The Risk of Avian Influenza in the Southern Ocean

A practical guide for operators interacting with wildlife

Advice from Avian Influenza experts suggests that there is a **high risk that Highly Pathogenic Avian Influenza will arrive in the Southern Ocean 2022/23-2024/25 austral summers.**

Summary

Since the beginning of 2022, the increasing intensity of highly pathogenic avian influenza (HPAI) H5N1 outbreaks has resulted in the death of hundreds of thousands of seabirds in the Northern Hemisphere, around the Atlantic and Pacific Oceans and southern Africa. The SCAR Antarctic Wildlife Health Working Group (AWHWG) is highly concerned about the likely arrival and subsequent impact HPAI H5N1 might have on Southern Ocean wildlife. Due to the heightened risk of HPAI being introduced to Antarctica during the the 2022/23 Austral summer by migrating seabirds, the AWHWG recommends that:

- People working with or close to wildlife should assume that HPAI will arrive in the sub-Antarctic and Antarctica and take precautions to protect themselves when working around wildlife (including appropriate PPE) and maintain the highest biosecurity to prevent transmission between wildlife aggregations.
- All National Programmes (NPs) and tourism operators should monitor colonies for signs of H5N1 before approaching, especially in migratory species such as skuas, gulls and giant petrels. Tourists should not enter colonies and high wildlife density areas with suspected HPAI and NPs should conduct risk analysis as to which activities need to continue.
- A more detailed protocol on how to assess wildlife aggregations for HPAI prior to a visit and what to do if HPAI is detected should be provided to all stakeholders physically present in Antarctica this season.
- If you detect signs of HPAI, you should report this to your permit issuer. Videos of affected animals are very helpful for experts to help determine whether or not this is HPAI.
- Operators should refresh themselves with and review all biosecurity and any response guidelines to unusual/mass mortality events.

This document aims to:

1. Outline the likely risk to Southern Ocean taxa (a more technical assessment will follow in a separate document).
2. Suggest which risks can be mitigated in light of human activity, transmission into and out of Antarctica and the sub-Antarctic regions through all operators as well as movements between sites within the Southern Ocean (primarily for science and tourism),
3. Start discussion with National Programmes about ongoing monitoring for disease and consequences.

What is Avian Influenza?

Avian influenza virus (AIV) comprises the avian strains of Influenza A virus (species *Alphainfluenzavirus influenzae*, family *Orthomyxoviridae*). The AIVs maintained in wild birds are low pathogenic avian influenza (LPAI) viruses, which cause no clinical signs of disease in wild birds. Of concern are subtypes H5 and H7, which may become highly pathogenic in poultry and then escape into wild populations. (Horimoto and Kawaokade 2005; Monne et al 2014; Bruin et al 2022). These highly pathogenic avian influenza viruses (HPAI) can range from causing no clinical disease to 100% mortality. The current outbreaks of global concern are caused by HPAI H5N1 viruses.

What is the risk to humans?

There have been 863 human cases of HPAI H5N1 with 456 deaths in 2003–2021. This translates to a low risk of infection in humans, but high risk of mortality if infected (~50%). Human cases caused by the current circulating lineage of HPAI H5 (lineage 2.3.4.4) have been reported in China, Laos, Russia, Nigeria, the UK and USA, with no examples of human to human transmission detected (Wille and Barr 2022). To date, all human infections with HPAI have been in people closely interacting directly with birds. If NPs decide to work at affected sites, we suggest that only appropriately trained field staff in appropriate PPE enter colonies with suspected HPAI and **do not handle sick, dying or dead birds**.

How is it spread?

Transmission and pathogenicity of avian influenza varies by strain and which species it infects. In wild birds, LPAI is transmitted via the faecal-oral route and environmental contamination (mostly water). Direct contact is also believed to be a mechanism of transmission and may be important in the spread of HPAI, in addition to transmission through respiratory droplets.

Colonial nesting seabirds may be at greater risk of disease spread due to the close proximity of individuals and nests over a long period of time, increasing direct contact rates among individuals or with infected faeces and water (Vittecoq et al. 2017).

AIV in seabirds and the risk to Southern Ocean wildlife

The natural reservoir for avian influenza virus comprises aquatic birds, including Anseriformes (ducks, geese, swans) and Charadriiformes (shorebirds, gulls, terns, skuas, auks). Since 2022, a substantial increase in outbreaks of HPAI has led to considerable mortality in seabirds in the Northern Hemisphere, southern Africa and the Atlantic and Pacific Oceans. Outbreaks in seabird colonies of southern Africa began ~2017, and repeated detections in South African and Namibian seabirds include African Penguins, Common Terns, Swift Terns, and Cape Cormorants (Khomenko et al. 2018; Mollini et al. 2020), all taxonomically close to Southern Ocean seabirds. The current HPAI H5N1 has been linked to the death of Harbor Seals (*Phoca vitulina*) and Grey Seals (*Halichoerus grypus*) in the United States and Canada, in addition to a range of other mammals, indicating that the disease is not limited to seabirds (NOAA Fisheries, 2022; Ann 2022).

LPAI strains have been detected in seabirds on the Antarctic Peninsula and South Shetland Islands, comprising Adelie, Gentoo and Chinstrap Penguins (Sanfilippo 2010; Hurt et al. 2014, 2016; Barriga et al. 2016), Southern Giant Petrel (de Souza Petersen et al. 2017), Brown Skua (Seixas 2014), and Snowy Sheathbill (Hurt et al. 2016). Antibodies against AIV have also been detected in a range of seabird species and localities in Antarctica and sub-Antarctic islands (Lang et al. 2016; Smeele et al. 2018).

As of August 2022, no HPAI outbreak has been recorded in the Southern Ocean, however, the recent outbreaks elsewhere suggest high risk of introduction to the region, given a number of species currently impacted in the Northern Hemisphere are Antarctic migrants, such as skuas and terns, and other migratory species (such as gull species) that mix with Antarctic migrants. Migratory species arriving from outside the Southern Ocean (mostly between September and November) that could transmit the virus to the Antarctic and sub-Antarctic coincides with the arrival of penguins and other flying seabirds for breeding, thus increasing the risk amongst susceptible species.

Monitoring for early detection of HPAI

HPAI could most likely be introduced and transmitted to wildlife ‘naturally’ in Antarctica and sub-Antarctic islands via long-distance migratory species for which

HPAI does not preclude long-distance flight. It could also be introduced by humans, via contaminated clothing and equipment.
Continued monitoring of HPAI along migratory pathways will enable all operators to assess the risk and likely arrival of HPAI into sub-Antarctic and Antarctica.
We recommend working with seabird biologists to identify important migratory species, and flyways to monitor the movement of HPAI towards the Southern Ocean and assess the risk of HPAIs arrival.

Detecting and responding to possible outbreaks

Mass mortality events occur normally in times of food stress. These are hard to distinguish from mortality due to disease or contaminants. Most diseased birds will die at sea, making it difficult to notice the impacts of an infectious agent such as HPAI. Ongoing disease monitoring programmes aim to resolve background and 'natural' diseases versus introduced and emerging diseases that pose a risk to populations. Despite this, where mass mortality occurs, it is necessary to react in a precautionary manner because of the risk of HPAI to visitors and wildlife alike and the high risk of spreading it to other colonies. If unusually large numbers or clusters of dead animals are observed, it is best to assume a mass mortality event due to disease, and close the site until further investigation. As a rule, you should alert the person who authorises your visit or issues your permit, which may differ between Antarctica and the sub-Antarctic islands. We strongly advise people against entering possibly infected colonies, touching sick or dying birds, or taking any samples unless they (1) have been trained to do so, (2) are wearing appropriate PPE and taking appropriate biosecurity precautions (3) have a clear need to do so in light of an outbreak (4) have permits to collect diseased samples. To identify potential presence of HPAI in wildlife, some of the most **common behavioural signs** observed in the current outbreak in the Northern Hemisphere include;

- **Neurological issues such as loss of coordination and balance,**
- **Trembling head and body,**
- **Sudden and rapid increase in the number of birds found dead between visits,**
- **Lethargy and depression, unresponsiveness, lying down, drooping wings, dragging legs,**
- Swollen head,
- Closed and excessively watery eyes, possibly with opaque cornea or darkened iris (new symptom associated with current outbreak),

- Twisting of the head and neck,
- Haemorrhages on shanks of the legs and under the skin of the neck,
- Respiratory distress such as gaping (mouth breathing), nasal snicking (coughing sound), sneezing, gurgling or rattling,
- Discoloured or loose watery droppings, bright green in some species.

Bold points are practical observations that could be made via binoculars prior to landing or approaching the colony. In the event of an outbreak, it would be expected that multiple of these behavioural signs are manifested by multiple individuals. If in doubt, it is best to refrain from approaching the colony and reporting for someone else to confirm. This could be a second opinion from someone who knows

Examples of behaviours observed in infected seabirds in recent outbreak:

- https://twitter.com/i/status/1542423370511302656
- https://twitter.com/gannetrocks/status/1549641794165538817
- https://photos.app.goo.gl/u9f3jpuy4SKQr1Lw9

One of the most practical changes that visitors can make prior to approaching a colony is a site assessment looking for behavioural signs (listed above). Experienced researchers, guides and naturalists will be especially good at spotting atypical behaviour and spasms, which could be integrated into a site evaluation prior to landing. If one is unsure if the behaviour is typical of HPAI, video footage could be taken using a mobile phone and sent to the Antarctic Wildlife Health Working Group for verification by an expert team (contact details below). In case of an abnormal number of dead individuals, panoramic pictures should be taken. **Do not approach colonies if there is a suspected disease outbreak.**

Prevention and Control

Given that Antarctica and sub-Antarctic islands are at high risk for the 2022/23 Austral summer, personnel from all operators living, working and visiting these regions should **act as if HPAI will arrive in Antarctica and sub-Antarctic Islands** and should take appropriate precautions. Responses may be stepped up if cases are confirmed. Suggested prevention and control measures that operators can immediately implement to prevent the spread of HPAI are outlined below:

Before leaving for Antarctica and the sub-Antarctic:

1. All expeditioners/guides working in other wildlife areas (e.g., seabird colonies, the Arctic, Alaska, etc.) should thoroughly remove any soiled material (i.e., soil, faeces) from their boots and disinfect all clothing, footwear and any equipment before leaving for Antarctica and the sub-Antarctic to prevent introduction of HPAI from other wildlife areas. It is recommended to use new clothes, footwear and equipment when possible.

2. All guests should remove all soiled material and disinfect footwear before boarding the vessel, especially if they have been near wildlife colonies.

3. The use of Virkon™ S, F10 or soap followed by 10% bleach is recommended for disinfection of boots and outer clothing.

Before visiting a colony or wildlife aggregation:

1. In general, regional specific advice/regulation may exist, so we suggest adopting whichever is the more precautionary.

2. To identify if a colony is potentially infected with HPAI, an appropriately trained or experienced guide/research team should be sent out via zodiac and avoid landing if possible (or via high vantage point at remote southern colonies) and observe the colony using binoculars to look for carcasses and behaviour of live birds (listed above) before entering site/sending tourists/parties to shore. In case of terrestrial approaching, observations using binoculars will be made at a distance of 150 m from the closest animal aggregation.

3. If there are signs of an unusual/mass mortality event or behavioural signs of HPAI within a colony, the visit should be aborted. Equipment and clothing should be disinfected as soon as possible and the observations reported to your permit issuer/national authority immediately. There may be specific reporting forms or procedures, particularly for sub-Antarctic Islands.

4. In general, all equipment (including boots, backpacks, hiking poles, tripods, and cones or route markers etc.) should be cleaned of any soiled material (i.e., soil, faeces) and disinfected before disembarking the boat/leaving base and every time after visiting a colony.

During a visit:

1. Unless permitted, visitors to wildlife colonies, without a permit, should always keep **a minimum distance of 5 metres from wildlife**, in addition to strict adherence to IAATO guidelines/ATCM general guidelines or any other local requirements. (https://documents.ats.aq/recatt/att483_e.pdf) given a greater

distance may be required for different animal species and age cohorts. If an animal spontaneously approaches an individual or visitors, they should retreat to ensure this minimum distance is rigorously adhered to unless specifically studying or sampling animals.

2. People should refrain from sitting on or lying on bare ground or rocks, or leaving any equipment on bare ground or rocks close to animal activity or faecal matter (within 10 metres of nests, haul-out sites or pathways). Freshwater pools should also be avoided.

3. To minimise animal exposure to equipment/potential fomite transmission (i.e., transmission from objects or equipment carrying infection), field equipment should not be left unattended and should be kept far from wildlife.

4. Visitors should adhere to strict recommendations for personal hygiene at all times (frequent hand washing for the appropriate time and regular disinfection).

5. **Never touch birds, dead or alive unless you have a permit that in this case specifically includes birds with suspected disease.**

Post visit:

1. All equipment (including boots, tripods, etc.) should be also cleaned of any soiled material (i.e., soil, faeces) and disinfected upon returning to the ship or a base after a shore visit. Wear a mask to prevent inhalation during cleaning.
2. Field equipment disinfection procedures should be carried out prior to and after shore visits.

General Recommendations:

1. All logistics providers and expeditions should be on high alert for HPAI from September through to April, **assume HPAI will arrive in the Southern Ocean** and take appropriate precautions. In addition:

    a. Wear appropriate PPE including face masks and gloves when handling seabirds in the absence of disease or even working close to wildlife. If disease is suspected, PPE should be increased to include, disposable overalls/aprons and safety glasses/shield,

    b. Be appropriately trained in working with potentially infectious animals, and correctly wear/remove/dispose of PPE. The World Health Organisation has online training for this. https://openwho.org/courses/IPC-PPE-EN

2. Anyone responsible for groups visiting/transiting through wildlife colonies should be briefed on identifying signs of mass mortality events and HPAI behavioural signs, and abort visits if signs of mass mortality is seen.
3. Minimise movements between wildlife aggregations without biosecurity (eg fieldworkers walking between aggregations within a single day.
4. To avoid transmission through fomites, disinfect outer clothing using soap and warm water every day prior to and after work with animals and in between colonies (if researchers visit more than one colony per day).
5. Field equipment disinfection procedures should be carried out prior to and after animal handling, especially when working in different areas or colonies. Wherever possible, it is recommended that field/sampling equipment not be shared between locations if appropriate disinfection cannot be achieved. The use of 70% ethanol, Virkon™ S, F10 or 10% bleach (sodium hypochlorite) and soap are recommended.
6. Special attention should be paid to keep strictly stored controlled poultry meat and eggs and their remains in the vessels and stations and waste products be incinerated.

Response to Suspected Avian Influenza Outbreak

1. Abort a visit if signs of HPAI are seen.
    a. Do not enter colonies with suspected HPAI
    b. **Do not touch dead, sick or dying birds.** Advice from vets is not to remove carcases in an attempt to reduce infection.
    a. **Immediately report the event following your organisation's reporting procedures (see below for evidence you can collect)**
2. Sampling requires appropriate authorisation/permitting and, if done without training, PPE and containment, could do more harm than good as well as being a breach of permits or the law.
3. The suspected event should be **reported immediately to the following:**
    a. Nearest scientific station, field parties, and vessels operating in the area;
    b. The National Competent Authority which permits/authorises the operation;

c. The Council of Managers for Antarctic Programmes (COMNAP)

d. The International Association of Tour of Antarctica Operators (IAATO)

e. National Programs should then report the event to the World Organisation for Animal Health (WOAH)

Relevant contacts are listed below.

Helpful information to collect/provide:

- Date;
- Time in GMT
- Location including name of site and coordinates (use a GPS if available),
- Name of observer, organisation and vessel (if applicable)
- Area affected,
- Species present, age class and sex ratio, and which one(s) seem(s) affected by the outbreak (if available),
- Indication of the number of animals involved - if possible count the dead and dying and estimate the percentage of each among the colony,
- Note any behavioural signs, and
- Photographs and/or videos of unusual behaviours, but also of groups of apparently healthy and unhealthy/dead individuals.

If landing was conducted and later the presence of HPAI suspected, all clothing and footwear should be cleaned and disinfected using 70% ethanol, Virkon S, F10 or soap and then 10% commercial bleach (sodium hypochlorite).

4. If a National Competent Authority permits/authorises an investigation team, they must be adequately trained and aware of all risks. The team must follow guidelines on health and safety and ensure adequate personal protection. The team will not visit any unaffected colonies after visiting the affected colony. Specific guidelines for fieldworkers and investigation teams are attached.

Contacts for reporting a suspected Avian Influenza outbreak

- Antarctic National Competent Authorities:

https://www.ats.aq/devAS/Ats/NationalCompetentAuthorities?lang=e

- The International Associate for Antarctic Tour Operators

environment@iaato.org; +1 401 608 2090; www.iaato.org

- The World Organisation for Animal Health (WOAH)

As HPAI is a globally notifiable disease, the World Organisation for Animal Health (WOAH) **needs to be notified by the authorising authority if there is any** suspected outbreak.

Submission of a suspected outbreak can additionally be reported to the PROMED website using the following link:

- https://promedmail.org/submitinfo

Avian Influenza Surveillance

- **If you are interested in either longer-term or rapid, in-field surveillance using an in-field "lab in a suitcase"**, or for any of the references, please contact:
    - Meagan Dewar - m.dewar@federation.edu.au
    - Tom Hart - tom.hart@biology.ox.ac.uk
- **To confirm suspect behaviour**, please send example footage to the:
    - Antarctic Wildlife Health Network - wildlifehealthmonitoringgroup@gmail.com

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