Wildlife Health Australia

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Wildlife Health Australia (WHA)[11] is the peak body for wildlife health in Australia. WHA was established as the Australian Wildlife Health Network in 2002 as an Australian Government initiative to coordinate wildlife health surveillance information across Australia, to support Australia's animal health industries, human health, biodiversity, trade and tourism. WHA collates information from multiple sources into a national database — the Wildlife Health Information System (eWHIS)[12] — including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians.

During the quarter, 153 wildlife disease investigation events were reported in eWHIS (Table 1 and Figure 3), and samples were collected from 1164 wild birds for avian influenza (AI) surveillance.

This report details some of the disease and mortality events in free-living wildlife recorded in eWHIS this quarter. WHA thanks all those who submitted information for this report.

Table 1 Number of disease investigations reported into eWHIS, October to December 2018[a]

Mammals			Birds[d,e]	Reptiles
Bats[b]	Marsupials	Feral mammals[c]		
86	14	5	45	5

a Disease investigations may involve a single animal or multiple animals (e.g. mass mortality event).
b The majority of bat disease investigations are single bats submitted for Australian bat lyssavirus testing.
c European rabbits (*Oryctolagus cuniculus*), horse (*Equus caballus*)
d Additional sampling for targeted AI surveillance is presented elsewhere in this report.
e Includes free-ranging birds (native or feral species) and a small number of events involving birds from zoological collections and captive breeding programs.

11 www.wildlifehealthaustralia.com.au/Home.aspx
12 www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

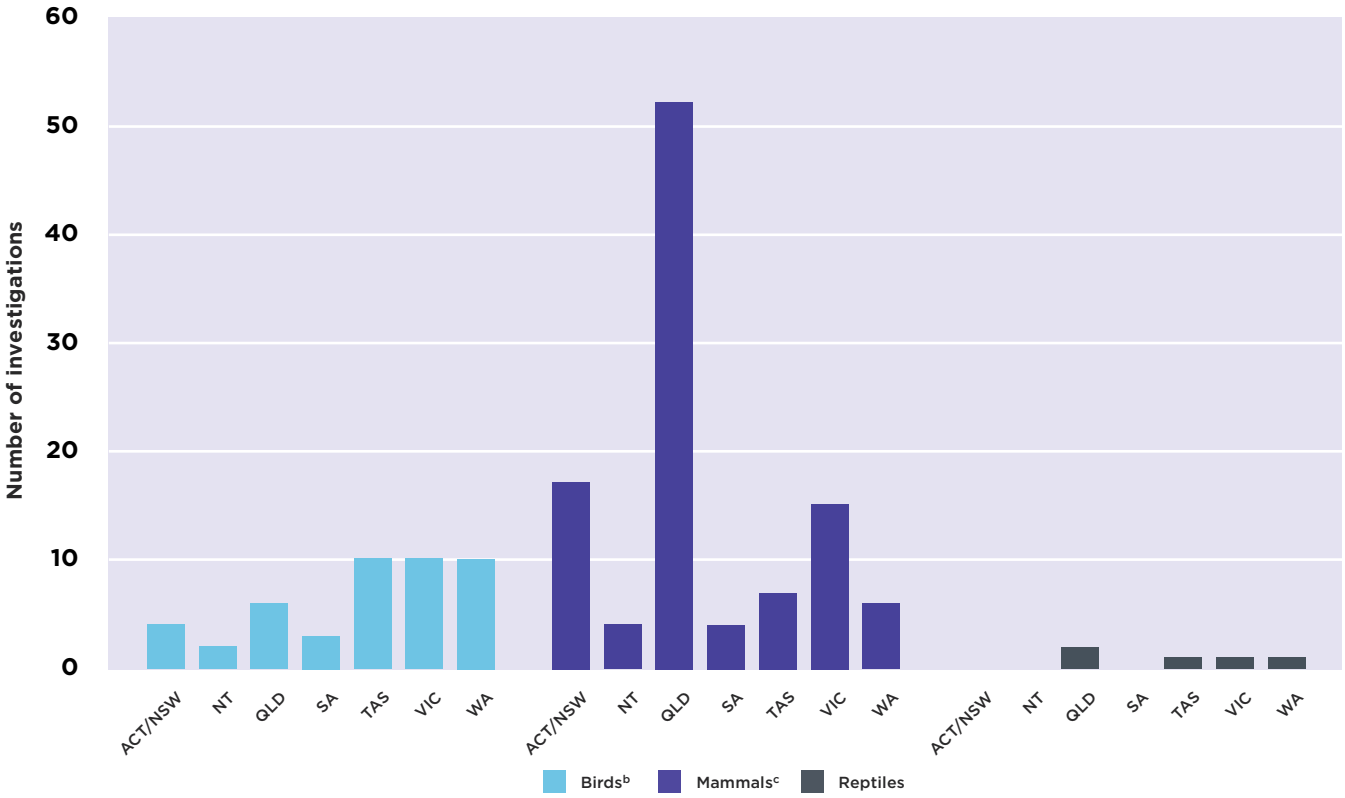

Figure 3 Number of disease investigations reported, by jurisdiction, into eWHIS, October to December 2018[a]

a The chart shows the number of disease investigations or events reported into eWHIS. Each disease investigation may involve one or multiple animals.
b 'Birds' includes free-ranging birds (native or feral species) and a small number of events involving birds from zoological collections and captive breeding programs.
c Investigations involving mammals include individual bats submitted for Australian bat lyssavirus testing.

Wild bird mortality event summary — Newcastle disease and avian influenza exclusion

WHA received 45 reports of wild bird mortality or morbidity investigations from around Australia during the quarter; investigations may involve a single animal or multiple animals (e.g. mass mortality event). A breakdown of wild bird events by taxonomic order is given in Table 2. Reports and samples from sick and dead birds are received from members of the public, private practitioners, universities, zoo wildlife clinics and wildlife sanctuaries. AI was excluded by polymerase chain reaction (PCR) testing for influenza A in 27 of the events as part of Australia's general (sick and dead bird) AI surveillance program. Disease caused by AI was excluded in the remaining 18 events, based on clinical signs, history, histopathology, prevailing environmental conditions or other diagnoses. Avian paramyxovirus (APMV) was excluded in 27 events by PCR testing specifically for Newcastle disease (ND) virus or pigeon paramyxovirus type 1, or both.

Avian influenza surveillance

Australia's National Avian Influenza Wild Bird Surveillance Program[13] comprises two sampling components: pathogen-specific risk-based surveillance by sampling of apparently healthy, live and hunter-killed wild birds; and general surveillance by investigating significant unexplained morbidity and mortality events in wild birds, including captive and wild birds within zoo grounds (with a focus on exclusion testing for AI virus subtypes H5 and H7).

Samples from sick or dead birds were discussed earlier. Sources for targeted wild bird surveillance data include state and territory government laboratories, universities and samples collected through the Northern Australia Quarantine Strategy.

During the quarter, pathogen-specific, risk-based surveillance occurred at sites in Northern Territory, Queensland, South Australia, Victoria and Western Australia. Cloacal and faecal environmental swabs were collected from 1772 waterbirds, all samples were tested for avian influenza viruses (AIVs). Based on results to date, no highly pathogenic AIVs were identified. However, targeted surveillance activities[14,15] from this quarter continued to find evidence of a wide range of low pathogenicity avian influenza (LPAI) viruses, including LPAI H7. Molecular

13 www.wildlifehealthaustralia.com.au/ProgramsProjects/WildBirdSurveillance.aspx

14 Haynes et al. (2009) Australian surveillance for avian influenza viruses in wild birds (July 2005 to June 2007). *Australian Veterinary Journal* 87(7): 266–272.

15 Grillo et al. (2015) Avian influenza in Australia: a summary of 5 years of wild bird surveillance. *Australian Veterinary Journal* 93(11): 387–393.

Table 2 Wild bird disease investigations, by taxonomic order, reported into eWHIS, October to December 2018

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie geese, ducks, geese and swans	6
Caprimulgiformes	Frogmouths, nightjars, owlet-nightjars, swifts	2
Charadriiformes	Shorebirds	5
Columbiformes	Doves and pigeons	4
Falconiformes	Falcons	1
Gruiformes	Rails, gallinules, coots and cranes	1
Passeriformes	Passerines or perching birds	15
Pelecaniformes	Ibis, herons and pelicans	4
Psittaciformes	Parrots and cockatoos	11
Sphenisciformes	Penguins	2
Suliformes	Gannets, boobies and cormorants	2

a Common names adapted from: del Hoyo and Collar, 2014, *HBW and BirdLife International Illustrated Checklist of the Birds of the World*. Volume 1 — Non-passerines, Lynx Editions, Barcelona. (Courtesy of the Australian Government Department of the Environment and Energy.)

b Disease investigations may involve a single or multiple bird orders (e.g. mass mortality event). The number of events reported against each bird order do not equal the total number of investigations due to multi-species events. This quarter, five wild bird events involved multiple bird orders. One event involved the orders Charadriiformes and Anseriformes, the second event involved Columbiformes and Psittaciformes, the third event involved Gruiformes, Pelecaniformes, Anseriformes, Pelecaniformes and Psittaciformes, the fourth involved Pelecaniformes and Anseriformes, and the fifth involved Suliformes, Pelecaniformes and Charadriiformes.

analysis of AIVs detected through the targeted surveillance activities contribute to the understanding of AIV dynamics in Australia, help maintain the currency of diagnostic tests, and serve as a point of comparison when novel AIV strains of importance emerge overseas.

Widespread mortality of raptors and owls — avian influenza and avian paramyxovirus excluded

Over the period from May to September 2018, there was a steep increase in the numbers of birds of prey found sick or dead, initially in Victoria and subsequently New South Wales.

In Victoria, wildlife carers, community members and WHA surveillance partners responded to a total of 537 reports of sick or dead birds of prey, compared to 175 bird of prey reports in the same period in 2017.[16] The predominant species were barn owls (*Tyto alba*) (n = 289), followed by Nankeen kestrels (*Falco cenchroides*) (n = 47) and southern boobook owls (*Ninox boobook*) (n = 40). Other species included whistling kites (*Haliastur sphenurus*), black-shouldered kites (*Elanus axillaris*) and tawny frogmouths (*Podargus strigoides*). Events were reported from across Victoria, and many concentrated within 100 km of the coast. The reason for the geographic distribution of these cases is not known but may reflect increased detection of affected species in areas where there was a higher human population density.

A total of 48 birds were submitted for necropsy investigation to Wildlife Health Victoria: Surveillance at the University of Melbourne and Agribio Veterinary Diagnostic Services, Bundoora. The majority of cases examined had been found in the Bellarine, Greater Geelong and Surf Coast locations, submitted by a proactive group in this region. Over half of the 27 barn owls submitted and 8 of the 10 Nankeen kestrels were found in poor or emaciated body condition. Most of the southern boobooks, tawny frogmouths and the single whistling kite were in reasonable body condition. All the barn owls examined were subadults. No gross or histopathological lesions were suggestive of an infectious cause of mortality in any of the species examined. AI and APMV-1 were excluded via PCR assay at Agribio Veterinary Diagnostic Services. Of the barn owls, seven were diagnosed as having died from trauma (presumptively vehicular) and two from anticoagulant rodenticide poisoning. The latter two birds both presented with extensive multifocal haemorrhage in the absence of any wounds or fractures on gross necropsy, and anticoagulant rodenticides were detected in liver samples at levels where toxicity is considered possibly lethal (0.1–0.5 mg/kg).[17]

In New South Wales, a total of 571 bird of prey events were responded to by wildlife carers (of which 238 were barn owls). Over the same period in 2017 in New South Wales, there were 66 barn

16 Data courtesy of Wildlife Victoria, Bellarine Landcare and WHA surveillance Partners in Victoria.

17 Lohr M (2018) Anticoagulant rodenticide exposure in an Australian predatory bird increases with proximity to developed habitat. *Science of the Total Environment*, 643: 134-144.

owl reports.[18] A total of 19 birds were submitted for necropsy investigation to either the University of Sydney's Avian Reptile and Exotic Pet Hospital (AREPH) or the Australian Registry of Wildlife Health, Taronga Zoo. The predominant species submitted were barn owls, the majority subadults, followed by southern boobooks. The principal source of submissions was wildlife carers in the greater Sydney region. On gross necropsy, many were found to be emaciated with pectoral muscle atrophy and absence of body fat. However, some birds examined were well muscled with adequate body fat. Haemorrhagic lesions were a common finding in some of the birds. Also, all of the owls presenting to AREPH had unusually small spleens. In New South Wales, diagnostic investigations are ongoing and include samples being tested for anticoagulant rodenticides, and possible viruses that might target the immune system (including for example avian circoviruses). AI and APMV-1 were excluded via PCR assay at Elizabeth Macarthur Agricultural Institute, New South Wales.

It is not known exactly why there was an increase in the numbers of birds of prey reported during this period. Suggested theories include young birds struggling to find sufficient prey, the boom-and-bust cycle of mice populations impacting on the raptors that feed on them and the drought conditions in New South Wales and Victoria affecting bird of prey movements.[19] This event provided an opportunity to document the presence of anticoagulant rodenticide compounds in native birds of prey, with results from Victoria showing that in a small but significant percentage of these birds, anticoagulant rodenticides have caused morbidity and mortality. The wildlife rehabilitation sector and community land care groups were important sources of suitable submissions for necropsy and high-quality baseline data.

These events highlight the importance of investigating unusual wildlife disease events, including:

- Full clinical veterinary examination of any sick birds of prey presenting to wildlife carers and veterinary clinics to assess appropriate treatment options.
- Laboratory investigations to exclude diseases of concern, such as AI, and determine likely causes of death during unusual mortality events.

For example, in Europe and North American, birds of prey are considered species of interest for highly pathogenic avian influenza (HPAI) surveillance given their susceptibility to the recently emerged HPAI H5 Guangdong lineage.[20,21] In particular, those species that hunt or scavenge medium-sized to large birds.

Australian bat lyssavirus

Reports to WHA for the quarter included 90 bats tested for Australian bat lyssavirus (ABLV) from all states and territories except Tasmania.

Bat submissions were made for a variety of reasons:

- 31 cases involved contact with the potential for ABLV transmission to humans, of these:
  - 10 were associated with trauma (e.g. barbed wire fence entanglement, bone fractures, head trauma, suspected electrocution)
  - 8 displayed other (non-neurological) signs
  - 3 involved contact with a pet dog or cat
  - 2 displayed neurological signs (aggression)
  - the remainder had no further history reported
- 30 cases involved contact with a pet dog (28) or cat (2)
- 10 bats displayed other (non-neurological) signs
- 9 bats displayed neurological signs (e.g. aggression, inability to swallow, paralysis, abnormal vocalisation, incoordination, tremors)
- 8 cases were associated with trauma (e.g. injuries due to entanglement in barbed wire fence or fruit tree netting, electrocution on power lines, fractures)
- 1 bat was found dead
- 1 bat had no history reported.

During the quarter, four flying-foxes were confirmed positive for ABLV by fluorescent antibody test, PCR testing for pteropid ABLV ribonucleic acid (RNA) and/or immunohistochemistry. These were two grey-headed flying-foxes (*Pteropus poliocephalus*) from New South Wales, and a little red flying-fox (*P. scapulatus*) and black flying-fox (*P. alecto*) from Queensland. The flying-fox was found on the ground in three of the four cases and the range of clinical signs included depression, emaciation, paralysis, inability to fly, aggression, abnormal vocalisation, twitching, incoordination and involuntary movements.

More information on ABLV testing of bats in Australia is available in ABLV Bat Stats.[22] ABLV is a nationally notifiable disease in Australia. Cases of suspect ABLV infection or exposure should be reported to the Emergency Animal Disease Watch Hotline on 1800 675 888.

18 Data courtesy of wildlife carers in NSW, including WIRES, FAWNA, NSW Wildlife Council as well as WHA Surveillance Partners.

19 McOrist S (1989). Deaths in free-living barn owls (*Tyto alba*). *Avian Pathology* 18(4): 745–750.

20 Alarcon P et al. (2018). Comparison of 2016-17 and previous epizootics of highly pathogenic avian influenza H5 Guangdong lineage in Europe. *Emerging infectious diseases* 24(12): 2270–2283.

21 Krone O, Globig A, Ulrich R, Harder T, Schinköthe J, Herrmann C & Beer M (2018). White-Tailed Sea Eagle (*Haliaeetus albicilla*) die-off due to Infection with highly pathogenic avian influenza virus, subtype H5N8, in Germany. *Viruses* 10(9): 478.

22 www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx