

Highly Pathogenic Avian Influenza (HPAI) and Wild Animals in Australia

A RISK MITIGATION TOOLBOX FOR
WILDLIFE MANAGERS

Version 1

NOVEMBER 2023

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High Pathogenicity Avian Influenza and Wild Animals in Australia

Risk mitigation toolbox for wildlife managers

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 local veterinarian or state or territory's department of primary industries or agriculture 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](#).

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 wild animal populations in Australia develop plans to mitigate the risk of High Pathogenicity Avian Influenza (HPAI). It aims to:

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

1.2 Why should managers of wild animal populations use this toolbox?

HPAI presents risks to animal, human and environmental health, which 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, wild mammals and poultry on all continents except Oceania (including Australia and New Zealand) and mainland Antarctica (see [Section 2.2](#) and [2.4](#)). The current global situation means an increased level of risk to Australia. With the return of migratory shorebirds from the northern hemisphere to Australia from August to November, there is likely a higher chance for an introduction of HPAI viruses into Australia compared to previous years. **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 wild animal 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 highlighted 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 wild animal populations in Australia**, including national and state environmental and biosecurity agencies, local governments 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.* The management of HPAI risk for wildlife held in captivity (e.g. in zoos, fauna parks, wildlife parks, rehabilitation or any other facility housing non-domestic animals), 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

Wild animal 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 integrated in to, where appropriate) any other existing management plans or procedures for the sites and populations.

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

This toolbox provides guidance in line with Australia's existing avian influenza (AI) response plans and guidance material, biosecurity guidelines, and general emergency management arrangements (as described in [Section 2.5](#)).

Anyone working with wildlife must also be aware of Commonwealth and state/territory legislation covering matters relating to biosecurity, wildlife protection and conservation, animal welfare, emergency management and workplace health and safety. See the [AUSVETPLAN Wild Animal Response Strategy](#) for a list of relevant legislation.

2 Background information on HPAI

2.1 What is HPAI?

Avian influenza, 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 severity of 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).

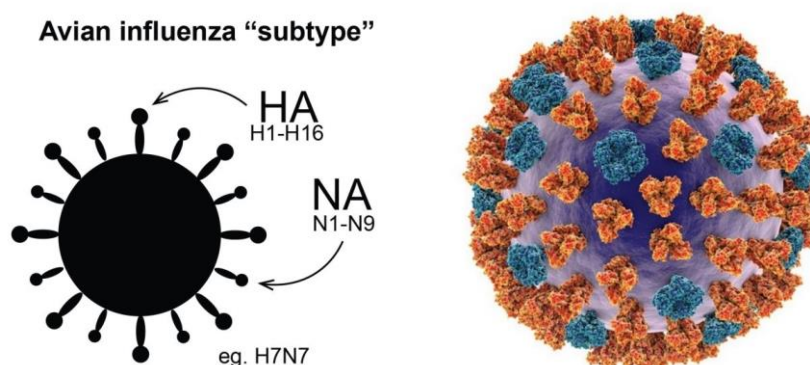


Figure 2: AI viruses are classified according to the serological subtypes of their surface glycoproteins (courtesy of [Michelle Wille](#))

AI 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. Note that the naming conventions for avian influenza viruses are complex, and this document will utilise 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](#)).

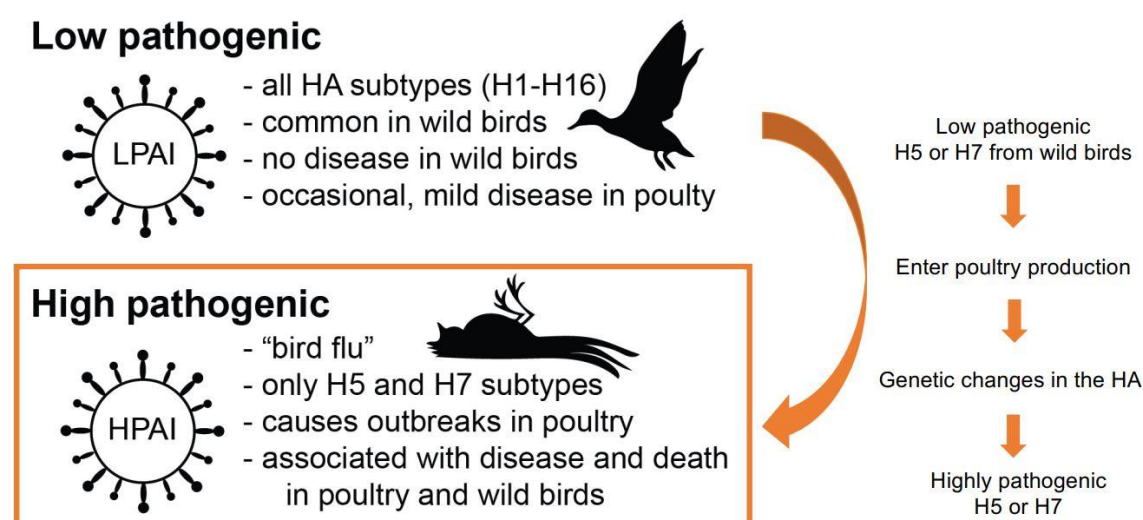


Figure 3: Low pathogenicity AI vs high pathogenicity AI (courtesy of [Michelle Wille](#))

Although AI viruses do not normally infect humans, some subtypes have been associated with disease in humans ranging from mild illness to severe disease (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.

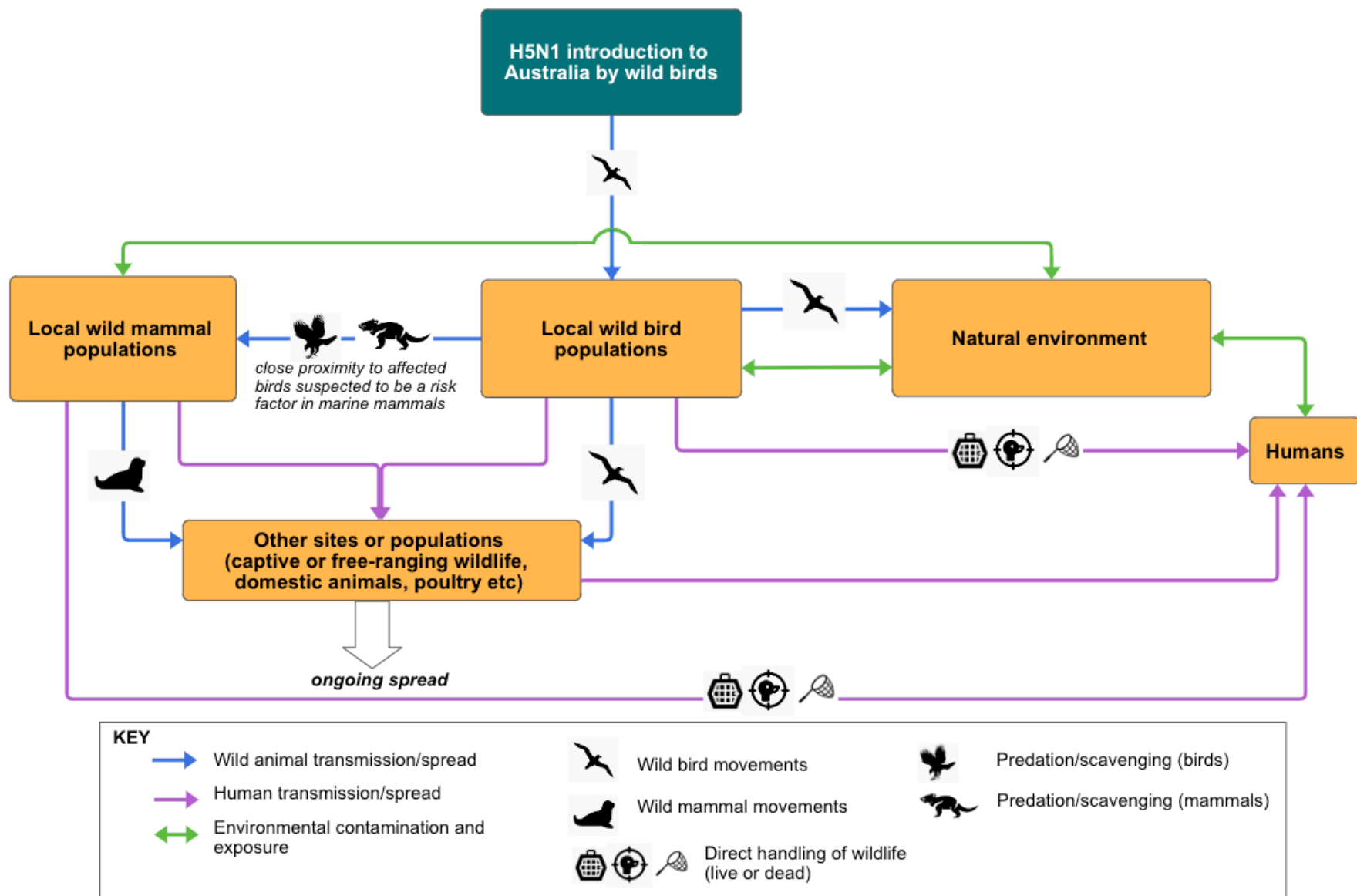


Figure 4: Likely pathways for the introduction, transmission and spread of HPAI to, from and within wild populations following introduction via wild birds.

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](#).

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, wild mammals and poultry in all continents apart from Oceania (including Australia and New Zealand) and mainland Antarctica.**

Mortalities and illness from strain 2.3.4.4b have been recorded in at least 405 bird species and at least 35 mammal species (both terrestrial and aquatic). 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.

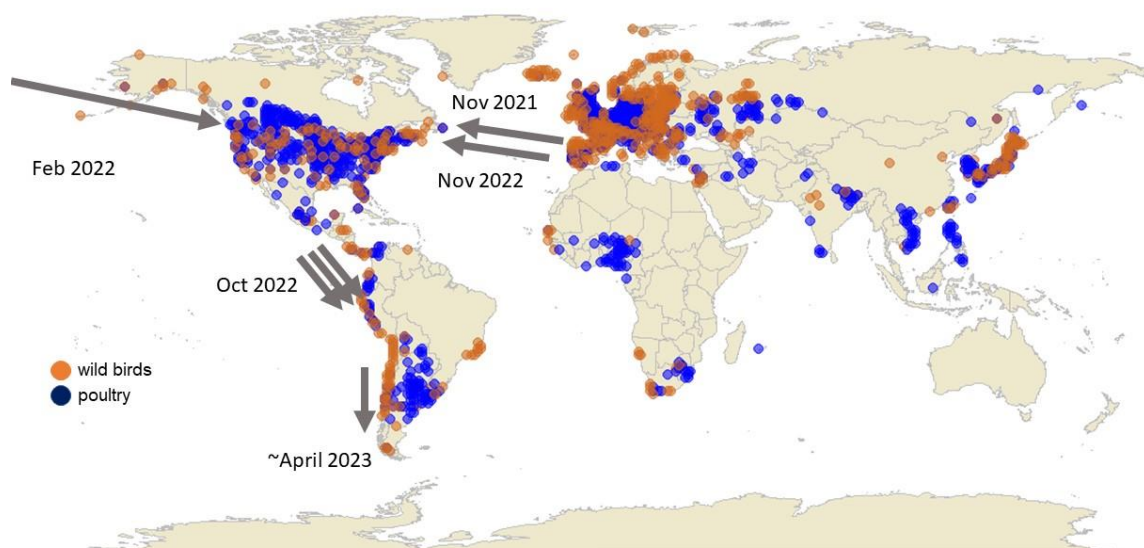


Figure 5: H5 HPAI outbreaks October 2021 to March 2023 in poultry and wild birds. Grey arrows and dates indicate the approximate timeline of geographic spread. Adapted from [Klaassen and Wille \(2023\)](#).

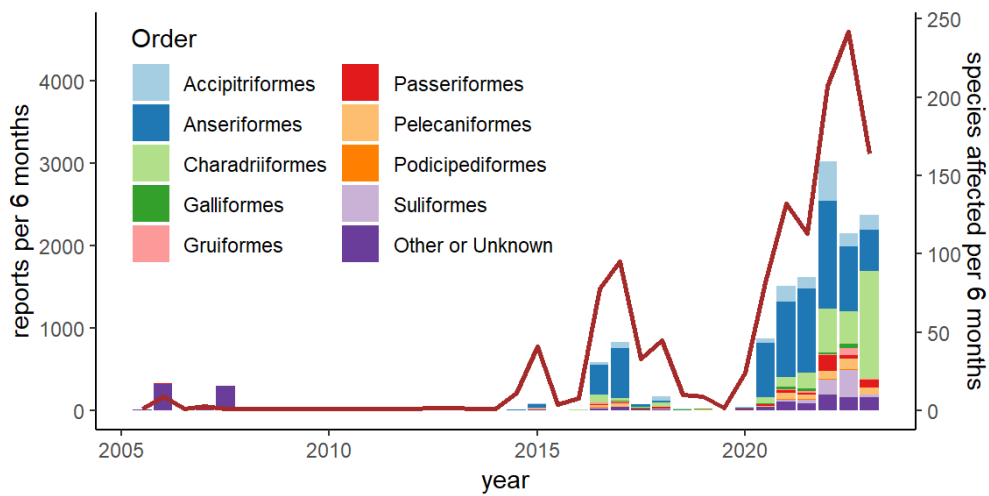
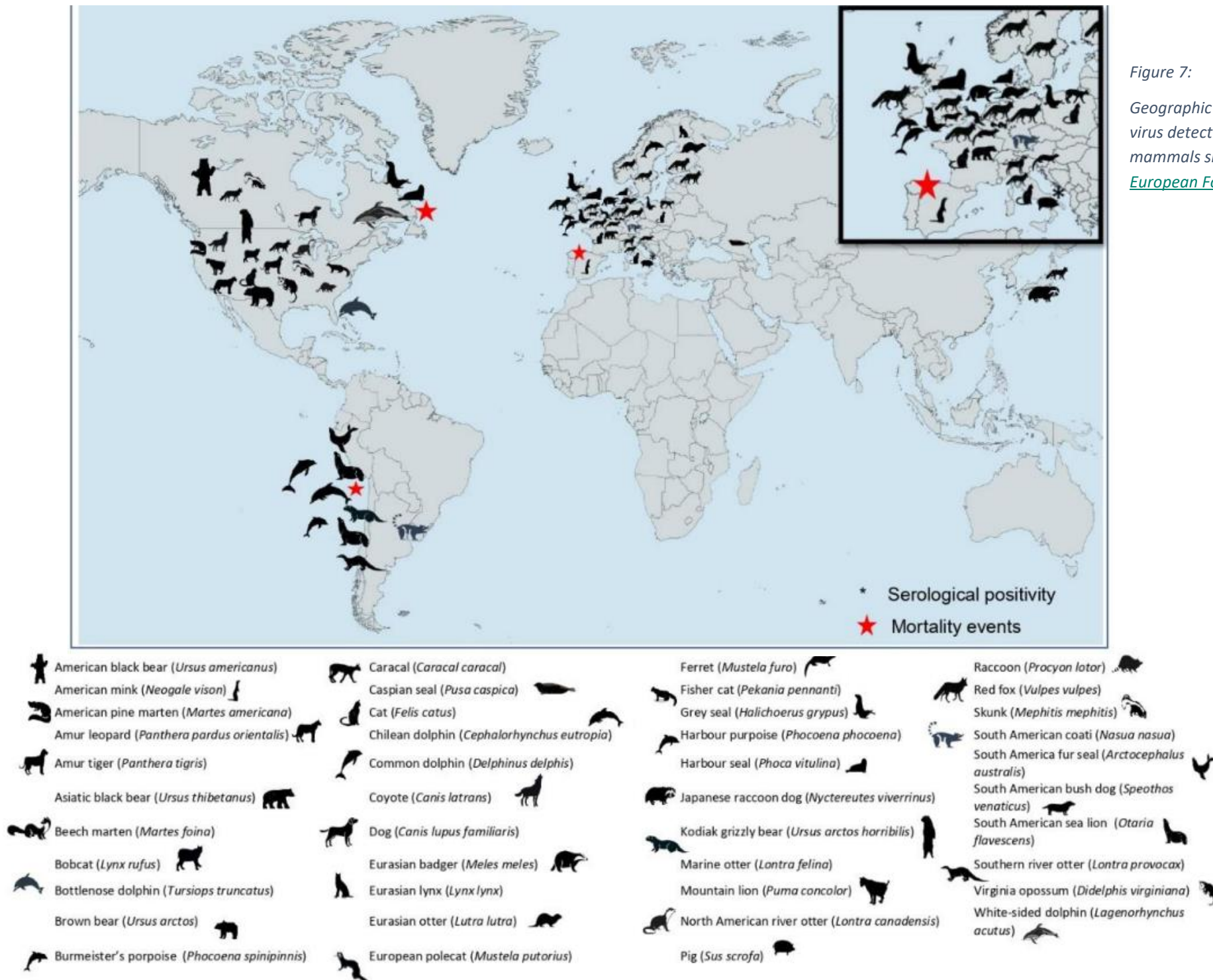


Figure 6: Total number of wild bird cases reported (stacked bars) and number of species involved (brown line) as a function of time (half yearly periods). The different colours denote the order to which the various species of birds belong. Data from World Animal Health Information System. From [Klaassen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

Figure 7:

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



2.3 Occurrence of HPAI in Australia

HPAI strain 2.3.4.4b has not been detected in Australia in wild birds or poultry.

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 eight outbreaks due to HPAI H7 viruses in Australian poultry since 1976, with the most recent being in 2020 in Victoria, all of which were successfully eradicated. All had evidence of contact with wild waterfowl or inadequately treated drinking water that had potentially been contaminated by wild waterfowl. 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.

Outbreaks of HPAI could occur in Australia following:

- transfer of local LPAI viruses from asymptomatic waterfowl to susceptible poultry flocks via close contact, including contamination of poultry feed and water by wild bird droppings or secretions; this is the most likely pathway of introduction into Australian poultry
- migration of infected wild birds on established flyways
- the movement of virus-contaminated poultry products, equipment or other materials.

Research undertaken prior to the emergence of the 2.3.4.4 strains found the risk introduction of HPAI to Australia via migratory birds to be low ([East et al. 2008](#); [East et al. 2008](#); [Curran 2012](#)), due to the fact that waterfowl were the usual species responsible for long-distance transmission of HPAI overseas, whereas waterfowl species found in Australia are not migratory.

A formal risk assessment of the risk to Australia of the 2.3.4.4 strains was undertaken in 2023 but has not yet been published. 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.

The emergence of the 2.3.4.4 strain overseas means an increased risk to Australia, due to the increase in the likelihood of entry into Australia via wild bird migration, and an increased consequence 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**. While 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. [AUSVETPLAN](#) is a series of technical response plans that describe the proposed Australian approach to an emergency animal disease (EAD) incident such as a detection of HPAI. There are many manuals covering different elements of 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 wild animals 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, roles and responsibilities of the groups involved, and coordination of the scientific, logistic, managerial and financial resources.

Wild animal managers must be aware that broad decisions on response and recovery activities to be undertaken 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 Department of Primary Industries or Agriculture in your State/Territory.

The role of managers of wild animal populations will be to support these activities and provide advice to decision-makers as required through the established EAD response framework. Communication and engagement with the Department of Primary Industries or

Agriculture in your State/Territory prior to a HPAI outbreak is recommended to promote understanding and integration of wild animal concerns into overall incident management and to enable the most effective use of the knowledge and expertise of wildlife managers. The EAD response arrangements and roles and responsibilities of various groups in responding to disease in wild animals is described in greater detail in [Emergency Wildlife Disease Response Guidelines](#).

□ Ensure that managers of wild animal populations have a basic understanding of how emergency animal diseases such as HPAI are managed in Australia and what role managers of wild animal populations might play during an HPAI response.

Consider:

- ⇒ Training, such as the EAD foundation course ([see Appendix 4](#))
- ⇒ Engagement with the Department of Primary Industries or Agriculture in your State/Territory.

PART B HPAI RISK MITIGATION TOOLBOX

Figure 8 below 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.

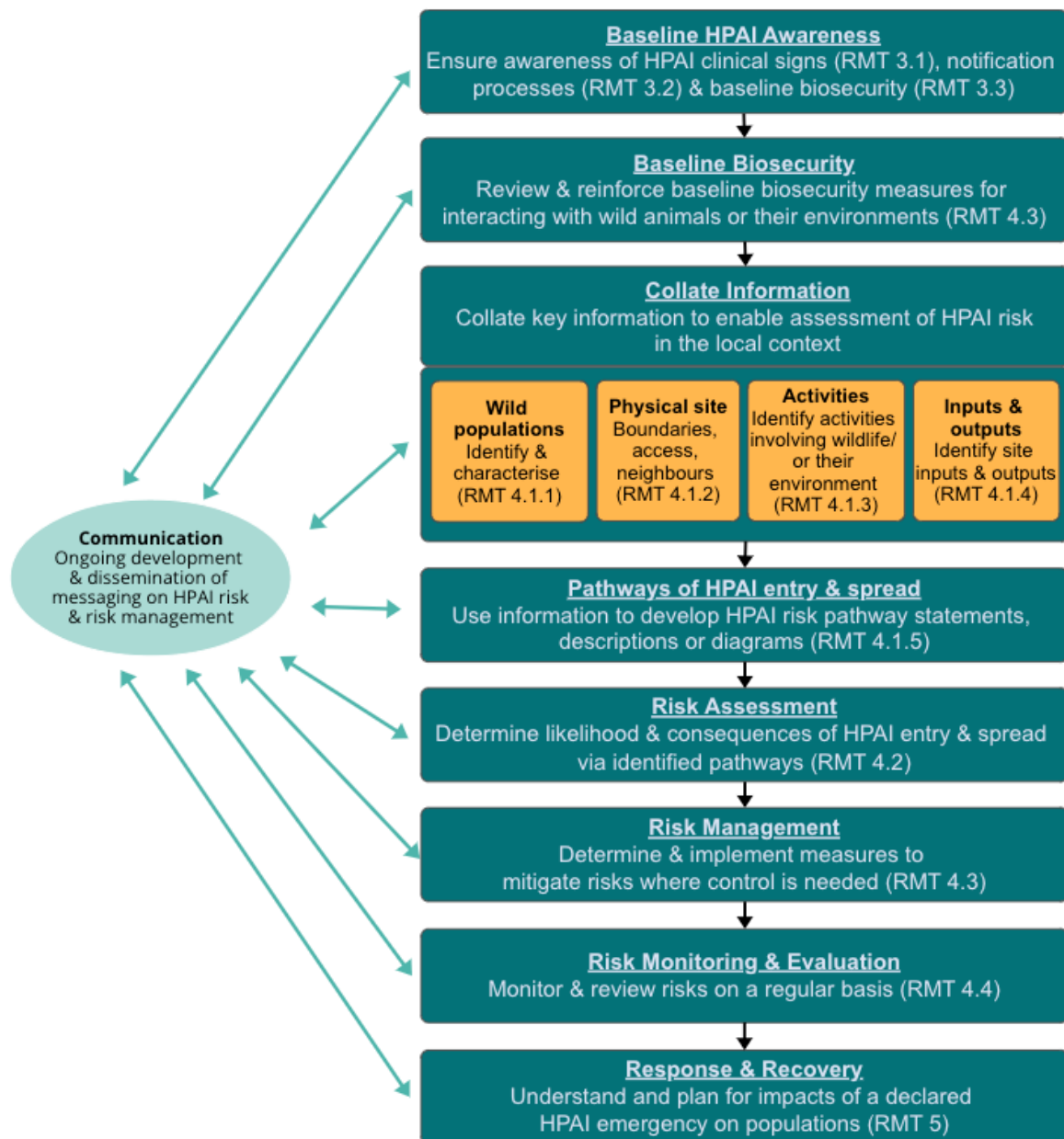


Figure 8 The toolbox should be used in a stepwise fashion as shown.

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 wild animals to reduce the likelihood and consequence of HPAI entry and spread. **They should be employed at all times, even while 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 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. See [Appendix 4](#) for links to videos of wild birds affected by HPAI.

3.1.2 Live mammals

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

Infected live 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 wild animal 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 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 <5 sick or dead wild birds:
 - seabirds, waterbirds, shorebirds or birds of prey
 - any other bird species with signs of AI infection as outlined below.
- sick or dead wild mammals with signs of AI infection as outlined in [Section 3.1](#).

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](#):

- 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 can be made to:

- the Emergency Animal Disease Hotline on 1800 675 888 (toll free, 24 hours per day from anywhere in Australia).
- the [State/Territory WHA Coordinator](#) in which the event is occurring/occurred
- local private veterinarians

- the Department of Primary Industries or Agriculture in the State/Territory in which the event is occurring/occurred.

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

⇒ Staff training

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

- Contact details relevant to your State/Territory
- When should disease be reported
- What information should be collected and reported

3.2.4 What will happen following reporting of disease?

The Department of Primary Industries or Agriculture in the State/Territory 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 rule-in or rule-out HPAI as the cause of disease. Managers of wild animal populations will be advised on the next steps and should await further direction.

There may be a number of 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 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 wild animals, managers and staff should wait for further direction from The Department of Primary Industries or Agriculture in the State/Territory in which the event is occurring before undertaking any further activities.

3.3 Practice good baseline biosecurity

The biosecurity and hygiene practices listed in this section should always be followed when interacting with wild animal populations, even when HPAI is not present in Australia, and when animals appear to be healthy. These should be considered baseline biosecurity measures. Measures should be tailored to the specific site and wild animal populations based on 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 wild animal populations

Interacting with wild animal 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 wild animal 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 wild animal populations

- Use appropriate personal protective equipment (PPE) depending on the activity being undertaken.
- If the activity involves handling wild animals:
 - wear appropriate PPE (e.g. disposable gloves, facemasks and eye protection), and ensure PPE is removed properly to avoid self-contamination.
 - particular attention should be given to hand washing after handling wild animals, after contact with potentially contaminated materials and after removal of gloves. Hands and arms should be washed with abundant soap and warm water. Hand sanitizer (gel with 60 to 90% ethanol concentration) can be applied to reinforce disinfection but should not replace proper handwashing.
 - take care to avoid rubbing eyes or touching the mouth, eating, drinking, or smoking until hands are clean.
 - where practicable, handle animals in a well-lit and well-ventilated area to minimise the possibility of inhaling dried faecal or other material.
 - where disposable gloves are used, use a new pair of gloves for each animal if practicable, especially for species which do not congregate or live in close proximity to each other.

3.3.3 After interaction with wild animal 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 [World Organisation for Animal Health & IUCN Wildlife Health Specialist Group Avian Influenza and Wildlife: Risk management for people working](#)

[with wild birds document](#) also contains some succinct information on cleaning and disinfectant agents for HPAI.

- Waste material (e.g. disposable gloves) should be disposed of appropriately (e.g. sealed in plastic bags).
- Anyone that has handled wild animals 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 wild animal populations, including the date and time of the visit, what activities were undertaken and who was involved.

□ **Ensure that managers of wild animal 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 wild animal populations, specific to the activities typically undertaken at the site
- ⇒ Ensure availability of appropriate PPE, soap and disinfectants, equipment washing facilities and disposal sites for waste materials
- ⇒ Maintain a log of visits to wild animal populations

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

This section sets out a framework for developing a site or population specific risk management plan for HPAI, including undertaking a simple risk assessment. There are many approaches to undertaking risk assessments, some of which can be complex. Wild animal population managers are encouraged, at a minimum, to follow the framework set out in this section, however may also 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 Nature's [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 wild animal 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 the following (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 and political 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
- wild animal translocations
- recreational wildlife hunting

4.1.4 Document population/site inputs and outputs

In a wild animal 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.

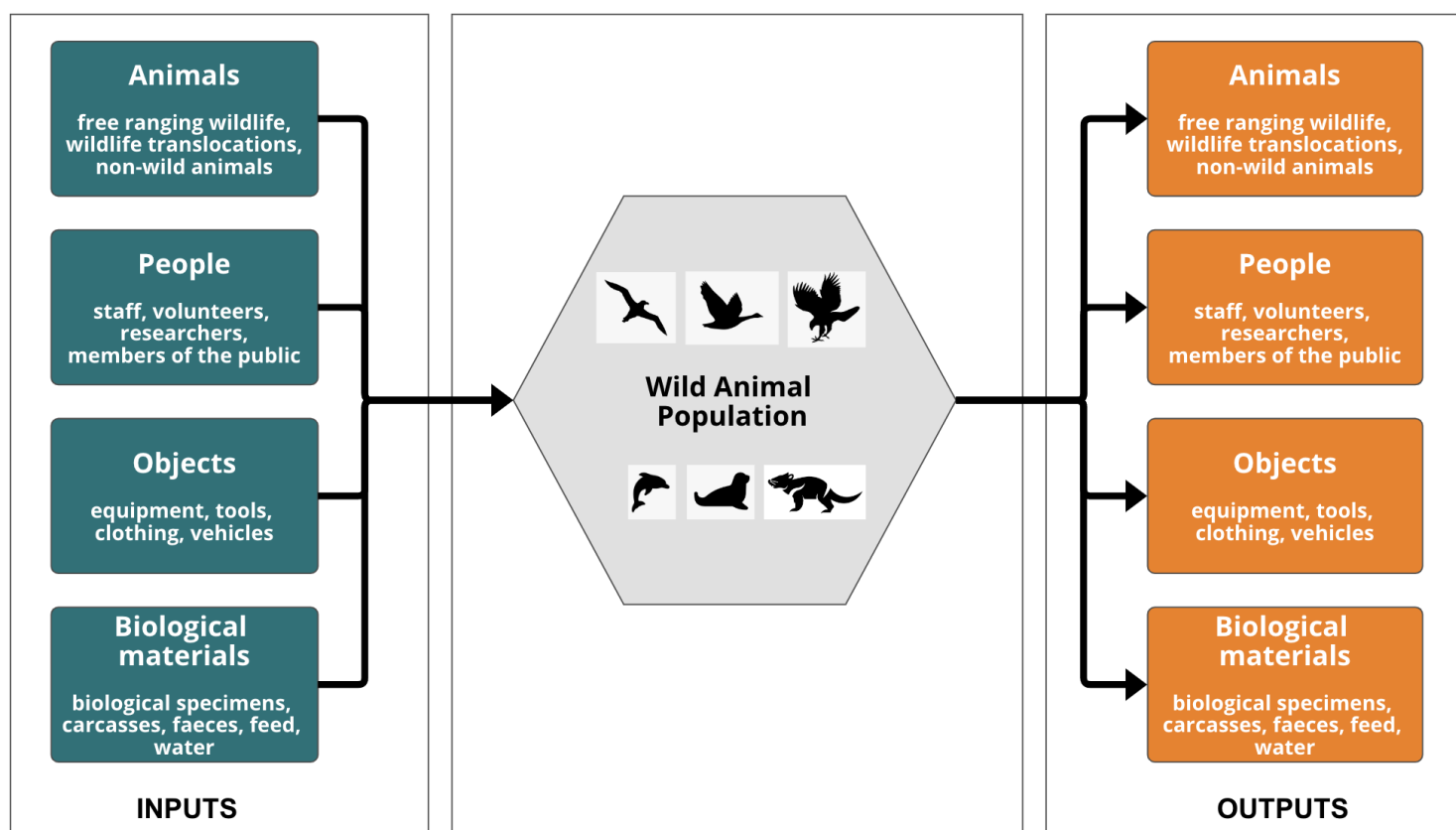


Figure 9: Inputs and outputs of HPAI to and from wild animal populations

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

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

all of the information to make an assessment may not be available. It is recommended that wild animal 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-wild animal 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 rating. Measures could reduce the likelihood and consequence components to risk. 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 may 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 and followed, 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 wild animals

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 describes **potential** approaches to **response and recovery activities**, based on AUSVETPLAN, following a detection of HPAI in Australia, focusing on likely impacts for wild animal sites or populations and their operations.

Activities may be relevant to sites where an active HPAI outbreak is occurring, as well as non-affected sites. Action items for wild animal managers listed in this section are designed to support decision making and on the ground response activities **should they be 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 wild animal 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 what animals in the vicinity 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 wild animals)
- pest animal control activities
- wild animal translocations
- recreational wildlife hunting.

There may be regular activities undertaken at the site that are essential to the health and welfare of the wild animal population, such as maintenance activities. While CCEAD will ultimately determine any restrictions on activities, wild animal 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 may be required for certain activities or restriction exemptions if deemed appropriate by CCEAD.

□ 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](#))
- ⇒ Maintain contact lists of stakeholders that usually visit the site to ensure that any restrictions can be easily communicated
- ⇒ Identify any essential activities that site managers feel should not be subject to restriction and the reason why
- ⇒ Consider 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 wild animals 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 wild animal 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. There are a range of cleaning and disinfectant agents that are effective against AI viruses. These agents 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.

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

- ⇒ **Developing a site standard operating procedure (SOP) for baseline hygiene and biosecurity measures for interacting with wild animal 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 to monitor the spread of the disease and detect disease early if it is present.

Disease surveillance may include a range of activities such as:

- Implementing a regular schedule of observation of populations for clinical 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 wild animal species at the site.
- ⇒ Establishing SOPs for catching wild animal species at the site.

5.6 Euthanasia/culling of wild animals

Australia's policy as per the AUSVETPLAN *Disease Strategy for Avian Influenza* is that no destruction or culling of healthy wild birds will occur 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 joint CMS and FAO's Scientific Task Force on Avian Influenza and Wild Birds.

Euthanasia of sick wild birds may still take place based on considerations of individual animal welfare, consistent with the relevant animal welfare legislation in your 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
- ⇒ Ensure appropriate PPE is available and staff are trained in its use.

5.7 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 wild animal populations, as these are likely to disperse wild animal 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.

5.8 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 the CCEAD.

❑ Document features of the site and wild animal 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?

5.9 Vaccination of wildlife

Following an outbreak of HPAI, Australia's 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 (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 CCEAD.

The current global HPAI situation has provoked interest in the use of vaccination in wild birds. 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 where it is practically and financially feasible. However, there are a number of constraints to the use of vaccination as a risk mitigation tool for HPAI in free-ranging wildlife and to date its application in this context has been limited (see for example vaccination of California Condors in the [California Condor Recovery Program](#)).

☐ 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.

5.10 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 wild animal 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 wild animal 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?	2.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Are you, your staff and anyone regularly interacting with the wild animal populations that you manage familiar with the clinical signs of HPAI in wild animals?	3.1	<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 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"/>		
Are you, your staff and anyone regularly interacting with the wild animal populations aware of baseline biosecurity procedures to follow when interacting with wild animal 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 wild animal 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 wild animals; wild animal dispersal or containment; environmental modification; environmental decontamination; vaccination of wild birds.	5.6 5.7 5.9	<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.
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 wild animals, including: <ul style="list-style-type: none"> Clinical signs that should raises suspicion for HPAI Contact numbers relevant to your State/Territory Information to be collected for reporting Actions to take following disease reporting 	3.1 3.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Do you have a documented plan or procedure for baseline biosecurity measures to be taken by anyone interacting with wild animal 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 measures in the event of an HPAI outbreak?	5.4	<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"/>		
Do you have established procedures for catching the wild animal species found at the site , in the event that this is required for HPAI	5.5	<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.
surveillance? Do you have a register of personnel that are skilled and experienced in undertaking this procedure?						
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"/>		
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"/>		

	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 your HPAI preparedness plans and procedures make it clear that euthanasia or culling of healthy wild animals, 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 wild animals if required to mitigate animal welfare risks?	5.6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you documented information to assist with decision making around carcass removal in the event of an outbreak of HPAI, including: <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 	5.8	<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.
people, vehicles and interacting closely with the population and habitats to remove carcasses?						
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?	5.10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Have you considered measures that could be taken to minimise the biodiversity and conservation impacts of an HPAI outbreak?	5.10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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 wild animal populations supply these items themselves?	3.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Appendix 2 Example spreadsheets for collating population information

These screenshots illustrate 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? (Y/N)	Total number of individuals	Total number of populations	Age structure (Ad:Sub:Juv)	Other population information

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 (cont):

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.
--	---

Appendix 3 (cont):

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 outreach material and contingency planning documents may be applicable at the national, state or local levels, or targeted to various stakeholder groups that interact with wild animals. 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 wild animals affected by HPAI

[Link 1](#)

[Link 2](#)

[Link 3](#)

[Link 4](#)

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
- Wildlife Health Australia- [WHAT TO DO IF... You see sick, orphaned or injured wildlife?](#)
- WOAHP & 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](#)
- Dept for Environment Food & Rural Affairs- Avian influenza - [posters for land managers](#)
- Scottish Govt- [Scottish wild bird highly pathogenic avian influenza response plan](#)
- Council of Managers of National Antarctic Programs - [one page summary](#)
- International Association of Antarctic Tour Operators - [2022-23 Biosecurity Protocols Regarding Avian Influenza](#)
- The Raptor Centre (University of Minnesota) - [notice to falconers](#)
- U.S. Fish & Wildlife Service, [California Condor Recovery Program](#)
- CDC [Information on Bird Flu](#)
- Australian Antarctic Division Safety & Environment Alert - [Avian \(bird\) Influenza](#)
- Michelle Wille- [Avian influenza resources](#)
- Govt of Canada- Wildlife & avian influenza – [Handling guidelines to protect your health](#)
- Government of South Georgia & the South Sandwich Islands- [Biosecurity Handbook](#)
- Falkland Islands Department of Agriculture - [Avian Influenza Information](#)
- Native American Fish & Wildlife Society - [Impacts of HPAI to Native American Cultural Practices](#)
- 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 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 Manual](#)
- [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](#)

AUSVETPLAN

- The Avian Influenza AUSVETPLAN 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)

World Organisation for Animal Health (WOAH)

- WOAH website on [avian influenza](#)
- [Terrestrial Animal Health Code](#)

Global Situation

- World Organisation for Animal Health (WOAH) [website on avian influenza](#)
- World Organisation for Animal Health (WOAH) [updates on avian influenza in animals \(types H5 and H7\)](#)
- Joint OIE-FAO Scientific Network on Animal Influenza (OFFLU) [situation updates and statements on avian influenza](#)
- 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](#)

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

Pathogen	Any organism causing disease.
Spillback	The reverse of <i>spillover</i> . For example, HPAI viruses in poultry can be transmitted back 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 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> .
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.