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High Pathogenicity Avian Influenza (HPAI) and Wildlife in Australia

A RISK MITIGATION TOOLBOX FOR
WILDLIFE MANAGERS WITH A FOCUS
ON HPAI H5 2.3.4.4b

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High Pathogenicity Avian Influenza and Wildlife in Australia

Risk mitigation toolbox for wildlife managers with a focus on HPAI H5 2.3.4.4b

Avian influenza is a nationally notifiable disease.

Anyone who suspects an animal might be infected with avian influenza has a legal responsibility to report it to their jurisdiction's biosecurity agency by phoning the Emergency Animal Disease Hotline on 1800 675 888.

See: <https://www.outbreak.gov.au/report-outbreak>

Unusual signs of disease or deaths in wildlife can also be reported to the [State or Territory WHA Coordinator](#).

The advice in this document is focussed on the increased risk to Australia from HPAI H5 2.3.4.4b. Other strains of HPAI have not caused such widespread disease in wild birds and mammals, but the general principles within these documents can be applied to other HPAI strains, while also considering and adjusting for any known differences in epidemiology.

PART A INTRODUCTION AND BACKGROUND

1 Introduction to the toolbox

1.1 Aim and purpose of this toolbox

The toolbox is intended as a guidance document to assist managers of wildlife populations in Australia develop plans to mitigate the risk of high pathogenicity avian influenza (HPAI). It aims to:

- enhance early detection of HPAI in wildlife
- enhance biosecurity measures for wildlife managers to reduce the risk of introduction, establishment and spread of HPAI
- reduce the risk to human, animal and environmental health posed by HPAI in wildlife
- prepare wildlife managers for the response to and recovery from an outbreak of HPAI in wildlife.

This toolbox provides guidance in line with Australia's existing emergency management arrangements and other guidance material (as described in [Section 2.5](#)). It is not intended to provide definitive advice or to replace individual site assessments and veterinary advice. Every location is different, and this document cannot predict all eventualities for all situations.

It is important to note that any decisions before or during an emergency response need to be made in line with current legislation and government legal orders or advice. It is up to wildlife managers to ensure they are following the most up-to-date jurisdictional legislation, legal orders and guidance relating to biosecurity, wildlife protection and conservation, animal welfare, emergency management and workplace health and safety. Wildlife managers should contact the government authorities in their jurisdiction to clarify legal responsibilities or refer to the [AUSVETPLAN](#) documents and the [Emergency Wildlife Disease Response Guidelines](#) for relevant legislation.

The advice in this document is focussed on the increased risk to Australia from HPAI H5 2.3.4.4b. Other strains of HPAI have not caused such widespread disease in wild birds and mammals, but the general principles within these documents can be applied to other HPAI strains, while also considering and adjusting for any known differences in epidemiology.

1.2 Why should managers of wildlife populations use this toolbox?

High pathogenicity avian influenza presents risks to animal, human and environmental health, and these can be reduced by risk mitigation plans. Since 2021, a new strain of HPAI caused by the H5N1 2.3.4.4b strain has caused significant illness and deaths in wild birds, mammals (both wild and domestic) and poultry in all geographical regions except Oceania (which includes Australia and New Zealand) (see [Section 2.2](#) and [2.4](#)). The current global

situation means increased level of risk to Australia via migratory birds from the northern hemisphere and local non-migratory movements of infected wildlife including from south-east Asia and the Antarctic / subantarctic regions. **Given the increased risk to Australia, there is a need for enhanced awareness and risk mitigation plans across various stakeholder groups and levels of government, including managers of wildlife populations.**

The urgent need for risk mitigation plans is also reflected in a recent [statement](#) by the joint Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Food and Agriculture Organization of the United Nations (FAO)'s Scientific Task Force on Avian Influenza and Wild Birds, which highlights the need for cross-sectoral multi-stakeholder contingency planning for HPAI outbreaks in wild birds.

1.3 Who should use this toolbox?

This document is designed for use by all **managers of free-ranging wildlife populations in Australia**, including national and jurisdictional environmental and biosecurity agencies, local governments, non-profit organisations, native title holders, and private landholders.

Components of the guidelines may also be useful to individuals or groups that interact with free-ranging wildlife, such as wildlife care and rehabilitation centres, researchers, environmental scientists, bird banders, conservation groups and veterinarians.

The toolbox provides strategies for **HPAI in wild birds as well as wild mammals**.

Only **free-ranging wildlife** will be specifically considered by these guidelines, where a wild animal is as defined in the [Australian Veterinary Emergency Plan \(AUSVETPLAN\) Wild Animal Response Strategy](#): *an animal that is found in the natural environment and does not live under human supervision and control. The species may be native to Australia or an introduced species. An introduced species may be a feral or invasive species.* A risk mitigation toolbox targeted to wildlife care providers (such as wildlife hospitals and rehabilitators) is also available on the [Wildlife Health Australia \(WHA\) website](#), and shares common information with these guidelines.

The management of HPAI risk for wildlife held in captivity permanently (e.g. in zoos, fauna parks, wildlife parks), semi-permanently (e.g. captive breeding programs) or for domestic animals will not be considered specifically, although the principles and processes may be of some relevance to these situations. See [Appendix 5](#) for biosecurity resources relevant to domestic animals and wildlife held in captivity.

1.4 How should this document be used?

This document contains three parts (Figure 1):

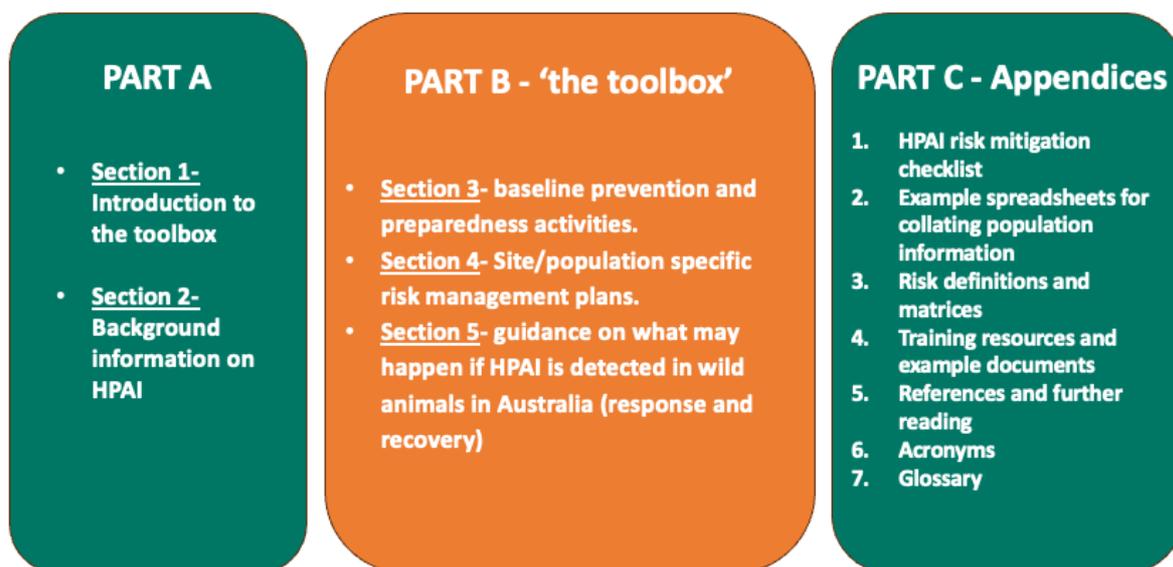


Figure 1: Structure of this document

Wildlife population managers should work through Part B, 'the toolbox' in a stepwise fashion (as shown in Figure 8) and use the resulting information to develop a HPAI risk mitigation plan tailored to their site.

Text within grey boxes (example below) indicates actionable items that should be considered for inclusion within these plans, which are consolidated as an overall checklist in [Appendix 1](#). Ideally, these plans should be implemented alongside (and where appropriate, integrated in to) any other existing management plans or procedures for the sites and populations.

Text within these boxes indicates items that wildlife population managers should consider in their HPAI risk mitigation planning.

2 Background information on HPAI

2.1 What is HPAI?

Avian influenza (AI), also known as bird flu, is a viral disease caused by influenza A virus. Strains of AI are categorised as either low pathogenicity (LPAI) or high pathogenicity (HPAI) depending on the potential disease caused in poultry. Influenza A viruses are also categorised according to the serological subtypes of their surface glycoproteins, haemagglutinin (HA) and neuraminidase (NA). To date, 16 HA (H1–16) and 9 NA (N1–9) subtypes are recognised in birds and are found in different combinations (Figure 2).

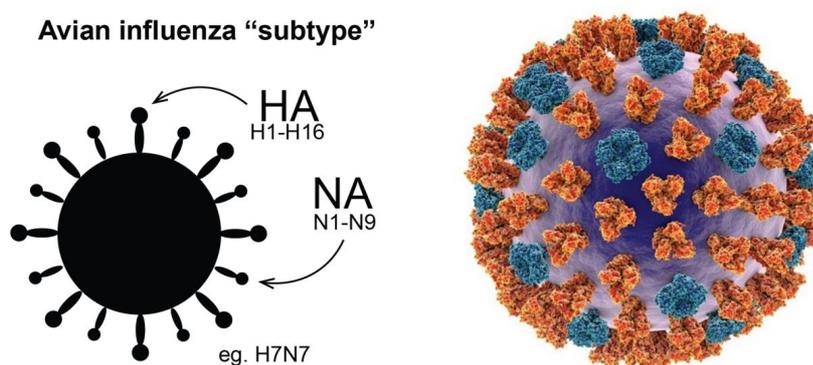
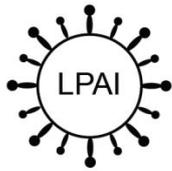


Figure 2: AI viruses are classified according to the serological subtypes of their surface glycoproteins (courtesy of [Michelle Wille](#))

Avian influenza viruses constantly evolve resulting in ongoing emergence of new strains. Multiple strains of AI viruses have been classified based on sequence analysis and distributions of the viruses in hosts, geographic locations and time. Naming conventions for avian influenza viruses are complex, and this document will use the generic term ‘strain’ to distinguish the distinct avian influenza virus currently causing outbreaks of disease in animals overseas.

Around the world, including in Australia, LPAI viruses occur naturally in wild birds, notably waterfowl (ducks, geese and swans) and shorebirds. LPAI viruses typically do not cause severe disease. Some specific LPAI subtypes (subtypes H5 and H7) can evolve to HPAI following spillover and circulation in poultry. HPAI infections typically causes severe disease in poultry and may also impact other species including wild birds, humans and other mammals (Figure 3). The spillback of HPAI from poultry into wild birds contributes to the geographic spread of HPAI. (NOTE: The epidemiology of currently circulating strains of HPAI does not fit this typical pattern. See [Section 2.2](#)).

Low pathogenic



- all HA subtypes (H1-H16)
- common in wild birds
- no disease in wild birds
- occasional, mild disease in poultry



High pathogenic



- “bird flu”
- only H5 and H7 subtypes
- causes outbreaks in poultry
- associated with disease and death in poultry and wild birds

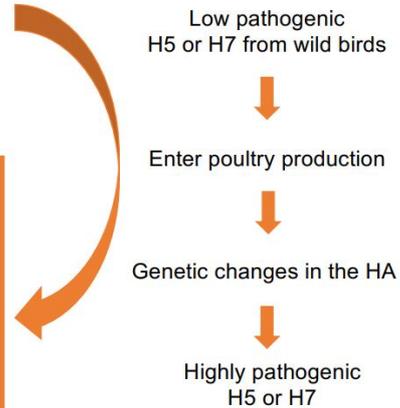


Figure 3: Low pathogenicity AI vs high pathogenicity AI (courtesy of [Michelle Wille](#))

Although AI viruses do not normally infect humans, some subtypes (including strains currently circulating globally) have been associated with disease in humans ranging from mild illness to severe disease and death (see [Australian Department of Health and Aged Care](#)).

AI viruses are most commonly transmitted between birds or to other animals via direct contact with respiratory aerosols / secretions and faecal material, as well as indirect exposure to contaminated environments, water or objects (e.g. clothing, boots, equipment, etc.). In the case of mammals (both terrestrial and marine), infection is also thought to occur via ingestion of infected birds through predation or scavenging behaviours. Likely pathways of transmission through wild populations and environments are illustrated in Figure 4.

AI is a nationally notifiable disease, meaning that it must be reported to agricultural authorities (see [Section 3.2](#)). For more information on AI in wild birds, see the [Wildlife Health Australia \(WHA\) Fact Sheet](#).

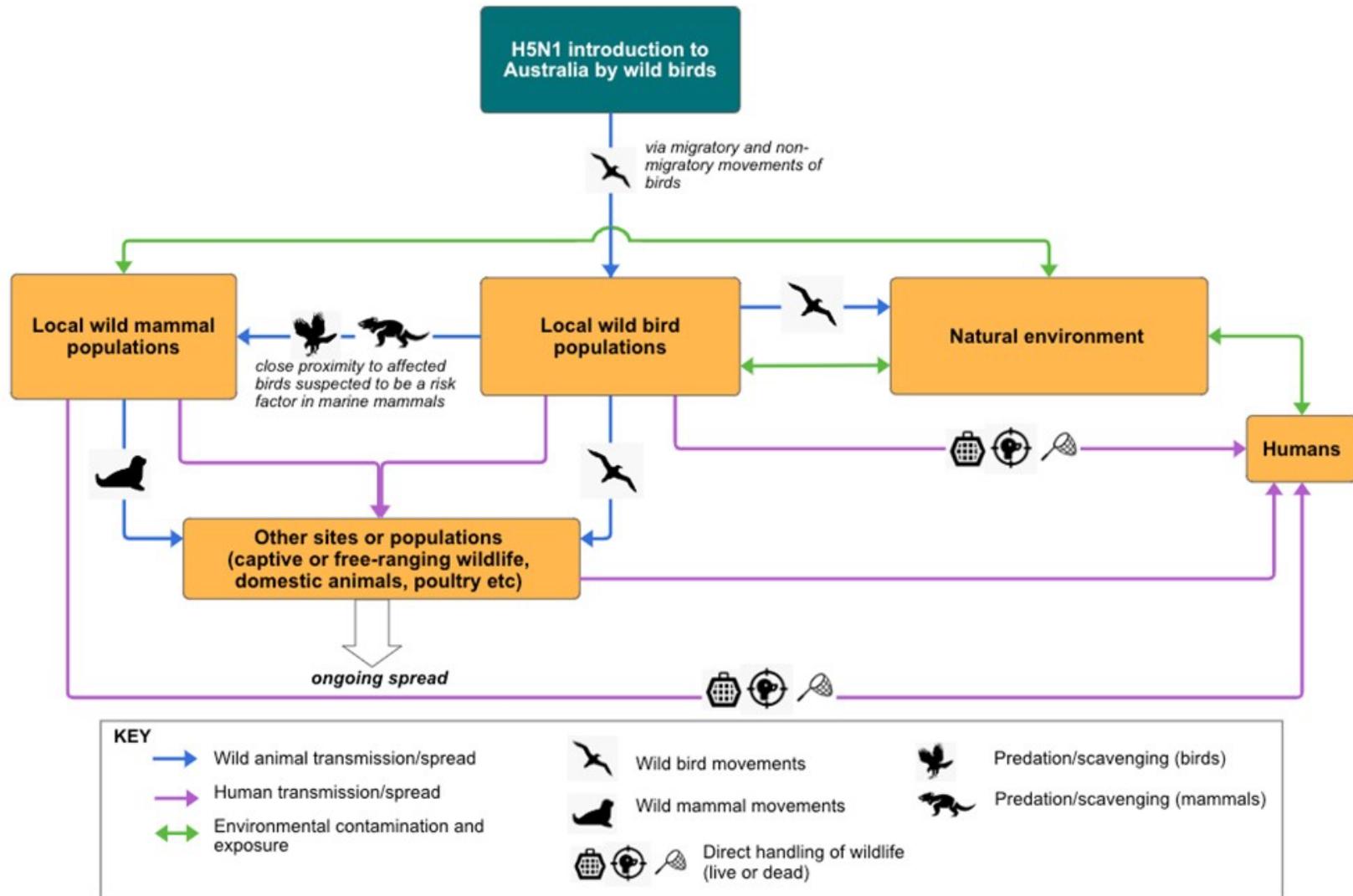


Figure 4: Likely pathways for the introduction, transmission and spread of HPAI to, from and within wild populations following introduction via wild birds.

2.2 Current global status - the emergence of strain 2.3.4.4b

Currently, the AI viruses of most concern worldwide belong to the H5 subtypes of the "A/goose/Guangdong/1/96" lineage. This lineage has been present in various parts of Asia for the past two decades, evolving constantly and causing HPAI outbreaks in both wild birds and poultry overseas, mostly in Asia and Europe. **In 2021, a new strain from this lineage emerged, strain 2.3.4.4b. The emergence of strain 2.3.4.4b has been a 'game changer', causing a significant increase in the frequency and geographic range of HPAI outbreaks in both wild birds and poultry overseas. Strain 2.3.4.4b has now caused unprecedented outbreaks of HPAI in wild birds, mammals (both wild and domestic) and poultry in all geographical regions except Oceania (which includes Australia and New Zealand).**

At least 500 species from more than half of all bird orders have been affected by HPAI worldwide, with over half being newly reported species since 2021 when 2.3.4.4b emerged. More than 60 mammalian species have also been affected by HPAI, with over half being newly reported species since 2021. See the [WHA Technical Issues Update](#) for more information and the [FAO's list](#) of species in which HPAI has been detected. Figures 5-7 illustrate the significant increase in frequency, geographic range and range of bird species and mammals impacted by HPAI in recent years.

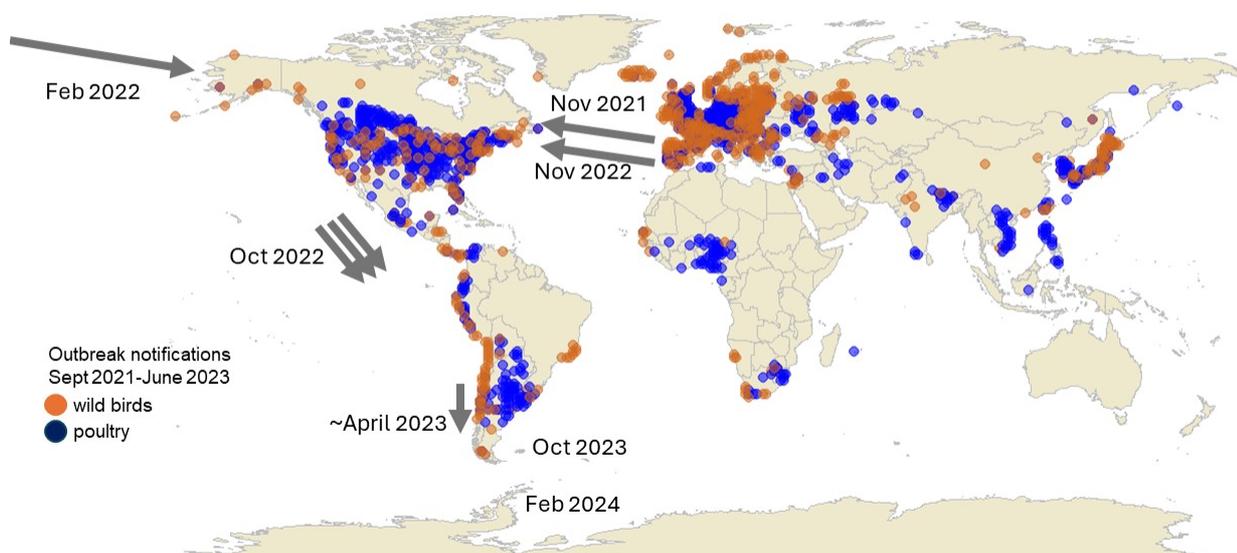


Figure 5: H5 HPAI outbreaks October 2021 to March 2023 in poultry and wild birds. Grey arrows and dates indicate the approximate timeline of geographic spread. Adapted from [Klaassen and Wille \(2023\)](#).

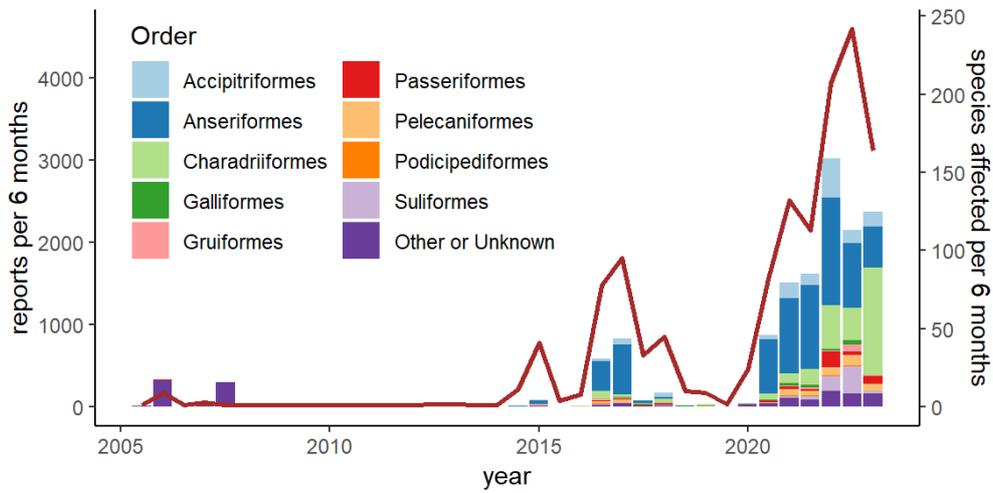


Figure 6: Total number of wild bird cases reported (stacked bars) and number of species involved (brown line) as a function of time (half yearly periods). The different colours denote the order to which the various species of birds belong. Data from World Animal Health Information System. From [Klaassen and Wille \(2023\)](#).

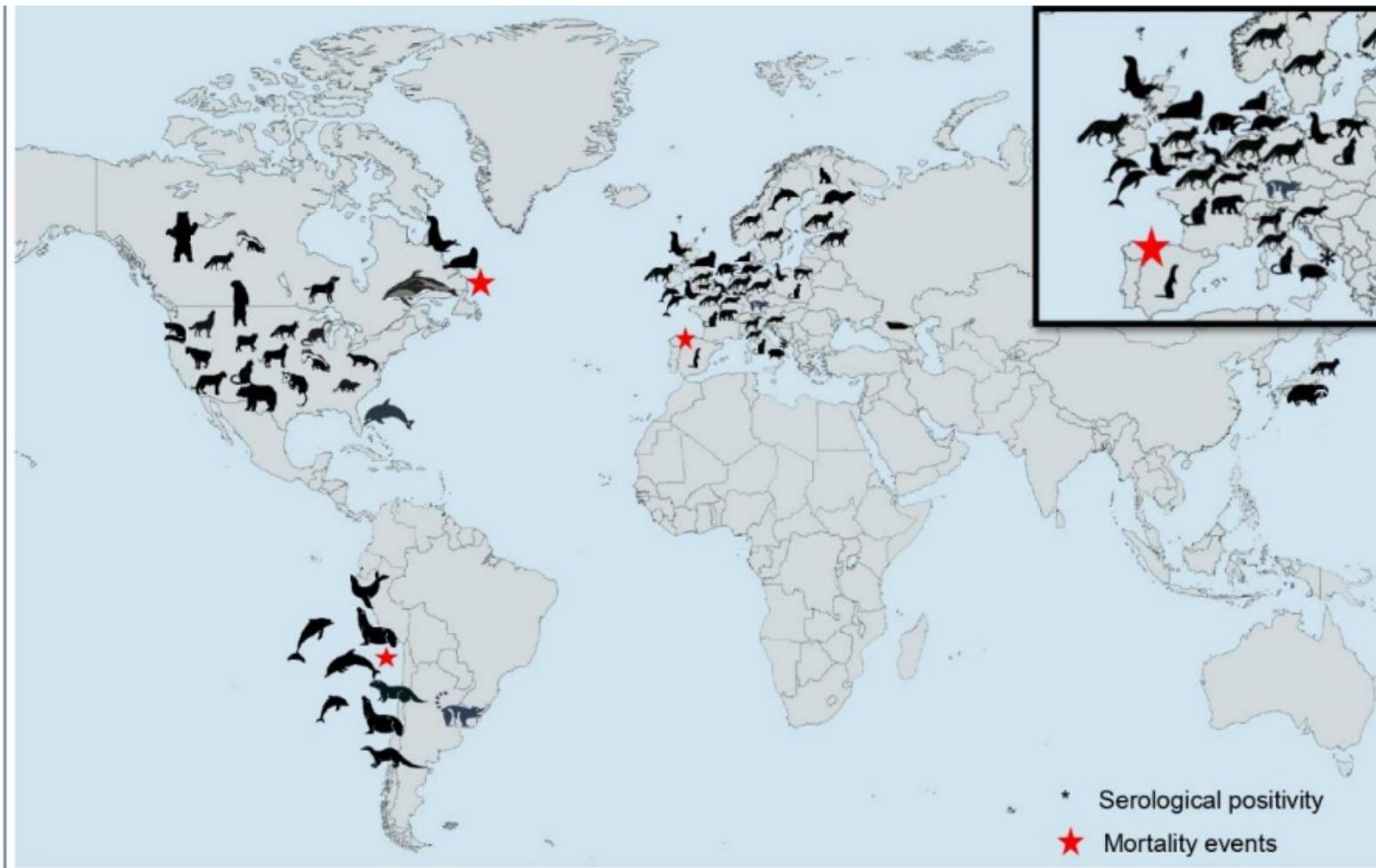


Figure 7:
 Geographic distribution of HPAI virus detections in non-human mammals since 2016 to June 2023.
 From [European Food Safety et al 2023](#).

- | | | | |
|---|---|---|---|
| American black bear (<i>Ursus americanus</i>) | Caracal (<i>Caracal caracal</i>) | Ferret (<i>Mustela furo</i>) | Raccoon (<i>Procyon lotor</i>) |
| American mink (<i>Neogale vison</i>) | Caspian seal (<i>Pusa caspica</i>) | Fisher cat (<i>Pekania pennanti</i>) | Red fox (<i>Vulpes vulpes</i>) |
| American pine marten (<i>Martes americana</i>) | Cat (<i>Felis catus</i>) | Grey seal (<i>Halichoerus grypus</i>) | Skunk (<i>Mephitis mephitis</i>) |
| Amur leopard (<i>Panthera pardus orientalis</i>) | Chilean dolphin (<i>Cephalorhynchus eutropia</i>) | Harbour porpoise (<i>Phocoena phocoena</i>) | South American coati (<i>Nasua nasua</i>) |
| Amur tiger (<i>Panthera tigris</i>) | Common dolphin (<i>Delphinus delphis</i>) | Harbour seal (<i>Phoca vitulina</i>) | South America fur seal (<i>Arctocephalus australis</i>) |
| Asiatic black bear (<i>Ursus thibetanus</i>) | Coyote (<i>Canis latrans</i>) | Japanese raccoon dog (<i>Nyctereutes viverrinus</i>) | South American bush dog (<i>Speothos venaticus</i>) |
| Beech marten (<i>Martes foina</i>) | Dog (<i>Canis lupus familiaris</i>) | Kodiak grizzly bear (<i>Ursus arctos horribilis</i>) | South American sea lion (<i>Otaria flavescens</i>) |
| Bobcat (<i>Lynx rufus</i>) | Eurasian badger (<i>Meles meles</i>) | Marine otter (<i>Lontra felina</i>) | Southern river otter (<i>Lontra provocax</i>) |
| Bottlenose dolphin (<i>Tursiops truncatus</i>) | Eurasian lynx (<i>Lynx lynx</i>) | Mountain lion (<i>Puma concolor</i>) | Virginia opossum (<i>Didelphis virginiana</i>) |
| Brown bear (<i>Ursus arctos</i>) | Eurasian otter (<i>Lutra lutra</i>) | North American river otter (<i>Lontra canadensis</i>) | White-sided dolphin (<i>Lagenorhynchus acutus</i>) |
| Burmeister's porpoise (<i>Phocoena spinipinnis</i>) | European polecat (<i>Mustela putorius</i>) | Pig (<i>Sus scrofa</i>) | |

2.3 Occurrence of HPAI in Australia

HPAI strain 2.3.4.4b has not been detected in Australia.

The [National Avian Influenza Wild Bird Surveillance \(NAIWB\) program](#) collects and screens samples from Australian wild birds for AI viruses and the data generated are used to monitor and understand AI in wild birds in Australia. Sequence analysis of AI viruses detected in wild birds through the NAIWB program contributes to tracking Australian virus evolution and dynamics, maintaining currency of diagnostic tests, and maintaining a virus sequence library allowing comparison of Australian and overseas strains.

LPAI viruses are occasionally detected in wild birds in Australia and are part of the natural virus community of Australian wild birds. HPAI viruses have not been detected in free-ranging Australian wild birds.

There have been 11 outbreaks due to HPAI H7 viruses in Australian poultry since 1976, with the most recent outbreaks in 2024 in Victoria, NSW and ACT. All previous outbreaks were successfully eradicated and response to the three 2024 outbreaks is ongoing at time of publication. These outbreaks were most likely caused by introduction of local wild bird LPAI viruses and subsequent mutation from LPAI to HPAI after circulation in poultry: a well-documented occurrence.

2.4 Risk of HPAI to Australia

The risk of HPAI to Australia is dependent on the likelihood of entry, establishment and spread of the virus, as well as the potential consequences of this to Australia, including impacts on animal, human and environmental health.

HPAI could occur in Australia by the following means:

- transfer of local LPAI viruses from asymptomatic waterfowl to susceptible poultry flocks via close contact, including direct contact or contamination of poultry feed and water by wild bird droppings or secretions, followed by mutation to HPAI in poultry
- migration of HPAI infected wild birds on established flyways
- non-migratory movements of HPAI infected wildlife
- the importation of HPAI virus-contaminated poultry products, equipment or other materials.

A formal [HPAI incursion risk assessment](#) for the risk (likelihood and consequence) of HPAI H5N1 clade 2.3.4.4b incursions into Australia via wild birds was undertaken in 2023. This risk assessment found that the risk of HPAI virus incursions into Australia via wild birds has increased due to changes in the epidemiology and ecology of viruses within the current HPAI H5N1 clade 2.3.4.4b. Poultry industries, wild bird and mammal populations, and

potentially humans, will be impacted should disease enter and become established within Australia.

A [report](#) from the Joint WOAHA-FAO Scientific Network on Animal Influenza on the continued expansion of HPAI has indicated that incursion into Australia from the Antarctic regions via infected birds is plausible, although given the current unprecedented HPAI situation and limited movement data for birds in this region there is uncertainty surrounding this potential route of introduction.

The emergence of the 2.3.4.4b strain overseas means an increased risk to Australia, due to the increase in the likelihood of entry into Australia via wild bird movements, and anticipated increased consequences if it were to enter.

2.5 HPAI response arrangements in Australia

The Australian approach to managing emergencies recognises four phases of emergency management: **prevention, preparedness, response and recovery**. Although HPAI has not been detected in wild birds in Australia, **prevention and preparedness** activities should be implemented. If HPAI were to be detected in wild birds in Australia, **response and recovery** activities may occur. [The Australian Veterinary Emergency Plan \(AUSVETPLAN\)](#) is a series of technical response plans that describe the current proposed Australian approach to an emergency animal disease (EAD) incident, such as a detection of HPAI. There are many AUSVETPLAN manuals covering different elements of an EAD response, however of key relevance to HPAI in wild birds for managers of wildlife populations are:

- [AUSVETPLAN Response Strategy: Avian Influenza](#) describes the nationally agreed response to an incident – or suspected incident – of AI in poultry, cage (aviary) or zoo birds in Australia. This manual also contains information on the response to a detection of AI in wild birds.
- [AUSVETPLAN Operational Manual: Wild Animal Response Strategy \(WARS\)](#) describes the overall framework for the management strategies and control procedures for wildlife during an EAD incident in Australia.
- [AUSVETPLAN Management Manual: Control Centres Part 1](#) and [2](#) describes how EAD incidents are managed across animal authorities at national, state and local levels, including how decisions are made, the roles and responsibilities of the groups involved, and coordination of the scientific, logistic, managerial and financial resources.

Wildlife managers should be aware that broad decisions on response and recovery activities will be made at a national level by the **Consultative Committee on Emergency Animal Disease (CCEAD)**, depending on the specifics of the outbreak. Implementation of these activities, including on-the-ground response activities, is the responsibility of the biosecurity agency in each jurisdiction.

The role of managers of wildlife populations is to support these activities and provide information to decision-makers in government authorities as required through the established EAD response framework.

The EAD response arrangements and roles and responsibilities of various groups during a response to disease in wildlife are described in greater detail in [Emergency Wildlife Disease Response Guidelines](#).

Wildlife manager engagement with the biosecurity agency in their jurisdiction **before** an HPAI outbreak is recommended. Sharing a completed risk management plan and other preparedness activities with jurisdictional authorities will help promote understanding and integration of wildlife manager knowledge and expertise into overall incident management planning where appropriate.

- Ensure that managers of wildlife populations have a basic understanding of how emergency animal diseases such as HPAI are managed in Australia and the role managers of wildlife populations might play during an HPAI response. Consider:
 - ⇒ training, such as the EAD foundation course ([see Appendix 4](#))
 - ⇒ engagement with the biosecurity agency in the relevant jurisdiction.

2.6 Diagnostic testing for notifiable animal diseases in Australia

HPAI is a notifiable disease, therefore laboratory testing and diagnosis for HPAI is the responsibility of the biosecurity agency in each jurisdiction. While WCP activities are important for detecting and reporting signs of disease in wildlife (see [Section 3.2](#)), and undertaking sample collection if required, **diagnostic testing for HPAI must not be undertaken without the oversight and approval of the biosecurity agency in the relevant jurisdiction.**

Point of care diagnostic testing (or pen-side testing) refers to the use of test kits in the field (outside of authorised laboratories), to test animals for specific diseases. The use of point of care testing for animals is regulated by the animal biosecurity authority in each jurisdiction. There are no point of care diagnostic tests for HPAI currently approved for use in Australia. See the [Department of Agriculture, Fisheries and Forestry](#) for more information.

- Ensure that wildlife managers are aware that they must not undertake diagnostic testing for HPAI without the oversight of the biosecurity agency in the relevant jurisdiction. Consider:
 - ⇒ training
 - ⇒ engagement with the biosecurity agency in the relevant jurisdiction.

PART B HPAI RISK MITIGATION TOOLBOX

Figure 8 summarises the recommended stepwise approach to using the risk mitigation toolbox (RMT). At all points of development, ongoing communication with the relevant staff, agencies and other key stakeholders is an important component of effective risk management.

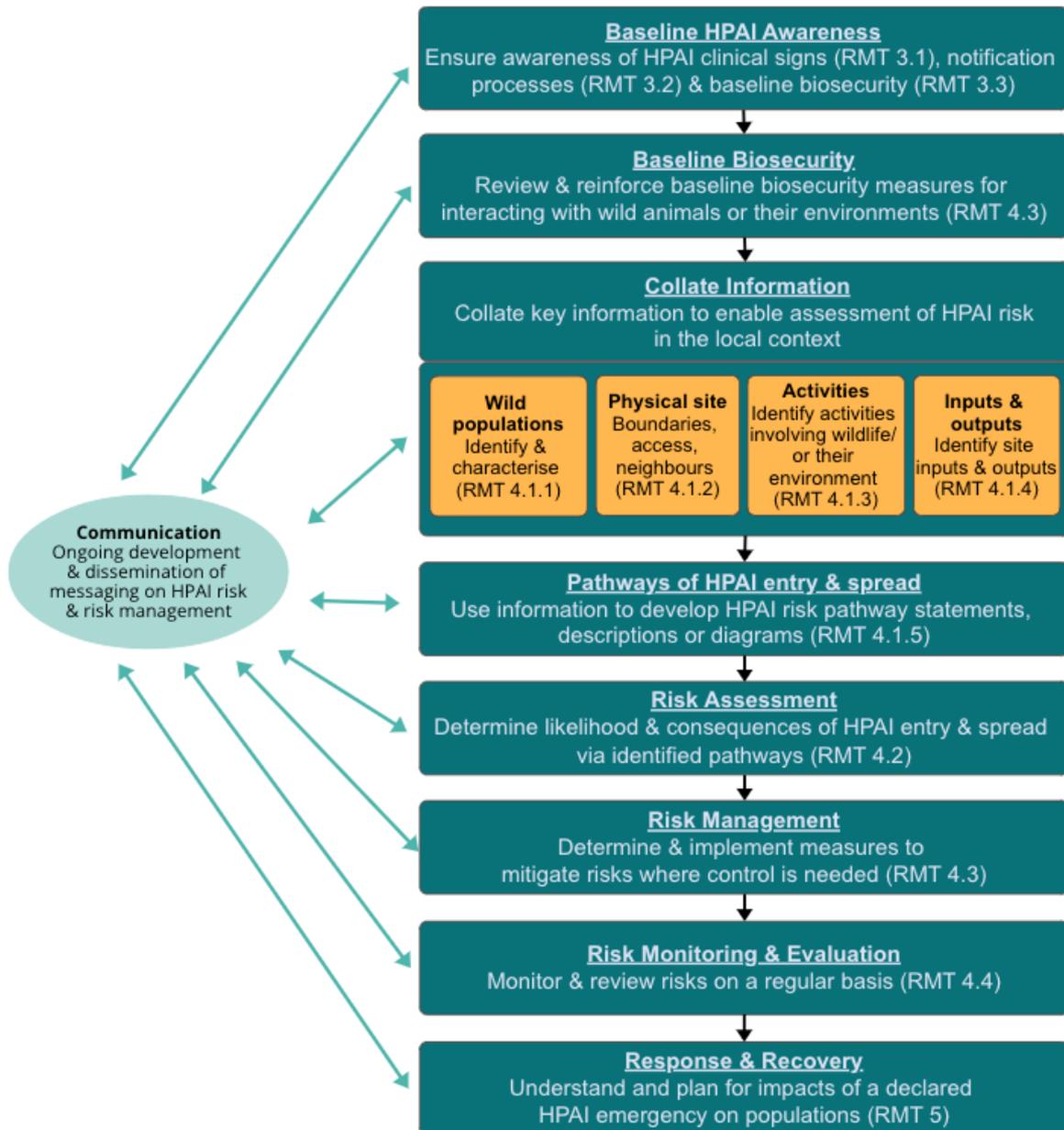


Figure 8: The recommended stepwise approach to using the toolbox.

3 Prevention and preparedness for HPAI: baseline strategies

The following information sets out baseline strategies that should be employed by all stakeholders that interact with wildlife to reduce the likelihood and consequence of HPAI entry and spread:

- Be aware of clinical signs of HPAI (Section 3.1).
- Report signs of HPAI (Section 3.2).
- Practice good baseline biosecurity (Section 3.3).

These strategies should be employed at all times, even when HPAI is not detected in Australia.

3.1 Be aware of clinical signs of HPAI

3.1.1 Wild birds

A wide range of wild bird species can be infected with HPAI. **It should be assumed that all bird species may be infected by HPAI virus.** See the [FAO's list](#) of species in which HPAI has been detected.

Clinical signs in wild birds are largely neurological, respiratory or gastrointestinal. These can include:

- incoordination, tremors, swimming in circles
- twisted necks or other abnormal posture
- inability to stand or fly
- diarrhoea
- difficulty breathing, coughing or sneezing
- swelling around the head, neck and eyes
- cloudiness or change in colour of the eyes
- sudden death.

Some species may not show any signs of disease or show only very mild signs.

In some cases, birds may die suddenly without displaying any clinical signs or be found dead.

See [Appendix 4](#) for links to videos of wild birds affected by HPAI.

3.1.2 Mammals

A wide range of mammals can be infected with HPAI, particularly marine mammals and mammals that prey or scavenge on birds. See the [FAO's list](#) of species in which HPAI has been detected.

Infected mammals may show a wide range of clinical signs, including:

- incoordination and tremors
- seizures
- difficulty breathing
- nasal discharge
- drooling
- death, including the potential for mass mortality events.

Ensure all stakeholders that interact with the wildlife populations are familiar with the clinical signs of HPAI. Consider:

- ⇒ staff training ([see Appendix 4](#))
- ⇒ communications materials for visitors to the site
- ⇒ documenting clinical signs as part of the site HPAI risk mitigation plan.

3.2 Report signs of HPAI

3.2.1 When should signs of HPAI be reported?

HPAI is a nationally notifiable animal disease, meaning that anyone who suspects an animal might be infected with HPAI has a legal responsibility to report it as soon as possible. As a guide, the following situations should be reported:

- small groups or clusters (5 or more) of sick or dead wild birds of any species
- individual or less than 5 sick or dead wild birds, if they are:
 - seabirds, waterbirds, shorebirds or birds of prey
 - any other bird species with signs of AI infection as outlined in [Section 3.1](#)
- sick or dead wild mammals with signs of AI infection as outlined in [Section 3.1](#).

If you suspect animals may be infected with HPAI at any time, you must immediately follow the notification processes in [Section 3.2.2](#) and [3.2.3](#), before proceeding with any, or further, activities. **Do not handle or remove animals suspected to have HPAI unless instructed to do so by government authorities.**

3.2.2 What information should be reported?

As much of the following information should be reported and documented as possible, **where this can be achieved without compromising the baseline biosecurity measures** outlined in [Section 3.3](#):

- species, age and sex (if known)
- date and time of report
- date that the signs of disease were first noticed
- name and contact details for the manager of the population and any individuals who observed the animals
- estimated number and species of sick or dead animals

- estimated total number and species of animals at the site
- clinical signs that sick animals are showing, including photos and videos if possible
- location of the event (address, and GPS coordinates if possible).

A sample [reporting form for disease incidents](#) is available on the WHA website.

3.2.3 How should signs of HPAI be reported?

Reports of suspect cases of HPAI in free-ranging wildlife must be made to relevant government authorities by contacting any of the following:

- the [Emergency Animal Disease Hotline](#) on 1800 675 888 (24 hours per day from anywhere in Australia)
- the [State/Territory WHA Coordinator](#) in which the event is occurring
- the [biosecurity agency](#) in the jurisdiction in which the event is occurring.

Ensure that managers of wildlife populations and staff are aware of when and how to report signs of disease consistent with HPAI, and what information to collect when reporting signs of disease. Consider:

⇒ staff training

⇒ documenting HPAI disease reporting procedures as part of the site HPAI risk mitigation plan, including:

- contact details for the relevant jurisdiction
- when should signs of disease be reported
- what information should be collected and reported.

3.2.4 What will happen following reporting of signs of disease?

The biosecurity agency in the jurisdiction in which the event is occurring will determine whether further investigation is needed and whether any other activities are required. Samples may be sent to the laboratory to investigate HPAI as the cause of disease. Managers of wildlife populations will be advised on the next steps and should await further direction.

There may be circumstances in which a decision is made not to undertake AI sampling and testing e.g., if related investigations are underway in the vicinity, if no suitable samples can be obtained, or if samples cannot be obtained safely. Even if testing is not undertaken, all reports help to inform understanding of the disease and how to manage it.

Ensure that site HPAI risk mitigation plans make it clear that following reporting of suspicion of HPAI in wildlife, managers and staff should wait for further direction from the biosecurity agency in the jurisdiction in which the event is occurring before undertaking any further activities.

3.3 Practice good baseline biosecurity

During routine activities, operate with an increased awareness of potential risks of disease in wildlife. If you suspect animal/s may be infected with HPAI at any time, immediately follow the notification processes in [Section 3.2](#), before proceeding with any, or further, activities. Do not handle or remove animals suspected to have HPAI unless instructed to do so by government authorities.

Always maintain good hygiene and biosecurity practices before, during and after working with wildlife, even when HPAI is not present in Australia and when animals appear to be healthy. The biosecurity and hygiene practices listed in this section should always be followed when interacting with wildlife populations and are considered “baseline biosecurity measures”.

Measures should be tailored to the specific site and wildlife populations following a risk assessment (see [Section 4](#)). In the event that HPAI is present in Australia, or animals are displaying signs of disease, heightened biosecurity and hygiene practices may be needed (see [Section 5.4](#)).

To prevent spread and protect the health of wildlife, domestic birds, and humans, good hygiene and biosecurity practices should be maintained when visiting sites, moving between sites and when handling wildlife. This includes measures prior to arrival, during activities and after departure.

3.3.1 Prior to interaction with wildlife populations

Interacting with wildlife populations may encompass a wide range of activities, ranging from observation of animals at a distance, to catching, handling and collecting samples from animals. Irrespective of the nature of the planned activity, prior to interacting with the wildlife population, the animals should be observed for signs of sickness or death. This should ideally be done at a distance, with binoculars or drones. If signs of sickness or death are observed, the activity should be avoided, and the disease reported as outlined in [Section 3.2](#).

3.3.2 During interaction with wildlife populations

- Use appropriate personal protective equipment (PPE) depending on the activity being undertaken.
- If the activity involves handling wildlife:
 - Wear appropriate PPE (e.g. disposable waterproof gloves, facemasks and eye protection), and ensure PPE is removed properly to avoid self-contamination (see [Appendix 5](#) for resources).
 - Particular attention should be given to hand washing after handling wildlife, after contact with potentially contaminated materials and after removal of gloves. Hands and arms should be washed with abundant soap and warm water, then dried thoroughly, even if gloves are used. Hand sanitizer (gel with

60 to 90% ethanol concentration) can be applied to reinforce disinfection but should not replace proper handwashing.

- Avoid rubbing eyes or touching the mouth, eating, drinking, or smoking while working with animals or their products.
- Where practicable, handle animals in a well-lit and well-ventilated area to minimise the possibility of inhaling dried faecal or other material.
- Use new or appropriately cleaned and disinfected equipment and PPE for handling of each animal, especially for species which do not congregate or live in close proximity to each other.

3.3.3 After interaction with wildlife populations

- Clothing, shoes and equipment (e.g. used for capture, handling, marking, holding [e.g. transport boxes/bags]) should be thoroughly cleaned after use, followed by disinfection. There are a range of cleaning and disinfectant agents that are effective against AI viruses. These agents are listed in [AUSVETPLAN Operational Manual: Decontamination](#). The [WOAH & IUCN Wildlife Health Specialist Group Avian Influenza and Wildlife: Risk management for people working with wild birds document](#) also contains succinct information on cleaning and disinfectant agents for HPAI.
- Waste material (e.g. disposable equipment or PPE) should be disposed of appropriately.
- Anyone who has handled wildlife should avoid contact with domestic birds and poultry for 48 hours, and should avoid visiting multiple field sites in one day.
- Maintain a log of visits to wildlife populations, including the date and time of the visit, what activities were undertaken and who was involved.

For further information see the [National Wildlife Biosecurity Guidelines](#) and [AVA Guidelines for Veterinary Biosecurity](#).

Ensure that managers of wildlife populations, staff and visitors to the site are aware of baseline biosecurity and hygiene measures for HPAI and have the resources to implement them. Consider:

- ⇒ staff training ([see Appendix 4](#))
- ⇒ communications materials for visitors to the site
- ⇒ developing a site standard operating procedure (SOP) for interacting with wildlife populations, specific to the activities typically undertaken at the site
- ⇒ ensuring availability of appropriate PPE, soap and disinfectants, equipment washing facilities and disposal sites for waste materials
- ⇒ maintaining a log of visits to wildlife populations.

4 Prevention and preparedness for HPAI: site or population specific risk management plan

This section sets out a suggested framework for developing a site or population specific risk management plan for HPAI, including undertaking a simple risk assessment. Alternatively, wildlife population may prefer to use any established risk assessment processes. For further information on undertaking risk assessments and risk management plans, see the WHA's [National Wildlife Biosecurity Guidelines](#), the [World Health Organisation's Joint Risk Assessment Operational Tool](#) and the International Union for Conservation of Natures [Manual of Procedures for Wildlife Disease Risk Analysis](#).

The HPAI risk for a particular site or population will not be static, and may change following changes to the animal populations, the AI strains circulating in the area at the time, environmental factors, and changes to activities undertaken at a site. Most importantly, the HPAI risk for wildlife populations in Australia will change significantly from its current level if the 2.3.4.4b strain were to enter Australia. **It is recommended that site or population risk management plans should be developed based on the current situation (where HPAI is not present in Australia), and frequently reviewed and updated as required.**

4.1 Establishing the context

This section identifies key features of the population and the site that will inform the likelihood of entry of HPAI, as well as the consequence if it does enter.

4.1.1 Identify and collate information on the populations at risk

Animal populations at the site at risk of HPAI should be identified and documented. As described in [Section 3.1](#), all wild bird species should be assumed to be susceptible to HPAI. A wide range of wild mammals are also susceptible, particularly marine mammals and mammals that prey or scavenge on birds.

For each wild bird and mammal population at the site, it is important to maintain current documentation of key information as outlined below. This will enable thorough evaluation of risk and may also assist with prioritisation of effort and resources in the event of an HPAI incursion. A template spreadsheet ([Appendix 2](#)) is provided to assist with collating this information.

Types of information that should be collected includes (see spreadsheet for details):

- basic population information: species, numbers, age structure, location
- ecological and health knowledge of the population, including:
 - **movement patterns** of the population into, within and out of the site
 - known environmental or seasonal **stressors**
 - **history of mortality** and illness events (including causes if known)
 - baseline mortality levels and seasonality (a **mortality log** is useful)
- other features of the population of relevance when assessing HPAI risk, including:

- **conservation status** of the species and any species-specific recovery plans currently applicable
- any **population management interventions** currently in place
- whether that species is known to have been affected by HPAI (see [FAO species list](#))
- where that species demonstrates **behaviours that increase their risk of infection** with HPAI, such as colony nesting, communal feeding, communal roosting, scavenging or having close association with seabirds or waterfowl
- **value of the population** (or individual animals in the population) in terms of tourism, research or the local community
- **public interest** in individual animals, the specific population or the species in general.

4.1.2 Document physical details about the site

The following key natural and built features of the site should be documented to inform disease risk pathways, as well as informing response activities set out in [Section 5](#):

- site boundaries, including any natural or built barriers at the perimeter of, or within the site
- site access, into and out of the site, and around the site, including public and private roads, maintenance tracks, walking trails
- details of neighbouring properties, including proximity to commercial or backyard poultry.

4.1.3 Document all activities that are undertaken at the site that interact with the animals or their environment

All activities undertaken at the site, when and where they are undertaken and approximate numbers of people are involved should be documented (note this is also required in [Section 5.3](#)). Activities might include:

- tourism
- general public access to public spaces e.g. beaches, lakes.
- bird banding
- population monitoring or management activities
- research and environmental studies
- pest animal control activities
- wildlife translocations
- recreational wildlife hunting.

4.1.4 Document population/site inputs and outputs

In a wildlife population, pathogens such as HPAI may enter or leave via a number of routes. Any animal, human, biological product, vehicle, equipment or other product entering (an **input**) or leaving a facility or a geographic location (an **output**) should be seen as a possible

route for disease transmission. Figure 9 summarises inputs and outputs from the site and populations that are possible pathways of HPAI transmission.

An example spreadsheet of how this information can be captured is shown in [Appendix 2](#). This spreadsheet is also provided as a separate attachment on the [WHA website](#).

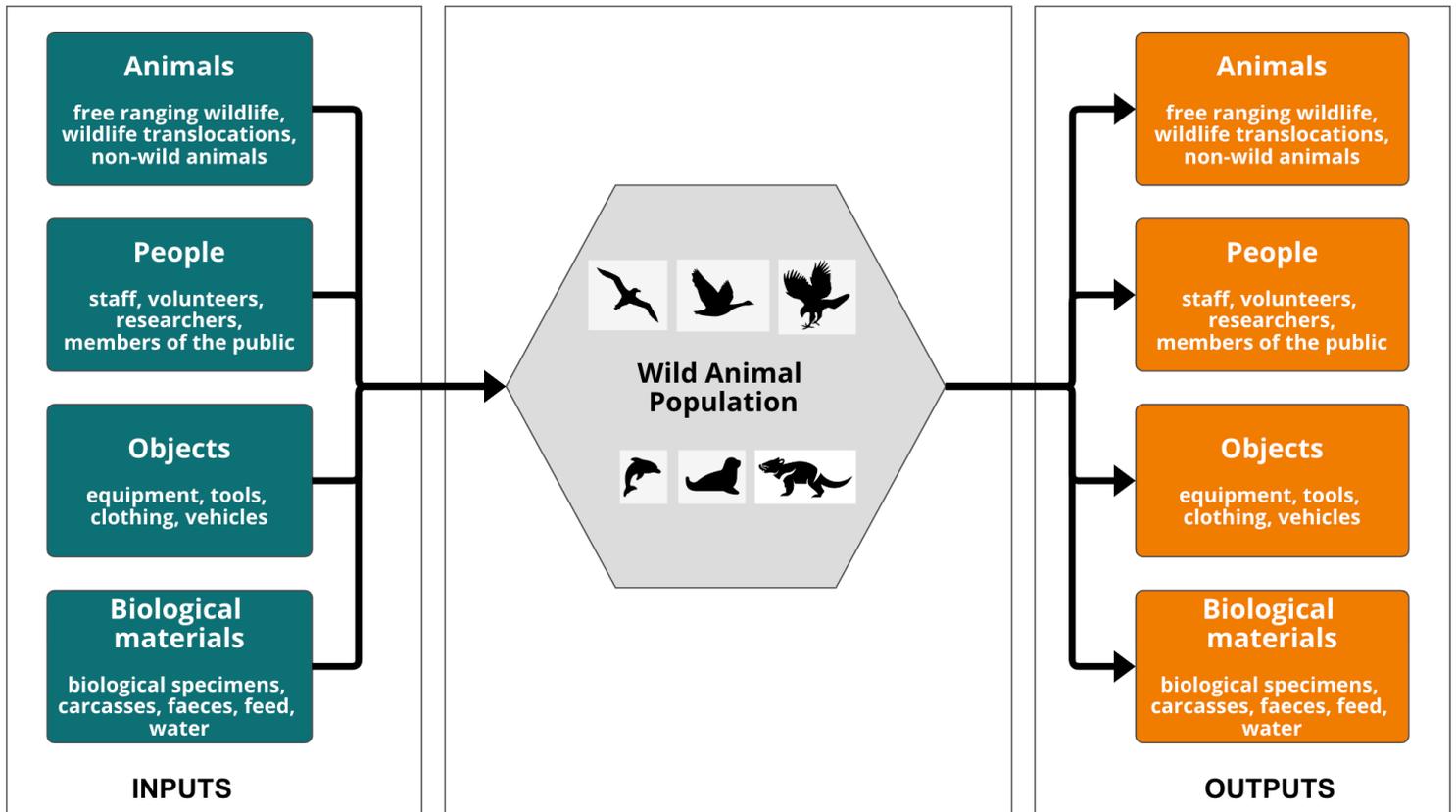


Figure 9: Inputs and outputs of HPAI to and from wildlife populations

4.1.5 Document disease risk pathways (disease entry to the population and spread to other populations)

All of the potential pathways of HPAI entry into the population and spread from the population should be documented. The information on inputs and outputs collected in 4.1.4 should help to identify key pathways. It may be useful to compile a list of HPAI risk pathway statements, for example:

Example 1:

Population: Herald petrel

Site: Raine Island

Input or Output: Input

Details: Seabird surveys are undertaken three times per year to monitor breeding numbers. Surveys are undertaken by a team of three people, who view the birds at a distance using binoculars. HPAI could enter the population through teams wearing boots that are contaminated with HPAI virus, which could then contaminate the local environment on Raine Island and cause infection in the Herald petrel population.

Example 2:

Population: Australian sea lions

Site: Coast of South Australia

Input or Output: Input

Details: Australian sea lions could become infected by HPAI through contact with migratory wild birds that are infected with HPAI.

Example 3:

Population: Black swan

Site: Herdsman Lake (metropolitan Perth)

Input or Output: Output

Details: Black swans are nomadic and leave the site to other water bodies within and outside of the Perth metropolitan area. The movements do not follow a set migratory pattern, and are usually due to rainfall or drought conditions. Black swans infected with HPAI at Herdsman Lake could transmit HPAI infections to other animals after leaving the site.

4.2 HPAI risk assessment

Using the information gathered in [Section 4.1](#), for each of the disease risk pathways described above, consider the likelihood and consequence of that HPAI transmission pathway occurring, and assign an overall risk rating (see [Appendix 3](#) for example likelihood and consequence definitions, and risk overall matrices). There will be **many factors** that impact on the likelihood and consequence of the risk pathways occurring, and in many cases not all of the information to make an assessment may be available. It is recommended that wildlife population managers conduct as thorough an HPAI risk assessment as possible, to help identify key risk pathways and populations.

For the example scenarios in 4.1.4, some example questions to consider when assigning risk ratings are included as follows:

Example 1:

Likelihood: What is the likelihood that the boots worn by field teams are contaminated with HPAI virus? What is the likelihood that the virus from the boots comes into contact with the Herald petrel population?

Consequence: If the Herald petrel population were to become infected with HPAI, what would be the impact, including impact to individual animal health, health of the population and ecosystem, and potential impact on other species in the area that share an environment with this population?

Example 2:

Likelihood: What is the likelihood that migratory wild birds arrive in the coast of South Australia infected with HPAI? What is the likelihood that the Australian sea lion population has contact with infected migratory birds?

Consequence: If Australian sea lion populations were to become infected with HPAI, what would be the impact, including impact to individual animal health, health of the population and ecosystem, and potential impact on other species in the area that share an environment with this population?

Example 3:

Likelihood: What is the likelihood that Black swans infected with HPAI leave Henderson Lake? What is the likelihood that Black swans interact with other animal populations (wild and non-wild) after leaving Henderson Lake? Are there important wild or non-wildlife populations (including poultry farms) nearby?

Consequence: What is the consequence if other animal populations (wild and non-wild) become infected with HPAI?

4.3 Risk control measures

Consider measures that could be put in place to reduce the risk. Measures could reduce either the likelihood or consequence components to risk, or both. The baseline strategies discussed in [Section 3](#) should be considered in light of the risk assessment, and some of the measures in [Section 5](#) may also be appropriate (e.g. [5.3](#), [5.4](#) and [5.10](#)).

It will not always be possible to eliminate risk when working with wildlife, but everyone should work to an agreed acceptable level of risk (or a safe or minimum risk level). An acceptable level of risk is the maximum overall exposure to risk that can be accepted, based on the benefits and costs involved. This may be determined by the authorities, by an organisation or by an individual.

4.4 Monitoring and evaluation

Once the risk assessment has been undertaken and any risk control measures determined and implemented, they should be monitored and reviewed on a regular basis. Monitoring and evaluation aims to make sure that risks have not changed, that control measures are being properly implemented, that the control measures are continuing to appropriately minimise the risk, that no additional control measures need to be implemented and that the controls are not causing any new problems. **A key trigger for review of the risk assessment will be if the HPAI 2.3.4.4b strain were to enter Australia.**

- Undertake a site/population specific HPAI risk assessment, which is reviewed and updated frequently as required, and particularly if HPAI enters Australia.

5 Response and recovery from HPAI in wildlife

As described in [Section 2.5](#), the pre-agreed national response arrangements following a detection of HPAI in Australia are set out in *AUSVETPLAN Response Strategy: Avian Influenza*. This section of the toolbox describes **potential** approaches to **response and recovery activities**, following a detection of HPAI in Australia, focusing on likely impacts for wildlife sites or populations and their operations, and is based on information in the AUSVETPLAN.

Response and recovery activities aim to contain and eradicate the disease in the shortest possible time, reducing environmental contamination and the risk of disease spread to captive birds, wild birds, poultry and other animals.

Response and recovery activities may be relevant even if no HPAI has been detected at the site. Action items for wildlife managers listed in this section are designed to support decision making and on the ground response activities **if they are required** under the response framework as discussed in [Section 2.5](#).

5.1 Source of the outbreak

If HPAI is detected in a population, an investigation may be undertaken by government authorities to determine how the animals came to be infected. This will help identify other sites or populations may be infected or at risk of infection.

Ensure that the site manager is able to rapidly provide information to government authorities that will inform how the animals came to be infected.

⇒ This information will be collected during the risk assessment process in [Section 4](#).

⇒ Ensure that visitor and activity logs are maintained.

5.2 Populations at risk of infection

If HPAI is detected in a population, an investigation may be undertaken by government authorities to determine whether animals in the vicinity may be at risk of infection, including other wildlife populations, or captive and domestic animals. This will help inform decisions around whether risk mitigation actions are needed at those sites.

Ensure that the site manager is able to rapidly provide information to government authorities about animals in the vicinity that may be at risk of infection.

⇒ This information will be collected during the risk assessment process in [Section 4](#).

⇒ Ensure that visitor and activity logs are maintained.

5.3 Restrictions on activities

There may be need for prohibition, reduction or restrictions on visitors and activities at the site, as directed by government authorities. Restrictions may be implemented to reduce the risk to human, animal or environmental health, such as reducing the likelihood of disease introduction or spread or reducing stressors to animal populations. Activities that may be subject to restriction may include, but are not limited to:

- tourism
- access to public spaces e.g. beaches, lakes.
- bird banding
- population monitoring or management activities
- research and environmental studies (with or without interaction with wildlife)
- pest animal control activities
- wildlife translocations
- recreational hunting.

There may be regular activities undertaken at the site that are essential to the health and welfare of the wildlife population, such as maintenance activities. Government authorities will ultimately determine any restrictions on activities, but wildlife managers should consider what activities they would regard as being essential, and the associated rationale, so that they are able to provide this advice to government authorities. Permits or restriction exemptions may be required for certain activities if deemed appropriate by government authorities.

□ Ensure that any restrictions on visitors and activities at the site can be quickly and effectively implemented if required. Consider:

- ⇒ documenting the usual visitors and activities undertaken at the site, when and where they are undertaken and how many people are involved (as set out in [Section 4](#))
- ⇒ maintaining contact lists of stakeholders that usually visit the site to ensure that any restrictions can be easily communicated
- ⇒ identifying any essential activities that site managers think should not be subject to restriction and the reason why
- ⇒ documenting the entry and exit points to the site and populations and how general access may be restricted (e.g. locking gates, barriers).

5.4 Enhanced hygiene and biosecurity measures

In the event that HPAI has been detected in Australia, there may be a recommendation or requirement for enhanced biosecurity and hygiene measures in addition to the baseline measures in [Section 3.3](#). This will depend on whether the site itself is experiencing an

outbreak of HPAI and the type of interaction with the wildlife populations. Measures may include:

- increased vigilance in implementing the baseline measures as determined in [Section 3.3](#)
- enhanced cleaning and disinfection beyond the baseline measures, such as cleaning and disinfection of boots, clothes, vehicles and field equipment prior to arrival at a site as well as after departure, and requirements to clean and disinfect vehicles (the range of cleaning and disinfectant agents that are effective against AI viruses are listed in [AUSVETPLAN Operational Manual: Decontamination](#))
- enhanced PPE, such as disposable overalls, rubber/polyurethane boots, safety goggles, heavy duty rubber gloves, facemasks with increased protection levels or full-face respirators. Personnel using enhanced PPE will require specific training in its use.

Ensure that any enhanced biosecurity and hygiene measures can be quickly and effectively implemented if required. Consider:

- ⇒ **developing a site-specific standard operating procedure (SOP) for baseline hygiene and biosecurity measures for interacting with wildlife populations (as per [Section 3.3](#))**
- ⇒ **documenting potential options for enhanced cleaning and disinfection that could be realistically implemented at the site**
- ⇒ **documenting local suppliers of appropriate PPE and disinfectants.**

5.5 Enhanced disease surveillance

Response activities may include enhanced disease surveillance as directed by government authorities for early detection of disease and to monitor its spread. Disease surveillance strategies that could be undertaken by government authorities include:

- implementing a regular schedule of observation of populations for signs of disease
- collection of samples from any dead animals, even if HPAI is not suspected as the cause of death
- catching and sampling healthy animals
- collecting samples from the environment (e.g. soil, faeces, water).

□ Ensure that any enhanced disease surveillance measures required by government authorities can be quickly and effectively implemented if required. Consider:

⇒ maintaining a register of personnel with experience in catching and sampling the wildlife species at the site

⇒ establishing SOPs for catching wildlife species at the site.

5.6 Euthanasia or culling of wildlife

Australia's policy as per the AUSVETPLAN *Disease Strategy for Avian Influenza* is that no destruction or culling of free-ranging healthy wild birds will occur as part of a response to HPAI, because it is not practical or environmentally sound and may be counterproductive in stopping spread of the disease. This is irrespective of the species of bird, and whether it is a native or introduced species, and is reflected in advice from the [joint CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds](#).

Euthanasia of sick wild birds may be undertaken based on considerations of individual animal welfare, consistent with the animal welfare legislation in the relevant jurisdiction. Procedures for welfare-based euthanasia should take into account restrictions imposed on general activities ([Section 5.3](#)) and removal of carcasses ([Section 5.8](#)).

□ Ensure that communications and procedures clearly state that culling of healthy wild birds will not ensue following detection of HPAI, irrespective of the species. Consider:

⇒ staff awareness and training

⇒ documenting this policy as part of the site HPAI risk mitigation plan.

□ Policy and procedures should be in place for euthanasia of individual sick wild birds if required to mitigate animal welfare risks. Consider:

⇒ documenting this policy and procedures as part of the site HPAI risk mitigation plan

⇒ ensuring appropriate PPE is available and staff are trained in its use.

5.7 Vaccination of wildlife

Following an outbreak of HPAI, Australia's current preferred policy is to control the disease without the use of vaccination. The use of vaccination in wild birds is not considered to be a feasible control option in Australia under AUSVETPLAN. However, vaccination may be considered in poultry if the outbreak has become widespread, or to protect rare, endangered and valuable captive birds under AUSVETPLAN (see [AUSVETPLAN Avian Influenza](#) and [AUSVETPLAN Guidance Document-Risk-based assessment of disease control options for rare and valuable animals](#)). Decisions around implementing vaccine programmes will be made by government authorities.

The current global HPAI situation has prompted exploration of the use of vaccination in wild birds overseas. While the advice from the joint [CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds](#) is that vaccination could be considered for key localised populations, there are a number of constraints to the use of vaccination as a risk mitigation tool for HPAI in free-ranging wildlife, and its application in this context has been limited (see vaccination of California Condors in the [California Condor Recovery Program](#) or [the Bird flu vaccination trial in Aotearoa New Zealand](#)). WOAHP has produced a guidance document on [Considerations for emergency vaccination of wild birds against HPAI in specific situations](#) to assist decision-makers.

Be aware that under current policy in Australia, vaccination of wild birds will **not** be undertaken irrespective of the species of bird. Consider:

⇒ staff awareness

⇒ documenting this policy as part of the site HPAI risk mitigation plan.

5.8 Environmental modification, environmental disinfection, animal dispersal or containment

As described in the AUSVETPLAN WARS and the [advice](#) from joint CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds, habitat destruction or disinfection of environments should not be considered as HPAI control measures in wildlife populations, as these are likely to disperse wildlife populations and potentially assist in spreading the virus further. Attempts to disperse or contain animals may also potentially assist in virus spread, and is not practical for HPAI susceptible species.

Ensure that communications and procedures clearly state that environmental modification, environmental disinfection, wildlife dispersal or wildlife containment are **not** considered effective or appropriate for HPAI control, irrespective of the species. Consider:

⇒ staff awareness and training

⇒ documenting this policy as part of the site HPAI risk mitigation plan.

5.9 Removal of carcasses

Carcasses of animals infected with HPAI can act as a source of infection to other animals that may be in close proximity to, or who scavenge on the carcass. HPAI infected carcasses may also present a risk to human health, which will be of particular importance in publicly accessible areas e.g., beaches. Removing carcasses, however, introduces new risks and challenges such as: disturbing animals, which may be of particular concern in breeding colonies; contributing to spread of infection via people, equipment and vehicles if not undertaken in a biosecure manner; difficulties disposing of carcasses in a biosecure manner,

particularly if there are large numbers; human health risks with handling carcasses; logistical and resourcing challenges of accessing large numbers of carcasses.

The advice from joint [CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds](#) is that decisions around the removal of carcasses should be determined based on a risk assessment that considers risk factors such as those described above. Decision making around carcass removal will be made by government authorities.

- Document features of the site and wildlife populations that may be useful when making decisions around removal of infected carcasses. Consider:
 - ⇒ Could people and vehicles easily access sites if carcasses were to be removed?
 - ⇒ What scavengers are present in the area that are likely to scavenge on carcasses?
 - ⇒ Do members of the public have access to the site? If so, can their access be restricted?
 - ⇒ What would the risk to the population be of significant disturbance of the site, such as accessing the site with people, vehicles and interacting closely with the population and habitats to remove carcasses?

5.10 Managing biodiversity conservation impacts

The HPAI H5N1 2.3.4.4b strain is causing unprecedented mortality of wild birds and mammals overseas, to the extent that it is threatening certain populations of animals. The [advice](#) from joint CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds is that governments should see HPAI as a conservation issue and consider this in contingency planning.

- Document the likely biodiversity conservation impacts of an HPAI outbreak and plan for ways to reduce this impact. Consider:
 - ⇒ ways to reduce pressures on the wider environment to improve wildlife resilience to disease
 - ⇒ the need for enhanced protection of wild habitats and provision of additional or alternative breeding sites
 - ⇒ developing a system and SOP for recording numbers of animal deaths, species and locations, to ensure that the impact on a population can be measured effectively
 - ⇒ any other means of supporting species recovery.

PART C APPENDICES

Appendix 1 HPAI risk mitigation checklist

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
HPAI AWARENESS, TRAINING AND OUTREACH						
Do you have a basic understanding of how emergency animal diseases such as HPAI are managed in Australia and what role managers of wildlife populations might play during an HPAI response?	2.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you engaged with the Department of Primary Industries or Agriculture in your State/Territory to discuss HPAI prevention and preparedness? Please read the entire toolbox and complete the checklist before reaching out.	2.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Are you, your staff and anyone regularly interacting with the wildlife populations that you manage, familiar with the clinical signs of HPAI in wildlife?	3.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Are you and your staff aware of how to report suspicious signs of HPAI including what situations warrant reporting, who to report signs to and what information to collect?	3.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
Are you, your staff and anyone regularly interacting with the wildlife populations aware of baseline biosecurity procedures to follow when interacting with wildlife populations, including measures before, during and after the interaction?	3.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you have outreach material such as signage, fliers or website material available to people that may not interact regularly with the wildlife populations (such as members of the public, tourists) to raise awareness about HPAI (including clinical signs, biosecurity measures, disease reporting)?	3.1 3.2 3.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Are you and your staff aware of the response activities that are not currently supported by Australia's AI response frameworks? Specifically: euthanasia or culling of wildlife; wildlife dispersal or containment; environmental modification; environmental decontamination; vaccination of wild birds.	5.6 5.7 5.8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
PLANS AND PROCEDURES						
Do you have a documented site/population specific HPAI risk assessment ?	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you have a documented plan or procedure for how to report suspicion of HPAI in wildlife, including: <ul style="list-style-type: none"> clinical signs that should raises suspicion for HPAI 	3.1 3.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
<ul style="list-style-type: none"> • contact details relevant to your jurisdiction • information to be collected for reporting • actions to take following reporting 						
Do you have a documented plan or procedure for baseline biosecurity measures , to be undertaken by anyone interacting with wildlife populations, that is tailored to the types of interaction that take place?	3.3 5.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you documented potential ways in which biosecurity measures could be enhanced beyond baseline in the event of an HPAI outbreak?	5.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you have established procedures for catching the wildlife species found at the site , in the event that this is required for HPAI surveillance? Do you have a register of personnel that are skilled and experienced in undertaking this procedure?	5.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you maintain a detailed visitor and activity log , that documents visitors and activities undertaken at the site, when and where they are undertaken and who is involved?	3.3 5.1 5.2 5.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
Do you maintain contact lists of stakeholders that usually visit the site to ensure that in the event of an HPAI outbreak, any restrictions on activities can be easily communicated?	5.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you identified and documented any activities undertaken at the site that you would regard as being essential to the health and welfare of the animals at the site?	5.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you identified and documented the entry and exit points to the site and populations and how vehicle or pedestrian access could be restricted in the event of an HPAI outbreak (e.g. locking gates, barriers)?	5.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do your HPAI preparedness plans and procedures make it clear that euthanasia or culling of healthy wildlife, animal dispersal or containment, environmental modification, environmental decontamination and vaccination of wild birds do not form part of the planned response to an outbreak of HPAI in Australia?	5.6 5.7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you have established procedures for euthanasia of individual sick wildlife if required to mitigate animal welfare risks?	5.6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
<p>Have you documented information to assist with decision making around carcass removal in the event of an outbreak of HPAI, including:</p> <ul style="list-style-type: none"> • Could people and vehicles easily access sites if carcasses were to be removed? • What scavengers are present in the area that are likely to scavenge on carcasses? • Do members of the public have access to the site? If so, can their access be restricted? • What would the risk to the population be of significant disturbance of the site, such as accessing the site with people, vehicles and interacting closely with the population and habitats to remove carcasses? 	5.8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<p>Do you have systems and procedures that will be able to record the number of animal deaths (including species affected and their geographical location), in order to accurately measure the impact of HPAI on a population?</p>	5.10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<p>Have you considered measures that could be taken to minimise the biodiversity and conservation impacts of an HPAI outbreak?</p>	5.10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

	TOOLBOX REF.	Y	N	N/A	COMMENT e.g. what do you currently do, what document currently exists?	FOLLOW UP ACTION REQUIRED? Describe what action is required.
EQUIPMENT AND FACILITIES						
Do you have PPE, soap and disinfectants, equipment washing facilities and disposal sites for waste materials appropriate to the baseline biosecurity measures for your site? If not, do you have a system whereby people interacting wildlife populations supply these items themselves?	3.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you identified suppliers of PPE and disinfectants?	5.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Appendix 2 Example spreadsheets for collating population information

These images demonstrate the layout of a spreadsheet for recording i) information on wildlife populations at risk and ii) site or population inputs and outputs. An electronic version is available on the Wildlife Health Australia website: [High Pathogenicity Avian Influenza Information](#).

i) Wildlife populations at risk

HPAI Populations at Risk								
Site Information:				Date:				
Contributors (initials):								
SPECIES				POPULATION INFORMATION				
Common Name	Scientific Name	Conservation status	Recovery plan?	Total number of individuals	Total number of populations	Age structure (Ad:Sub:Juv)	Other population information	
			(Y/N)					
POPULATION ECOLOGY & HEALTH								
Movements into and out of the site	Known environmental or seasonal stressors	Previous illness events?		Previous mortality events?		Baseline mortality information		
		(Y/N)	Details	(Y/N)	Details			
BEHAVIOURS ASSOCIATED WITH AI SPREAD (include specific location details)					ASSOCIATED HUMAN ACTIVITIES & INTERESTS			
Colony nesting?	Communal feeding?	Communal roosting?	Scavenger?	Close association with seabirds or waterfowl?	Research activities	Tourism involvement	Population management interventions	Public & political interest
(Y/N; location)	(Y/N; location/s)	(Y/N; location/s)	(Y/N)	(Y/N)				

Appendix 2 (continued):

ii) Site or population inputs and outputs

HPAI Site Assessment - Inputs and Outputs			Date:		
Site Information:			Initials of contributors:		
INPUTS			OUTPUTS		
	Y/N			Y/N	DETAILS
ANIMALS					
Migratory birds			Migratory birds		
Marine mammals			Marine mammals		
Other free-ranging wildlife			Other free-ranging wildlife		
Translocations			Translocations		
Domestic poultry			Domestic poultry		
Domestic birds			Domestic birds		
Domestic carnivores			Domestic carnivores		
Domestic mammals (other)			Domestic mammals (other)		
PEOPLE					
Staff			Staff		
Volunteers			Volunteers		
Researchers			Researchers		
General public			General public		
Other			Other		
OBJECTS					
Equipment			Equipment		
Tools			Tools		
Clothing			Clothing		
Vehicles			Vehicles		
Other			Other		
BIOLOGICAL MATERIALS					
Biological specimens			Biological specimens		
Carcasses			Carcasses		
Faeces			Faeces		
Feed			Feed		
Water			Water		
Other			Other		

Appendix 3 Risk definitions and matrices

The following definitions are provided as an example of ways in which likelihood, consequence and overall risk could be evaluated for the entry and spread of HPAI to a given population. The matrix in Table 3 demonstrates how the likelihood and consequence can be combined to give an overall risk estimate.

Table 1: Likelihood definitions

Likelihood level	Definition
Negligible	Almost certain not to occur except in exceptional circumstances
Low	Unlikely to occur
Moderate	May occur
High	Likely to occur

Table 2: Consequence definitions

Description	Definition
Insignificant	No detectable conservation or welfare effects; effect unlikely to be recognised at any level within Australia.
Very minor	Local short-term population loss or economic impact, no significant ecosystem effect; OR mild animal welfare effects; effect is likely to be minor to directly affected parties
Minor	Some localised, reversible ecosystem impact; OR mild animal welfare effects; effect and significant to directly affected parties.
Moderate	Measurable long-term damage to populations and/or ecosystem, but little spread, no extinction; OR more significant animal welfare effects; effects significant within the region, with economic and social effect highly significant to directly affected parties; recognised on a national level.
High	Long-term irreversible ecosystem change, spreading beyond local area; OR significant animal welfare effects; effects highly significant within the region, with serious economic stability, societal values or social well-being limited to a given region; significant at the national level
Catastrophic	Widespread, long-term population loss affecting several species OR local extinction of a species, serious ecosystem effects; OR severe animal welfare effects; effect highly significant nationally, with economic stability, societal values or social well-being seriously affected; highly significant at the national level.

Table 3: Overall risk ratings

		Consequences of HPAI entry and establishment					
		Insignificant	Very minor	Minor	Moderate	High	Catastrophic
Likelihood of entry and exposure	Negligible	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk
	Low	Negligible risk	Negligible risk	Low risk	Low risk	Moderate risk	High risk
	Moderate	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	High risk
	High	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk

Appendix 4 Training resources and example documents

Note that the following lists are not comprehensive, and include resources, information and advice from official and un-official sources from Australia and overseas. Example resources may be applicable at the national, state or local levels, or targeted to various stakeholder groups that interact with wildlife. Information contained in these links has not been assessed for accuracy.

Training material- Australia's emergency management arrangements

- [Animal Health Australia's Emergency Animal Disease foundation course](#)

Training material - clinical signs of HPAI

- Links to photos and videos of wildlife affected by HPAI
[Link 1](#) [Link 2](#) [Link 3](#) [Link 4](#)

Example HPAI biosecurity measures for WCP facilities overseas

- British Veterinary Association- [Avian influenza \(AI\) advice for vets dealing with wild birds and backyard poultry](#)
- Environment and Climate Change Canada- [Guidance to Wildlife Rehabilitation Facilities Regarding the Intake of Birds during a Highly Pathogenic Avian Influenza Outbreak](#)

Example outreach material and contingency planning documents

- Wildlife Health Australia's [HPAI resources](#):
 - HPAI Advice for people who encounter sick or dead wild birds
 - HPAI Risk management advice for bird banders, wildlife rangers and researchers
 - HPAI Advice for veterinarians and animal health professionals
 - HPAI Risk mitigation toolbox for wildlife care providers
- Northern Australia Biosecurity Strategy - [Avian influenza awareness: Keep a TopWatch!](#) (video)
- WOAH & IUCN Wildlife Health Specialist Group [Avian Influenza and Wildlife: Risk management for people working with wild birds](#)
- Department for Environment Food & Rural Affairs [Mitigation Strategy for Avian Influenza in Wild Birds in England and Wales](#)
- Scottish Govt [Scottish wild bird highly pathogenic avian influenza response plan](#)
- U.S. Fish & Wildlife Service [California Condor Recovery Program](#)
- Michelle Wille [Avian influenza resources](#) and [Highly pathogenic avian influenza panzootic and the threat to wildlife and ecosystems](#)
- Govt of Canada- Wildlife & avian influenza [Handling guidelines to protect your health](#)
- Government of South Georgia & the South Sandwich Islands [Biosecurity Handbook](#)

Appendix 5 References and further reading

Wildlife Health Australia

- Fact Sheet: [Avian influenza in wild birds in Australia](#)
- [High Pathogenicity Avian Influenza Resources](#)
- [National Avian Influenza Wild Bird Surveillance](#)
- [Emergency Wildlife Disease Response Guidelines](#)

Australian Biosecurity Manuals

- [National Wildlife Biosecurity Guidelines](#)
- [National Farm Biosecurity Manuals – Poultry](#) (e.g. chickens)
- [National Zoo Biosecurity Manual](#)
- Australian Veterinary Association (2017) [Guidelines for Veterinary Personal Biosecurity](#)

Australian Department of Agriculture, Water and the Environment

- [Information on Avian Influenza or Bird Flu](#) and [Information for bird owners](#)
- [Outbreak.gov.au](#) provides details on how to prepare for and respond to animal pests and diseases
- Descriptive characteristics of the seven HPAI outbreaks in Australia from 1976 to 2013 and of the confirmed LPAI reports in poultry in Australia from 1976 to 2018 are described in [Scott et al. 2020](#)

Human Health

- Australian Dept of Health and Aged Care information on [Avian influenza in humans](#)
- [The Communicable Diseases Network Australia \(CDNA\) National Guidelines for Public Health Units on Avian Influenza](#)
- [Australian Health Management Plan for Pandemic Influenza](#)

Personal Protective Equipment

- Australian Veterinary Association (2017) [Veterinary personal biosecurity & PPE](#) and [Guidelines for Veterinary Personal Biosecurity](#)
- [National Wildlife Biosecurity Manual](#)

AUSVETPLAN

- The AUSVETPLAN Disease Strategy for Avian Influenza sets out the nationally agreed response approach to AI outbreaks in Australia. This includes agreed policy in Australia with respect to LPAI or HPAI detection in wild birds.
- The AUSVETPLAN Disease Strategy for Avian Influenza can be downloaded from [Animal Health Australia website](#) under Disease-specific documents.

- Also see: AUSVETPLAN Management Manual: Control Centres Part 1 & 2 and AUSVETPLAN Wild Animal Response Strategy (WARS), also available from the [Animal Health Australia website](#).

World Organisation for Animal Health (WOAH)

- WOAH website on [avian influenza](#)
- WOAH [Considerations for emergency vaccination of wild birds against HPAI in specific situations](#)
- WOAH [Practical guide for authorised field responders to HPAI outbreaks in marine mammals, with a focus on biosecurity, sample collection for virus detection and carcass disposal](#)
- WOAH & IUCN Wildlife Health Specialist Group [Avian Influenza and Wildlife: Risk management for people working with wild birds](#)
- [Terrestrial Animal Health Code](#)

Global Situation

- World Organisation for Animal Health (WOAH) [website on avian influenza](#)
- Joint OIE-FAO Scientific Network on Animal Influenza (OFFLU) [situation updates and statements on avian influenza, Statement on Continue expansion of HPAI H5 in wildlife in South America and incursion into the Antarctic region](#)
- Food and Agriculture Organisation of the United Nations (FAO) [Global AIV with Zoonotic Potential situation update](#)
- [Avian influenza in Europe update](#)
- Convention on the Conservation of Migratory Species of Wild Animals [Scientific Task Force on Avian Influenza and Wild Birds](#)
- Centres for Disease Control and Prevention [Information on Bird Flu](#)
- Regional or country-specific data
 - European Union Reference Laboratories (EURL) [Avian Flu Data Portal](#)
 - Canadian Food Inspection Agency National Emergency Operations Center GIS services [High Pathogenicity Avian Influenza in Wildlife dashboard](#)
 - United States Department of Agriculture [HPAI in wild birds map](#)
 - Information on current and suspected HPAI wildlife cases arising in the Antarctic and subantarctic region [SCAR Antarctic Wildlife Health Network HPAI database](#)

Other international resources

- Department for Environment Food & Rural Affairs [Mitigation Strategy for Avian Influenza in Wild Birds in England and Wales](#)
- Scottish Govt [Scottish wild bird highly pathogenic avian influenza response plan](#)
- Michelle Wille [Avian influenza resources](#) and [Highly pathogenic avian influenza panzootic and the threat to wildlife and ecosystems \(video\)](#)
- Govt of Canada- Wildlife & avian influenza [Handling guidelines to protect your health](#)

- [Government of South Georgia & the South Sandwich Islands- Biosecurity Handbook](#)
- Agreement on the Conservation of Albatrosses and Petrels (ACAP) [Guidelines for working with albatrosses and petrels during the high pathogenicity avian influenza \(HPAI\) H5N1 panzootic](#)

Appendix 6 Acronyms

AI	Avian influenza
AUSVETPLAN	Australian Veterinary Emergency Plan
CCEAD	Consultative Committee on Emergency Animal Disease
CMS	The Convention on Migratory Species
EAD	Emergency Animal Disease
FAO	Food and Agricultural Organisation of the United Nations
HPAI	High pathogenicity avian influenza
LPAI	Low pathogenicity avian influenza
NAIWB program	National Avian Influenza Wild Bird program
PPE	Personal protective equipment
WHA	Wildlife Health Australia
WOAH	World Organisation for Animal Health

Appendix 7 Glossary

Biosecurity agency	Any government agency responsible under law for managing biosecurity in Australia or part thereof. This is generally the Department of Primary Industries or Agriculture in each jurisdiction.
Pathogen	Any organism causing disease.
Spillback	The reverse of <i>spillover</i> . For example, HPAI viruses in poultry can be transmitted back (spillback) to wild birds.
Spillover	An event during which a <i>pathogen</i> which occurs naturally in one species moves into another species; such movement can result in a disease outbreak. For example, LPAI viruses known to occur naturally in wild birds in Australia can spillover to poultry, resulting in outbreaks of disease.
Strain	A distinct category of virus characterised by its genetic lineage and ability to cause disease. For example, the new AI strain causing unprecedented outbreaks of disease worldwide is the H5Nx 2.3.4.4b strain, which evolved from the A/goose/Guangdong/1/96 lineage.
Subtype	A categorisation of influenza viruses according to the characteristics of the haemagglutinin (HA) and neuraminidase (NA) surface glycoproteins.
Surveillance	A systematic program of investigation designed to establish the presence, extent or absence of a disease, or of infection or contamination with the causative organism. It includes the examination of animals for clinical signs, antibodies or the presence of the <i>pathogen</i> .
Wildlife or wild animal	An animal that is found in the natural environment and does not live under human supervision and control. The species may be native to Australia or an introduced species. An introduced species may be a feral or invasive species.
Wildlife managers	Agencies, organisations or individuals who manage free-ranging wildlife populations in Australia, including national and jurisdictional environmental and biosecurity agencies, local governments, non-profit organisations, native title holders and private landholders.