Wildlife Health Australia

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Wildlife Health Australia (WHA)[3] 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, and 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)[4]—including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians. During the quarter, 159 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 in April–June 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 were 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 12 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 40 events, based on clinical signs, history, prevailing environmental conditions or other diagnoses. In addition, avian paramyxovirus was excluded in 9 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, April–June 2016

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie geese, ducks, geese and swans	7
Charadriiformes	Shorebirds	4
Columbiformes	Doves and pigeons	3
Gruiformes	Rails, gallinules, coots and cranes	2
Passeriformes	Passerines or perching birds	7
Pelecaniformes	Ibis, herons and pelicans	3
Procellariiformes	Fulmars, petrels, prions and shearwaters	1
Psittaciformes	Parrots and cockatoos	26
Strigiformes	Typical owl and barn owls	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).

b Disease investigations may involve a single or multiple bird orders (e.g. mass mortality event). This quarter there were two wild bird events which involved multiple bird orders: one event involved Anseriformes, Gruiformes and Charadriiformes; the second event involved Columbiformes and Psittaciformes.

Table 1 Number of disease investigations reported into eWHIS, April–June 2016[a]

Bats[b]	Birds	Marsupials	Feral animals	Snakes & lizards	Freshwater turtles	Monotremes	Marine mammals	Wild fish
54	52	27	23	4	2	3	3	1

a Disease investigations may involve a single animal or multiple animals (e.g. mass mortality event).

b All bat disease investigations were single bats submitted for Australian bat lyssavirus testing.

3 www.wildlifehealthaustralia.org.au/Home.aspx

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

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.

During the quarter, pathogen-specific, risk-based surveillance occurred at sites in New South Wales, Northern Territory, South Australia, Queensland, Tasmania and Victoria with cloacal and faecal environmental swabs collected from 1572 waterbirds. Results are pending.

Australian bat lyssavirus

Reports to WHA for the quarter included 54 bats tested for Australian bat lyssavirus (ABLV) from New South Wales, Northern Territory, Queensland, Victoria and Western Australia.

Bat submissions were made for a variety of reasons:

- 18 cases involved contact with a pet dog (15 bats) or a cat (3 bats)
- 12 cases involved contact or suspected contact with the potential for ABLV transmission to humans; of these
  - 3 also involved contact with a pet dog or cat
  - 2 were also associated with trauma (fence or netting entanglement)
  - the remainder had no further history reported
  - 9 bats displayed neurological signs (e.g. paresis, nystagmus, aggression, tremors)
  - 3 cases were associated with trauma
  - 2 bats presented with other clinical signs
  - 10 bats had no further history reported at this time.

During the quarter, two flying-foxes from Queensland were confirmed positive for ABLV by fluorescent antibody test and PCR for pteropid ABLV ribonucleic acid (RNA). One was a subadult female little red flying-fox (*Pteropus scapulatus*) that was found hanging low in a bush in a park, was very subdued and easy to handle. No injuries were detected on X-ray. The bat was euthanased on suspicion of ABLV based on unusual demeanour and behaviour in the absence of significant injuries or illness. Following necropsy examination, histopathology revealed mild to moderate, nonsuppurative meningoencephalitis. The other case was an adult female black flying-fox (*P. alecto*) found hanging low in a tree. On examination it was found to be unable to hang, appeared dazed and had increased respiratory rate and effort. There was no evidence of trauma on X-ray. The bat was euthanased on suspicion of ABLV. On necropsy examination the lungs were found to be markedly enlarged and failed to collapse, with consolidation of the right craniodorsal lobe. The urinary bladder was markedly distended with urine and had a haemorrhagic wall. Mild subcutaneous bruising was apparent over the lumbar spine. Histopathology revealed moderate to severe nonsuppurative meningoencephalomyelitis and ganglioneuritis, subacute aspiration pneumonia and mild sialoadenitis. No potentially dangerous human contact was reported for either case.

More information on ABLV testing of bats in Australia is available in *ABLV Bat Stats*.[5]

Yellow fungus disease exclusion in an eastern water dragon

An eastern water dragon (*Physignathus lesueurii lesueurii*) was found moribund in a backyard in south-east Brisbane, Queensland, and was clinically assessed at the RSPCA Queensland Wildlife Hospital. The water dragon had extensive hyperkeratotic and ulcerative skin lesions on the ventrum. It was euthanased and submitted for necropsy to Queensland's Biosecurity Sciences Laboratory. On external examination it appeared to be cachectic, however large bilateral fat pads were present in the coelom. Histology of skin revealed locally extensive, chronic necrotising dermatitis. Kidney histology revealed nephropathy with widespread glomerular sclerosis. The *Chrysosporium* anamorph of *Nannizziopsis vriesii* (CANV)[6] was excluded by fungal culture and histology. Metabolic or immune-mediated processes are possible causes for the skin lesions.

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

6 See recent taxonomic revisions to the CANV complex in: Paré JA and Sigler L (2016) An overview of reptile fungal pathogens in the genera *Nannizziopsis, Paranannizziopsis, and Ophidiomyces. Journal of Herpetological Medicine and Surgery*, 26(1–2): 46–53.

CANV causes yellow fungus disease, a slowly progressive and often fatal skin disease that affects a wide range of reptile species. It has been isolated from captive reptiles in Australia.[7,8] Skin lesions commonly affect the mouth but may occur anywhere on the body. In later stages, infection extends to muscle, bone and deeper tissues. Diagnosis is based on clinical signs, fungal culture, histopathology and PCR.[7] Further research is required to better understand the ecology of this pathogen, including which free-living reptile species may be susceptible to infection.

Investigation of skin disease in reptiles can provide further information on fungal pathogens, which are an emerging cause of diseases in wildlife with the potential to impact on biodiversity. Snake fungal disease in North America due to *Ophidiomyces ophiodiicola* is a recent example.[9]

Sparganosis in a short-beaked echidna

In June, a short-beaked echidna (*Tachyglossus aculeatus*) was found in West Gippsland, Victoria, with a moderate tick burden and a large firm mass on the ventro-lateral abdominal wall, located caudal to the left thoracic limb. The echidna was euthanased and submitted for necropsy to Wildlife Health Surveillance Victoria at the Faculty of Veterinary and Agricultural Sciences, the University of Melbourne.

On gross necropsy, one large and several small firm pale fibrous masses were found in the subcutis. The large mass measured 13 x 11 x 8 cm and weighed 602 g (approximately 16% of the total body mass of the echidna). Extensive firm pale masses were also seen in both lungs.

A short-beaked echidna with a large firm mass on the ventro-lateral abdominal wall, located caudal to the left thoracic limb. Photo: P. Whiteley.

On histopathology, the subcutaneous masses consisted of dense fibrous connective tissue with numerous cavitations containing sections of pleurocercoids (larval stages of pseudophyllidean cestodes). Similar parasitic cysts effaced the lung parenchyma. These histological findings confirm the diagnoses of subcutaneous and pulmonary sparganosis.

Sparganosis is caused by a host reaction to pleurocercoids (or sparganum) following ingestion by a vertebrate host.[10] Once ingested, pleurocercoids migrate into subcutaneous tissues where they may initiate a significant inflammatory response leading to the clinical presentation described here.

In previous reports from eastern Australia, subcutaneous masses in echidnas were considered most likely to be due to the presence of the larval stages of the cestode, *Spirometra erinacei*.[11] Carnivores are the definitive hosts of this cestode, with adult stages found within the intestine. Larval stages are found in crustaceans (procercoids) and a range of wildlife species including amphibians, reptiles and mammals (pleurocercoids).[12] Wild echidnas are most likely to become infected following accidental ingestion of water containing larval-infected crustaceans or small amphibians.[13,14] Infection of humans may also occur via accidental ingestion of contaminated water, or through the consumption of raw or insufficiently cooked meat harbouring larval infective stages (e.g. feral pigs may represent a zoonotic risk in Australia).[15]

Rabbit haemorrhagic disease virus 2 detection in wild hares

Reported in collaboration with David Peacock, Biosecurity SA; Andrew Woolnough, DEDJTR; Tanja Strive and Robyn Hall, CSIRO; Tarnya Cox, NSW DPI; and Ian Macdonald, the Invasive Animals Cooperative Research Centre.

Rabbit calicivirus, specifically rabbit haemorrhagic disease virus 1 (RHDV-1) from Czechoslovakia (Czech 351), has

7 Johnson RSP et al (2011) Deep fungal dermatitis caused by the *Chrysosporium* anamorph of *Nannizziopsis vriesii* in captive coastal bearded dragons (*Pogona barbata*). *Australian Veterinary Journal*, 89(12): 515—519.

8 Wildlife Health Australia. *Yellow fungus disease* (Chrysosporium anamorph of Nannizziopsis vriesii) *in reptiles in Australia fact sheet*. September 2009. www.wildlifehealthaustralia.com.au/Portals/0/Documents/FactSheets/Yellow%20Fungus%20Disease%20(CANV)%2018%20Aug%202009%20(1.0).pdf

9 USGS (2013) Snake Fungal Disease in the United States. *National Wildlife Health Center Wildlife Health Bulletin 2013-02*, www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB_2013-02_Snake_Fungal_Disease.pdf

10 Taylor, MA, Coop, RL and Wall, RL. 2007. *Veterinary parasitology*. Blackwell Publishing, Ames, Iowa.

11 The national electronic Wildlife Health Information System (eWHIS). www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

12 Ladds, P., 2009. Pathology of Australian native wildlife. CSIRO PUBLISHING.

13 Whittington, R, Middleton, D, Spratt, DM, Muntz, F, Carmel, B, McCracken, HE, Strakosch, MR, Stephanson-Shaw, J, Harper, PA and Hartley, WJ. 1992. Sparganosis in the monotremes Tachyglossus aculeatus and Ornithorhynchus anatinus in Australia. *Journal of wildlife diseases*, 28(4): 636–640

14 Whittington, R. 2008. Monotremes. In Proceedings: Wildlife Pathology Short Course 21–24 August 2008. Australian Registry of Wildlife Health Taronga Conservation Society Australia.

15 Henderson, WR. 2009. Pathogens in vertebrate pests in Australia. Canberra: Invasive Animals Cooperative Research Centre.

been used in Australia as a biological control agent since 1996. A new strain, rabbit haemorrhagic disease virus 2 (RHDV-2), was first detected in wild European rabbits (*Oryctolagus cuniculus*) in the Australian Capital Territory in May 2015[16] and has since been detected in pet rabbits, rabbits grown for meat and wild rabbits in every state except Queensland and Western Australia.[17]

In May 2016, as part of routine monitoring for RHDV, 3 dead wild European brown hare (*Lepus europaeus*), two from South Australia and one from Victoria, tested positive for RHDV-2 via PCR and/or virus sequencing.[15] Two additional European brown hares from South Australia have since tested positive, bringing the total detections to five. These are the first detections of RHDV-2 in European hares in Australia. It is unclear if the detections in wild hare were due to a rare spillover event from rabbits to hares or whether RHDV-2 spread directly between hares.[18]

16 OIE WAHIS Report: www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=18075

17 OIE WAHIS report: www.oie.int/wahis_2/temp/reports/en_imm_0000020384_20160630_165401.pdf

18 www.pestsmart.org.au/the-arrival-of-rhdv2-in-australia-and-implications-for-current-rabbit-biocontrol-initiatives/

RHDV-2 is a lagovirus, a pathogen specific to lagomorph species, that causes rabbit haemorrhagic disease (RHD). Australia only has two lagomorph species—the European rabbit and the European brown hare, both of which are invasive species. In Europe, RHDV-2 has been shown to cause disease in European rabbits, Sardinian Cape hare (*Lepus capensis mediterraneus*) and Italian hare (*Lepus corsicanus*).[19,20] RHDV-2 has not been shown to infect or kill any other native or introduced species in Australia or Europe.[21]

Current vaccination protocols provide full protection to RHDV-1 strains (Czech 351 and the soon-to-be-released K5[22]), however the current vaccine only provides partial protection against RHDV-2, under a revised vaccination protocol[23]. A vaccine is being developed in Europe specifically against RHVD-2 but is not yet available in Australia.

19 Camarda, A, Pugliese, N, Cavadini, P, Circella, E, Capucci, L, Caroli, A, Legretto, M, Mallia, E and Lavazza, A (2014). Detection of the new emerging rabbit haemorrhagic disease type 2 virus (RHDV2) in Sicily from rabbit (Oryctolagus cuniculus) and Italian hare (Lepus corsicanus). *Research in Veterinary Science* 97, 642–5.

20 Puggioni, G, Cavadini, P, Maestrale, C, Scivoli, R, Botti, G, Ligios, C, Le Gall-Recule, G, Lavazza, A and Capucci, L (2013). The new French 2010 Rabbit Hemorrhagic Disease Virus causes an RHD-like disease in the Sardinian Cape hare (Lepus capensis mediterraneus). *Veterinary Research* 44: 96.

21 www.pestsmart.org.au/rhdv2-now-confirmed-european-brown-hares/

22 www.pestsmart.org.au/rhdv-k5-frequently-asked-questions/

Virologists at the CSIRO Canberra, Elizabeth Macarthur Agricultural Institute and Biosecurity SA continue to work closely with the Invasive Animals Cooperative Research Centre to better understand the effects of RHDV-2 on rabbit control in Australia. Current research focuses on the collection of samples from affected domestic and wild European rabbits and wild European hares to monitor RHDV-2 spread and interaction with current circulating field strains.

Rabbits and hares that have died from RHDV-1 or RHDV-2 typically look physically intact, lying on the side with legs stretched out and the head tilted back. Where a rabbit or hare is suspected of having died as a result of RHDV-1 or RHDV-2, please contact CSIRO Canberra[24], Elizabeth Macarthur Agricultural Institute[25] or Biosecurity SA[26] to receive a sampling pack or instructions on how to collect a sample.

23 www.ava.com.au/rabbit-calicivirus

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