The VIDA diagnoses are recorded on the VLA FarmFile database and comply with agreed diagnostic criteria against which regular validations and audits are undertaken.

The investigational expertise and comprehensive diagnostic laboratory facilities of both VLA and SAC are widely acknowledged, and unusual disease problems tend to be referred to either. However recognised conditions where there is either no diagnostic test, or a clinical diagnosis offers sufficient specificity to negate the need for laboratory investigation, are unlikely to be represented. The report may therefore be biased in favour of unusual incidents or those diseases that require laboratory investigation for confirmation.

VLA RLs and SAC Veterinary Services have UKAS accreditation and comply with ISO 17025 standard.

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<td>Diagnosis not reached analysis</td>
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**HIGHLIGHTS**

- Risk of disease introduction - Warble fly-like parasitism in imported deer
- Emerging disease reports - Trichomoniasis in blackbirds in England and Scotland
- Emerging disease reports – chlamydiosis in England and Scotland
- Risks to priority species – deaths of hen harrier chicks from predation
- Mass mortality incidents – auk deaths on the Ayrshire coast
- Mass mortality incidents – starling incidents in England and Wales
- Zoonotic disease – listeriosis in a red squirrel
INTRODUCTION

The GB Wildlife Disease Surveillance Partnership comprising the Veterinary Laboratories Agency (VLA), Scottish Agricultural College (SAC), Institute of Zoology (IoZ), the Food and Environment Research Agency (FERA) and the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) produces the GB Wildlife Disease Surveillance Partnership Quarterly Reports. The details of the individual partners areas of surveillance and research can be found at: http://www.defra.gov.uk/vla/reports/docs/rep_survrep_gbwsp.pdf

OVERVIEW

Chlamydiosis, psittacosis: the more one looks the more one finds, the adage appears to apply. This appears to be the case with chlamydiosis, and this WQR has reports of cases from garden birds and pigeons from England and Scotland. Detection of *Chlamydophila* sp. in tissues has been improved significantly with the recent development of a PCR test. We know infection in wild pigeons has significant zoonotic potential. What we do not know at present is if there is similar zoonotic risks from infection in passerines and other species of wild birds.

NOTIFIABLE DISEASE

GB Avian Influenza Wild Bird Surveillance (AIWBS) Results: July –September 2010

<table>
<thead>
<tr>
<th>Surveillance activity</th>
<th>Number of birds tested*</th>
<th>Positive AI virus result and species of bird</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legally trapped (ringing)</td>
<td>0 (21)</td>
<td>n/a</td>
<td>Seasonal targeted surveillance during winter and spring only.</td>
</tr>
<tr>
<td>Found dead</td>
<td>132 (98)</td>
<td>Nil</td>
<td>Scanning surveillance, all-year-round.</td>
</tr>
</tbody>
</table>

* Number of birds tested: figures for July to September 2009 are shown in brackets.

H5N1 Highly Pathogenic Notifiable Avian Influenza (HPNAI) was not detected from any of the 132 wild birds found dead, sampled and tested during the last quarter in Great Britain. No wild birds were sampled as part of wildfowl trapping activities (Table 1). The last detection of H5N1 HPNAI in wild birds in GB was during January-February 2008, from ten Mute swans (*Cygnus olor*) and one Canada goose (*Branta canadensis*) in South Dorset (Defra, 2008).

AIWBS policy and activities in Great Britain were revised by Defra and the VLA during October 2010, following changes to European Commission guidelines. The main emphasis is on AIWBS in found dead birds, with patrols of designated reserves by wild bird ecologists and wardens continuing all-year-round. Members of the public are also asked to remain vigilant for mass mortality incidents and report these to the Defra Helpline (08459 33 55 77). The criteria for a mass mortality incident have been revised to five or more wild birds of any species at any location (irrespective of county) in England, Scotland and Wales. Further information is available at: http://www.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/ai/wildbirds/survey.htm

Avian Virology, VLA

H5N1 HPAI events in wild birds in Europe (July –September 2010)

VLA, in collaboration with Defra, monitors the international situation and distribution of Avian influenza detections. As a result, Defra currently considers there is an ongoing, low risk of introduction of notifiable avian influenza to the UK via a number of routes, including wild birds. The importance for all poultry keepers to maintain robust biosecurity measures, vigilance for clinical signs of disease and to promptly report suspect cases of avian notifiable disease remains undiminished.

There were no reports of H5N1 HPNAI detections in poultry or wild birds from EU Member States during the period July to September 2010 (ADNS, 2010). However, from 9th to 25th May 2010, a wild bird die-
off caused by H5N1 HPNAI infection occurred in Shuanghu district, Tibet. On 2nd July 2010 final details of this event were reported to the OIE (OIE, 2010). In total, 170 dead wild birds were found dead, including 141 brown-headed gulls (*Larus brunnicephalus*), 27 bar-headed geese (*Anser indicus*), one red-billed chough (*Pyrrhocorax pyrrhocorax*) and one Eurasian wigeon (*Anas penelope*). No spread to domestic poultry was reported. The geographical distribution of further H5N1 HPNAI events that have been reported from January to August 2010 in wild birds and poultry is shown in Figure A.

Avian Virology, VLA

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**Figure A:** Reports of Highly Pathogenic Avian Influenza Outbreaks in domestic poultry and wild or captive birds in 2010 (with clade 2.3.2 highlighted and countries with reported endemicity)

---

**References**


http://www.oie.int/wahis/public.php?page=weekly_report_index&admin=0

---

**Hypoderma tarandi in an imported reindeer (Rangifer tarandus)**

Twenty four reindeer, imported into England in April 2010, had suspect warble fly infestation, thought initially by the submitting AHO, to be *Hypoderma diana*. Concern was raised about the possibility of these being the cattle species *H. bovis* or *H. lineatum*, both of which are notifiable in GB. Grubs removed from the animals were sent to the Natural History Museum and identified as *Hypoderma tarandi*, a warble of reindeer and caribou, which is common in Scandinavian countries.

Fera
Zoonotic Disease

Salmonellosis in Wildlife: - July –September 2010

There were three isolates of salmonella from wild terrestrial mammals from the VLA Diseases of Wildlife Scheme (VLADoWS) this quarter from England and Wales. *Salmonella* Agama and *Salmonella* Durham were probable incidental isolates from badger (*Meles meles*) cubs, at a wildlife rescue centre. The cubs had clinical coccidial diarrhoea. *S. Agama* is a found relatively frequently in badgers, and infections occasionally causes disease in cattle. An untypeable Group B salmonella sp. was isolated from systemic sites of an adult female water vole (*Arvicola terrestris*). This vole was found dead on the bank of a fishery lake which was adjacent to a large business park. Post mortem examination revealed a perihepatitis and sanguineous fluid was present in the peritoneal cavity. The gross pathology and bacteriological findings would suggest that salmonellosis was the cause of death. To our knowledge this may be the first such case in a free-living water vole from the UK.

*Salmonella Typhimurium* phage type 193 was isolated from a sample of probable pheasant (*Phasianus colchicus*) faeces collected during a farm visit. The purpose of the visit was to investigate an outbreak of *S. Typhimurium* phage type 193 disease in young cattle. Pheasants were thought to be one possible source of infection. It was reported that they had been eating out of the cattle troughs in the field. *S. Typhimurium* phage type 193 was shown to be widespread in the environment by environmental sampling. Thus it was not possible to rule out cross contamination as the sample was picked up from the ground. *Salmonella* Newport was an incidental finding from a dead young mute swan (*Cygnus olor*) cygnet from a wildfowl reserve. Salmonellae were not isolated from follow-up environmental samples.

There were two reports of bird variant *Salmonella Typhimurium*. *Salmonella Typhimurium* DT40 was isolated from a suckler cow that was losing condition and had diarrhoea. *Salmonella Typhimurium DT56V* was isolated during a routine post destocking sampling on a chicken broiler unit.

**VLA Wildlife Group**

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

**Cetaceans**

A *Salmonella* sp. was isolated in one of twelve stranded cetaceans from England and Wales examined by the Cetacean Strandings Investigation Programme (CSIP) this quarter: a juvenile harbour porpoise (*Phocoena phocoena*) stranded on the south coast of west Cornwall in September had signs of bycatch, including typical encircling marks/wounds cranial to the pectoral fins and on the tail flukes. In addition, there was evidence of lungworm infestation and monophasic Group B *Salmonella enterica* 4,12:A:- was isolated from the lungs. This infection appeared to be incidental.

**CSIP and VLA Truro**

Other wild mammals

A hedgehog (*Erinaceus europaeus*) examined at the IoZ in September was negative for *Salmonella* sp..

**IoZ**

Wild birds

No *Salmonella* sp. was isolated from any of 70 garden birds, five cirl buntings (*Emberiza cirlus*) and 16 corncrakes (*Crex crex*) sampled for *Salmonella sp.* this quarter at the IoZ.

**IoZ**

Wild birds in Scotland

Faecal material was collected from twenty wild bird nesting sites on a pig unit on which pigs were consistently found to be seropositive for *Salmonella* species. *Salmonella Reading* was cultured from five sites and *Salmonella Typhimurium* from three sites.

**SAC Consulting Veterinary Services**
Passive surveillance for lyssaviruses in UK bats
Over 700 bat carcasses were submitted to the VLA in this quarter for lyssavirus screening. These included 15 Daubenton’s (M. daubentonii) and two Serotines (Eptesicus serotinus). One bat was submitted with clinical suspicion of lyssavirus infection. All samples tested were negative.

Active surveillance for bat lyssavirus in UK bats
Active surveillance for European Bat Lyssavirus type 2 in Daubenton’s bats has been undertaken over the summer months with minimally invasive sampling, in selected sites, for serology and detection of virus in saliva through PCR and virus culture. Tests are ongoing.

Rabies surveillance in terrestrial wildlife
Vigilance continues for this notifiable disease in UK wildlife, but no suspected cases were reported this terrestrial wildlife this quarter

Rabies and Wildlife Zoonoses Group, VLA Weybridge

West Nile Virus Surveillance
Between 1/7/10 and 30/9/10 brain and kidney tissues from 100 wild birds were tested for WNV by virus isolation and RT-PCR, with negative results. During the same period six horses showing neurological signs were tested by PRNT and by cELISA for WNV, with negative results. Also nine Common (Eurasian) Cranes (Grus grus) tested on behalf of The Wildfowl and Wetlands Trust Great Crane Project. This was prior to their release on the Somerset Moor as part of a reintroduction programme. They were negative by WNV cELISA.

Rabies and Wildlife Zoonoses Group, VLA Weybridge

Psittacosis in Scotland
An immature feral pigeon (Columba livia) was found alive but unable to fly and so was euthanased and submitted for necropsy. The bird was thin, had a light fibrinous pericarditis, perihepatitis and airsacculitis, and the intestines were distended with green mucoid contents. Chlamyphila psittaci was demonstrated by PCR. An immature jackdaw (Corvus monedula) was found alive but moribund on a different site. The bird had been seen to be lethargic for some time. The bird was thin and the vent feathers were soiled with faeces. The intestines were distended with green semi-solid contents and the bones of the lower legs were soft. No significant parasites were detected or significant bacteria isolated. However Chlamyphila psittaci was demonstrated by PCR. These two incidents underline the potential zoonotic risks posed by wild birds.

SAC Consulting Veterinary Services

Viral zoonoses in urban rodents
Surveillance for Hanta and Ljungan viruses continues in urban rodents in North West England. A successful workshop was held on Hanta viruses this summer, in collaboration with the National Centre for Zoonoses Research, Liverpool. Globally recognised experts were invited to talk on different approaches to surveillance, to promote knowledge sharing and improve techniques.

Rabies and Wildlife Zoonoses Group, VLA Weybridge
EMERGING AND ENDEMIC DISEASES

SUBMISSIONS: Wild bird submissions this quarter to VLA DoWS –

<table>
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<tr>
<th>Month</th>
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<th>Wild birds examined for West Nile Virus</th>
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<td>July</td>
<td>9</td>
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<td>August</td>
<td>3</td>
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<tr>
<td>September</td>
<td>3</td>
<td>9</td>
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Wild bird carcasses examined for projects managed at the IoZ this quarter

<table>
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<th>Month</th>
<th>GBHi</th>
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<td>22</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>August</td>
<td>31</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>September</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>15</td>
<td>88</td>
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</table>

Wild bird reports from Scotland

**Presumed trichomonosis** was diagnosed in chaffinches (*Fringilla coelebs*), greenfinches (*Carduelis chloris*), siskins (*Carduelis spinus*) and a goldfinch (*Carduelis carduelis*). More unusual was the diagnosis of presumed trichomonosis in an adult male blackbird (*Turdus merula*). Significant confluent areas of necrosis of the upper oesophagus were present, suggestive of trichomonosis, and histopathology demonstrated organisms consistent with trichomonads associated with the lesions. A second blackbird in the garden was observed to be sick but no further material was submitted.

A siskin from a different location died from infection with *Escherichia albertii* (previously referred to as *E coli* O86 profile).

A peregrine falcon (*Falco peregrinus*) was observed being attacked by gulls and was taken into a wildlife rehabilitation centre where it died two days later. An extensive fibrinous pericarditis was found at necropsy, with severe airsacculitis and pneumonia. Heavy growths of *Aspergillus fumigatus* were isolated from the lesions. The extent of the lesions suggested that the aspergillosis pre-dated admission to the rehabilitation centre and had predisposed the peregrine to attack by other birds.

Two hen harrier (*Circus cyaneus*) chicks were found dead near their nest. Both birds had puncture wounds on the back and breast, and fractures of the sternum bone. **Predation by a fox** was suspected.

Significant residues of aldicarb were found in a peregrine falcon. This was the second peregrine in two weeks to die from aldicarb poisoning at this site.

Multiple dead razorbills (*Alca torda*) and guillemots (*Uria aalge*) were reported at several locations on the Ayrshire coast in September. Postmortem examination found that the birds were thin, with no food in the digestive tract. The lungs were waterlogged, suggesting that the birds had died at sea and were then washed ashore. It is thought that such seabird “wrecks” are related to **reduced availability of food**.

SAC Consulting Veterinary Services
Trichomonosis
There was a seasonal increase in the number of trichomonosis incidents diagnosed in garden birds this quarter, following the same temporal pattern as previous years: trichomonosis was suspected or confirmed in 46 of 73 garden birds (63%) examined at the IoZ this quarter. These cases comprised two blackbirds (*Turdus merula*) (from two sites), one barn owl (*Tyto alba*), one bullfinch (*Pyrrhula pyrrhula*), six chaffinches (*Fringilla coelebs*) (from 5 sites), two collared doves (*Streptopelia decaocto*) (from two sites), one feral pigeon (*Columba livia*), two goldfinches (*Carduelis carduelis*) (from two sites), 26 greenfinches (*Carduelis chloris*) (from 24 sites), two sparrowhawks (*Accipiter nisus*) from two sites, and three wood pigeons (*Columba palumbus*) (from three sites). As in previous years, greenfinches appeared the most commonly affected species. Affected cases were received from across England and Wales.

The two affected blackbirds were submitted in July, from separate mortality incidents in which there were concurrent finch mortalities. The first of the two cases, which was from a Wiltshire garden, had been observed ill for approximately two weeks prior to death and had gradually developed severe torticollis (Figure 1). On post mortem examination there was a large, necrotic, caseous lesion adherent to the oesophageal wall (Figure 1), from which *Trichomonas* sp. was isolated. This lesion extended dorsally into the tissues of the vertebral column adjacent to the spinal cord. Approximately ten finches (mainly greenfinches, also goldfinches and chaffinches) had been observed ill in the garden over the course of the year and up to the period that the blackbird was submitted. The second blackbird was submitted from a Lincolnshire garden, where it had been seen having difficulty feeding prior to death. There was a large, spherical, necrotic lesion on the caudal tongue consistent with trichomonosis (pending PCR confirmation). Approximately nine finches (mainly greenfinches, also chaffinches) had also been observed ill, or died, in the garden around the time that the blackbird died.

Figure 1 a) Severe torticollis in a blackbird (© Diane Chandler), and, b) cervical trichomonosis lesion identified in this bird at post mortem examination: necrotic tissue is adherent to the oesophageal mucosa, and extends through the oesophageal wall into the tissues of the vertebral column.

In both these instances supplementary food was regularly provided to the blackbirds and other garden birds. It was reported that the blackbirds usually fed at different sites in the gardens to the finches, however, given the history of concurrent finch mortalities it seems most likely that both blackbirds acquired the infection as a consequence of ‘spill-over’ from infected finch populations. The GBH had previously diagnosed only one case of trichomonosis in a blackbird, in 2007 (also from a site with concurrent finch mortality). Trichomonosis has been shown to cause population-level declines in breeding populations of greenfinches and chaffinches in the UK (Robinson and Lawson et al. 2010): these non-finches cases demonstrate the need for continuing avian disease surveillance, in order to identify changes in species’ susceptibility to this, and other, infectious diseases that have the potential to cause population-level impacts. The severe nature of the lesions in these cases were also of welfare concern; it is important that we continue to emphasise to the public the importance of good hygiene.
practice when feeding garden birds, and other appropriate control measures, in order to reduce the likelihood of disease transmission at garden bird feeding stations (see http://www.ufaw.org.uk/gbhi.php).

Two sparrowhawks and a barn owl also had oropharyngeal lesions consistent with trichomonosis. One of the sparrowhawks was found dead in a Kent garden, and the other two raptors had been submitted to a wildlife rehabilitation centre in southern England, where they had been euthanased. The GBHi has previously diagnosed trichomonosis in five raptors of three species, which were submitted in 2006 and 2007: two sparrowhawks, two common buzzards (Buteo buteo) and one tawny owl (Strix aluco). Raptors are known to be susceptible to trichomonosis (‘frounce’), but the incidence of trichomonosis in wild raptors is unknown: these cases further highlight the need for disease surveillance, in order to monitor for changes in the incidence of trichomonosis in free-ranging birds of prey.

One collared dove was submitted from a site with multiple collared dove mortality in Wales. There was necrotic, caseous pharyngitis and ingluvitis and *Trichomonas* sp. was isolated from the affected tissue. A whole peanut was lodged in the pharynx, apparently stuck within the trichomonosis lesion (Figure 2), which might have caused terminal asphyxia.

**Figure 2. Whole peanut lodged in the pharynx of a collared dove with trichomonosis.**

Reference

GBHi, IoZ

**Avian pox**
Avian poxvirus infection was suspected or confirmed in two birds submitted to the GBHi this quarter: a house sparrow (*Passer domesticus*) and a wood pigeon from a separate site. These are both species in which avian pox infection has previously been diagnosed. The house sparrow was submitted from a wildlife rehabilitation centre in southern England, and had an atypical presentation, with multiple, small, cutaneous lesions distributed over the entire body and appendages. Skin samples were negative for parasites and no pathogenic bacteria or fungi were isolated; florid cutaneous pox viral infection was evident on histopathology.

**Tick-related syndrome**
Ticks were present in six cases submitted during August and September, and were associated with pathology in two cases. The first of these cases was an emaciated adult female sparrow, from a garden in which multiple sparrows had been observed with tick-like ‘growths’, although this was the only one that had appeared ill. There were two well-engorged ticks attached to the forehead associated with mild cutaneous congestion. Caudal to this, over the dorsal skull, there was extensive subcutaneous oedema,
haemorrhage and necrosis, and, possibly, a small overlying puncture wound. There were also two small puncture wounds in the dorsal neck with associated cutaneous and subcutaneous inflammation. *Staphylococcus aureus* was isolated in pure culture from the head lesion, and in mixed culture from the neck lesion, but not from the viscera. Given the small puncture wounds observed, the cranial necrosis, oedema and haemorrhage might have occurred secondary to a tick bite, or possibly predation. The second case was a thin adult male collared dove, in which a well-engorged tick was attached to the left lateral neck, in association with an extensive and well-defined area of subcutaneous haemorrhage over the neck and head.

Tick-related haemorrhage and/or necrosis have been observed in a variety of species, particularly collared doves, by the GBHi and others, in recent years. In previous cases the ticks have most commonly been female *Ixodes frontalis* (HPA) (Monks et al. 2006; GBHi unpublished data) (tick identification in the recent cases is pending). Tick presence, and this syndrome, is markedly seasonal, with most cases observed in August and September (Monks et al. 2006; GBHi unpublished data). The pathogenesis of this condition is uncertain: previous cases have tested negative for a number of tick-borne pathogens, and the lesions might occur in response to toxic substances secreted in tick saliva (Monks et al. 2006).

**Tick related disease including Louping-ill in a red grouse (*Lagopus lagopus*)**

A red grouse with conjunctivitis and cellulitis of head tissues was examined from a North country estate where several birds had been seen with swollen heads. *Staphylococcus aureus* and a *Pasteurella* sp. were cultured from lesions. The bird was also seropositive to Louping Ill. This is a zoonotic disease caused by a flavivirus infection. Many grouse die in England due to louping ill encephalitis. Grouse are important in Louping Ill epidemiology as they develop a sustained viraemia of sufficient titre to infect ticks. Fortunately few human cases of Louping Ill have been recorded in the UK. It is possible in this case that tick bites were responsible for the head lesions.

**Jay (*Garrulus glandarius*) mortality**

A first-year jay was submitted from a Surrey garden in September, in which another jay had been found dead in July underneath a bird feeder. It had been observed lethargic before being found dead, and was emaciated. There were wounds, fractures and haemorrhage, and a *Pasteurella multocida* septicaemia consistent with bacterial infection secondary to cat predation.

**References**


**Lead poisoning in a mute swan (*Cygnus olor*)**

Lead poisoning was diagnosed in a mute swan found in an emaciated condition by the crew of a Lake District steamer. The source of the lead was not found however the dry weather at the time had reduced lake water levels and probably exposed lead fishing weights to the swan. A similar, non-fatal case was diagnosed at VLA Shrewsbury this quarter, caused by declining water levels at a pond. This scenario has been seen before in lead poisoning incidents with waterfowl and will continue for many years despite restrictions in lead use as the metal persists in the environment. Lead poisoning kills wild waterfowl in the UK every year, and is occasionally a cause of mass mortality, for example See WQR 5.3, (2003)

**Mass mortality of corvids; corvid respiratory syndrome suspected**

Two carrion crows (*Corvus corone*) with respiratory tract pathology from which *Pasteurella multocida* was isolated were considered to have died from Corvid respiratory syndrome. The submission was part of an on-going mortality incident in crows. The aetiology of this condition is not known however pasteurellosis is probably a component part.

**References**

VLA Penrith

VLA Bury St Edmunds
Mass mortality of starlings (*Sturnus vulgaris*) on Jersey and in Wales

Six starling carcasses were received from Jersey following a mass mortality with 11 having being found dead together on a road between a wall and a house. The gross post-mortem findings showed haemorrhages on the skull and in the pleural surfaces. All the birds submitted were in good bodily condition and had feed in their crops. The findings were suggestive of trauma as a cause of death with no other abnormal findings noted and AIV infection was excluded. It was suspected that the birds for some reason may have been hit by a lorry although why this happened is not clear, visibility at the time was reported as being good. **VLA Winchester**

In June this year 10 starlings were found dead in a pool, in Cardiff, with steep sides. Drowning was diagnosed.

**Conclusion**  Mass mortality of starlings involving many carcasses being found together at the same time and place are relatively frequent in the UK. There are two major causes, trauma and drowning. Several incidents are reported in previous WQRs. Flock flight behaviour, flying in tight formation and perhaps birds closely following a leading bird are probable contributory factors. In drowning incidents, birds seem to enter the pools to drink or bathe but cannot get out of the water.

### Wild Mammal submissions July - September 2010 VLADoS

<table>
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<tr>
<th>Month</th>
<th>Number of ED1600 wild mammal submissions</th>
<th>Number of ED1600 mammals Submitted</th>
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<tr>
<td>September</td>
<td>20</td>
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### Cetacean carcasses from England and Wales examined for the CSIP this quarter

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</thead>
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<td>4</td>
</tr>
<tr>
<td>September</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
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Outbreak of Infectious Canine Hepatitis (ICH) in red foxes (*Vulpes vulpes*) in a wildlife centre

Eleven fox cubs were affected of which seven died and four survived. All the cubs were from various locations in Surrey. Some cubs were hand-reared at the centre and others joined their groups later on in their development. Disease was very acute. The dying cubs had enlarged popliteal lymph nodes, high temperatures, rapid dehydration and collapse, coma, fitting and death. They did not respond to medication or IV drips. The four cubs showing clinical signs that survived had high temperatures, enlarged lymph nodes, weakness and severe diarrhoea. After recovery they showed the “classic blue eye” in one eye which resolved totally within 2-4 weeks. Adenoviral intranuclear inclusions were identified in the liver and vascular endothelial cells in histological sections from a typically affected cub. The centre is now instigating a strict quarantine to new cubs from this point due to this disease and the other viruses foxes can carry, and investigating the possibility of vaccination of next years cubs. Thompson and others (2010) have recently reported ICH in free ranging red foxes in the UK. They also record that in a small serological study antibodies to CAV-1 were detected in 11 of 58 (19%) frozen fox carcasses from England and Scotland. **Wildlife Aid**
Disease surveillance in red foxes (*Vulpes vulpes*)

- *Trichinella* surveillance in foxes continues and we are extending our network of sample collection into areas that have not previously been strongly represented.
- Data collection is progressing on an MRes Project on the prevalence of *Angiostrongylus vasorum* in foxes. This is a continuation of earlier work on this parasite, that may present a significant disease risk to domestic dogs in the UK (Morgan and others, 2010).

Fera

Reference:

Disease surveillance in Eurasian badgers (*Meles meles*)

- Data collection has been completed on a PhD project investigating the correlates for the establishment and progression of *Mycobacterium bovis* infection in individual badgers. Anticipated factors of interest include the age of detection of infection, route of infection, gender, reproductive status and co-infection with macroparasites.
- In addition, data collection is progressing on an MRes project on the interaction between infections of badgers by helminths and coccidia, that may in turn identify patterns of co-infection with *M. bovis*.

Fera

Rabbit haemorrhagic disease (RHD) mortality incident at a prison

A rabbit found dead was submitted due to concerns that animals had been poisoned. It was one of eight found dead over 2-3 days in the grounds of a prison where they live in a 20 acre enclosed paddock. RHD and concurrent hepatic coccidiosis were diagnosed and both probably accounted for the mass mortality. No evidence of poisoning was found, and we were able to say that both pathogens are host-species specific and posed no health risks to sheep and dogs that shared the enclosure. **Conclusion:** RHD and coccidiosis are both important causes of mortality in wild rabbits in the UK, neither are zoonotic. RHD was a UK notifiable disease between 1994-1996 but it is now endemic in domestic and wild populations and no longer notifiable (it remains an OIE Listed disease). The epidemiology of RHD in wild rabbits in the UK is not understood.

Wild amphibian submissions

A total of 26 common frogs (*Rana temporaria*) were submitted or collected from eight separate incidents of common frog mortality in England during this quarter (in Manchester, West Yorkshire, Cheshire, Greater London, West Sussex and Hampshire). Ranavirus infection was the suspected cause of death in animals from at least seven of the eight sites: carcasses had dermal ulceration and visceral congestion consistent with Ranavirus infection. Swabs from 17 cases were analysed for *Batrachochytrium dendrobatidis* (*Bd*) infection, and all test results were negative. Ranavirus screening of these cases is in progress. Since its emergence in amphibians in England in the 1980s, Ranavirus infection appears to have caused long-term declines in English common frog populations (Teacher et al. 2010).

IoZ

Reference:
Aquatic animal disease

Cockle mortality
Research into cockle mortality has continued. Progress has been made in developing PCR tests to detect the haplosporidian parasites thought responsible for some of the observed mortality.

Eel herpesvirus
Cefas has collaborated with the Environment Agency in investigating incidents of eel mortality. Eel herpesvirus was isolated from affected eels. Cefas and EA will continue to collaborate in future investigations of the impact and distribution of eel herpesvirus.

Diseases of crayfish
There were no samples submitted on suspicion of crayfish plague during this quarter. However, samples were received from a mortality event of signal crayfish (Pacifastacus leniusculus) from the Trent River catchment. Several samples received from the site had pathology consistent with a nudivirus/bacilliform virus infection. This has not been observed previously in the UK and it remains to be fully characterised. More samples have been obtained for further analysis.

White Spot Syndrome Virus (WSSV) testing
The second year of testing wild populations of decapod crustacea for WSSV has been completed during this reporting period. A total of 2757 animals were tested from 39 marine and freshwater sites in England and Wales, our colleagues in Scotland have tested approximately 1500 animals from 10 sites. Samples are currently being processed, and the results will be available later this year.

A Hematodinium-like dinoflagellate parasite in brown shrimp (Crangon crangon)
A Hematodinium-like dinoflagellate parasite has been discovered infecting the commercially exploited brown shrimp (Crangon crangon) from the Wash fishery. C. crangon is a non-quota species exploited by many of the countries that border the North Sea. Total annual North Sea landings have increased since the 1970s and in 2006 total landings were over 37,000 tonnes (worth circa £60 million). The most significant UK fishery is in the North Sea, centred around The Wash (accounting for circa 90% of all recorded landings). The pathogen was detected during annual disease screening as part of the Clean Seas Environmental Monitoring Programme (CSEMP). Hematodinium-like dinoflagellates are considered to be one of the most significant disease issues in the global fishery for crabs and lobsters and this new description represents the first case in shrimp. Work is now underway to characterise the pathogen relative to other known isolates from European crabs (Carcinus maenas, Cancer pagurus, Necora puber) and lobsters (Nephrops norvegicus). In particular, taxonomic studies will elucidate whether this pathogen is the same as that causing so-called ‘Pink Crab Disease’ in UK stocks of edible crab (C. pagurus). The pathogen was absent from shrimp collected during previous surveys from this region, indicating that the parasites has either only recently infected the population or increasing in prevalence.

An invasive gammarid found for the first time in the UK
Dikerogammarus villosus, a gammarid crustacean belonging to the order Amphipoda, was found for the first time in the UK (Grafham Water, Cambs) during September. The arrival of the so called ‘killer shrimp’ was widely reported by the media. D villosus has spread widely in Europe from its original distribution in the Ponto-Caspian. It may displace our smaller native gammarids. Cefas has been involved with the managing of D villosus since its first discovery through the STAG (Science and Technical Advisory Group). Work is being undertaken to determine if it has spread from Grafham water. Measures have been put in place to minimise spread. 200 specimens have been brought to Cefas and an initial histopathological screen for pathogen and parasites will be undertaken.

CEFAS Weymouth

UK Priority and Conservation concern Mammal Species

The Monnow Water Vole (Arvicola terresteris) Re-introduction Project
Since 2003 the Game and Wildlife Conservation Trust (GWCT) have been leading a habitat restoration project along the River Monnow in Herefordshire. By 2006, much of the restored riverside habitat was
judged satisfactory for water voles. However water voles were extinct throughout this part of the west Midlands, attributed to previous habitat degradation/loss and predation by mink (*Mustela vison*). Thus even if mink were now eradicated, as there are no nearby source populations, water vole were unlikely to return unaided.

Initially the GWCT eliminated mink from one part of the catchment, using mink rafts to guide trapping on 40 km river channel. 300 juvenile water voles were then introduced along a 10 km length of river in 2006; these had been captive bred at a specialist wildlife centre. A further 400 were released on a contiguous stretch in 2007. Monitoring for mink and responsive trapping has continued and extended because – as expected – mink have reinvaded repeatedly from neighbouring catchments. Currently the entire 400 km² Monnow Catchment is held free of mink.

The life span of each individual vole in the wild was expected to be only 12 months or less. No disease problems were reported during the rearing phase. No attempt has been made to measure mortality or monitor health after release. However annual field sign surveys have been carried out each April following water voles release, and these have confirmed that water voles are now established on the Monnow.

This project has shown that remedial action to reverse habitat loss and mink invasion allows native water voles to be restored from captive-bred stock. Disease was not implicated in the original loss of range, and there are currently no disease concerns for released water voles or for captive breeding stocks. Although as noted in the salmonellosis section salmonella infection was implicated as the cause of death in one free-living water vole.

**GWCT, Fordingbridge**

**VLA Wildlife Group**

**Hedgehog**

A juvenile hedgehog (*Erinaceus europaeus*) that had been found dead in a Buckinghamshire garden in September was examined at the IoZ: it was emaciated, with scant gastrointestinal content, and there was pneumonia in association with nematode infestation of the lower airways (lungworm). The hedgehog had been seen ill before death; its poor body condition and inadequate food intake were likely to have predisposed to pneumonia.

**IoZ**

**Red Squirrel (*Sciurus vulgaris*) diseases**

Mycotic pneumonia caused by *Aspergillus funigatus* was diagnosed in a red squirrel found dead, possibly the first record of this diagnosis in the species. Three other new diseases and causes of mortality were reported in this species in a recent publication (Duff and others 2010), fatal *Neohaematopinus sciuri* lice infestation, infection with *Staphylococcus sciuri* secondary to pox virus infection and family pet predation of squirrels in gardens. Some were seen during the current reporting period, *N sciuri* infestation was diagnosed in two juvenile red squirrels. Of the 11 squirrel pox cases this quarter from the North of England, one was despatched by a carnivore, probably a pet dog.

Ingestion of placenta was an interesting finding in an aborting red squirrel however a cause for the abortion and a specific cause for the death were not identified. Adenovirus enteritis and concurrent listeriosis due to *Listeria monocytogenes* infection were diagnosed in an adult female red squirrel. Listeriosis has been diagnosed previously in this species. The disease is zoonotic but the risks to human health are considered to be minimal. In a separate incident, coccidiosis was diagnosed in a juvenile red squirrel. **Conclusion** – populations of this species are under significant threat in mainland England and surveillance for diseases that may contribute to the population declines is increasingly important.

**Increased squirrel pox cases in Northern England, Fig 3.** This year to date in Northern England, has seen an increase in the number of poxvirus cases in red squirrels compared to recent years. It is tempting to speculate that this is primarily due to what are still substantial populations of red squirrels coming in contact with substantial populations of invading grey squirrels in the presence of pox virus. Serological investigations show that these grey squirrels in the area are carrying pox virus. The VLA cases are probably the tip of an iceberg, overlying a larger undiagnosed mortality and significant depletion in the red squirrel population. Should this continue it will lead to fragmentation of the metapopulation in the area. This sequence of events would repeat a pattern that has occurred in North
Lancashire and the South Lakes over the last three decades. **Conclusion** – Increasing populations of the reservoir population, infers increased virus in the area and increased opportunities for inter-species virus transmission leading to population depletion of the red squirrel. There is anecdotal evidence that some local red squirrel populations have disappeared in North Cumbria.

**Squirrel pox disease – basic epidemiology**

The epidemiology of squirrel pox is particularly important as it will inform control strategies for the disease. Although based on scant data, we looked at temporal patterns in mortality (Fig 4 below). We might assume that the increased social contact that squirrels have during the two breeding seasons each year may provide opportunities for virus transmission. The data below suggests that mortality is highest between April and September, or between April and July with a small second peak in September. Mortality in 2009 did not follow this pattern so the possibilities therefore remain that there is no temporal pattern of mortality, or alternatively that mortality in any year may follow specific patterns; but we have not recognised these annual variations as yet.
VLA Wildlife Group, VLA Weybridge

Cetaceans
Seven harbour porpoises, a Sowerby’s beaked whale (*Mesoplodon bidens*), a Risso’s dolphin (*Grampus griseus*), a striped dolphin (*Stenella coeruleoalba*), a minke whale (*Balaenoptera acutorostrata*) and a short-beaked common dolphin (*Delphinus delphis*) were examined as part of the CSIP this quarter. Validated and finalised data covering this period for GB will be produced in the CSIP annual report, and will be published at:


Live stranding of harbour porpoise (*Phocoena phocoena*) following dolphin attack
A harbour porpoise neonate stranded in north Cornwall in July in poor nutritional state with no evidence of recent food intake. The bright orange liver also was consistent with fatty infiltration following a period of inanition. Multiple rake marks with 2-7mm spacing and haemorrhages over the thorax were very suspicious of aggressive interaction with a common dolphin (*Delphinus delphis*) or striped dolphin (*Stenella coeruleoalba*). Marked pulmonary congestion and oedema, froth in the airways and sand in the mouth also were suggestive of live stranding. It was difficult to tally this with the presence of extensive presumed post mortem skin damage to the dorsum and left side of the animal but this has been observed in neonates before and could be consistent with an animal that has previously live stranded and died prior to discovery in the surf.

Post-mortem investigation was carried out under the Defra-funded UK Cetacean Strandings Investigation Programme. VLA Truro

UK Priority and Conservation concern Bird Species

Garden birds
Eleven birds of BAP-listed or Conservation Concern species were examined for the GBHi this quarter. Of three bullfinches examined (from three sites), two cases appeared to have suffered trauma, and one case had suspected trichomonosis. Of three house sparrows submitted, one had avian poxviral infection (see above), one had suspected tick-related syndrome (see above), and the cause of death was undetermined in the third case. A barn owl was examined, which had suspected trichomonosis (see above). A dunnock (*Prunella modularis*) had wounds and fractures consistent with predation; a house martin (*Delichon urbica*) had a fracture and haemorrhage consistent with trauma; a nestling song thrush (*Turdus philomelos*) was suspected to have suffered trauma; and in a swift (*Apus apus*) nestling the cause of death was undetermined.

IoZ
Appendix 1

Diagnosis not reached Analysis July – September (Q3) 2010

The following is a summary of wildlife data analysed by the VLA from diagnostic submissions received by its 15 regional laboratories and 2 surveillance centers situated in England and Wales. The aim of this report is to review data where a diagnosis was not reached despite the sample receiving testing which was deemed adequate to allow the potential of a diagnosis to be reached. This allows monitoring of this class of submission with the aim of providing information on, and the early detection of new or emerging syndromes.

Overview

Data analysis revealed no changes thought to constitute evidence of emergence of new, undiagnosed disease.

During the third quarter of 2010, a no diagnosis was reached for only 3 of the 68 wildlife submissions undergoing reasonable testing over the period. These included 1 hedgehog and 2 mute swans.

In the 12 month period Q4 2009 to Q3 2010 there was no significant increase in the proportion of submissions from terrestrial mammals for which no diagnosis was reached despite reasonable testing (%DNR) compared with the last 5 years (Q4 2004 to Q3 2009). Nor was there any significant increase compared to the proportion of DNR in the previous year (Q4 2008 to Q3 2009). See Table 1.

Likewise, for wild birds no significant increases were observed in the proportion of submissions from wild birds for which no diagnosis was reached compared with the previous year or the previous 5 years (Table 1).

Table 1. Changes in % of undiagnosed submissions for native birds and mammals

<table>
<thead>
<tr>
<th></th>
<th>Latest 12 months Q3 2009-Q2 2010</th>
<th>Prior 5 years (Q3 2004 – Q2 2009)</th>
<th>Z</th>
<th>Previous year (Q3 2008 – Q2 2009)</th>
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</thead>
<tbody>
<tr>
<td>Terrestrial mammals</td>
<td>3.37%</td>
<td>7.66%</td>
<td>1.99▼▼</td>
<td>7.10%</td>
<td>1.57▼</td>
</tr>
<tr>
<td>Wild birds</td>
<td>21.95%</td>
<td>21.49%</td>
<td>-0.10▲</td>
<td>28.13%</td>
<td>0.86▲</td>
</tr>
</tbody>
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▲▲ or ▼▼ Statistically significant increase or decrease (z >1.96 or z < -1.96)

(not calculated where N < 40)

For other species groups examined no significant increase in the proportion of submissions for which Diagnosis Not Reached over the last 12 months was found. The low numbers of submissions per quarter, and low number of DNRs mean comparisons by quarter is not reliable.

CERA, VLA Weybridge