Wild Bird News

National Avian Influenza Wild Bird Surveillance Newsletter - December 2020

Avian Influenza Virus

To date, 16 haemagglutinin (HA; H1-H16) and 9 neuraminidase (NA; N1-N9) subtypes are recognised in birds. **Waterfowl and shorebirds are the main natural reservoirs and rarely show signs of disease.** Avian Influenza Virus (AIV) can cause significant infectious disease in domestic poultry and can also infect and/or cause disease in a range of other species including other captive birds, wild birds, and humans[1,2].

Of global concern is the capacity of AIV subtypes H5 and H7 to mutate from Low Pathogenicity (LPAI) into **High Pathogenicity (HPAI) forms which can cause significant losses in both poultry and wildlife, and potentially human health issues.**

AIV in Australia

HPAI H5 viruses have not been detected in Australia. As of December 2020, there have been eight outbreaks due to HPAI H7 viruses in commercial Australian poultry operations between 1976 and 2020 in the states of Victoria, Queensland and New South Wales[3,4,5,6,7,8,9].

Mortality due to AIVs have not been reported in feral or native free-ranging birds[10]. However, **LPAI viruses have been detected in wild birds in Australia.**

Given Australia's geographic and ecological isolation, **it is important that assumptions about AIV epidemiology in Australia are not based entirely on studies from Asia, Europe or North America[11,12].**

More info: WHA FACT SHEET

Teal - Image Courtesy of Guy Weerasinghe

National Avian Influenza Wild Bird Surveillance Program

The National Avian Influenza Wild Bird (NAIWB) Steering Group ensures national coordination and collaboration of wild bird avian influenza virus (AIV) surveillance activities which are conducted Australia-wide. Australia's NAIWB Surveillance Program comprises two sampling components.

As part of the targeted surveillance component of the NAIWB surveillance program, faecal environmental swabs and cloacal and/or oropharyngeal samples are collected from apparently 'healthy' wild birds and hunter-shot wild birds of known AIV reservoir species (including waterfowl and shorebirds) at key locations across Australia and tested for avian influenza viruses (AIVs).

The second component - general surveillance - involves investigation of significant morbidity and mortality events in wild birds, including zoo bird population. Reports and samples from sick and dead birds are received from members of the public, private practitioners, universities, zoo wildlife clinics and wildlife sanctuaries. Diagnostic investigations focus on ruling out disease caused by avian influenza virus, specifically the subtypes H5 and H7. The diagnostic investigation considers history, clinical signs and/or histopathology, prevailing environmental conditions or detection of other pathogens or diagnoses. Activities are funded by the Australian Government Department of Agriculture, Water and the Environment (DAWE), in addition to in-kind support provided by the jurisdictional agencies, researchers and representative's institutions. Further background can be found in Wild Bird News.

Avian Influenza Outbreaks in Victoria

Between 31st July and 25th August 2020 three different strains of avian influenza were detected across six commercial production farms in Victoria:

- Three egg producing farms with highly pathogenic H7N7 avian influenza.
- Two turkey farms with low pathogenic H5N2 avian influenza.
- One emu farm diagnosed with low pathogenic H7N6 avian influenza.

Avian influenza was successfully eradicated from all six farms and on the 26th February 2021 [*note – this issue of wild bird news was published post-eradication*]. Australia self-declared that freedom from highly pathogenic avian influenza had been regained in accordance with international guidelines published by the World Organisation for Animal Health (OIE). This significant achievement is the result of a successful eradication program implemented by Agriculture Victoria, which was supported by other states and territories, Animal Health Australia, Wildlife Health Australia (WHA) as well as affected industry groups, through national response and cost-sharing arrangements. Further information about this event can be found on the **Agriculture Victoria website**. An article was also published in **the Conversation** (7th Oct 2020) that discusses how wild bird AIV surveillance can inform outbreak response.

More information about emergency responses to animal and plant pest and disease incursions that affect Australia's agriculture industries and environment can be found at **www.outbreak.gov.au**.

Avian Influenza response activities relating to wild birds

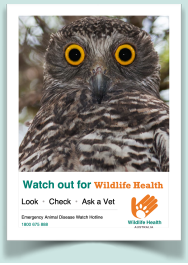
During the response to the outbreak, an ad hoc wild bird working group was established by Agriculture Victoria and drew upon the wild bird avian influenza and ecology technical expertise in the NAIWB Steering Group. Activities undertaken by Agriculture Victoria (including Agriculture Victoria Research), CSIRO Australian Centre for Disease Preparedness, Deakin University, University of Sydney, WHO Collaborating Centre for Reference and Research on Influenza, other members of the ad hoc wild bird / NAIWB Steering Group and WHA included:

- Expert ornithological field assessment in the areas surrounding the affected farms,
- Mapping Birdlife Australia waterbird data, alongside **Ramsar** wetlands and nationally significant wetlands within 60km radius of the affected farms,
- Enhanced targeted and general wild bird surveillance,
- Sequencing and genomic epidemiology of environmental and wild bird samples,
- Provision of historic NAIWB targeted surveillance results, specifically H5 and H7, to government agencies,
- Assessment of possible wild bird source and spread pathways,
- Input into additional (enhanced) targeted and general wild bird surveillance activities in Victoria and other states and territories, and
- Expert technical advice to inform response to media queries.

Details of the enhanced targeted and general wild bird surveillance activities in Victoria are outlined below in the relevant sections.

AVIAN INFLUENZA IS A NATIONAL NOTIFIABLE DISEASE AND REQUIRES REPORTING TO THE CHIEF VETERINARY OFFICER (CVO) AT THE APPROPRIATE AUSTRALIAN STATE OR TERRITORY

If you would like information about Avian Influenza testing and sample collection, please seek advice from your local **WHA Coordinator** or call the **Emergency Animal Disease Watch Hotline** (**1800 675 888**).



Data provided in this document should be considered preliminary and may be changed.

Targeted surveillance - Jul to Dec 2020

Between July and December 2020, AIV-specific, risk-based surveillance occurred at sites in New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia with cloacal and oropharyngeal or faecal environmental swabs collected from 4426 waterbirds. Samples were tested using RT-PCR for AIV M (matrix) gene detection. Influenza A reactors (positives) to the influenza A matrix gene PCR were tested using specific qRT- PCRs for influenza A H5 and H7. Samples for which H5/H7 subtypes were detected by RT-PCR were dispatched to the CSIRO Australian Centre for Disease Preparedness (ACDP) for confirmatory and further testing.

In response to the avian influenza outbreaks, enhanced targeted wild bird surveillance was undertaken in Victoria and NSW, complementing samples collected as part of the ongoing NAIWB Surveillance Program.

In Victoria, an additional 255 samples were collected, including:

- 207 faecal environmental samples collected by Agriculture Victoria in the areas surrounding the affected farms, and
- 48 cloacal and oropharyngeal samples from trapped ducks collected by Deakin University.

In NSW, a further 88 cloacal and oropharyngeal samples from ducks were also collected just north of the Victorian border.

Enhanced surveillance was also undertaken in southeast Qld, where 125 extra environmental faecal samples from ducks were collected at sampling sites close to intensive commercial poultry farms.

Targeted surveillance - Influenza A virus detections (Jul - Dec 2020)

State / Territory	# Individual Swabs Collected[a]	# Positives[b]	H5 LPAI	H5 HPAI	H7 LPAI	H7 HPAI	Other LPAI HA Subtypes[d]
NSW	472	1	0	0	0	0	
NT	299	0					
Qld	1306	7	1	0	0	0	H1, H6, H9
SA	900	37	10[c]	0	10[c]	0	H2, H9, H11
TAS	282	0					
VIC	867[e]	28	0	0	5	0	H2, H4, H9, H11
WA	300	0					
Total	**4426**	**73**	**11**	**0**	**15**	**0**	

[a] Swabs include faecal environmental and cloacal (and/or oropharyngeal) swabs.

[b] A number of swabs were tested as a pooled sample (up to 3 swabs in one pool). A positive pool represents one AIV positive. A sample is considered AIV positive if either: a) Positive at original lab; b) Indeterminate at original lab and subsequently tested positive; c) Indeterminate at original lab and subtyped at any lab.

[c] Mixed detections of LPAI H5 and LPAI H7 identified in three positives samples from SA.

[d] When positive AIV samples (not identified as H5 or H7) are submitted for subtyping and successful.

[e] The number of individual swabs collected in Victoria includes 441 environmental samples collected as part of the ongoing NAIWB targeted surveillance, 255 samples from enhanced surveillance described above, and further 171 cloacal and oropharyngeal samples from trapped birds collected across the state by Deakin University.

Between July and December 2020, no HPAI viruses were identified, but targeted surveillance continues[12,13] to find evidence of a wide range of low pathogenicity virus subtypes, including LPAI H7.

Molecular analysis of AIVs detected through the targeted surveillance activities contribute to: tracking Australian virus evolution and dynamics, maintaining currency of diagnostic tests, maintaining a virus sequence library allowing comparison of Australian and overseas strains. This information informs risk to industry and response to detections in poultry.

From July to December 2020, species targeted for sampling were from the order Anseriformes.

Other bird orders may have been present during sample collections. The great majority of samples collected during this period were faecal environmental swabs. A small proportion of cloacal samples from hunter-shot birds were also collected.

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General surveillance - Jul to Dec 2020

Wild bird morbidity and mortality investigation are reported into the Australia's wildlife health information system (eWHIS) via a network of state / territory WHA coordinators (appointed by their respective Chief Veterinary Officer) and WHA environment representatives, the Northern Australia Quarantine Strategy (NAQS), veterinarians at zoo-based wildlife hospitals and sentinel wildlife clinics, university clinics and pathology departments, researchers, other wildlife health professionals and WHA members. General surveillance summary tables (below) are drawn from data entered into eWHIS.

In addition to surveillance activities in Victoria (see page 5), other state and territory government agencies enhanced their public awareness campaigns on avian influenza and the importance of early reporting. Between July and December 2020, WHA received 30 reports of wild bird mortality or morbidity investigations from around Australia from July to December 2020, which were tested for AIV by PCR for influenza A. Investigations may involve a single animal or multiple animals (e.g. mass mortality event). Reports and samples from sick and dead birds are received from members of the public, private practitioners, universities, zoo wildlife clinics and wildlife sanctuaries.

General surveillance - mortality and morbidity events in which birds were tested for Influenza A viruses (Jul - Dec 2020)[a]

Bird Order	Common Names for Bird Order[14]	Number of Events AIV Tested via PCR[b]	Number of Events AIV Positive
Accipitriformes	Osprey, hawks and eagles	2	0
Anseriformes	Magpie Goose, ducks, geese and swans	3	0
Charadriiformes	Shorebirds	2	0
Columbiformes	Doves and pigeons	4	0
Passeriformes	Passerines or perching birds	10	0
Pelecaniformes	Ibis, spoonbill, herons and pelicans	3	1
Psittaciformes	Parrots and cockatoos	8	0

[a] Excluding general surveillance activities in Victoria, which are described on page 5.

[b] Disease investigations may involve a single or multiple bird orders (e.g. mass mortality event). The number of events where AIV was tested via PCR against each bird order do not equal the total number of investigations due to multi-species events. During the semester, one wild bird event involved Accipitriformes, Charadriiformes and Psittaciformes orders tested for AIV.

Royal spoonbill - Image Courtesy of Guy Weerasinghe

Avian influenza was not confirmed as the cause of any wild bird morbidity or mortality event between July and December 2020 reported to eWHIS.

One royal spoonbill observed trapped in mud was positive for AIV. Histopathology findings were not consistent with avian influenza and therefore this detection is an incidental finding. More information can be found at **WHA Animal Surveillance Quarterly Report, Volume 25, Issue 4**.

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Enhanced general surveillance undertaken during the response to the avian influenza outbreak in Victoria

In addition to extensive surveillance activities on poultry farms and additional targeted wild bird surveillance, Agriculture Victoria enhanced their wild bird general surveillance activities. Activities included raising awareness and requesting reports of sick and dead wild birds from across the state of Victoria. There was a specific focus on obtaining reports from locations surrounding the affected properties, from which single bird reports of any species were investigated. A relevant history, location and species information was recorded for each sick and dead wild bird reported. Carcass collection and submission to the state diagnostic laboratory, Veterinary Diagnostics Services - Agribio, was facilitated via Agriculture Victoria. Diagnostic investigation included AIV and APMV-1 exclusion testing via PCR. Between 26th July and 31st December 2020, AIV was excluded in 195 individual sick and dead birds in Victoria, covering a range of bird species (including birds from Accipitriformes, Anseriformes, Caprimulgiformes, Charadriiformes, Columbiformes, Cuculiformes, Falconiformes, Passeriformes, Pelecaniformes, Psittaciformes and Strigiformes orders), with the majority of samples submitted from the areas surrounding the three farms with highly pathogenic H7N7 avian influenza.

Whilst the risk of HPAI H7 spread via wild birds during the outbreak in Victoria was considered low, enhanced wild bird general surveillance is a critical part of avian influenza outbreak response surveillance activities. Wild bird surveillance activities ensure early detection if indeed wild birds are playing a role in the onward spread of disease during an outbreak. Assessments overseas have identified that general surveillance, inclusive of reports of individual dead wild bird from members of the public, provides a sensitive means of early detection of HPAI in wild birds on the basis that HPAI subtypes are most likely to be observed as sickness and death in infected wild birds[15, 16, 17, 18].

In contrast to HPAI H5 viruses, HPAI H7 viruses have been infrequently detected in free-ranging and captive wild birds globally. Documented detections include:

- Australia: Serological evidence of H7N7 virus infection in sparrows and a HPAI H7N7 virus isolated from a single feral Eurasian starling (*Sterna vulgaris*; trapped on an affected poultry property) during a HPAI H7 virus outbreak in commercial poultry in 1985[19].
- Italy: HPAI H7N1 detected in two house sparrows (*Passer domesticus)* and a collared dove (*Streptopelia decaocto*), all found dead in the proximity of HPAI H7N1 infected farms during an epidemic in poultry between December 1999 and April 2000[20].
- The Netherlands: Detection in seven captive wild birds (four mallards and three mute swans) kept at a site situated about 100 metres from HPAI-positive poultry farms during an outbreak in 2003[21].
- Mexico: Detection of HPAI A/H7N3 in sick and dead great-tailed grackles and a barn swallow in the same region during a HPAI A/H7N3 outbreak in poultry in 2012[22,23].

In all the above events it was concluded that wild birds became infected with HPAI H7 viruses as a result of a spill-over from infected poultry, and wild bird were not implicated in further spread of the HPAI virus.

Further studies[24] using the viruses isolated from the chickens and starlings during the HPAI H7N7 Australian 1985 outbreak investigated the role of starling and sparrow in the transmission of these viruses. Infection in starlings resulted in high mortality, suggesting infection would be self-limiting. Whereas infection in sparrows did not always result in death and the virus was also detected in their faeces indicating sparrows may represent a risk of onward spread and introduction of avian influenza virus into poultry populations. Research to date highlights the need for further work to better understand the role of Passeriformes species, such as starlings and sparrows, in the epidemiology of avian influenza, and there is little evidence that they are maintenance or reservoir hosts. However, these species have the potential to act as a bridge species* if exposed to avian influenza viruses in natural settings[25,26,27], including during outbreak situations. Camera-trap studies on commercial chicken farms in New South Wales and Southeast Queensland found that wild birds, specifically Passeriformes, were common visitors to farms[28]. Taken in combination, these studies highlight the importance of on farm biosecurity activities such as exclusion of small birds (not just waterfowl) from poultry sheds, and actions to reduce the attractiveness of farms to wildlife.

* Bridge hosts can be defined as non-maintenance host species capable of transmitting a pathogen from a reservoir population to a target population.

Disclaimer

This document was developed and approved by the National Wild Bird Avian Influenza (NAIWB) Steering Group for information purposes only. NAIWB Steering Group was established to ensure national coordination and collaboration of wild bird avian influenza surveillance activities. Wildlife Health Australia provides support to the NAIWB Steering Group and collates avian influenza surveillance data from wild birds sampled across Australia. Information contained in it is drawn from a variety of sources external to Wildlife Health Australia. Data is provided on an "as is" basis and may be changed periodically; these changes may or may not be incorporated in any new version of the publication. Although reasonable care was taken in its preparation, Wildlife Health Australia does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information or its usefulness in achieving any purpose. To the fullest extent permitted by law, Wildlife Health Australia will not be liable for any loss, damage, cost or expense incurred in or arising by reason of any person relying on information in this document. You may download, display, print and reproduce this material in unaltered form only for personal, non-commercial use or use within your organisation, provided due acknowledgement is made of its source. For any other use of the material contained in this document (including, but not limited to any text, illustration, table, or any other material), written permission must be obtained with Wildlife Health Australia and the NAIWB Steering Group.

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