Wildlife Health Australia

Tiggy Grillo, Keren Cox-Witton and Sam Gilchrist, Wildlife Health Australia; and Iain East, Australian Government Department of Agriculture and Water Resources

Wildlife Health Australia (WHA)[1] is the peak body for wildlife health in Australia. WHA was established as the Australian Wildlife Health Network (AWHN) 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)[2] — including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians. During the quarter, 177 wildlife disease investigation events were reported into eWHIS (Table 3). 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.

1 www.wildlifehealthaustralia.com.au

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

Table 2 Wild bird disease investigations reported into eWHIS, January–March 2016

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie geese, ducks, geese and swans	11
Charadriiformes	Shorebirds	1
Columbiformes	Doves and pigeons	1
Cuculiformes	Cuckoos and koels	2
Gruiformes	Rails, gallinules, coots and cranes	1
Passeriformes	Passerines or perching birds	14
Pelecaniformes	Ibis, herons and pelicans	2
Procellariiformes	Fulmars, petrels, prions and shearwaters	2
Psittaciformes	Parrots and cockatoos	16
Sphenisciformes	Penguins	1
Struthioniformes	Ostrich, emus and cassowary	1

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).

b Disease investigations may involve single or multiple bird orders (e.g. mass mortality event).

Wild bird mortality events — Avian paramyxovirus and avian influenza exclusion

WHA received 49 reports of wild bird mortality or morbidity investigations from around Australia in January–March 2016; 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. Avian influenza (AI) was excluded by polymerase chain reaction (PCR) testing for influenza A in 18 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 31 events, based on clinical signs, history, prevailing environmental conditions or other diagnoses. In addition, avian paramyxovirus was excluded in 14 events by PCR testing specific for Newcastle disease (ND) virus and/or pigeon paramyxovirus 1 (PPMV-1).

Avian influenza surveillance

Australia's National Avian Influenza Wild Bird (NAIWB) 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 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 are discussed above. Sources for targeted wild bird surveillance data include state and territory government laboratories, universities and samples collected through the Northern Australia Quarantine Strategy (NAQS).

During the quarter, pathogen-specific, risk-based surveillance occurred at sites in New South Wales, South Australia, Tasmania, and Victoria with faecal environmental swabs collected from 1190 waterbirds. Results are pending.

Wildlife disease event investigations in remote locations

Wildlife disease events present a number of challenges in terms of detection and investigation, and these difficulties are exacerbated where the event occurs in a remote location. Detection of an event relies on observation of sick or dead wildlife (e.g. by a member of the public, field researcher, ranger, hunter or wildlife carer) and then on the observer deciding to, and knowing how to, report the event.

Table 3 Number of disease investigations reported into eWHIS, January–March 2016[a]

Bats[b]	Birds	Marsupials	Feral animals	Snakes and lizards	Freshwater turtles	Monotremes	Marine mammals	Marine turtles
90	49	17	13	3	2	0	2	1

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.

Factors such as the number, density, size, coloration and visibility of sick and dead wild animals determine the likelihood of an event being observed[3]. In addition, weather, habitat and the presence of scavengers or predators will determine persistence of carcases in the environment[4,5,6]. This not only influences the likelihood of detection but may lead to an underestimate of the number of animals affected and the extent of the event, and therefore influence the decision to report. Once reported, collection and submission of samples suitable for diagnostic investigation can be very challenging.

WHA aims to capture wildlife disease events by incorporating surveillance reports from veterinary clinics and agencies working in remote locations. For example, general wildlife disease surveillance reports are received through NAQS across remote locations in Western Australia, Northern Territory and Queensland; and wildlife hospitals and zoos participating in the Zoo Based and Sentinel Clinic Wildlife Disease Surveillance programs report on wildlife cases from Northern Territory and Far North Queensland.

Despite all the challenges, wildlife disease events in remote locations of Australia do get reported. Two cases this quarter are outlined as examples (see Figure 3 for locations).

In early January 2016, a member of the public reported a group of rainbow lorikeets (*Trichoglossus haematodus*) found suddenly dead on Somerset Beach, in the Northern Peninsula Area, east of the tip of Cape York, Queensland. The person reported seeing the birds fly into trees and then dropping to the ground dead. Following the report to a NAQS biosecurity officer in Bamaga, one bird carcase that was fresh enough for sampling was collected. It was refrigerated and sent to Cairns for gross necropsy, where samples were taken for histology and specific disease exclusion testing at the Biosecurity Sciences Laboratory in Brisbane.

No significant findings were found on gross and histological examination. Avian influenza and avian paramyxovirus were both excluded via polymerase chain reaction (PCR) testing. The brain cholinesterase activity was measured to determine whether there had been likely exposure to organophosphate or carbamate pesticides. The value obtained was similar to levels recorded for this species with confirmed organophosphate poisoning so pesticide poisoning remains a possibility in this case. Heat exhaustion or potentially some other environmental contaminant were considered other possible factors in these mortalities but no definitive diagnosis was reached. No further deaths have been reported.

In March 2016, a black flying fox (*Pteropus alecto*) from Groote Eylandt, Northern Territory, suspected to be sick, was submitted for Australian bat lyssavirus (ABLV) exclusion following interaction with a dog. On gross necropsy, the bat was emaciated and had a number of traumatic lesions, the latter consistent with a dog interaction. ABLV was excluded via indirect fluorescent antibody test (IFAT) on brain and spinal cord tissue and pteropid TaqMan assay of brain tissue.

Mycobacterium ulcerans excluded in possums

Between January and February 2016, two brushtail possums (*Trichosurus vulpecula*) presented at two separate Victorian veterinary clinics, one in Parkville and the other in Barwon Heads, for investigation of skin lesions. The possum from Barwon Heads presented with a facial skin ulcer or wound that was heavily infested with maggots (myiasis).

Both possums were euthanased and swabs of the affected areas were collected by the University of Melbourne and sent to the Victorian Infectious Diseases Reference Laboratory where infection with *Mycobacterium ulcerans* was excluded by real-time PCR testing. The cause of the skin lesions was not determined in either case although mites and fungi were excluded in the Parkville case.

M. ulcerans is a slow-growing bacterium that produces a destructive toxin, mycolactone, which causes tissue damage and inhibits immune response[7]. It is the causative agent of Buruli ulcer (BU). Previous Australian synonyms for BU include Bairnsdale ulcer and Daintree ulcer, each named after localities where human cases are known to occur.

Laboratory-confirmed cases in Australian native animals have previously only been reported from Victoria and included various species of possums, koalas (*Phascolarctos cinereus*) and a long-footed potoroo (*Potorus longipes*)[8].

3 Stallknecht DE (2007). Impediments to wildlife disease surveillance, research, and diagnostics. In *Wildlife and emerging zoonotic diseases: The biology, circumstances and consequences of cross-species transmission*, Springer Berlin Heidelberg, pp. 445–461.

4 Stallknecht DE (2007). Impediments to wildlife disease surveillance, research, and diagnostics. In *Wildlife and emerging zoonotic diseases: The biology, circumstances and consequences of cross-species transmission*, pp. 445–461. Springer Berlin Heidelberg.

5 Ward MR, Stallknecht DE, Willis J, Conroy MJ and Davidson WR (2006). Wild bird mortality and West Nile virus surveillance: biases associated with detection, reporting, and carcass persistence. *Journal of Wildlife Diseases* 42: 92–106.

6 Wobeser G and Wobeser AG (1992). Carcass disappearance and estimation of mortality in a simulated die-off of small birds. *Journal of Wildlife Diseases* 28: 548–554.

7 Wildlife Health Australia (2010). *Mycobacterium ulcerans* disease (Buruli ulcer) fact sheet. www.wildlifehealthaustralia.com.au/FactSheets.aspx

8 Wildlife Health Australia (2010). *Mycobacterium ulcerans* disease (Buruli ulcer) fact sheet. www.wildlifehealthaustralia.com.au/FactSheets.aspx

Figure 3 Locations of two wildlife disease event investigations in remote northern Australia, 2016

Source: Iain East, Australian Government Department of Agriculture and Water Resources

The transmission pathways remain unclear but recent research suggests the epidemiology of *M. ulcerans* may involve its presence in terrestrial and aquatic habitats, invertebrate vectors and vertebrate host reservoirs[9]. In a proposed transmission model for BU in south-eastern Australia, terrestrial mammals, including possums, have been suggested as environmental reservoirs for *M. ulcerans*[10].

There is currently no evidence to suggest direct transmission of *M. ulcerans* from animals to humans. Continued surveillance in wildlife presenting with suspect skin lesions may assist in identifying new locations where human infection has not previously been recorded and therefore help to direct the circulation of public health messages.

O'Brien et al (2014)[11] stated that further work was required to determine whether M. ulcerans infection posed a potential threat to possum populations and whether possums were acting as environmental reservoirs in certain geographical areas.

It is a Victorian statutory requirement that *M. ulcerans* infection in humans must be notified in writing within 5 days of diagnosis (presumptive or confirmed)[12]. Statistics on notifiable disease in humans, including *M. ulcerans*, are reported in the Victorian Department of Health Infectious Disease summaries[13].

Australia currently hosts the World Health Organization (WHO) Collaborating Centre for *Mycobacterium ulcerans*[14] at the Mycobacterium Reference Laboratory, Victoria. Agreed activities of the WHO Collaborating Centre include research, training and education and the development and application of appropriate technology.

Australian bat lyssavirus

Reports to WHA for the January–March quarter included 96 bats tested for ABLV from New South Wales, Northern Territory, Queensland, South Australia, Tasmania and Victoria.

Bat submissions were made for a variety of reasons:

- 33 cases involved contact or suspected contact with the potential for ABLV transmission to humans; of these
  - 6 were also associated with trauma
  - 2 displayed neurological signs and 2 displayed other clinical signs
  - 3 also involved contact with a pet dog
  - the remainder had no further history reported
- 35 cases involved contact with a pet dog (24 bats), cat (9 bats) or other animals (2)
- 8 bats displayed neurological signs (e.g. paresis, nystagmus, aggression, tremors)
- 6 bats presented with other clinical signs (e.g. emaciation, sudden death, skin disease)
- 8 cases were associated with trauma (e.g. barbed wire, netting or fishing line entanglement)
- 6 bats had no further history reported at this time.

During the quarter, seven flying foxes were confirmed positive for ABLV by PCR testing for pteropid ABLV ribonucleic acid (RNA). Of these, one little red flying fox (*Pteropus scapulatus*), one grey-headed flying fox (*P. poliocephalus*) and one unidentified flying fox (*Pteropus* sp.) were from New South Wales; one little red flying fox, one black flying fox (*P. alecto*) and one spectacled flying fox (*P. conspicillatus*) were from Queensland; and one grey-headed flying fox was from Victoria.

Three of the ABLV-positive flying foxes presented with a variety of neurological and other clinical signs, including paresis, aggression, agitation, abnormal vocalisation, twitching, nystagmus, seizures and weakness; three were submitted for testing due to human or pet contact, and one presented with suspected head injury due to trauma. In one flying fox, histology revealed very mild, patchy, nonsuppurative encephalitis. Potentially dangerous human contact was reported in two of these cases and an experienced public health official provided appropriate counselling and information.

More information on ABLV testing of bats in Australia is available in *ABLV Bat Stats*[15].

Flying fox with unusual neurological signs — Australian bat lyssavirus excluded

A juvenile male black flying fox (*Pteropus alecto*) was found orphaned at Cooktown, Queensland, in February 2016 and brought into care. He was severely underweight but behaving normally. Over a period of 8 days, he became weak with episodes of almost losing consciousness and then developed rhythmic, repetitive ear flicking. He was euthanased due to poor prognosis and submitted for necropsy. The only findings at necropsy were carcase pallor and possible mild jaundice. The liver was noticeably small but of normal colour and consistency and the lungs were mottled. Histology revealed severe subacute hepatopathy with widespread loss of periacinar and midzonal parenchyma with replacement haemorrhage and some macrophage infiltration. Patchy interstitial pneumonia and occasional cortical tubular epithelial necrosis were observed.

ABLV was excluded by PCR testing for pteropid ABLV RNA on brain tissue. The cause of the liver disease is not known but the changes were suggestive of exposure to a hepatotoxin. The neurological signs may have been a result of hepatic encephalopathy.

9 Fyfe JAM, Lavender CJ, Handasyde KA, Legione AR, O'Brien CR, Stinear TP, Pidot SJ, Seemann T, Benbow ME, Wallace JR, McCowan C and Johnson PDR. (2010). A major role for mammals in the ecology of *Mycobacterium ulcerans*. *PLoS Negl Trop Dis* 4: e791. doi:10.1371/journal.pntd.0000791

10 Fyfe JAM, Lavender CJ, Handasyde KA, Legione AR, O'Brien CR, Stinear TP, Pidot SJ, Seemann T, Benbow ME, Wallace JR, McCowan C and Johnson PDR. (2010). A major role for mammals in the ecology of *Mycobacterium ulcerans*. *PLoS Negl Trop Dis* 4: e791. doi:10.1371/journal.pntd.0000791

11 O'Brien CR, Handasyde KA, Hibble J, Lavender CJ, Legione AR, et al. (2014). Clinical, microbiological and pathological findings of *Mycobacterium ulcerans* infection in three Australian possum species. *PLoS Negl Trop Dis* 8: e2666. doi:10.1371/journal.pntd.0002666

12 https://www2.health.vic.gov.au/public-health/infectious-diseases/notification-procedures

13 https://www2.health.vic.gov.au/public-health/infectious-diseases/infectious-diseases-surveillance

14 http://apps.who.int/whocc/Detail.aspx?cc_ref=AUS-95&cc_code=aus&cc_city=melbourne

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