Wildlife Health Australia

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

Wildlife Health Australia (WHA)[2] 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)[3]—including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians. During the quarter, 158 wildlife disease investigation events were reported into eWHIS (Table 1). 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 52 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. Avian influenza (AI) was excluded by polymerase chain reaction (PCR) testing for influenza A in 14 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 38 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).

Table 2 Wild bird disease investigations reported into eWHIS, July to September 2016

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie geese, ducks, geese and swans	2
Columbiformes	Doves and pigeons	4
Coraciiformes	Bee-eaters and kingfishers	1
Falconiformes	Falcons	1
Passeriformes	Passerines or perching birds	20
Pelecaniformes	Ibis, herons and pelicans	1
Psittaciformes	Parrots and cockatoos	22
Strigiformes	Typical owl and barn owls	1
Unidentified[c]	–	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). This quarter there was one wild bird event that involved multiple bird orders (Columbiformes, Passeriformes and Psittaciformes).
c Wild bird faecal samples collected for disease exclusion testing as part of two ongoing disease events.

2 www.wildlifehealthaustralia.org.au/Home.aspx
3 www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

Table 1 Number of disease investigations reported into eWHIS, July to September 2016[a]

Bats[b]	Birds	Feral animals	Lizards & snakes	Marine mammals	Marine turtles	Marsupials	Monotremes
47	52	9	2	2	2	44	0

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.

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 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).

During the quarter, pathogen-specific, risk-based surveillance occurred at sites in New South Wales, Queensland, Tasmania, and Western Australia with cloacal and faecal environmental swabs collected from 1089 waterbirds. Results are pending.

Salmonella isolated in two mass mortalities of house sparrows

In early August 2016, two house sparrow (*Passer domesticus*) mortality events were recorded in Tasmania. A number of dead sparrows were found on a property in the north-west of Tasmania and at least 12 sparrows were found dead on a property approximately 20 km south of Hobart (population declines were also noted in this location). In both locations, a proportion of the sparrow carcases were recovered from poultry runs or coops.

Seven dead birds representing both locations were submitted to the Animal Health Laboratory, Launceston. All birds were in moderate-to-poor body condition with some exhibiting slight soiling around the vent. Gross necropsies did not reveal any significant internal abnormalities. For both events, AI and avian paramyxovirus were excluded using PCR testing. Samples (cloacal swabs) were also collected for bacterial culture. *Salmonella enterica* subsp. *enterica* serotype Typhimurium (*S.* Typhimurium) was isolated from all seven sparrows. Further testing on the isolates identified the presence of *S.* Typhimurium phage type DT160 in birds from each location. Property owners from where the sparrows were submitted were notified of the results.

The first record of significant sparrow mortality from *S.* Typhimurium DT160 in Australia occurred in south-east Tasmania in June 2009.[4,5] *S.* Typhimurium DT160 is now considered enzootic in Tasmania and has been diagnosed in 13 investigations involving house sparrows, all from Tasmania.[6] Infected sparrows have the potential to be sources of infection for humans, native species of high conservation value and domestic animals.[7]

4 Grillo T, 2009, *Animal Health Surveillance Quarterly*, Volume 14, Issue 3, pp. 6–8, Animal Health Australia.

5 Lloyd SJ, 2013, *Bugs, Birds, Bettongs & Bush: Conserving Habitats for Tasmania's Native Animals*, DPIPWE, Hobart.

6 National Wildlife Health Information System (eWHIS), up until 12 October 2016.

Chlamydiosis in a spotted turtle dove

In August 2016, a member of the public found a spotted turtle dove (*Spilopelia chinensis*) in suburban Melbourne, Victoria, and cared for the bird in their house for 3 days before contacting the Department of Economic Development, Jobs, Transport and Resources (DEDJTR). A DEDJTR veterinary officer attended the property and described the bird as having severe torticollis, depression and ataxia. The bird was euthanased and submitted to AgriBio Veterinary Diagnostic Services for necropsy with a provisional diagnosis of PPMV-1.

On necropsy, significant gross findings included breast muscle atrophy (poor nutritional condition) and marked yellow faecal–urate staining of feathers around the cloaca. The cloacal contents were pale and watery. The abdominal air sacs were thickened with scant deposits of pale exudate. A diffuse thin deposit of pale fibrin-like material was on the epicardium. The liver contained a few slightly pale, poorly defined foci, 2–3 mm diameter.

Significant histopathological findings were severe histiocytic meningitis, ependymitis and polyserositis with

7 WHA, 2013, *Salmonella* Typhimurium *DT160 in house sparrows in Australia*, Wildlife Health Australia fact sheet, December 2013, www.wildlifehealthaustralia.com.au/FactSheets.aspx

prominent intralesional elementary bodies, mild histiocytic splenitis and multifocal hepatitis. A presumptive diagnosis of meningoencephalitis (caused by *Chlamydia psittaci*) and airsacculitis was made. Confirmation of the diagnosis was achieved by sequencing a product from a conventional pan-Chlamydiales PCR, the sequence having 98% similarity to *C. psittaci*. Real-time PCR tests for PPMV-1 were negative.

This case demonstrates the value of full diagnostic investigations in wildlife cases. In many cases, a presumptive diagnosis (in this case of PPMV-1) would have been made with no further investigations undertaken. However, a notifiable zoonotic disease was diagnosed, enabling appropriate notification to the Victorian Department of Health and Human Services.

C. psittaci is an obligate intracellular gram-negative bacterium. All bird species are susceptible but the disease is most commonly diagnosed in psittacine birds.[8] Prevention and control of avian chlamydophilosis relies on the identification, isolation and treatment of affected birds, quarantine and prophylactic treatment of potentially infected birds, and detection of carriers of the disease.

Australian bat lyssavirus

Reports to WHA for the quarter included 47 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:

- 15 cases involved contact with a pet dog
- 14 cases involved contact with the potential for ABLV transmission to humans; of these
  - 4 were also associated with trauma (e.g. barbed wire fence entanglement)
  - 2 displayed neurological signs (e.g. aggression, manic behaviour)
  - 2 displayed other clinical signs (e.g. found on the ground)
  - 1 also involved contact with a pet dog
  - the remainder had no further history reported
- 4 bats were found dead
- 2 bats displayed neurological signs (e.g. aggression, incoordination, involuntary urination)
- 2 cases were associated with trauma
- 1 bat was found in a container from interstate
- 9 bats had no further history reported at this time.

During the quarter, two flying-foxes from New South Wales were confirmed positive for ABLV by fluorescent antibody test and PCR for pteropid ABLV ribonucleic acid (RNA). One was a grey-headed flying-fox (*Pteropus poliocephalus*) that presented with manic behaviour and neurological signs, and was euthanased. The other was an unidentified flying-fox (*Pteropus* sp.) exhibiting abnormal aggression. Potentially dangerous human contact was reported in both 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*.[9]

Common wallaroo with maggot-infested skin lesions—screw-worm fly excluded

In July 2016, a juvenile common wallaroo (*Macropus robustus*) was found out of the pouch and without a dam on a rural block in the Ilparpa suburb of Alice Springs, Northern Territory. The animal was taken to a wildlife carer, who took the animal to a local veterinarian, who euthanased it due to severe and extensive maggot-infested skin papillomas. Samples of the affected skin from the wallaroo were submitted to the Berrimah Veterinary Laboratories, Darwin, for further investigation. A diagnosis of pox was made on the basis of typical gross appearance and histological examination of multiple papillomatous skin lesions in which there were abundant poxvirus-like intracytoplasmic inclusions. Fly larvae (maggots) from skin papillomas were identified to rule out screw-worm fly. The larvae were identified as *Chrysomya sp.*; either *C. saffranea* or *C. megacephala* but not *C. bezziana* (screw-worm fly).

Screw-worm fly maggots are insect parasites of warm-blooded animals, including domestic, native and feral wild animals, birds and humans. Australian native fauna have been shown to be susceptible to infection[10]. Screw-worm fly infections have been recorded in agile wallabies and red kangaroo at a Malaysian zoo.[11] Screw-worm fly eggs hatch to become flesh-eating maggots or larvae that invade all types of wounds or moist openings on animals and people. Both Old World screw-worm fly (*C. bezziana*) and New World screw-worm fly (*Cochliomyia hominivorax*) are exotic to Australia and are notifiable under state and territory legislation. Any suspected cases of screw-worm fly infestation in animals should be reported to the relevant state authority for investigation. Australia has a preparedness strategy for an incursion of screw-worm fly, as part of the Australian Veterinary Emergency Plan (AUSVETPLAN), which outlines the national response plan to control and eradicate screw-worm fly from Australia if it were introduced. In addition, Animal Health Australia manages a national Screw Worm Fly Surveillance & Preparedness Program[12] that ensures early detection of an incursion. In a 2014 analysis of the targeted surveillance program[13],

8 WHA, 2009, Chlamydia in Australian Wild Birds Mar 2009, Wildlife Health Australia fact sheet, March 2009, www.wildlifehealthaustralia.com.au/FactSheets.aspx

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

10 www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents/ (see both Disease Strategy for Screw-worm Fly and Operational Manual: Wild Animal Response Strategy)

11 Spradbery JP & Vanniasingham JA, 1980, 'Incidence of the screw-worm fly, Chrysomya bezziana, at the Zoo Negara, Malaysia', Malaysian Veterinary Journal 7(1): 28–32.

12 www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/screw-worm-fly/

13 Fruean SN & East IJ, 2014, 'Spatial analysis of targeted surveillance for screw-worm fly (Chrysomya bezziana or Cochliomyia hominivorax) in Australia', Australian Veterinary Journal 92(7): 254–262.

the relative likelihood of a screw-worm fly incursion that would result in successful establishment of the fly in Australia was highest along the north coast, particularly the top of Cape York Peninsula. It is likely that feral animal populations would be important hosts in the spread of screw-worm fly should it enter and establish in northern Australia.[14]

Suspected rodenticide poisoning in possums

This quarter, suspected anticoagulant rodenticide poisoning was reported in seven individual brushtail possum (*Trichosurus vulpecula*) events from the Greater Brisbane and Gold Coast regions, Queensland. Possums were clinically assessed, at either Currumbin Wildlife Sanctuary or the RSPCA Queensland, as very weak with poor responsiveness and pale mucous membrane colour. Two possums presented with bleeding from the mouth and cloaca. Euthanasia was elected for three possums, due to the severity of clinical signs on examination, including one with an extremely low packed cell volume (PCV) of 0.04 L/L (reference range: 0.30–0.60 L/L[15]). The remaining four possums, with PCVs ranging from 0.09 to 0.12 L/L, recovered after treatment with blood transfusion and vitamin K injections. The presumptive diagnosis of anticoagulant rodenticide poisoning in these cases was based on a clinical presentation and/or response to treatment. History of recent pest control baiting and blood clotting times may further inform the diagnosis. As laboratory verification is not required to guide therapy, it is often not conducted, but could be considered to confirm diagnosis in future cases.

Cases of suspected rodenticide poisoning in possums commonly present to wildlife veterinary clinics in South East Queensland, with incidents largely involving subadults, females and their babies, with PCVs in these animals consistently below 0.15 L/L. Anticoagulant rodenticides suppress

14 WHA, 2011, *Exotic Screw-worm Fly Fact Sheet*, Wildlife Health Australia, July 2011, www.wildlifehealthaustralia.com.au/FactSheets.aspx

15 Johnson R & Hemsley S, 2008, 'Gliders and possums'. In: Vogelnest L & Woods R (eds), *Medicine of Australian Mammals*, CSIRO Publishing, Melbourne.

the vitamin K cycle that occurs in the liver, inhibiting the production of clotting factors in the blood and resulting in haemorrhage.[16,17] A number of first-generation rodenticides (applied as multiple-bait feedings) and second-generation rodenticides (applied as a single-bait feeding) are registered for use in Australia for vertebrate pest control,[18] with the latter restricted to use in and around buildings in Australia.[19] Studies into the effects of the second-generation anticoagulants (e.g. brodifacoum) on brushtail possums document similar clinical signs to these cases, in addition to prolonged blood clotting times.[20] Brushtail possums have a higher tolerance to first-generation rodenticides (e.g. warfarin) than to second-generation anticoagulants, with death occurring as a consequence of liver failure due to consumption of high doses.[21]

16 McLeod L and Saunders G (2013). *Pesticides Used in the Management of Vertebrate Pests in Australia: A Review*, Orange, NSW Department of Primary Industries.

17 Hadler MR, & Buckle AP, 1992). *Forty-five Years of Anticoagulant Rodenticides: Past, Present and Future trends*.

18 McLeod L & Saunders G, 2013, as above.

19 McLeod L & Saunders G, 2013, as above.

20 Littin KE, O'Connor CE, Gregory NG, Mellor DJ, & Eason CT, 2002, 'Behaviour, coagulopathy and pathology of brushtail possums (Trichosurus vulpecula) poisoned with brodifacoum', *Wildlife Research* 29(3): 259–267.

21 Jolly SE, Eason CT, Frampton C & Gumbrell RC, 1994, 'The anticoagulant pindone causes liver damage in the brushtail possum (Trichosurus vulpecula)', *Australian Veterinary Journal* 71(7): 220–220.

Poisoning can occur in non-target species (including mammal and bird species) as a result of primary exposure when consuming bait, or secondary risk through ingestion of poisoned animals.[22,23] Second-generation anticoagulant rodenticides are currently nominated for reconsideration by the Australian Pesticides and Veterinary Medicines Authority (APVMA) through the Chemical Review Program, on the basis of public health, worker safety and environmental safety concerns.[24] WHA continues to liaise with the APVMA program on the investigation of wildlife incidents. These brushtail possum cases illustrate possible unintentional poisoning of a non-target species and highlight the need to consider these risks when placing baits for pest species control.

22 Brakes CR & Smith RH, 2005, 'Exposure of non-target small mammals to rodenticides: short-term effects, recovery and implications for secondary poisoning', *Journal of Applied Ecology* 42(1): 118–128.

23 McLeod L & Saunders G, 2013, as above

24 AVPMA, 2016, 'Chemicals nominated and prioritised for reconsideration', Australian Pesticides and Veterinary Medicines website, apvma.gov.au/node/10876 [accessed 24 October 2016]