Wildlife Health Australia

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Wildlife Health Australia (WHA)[5] 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)[6] — including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians. During the quarter, 194 wildlife disease investigation events were reported into eWHIS (Table 1) and samples were collected from 787 wild birds for avian influenza (AI) and avian paramyxovirus 1 (APMV-1) 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.

Wild bird mortality events — Newcastle disease and avian influenza exclusion

WHA received 41 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 the bird orders represented is presented 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 22 of the events as part of Australia's general (sick and dead bird) AI surveillance program. AI exclusion testing was not warranted in the remaining 19 events, based on clinical signs, history, prevailing environmental conditions or other diagnoses. In addition, avian paramyxovirus was excluded in 16 events by PCR testing specific for Newcastle disease (ND) virus and/or pigeon paramyxovirus 1 (PPMV-1).

Avian influenza and avian paramyxovirus 1 surveillance

Australia's National Avian Influenza Wild Bird (NAIWB) and Avian Paramyxovirus 1 Surveillance Program 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

5 www.wildlifehealthaustralia.com.au/Home.aspx

6 www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

Table 1 Number of disease investigations reported into eWHIS, July to September 2017[a]

Bats[b]	Birds[c,d]	Feral animals	Lizards & snakes	Marine mammals	Marine turtles	Marsupials	Monotremes
83	41	3	1	1	2	61	2

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 Additional sampling for targeted avian influenza surveillance is presented separately.
d Includes native and feral bird species.

Table 2 Wild bird disease investigations reported into eWHIS, July to September 2017

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie Goose, ducks, geese and swans	3
Charadriiformes	Shorebirds	7
Columbiformes	Doves and pigeons	6
Falconiformes	Falcons	2
Gruiformes	Rails, gallinules, coots and cranes	1
Passeriformes	Passerines or perching birds	10
Pelecaniformes	Ibis, herons and pelicans	3
Psittaciformes	Parrots and cockatoos	11
Sphenisciformes	Penguins	5
Strigiformes	Typical owl and barn owls	1

a Common names adapted from: del Hoyo & 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). This quarter two wild bird events involved multiple bird orders. One event involved six bird orders, including Anseriformes, Charadriiformes, Ciconiiformes, Columbiformes, Gruiformes and Passeriformes; the other wild bird event involved the bird orders Columbiformes and Psittaciformes.

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 (NAQS). Surveillance activities were expanded to include testing for avian paramyxoviruses, predominantly targeting APMV-1 in 2017.

During the quarter, pathogen-specific, risk-based surveillance occurred at sites in New South Wales, Queensland and South Australia. Faecal environmental swabs were collected from 787 waterbirds, with 787 tested for AI and 670 for APVM-1. Results are pending.

Between July 2016 and June 2017, pathogen-specific, risk-based surveillance occurred at sites in New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia. Anseriformes (waterfowl) were primarily targeted, and a small number of Charadriiformes (shorebirds) were sampled. Sampling focused on areas with known mixing of shorebirds and waterfowl, or those in close proximity to poultry and humans, or both. Cloacal and faecal environmental swabs were collected from 4728 waterbirds, with 4728 tested for AI and 2297 tested for APVM-1. No highly pathogenic AI viruses nor virulent strains of APMV-1 were identified. However, surveillance activities continued to find evidence of a wide range of subtypes of low pathogenic AI viruses, including low-pathogenic H5 and H7, as well as H2-H4, H6 and H9-H11, and avirulent strains of APMV-1. The findings reiterate the need for poultry producers to remain alert and ensure that appropriate biosecurity arrangements and effective risk-reduction measures for AI are in place at their premises.

Given Australia's geographic and ecological isolation, it is important that assumptions about AI virus and APMV-1 epidemiology in Australia are not based entirely on studies from overseas. In particular, it is extremely important to maintain and update the capacity to rapidly and reliably test for AI virus and APMV-1 in Australian poultry and wild birds as these viruses undergo constant evolution. Detections of AI virus and APMV in poultry are relatively rare in Australia so samples from wild bird surveillance provide a principle source of AI virus and APMV-1 sequence data necessary to monitor the ongoing evolution of Australian-specific lineages.

This helps to reduce the possibility of detection failure that could result from tests based solely on historical or non-Australian strains. Surveillance activities will continue through to the end of 2017.

Toxicoses suspected in wild bird mortality event — avian influenza and avian paramyxovirus excluded

In September 2017, Burswood Park Board in Western Australia reported a number unusual bird deaths in the Burswood Park area.

More than 60 wild birds were found dead in the same area over the period of a week, including coots (*Fulica* sp.), crows (*Corvus* sp.), ducks (*Anas* sp.), feral pigeons (*Columba* sp.), gulls (*Larinae* sp.), honeyeaters (*Meliphagidae* sp.), magpies (*Cracticus* sp.), swans (*Cygnus* sp.) and heron (*Egretta* sp.). A number of birds were reported to be showing signs of weakness before death. One crow was observed to be frothing at the beak before dying.

The bird deaths were suspected to be a result of acute chemical toxicoses although there was no history of any unusual application of chemicals in the area. Burswood Park Board worked closely with the Department of Primary Industries and Regional Development (DPIRD), the Department of Biodiversity, Conservation and Attractions (DBCA) and the Department of Water and Environment Regulation (DWER) to investigate, which included collection of environmental samples.

All deceased birds were submitted to the DPIRD animal health laboratory for diagnostic investigation. There were no consistent pathological findings from necropsy and histopathology. However, on toxicological analysis, there were consistent and markedly decreased brain cholinesterase (ChE) levels detected in a number of birds, consistent with organophosphorus, carbamate or quaternary ammonium compound exposure.[7] However, no organophosphate or related metabolite was detected in any of the tissue samples (brain, lung, liver, feet and gut content) submitted to DPIRD for analysis. AI and APMV-1 were excluded via PCR assay from tracheal and cloacal swab collected from all birds submitted to the laboratory. This wild bird mortality event is consistent with a common environmental factor and is suspected to be due to a toxin based on the decreased brain ChE findings. Despite extensive testing and investigation, no toxin was confirmed.

After a period of 2 weeks, there were no further reports of bird mortalities from the area.

Exudative facial dermatitis in a brushtail possum

A case of severe ulcerative moist facial dermatitis in a brushtail possum (*Trichosurus vulpecula*) from Darwin, Northern Territory, was reported in October 2017.

The animal was first presented to a private veterinarian in April 2017 with full-thickness cutaneous ulceration involving a large region of the face. The ulcerative lesions affected the eyelids and bridge of nose, with exposure of nasal bone and bone erosion into sinus (Figure 3).

7 WHA 2017, Pesticide Toxicity in Australian Native Birds. Fact Sheet, June 2017, Wildlife Health Australia. www.wildlifehealthaustralia.com.au/FactSheets.aspx

Figure 3 Severe ulcerative moist facial dermatitis in a brushtail possum from Darwin, Northern Territory. Photo Berrimah Veterinary Laboratories

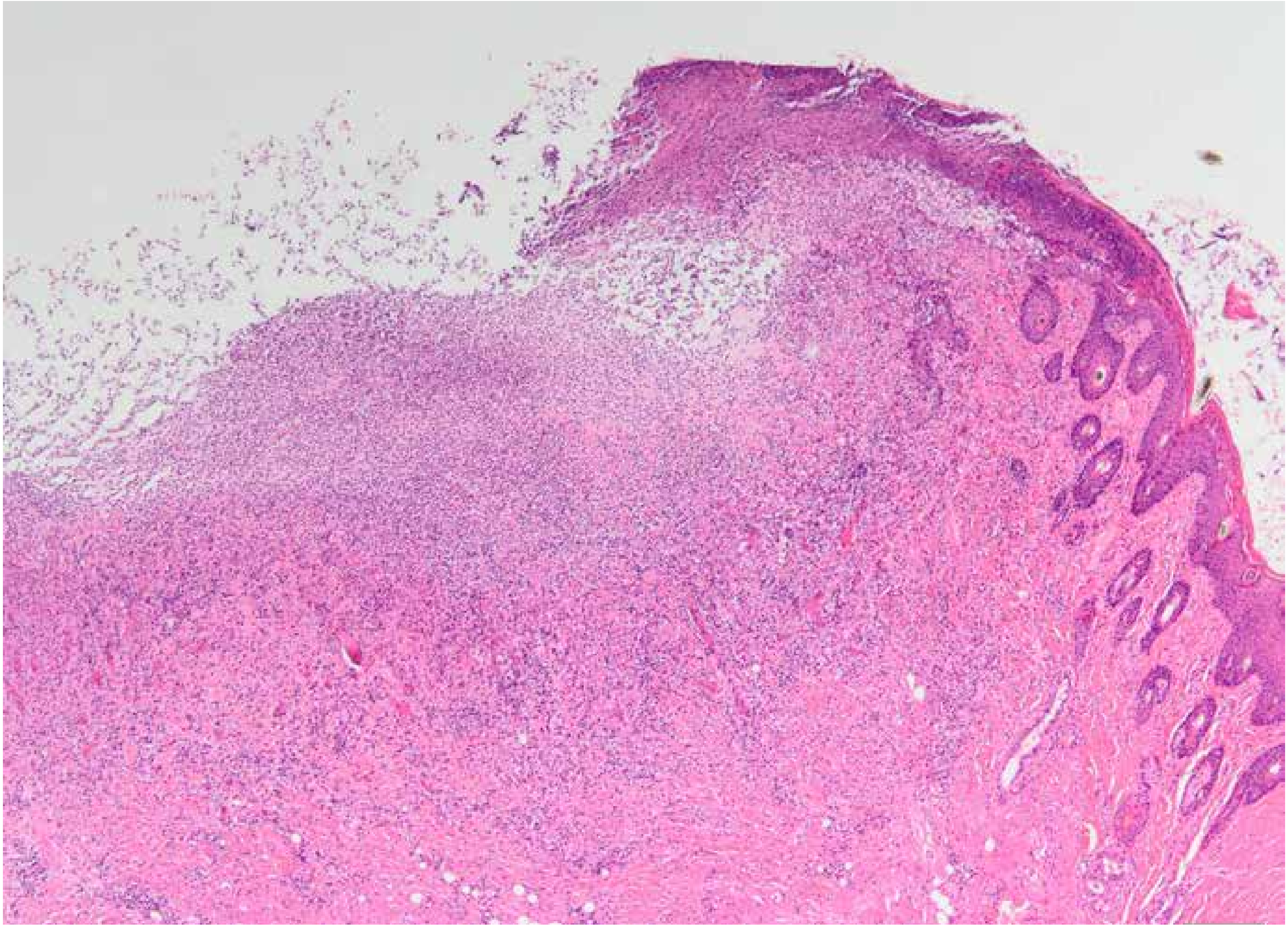

Figure 4 Histological image of margin of ulcerated skin with normal skin, right muzzle region of possum grossly depicted. HE, 40X magnification. Note abrupt transition from normal skin at right to full-thickness ulceration at left, with ulcer bed composed of granulation tissue markedly infiltrated with neutrophils. Photo Berrimah Veterinary Laboratories

The possum was euthanased at the clinic and sent to Berrimah Veterinary Laboratories, Darwin, where the syndrome of severe ulcerative moist facial dermatitis was diagnosed by gross and histological appearance (Figure 4). Bacterial culture yielded a coagulase positive *Staphylococcus* sp. and a group F *Streptococcus* sp. Sequencing of the 16S gene in the latter isolate identified *Streptococcus didelphis*.

Historically, from 2003 to February 2017, there have been four similar isolated cases submitted to Berrimah Veterinary Laboratories for diagnostic investigation following reports from wildlife carers or veterinarians in the Darwin area. Histology consistently reveals severe ulcerative dermatitis involving the skin of the head with Ziehl–Neelsen acid fast and fungal stains negative, similar to the recent case. The bacterial culture typically yields a variety of *Staphylococcus* spp. and *Streptococcus* spp.

In Queensland, *S. didelphis* has been previously isolated from swabs collected from the lesions of brushtail possums with severe, extensive and ulcerative exudative dermatitis.[8]

Wildlife care centres frequently receive brushtail possums presenting exudative dermatitis.[9,10,11] The aetiology is not fully understood, involves multiple pathogens, and mixed bacteria species are usually present.[12]

Stress is considered an important predisposing factor in the epidemiology of this syndrome. For example, cases may occur when there is population overcrowding, which in turn leads to increased competition for food sources and territorial disputes.[8] With severe and extensive lesions, particularly those involving necrosis of the eyelids, humane euthanasia is the typical course, although cases with less extensive lesions may respond to antibiotic treatment. Further research is required to fully understand the epidemiology of this syndrome to assist in appropriate treatment and management of cases.

8 Neagle E, Moss S, Kielly K, Jennison A, Smith H, Trott D & Cobbold R 2012, Isolation of a novel streptococcus species from exudative dermatitis cases in Australian possums, Australasian Society for Infectious Diseases Annual Scientific Meeting.

9 Rose, K 2005, Common Diseases of Urban Wildlife: Mammals. The Australian Registry of Wildlife Health.

10 Spielman, D, Krockenberger, M, Hemsley, S 2012, Necrotising Lesions in Possums, Zoonoses, Sydney: Australian Society for HIV Medicine.

11 Pollock, J 2006, Exudative Dermatitis in Common Brushtail Possums, Australian Wildlife Rehabilitation Conference, Darwin.

12 Vogelnest, L & Woods, R (Eds) 2008, *Medicine of Australian Mammals*, CSIRO Publishing, Collingwood.

Australian bat lyssavirus

Reports to WHA for the quarter included 91 bats tested for Australian bat lyssavirus (ABLV) from New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia.

Bat submissions were made for a variety of reasons:

- 27 cases involved contact with the potential for ABLV transmission to humans; of these
  - 7 were associated with trauma to the bat (e.g. barbed wire fence entanglement, fracture)
  - 6 involved contact with a pet dog or cat
  - 2 displayed neurological signs
  - 2 displayed other (non-neurological) signs
  - the remainder had no further history reported
- 42 cases involved contact with a pet dog (38) or cat (4)
- 7 bats displayed neurological signs (e.g. aggression, seizures)
- 5 bats were associated with a mass mortality event
- 4 cases were associated with trauma
- 2 bats displayed other (non-neurological) signs
- 2 bats had been found dead
- 2 bats had no further history reported at this time.

During the quarter, five flying-foxes were confirmed positive for ABLV by fluorescent antibody test and/or PCR testing for pteropid ABLV ribonucleic acid (RNA).

One unspecified flying-fox (*Pteropus* sp.) from New South Wales was found hanging low in a tree. It displayed neurological signs and was dehydrated. There had been potentially infectious human contact in this case and an experienced public health official provided appropriate counselling and information.

One black flying-fox was found dead under a roost in New South Wales as part of a mass mortality event.

A little red flying-fox from Western Australia presented with signs of aggression and subsequently died.

An unspecified flying-fox from Western Australia was found dead and was submitted for testing due to possible contact with a pet dog. Subsequent investigation determined a low level of likelihood of contact between the flying-fox and the dog.

A grey-headed flying-fox (*P. poliocephalus*) from Victoria was described as angry and had raspy breathing, as well as a suspected miscarriage post trauma. It failed to respond to treatment and was euthanased.

More information on ABLV testing of bats in Australia is available in ABLV Bat Stats.[13] 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.

National wildlife disease surveillance through sentinel veterinary clinics

Australia's general wildlife health surveillance system relies on the detection, submission, investigation and reporting of sick or dead free-living (both native and feral species) and captive wildlife. In recognition that veterinary hospitals perform an important role in disease surveillance of wildlife, WHA coordinates a Sentinel Clinic Wildlife Disease Surveillance Program. The program captures information from veterinary hospitals with a high or dedicated wildlife caseload into the general wildlife health surveillance system.

The program, which started in 2014, now has six clinics participating. The first clinics to join were based in Adelaide, Melbourne and Brisbane. The geographic and species coverage of the program has since expanded by inclusion of two clinics in Tasmania, and a Cairns-based veterinary clinic specialising in wildlife that treats animals as far north as Cape York. The program will soon include two additional clinics in northern Western Australia. The program is run alongside the Zoo Based Wildlife Disease Surveillance Program, which is jointly coordinated by WHA and the Zoo and Aquarium Association. Both the sentinel clinics and zoo-based wildlife clinics report wildlife disease events into WHA's eWHIS. The information collected through these programs complement data reported through government animal health agencies to Australia's general wildlife health surveillance system. The information is used to better understand disease threats to livestock, human health and biodiversity, and contributes to our national picture of wildlife health.

The sentinel clinic and zoo based surveillance programs provide valuable information on wildlife disease events from a broad geographic and species range, including threatened species. This increases Australia's capacity for early detection of emerging diseases.[14] More than 39,000 free-ranging wildlife cases are seen by clinics participating in the zoo and sentinel clinic surveillance programs each year, representing a significant surveillance effort.

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

14 Cox-Witton K, Reiss A, Woods R, Grillo V, Baker RT, Blyde DJ, et al. 2014, Emerging Infectious Diseases in Free-Ranging Wildlife–Australian Zoo Based Wildlife Hospitals Contribute to National Surveillance, PLoS ONE. 9(5): e95127. https://doi.org/10.1371/journal.pone.0095127