

Significance – of biodiversity interest primarily.

Brandt's bats (*Myotis brandtii*) hibernating normally (no clinical disease and no mortality evident) were seen to have white growth-like markings on their faces. These were swabbed and the swabs submitted to APHA DoWS. Fungal cultures have resulted in the causative fungus of white nose syndrome, *Geomyces* spp. being isolated. The cultures will be sent to a reference laboratory for definitive identification and a further report will follow. This finding is not unexpected, white nose syndrome has been detected in healthy British bats before by DoWS.

APHA DoWS

Natterer's bats in Northern England

Most wildlife pathogens usually don't move very far by themselves. If we're interested in wildlife epizootiology we need to know how wildlife hosts move and interact if we want to start understanding the maintenance and spread of their diseases. The behavioural ecology of bats, where they might host diseases of policy concern (such as the bat lyssaviruses which can spill-over to cause rabies in man) is therefore of some interest, especially considering novel or exotic pathogens, or how environmental change might affect the risks produced by hitherto scarce endemic diseases.

The Natterer's bat is medium sized by British standards, at around 7-10 g, and as well as being the putative host for one lyssavirus (Bokeloh virus; BBLV), its ecology is also typical of other small/medium Myotis bats which host other lyssaviruses; they make a good general model. As such they live in social groups of varying size in the summer (communities), typically in lowland settings; migrate to hibernate in caves through the winter; and in autumn aggregate at traditional sites to mate (autumnal swarming; think night-club). These autumnal swarming sites are often also hibernation sites, so the regular seasonal attendance of bats may have other social functions (showing young of the year where to hibernate). This appears to be a good mechanism to avoid inbreeding as bats collect at mating sites from across geographically extensive catchments. Previous work using bat rings suggested bats might travel as far as 65km to mate and hibernate, and this in turn suggested most summer communities would be exclusively associated with a single mating/hibernation site, with all of its members knowing of, and passing on, the location of this key resource in the landscape.

Here, we leveraged the power of studies into bat population genetics to explore how bats move and mix at landscape scales. Using wing biopsy samples collected as part of an APHA sponsored bat ecology PhD in Northumberland, and an historical active surveillance exercise in Yorkshire and Lancashire, we identified that summer colonies close to one another (and also close to a substantial regional mating/hibernation site) were not so closely related (in relative terms) whilst our Northumbrian site looked like it had regular

constant interaction (gene-flow) with some of those in Yorkshire, presumably through autumnal mating. Not only does this indicate that bats regularly move substantial distances (>120 km) to aggregate and mate, but that some summer communities appear to use multiple mating sites, i.e. separate traditions are maintained in the same summer community with different individuals or kin-groups flying in different directions to different mating sites in autumn.

Our approach also permitted us to compare for the first time the kin-relationships within summer communities, revealing intriguing differences. Current knowledge suggests that summer communities should be dominated by matrilines; sisters, aunts, grandmothers, great grandmothers and mothers all sharing a site. Some of our sites did begin to show this character, but others showed a surprising lack of kin-associations, as well as the presence of unusual genetic signatures. A number of possible explanations exist but one we favour is the likely existence of source and sink sub-populations (our summer communities) across a heterogenous landscape. Daughters stay in source communities because they are a great place to live. In contrast disparate unrelated individuals may collect at genetically isolated sink sites, where life may be hard and short, and reproduction may be more difficult. Counter-intuitively, this dynamic may not be related to the size of summer communities. This source-sink concept is important in understanding where disease might be maintained (sources) or burn-out (sinks) because of potential differences in survival, reproduction, or landscape connectivity.

Together, our work suggests that bat behaviour and population dynamics (collectively ecology) make predicting the maintenance and spread of bat disease more challenging. Our evidence that very distant sites may be connected through two independent networks of regular seasonal aggregation suggest the potential for rapid long-distance spread of contagious disease, and may make geographically defined ideas of disease presence or absence difficult to defend. Find disease in one place and you might have to immediately assume it is everywhere. However, identifying whether a novel or exotic disease will be maintained and spread is also a function of processes happening within communities, and the potential variation in bat community population dynamics is probably important; now all we have to do is to characterise the factors producing source or sink communities and map those across the country.

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James Aegerter, APHA Sand Hutton and DoWS, APHA Wildlife Expert Group

Avian Reports

Wild Bird reports from the IoZ

Sarcocystis wobeseri-like parasites in a white-tailed sea-eagle

Point for information - Potential threat to wild bird health.

In October 2019, a reintroduced white-tailed sea eagle (*Haliaeetus albicilla*), in moderate body condition, was found dead on the Isle of Wight and was submitted for postmortem examination at the Institute of Zoology, Zoological Society of London. There were no signs of disease on gross pathological examination however, histopathological examination of pectoral and cardiac muscle sections revealed the presence of encysted protozoan parasites. Polymerase chain reaction amplification of extracted genomic DNA and sequencing of four regions: the 18S rDNA, 28S rDNA, internal transcribed spacer (ITS) 1 and RNA polymerase B (rpoB) loci, was carried out. Results confirmed the presence of a *Sarcocystis* species in pectoral and cardiac muscle which appeared phylogenetically similar to *Sarcocystis wobeseri*. This was the first report of *Sarcocystis wobeseri*-like infection in a white-tailed sea eagle, revealing a new intermediate host species for this parasite. Although there was no evidence of disease associated with this infection, findings were considered of interest in understanding the host range of the parasite and results were published in Parasitology Research.

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Shadbolt T, Pocknell A, Sainsbury AW, Egerton-Read S, Blake DP. Molecular identification of *Sarcocystis wobeseri*-like parasites in a new intermediate host species, the white-tailed sea eagle (*Haliaeetus albicilla*). Parasitology Research 2021;**11**:1432-1435 https://doi.org/10.1007/s00436-021-07103-0

Institute of Zoology (IoZ)

Wildfowl and Wetlands Trust (WWT) report

Passive surveillance of waterbirds

Postmortem examinations were performed on 45 wild birds originating from five WWT sites (Slimbridge, Gloucestershire; Arundel, West Sussex; Martin Mere, Lancashire; London Wetland centre, Greater London and Caerlaverock, Dumfries and Galloway). A total of ten target species were examined, which included five mallards (*Anas platyrhynchos*), three black-headed gull (*Chroicocephalus ridibundus*), one common shelduck (*Tadorna tadorna*), four greylag goose (*Anser anser*), two tufted duck *(Aythya*

fuligula), three eurasian coots (*Fulica atra*), six moorhens (*Gallinula chloropus),* five canada goose (Branta Canadensis), nine mute swans (*Cygnus olor*) and four whooper swans (*Cygnus cygnus*). Two other species were also examined: a feral pigeon (*Columba livia domestica*) and a mandarin duck (*Aix galericulata*). The primary causes of death are summarised below (Table 4 and Figure 8).

There was a wide variety of fatal occurrences among the wild birds collected and examined this quarter. The main causes of avian mortality during this quarter were trauma (27%) and predation (15%). Within the trauma cases, there were four mute swans, a whooper swan, two moorhens, a mallard, a feral pigeon and a black-headed gull all presenting with internal haemorrhage and soft tissue bruising secondary to collision (one confirmed case where bad weather conditions were responsible) or same species aggression. One coot and one whooper swan suffered trauma from being trapped in field netting. The majority of the predated birds collected presented with intact skeletal structure with skin, albeit minimal soft tissue or missing sections, and absence or minimal presence of internal organs. High suspicion of gull predation in many of these mentioned cases.

Avian mycobacteriosis was the primary cause of mortality in 13% of the carcases found with a characteristic presentation of mutil-focal granuloma-like lesions in hepatic, splenic and/or renal tissues in all six birds (two canada geese, two mandarin ducks, a mallard and a coot).

Severe necrotising enteritis was detected in three mute swans (7% of total cases). All carcases presented with congested intestinal loops, necrotic lesions within intestinal lining and pancreas, as well as, renomegaly and/or hepatomegaly. Another three wild birds (7%); two greylags and one mallard, presented with extensive visceral and articular gout related lesions, as well as, macroscopic renal lesions.

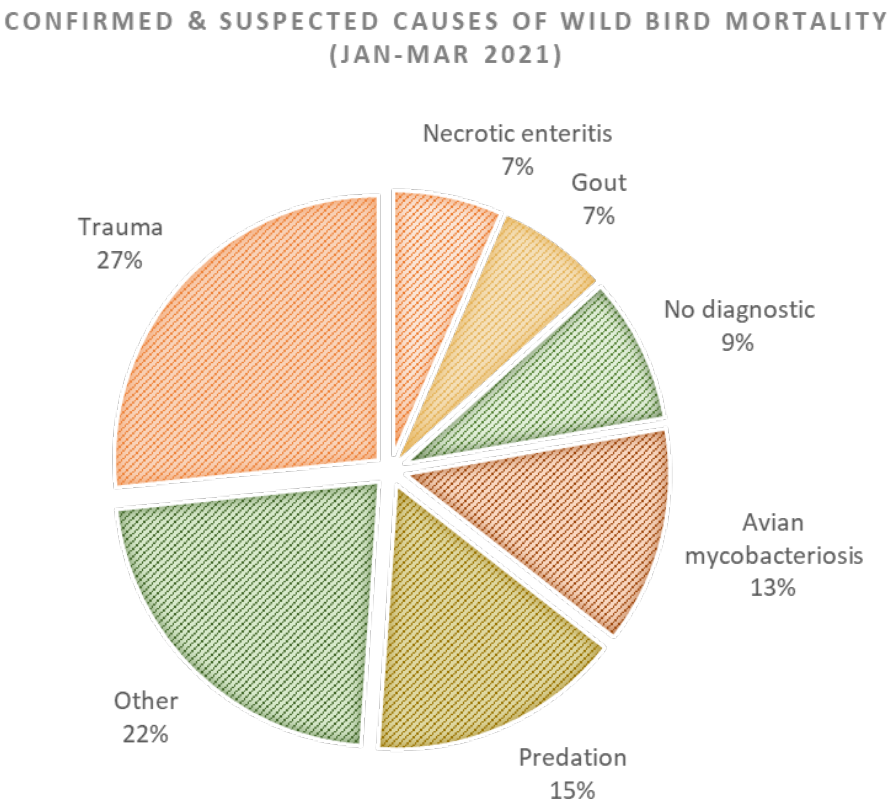
Other causes that were less prevalent during this quarter included possible lead intoxication in a whooper swan and a greylag (which also presented with severe airsacculitis concomitantly), and three drowning cases involving a tufted duck, a greylag and a mute swan with a potential cardiovascular condition. Two canada geese presented with internal haemorrhage, possibly due to the progression of an undetected viral disease. One mute swan was euthanased on welfare grounds, due to increased respiratory effort on inspiration, wet feathers, severe ectoparasite infestation, lethargy, difficulty eating underwater, facial muscle wastage and stunted growth. On postmortem examination, a congenital factor was suspected since the mute swan presented with several internal anomalies including herniation of intestinal loops into the right caudal air sac, liver and digestive tract displaced left-laterally and organomegaly. Lastly, within this group of mortalities, there was one mallard with potential hepatic disease, presenting with hepatomegaly and a thickened and bright yellow serosal surface.

Four wild birds (9%) did not receive diagnostic investigations due to advanced decomposition or absence of gross abnormalities.

Table 4 - Confirmed and suspected causes of wild bird mortality (including morbidity meriting euthanasia on welfare grounds) at WWT reserves between January and March 2021; †n denotes juvenile birds and number of juvenile birds; *n denotes euthanased birds and number of euthanased birds

Primary cause of death/PM findings	Total	Species (and notes)
Trauma	12	4 x mute swans†2*1, 2 x whooper swan, 2 x moorhens, 1 x coot, 1 x black-headed gull, 1 x mallard, 1 x feral pigeon,
Predation	7	4 x moorhens 1 x tufted duck, 1 x shelduck, 1 x black headed gull
Avian mycobacteriosis	6	2 x canada goose*1, 2 x mandarin duck, 1 x mallard*1, 1 x coot
Necrotic enteritis	3	3 x mute swan
Gout	3	2 x greylag, 1 x mallard
Other	10	2 x mute swan (cardiovascular disease, renal disease, congenital defect), 2 x canada goose (internal haemorrhage), 1 x black-headed gull (renal disease), 1x whooper swan*1 (poss. lead intoxication), 2 x greylag (airsacculitis, poss. lead intoxication, drowned), 1 x mallard (liver disease), 1 x tufted duck (drowned)
No diagnosis (due to decomposition or absence of gross abnormalities)	4	1 x mallard, 1 x whooper swan, 1 x canada goose, 1 x coot

Figure 8 - Graph showing percentage summary of confirmed and suspected causes of wild bird mortality at WWT reserves between January and March 2021



Sarcocystis surveillance project

In January to February 2021, the Sarcocystis surveillance project received a final 14 reports from members of the hunting community, with one non-national submission excluded from the survey. This brings the total number of submissions to 61 for the 2020-2021 hunting season. The majority of sarcocystis cases were reported in mallards *Anas platyrhynchos* (36) and Eurasian wigeon *Mareca penelope (18),* representing 60% and 30% of cases respectively. Cases were also reported in Eurasian teal *Anas crecca* (5), and gadwall *Mareca strepera* (1).

Approximately 67% of cases were reported in males, possibly reflecting bias in the hunting bag rather than infection predilection. Most cases (67%) were reported in birds with good body condition, which had some carcase fat deposits and plump breast muscles.

The data collected during the 2020-2021 hunting season is now being compiled into a feedback report, which will be published online in due course. For further information on Sarcocystis surveillance in UK waterfowl and for previous reports, please refer to the Sarcocystis Survey website (http://www.sarcocystissurvey.org.uk/).

Rosa Lopez, Veterinary Officer (Conservation), Wildfowl & Wetlands Trust (WWT)

Wild Bird reports from Scotland

Significant levels of brodifacoum (0.307 mg/kg) and low levels of bromadiolone (0.023 mg/kg) and difethialone (0.002 mg/kg) were detected in liver tissue from a common buzzard (*Buteo buteo*) found dead in woodland by a garden in Dumfries and Galloway. At necropsy, body condition was good, and bruising and swelling were noted around the right eye, extending slightly down the neck. There was haemorrhage within the orbit but the eye appeared undamaged. No other evidence of trauma was detected. The presence of haemorrhage suggests that anticoagulant rodenticide poisoning is likely to have contributed to the death - possibly following trauma that may not otherwise have been fatal.

Caroline Robinson, SRUC Veterinary Services

Wild Bird reports from APHA DoWS

Systemic aspergillosis in a golden eagle (*Aquila chrysaetos*)

A golden eagle was submitted for postmortem examination under the Wildlife Incident Investigation Scheme (WIIS) at APHA Carmarthen VIC. It was thought to be 12-15 years old and was reported dead by a walker. This bird had been living alone in the wild well outside its natural UK distributional range in Scotland, for several years.

Figure 9 Multiple fungal granulomatous plaques in the ceolomic cavity of a golden eagle with systemic aspergillosis

At postmortem examination the bird was emaciated and there were extensive, multiple white plaques throughout the coelomic cavity. Aspergillus fumigatus was cultured from multiple sites confirming systemic aspergillosis. Histopathology identified severe chronic multifocal to coalescing necrotising and granulomatous lesions with intra-lesional hyphae and conidiophores.

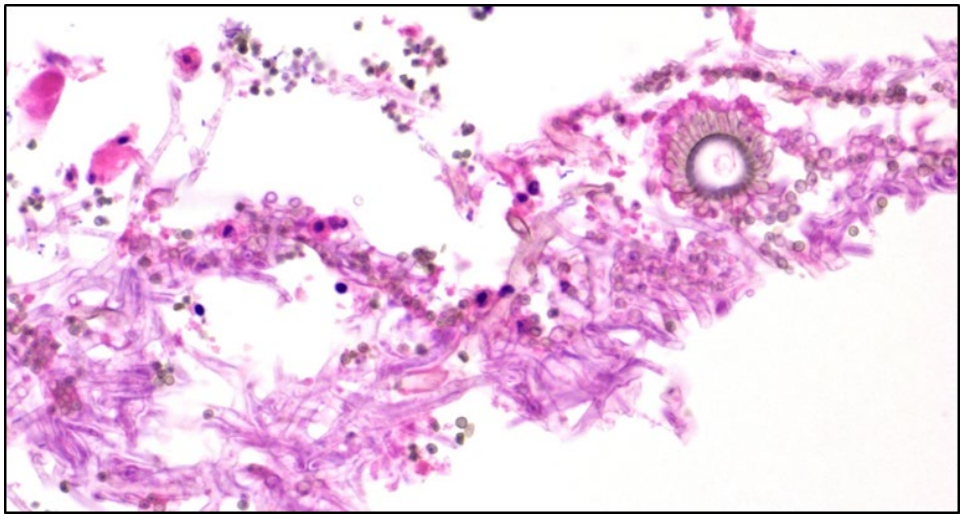


Figure 10 Mat of hyphae and a conidiophore from a granulomatous plaque in a golden eagle with systemic aspergillosis (H&E). Photo and caption APHA Lasswade

Radiographs of the carcase demonstrated two small circular radio-opaque foreign bodies. One metal pellet (about 2mm diameter) was located subcutaneously two-thirds of the way down the right tibia. The metal pellet was encapsulated within a thin membrane, suggesting the bird was not shot recently and presence of the pellet is unlikely to have contributed to the death of this bird. The other circular radio-opaque foreign body was not located. Testing for lead showed background exposure only.

Aspergillosis is the most common fungal mycosis in birds with Aspergillus fumigatus, a ubiquitous opportunistic organism, the predominant species isolated. Inhalation is thought to be the main route of infection, and air sacs are usually the primary site of infection. Haematogenous spread can occur disseminating spores to other organs. Factors impairing the birds' immunity such as concomitant disease, starvation or trauma can predispose to aspergillosis. No underlying immunocompromising factors were detected on testing in this eagle. The lesions were extensive and chronic throughout the carcase, likely resulting in reduced feed intake, ill-thrift, dehydration and ultimately death.

Caroline Fenemore, APHA Veterinary Investigation Centre Carmarthen

Renal cell carcinoma in a crow

An emaciated adult carrion crow (*Corvus corone*) was submitted for postmortem examination as part of the avian influenza wild bird surveillance survey. Within its retroperitoneum, overlying the kidneys on the left hand side, there was a roughly spherical,

approximately 3cm in diameter, firm, smooth mass. Some small haemorrhages were evident on its surface. When incised, the contents of this mass were well encapsulated, solid and gritty, cream to grey coloured.

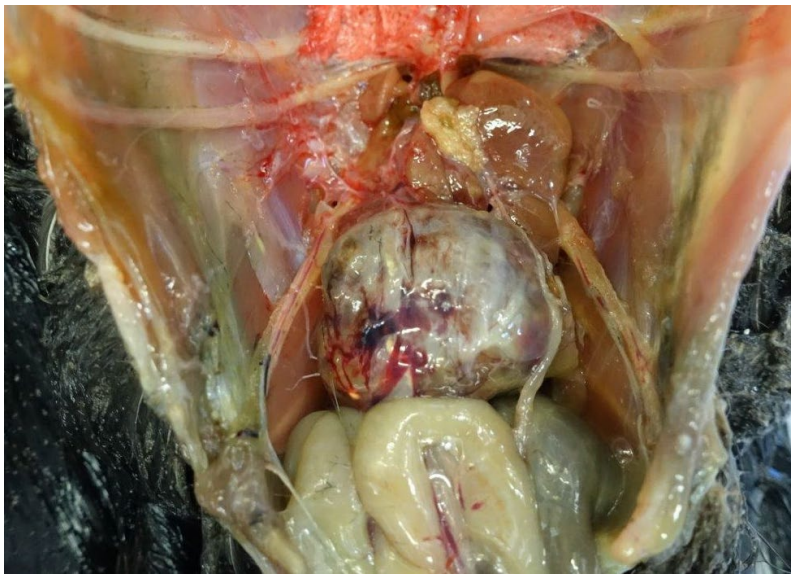


Figure 11 Retroperitoneal mass in a crow

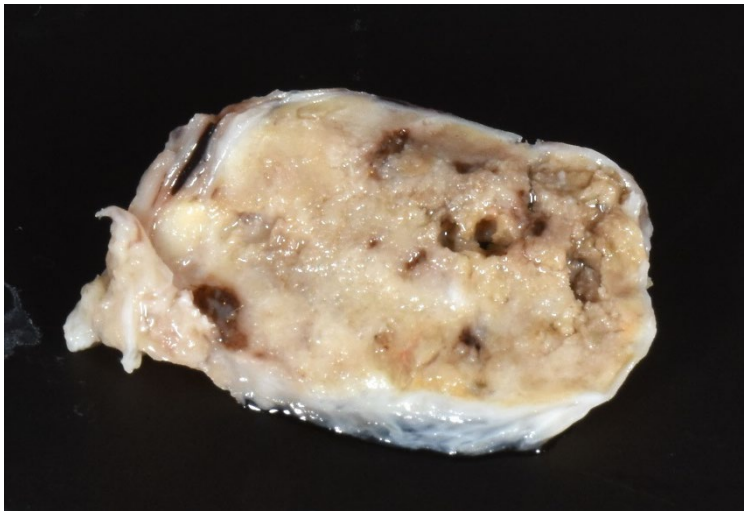


Figure 12 cross-section of retroperitoneal mass

The retroperitoneal mass is made of a densely cellular epithelial neoplasm with frequent osseous metaplasia; the presence of osseous metaplasia can account for the gritty and discohesive macroscopic appearance. Neoplastic cells are mainly arranged in tubules and multifocal in papillae, sustained by a paucity of fibro-vascular stroma. The histological diagnosis is renal cell carcinoma with osseous metaplasia. The renal neoplasms are rare in animals and in wild birds and there are sporadic reports.

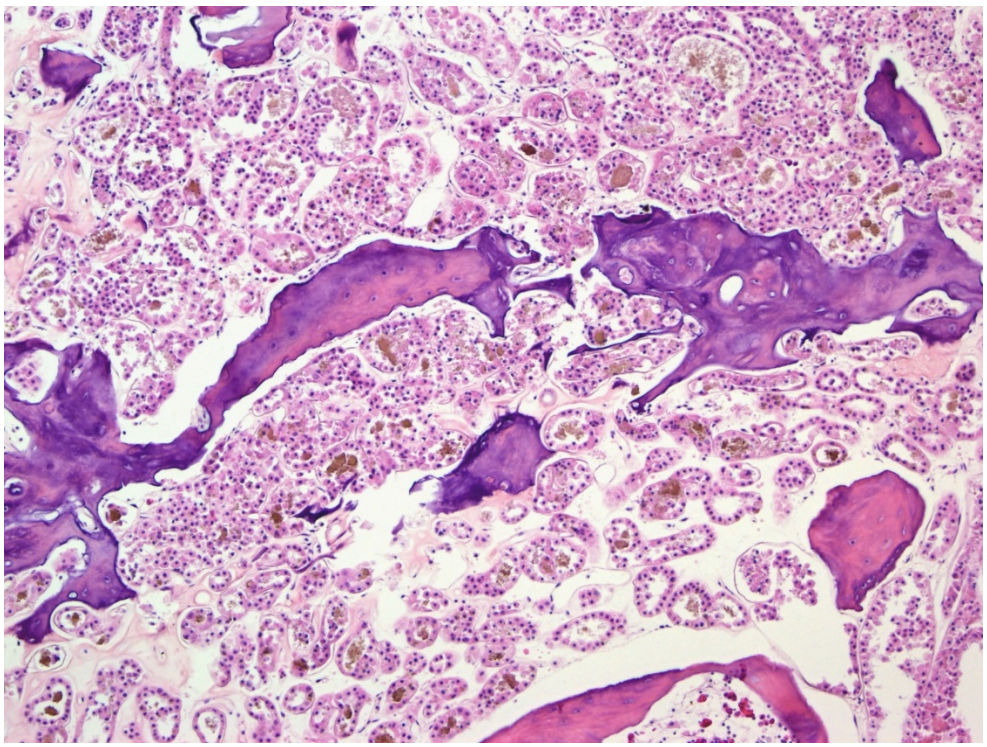


Figure 13 - Retroperitoneal mass: renal cell carcinoma exhibiting mainly a tubular growth pattern with osseous metaplasia (H&E; Obj 10x)

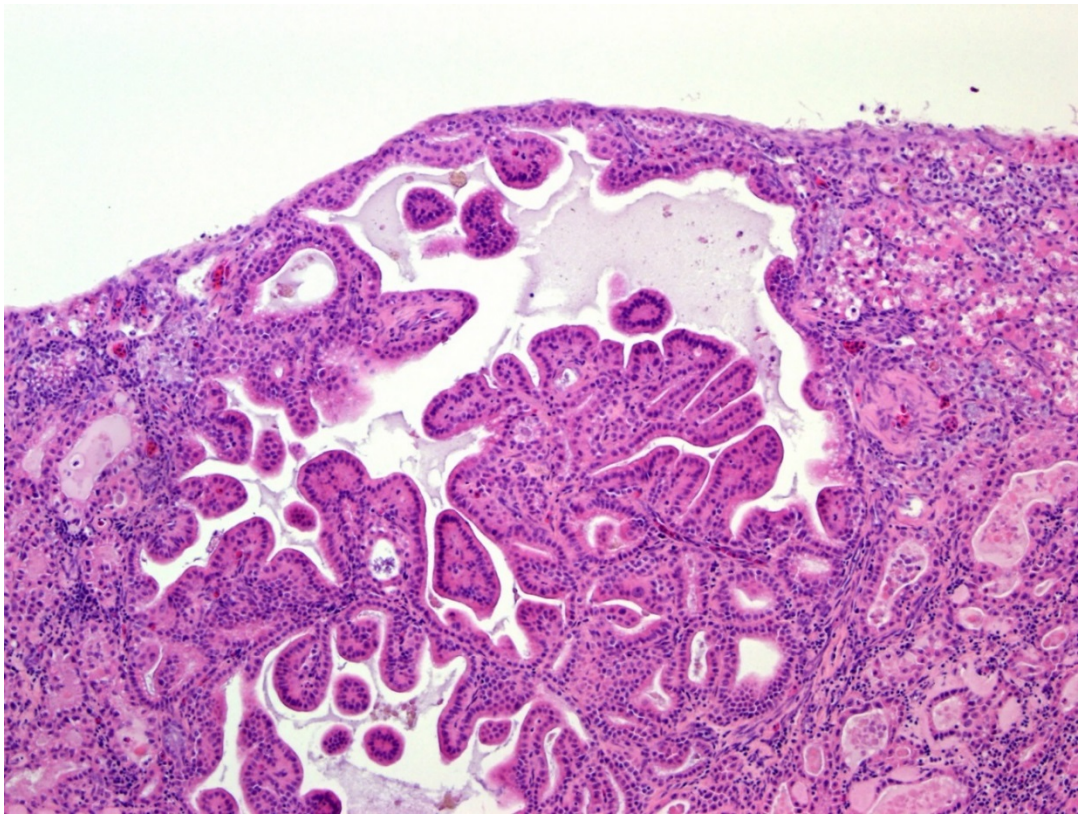


Figure 14 - Retroperitoneal mass: renal cell carcinoma exhibiting multifocal papillary growth pattern (H&E; Obj 10x)

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Catherine Man APHA DoWS and Carlo Bianco, APHA Lasswade

Unusual *Eucoleus dispar* stomatitis and glossitis in a buzzard

A diagnosis of *Eucoleus dispar* stomatitis and glossitis was made in an emaciated common buzzard (*Buteo buteo*) whose oropharynx and oesophagus were covered in a pale brown granular material. This nematode parasite is known to embed in the oral mucosa of birds of prey and cause caseous lesions however, this has been an uncommon diagnosis in the experience of the APHA Diseases of Wildlife Scheme (DoWS). Dissection of the tongue, crop and oesophagus revealed nematodes; histopathological examination showed a severe proliferative and necrotising glossitis with nematodes, fungi and bacteria present.

Figure 15 - Lesions in the proximal oesophagus of a common buzzard associated with Eucoleus dispar

Mycoplasmosis involving *Mycoplasma buteonis* in a common buzzard

Suspect infection with *Mycoplasma buteonis* was identified in a common buzzard (*Buteo buteo*) with severe caseous conjunctivitis and sinusitis. The buzzard had been seen prior to death and was noted to have swollen eyes; it was observed foraging for worms on foot, and seemed to be having difficulties hunting. It was submitted as part of the Diseases of Wildlife Scheme (DoWS) however, was screened for avian influenza as part of the Avian Influenza Wild Bird Surveillance scheme, and tested negative for Influenza A on PCR testing of oropharyngeal and cloacal swabs. At postmortem examination, the bird was

Figure 16 – Common buzzard with the eyelids and surrounding skin have been removed, showing caseous material overlying the eye and within infraorbital sinus

found to be be emaciated, and had caseous plugs overlying the conjunctiva and within the infraorbital sinuses (Figure 16). Testing identified the presence of *M. buteonis*, and no other significant pathogens were detected by routine bacteriology. This *Mycoplasma* species was first isolated from a captive buzzard in 1994 with signs of respiratory disease, and since this report M. buteonis has been detected in several species of raptors with and without disease (Poveda *et al.*, 1994; Lierz *et al.*, 2008). Transversal sections of the buzzard's head showed the nasal cavity and sinuses were filled with caseous material that may have forced the bird to breath via its mouth (Figure 17). Histopathology revealed severe chronic necrotising rhinosinusitis, conjunctivitis, cellulitis and osteomyelitis with intralesional bacteria in the head, and mycotic necrotising pneumonia in the lungs, which was likely to be secondary to the severe upper respiratory tract lesions. *M. buteonis* has been detected in both healthy and diseased free- living birds of prey in Europe, and its role of a primary pathogen in raptors remains unknown, however this investigation suggests it was involved in the pathology seen in this buzzard.

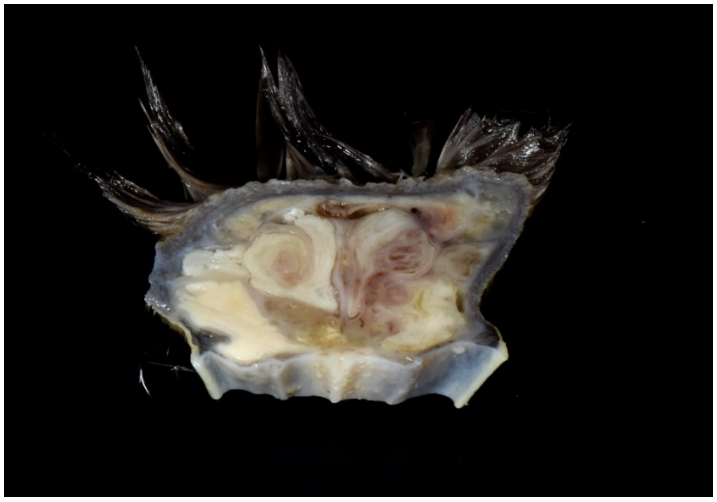

Figure 17 - Transverse section of the upper beak/nasal cavity filled with caseous material. Photo credit APHA Lasswade

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Edward Fullick, APHA DoWS

Severe aspergillosis in an immature herring gull

An immature herring gull (*Larus argentatus*) was found dead at an RSPB reserve and submitted as part of the AIWBS. After testing negative for avian influenza, the herring gull underwent postmortem examination. The gull was found to have a severe fungal airsacculitis, with liquefactive and caseous lesions, with visible fungal growth within the thoracic airsacs (Figure 18 & Figure 19). Fungal cultures returned positive for *Aspergillus fumigatus*. Due to the feeding habits of these birds, it's possible that the gull might have been exposed to high risk material (i.e. decaying material, particularly vegetation) for a prolonged period of time, increasing the risk of aspergillosis infection.

Figure 18 - Photo showing the ventral thoracic cavity, with severe liquefactive and caseous lesions within the thoracic

Figure 19 - Photo showing the dorsal thoracic cavity, with caseous thickening of the airsacs and presumptive fungal

Edward Fullick, APHA DoWS

Amphibian reports

Wild amphibian reports from the IoZ

Batrachochytrium salamandrivorans (Bsal) surveillance and eradication of non-native species

Point for information - Potential threat to urodele health, welfare and biodiversity if Bsal becomes established in the wild in GB.

In March 2021 Defra was alerted to the presence of a non-native banded newt, either the Northern banded newt (*Ommatotriton ophryticus*) or the Southern banded newt (*O. vittatus*) in a garden pond in Amersham, Buckinghamshire. Upon further enquiry, it became apparent that the animal was likely to be an escapee from a captive population. From the information available, this is also the most likely source of the sizeable population of alpine newt (*Ichthyosaura alpestris*) in the area.

As there are no known wild populations of banded newts in GB, Defra requested the Animal and Plant Health Agency (APHA) team to attend the location to conduct a trapping exercise. After initially being invited into one garden, APHA staff were given permission to visit a further six. Both Defra and APHA greatly appreciate the cooperative and helpful approach taken by the householders.

The escape of captive amphibians is of particular concern because of the presence of the *Batrachochytrium salamandrivorans* (Bsal) fungus in captive populations (Martel et al, 2020; Fitzpatrick et al, 2018) and because all three species of native British urodele have been shown to be susceptible to Bsal infection, with great crested newts (*Triturus cristatus*) being at particular risk of lethal infection (Martel et al, 2014). Bsal has not, at the time of writing, been recorded in the wild in GB (Cunningham et al, 2019).

Although no banded newts were trapped during the exercise, over 300 alpine newts were removed from seven ponds over three nights. Acting in accordance with the Wildlife and Countryside Act 1981, all non-native newts trapped at the site were not returned to the wild and were euthanised. Thirty of these alpine newts were submitted to IoZ for Bsal testing.

On external examination, all 30 newts (17 females and 13 males) appeared in normal body condition with no evidence of skin lesions. Skin swabs were collected from each newt for real time duplex qPCR to test for the presence of Bsal and *B. dendrobatidis* (Bd) DNA. All samples were qPCR negative for Bsal. A sample size of 30 gives a probability of Bsal detection of 99% if infection prevalence within the sampled amphibian population is 15%, or a probability of detection of 79% with an infection prevalence of 5% (assuming random sampling, 100% diagnostic sensitivity, and that the six ponds are a single epidemiological unit (i.e. with a contiguous, mixing population).

Eight of the 30 skin swab samples (from 4/6 ponds) tested qPCR positive for Bd. Chytridiomycosis caused by Bd has been shown to have a huge impact on global amphibian biodiversity (Scheele et al, 2019), and whilst this pathogen is known to be present elsewhere in GB, its impact (if any) on British amphibian conservation has yet to be elucidated. The role that non-native species play in the introduction and/or maintenance of Bd infection also has yet to be determined.

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Institute of Zoology (IoZ)

The material in this report has been compiled by the Animal and Plant Health Agency (APHA) Surveillance Intelligence Unit in collaboration with the APHA Surveillance and Laboratory Services Department.

The report is available on GOV.UK at:

https://www.gov.uk/government/collections/animal-disease-surveillance-reports.

Any enquiries regarding this report should be sent to APHA's Surveillance Intelligence Unit by emailing SIU@apha.gov.uk.

More information about scanning surveillance reports is available on APHA's Vet Gateway at http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm.

APHA is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.