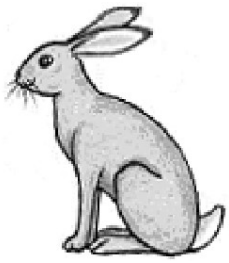
Great Britain Wildlife Disease Surveillance Partnership quarterly report

Disease surveillance and emerging threats



Volume 34: Q3 – July-September 2021

Highlights

- **Highly pathogenic avian influenza virus (HPAIV) outbreak in wild birds, page 3 and 22**
- **Another large outbreak of squirrelpox at Formby, Merseyside, page 17**
- **Intraspecific aggression in a large gull colony, page 25**

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), Forestry England (FE) and the Garden Wildlife Health (GWH) project produces the GB Wildlife Disease Surveillance Partnership Quarterly Reports.

A full explanation of how data is analysed is provided in the annexe available on GOV.UK.

Issues and trends

Highly pathogenic avian influenza virus (HPAIV) has affected birds including wild birds and pheasants in Wales, Scotland and England, with the first outbreak confirmed on 17 October 2021. This closely follows the final cases of the H5N8 outbreak (winter 2020 to summer 2021) which occurred in great skuas (*Stercorarius skua*) in Scotland during August 2021. At the time of writing there have been 5 incidents of this notifiable disease, all during October, in Wales (1), Scotland (2) and England (2). Species affected and provisionally identified include pheasants (*Phasianus colchicus*), Eurasian curlew (*Numenius arquata*), mute swan (*Cygnus olor*) whooper swan (*Cygnus cygnus*), greylag goose (*Anser anser*) and pink-footed goose (*Anser brachyrhynchus*). Examinations have not been completed in all cases but where the HPAIV sub-type is known it is primarily H5N1. This differs from the predominant HPAIV sub-type from the previous outbreak (winter 2020-summer 2021) which was H5N8. Assessment of the molecular profile of the H5N1 virus to provide an indication of its zoonotic potential is under way.

Great Britain, for a second successive winter period, could therefore be facing an extensive HPAIV outbreak in wild birds with significant pressure of infection from wild birds to domesticated poultry flocks (risk of infection from wild birds to domesticated bird). Please be alert to government advice, particularly advice for poultry owners. APHA Diseases of Wildlife Scheme together with colleagues in Weybridge and the SRUC published an account of HPAIV in wild birds during the previous 2020/2021 (Duff et al 2021).

Reference

Duff P, Holmes P, Aegerter J, Man C, Fullick E, Reid S, Lean F, Núñez A, Hansen R, Tye J, Stephan L, Brown I, Robinson C. Investigations associated with the 2020/21 highly pathogenic avian influenza epizootic in wild birds in Great Britain. *Veterinary Record* 2021;**189**:356-358.

Notifiable diseases

Avian Influenza (AI) Virus

A report has not been submitted for Q3 of 2021. This data will be included in the next Wildlife Quarterly Report.

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 third quarter of 2021, WWT continued to carry out passive surveillance of avian influenza across the reserves. Between July and September, 132 dead wild birds were found across six WWT sites located in Gloucestershire, West Sussex, Tyne and Wear, Greater London, Lancashire and Carmarthenshire. Of the birds found, 57 were sampled for avian influenza virus, with four carcases being too heavily predated or in advanced decomposition to swab and the remaining 71 birds were part of a botulism outbreak of 81 birds, ten of which were sampled for the AI surveillance scheme.

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

A total of 56 samples, sent to APHA laboratory for testing, were PCR negative to Influenza A viral RNA and one oesophageal swab from the botulism outbreak case (from a mallard), tested positive for low pathogenic non-H5 Influenza A viral RNA.

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.

APHA Salmonellosis diagnosis in wildlife for Q3 are summarised in Table 1.

Table 1 shows the number of Salmonellosis diagnoses in wildlife in Q3 of 2021, the phage type, which species were infected, the number of isolations and the clinical diseases associated with the isolate

Salmonella isolated	Species infected	Number of isolations	Clinical disease
S. Enteritidis PT11	Hedgehog	4	Yes (diarrhoea)
S. Enteritidis PT11	Hedgehog	1	Yes (nervous)
S. Enteritidis PT20	Hedgehog	1	Yes (presenting signs not available)

S. Enteritidis PT11 is the commonest *Salmonella* spp. isolated from hedgehogs; it is common and widespread in hedgehogs in England (Keymer and others, 1991). Robinson & Routh (1999) suggest that *S*. Enteriditis PT11 appears to be endemic in hedgehogs. S. Enteritidis PT20 has also been previously detected by APHA although it appears to be a less common isolate than PT11.

Quality statement regarding these data: - GB 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.

References

Keymer I, Gibson E, Reynolds, D. Zoonoses and other findings in hedgehogs (*Erinaceus europaeus*): a survey of mortality and review of the literature. *The Veterinary Record* 1991:**128**(11): 245-249.

Robinson I and Routh A. Veterinary care of the hedgehog. *In Practice* 1999:**21**:128-137.

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

Two hundred and seventy-nine bats were tested for lyssavirus under passive surveillance during this quarter. Two hundred and seventy- five bats were negative whilst 2 serotine bats were tested positive for EBLV1 and 2 daubentons bats were positive for EBLV 2.

Seven zoo bats were tested in this quarter for lyssaviruses. All were negative.

One unspeciated bat as an illegal landing was tested for lyssavirus with negative results.

Rabies diagnosis

Two dogs and 7 cats that died in quarantine were tested for rabies with negative results.

Rabies surveillance in terrestrial wildlife

Vigilance continues for this notifiable disease in UK wildlife but no samples from terrestrial wildlife were submitted for testing this quarter.

West Nile virus surveillance and Usutu virus surveillance in wild birds

Brain and kidney tissue samples from 126 wild birds collected during this period and submitted via APHA, SRUC and IoZ were tested by PCR for WNV with negative results.

Tissues from 84 birds were also tested by PCR for Usutu virus with negative results whilst one blackbird (*Turdus merula*) submitted from Central London during September tested positive for the presence of Usutu RNA.

West Nile virus surveillance in Equids

There have been no samples submitted for differential diagnosis of neurological signs in horses during this quarter. However, the connections of one horse from South Africa requested pre-sale import testing by WNV IgM ELISA during this period with negative results.

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. **Avian-derived highly pathogenic avian influenza virus H5N8 in wild mammals:**
   a. HPAIV H5N8 causing mortality in harbour seals in Germany. Threat from notifiable disease extending the host species range.
   Reference: [H5N8 HPAI in harbour seals in Germany]

b. HPAI in seals and fox in UK.
Reference: Floyd T, Banyard AC, Lean FZX, Byrne AMP, Fullick E, Whittard E, Mollett BC, Bexton S, Swinson V, Macrelli M, Lewis NS, Reid SM, Núñez A, Duff JP, Hansen R and Brown IH. Encephalitis and Death in Wild Mammals at a Rehabilitation Center after Infection with Highly Pathogenic Avian Influenza A(H5N8) Virus, United Kingdom. *Emerg Infect Dis.* 2021;**27**(11):2856-2863.

2. **Undiagnosed mass mortality of passerine (songbird) species in USA. Relevance – this is probably a new disease; risk of occurrence in Great Britain is likely to be low.** Mass mortalities across 10 states involving conjunctivitis and nervous signs, cause unknown despite extensive investigations.
Reference: https://www.usgs.gov/news/updated-interagency-statement-usgs-and-partners-continue-investigating-dc-area-bird-mortality

Garden Wildlife Health summary

The Garden Wildlife Health project (GWH) has continued to conduct scanning disease surveillance of garden birds, hedgehogs, reptiles, and amphibians, with no unusual diagnoses reached upon postmortem examinations (PMEs) conducted in Q3 2021. The disease incident reports (DIRs) received, and postmortem examinations (PMEs) conducted by the GWH team during Q3 2021 are summarised in Table 2 and 3, and Figure 1.

Table 2 shows the numbers of Garden Wildlife Health disease incident reports and postmortem examinations for Q3 2021

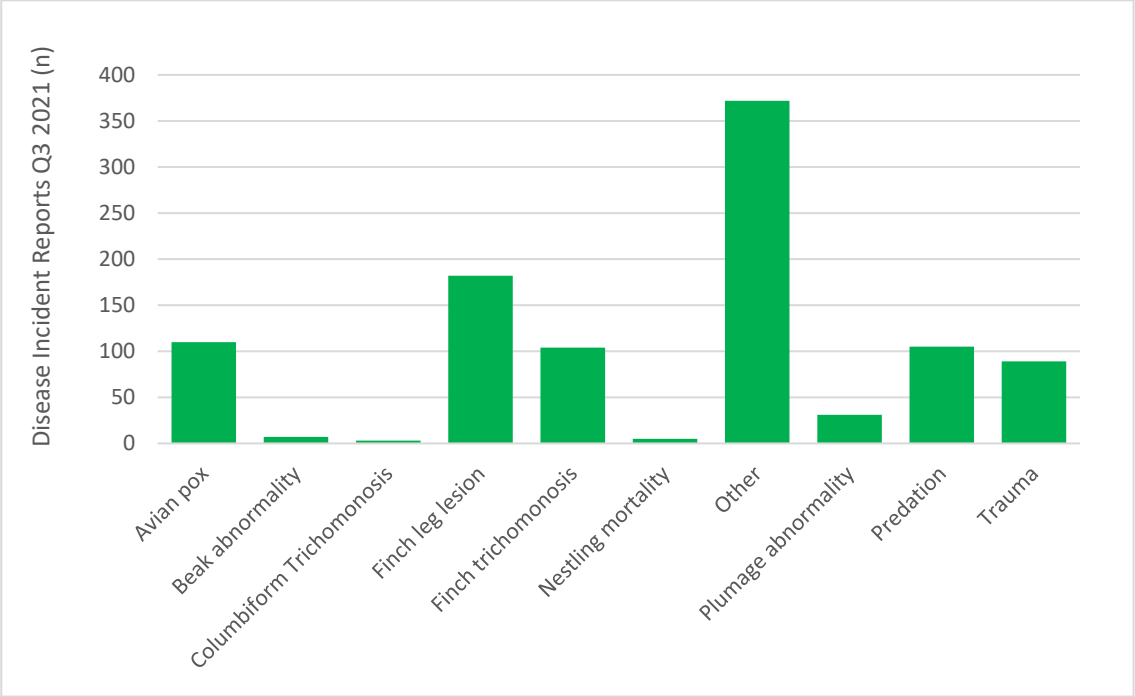
Taxon	No. of disease incident reports (no. of sites)	Total No. of animals observed (sick/dead)	No. of postmortem examinations (no. of sites)
Amphibians	73 (70)	137 (39/103)	9 (4)
Birds	1008 (987)	1271 (770/481)	14 (11)
Hedgehogs	183 (176)	219 (32/187)	2 (2)
Reptiles	14 (9)	17 (2/15)	7 (7)
Total	**1278 (1242)**	**1644 (843/786)**	**32 (24)**

Table 3 compares the numbers of Garden Wildlife Health disease incident reports for Q3 2020 and 2021

Taxon	No. of disease incident reports in Q2 (no. sick/dead) in 2020	No. of disease incident reports in Q2 (no. sick/dead) in 2021
Amphibians	73 (36/78)	73 (39/103)
Birds	1920 (1632/898)	1008 (770/481)
Hedgehogs	184 (40/213)	183 (32/187)
Reptiles	5 (0/5)	14 (2/15)
Total	**2182 (1708/1194)**	**1278 (843/786)**

No unusual trends in GWH DIRs were observed this quarter. The number of avian DIRs was reduced in Q3 2021, in contrast to Q3 2020, to a similar level to those received over the same period in 2019 (898 DIRs involving 853 sick and 383 dead garden birds). The high number of avian DIRs received in 2020 is considered likely, in large part, to be a result of increased observer effort during the COVID-19 pandemic, with people spending more time at home and in their gardens observing birds.

Figure 1 shows the numbers of Garden Wildlife Health avian disease incident reports allocated suspect diagnoses for Q3 2021, with the category of 'other' mostly comprising reports of birds exhibiting non-specific signs of ill health (e.g. fluffed-up plumage, lethargy). Further information on avian pox, beak abnormality, finch leg lesions, trichomonosis, and plumage abnormality is available by following the respective links



Institute of Zoology (IoZ)

Mammal reports

Wild Mammal reports from Scotland

Salmonella meningitis and septicaemia caused by *Salmonella* Enteritidis ST183 (5,2,3,7,50,6,11) was diagnosed in an adult female hedgehog (*Erinaceus europaeus*) which was found dead in a garden. The hedgehog was thin and appeared aged, as all four canine teeth were well worn and no longer had points. The necropsy was unremarkable, and the brain was grossly normal. Histopathology found a subacute meningitis in which bacteria were present, some of which have been phagocytosed, indicating that this was an ante-mortem invasion. The findings were consistent with bacterial meningitis. There were also microvascular thrombi within renal glomeruli and liver sinusoids, pulmonary oedema, and some small foci of necrosis in the adrenal cortex, findings consistent with septicaemia. An incidental residue of difenacoum, a rodenticide, was also detected.

Caroline Robinson, SRUC Veterinary Services

Wild mammal reports from APHA DoWS

Railway tunnels as a cause of significant mortality in bat species

Visits were made to inspect work on the renovation of bat roost sites in a railway tunnel, which is an old single track non-electrified tunnel 0.96 km long in East Anglia. 20 dead bats were found during an inspection visit on 14 September. These included five brown long eared bats (*Plecotus auritus*), seven Daubenton's bats (*Myotis daubentonii*), three common pipistrelles (*Pipistrellus pipistrellus*), four Natterer's bats (*Myotis nattereri*) and one of unknown species. All had gross evidence of traumatic injuries.

Figure 2 Natterer's bat on track bed

On a further visit on 23 September 12 more bats were found; four brown long-eared bats, one Daubenton's bat, one common pipistrelle, four Natterer's bats, one *Myotis* spp. and one unknown species. All these were dead except one of the brown long-eared bats, which was grounded. This was taken to the tunnel entrance and after a short while it flew away. Presumably it had only minor concussion. It was noted that the majority of the bats were found on the track bed between the rail and the wall.

Figure 3 Natterer's bat, subcutaneous and pectoral muscle haemorrhage

Unfortunately these bats were unsuitable for necropsy due to autolysis. Figure 3 is of a Natterer's bat previously found dead in a similar railway tunnel in Oxfordshire. Marked bruising and subcutaneous haemorrhage was seen on the left side of the thorax extending into the pectoral muscles. Also breaks/dislocations were identified affecting the 5th, 4th and 3rd metacarpals/phalanges of the right wing. A small hole was also present in the wing membrane of the right wing, caudal and slightly medial to the elbow joint.

These findings of haemorrhage and broken bones are typical of traumatic deaths of bats in railway tunnels. However it may not be possible to say if the trains directly hit the bats or if the pressure wave preceding the train throws the bats against the tunnel wall.

This spike in mortality is probably the result of late summer/early autumn leking and swarming of bats in the tunnel. Mitigation could be put in to substantially reduce mortality but it would be costly, e.g. a lighting system tripped before trains arrive combined with ‘bat shelters’ (tiles on walls) to flush bats into hiding. This has been used successfully in the previously mentioned Oxfordshire tunnel.

Alex Barlow, Wildlife Network for Disease Surveillance (WNDS); Geoff Billington, Greena Ecological Consultancy

Hydrocephalus in a fox cub (*Vulpes vulpes*)

Doming of the head and softening of the skull over the cerebrum was evident in the carcase of a 4- to 6-week-old fox cub. Four small fox cubs had been found in different locations; they were each wandering and were taken to wildlife hospitals from two different areas. Signs included lack of food recognition, suspected domed heads, and two were euthanased following onset of seizures. Rabies had been negated and one fox cub that was euthanased was received for examination.

It had marked cavitation of the cerebral hemispheres, and over 40ml of reddened cerebrospinal fluid was collected as the top of the skull was removed. The cerebral hemispheres collapsed when the skull was opened, but the cerebellum was not grossly affected. A pan-adenovirus PCR was carried out and no adenovirus nucleic acid was detected. A Ljungan virus PCR was also performed, but no Ljungan RNA was detected. Histological examination found no neuroparenchymal damage and congenital internal hydrocephalus was the most likely diagnosis. We have previously found similar signs associated with Infectious canine hepatitis (canine adenovirus type1). There was a lack of evidence of viral infection in any of the tissues examined in this case.

Figure 4 Doming of the skull in a 4- to 6-week-old fox cub

Figure 5 Collapsed cerebral hemispheres due to marked cavitation seen when the top of the skull was removed

Paul Holmes, APHA Diseases of Wildlife Scheme

Adenovirus infection in red squirrels (*Sciurus vulgaris*)

Two red squirrels were found sick and dying at the same location in North Wales one week apart. They were submitted for further investigation. Both had faecal staining around the perineal area and dark, liquid, large-intestinal contents but no signs of squirrelpox virus. One had no food material in the stomach and enlarged mesenteric lymph nodes, and the other had only a small amount of pale, pasty, food-material in the stomach. Electron microscopic examination of intestinal contents confirmed the presence of adenovirus. The presence of virus particles is considered strongly suggestive of clinically significant infection, which was supported by the gross signs of enteritis.

Adenovirus is known to be present and has caused deaths in squirrels in this area. As this is an isolated population of red squirrels there is ongoing concern about the possibility of the introduction of squirrelpox virus by grey squirrels in the vicinity.

Paul Holmes, APHA Diseases of Wildlife Scheme

Rabbit Haemorrhagic Disease – mass mortality

Twelve rabbits (*Oryctolagus cuniculus*) were found dead in and around a cemetery over a two week period. The carcasses were found lying above ground and several had been predated. One that had recently died was submitted for examination. It had been in good bodily condition and recently feeding but rabbit haemorrhagic disease (RHD) was confirmed by PCR examination of the liver. Sequence analysis indicated the presence of RHDV variant 2 RNA (RHDV2). Rabbit haemorrhagic disease is a highly contagious infectious acute viral disease of rabbits and frequently no clinical signs are seen before death. RHDV2 was first diagnosed in 2010 in GB, and it has apparently replaced the original classic RHDV. It is capable of infecting several lagomorph species including brown hares (*Lepus europaeus*). In this case the disease seems to be limited to the population of

rabbits around the cemetery. Further information about the disease can be in the reference below.

Figure 6 Typical case of a wild rabbit found dead in the open in the cemetery

Reference

Duff P, Fenemore C, Holmes P, Hopkins B, Jones J, He M, Everest D, Rocchi M. Rabbit haemorrhagic disease: a re-emerging threat to lagomorphs *The Veterinary Record* 2020:**187**(3):106-107.

Paul Holmes, APHA Diseases of Wildlife Scheme

Lymphoma in a juvenile badger

A dead juvenile badger (*Meles meles*) found near an outlier sett with known badger activity was submitted for examination under the Diseases of Wildlife Scheme. There were no external signs of trauma, nor any road in the area. The badger had massive, generalised lymphadenopathy. The bronchial lymph nodes had placed pressure on the adjacent lung tissue, resulting in an area of atelectasis (Figure 7). The right kidney was several times the size of the left kidney, with focal pallor at the pole (Figure 8). These lesions were suggestive of neoplasia, and although histological examination was impaired by prior freezing of the carcase, the histopathological changes supported this diagnosis.

Figure 7 Lymphoma: enlarged bronchial lymph node and the right cranial lung lobe with red discolouration overlying the lymph node, likely due to compression of the lung parenchyma

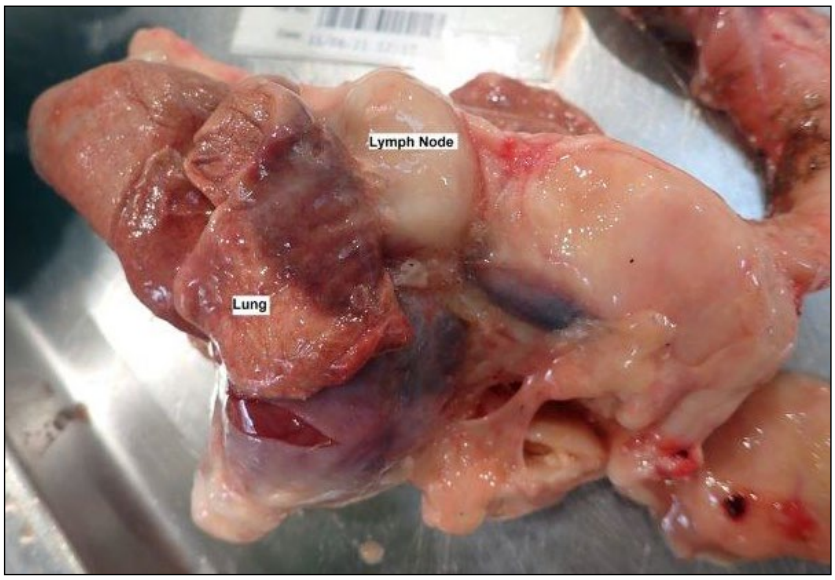
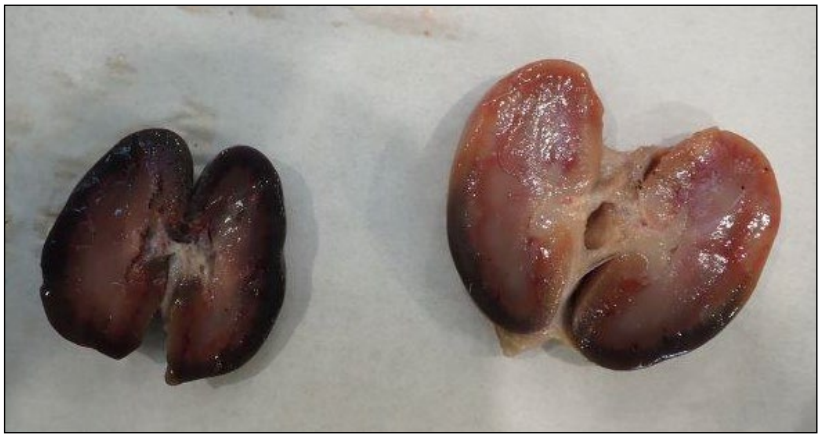


Figure 8 - Lymphoma: right kidney alongside the left kidney showing difference in size



Ed Fullick, APHA Diseases of Wildlife Scheme

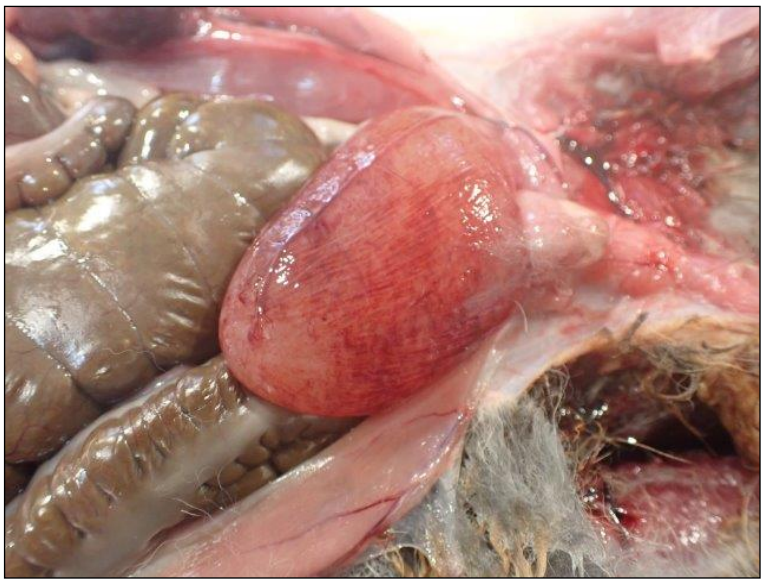
Myxomatosis and unexplained deaths in a population of rabbits

Four dead rabbits (*Oryctolagus cuniculus*) were submitted for post-mortem examination by a member of the public after a number were found dead in their local area. The rabbits were reported to have died quickly during the previous 24 hours. Rabbit haemorrhagic disease and poisoning were discussed as possible causes at the time of submission. One rabbit had extensive swelling tissues of the lower eyelid with accumulation of purulent material in the subcutis and at the bulbar conjunctiva (Figure 9). These findings were suggestive of myxomatosis with a secondary bacterial infection, and this diagnosis was confirmed on histopathology, with *Staphylococcus aureus* isolated from the site. Findings in the other rabbits were less conclusive, with a fibrinous peritonitis in one, reddening of the bladder in several, and gastrointestinal parasitism. One also had ulceration of the stomach, which was filled with dry ingesta, and it was considered that this might indicate a

degree of ileus in this animal. Mild cystitis was observed in several (Figure 10) and *Escherichia coli* was isolated in pure growth from the bladder of one. However, while *E. coli* can be involved in urinary tract infections, it is unclear why there would be multiple rabbits affected over a short time period. Aside from the rabbit with myxomatosis and associated staphylococcal infection, and the rabbit with cystitis, no other definitive diagnosis was reached in these rabbits. The case was not taken for investigation under the WIIS due to lack of evidence to raise concern about pesticide involvement.

Figure 9 - Myxomatosis: periocular swelling and purulent material exuding the eye of a rabbit

Figure 10 - Cystitis: haemorrhage within the bladder wall in a rabbit from which a pure growth of *E. coli* was isolated



Ed Fullick, APHA Diseases of Wildlife Scheme

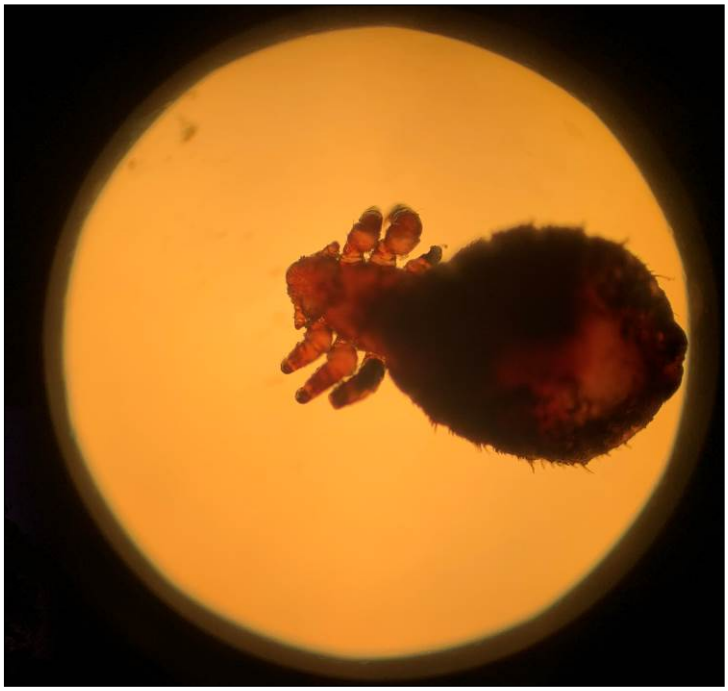
Suspected hypoglycaemia and lice in a harbour seal (*Phoca vitulina*)

A harbour seal pup was submitted for post-mortem examination under the Diseases of Wildlife Scheme. The pup had been seen on a beach in late August and was observed to be alert and responsive but thin; no other seals were observed. It was taken to a wildlife rehabilitation centre for veterinary examination and was found to have a mild skin abrasion over the mandibular symphysis, and gingival ulceration around the upper canines, but no other significant lesions. After several days, the seal became more lethargic and inappetant and was seen twitching before being found dead.

The seal was small, in poor condition and very underweight for the estimated age (based on dentition). The other gross findings were non-specific and no bacterial pathogens were isolated. Histopathological lesions were also non-specific and did not suggest a cause of death. Considering the history and findings of diagnostic investigation, it was suggested that a metabolic issue such as hypoglycaemia combined with physiological stress surrounding abandonment may have played a role in the pup's death. The pup was severely underweight with depleted energy reserves.

Several lice were observed on the seal pup (Figure 11) and were identified as the sucking louse of seals *Echinophthirius horridus*. There were insufficient lice present to be of clinical significance.

Figure 11 - *Echinophthirius horridus* found on a debilitated harbour seal pup



Ed Fullick, APHA Diseases of Wildlife Scheme

Outbreak of squirrelpox disease in a well-known habitat for wild red squirrels on the Formby coast, Merseyside, 2021

The pine wood (Scots pine (*Pinus sylvestris*)) and sand dune habitat for red squirrels (*Sciurus vulgaris*) along the Merseyside (Liverpool) coast centred at Formby is well known and valued by the public as a special amenity area, close to Liverpool. Red squirrels potentially may still be found in suitable coastal woods from North Liverpool in the south, to Ainsdale in the North. This large natural area, with a high number of visitors belies the threats to the survival of the species primarily from squirrelpox disease.

There have been two previous outbreaks of squirrelpox in this area in the last 14 years. During a squirrelpox outbreak in 2007-2009, the red squirrel population on Merseyside declined by 87% (Chantrey et al 2014).

The squirrelpox virus is introduced by grey squirrels (*Sciurus carolinensis*) which carry the virus subclinically but are rarely affected by it. While populations of red squirrels have plummeted during some of these outbreaks the meta-population has survived and usually recovered to some degree between the squirrelpox disease outbreaks.

During 2021, reports of sick and dead red squirrels were first received on 5th June. In total from that time until October 2021, 14 live red squirrels with symptoms suspicious of pox (lesions, lethargic) were reported, 26 dead red squirrels were reported and the bodies of 16 red squirrels were collected. Thirteen of these were submitted to APHA Diseases of Wildlife Scheme where squirrelpox disease has been confirmed in 10 of them by detection of viral particles using electron microscopy.

The following measures have been used to try and prevent and control the disease.

To reduce interaction and virus transmission between grey-red and red-red, Formby residents were asked to remove wildlife feeders from their gardens and to stop providing supplementary food. To monitor the outbreak, members of public were asked to report sick and dead red squirrels and sightings of grey squirrels. The Lancashire Wildlife Trust have an urban trap loan scheme to remove grey squirrels from gardens. If a member of public reports a grey squirrel sighting in their garden, they are given information on the scheme and if they wish to participate, they are provided with a live-capture trap. If a grey squirrel is caught, a trained member of staff or volunteer collects it and humanely dispatches it. Seven grey squirrels were caught and dispatched in Formby between June-August 2021.

As the numbers of carcases found has declined during September, we hope that the outbreak may be tailing-off. However, it is never possible to be certain about squirrelpox outbreaks particularly while they are still in contact, or sharing woodland, with grey squirrels and in these circumstances, as now, recrudescence of this disease is always possible. Control of the disease pivots around removal or separation of the two species.

Autumn is a peak dispersal period for squirrels and Formby is currently experiencing a large increase in the number of grey squirrel sightings. This increase in grey squirrel

density increases the risk of squirrelpox virus transmission from grey squirrels to red squirrels, and unfortunately, we are expecting further cases of disease in red squirrels. Through their trap loan scheme, Lancashire Wildlife Trust are working with Formby residents to remove grey squirrels from the area and are still advising against supplementary feeding at this time.

Conclusions

- All the red squirrels found to be squirrelpox virus positive had typical pox-type lesions on their face around the lips and eyes.
- Laboratory diagnosis is important to differentiate the lesions from other severe skin diseases including dermatophilosis, exudative staphylococcal dermatitis and leprosy due to *Mycobacterium lepromatosis* and *M. leprae* (Holmes et al 2019)
- Formby is currently experiencing an increase in the number of grey squirrel sightings and further squirrelpox cases amongst red squirrels are expected.

Figure 12 - Red squirrel from Formby with typical skin lesions due to squirrelpox virus infection (courtesy Paul Holmes, APHA DoWS)

Figure 13 - Formby woodland with a preponderance of Scots pine on a sandy coastal site bordering sand-dunes. This is good red squirrel habitat, particularly with the presence of Scots pine, cones from which are an important source of food for the red squirrel (photo courtesy of Emma Dwan, Lancashire Wildlife Trust)

References

Chantrey J, Dale TD, Read JM, White S, Whitfield F, Jones D, McInnes CJ, Begon M. European red squirrel population dynamics driven by squirrelpox at a gray squirrel invasion interface. *Ecology and Evolution* 2014:**4**: 3788–3799.

Holmes P, Everest DJ, Spiro S, Wessels M and Shuttleworth C. First report of dermatophilosis in wild European red squirrels (*Sciurus vulgaris*). *Vet Rec Case Rep*, 2019: **7**: e000838.

JP Duff (APHA DoWS), P Holmes (APHA DoWS), E Dwan (Lancashire Wildlife Trust) and D. Everest (APHA Weybridge)

Avian Reports

Wildfowl and Wetlands Trust (WWT) report

Passive surveillance of waterbirds

Postmortem examinations were performed on 49 wild birds originating from five WWT sites (Arundel, West Sussex; Llanelli, Carmarthenshire; London Wetland centre, Greater London; Slimbridge, Gloucestershire and Steart marsh, Somerset). A total of 12 target species were examined, which included 19 mallards (*Anas platyrhynchos*), seven mute swans (*Cygnus olor*), seven greylag geese (*Anser anser*), two moorhens (*Gallinula chloropus),* one common shelduck (*Tadorna tadorna*), one tufted duck *(Aythya fuligula),* one herring gull *(Larus argentatus)*, one black-headed gull (*Chroicocephalus ridibundus)*, one black-tailed godwit (*Limosa limosa),* one common kestrel (*Falco tinnunculus*), one great cormorant (*Phalacrocorax carbo*) and one gadwall (*Mareca strepera*). Six non-target species were also examined: a feral pigeon (*Columba livia domestica*), a jackdaw (*Corvus monedula*), a raven (*Corvus corax*), an oystercatcher (*Haematopus ostralegus)*, a hen harrier *(Circus cyaneus),* and a goldfinch (*Carduelis carduelis).*

The primary causes of death are summarised below (Table 4).

The most notable postmortem finding was gross pathologic lesions related with trauma (45%). Mixed lesions observed within this group: eight birds (seven mallards and one shelduck) presented bruising and skin lesions from intraspecific and/or interspecific species aggression; a tufted duck, a mallard, a mute swan and a gadwall duck had congested lungs with internal haemorrhage compatible with collision. A goldfinch also suffered from a fatal impact presenting intracranial bleed and bruising. A mute swan and a mallard had water in the coelomic cavity, as well as, bruising and markings indicative of constriction at the base of the neck from being trapped underwater, resulting in secondary drowning. Four birds had bone injuries: a raven with a broken neck, a juvenile swan with a septic severe right hock joint injury and fractures on various phalanges of the same limb, a moorhen with a swollen fractured right hock and pectoral muscle bruising and lastly a mallard with a complete fractured right limb, abdominal degloving wound and internal haemorrhage. A common kestrel and a hen harrier presented visceral gout, expected from dehydration secondary to limb and wing fractures that, most likely, impaired their ability to hunt food.

Predation was another predominant primary cause (20%). The majority of the predated birds collected, presented intact skeletal structure and skin, as well as, minimal soft tissue or missing sections, and absence or minimal presence of internal organs. High suspicion of a mixture of gull, bird of prey and, to less extent, mustelid predation was suspected in many of these cases, with carcases being headless, presenting dorsal puncture wounds

and/or degloving lesions. One black-tailed godwit was chased by a crow, which inflicted severe cutaneous injuries and ended in a fatal collision.

Lesions compatible with avian mycobacteriosis were found in a juvenile greylag and a mute swan (4%). Necropsy revealed a characteristic presentation of multi-focal granuloma-like lesions throughout the intestinal mesentery and kidneys, as well as, severe ulcerative-enteritis.

Other causes that were less prevalent during this quarter includes air sacculitis in a herring gull (cranial and intra-clavicular air sacs affected), necrotic enteritis in a mute swan (congested intestinal loops and necrotic lesions within the intestinal lining) and egg-related coelomitis in a jackdaw. A lack of availability of food was the most likely cause of death in two juvenile greylags and one juvenile mute swan collected from the same area that were emaciated and had empty digestive tracts on post-mortem examination. Within this group of mortalities, there was also one mallard with intense endoparasite presence and poor body condition and another with potential hepatic disease, presenting green pigmentation of the liver and hepatomegaly.

Eight wild birds (16%) did not receive diagnostic due to advanced decomposition, lack of obvious gross abnormalities or multifactorial non-fatal lesions present.

Table 4 - Confirmed and suspected causes of wild bird mortality (including morbidity meriting euthanasia on welfare grounds) at WWT reserves between July and September 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	21	3 x mute swan†1, 10 x mallards, 1 x moorhen, 1 x shelduck, 1 x tufted duck, 1 x gadwall, 1 x common kestrel, 1 x hen harrier, 1 x goldfinch, 1 x raven
Predation	10	6 x mallards, 1 x black-tailed godwit, 1 x great cormorant*1,1 x oystercatcher, 1 x pigeon
Avian mycobacteriosis	2	1 x mute swan, 1 x greylag goose†1
Airsacculitis	1	1 x herring gull
Necrotic enteritis	1	1 x mute swan
Coelomitis	1	1 x jackdaw
Other	5	2 x greylags†2 (starvation), 1 x mute swan†1 (drowned), 2 x mallards (parasite infestation, liver disease)
No diagnosis (due to decomposition or lack of or inconclusive gross abnormalities)	8	3 x greylags†1*1, 1 x moorhen, 2 x mute swans†1, 1 x black-headed gull, 1 x mallard

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

Wild Bird reports from Scotland

Avian influenza (H5N1) was found to be the cause of marked increased mortality in great skuas (*Stercorarius skua*) in Fair Isle and St Kilda, and was also detected on the Flannan Isles. In July, rangers on Fair Isle reported increased mortality in the breeding colony of skuas, with descriptions and videos recording weakness, incoordination and head twitching in birds that were observed before death. The first weakened birds were noted on Fair Isle on 8 July, then on the 19 July a search of the hill revealed 60 dead birds. Rangers on St Kilda subsequently reported marked increased mortality in their own great skua breeding colony also. Deaths continued almost until the departure of the birds on migration. The Flannan Isles are infrequently visited, but the reports from the other two

location prompted the collection of two carcases, one great skua and one juvenile black backed gull (species unclear), from the island on a passing visit by a ranger.

The submitted birds were generally in good or reasonable body condition. Pallor of part of the liver was noted in the birds from the Flannan Isles. Full postmortem examination was not carried out on most of the birds due to the positive status on avian influenza testing.

Around the time of the carcase submissions, it was reported that around 5% of the breeding population in both locations had been lost. At the time of the last update from the rangers in Fair Isle and St Kilda, around the time of the departure of the colonies on migration, the estimate was that up to 10% of the breeding population in both locations could have been lost – further data will become available next year when the birds return, and this estimate may change. More in-depth data on locations and numbers is in the process of being gathered, as this outbreak is being written up in greater detail for publication.

Brief summary of testing and results:

- Three out of four submitted skua carcases from Fair Isle tested positive for H5N1
- One skua submitted from St Kilda tested positive for H5N1
- One skua from the Flannan Isles, tested positive for H5N1. Juvenile gull from the Flannan Isles tested negative.
- Four further skuas from St Kilda tested positive for H5N1 as a group, and five more skuas (one a chick) were submitted and swabbed, but not tested (as this was deemed unnecessary by that point).

North Sea Guillemot and Razorbill deaths 07/09/21 to 29/09/21: Summary

From 7/9/21 to 29/9/21 inclusive SRUC Edinburgh received 12 batches of seabirds consisting of 39 guillemots (*Uria aalge*), 18 razorbills (*Alca torda*) and 1 gannet (*Morus bassanus*) that had washed up on the east coast from Northumberland to Moray. An additional 4 guillemots recovered on 10/9/21 were examined at The R(D)SVS and at least one further batch of guillemots was submitted to The R(D)SVS.

The birds were all very thin in varying degrees of decomposition. Of the 10 guillemots where the sex was recorded, all were male. Using photographs of the flight feathers provided by CEH for guidance on aging guillemots 9 were adult, 28 were juvenile and the age was unclear in 2 due to decomposition. Starvation was the presumed cause of death.

From 1/9/21 to 11/10/21 inclusive SRUC Aberdeen received 10 batches of seabirds consisting of 53 guillemots, 1 razorbill and 2 gannets that had washed up on the east coast from North Berwick to Banff. One gannet was in good condition and four birds were in fair condition but the rest, where not too autolysed to assess, were all in poor or very poor condition. The sex and age were not recorded.

Table 5 summarises the number of guillemots and razorbills found at each location

Guillemots	Razorbills (Gannets)	Location
13 (9 juvenile, 4 unknown, all male)*	1	St. Andrews, Fife
2 (juvenile)	0	Findhorn, Moray
3 (1 adult, 2 juvenile)	0 (plus one gannet)	Leven, Fife
9 (2 adult, 7 juvenile)	1	Montrose, Angus
1	0	Duridge Bay, Northumberland
1 (juvenile)	4	Blythe, Northumberland
2 (1 adult, 1 juvenile)	5	Arbroath, Angus
2 (1 adult, 1 juvenile)	2	Elie, Fife
4 (2 adult, 2 juvenile)	0	Kinghorn, Fife
0	3	Alnmouth, Northumberland
6 (2 adult, 3 juvenile, 1 unknown)	1	St. Andrews, Fife
1	0	Leven, Fife
4	0	Fraserburgh, Aberdeenshire
8	0	Aberdeen
1	0	Arbroath, Angus
8	0	Fraserburgh, Aberdeenshire
8	0	St Andrews, Fife
1	0	Banff, Aberdeenshire
2	1 (plus 2 gannets)	North Berwick, East Lothian
10	0	Boddam, Aberdeenshire
10	0	Peterhead, Aberdeenshire
1	0	Colliestone, Aberdeenshire

Nephritis and nephrosis, possibly secondary to urinary tapeworm infection, was diagnosed in a six-week-old male mute swan (*Cygnus olor*) which was one of three cygnets to die following the death of the adult female swan in a community park. The adult female had been picked up for treatment and died at a wildlife centre, and since then, three of the five cygnets - which had remained with the adult male - had also died or been euthanased. The examined cygnet was found emaciated, very weak and unable to rise. After euthanasia, necropsy revealed an enlarged right kidney with pale and mottled parenchyma. The ureter was markedly distended and filled with mucoid material. *Escherichia coli* was isolated from kidney tissue, and histopathology identified nephrosis, a multifocal granulocytic nephritis and ureteritis with cestode infection. Given the ureteral dilation seen, it was considered likely that the tapeworms present in the distal ureters were causing a reduction in passage of urine.

SRUC Veterinary Services noted that tapeworms of the genius *Cloacotaenia* were reported to be relatively common in the ureters of mallards and pintails (Wobeser, 1974, 1981). These parasites cause inflammation and pronounced swelling of the ureters. The identity of the tapeworms in the ureters of this cygnet remain unknown.

This case was of interest given the multiple mortalities of a waterfowl species, and also the location in a public park.

References

Wobeser, G. Renal coccidiosis in mallard and pintail ducks. *The Journal of Wildlife Diseases* 1974:10:249-255

Wobeser, G. 1981. *Diseases of Wild Waterfowl*, 2nd ed. Plenum Press, New York.

Caroline Robinson, SRUC Veterinary Services

Wild Bird reports from APHA DoWS

Avian botulism in mute swans (*Cygnus olor*)

Nine mute swans were submitted in July 2021 as part of the Avian Influenza Wild Bird Surveillance to investigate the cause of deaths and flaccid paralysis. Over the space of a week, approximately 15 swans had been found dead or with severe flaccid paralysis. Those found alive were described as having floppy necks, were unable to walk, had water dripping out their beaks, and were dyspnoeic. They were found on a section of river with an artificial barrier, resulting in a stretch of relatively slow-flowing freshwater.

The gross findings were relatively unremarkable, with scant feed material in the ventriculus. Histopathological findings were also unremarkable, with the main finding being vascular hypertrophy, thought to be in response to avian schistosomiasis and not of clinical significance.

All the swans tested had slightly elevated liver lead concentrations, above normal background exposure but not sufficiently high to result in clinical signs or death. Intestinal contents were found to be positive for *Clostridium botulinum* toxin type C in the toxin ELISA. Serum from two live affected swans tested negative, however this can occur due to the binding of the toxin at the neuromuscular junction.

The local authority liaised with various stakeholders regarding the incident, and put up signs advising the public of the situation and requesting that supplementary feeding of waterfowl was discontinued until water levels rose to prevent congregation of birds at one spot on the river. Further clinically affected birds or carcasses were removed promptly and the incident resolved in August.

Ed Fullick, APHA DoWS

Investigation into gull deaths at a declining breeding colony, Walney Island, Cumbria 2017- 2021

The Cumbrian Wildlife Trust, South Walney Nature Reserve, near Barrow, Cumbria, is an island reserve on the dunes of the Walney Island coast. The reserve is famous for its gulls

and in the 1970s this was the largest breeding gull colony in Europe, with 45,000 breeding pairs of herring gull (*Larus argentatus*) and lesser black-backed gulls (*Larus fuscus*). Numbers have been in steep decline in recent years and had reduced to just 449 pairs in 2021. The colony has been in decline since the local rubbish tip closed in the 1990s and since 2016 no chicks have been recorded as having fledged. Predation of chicks by otters (*Lutra lutra*), badgers (*Meles meles*) and foxes (*Vulpes vulpes*), in particular is important. Foxes only appeared on the island in the 1990s and badgers approximately 7 years ago. Over the last winter (2020/2021), thanks to sponsorship, a permanent predator-proof fence was built around the colony and this has resulted in the first gull breeding success for several years, with chicks fledging to flight. The colony attracts gulls from elsewhere giving them a safer site, than the nearby town rooftop alternative. The gulls on Walney now tend to eat natural shore-line food rather food that they find in towns. The colony is of significant ecological historic interest as it is where Nobel prize winner, Niko Tinbergen, who shared the 1973 Nobel Prize for his studies on social behaviour in animals (ethology) was based. Among other studies this included work on the begging behaviour of herring gull chicks. Apparently, Tinbergen moved his field station to Walney from 1966 to the early 1970s for the research, with ‘a large caravan and an encampment of tents around it in the dunes’.

Since 2017, carcases of dead gulls and chicks have been submitted to the Animal and Plant Health Agency (APHA) Diseases of Wildlife Scheme (DoWS) for diagnostic post-mortems, during each breeding season. Several diseases have been identified including avian botulism, starvation and trauma circumstantially related to attacks on the chicks by other gulls (intraspecific aggression). Over these years some unusual feed remains have been occasionally identified in bird stomachs however natural gull dietary items were usually found, including crabs, mollusc shells and bones, with little evidence of human-derived food items.

The predator attacks were of interest (see figures). These were of single penetrating wounds through the skin into the underlying muscle (Figure 17); single penetrating wounds to the head and skull (Figure 20); in the breast and back areas with underlying haemorrhages in the lungs (Figure 19); haemorrhages on the chick wings (Figure 18) as though the wing around the bone might have been grasped, for example, in a beak. Although a range of predators could have produced these lesions, the single penetrations suggested a bird beak-stab rather than paired punctures that would have been more typical of mammalian predator teeth marks. Chicks submitted appeared to have been left dead and minimally or only partially consumed i.e. cannibalism was not obvious. In 2018, when there was a complete loss of all young chicks (Figure 15), a young chick was found with evidence of vent pecking and removal of intestine through the vent (a form of evisceration). This again suggested bird rather than mammalian predator attack but in this case, we could not be certain that these lesions did not occur after death, although this was most likely (Figure 14) as altered blood was found around the lesions. Many of the carcases submitted were severely autolysed because it was not possible to regularly visit the colony without disturbing the breeding birds, in order to collect carcases, therefore autolysis impairing interpretation of post-mortem findings and the lack of any direct visual

observations of intraspecific aggression meant that we cannot definitively demonstrate that adult gulls were attacking the chicks. In this regard evidence from a trail camera (Figure 16) of a chick head between the mandibles of an adult gull, however, is suggestive and in this case, the chick was not seen again. The possible vent-pecking leading to evisceration is of specific interest because this is a vice behaviour recorded among modern commercial poultry. Vent pecking was seen only in 2018 and this together with the similarity of some of the traumatic lesions suggested that they may be caused by individual adult birds with learned vices.

Conclusions

The conclusions reached are based on broadly similar findings seen in submissions in successive years (apart from the 2018 vent pecking). As mentioned, care is needed in making these conclusions for the reasons given and as a consequence they are provisional in nature. Following the erection of an anti-predator fence around the colony in 2021, allowing young gulls to fledge, two juvenile gulls were submitted, both with evidence of severe peck-type wounds to the head (Figure 20). The losses due to intraspecific aggression have therefore continued when mammalian predator access was reduced; badger and otter were eliminated, however evidence was found of a fox that had jumped the fence late in the breeding season (this should be prevented by improvements to the fence in the future). The reduction in mammalian predator attacks in 2021 but continuing evidence of intraspecific aggression suggested that these two activities were not directly linked. Vent pecking was of specific interest; it was seen during one breeding season and may have been a learned vice. This behavioural vice, well recognised in modern domesticated poultry, on this evidence, has a parallel in wild birds.

Summary

In summary, the breeding colony was in decline due to removal of a primary food resource following the closure of a local rubbish tip. Mortality in recent years has been due to predation, disease and (suspected) intraspecific aggression. Of these recent factors, predation is by far the most important in terms of numbers of chicks killed. The number of annual losses due to intraspecific aggression resulting in deaths of chicks is difficult to assess however this behaviour in adult gulls may continue while other factors have been controlled or eliminated. It would be interesting to compare the intraspecific aggression findings in this colony with observations from other large gull colonies; to assess if they are relatively frequent in this species (and possibly in other species of colonial breeding carnivorous animals) and to investigate potential associative factors.

Figure 14 Young gull chick with blood around the vent, subsequent examination showed that most of the intestine had been removed, per vent, and was associated with intestinal haemorrhage, which suggested ante-mortem lesions. 2018. Photos JP Duff, DoWS, unless otherwise marked

Figure 15 The gull breeding colony 2018 giving an idea of what the reserve wardens found and described as a 'carpet of dead chicks' (at least 4 can be seen in the photo). The entire population of chicks died over the course of 10 days. Photo courtesy of Sarah Dalrymple, Cumbria Wildlife Trust

Figure 16 An enlargement of a trail cam still. This shows an adult gull with a chick's head between its mandibles. The black plastic piping is placed deliberately to provide shelter for chicks (not flotsam). Photo courtesy of Sarah Dalrymple, Cumbria Wildlife Trust

Gallery of lesions in gull chicks suspected of being caused by pecks from adult gulls:

Figure 17 Traumatic wound to the back

Figure 18 Traumatic puncture wounds to the wings of gull chicks

Figure 19 A puncture wound to the thoracic area in a gull chick that caused lung haemorrhage. This in turn led to blood filling the lower trachea, which would have been rapidly fatal

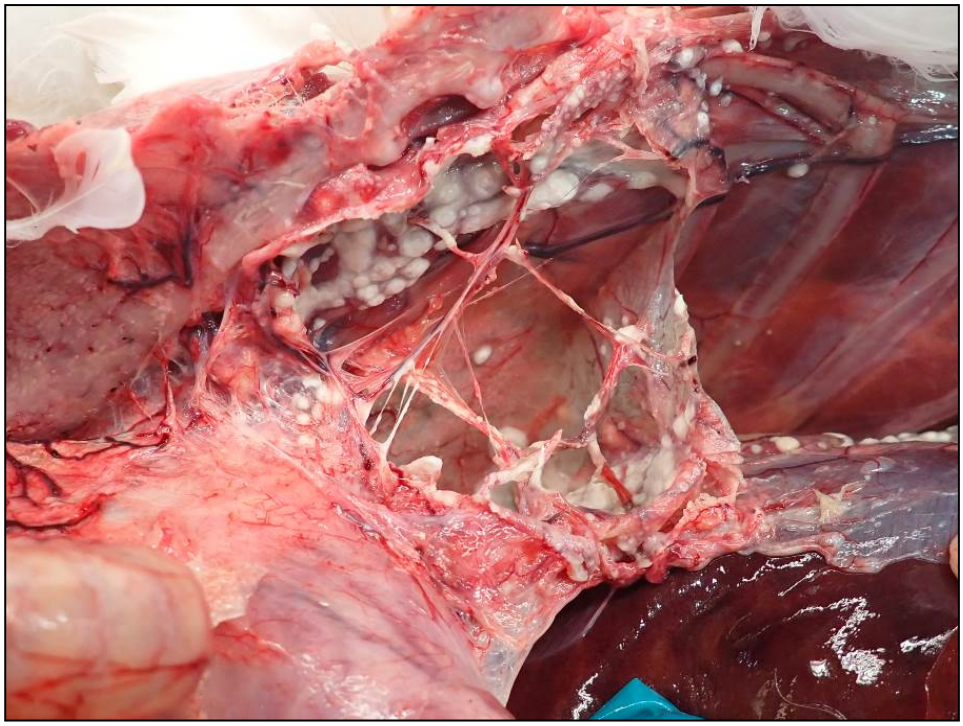
Figure 20 Juvenile gull with single, severe puncture wound to the back of the skull, resulting in sub-cutaneous bleeding down the dorsal neck area, 2021

J Paul Duff (APHA DoWS), Sarah Dalrymple (Cumbria Wildlife Trust)

Aspergillosis and missed migration in a Whooper swan (*Cygnus cygnus)*

A dead whooper swan was received in early May as part of the Avian Influenza Wild Bird Surveillance (AIWBS) scheme. It was reported that the rest of its flock had left the reserve several weeks beforehand, however this individual remained and died several weeks later. It was found to have severe pneumonia and airsacculitis due to *Aspergillus* species infection (Figure 21). The presence of a whooper swan is unusual in May when it should be in the Arctic for breeding. The severe aspergillosis is likely to have prevented this bird from migrating.

Figure 21 Multiple aspergillosis lesions within the thorax of a Whooper swan



Ed Fullick, APHA Diseases of Wildlife Scheme

Investigation into an Autumn die off of guillemots (*Uria aalge*)

Throughout late August, September and October, APHA and SRUC received reports of large numbers of dead seabirds, primarily guillemots, across the East coast, from East Anglia up to Scotland. Multiple submissions were made as part of the Avian Influenza Wild Bird Surveillance scheme, with all birds submitted testing negative for avian influenza. Diagnostic postmortem examinations undertaken at APHA found the birds to be emaciated, with no feed present in the proventriculus or ventriculus. In cases where body weight could be obtained, these similarly presented markedly decreased body weights compared to reference ranges provided by the RSPB (Holden and Gregory, 2021). No anatomical abnormalities were observed that would explain the birds being unable to feed, and no significant visceral lesions were seen. The findings suggest that lack of food played a role in their demise. Due to the degree of autolysis, further diagnostic testing could not be conducted to investigate histological changes to implicate other causes, however the UK Centre for Ecology and Hydrology is continuing to conduct investigations in the potential involvement of toxins.

Figure 22 Three dead guillemots submitted for postmortem examination. Photo Credit Cornelia Bidewell, APHA

Reference

Holden P and Gregory R, 2021. *RSPB handbook of British birds*. Bloomsbury Publishing.

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 and Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.