INVESTIGATING THE HEALTH OF FREE RANGING BIRDS IN VICTORIA, AUSTRALIA.

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Wildlife health is important because it affects biodiversity, and is interconnected with the health of humans, domestic animals and their ecosystems. This is recognised in the One Health paradyme.

Wildlife Health Surveillance Victoria was established at the Faculty of Veterinary Science of The University of Melbourne, Werribee, in 2008 and is a general, scanning (passive) surveillance program linked to the Australian Wildlife Health Network. General surveillance is the only way a country can know what pathogens exist in its wildlife, and is the only available form of national vigilance for emerging diseases associated with wild animal pathogens (OIE, 2010).

The Canadian Cooperative Wildlife Health Center is based at their Veterinary Colleges. Wildlife Health Surveillance Victoria provides state-wide wildlife health surveillance based at a veterinary faculty. There is a part-time coordinator/manager who is the contact point for reports by phone or email and who manages all investigations. Funding has been provided by grants from foundations and trusts and donations with significant in-kind support from the Faculty of Veterinary Science (Melb?) and collaborating partners. We are seeking to develop memorandum of understanding with state wildlife and animal disease agencies and others to contribute to this efficient and productive collaborative and cooperative program which fills an existing gap in wildlife health surveillance in our state.

Our objectives are to improve knowledge of baseline health of free ranging endemic Victorian wildlife (mammals, birds, reptiles and amphibians) and patterns of disease, to detect changed patterns and identify factors involved or drivers of change. Approximately 100 investigations are undertaken annually. This is a very collaborative bottom-up project with most reports of mortality or morbidity from the Victorian public, community members who are interested in wildlife (bird observers, field naturalists, land owners etc), wildlife carers and veterinary practitioners, local government and regional staff of the Victorian Department of Environment and Primary Industry (DEPI) and Parks Victoria. Wildlife carcasses are collected, chilled, packaged and can be shipped overnight to Werribee from more than 30 places state-wide. Key input into these investigations is provided by pathologists, parasitologists, virologists, microbiologists, epidemiologists and avian specialists at the Faculty of Veterinary Science. Colleagues at the DEPI Veterinary Laboratory, CSIRO Australian Animal Health Laboratory, Victorian Infectious Disease Reference Laboratory Mycobacterium lab, Australian Rickettsial Reference Laboratory, and EPA make key contributions to investigations. The surveillance data is provided to the Australian Wildlife Health Network (renamed Wildlife Health Australia in 2013) data base, and pathology data to the Australian Registry of Wildlife Health. Feedback is provided to the person reporting the wildlife health event. Communication, extension and capacity building is undertaken through direct contact by telephone and during field investigations, email and website, and face-to-face meetings. Regular one-page newsletters/fliers are produced, emailed widely and are available from the website to alert anyone observing wildlife of wildlife health issues and provide contact information for reporting mortality or morbidity events. The Coordinator/Manager gives talks about the project to regional community groups and staff of DEPI and Parks Victoria. Regular meetings are convened with people responsible for wildlife management,

animal disease, EPA, human health (arboviruses), and from institutions investigating wildlife health (collaborating laboratories, Zoos Victoria).

Most wildlife health investigations are based on what is possible (convenience sampling) and are non-random and information on the population at risk, the denominator for prevalence calculations, is usually lacking. Sampling is biased to mortality and morbidity events, which is efficient for the purpose of detecting and investigating disease. Wildlife disease surveillance based at a veterinary faculty is very productive and efficient and benefits from the contributions of expert veterinary scientists, students are involved, and needs and opportunities for wildlife health research can be identified.

During the last five years many investigations have been undertaken with avian species based on telephone or email reporting from the public, members of community groups (wildlife carers, bird observers, field naturalists, farmers, etc), and referrals or direct reporting from staff of the Department of Environment and Primary Industry (DEPI) and Parks Victoria (PV), local government and others. Carcasses were collected into plastic bags and chilled with bags of ice. Appropriate packaging (3 layers of plastic, freezer packs not ice, information in plastic) by responsible groups (veterinary practitioners, DEPI or PV staff) for overnight transportation to Werribee by the contract carrier and advice on safe handling is important. In many cases individuals helped get carcasses to Werribee for necropsy. If quick transport of chilled carcasses was not possible, carcasses have been frozen for examination later.

The Victorian DEPI Veterinary Laboratory collaborates on all avian investigations by testing choana-pharynx-cloacal swabs in virus transport media by PCR for avian influenza (Haynes et al., 2007) and avian paramyxoviruses (AI/APMV). An exotic Avian Paramyxovirus was identified in Victoria in 2011 in dead domestic and feral pigeons, presumably the result of smuggling in of fancy pigeons from the middle east.

The Victorian Infectious Disease Reference Laboratory Mycobacterium group collaborated on testing swabs from captive brolgas (*Grus rubicunda*) by PCR for *Mycobacterium spp*. and detected *M. avium* (Painter, 1997; USGS, 1999a, Tell et al., 2001).

In 2012 CSIRO Australian Animal Health Laboratory collaborated on investigating a mortality event including at least 200 dead rainbow lorikeets(*Trichoglossus haematodus*) over several months in Melbourne for necrotic enteritis (McOrist and Reece, 1992) and undertook PCR to detect *Clostridium perfringens* alpha toxin. DEPI Veterinary Laboratory colleagues and investigations with our avian group also diagnosed necrotic enteritis and advice was provided to the public and local government on safe disposal of dead rainbow lorikeets.

Mostly during hot summers (2009, 2012-13), weak and dead Sacred Ibis (*Threskiornis aethiopicus*), various duck species and Australian Pelicans (*Pelecanus conspicillatus*) have been reported by various individuals and groups on drying wetland for investigation. Clinical signs of weak legs, then weak wings followed by weak necks (ascending paralysis) were observed with some birds not able to walk or paddle but used wings for movement on land or water. Some of these birds have recovered with supportive treatment. No significant lesions were observed on necropsy, and in some birds liver changes due to blue green algae were not detected on histopathology. These clinical signs together with lack of significant necropsy findings were used to diagnose 'suspect botulism'. Testing for botulism toxin was undertaken on two occasions but was not positive. (USGS, 1999b).

During 2013 *Pasteurella multocida* was identified from focal liver lesions in a Chestnut Teal (*Anas castanea*), Black Swan (*Cygnus atratus*) and Eurasian Coots (*Fulica atra*) found dead at two wetland sites. This is the first identification of this infection, which is common in domestic poultry, turkeys and ducks, in wild waterbirds. These mortality events were only detected because duck rescue volunteers were searching for dead waterbirds during duck hunting season. Other mortality events occurred, with only a few dead birds examined so the extent, duration and species affected by pasteurellosis mortality, and source are not known. (USGS, 1999c) Previously *Pasteuralla anatipestifer* was identified from a Black Swan (Munday et al., 1970).

Spironucleosis was diagnosis in Australian King Parrots (*Alisterus scapularis*) based on histopathology from intestinal tissues collected quickly after death or euthanasia by collaborating Veterinary Practitioners. Mortality events have been reported seasonally from several locations across the state. Feeding of birds and increased faecal-oral transmission may contribute to spread of disease. (Philbey et al., 2002)

Mortality of Little Penguins (*Eudyptula minor*) occurs mostly sporadically and had been well investigated by colleagues. Poor nutritional body condition and gastric nematodes and ulcers of uncertain significance were our major findings. (Obendorf and McColl, 1980)(Harrigan, 1992)

Seasonal morbidity and mortality of Short-tailed Shearwaters (*Puffinus tenuirostris*) has been investigated in several years. These events occurred not long after the birds returned from migration from the north-east pacific (Alaska, Japan? etc) and were in very poor nutritional body condition, tested negative for AI/APMV, with no other findings. It is also possible that inadequate food resources in the southern oceans contributed, but we have not found information on this to date.

We regularly examine psittacines with beak and feather changes consistent with circovirus. Dr Anthony Chamings and colleagues have recently developed a circovirus PCR and we plan to use this in future investigations to improve our knowledge of prevalence in the species of psittacines we examine. In New South Wales, the seroprevalence of psittacine beak and feather disease in wild sulphur crested cockatoos (*Cacatua galerita*), galahs (*Eolophus roseicapillus*), short-billed corellas (*Cacatua sanguinea*), and eastern long-billed corellas (*Cacatua tenuirostris*) ranged from 41% to 94% in different flocks, indicating infection with the virus is widespread in wild populations (Raidal et al., 1993). There is evidence for specificity of psittacine beak and feather disease viruses among avian hosts (Richie et al., 2003).

Chlamydia has only been tested for by PCR infrequently, however, pooled oral-cloacal swabs from culled Long-billed Corellas (*Cacatua tenuirostris*) detected infection in normal healthy free ranging birds.

Poxvirus (Harrigan et al., 1975) has been identified using histopathology from skin lesions near beaks and on legs from an Australia Magpie (*Cracticus tibicen*), a Superb Blue Wren (*Malurus cyaneus*) and an Australian Raven (*Corvus coronoides*).

In Australia, important zoonotic diseases involving free ranging avian species include Avian Influenza and Flaviviruses (Murray Valley Encephalitis and Kunjin in Australia) where there is no evidence of disease in the wild avian reservoir host. *Chlamydia psittaci* can cause serious disease in both avian and human hosts. Avian influenza is also important because of possible impacts on the poultry industry, biosecurity and food security. *Mycobacterium avium* infection and *Clostridium botulimum*

toxin can affect the health of free ranging and captive birds, but also humans and domestic animals, and these bacteria can persist in some ecosystems for a long time (biological environmental contaminants).

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