Photo: Paul Taylor

Australian flying-foxes: health & disease update

Keren Cox-Witton
Wildlife Health Australia

Wildlife Health AUSTRALIA

Who is Wildlife Health Australia?

WHA is the national coordinating body for wildlife health

Core funding from Department of Agriculture, Water and the Environment and State/Territory Governments

Coordinates Australia's general wildlife health surveillance system

A network of >700 wildlife health professionals

International connections

CEO:	**Rupert Woods**
National Coordinator:	**Tiggy Grillo**
Senior Project Officer:	**Keren Cox-Witton**
Project Officers:	**Andrea Reiss**
	Silvia Ban
Administration Manager:	**Karen Magee**

Bat Health Focus Group

Bat health issues within the context of public health,
domestic animal health, biosecurity and environmental impacts in Australia

- Federal and State / Territory Government
  - Public health, Agriculture, Environment
- CSIRO-ACDP
- Researchers & scientists
  - Veterinarians, ecologists, virologists, epidemiologists
- Australasian Bat Society
- Bat carers
- Australian Speleological Federation

Collaborative One Health approach

Today

Australian bat lyssavirus – latest data

COVID-19 and bats

Reporting disease events

Keeping up to date

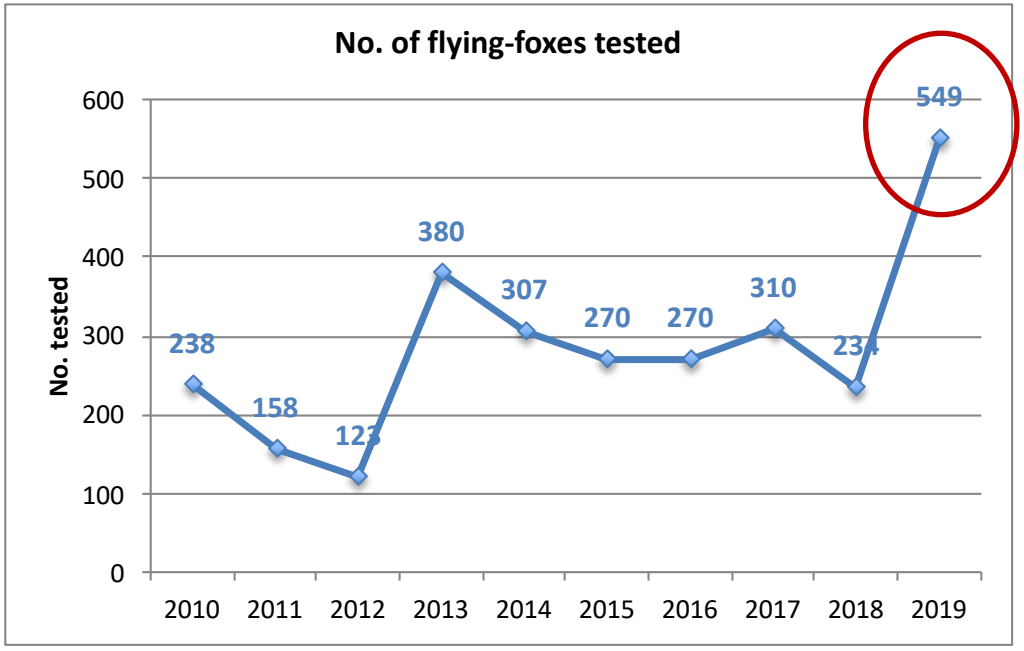
Cartoon: Jimmy Craig
https://www.instagram.com/theycantalkcomics/

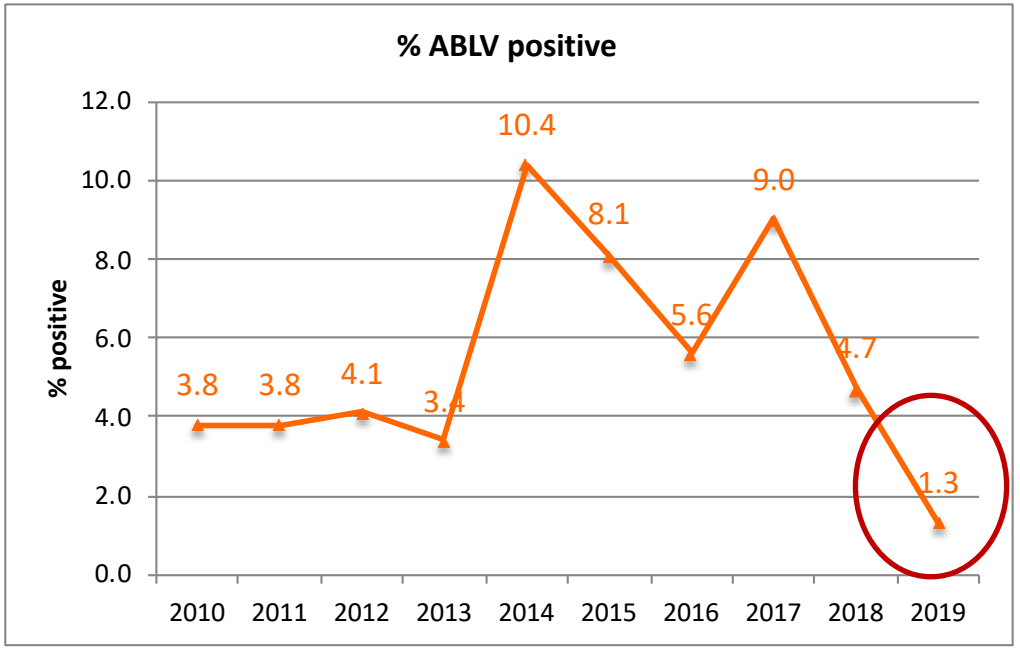
Australian bat lyssavirus

- ABLV infects Australian flying-foxes and insectivorous bats.
- Similar to but distinct from rabies virus.
- Transmitted by saliva introduced via a bite or scratch, or contamination of mucous membranes or broken skin.
- Can cause neurological signs in bats e.g. paralysis, inability to fly, tremors, seizures, unusual vocalization, abnormal aggression.
- Can spill over into other species – humans, horses.
- REMINDER: always use appropriate PPE when handling bats, maintain current rabies immunity, first aid and medical attention for a bite, scratch or other significant contact.

ABLV testing of flying-foxes 2010-2019

- Over 2,800 flying-foxes tested (human/pet contact, neurological signs, trauma, found dead)
- 148 (5.3%) flying-foxes infected
- Proportion of tested bats infected with ABLV is not representative of prevalence in wild bat populations - ABLV infection more common in unwell bats, which are more likely to be submitted. Prevalence in wild bats is considered to be less than 1%.





ABLV data – 2019 – an unusual year

- 549 flying-foxes tested for ABLV:
  - > 2x higher than 2018 (234 tested), usual range 120 to 380
- 1.3% of flying-foxes tested were infected with ABLV
  - > 3x lower than 2018 (4.7%), usual range 3.5 to 10.5%
  - Second half of 2019: only one ABLV detection

WHY?

- Passive surveillance system: bats are submitted due to contact with a person/pet, neurological signs/abnormal behaviour, euthanased (welfare), found dead
- Data affected not only by events in the wild bat population, but also by human and environmental factors - affect the pattern of submission of bats for testing e.g. 2013
- Can’t be sure, but a possible explanation…

ABLV data – 2019 – an unusual year

- Flying-fox mass mortalities in 2019 - starvation (drought), heat stress events, bushfires. Large number of sick and weak bats, bats searching for food in urban areas
- Bats more likely to come in contact with pets and people and therefore be submitted for testing
- These bats were sick or weak for reasons other than ABLV, resulting in a low proportion of tested bats that were ABLV positive
- Number returning to normal in 2020: 206 flying-foxes tested, 4.9% infected Jan-June

ABLV BAT STATS

Australian Bat Lyssavirus Report - June 2020

Cases of ABLV infection - January to June 2020

Ten cases of Australian bat lyssavirus (ABLV) infection were reported in bats in Australia between January and June 2020, four from New South Wales, four from Victoria and two from Queensland (Table 1). These cases are described below.

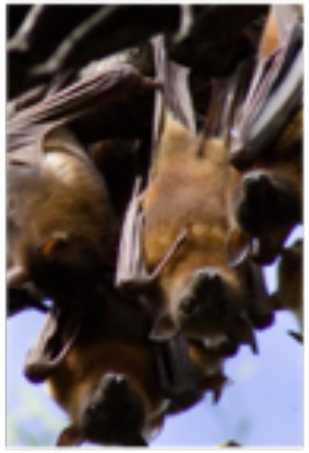
New South Wales

Three grey-headed flying-foxes (*Pteropus poliocephalus*) and an unspecified flying-fox (*Pteropus* sp.) from the south coast, Sydney and northern rivers regions of NSW were found to be infected with ABLV in the first half of 2020. All four presented with neurological signs. One bat was found hanging low in a tree, then fell and showed jerking movements and head tremors. The others presented with various signs such as twitching, shaking, biting, change in voice and weakness in the legs.

Victoria

Four grey-headed flying-foxes from the Melbourne region were found to be infected with ABLV from January to June. One presented with neurological signs and died in transit. Two were found on the ground, and one was found with a broken foot.

(continued overleaf)



Little red flying-foxes
Photo: Rex Walters / Flickr (CC)

Table 1: ABLV infection in Australian bats as confirmed by FAT, PCR, IHC and/or virus isolation^

YEAR	NSW	NT	QLD	VIC	WA	SA	Total
1995	0	0	1*	0	0	0	1
1996	1	0	9	1	0	0	11
1997	7	1	27*	0	0	0	35
1998	1	0	26*	0	0	0	27
1999	0	0	6	0	0	0	6
2000	1	0	14	0	0	0	15
2001	0	0	9	1	4	0	14
2002	4	0	10	2	1	0	17
2003	5	0	3	2	0	0	10
2004	5	0	6	1	0	0	12
2005	6	0	5	0	0	0	11
2006	2	0	4	0	0	0	6
2007	6	0	2	0	0	0	8
2008	0	0	0	0	0	0	0
2009	2	0	8*	0	0	0	10
2010	0	0	8	0	1	0	9
2011	0	0	4*	2	0	0	6
2012	1	0	3	0	0	1	5
2013	3*	0	11*	0	0	0	14
2014	5	1	14*	1	11*	0	32*
2015	10	1	11*	0	0	0	22
2016	5	1	8*	1	0	0	15*
2017	4*	0	19*	3	2	0	28*
2018	5	0	5*	1	0	0	11*
2019	6*	0	1*	0	0	0	7*
2020 (to June)	4	0	2*	4	0	0	10*
Total	83*	4	218*	19	19*	1	342*

Source: see page 6, Australian Bat Lyssavirus Report
^ ACT and TAS have not recorded any cases of ABLV infection that satisfy this case definition.
* ABLV was first recognised in 1996. A black flying-fox from Townsville, QLD that died in 1995 was subsequently diagnosed with ABLV.
* Higher numbers of ABLV infected bats were associated with peak years of testing in 1997-1998.
* For some bats, one equivocal and one negative result (FAT/PCR) was recorded. These bats are not included in these figures as they were not confirmed to be ABLV infected.

ABLV prevalence in bats submitted for testing

Some of the bats that come into contact with people or pets are tested for ABLV. The percentage of ABLV infection in bats submitted for testing is of interest as an indicator of public exposure, however it is also heavily influenced by factors affecting which bats are submitted for testing.

A total of 252 bats were tested for ABLV in Australia between January and June 2020 (Table 2). Ten cases of ABLV infection were reported in bats (4.0% of the bats submitted for testing) (Table 3). As described above, testing of unwell bats is not representative of the whole bat population, consequently these results over-estimate the level of ABLV infection in the wider bat population.

The number of bats submitted for ABLV testing appears to be returning to normal after an unusually high number of submissions in 2019, which was believed to be due to starvation, heat stress and bushfires resulting in large numbers of sick and weak bats. Similarly, the proportion of tested bats infected with ABLV has returned to the usual range for the first half of 2020, compared to a lower than normal level in 2019.

Table 2: ABLV testing by bat species (Jan - Jun 2020)

Species	No. tested	No. ABLV infected
Flying-foxes, blossom & tube-nosed bats		
Pteropus poliocephalus/Grey-headed flying-fox	115	8
Pteropus alecto/Black flying-fox	62	0
Pteropus scapulatus/Little red flying-fox	13	0
Pteropus sp.	16	2
Insectivorous bats (microbats)		
Chalinolobus gouldii/Gould's wattled bat	8	0
Nyctophilus geoffroyi/Lesser long-eared bat	4	0
Chalinolobus morio/Chocolate wattled bat	3	0
Mokosoidae sp.	2	0
Nyctophilus walkeri/Pygmy long-eared bat	2	0
Vespertilionidae sp.	2	0
Rhinolophus megaphyllus/Eastern horseshoe bat	1	0
Vespadelus regulus/Southern forest bat	1	0
Vespadelus darlingtoni/Large forest bat	1	0
Miniopterus sp.	1	0
Vespadelus vulturnus/Little forest bat	1	0
Chalinolobus/*Chalinolobus*	1	0
Nyctophilus/*Nyctophilus*	1	0
Ozimops planiceps/South-eastern free-tailed bat	1	0
Microbat; species not identified	17	0
TOTAL	**252**	**10**

Little red flying-fox Photo: Geoff Whalan / Flickr (CC)

Common bent-wing bat
G.B. Baker/Nature Focus © Australian Museum

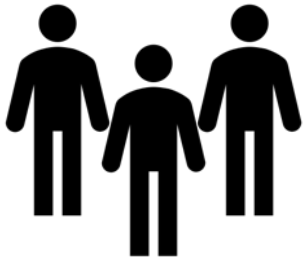
Table 3: ABLV infection (%) in bats submitted for testing (Jan-Jun 2020)

	No. tested	No. infected*	% infected*
Flying-foxes, blossom & tube-nosed bats	206	10	4.9%
Microbats	46	0	0%
TOTAL	**252**	**10**	**4.0%**

* This figure represents the percentage of ABLV infection in the bats tested. The level of ABLV infection in the wider bat population is estimated to be significantly lower.
^ In one bat there was an equivocal FAT or PCR result. This bat is not included in these figures as it was not confirmed to be ABLV infected.

COVID-19 & Australian bats

- No virus detections to date of SARS-CoV, MERS-CoV, SARS-CoV-2 or closely related viruses in Australian bats or other wildlife
- Coronaviruses are widespread in bats, including Australia
- SARS-CoV-2 'ancestor' probably originated in bats → ?? intermediate host
- Small number of overseas cases of human-to-animal transmission:
  - pet dogs and cats
  - tigers and lions (Bronx Zoo)
  - farmed mink (Europe & USA)
- Current outbreaks are driven by **person to person spread**
- Concerns about transmission from humans to bats



COVID-19 & Australian bats

- What is the risk of transmission of SARS-CoV-2 from humans to bats in Australia?
- **Australia vs overseas:** Low prevalence of COVID-19; differences in human-bat interactions.
- Expert risk assessment: LOW risk but high uncertainty (many unknowns)

COVID-19 & Australian bats – risk management

- **Guidance document** to provide biosecurity advice for interacting with bats

Wildlife Health Australia

COVID-19 and Australian bats – information for bat carers, researchers and others interacting with bats

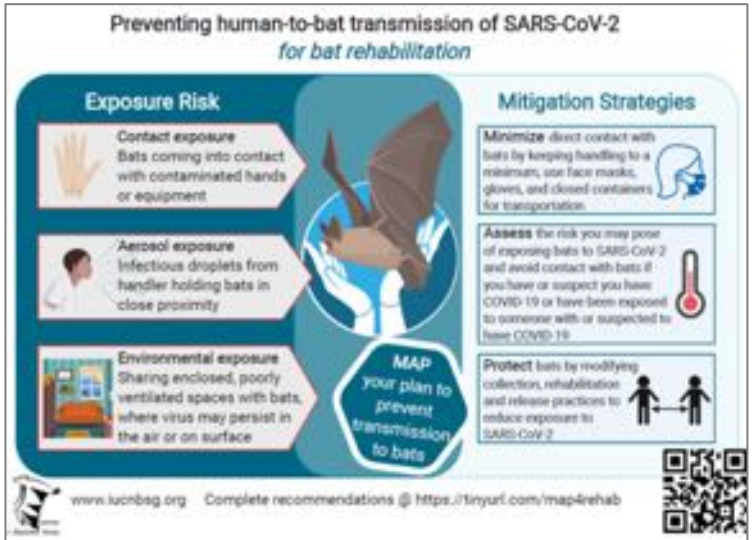
29 October 2020

Wildlife Health Australia, in collaboration with government and non-government stakeholders, is continually assessing information on the COVID-19 situation. A risk assessment was conducted to assess the likelihood of SARS-CoV-2 establishing in an Australian bat population following human-to-bat transmission, and the resulting consequences: *Qualitative Risk Assessment – COVID-19 & Australian Bats*. On the basis of the findings of this assessment and the current situation, the following information has been developed to assist bat carers, researchers and others interacting with bats to manage the potential risk.

This information is based on current knowledge. As this is a dynamic situation, we will continue to assess new information within the Australian context, and update this document accordingly. Overseas advice on reducing risk of transmission of SARS-CoV-2 has been developed by the IUCN SSC Bat Specialist Group,[1] and the IUCN Wildlife Health Specialist Group and OIE.[2] Information on COVID-19 and Australian wildlife is provided in the WHA fact sheet: Novel Coronavirus disease (COVID-19). Further information on COVID-19 and animals is provided by the Australian Veterinary Association and World Organisation

COVID-19 & Australian wildlife - resources

- WHA website www.wildlifehealthaustralia.com.au:
  - ‘COVID-19’ section on homepage with links to external resources
  - ‘COVID-19 & bats’ on WHA Bat Health Focus Group page
  - WHA fact sheets: *Novel coronavirus disease (COVID-19)* and *Coronaviruses in Australian bats*
- World Organisation of Animal Health (OIE): **Questions and Answers on the 2019 Coronavirus Disease (COVID-19)**
- Department of Agriculture, Water and the Environment: **Domestic animals and COVID-19**; Department of Health: **Coronavirus (COVID-19) health alert**



IUCN SSC Bat Specialist Group
https://www.iucnbsg.org/bsg-publications.html

Bat Health Focus Group – PPE information

- Information for bat handlers written by Tania Bishop, Jenny Mclean and Alison Peel, with input from the group

Wildlife Health Australia

PERSONAL PROTECTIVE EQUIPMENT (PPE) INFORMATION FOR BAT HANDLERS

This document provides information on personal protective equipment (PPE) aimed at preventing the transmission of ABLV and other bat-borne pathogens through bat bites and scratches, or via contact with infected urine, faeces, saliva or aerosols. It is intended to provide information for vaccinated bat rehabilitators, researchers, ecologists, veterinarians and associated workers. Use of appropriate PPE will also help prevent disease transmission from the person to the bat. For more information on biosecurity measures for working with Australian wildlife, see the National Wildlife Biosecurity Guidelines.

Only people who are appropriately vaccinated and maintain ongoing immunity should handle bats. If you are unvaccinated and find an injured or sick bat, do not handle the bat and contact a wildlife care organisation or your local veterinarian.

Bat-borne zoonotic pathogens circulate in Australian bat populations, meaning there is always some risk of transmission from bats to people. Risk is best minimised via a combination of appropriate PPE and manual handling techniques. PPE that allows for a good feel of the bat and its body parts is essential for reducing handling stress, getting the job done well and quickly and staying in control of the bat with a minimum of force. These factors combine to keep the bat calm and so help to avoid bites and scratches.

This document provides generic, helpful principles and examples; however, bat handlers may be required to adapt this information according to their expertise, experience and the task at hand. The appropriate level of PPE will vary under specific circumstances (Table 1). For example, risk may be increased in an individual bat demonstrating neurological signs or abnormal behaviour or decreased in healthy bats that have been handled intensively in care for long periods of time (e.g. months). Events preceding handling may be an important consideration. Handlers dealing with sick and injured bats are more likely to encounter an ABLV infected bat than those working with wild-caught healthy bats. Microbats being taken from harp traps are generally calmer than those being untangled from mist nets, and handling microbats requires a greater feel of the bat than handling flying foxes, and so lighter and thinner gloves are required. Bats in care generally humanise quite quickly, are much calmer and their behaviour more predictable. Many flying foxes in care are orphans and so much smaller and easier to handle; while orphaned microbats in care are so small that other challenges exist. Risk will vary according to individual bat temperament.

Each organisation and individual must assess the risk of each situation and apply the level of risk mitigation appropriate to that situation.

Table 1. Factors contributing to the risk spectrum

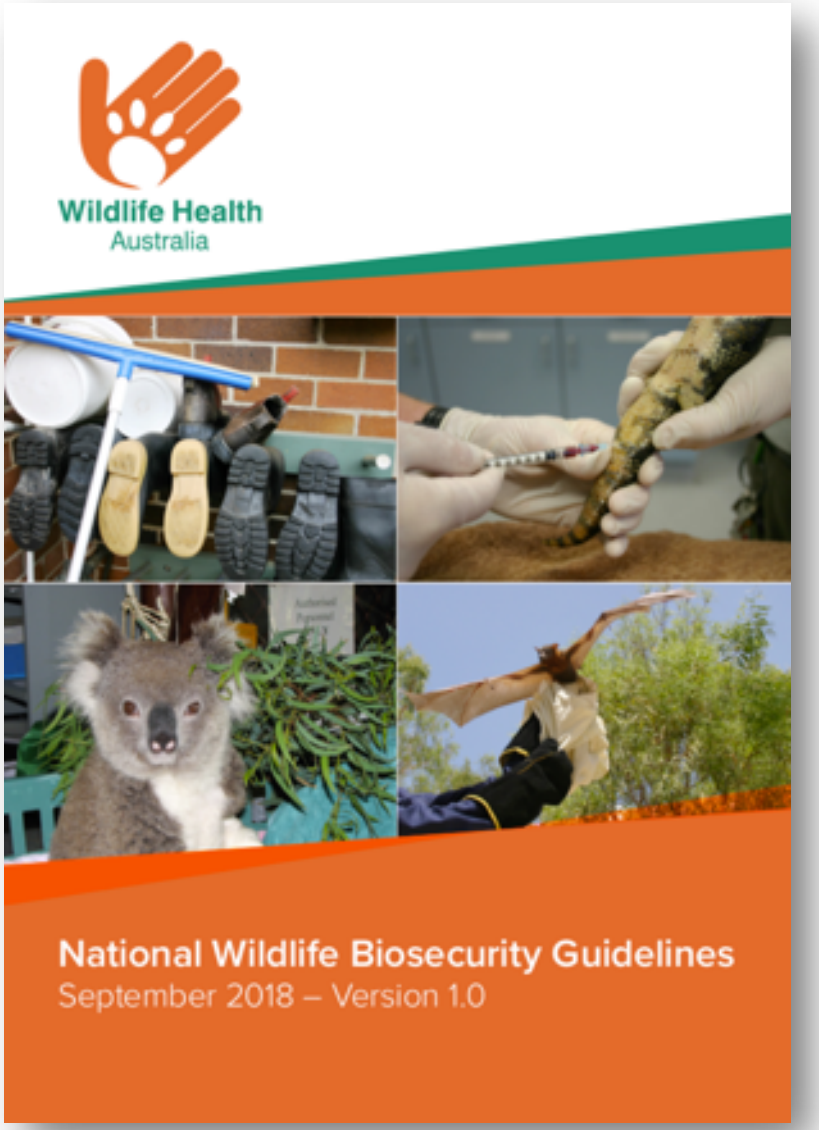
Lower risk scenario	Higher risk scenario
Healthy / normal behaviour	Unhealthy / abnormal behaviour

National Wildlife Biosecurity Guidelines

Outlines best practice biosecurity measures

For anyone who works or interacts with Australian wildlife including wildlife managers, researchers, veterinarians, carers and others

www.wildlifehealthaustralia.com.au/WHADocuments.aspx



Disease reporting

When to report?

- Ecologists, field researchers, rangers, land managers, carers have first-hand experience and know what's 'normal' for bats in their area
- Report anything out of the ordinary:
  - Increased numbers of sick or dead bats
  - Unusual signs
  - Change in pattern of a known disease e.g. new location, different time of year

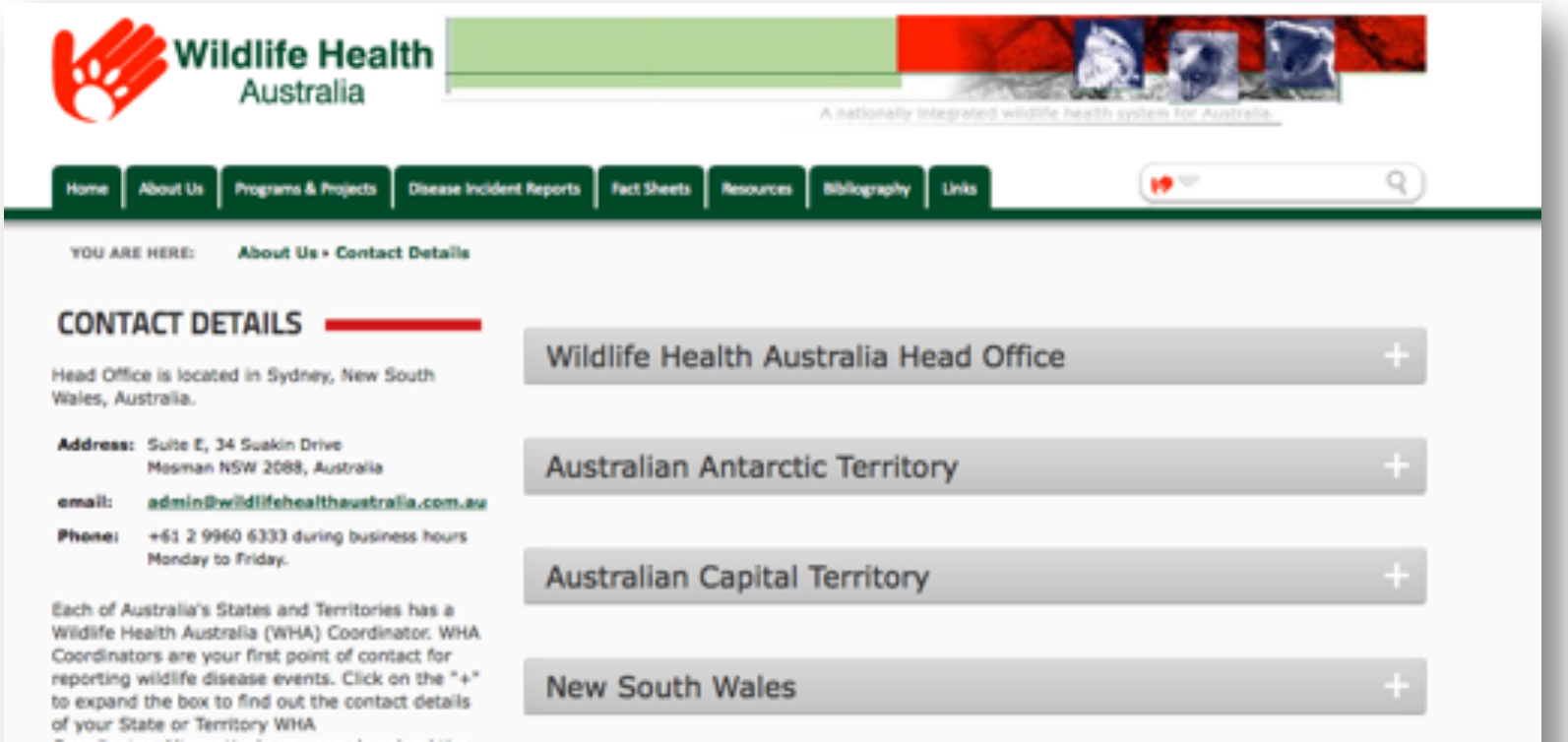
Who to report to?

- Wildlife care group
- Veterinarian
- Report to a government agency – advice on sample submission

Photo: James Cox

If you see any ***signs of disease that are unusual or clusters of wildlife deaths***
you should contact your local **WHA Coordinator** or call the Emergency Animal Disease Watch Hotline: **1800 675 888**

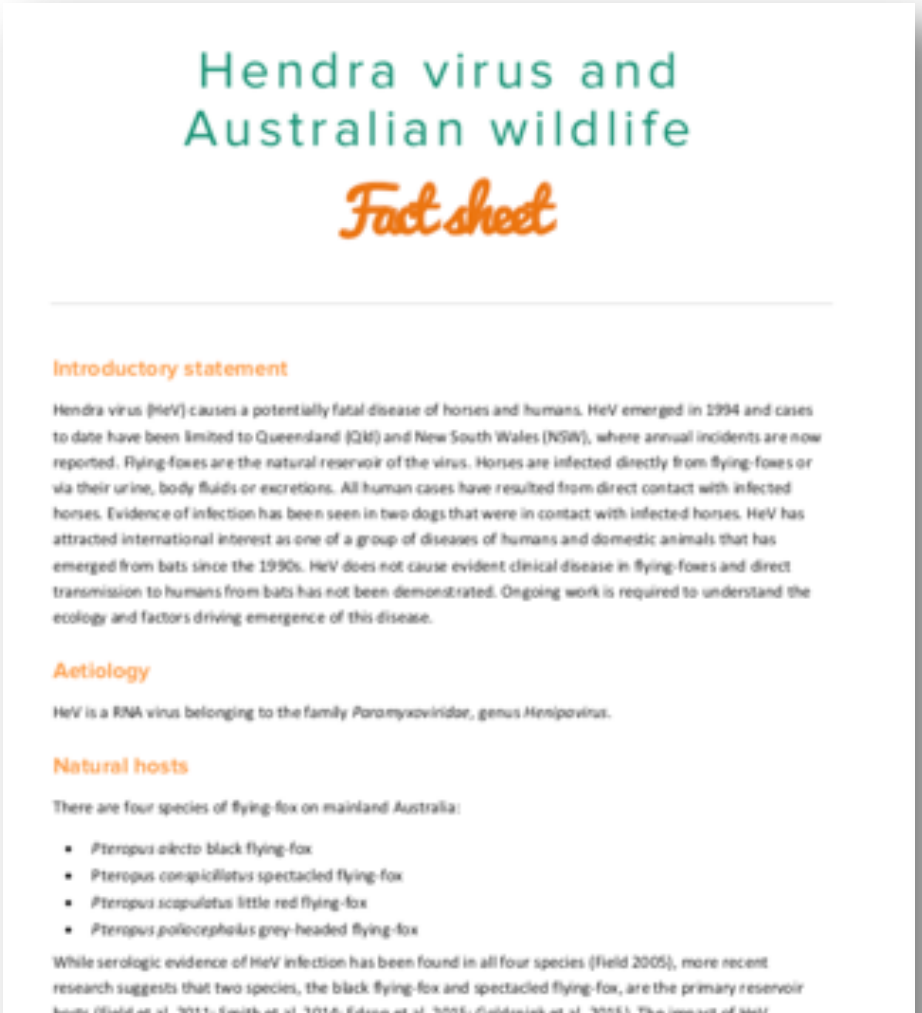
WHA website - About Us - Contact Details



Keeping up-to-date: Wildlife Health Fact Sheets

Brief, factual information on >100 wildlife diseases in Australia

ABLV, Coronaviruses, COVID-19, Hendra Virus, Menangle Virus, Zoonoses in Australian Bats



Hendra virus and Australian wildlife

Fact sheet

Introductory statement

Hendra virus (HeV) causes a potentially fatal disease of horses and humans. HeV emerged in 1994 and cases to date have been limited to Queensland (Qld) and New South Wales (NSW), where annual incidents are now reported. Flying-foxes are the natural reservoir of the virus. Horses are infected directly from flying-foxes or via their urine, body fluids or excretions. All human cases have resulted from direct contact with infected horses. Evidence of infection has been seen in two dogs that were in contact with infected horses. HeV has attracted international interest as one of a group of diseases of humans and domestic animals that has emerged from bats since the 1990s. HeV does not cause evident clinical disease in flying-foxes and direct transmission to humans from bats has not been demonstrated. Ongoing work is required to understand the ecology and factors driving emergence of this disease.

Aetiology

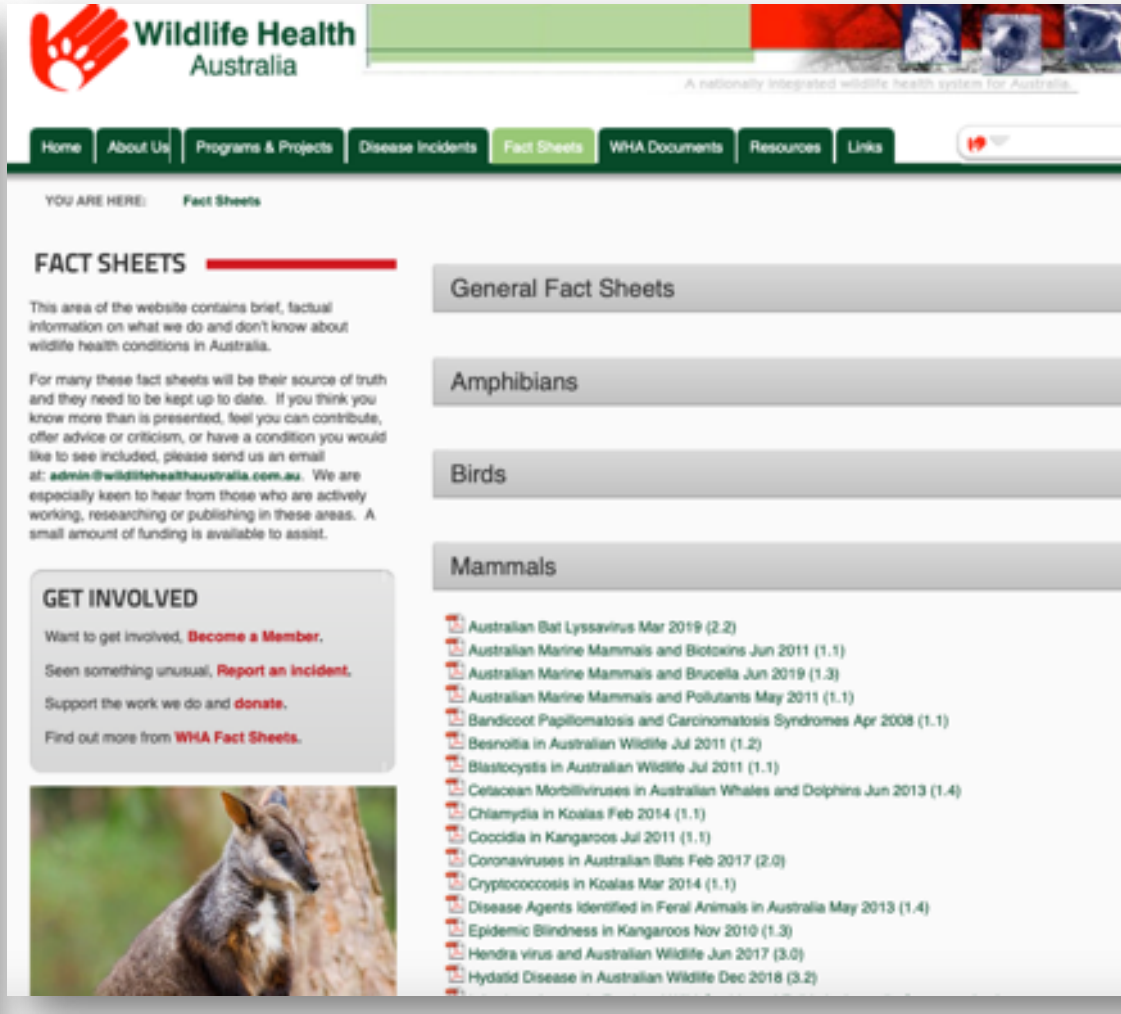
HeV is a RNA virus belonging to the family *Paramyxoviridae*, genus *Henipavirus*.

Natural hosts

There are four species of flying-fox on mainland Australia:

- *Pteropus alecto* black flying-fox
- *Pteropus conspicillatus* spectacled flying-fox
- *Pteropus scapulatus* little red flying-fox
- *Pteropus poliocephalus* grey-headed flying-fox

While serologic evidence of HeV infection has been found in all four species (Field 2005), more recent research suggests that two species, the black flying-fox and spectacled flying-fox, are the primary reservoir



Wildlife Health Australia

A nationally integrated wildlife health system for Australia

Home | About Us | Programs & Projects | Disease Incidents | Fact Sheets | WHA Documents | Resources | Links

YOU ARE HERE: Fact Sheets

FACT SHEETS

This area of the website contains brief, factual information on what we do and don't know about wildlife health conditions in Australia.

For many these fact sheets will be their source of truth and they need to be kept up to date. If you think you know more than is presented, feel you can contribute, offer advice or criticism, or have a condition you would like to see included, please send us an email at: admin@wildlifehealthaustralia.com.au. We are especially keen to hear from those who are actively working, researching or publishing in these areas. A small amount of funding is available to assist.

GET INVOLVED

Want to get involved, Become a Member.

Seen something unusual, Report an incident.

Support the work we do and donate.

Find out more from WHA Fact Sheets.

General Fact Sheets

Amphibians

Birds

Mammals

- Australian Bat Lyssavirus Mar 2019 (2.2)
- Australian Marine Mammals and Biotoxins Jun 2011 (1.1)
- Australian Marine Mammals and Brucella Jun 2019 (1.3)
- Australian Marine Mammals and Pollutants May 2011 (1.1)
- Bandicoot Papillomatosis and Carcinomatosis Syndromes Apr 2008 (1.1)
- Besnoitia in Australian Wildlife Jul 2011 (1.2)
- Blastocystis in Australian Wildlife Jul 2011 (1.1)
- Cetacean Morbilliviruses in Australian Whales and Dolphins Jun 2013 (1.4)
- Chlamydia in Koalas Feb 2014 (1.1)
- Coccidia in Kangaroos Jul 2011 (1.1)
- Coronaviruses in Australian Bats Feb 2017 (2.0)
- Cryptococcosis in Koalas Mar 2014 (1.1)
- Disease Agents Identified in Feral Animals in Australia May 2013 (1.4)
- Epidemic Blindness in Kangaroos Nov 2010 (1.3)
- Hendra virus and Australian Wildlife Jun 2017 (3.0)
- Hydatid Disease in Australian Wildlife Dec 2018 (3.2)

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WHA Bat News

A monthly collation of recent media articles and publications

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admin@wildlifehealthaustralia.com.au

Bat News - WHA - October 2020

Keren Cox-Witton

To: Keren Cox-Witton

Dear Bat News subscribers,
Please see below for recent news articles and publications relating to bat health.
Best regards,
Keren

COVID-19 & bats
- COVID-19 and Australian bats – risk assessment & biosecurity information
- Risk of human-to-wildlife transmission of SARS-CoV-2
- The 'bat man' tackles COVID-19
- Survey: Bats perception following the COVID outbreak
- COVID-19 and bats – other publications

White-nose syndrome (WNS)
- Hibernation ecology of bats using three high-elevation caves in northern Arizona: implications for potential white-nose southwest species
- White-nose syndrome – other publications

Other News & Events
- Loss of forest habitat from the devastating bushfires continues to impact flying-fox populations on the Mid North Coas
- Alarm bells ring as plummeting flying fox numbers trigger knock on effect for entire ecosystems
- EBLV-1 Positive Bat from Dorset [UK]
- Bats most common rabies carrier this year [Canada]
- Mice, bats, and coronaviruses with Tony Schountz
- New global research network to explore wonders of bats
- 2020 National Flying-fox Forum – registration open [24-25 November 2020; Virtual]
- 6th International Berlin Bat Meeting: The human perspective on bats [Online: 22-24 March 2021]
- PhD opportunity: Urban bat adaptation to city environments [University of Sydney]

Publications
- A call to action: Understanding land use-induced zoonotic spillover to protect environmental, animal, and human healt
- Corporate support for threatened species recovery efforts: three case studies from the 2019–20 Australian bushfire se
- Resilient responses by bats to a severe wildfire: conservation implications

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- Membership is free ☺
- Receive the Digest email newsletter
- Keep up-to-date with wildlife disease events and information

www.wildlifehealthaustralia.com.au

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Acknowledgements

Australian Government Department of Agriculture, Water and the Environment

State/Territory Governments

WHA Bat Health Focus Group

All our data submitters & surveillance partners

Thank you

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