

Obstacles in collecting bycaught seabird specimens from observer program
during the HPAI pandemic

Daisuke Ochi

¹Fisheries Resources Institute, Japan Fisheries Research and Education Agency

要約

ミナミマグロ（SBT）はえ縄漁業における混獲海鳥の種同定は、CCSBT-ERSWGにおける混獲リスク評価実施のために優先度の高いタスクである。正確な種同定のためには、混獲された海鳥の外部形態測定、写真撮影、DNA 標本の収集が不可欠である。しかし、近年の高病原性鳥インフルエンザ H5N1（HPAI）の世界的流行により、これらの取り組みに障害が発生することが懸念される。HPAI は南半球のアホウドリ類にも感染が確認されており、鳥からヒトへの感染例も増加している。このような状況から、船員の感染リスクの観点で船上での混獲海鳥の調査がより困難になることが予想される。陸上での HPAI 感染の恐れがある野鳥の取り扱いに関する感染防止対策については多くの情報があるが、海上での対策に関する情報共有はほとんどなされていない。そのため、種同定データの安定的な収集を維持するために、CCSBT が関連する他の組織 (ACAP や WOAH など) と協力の上 HPAI に関する海鳥の安全な取り扱いに関するガイドラインを検討し、広く共有することが勧奨される。

SUMMARY

Species identification of seabirds bycaught in southern bluefin tuna (SBT) longline fisheries is a high-priority task for assessing the risk of bycatch in CCSBT-ERSWG. Collecting external morphometric measurements, photographs, and DNA specimens from bycaught seabirds is essential for precise species identification. However, the recent global spread of highly pathogenic avian influenza H5N1 (HPAI) raises concerns about obstacles to these efforts. HPAI has been detected in seabird species, even in albatross species in southern hemisphere, and human infections from birds have also increased. This situation may make it more difficult to conduct onboard surveys of bycaught seabirds due to the risk of infection to crew members. While there is ample information on infection prevention measures for handling potentially HPAI-infected wild birds on land, there is little shared information on measures at sea. Therefore, to ensure stable collection of species identification data, it would be recommended that the CCSBT to develop and share guidelines for the safe handling of seabirds from an HPAI perspective with the collaboration of other organization (e.g. ACAP and WOAH).

1. BACKGROUND AND CURRENT ISSUE

The global outbreak of highly pathogenic avian influenza (HPAI) H5N1 since 2021 has expanded to pelagic seabirds, with infections spreading around Europe, Asia, Africa, the Americas, and even sub-

Antarctic islands (Bennison et al. 2023). The H5N1 strain has been noted to have a higher risk of human infection compared to other influenza strains, and it is recommended to avoid contact with wild birds suspected of being infected as much as possible.

Species identification of seabirds bycaught in SBT longline fisheries is a high-priority task for conducting bycatch risk assessments in the CCSBT-ERSWG, and improving species identification accuracy is listed in the ERSWG work plan (CCSBT-ERS/2406/05) and a multi-year seabird strategy (CCSBT-ERS/2406/09). Collecting external morphometric measurements, photographs, and DNA specimens from bycaught seabirds is essential for accurate species identification.

However, this effort is facing difficulties due to the aforementioned HPAI pandemic. HPAI infections have already been detected in albatrosses and petrels (ACAP 2023, 2024). When scientific observers collect species identification information from bycaught seabirds, the infection risk is presumed to be lower than on land. However, since most bycaught seabirds are dead when retrieved on deck, it is difficult to determine if there are signs of infection, and concerns about the risk of infection to vessel crews and scientific observers during sample collection cannot be dispelled.

Currently, while there are multiple publicly available information on handling wild birds suspected of avian influenza infection on land (e.g. CMS and FAO 2023; Cromie et al. 2012; WOA 2022), information on handling seabirds suspected of HPAI infection encountered offshore on a vessel is very limited, and implementing land-based protocols on a vessel is very challenging (e.g., disposable protective clothing and gloves, disinfection, etc.). There may be health concerns raised by crews and observers planning to collect seabird specimens. If the HPAI outbreak continues and appropriate handling methods are not established on board, it is also anticipated that seabird sample collection may be temporarily suspended as a precautionary measure, making species identification efforts significantly more difficult.

2. CONCLUSION AND RECOMMENDATIONS

- Continued collection of samples from bycaught seabirds is necessary for species identification.
- Appropriate handling protocols for HPAI infection prevention are needed to alleviate the concerns of fishing vessel crew members and observers and to continue sample collection.
- The CCSBT-ERSWG should recommend that the CCSBT collaborate with relevant organizations (such as ACAP and WOA) to develop practical infection prevention protocols for seabirds and widely share this information.

REFERENCES

- ACAP (2023) *Guidelines for working with albatrosses and petrels during the high pathogenicity avian influenza (HPAI) H5N1 panzootic*. <https://acap.aq/resources/acap-conservation-guidelines/4084-guidelines-for-working-with-albatrosses-and-petrels-during-h5n1-avian-influenza-outbreak/file>
- ACAP (2024) *Avian flu*. <https://www.acap.aq/resources/disease-threats/avian-flu>
- Bennison, A., Byrne, A. M., Reid, S. M., Lynton-Jenkins, J. G., Mollett, B., Silva, D. D., ... & Banyard, A. C. (2023). Detection and spread of high pathogenicity avian influenza virus H5N1 in the Antarctic Region. bioRxiv, 2023-11. doi: <https://doi.org/10.1101/2023.11.23.568045>
- CMS & FAO (2023) *Scientific Task Force on Avian Influenza and Wild Birds statement on H5N1 High pathogenicity avian influenza in wild birds - Unprecedented conservation impacts and urgent needs*. https://www.cms.int/sites/default/files/publication/avian_influenza_2023_aug.pdf

- Cromie, R. L., Lee, R., Delahay, R. D. J., Newth, J. L., O'Brien, M. F., Fairlamb, H. A., ... & Stroud, D. A. (2012). *Ramsar wetland disease manual: guidelines for assessment, monitoring and management of animal disease in wetlands*. Secretariat of the Ramsar Convention on Wetlands. https://www.wwt.org.uk/uploads/documents/Ramsar_Wetland_Disease_Manual.pdf
- WOAH (2022) *Avian influenza and wildlife. Risk management for people working with wild birds*. <https://www.woah.org/app/uploads/2022/08/avian-influenza-and-wildlife-risk-management-for-people-working-with-wild-birds.pdf>



Guidelines for working with albatrosses and petrels during the high pathogenicity avian influenza (HPAI) H5N1 panzootic

ACAP Intersessional Group on High Pathogenicity Avian Influenza H5N1

November 2023

Relevant information on high pathogenicity avian influenza (HPAI) H5N1

1. The current panzootic wave of high pathogenicity avian influenza (HPAI) subtype H5N1 started in 2021 and has killed millions of seabirds worldwide.
2. HPAI H5N1 viruses spread to South America in late 2022 and have since caused mass mortality of seabirds and marine mammals.
3. HPAI H5N1 viruses have arrived in sub-Antarctic islands in October 2023, but not yet in mainland Antarctica. The situation may change rapidly.
4. Oceania, including Australia and New Zealand, is the only remaining region of the world free of this virus, but this situation may also change rapidly.
5. By the end of October 2023 no mass mortality events of procellariiform birds have been attributed to HPAI H5N1; however, these species are susceptible to infection and could be vulnerable to future outbreaks.
6. Birds infected by HPAI H5N1 viruses typically show one or more of the following disease signs: atypical behaviour, neurological signs, conjunctivitis, and respiratory distress.
7. The virus is transmissible to humans, but risk is currently considered low.

The term “panzootic” refers to a large-scale spread of a pathogen in animals across continents or even worldwide (in other words, the animal equivalent to “pandemic” in humans). The ongoing panzootic wave of high pathogenicity avian influenza (HPAI) subtype H5N1 started in 2021, and has since caused the death of millions of birds, having spread to five continents (as of 5 November 2023, only Oceania and mainland Antarctica remain free of the disease). While HPAI H5N1 has been recognized as a threat to the poultry industry since its emergence in 1996, a genetic shift occurred in 2021, resulting in an explosion of cases in wild birds, especially seabirds. In particular, there has been a dramatic expansion in the range of known host species, which now comprises birds and mammals of 356 species across 21 orders (Klaassen & Wille 2023). Associated with this, there have been numerous, major mass mortality events, resulting in the death of hundreds of thousands of boobies, pelicans, terns, cormorants, cranes, geese, gannets, skuas and penguins in Africa, Eurasia, and the Americas (EFSA 2023; Breed et al. 2023). In addition to the enormous impact on wild birds, HPAI H5N1 has affected a wide diversity of wild mammals, including several marine mammals such as pinnipeds and cetaceans (EFSA 2023).

To date, there have been relatively few detections of HPAI H5N1 in Procellariiformes (**Table 1**). The clustered detection of HPAI H5N1 in small numbers of Sooty Shearwaters (*Ardenna grisea*) and Waved Albatross (*Phoebastria irrorata*) in Peru and Short-tailed Shearwaters (*Ardenna tenuirostris*) in Alaska suggests that localized outbreaks might have occurred; however, to date there are no reports of large-scale mortalities of Procellariiformes attributed to HPAI H5N1. This is likely because most HPAI H5N1 detections in Procellariiformes have occurred at wintering/foraging areas, in small numbers and in multi-species outbreaks, and most breeding colonies of procellariiform species are remote and thus located far from the epicentre of activity (**Figure 1**). Nevertheless, these sporadic detections of HPAI H5N1 in Procellariiformes confirm that these species are susceptible to the infection and could therefore be vulnerable if the virus were to spread to their breeding habitat.

In this context, the arrival and spread of HPAI H5N1 within seabird and marine mammal populations in South America since November 2022 is acutely concerning (Breed et al. 2023). The virus is approaching important breeding sites for ACAP-listed species and priority populations, and these species could be severely impacted if outbreaks were to occur at breeding colonies. For example, the first detection of HPAI H5N1 in seabirds at the Galapagos Islands in September 2023 is of concern for the conservation of the Waved Albatross, an ACAP-listed and critically endangered species that is endemic to that archipelago. Additionally, the detection of HPAI H5N1 in an Antarctic Prion (*Pachyptila desolata*) in Brazil in September 2023 is also worrying as it highlights the possibility that Procellariiformes might be exposed to the virus during their migration and could transport the virus when returning to their breeding colonies in the Southern Ocean. The high number of marine mammals affected by HPAI H5N1 in southern South America has also increased the alertness for the region, especially considering the proximity of cases in Patagonia to the Antarctic Peninsula. Scavengers such as giant petrels, gulls, skuas and sheathbills, among others, have been seen consuming the carcasses of infected marine mammals and pose an increased risk for further virus spread to the sub-Antarctic and Antarctic regions (Breed et al. 2023, Dewar et al. 2023). Indeed, the confirmation of HPAI H5N1 in Brown Skua populations on Bird Island (South Georgia/Islas Georgias del Sur*) and in a Southern Fulmar (*Fulmarus glacialisoides*) found dead near Stanley (Falkland Islands/Islas Malvinas*) in October 2023, the first known cases in the sub-Antarctic region, raises extreme concern for the ACAP species breeding on these sites; Wandering Albatross (*Diomedea exulans*), Black-browed Albatross (*Thalassarche melanophris*), Grey-headed Albatross (*Thalassarche chrysostoma*) and Light-mantled Sooty Albatross (*Phoebastria palpebrata*), as well as Northern Giant Petrel (*Macronectes halli*) and Southern Giant Petrel (*Macronectes giganteus*).

The 2023/2024 austral summer may present the greatest potential for HPAI outbreaks among seabird populations in the Southern Hemisphere, when most of these birds will congregate to breed. Therefore, all sites where ACAP species congregate or breed may be at risk of exposure via migratory birds and authorities should thus be in a state of alertness. Although the primary introduction route of the virus in seabird colonies has been through natural pathways, accidental introduction by human activities (tourism, fisheries, science, etc.) must be also considered as a potential risk. For detailed information on breeding sites of ACAP species, please refer to <https://www.acap.aq/acap-species>.

* A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Islas Malvinas), South Georgia and the South Sandwich Islands (Islas Georgias del Sur y Islas Sandwich del Sur) and the surrounding maritime areas.

Table 1. Summary of HPAI detections in Procellariiformes (updated 5 November 2023).

Species	Site	Date	Latitude	Longitude
Northern Giant Petrel ¹ <i>Macronectes halli</i>	St Helena Bay, South Africa	16/09/2021	-32.74	17.99
Great-winged Petrel <i>Pterodroma macroptera</i>	Silverstroomstrand, South Africa	12/11/2021	-33.59	18.36
Great-winged Petrel <i>Pterodroma macroptera</i>	Cape Town, South Africa	15/10/2021	-33.87	18.49
Great Shearwater <i>Ardenna gravis</i>	St. John's, Canada	11/05/2022	47.59	-52.70
Manx Shearwater <i>Puffinus puffinus</i>	Isle of Rum, UK	07/04/2022	57.00	-6.33
Northern Fulmar <i>Fulmarus glacialis</i>	Opinan, UK	19/09/2022	57.68	-5.78
Northern Fulmar <i>Fulmarus glacialis</i>	Dornoch, UK	21/09/2022	57.87	-4.01
Northern Fulmar <i>Fulmarus glacialis</i>	Opinan, UK	31/10/2022	57.68	-5.78
Northern Fulmar <i>Fulmarus glacialis</i>	San Luis Obispo, USA	13/12/2022	35.29	-120.66
Manx Shearwater <i>Puffinus puffinus</i>	Itanhaém, Brazil	09/03/2023	-24.25	-46.89
Sooty Shearwater <i>Ardenna grisea</i>	At sea near Putu, Chile	25/03/2023	-35.16	-72.61
Sooty Shearwater <i>Ardenna grisea</i>	Playa Chica Cartagena, Chile	01/04/2023	-33.55	-71.61
Black-browed Albatross ¹ <i>Thalassarche melanophris</i>	Colaco, Chile	20/04/2023	-41.78	-73.52
Southern Giant Petrel ¹ <i>Macronectes giganteus</i>	Playa Guanaqueros, Chile	27/04/2023	-30.20	-71.43
Waved Albatross ¹ <i>Phoebastria irrorata</i>	Playa Las Gaviotas, Peru	22/05/2023	-8.49	-78.86
Sooty Shearwater ² <i>Ardenna grisea</i>	Puerto Santa, Peru	22/06/2023	-9.00	-78.65
Northern Fulmar <i>Fulmarus glacialis</i>	Whitehaven, UK	13/07/2023	54.56	-3.56
Northern Fulmar <i>Fulmarus glacialis</i>	Longyearbyen, Svalbard (Norway)	09/08/2023	78.23	15.72
Short-tailed Shearwater ² <i>Ardenna tenuirostris</i>	North Slope Borough, Alaska (USA)	25/08/2023	71.29	-156.78
Northern Fulmar <i>Fulmarus glacialis</i>	Suðuroybanki, Faroe Islands (Denmark)	05/09/2023	61.56	-6.06
Northern Fulmar <i>Fulmarus glacialis</i>	Nólsoy, Faroe Islands (Denmark)	13/09/2023	62.01	-6.67
Manx Shearwater <i>Puffinus puffinus</i>	Bertioga, Brazil	13/09/2023	-23.78	-45.95
Antarctic Prion <i>Pachyptila desolata</i>	Itanhaém, Brazil	16/09/2023	-24.20	-46.81
Waved Albatross ^{1,2} <i>Phoebastria irrorata</i>	Moche, Peru	25/09/2023	-8.17	-79.03
Southern Fulmar <i>Fulmarus glacialoides</i>	Stanley, Falkland Islands (Islas Malvinas) ³	30/10/2023	-51.69	-57.86

¹ ACAP-listed species.

² Detection in two or more individuals collected at the same site and date.

³ A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Islas Malvinas), South Georgia and the South Sandwich Islands (Islas Georgias del Sur y Islas Sandwich del Sur) and the surrounding maritime areas.

Table to be updated monthly online at <https://acap.aq/resources/disease-threats/avian-flu>. The numbers of individuals in this table represent those tested and shown to be positive for HPAI H5Nx; they do not necessarily show the total number of birds likely to have died from HPAI at any location either on the date of the listed sample collection or thereafter. Sampling protocols may differ between countries.



Figure 1. Notifications of HPAI outbreaks to the World Organisation for Animal Health (WOAH) in Procellariiformes (updated 5 November 2023). Parties of the Agreement for the Conservation of Albatrosses and Petrels (ACAP) are marked in blue.

The first indication of HPAI may be unexplained deaths leading to a higher than usual mortality rate, especially of multiple species and clustered in space and time.

Clinical manifestations of HPAI H5N1 differ among species, and virtually nothing is known about how the disease manifests in Procellariiformes, however it is likely to be consistent with other seabirds. The most common and recognized clinical signs in seabirds include:

- Atypical behaviour such as unusual docility, landing at atypical places, lethargy and depression, unresponsiveness, lying down, drooping wings, and dragging legs.
- Neurological signs such as loss of coordination and balance, trembling or twitching of the head and body, twisting of the neck, repetitive movements, walking or swimming in circles, and seizures.
- Conjunctivitis, with closed or excessively watery eyes, possibly with slightly milky to opaque cornea. Darkening of the iris has also been reported in some species.
- Respiratory distress, with gaping (mouth breathing), nasal snicking (coughing sound), sneezing, gurgling, or rattling.

It is important to consider that numerous diseases may cause similar signs (for example: paralytic shellfish poisoning, Newcastle disease, mycoplasmosis, Marek’s disease, botulism, etc.), which highlights the importance of collecting and testing samples from affected birds in order to confirm the diagnosis.

HPAI H5N1 also has the ability to infect humans. However, while previous strains of this virus showed high lethality to humans (case fatality rate as high as 50-60%), the strains that have recently spread globally (referred to as “clade 2.3.4.4b”) have infrequently infected humans despite the tens of thousands of poultry outbreaks and likely human exposures to the virus. For this reason, the World Health Organization considers that the risk is “low” for humans (WHO 2022) and the European Centre for Disease Prevention and Control considers the risk is “low” for the general public (ECDC 2023). The risk has been assessed as “low to moderate” for occupationally-exposed or groups otherwise exposed to avian influenza-infected birds or mammals (ECDC 2023), and therefore caution is warranted, including appropriate use of personal protective equipment, when working in outbreak settings.

Recommendations for ACAP Parties representatives, government authorities and managers

Recommendations before an HPAI outbreak occurs

1. In preparation for potential HPAI outbreaks, scientists, wildlife managers and animal health agencies should work jointly with national governments on increasing surveillance efforts, minimizing disturbance (especially when/where populations are more stressed, e.g., breeding sites), increasing awareness and enabling a streamlined reporting and response mechanism.
2. Ensure that the following are clearly communicated to the local community, tourism agencies and guides, managers and scientists: (a) the risks posed by HPAI to human and animal health, (b) how to prevent human exposure and avoid human-mediated spread of HPAI viruses, and (c) how to recognize and report suspected HPAI cases in wild and domestic animals, and humans.
3. Where feasible, enhance surveillance and sampling efforts for the early detection of HPAI infection in symptomatic and dead wild birds and mammals, especially at breeding sites of ACAP species and other vulnerable seabirds.
4. Prepare and keep an updated emergency response plan that enables quick investigation of potential HPAI cases and outbreaks and minimizes risk of spread. Coordination with scientists or government authorities in neighbouring countries and particularly those that share migratory bird flyways is highly encouraged. Coordination with national reference laboratories is also recommended to ensure that laboratory testing capacity is in place to detect HPAI quickly and accurately in samples from wildlife, including ACAP species.
5. Establish a plan for visits and fieldwork at sites where ACAP species breed or congregate. This plan should include protocols or guidelines on (a) an initial assessment upon approaching/arriving at the site, (b) procedures if there are sick or dead animals that could be due to HPAI, and (c) biosecurity measures to be adopted when there is no evidence of sick or dead animals that could be due to HPAI.
 - The initial assessment should be conducted upon approaching/arrival, before entering the colony area or handling birds. This could include a survey using binoculars or drones to check for clinical signs and atypical mortality. If the site accommodates multiple species, and particularly if it includes birds and mammals, the survey should include as many of the species and areas of overlap as possible. At vulnerable locations with frequent tourist visitation such as Antarctica, the initial assessment should be performed by a staff member experienced in avian biology and behaviour before tourist landing.
 - If there is evidence of sick or dead animals, visitors should not be allowed to land/visit the site. Non-essential activities, especially those that involve the close approach of birds and mammals, should also be suspended. A clear procedure for the notification of government authorities should be established in advance. Whenever possible, additional information obtained during the initial assessment (number, species, ages and clinical signs of the animals, including photographs and videos) should also be reported to authorities.
 - Even if HPAI has not been recorded in the area and no abnormalities are detected

by the initial assessment at the site, it is still recommended that strict biosecurity measures should be implemented during the 2023/2024 austral summer as a precaution. It is particularly important that personnel going to apparently unaffected sites ensure they do not accidentally introduce HPAI viruses by using field gear or equipment that was not adequately disinfected after having been used at affected sites.

Recommendations during and after an HPAI outbreak

6. Control of HPAI viruses in wild birds should not be attempted through culling or habitat destruction. There is no evidence that this approach is effective, and it is actually thought to be counterproductive. There is general consensus on this recommendation, as expressed by the World Organisation for Animal Health (WOAH), the Food and Agriculture Organization of the United Nations (FAO), and the Convention on Migratory Species (CMS), among others (e.g. CMS FAO Co-convened Scientific Task Force on Avian Influenza and Wild Birds, 2023).
7. It is important to involve local animal health and environmental authorities in the decision-making process for authorizing fieldwork at sites where ACAP species breed or congregate. If HPAI infection is suspected in wild birds or mammals, local animal health and wildlife conservation authorities (or National Antarctic Programs) should be notified immediately to ensure that an appropriate investigation is conducted. Reporting confirmed cases of HPAI to WOA is mandatory and is essential to communicate the effects of the disease at an international level.
8. The general public should be provided with a way to report sick or dead birds and marine mammals to local authorities. Preferably, reporting should be possible even at remote locations and outside of business hours (for example: hotline, website, mobile application, etc.).
9. Teams that will conduct sampling of wild birds and mammals to confirm the presence of HPAI viruses must be provided with adequate training, proper personal protective equipment (PPE), and equipment for sample collection and disposal of carcasses after sampling. It is important to ensure strict biosecurity during sample collection, storage, transportation, and testing. Coordination with national reference laboratories is recommended to ensure that high-quality samples are collected, adequately stored, and transported, ensuring the reliability of diagnostic results.
 - Full personal protective equipment (PPE) requirements and re-evaluation of research necessities should be considered. Recommended PPE includes: properly-fitted unvented or indirectly vented safety goggles, disposable gloves (latex, nitrile, etc.), boots or boot covers, masks or approved respirator (N95, KN95, PFF-2, etc.), disposable fluid-resistant coveralls, and disposable head cover or hair cover.
 - The use of lysis buffers or RNA preservation solutions (e.g. RNA Shield, RNAlater, etc.) is recommended for the detection of HPAI in ACAP species and other seabirds and marine mammals. In addition to inactivating of the virus, which reduces the risk of human exposure during handling and shipping of samples, these buffers ensure that samples remain viable for molecular testing over extended periods, including in situations where maintaining a cold-chain is not feasible.
 - When possible, full genome sequencing should be performed and the results should be shared via international platforms, such as GenBank. This information is critical to improving understanding of how these viruses spread and change and whether they may threaten new species, including humans.

10. Considering areas within the reach of outbreaks, if personnel working in fishing or on other vessels have accidental Procellariiformes onboard, it may not be possible to determine if the bird has HPAI or not. A precautionary approach should be adopted. If birds are still alive, it is recommended that appropriately trained staff, wearing the highest level of PPE available, immediately release the bird over the side of the vessel. If birds are already dead, where fishers are required to retain bycaught carcasses by local government legislation, to guarantee compliance guidance should be sought from the relevant authority on storage and disposal of possibly infected carcasses. For other vessels, carcasses should be disposed of overboard by staff wearing PPE. Personnel touching birds should wash hands with abundant soap and water, even if gloves were used. Flush areas of the boat where bird guano may have splashed with abundant seawater. Bycatch mitigation procedures and compliance should be prioritized to minimize albatross and petrel mortality in fisheries and avoid contact with birds that might be infected with HPAI.
11. Research and monitoring of the demographic and ecological impacts of HPAI in or near affected colonies, or in areas where birds of affected species aggregate, should be encouraged. If possible, these data should be obtained using methods that cause minimal disturbance and that do not involve entering breeding colonies or handling birds (for example, observation from remote vantage points, deployable cameras, drones, etc.). Passive surveillance (count/check for ill or dead animals) should be undertaken where there is an ongoing outbreak. If affected animals are found, samples should be collected as local risk assessments and permits allow.
12. National Regulatory Authorities should consider limiting access or closing adjacent sites during an ongoing outbreak and tiered decision workflows should be planned for local authorities to control the risk of indirect spread or contamination.
13. Following an outbreak, HPAI viruses could remain viable and contagious in the environment for several days, possibly even weeks (particularly in humid and cold environments, and in freshwater). A waiting period of at least 14 days (after the last field visit where no sick animals or atypical mortality were recorded) should be respected before field activities can be resumed at a previously affected site. Basic PPE should still be worn in these areas and good hand hygiene applied.
14. Carcass removal and disposal may be considered in an attempt to mitigate the spread of HPAI to susceptible predators and scavengers, including ACAP species such as giant petrels. However, while this approach may be feasible on beaches with easy access and in urban areas, it is unlikely to be feasible at remote sites, breeding colonies of surface-nesting seabirds or pinniped haul-out sites which could be vulnerable to the disturbance associated with carcass removal. Hence, it should only be adopted following an assessment by trained personnel and considering disposal sites/options. Among the factors that should be considered are the number of carcasses, colony susceptibility to disturbance, options for safe carcass disposal, availability of PPE and trained personnel, and the feasibility of decontaminating equipment and vehicles used to transport and dispose of carcasses.
15. Vaccination may be an option to be considered for the future mitigation of HPAI outbreaks in wildlife; however, this is currently unavailable. Although United States Department of Agriculture (USDA) approved the emergency use of a vaccine against HPAI to be employed among the critically endangered California condors (*Gymnogyps californianus*), it is still a pilot study. Moreover, it has limitations and may prove to be ineffective or impractical for most seabird populations, including ACAP species. Few, if

any, HPAI vaccines prevent infection with the virus and almost none stop virus shedding, transmission and spread. At best they prevent disease and deaths and reduce the rate of spread. Additionally, vaccination programs can create additional evolutionary pressure and accelerate genetic mutations and changes in the transmissibility and pathogenicity of the virus. Surveillance is therefore important to ensure the vaccine strain remains matched to the dominant virus, but surveillance becomes more difficult when there are fewer clinical signs. Besides limitations of available vaccines, vaccination of wild birds would be a significant logistical challenge and has the potential to cause huge disturbance to colonies and possibly even spread the virus mechanically. All currently commercially-available vaccines were developed for poultry and are not validated for wild birds (i.e. it is unknown what level and duration of protection they provide in non-domestic species). They must also be injected into each individual bird and, depending on the vaccine's effectiveness, a large proportion of each population would probably need to be vaccinated with at least one dose and possibly more. If vaccination is deemed vital to the survival of a population, these challenges would need to be overcome with sufficient planning and preparation. However, current vaccines and their application requirements may prove limiting at this time.

Final remarks

The potential impact of HPAI H5N1 on ACAP species is a significant concern for albatross and petrel conservation and has been integrated into the ACAP Work Programme, particularly under the Population and Conservation Status Working Group (PaCSWG). These guidelines were initially launched by ACAP in July 2022 and the need for constant updating and advice to Parties regarding best practices for dealing with the disease motivated the creation of an intersessional group of experts on epidemiology, disease risk assessment and management, which could advise ACAP on issues related to the ongoing high pathogenicity H5N1 avian influenza outbreak. This group has been extensively engaged, since July 2023, to set up this updated version to guide an appropriate and competent response by ACAP member countries and identify appropriate mitigation measures to minimize the potential threat of spreading AI among ACAP species populations. This guide is general and aimed especially at managers and the general public, it does not exempt the need for more specific guidelines for fieldworkers who deal directly in HPAI H5N1 foci and also does not exempt countries from developing their own recommendations and guidelines, covering more details and involving its intrinsic particularities.

Notice regarding Southern Ocean concomitant initiatives: The Scientific Committee on Antarctic Research (SCAR), by its Antarctic Wildlife Health Network (AWHN), has been working in collaboration with COMNAP, the CEP, IAATO and the wider Antarctic community to develop detailed recommendations and guidelines in preparation for an outbreak of HPAI. The AWHN has published a Risk Assessment explaining the heightened risk, with guidelines focused on the protection of human life, prevention of inadvertent spread of the disease through human activity, and surveillance and monitoring. A central reporting database is also being set up for the Southern Ocean by the AWHN. The ACAP HPAI H5N1 Guidelines were developed with researchers involved in this forum to ensure alignment between SCAR and ACAP recommendations. Nevertheless, besides the taxonomic specificities for ACAP guidelines, there is a consensus that the ACAP recommendations go beyond the Southern Ocean, since although the majority of species listed in ACAP occur in the Antarctic and sub-Antarctic regions, they are valid for other areas that harbor species listed in ACAP (e.g., Waved Albatross in Galápagos, Balearic Shearwater in Spain, Pink-footed Shearwater in Chile and many other colonies outside the sub-Antarctic region, as well as places where non-reproductive populations of ACAP species aggregate).

ACAP Guidelines Authors (members of the ACAP Intersessional Group on high pathogenicity H5N1 avian influenza):

Patricia Pereira Serafini, Federal University of Santa Catarina and National Centre for Wild Birds Conservation and Research – CEMAVE/ICMBio/MMA, Brazil, patricia.serafini@icmbio.gov.br

Ralph E. T. Vanstreels, Latin America Program, Karen C. Drayer Wildlife Health Center, University of California - Davis, USA

Marcela Uhart, Latin America Program, Karen C. Drayer Wildlife Health Center, University of California - Davis, USA

Meagan Dewar, Future Regions Research Centre, Federation University Australia, Australia

Michelle Wille, Centre for Pathogen Genomics, Department of Microbiology, and Immunology, University of Melbourne, at the Doherty Institute for Infection and Immunity, Australia

Amandine Gamble, Department of Public and Ecosystem Health, Cornell University, USA

Brett Gartrell, Massey University, New Zealand

Gustavo Jiménez-Uzcátegui, Charles Darwin Foundation, Ecuador (based at Galapagos Islands)

Helen Baker, Joint Nature Conservation Committee, UK

Jane Younger, Institute for Marine and Antarctic Studies, University of Tasmania, Australia

Jennifer Black, Environment Manager, United Kingdom

Laura Roberts, University of Pretoria/ Western Cape provincial government, South Africa

Sarah Michael, Department of Natural Resources and Environment Tasmania, Australia

Thierry Work, United States Geological Survey, USA (based in Hawaii)

Veronica Lopez, Oikonos Ecosystem Knowledge, Chile

References

Abolnik, C., Phiri, T., Peyrot, B., de Beer, R., Snyman, A., Roberts, D., ... & Roberts, L. (2023). The Molecular Epidemiology of Clade 2.3. 4.4 B H5N1 High Pathogenicity Avian Influenza in Southern Africa, 2021–2022. *Viruses*, 15(6), 1383.

Banyard, A. C., Lean, F. Z., Robinson, C., Howie, F., Tyler, G., Nisbet, C., ... & Reid, S. M. (2022). Detection of highly pathogenic avian influenza virus H5N1 clade 2.3. 4.4 b in great skuas: a species of conservation concern in Great Britain. *Viruses*, 14(2), 212.

Baumeister, E., Leotta, G., Pontoriero, A., Campos, A., Montalti, D., Vigo, G., ... & Savy, V. (2004). Serological evidence of influenza A virus infection in Antarctica migratory birds. *International Congress Series*, 1263, 737–740.

Billings J.S. (1890). *The national medical dictionary: including English, French, German, Italian, and Latin technical terms used in medicine and the collateral sciences and a series of tables of useful data*. Philadelphia: Lea Brothers & Co.

Breed, A., Dewar, M., Dodyk, L., Kuiken, T., Matus, R., Serafini, P.P., Uhart, M., Vanstreels, R.E.T., Willie, M. (2023). Southward expansion of high pathogenicity avian influenza H5 in wildlife in South America: estimated impact on wildlife populations, and risk of incursion into Antarctica. Statement from the OFFLU (WOAH/FAO Network of Expertise on Animal Influenza) ad-hoc group on HPAI H5. <https://www.offlu.org/wp-content/uploads/2023/08/OFFLU-statement-HPAI-wildlife-South-America-20230823.pdf>

Camphuysen, C. J., & Gear, S. C. (2022). Great Skuas and Northern Gannets on Foula, summer 2022-an unprecedented, H5N1 related massacre. <https://doi.org/10.25850/nioz/7b.b.gd>

Camphuysen, C. J., Gear, S. C., & Furness, R. W. (2022). Avian influenza leads to mass mortality of adult Great Skuas in Foula in summer 2022. *Scottish Birds*, 42, 312-323.

Convention on the Conservation of Migratory Species of Wild Animals (CMS) and Food and Agriculture Organisation of the United Nations (FAO) Co-convened Scientific Task Force on Avian Influenza and Wild Birds (2023). Scientific Task Force on Avian Influenza and Wild Birds statement on H5N1 high pathogenicity avian influenza in wild birds – Unprecedented conservation impacts and urgent needs. <https://www.cms.int/en/workinggroup/scientific-task-force-avian-influenza-and-wild-birds/>

Downie, J. C., & Laver, W. G. (1973). Isolation of a type A influenza virus from an Australian pelagic bird. *Virology*, 51(2), 259-269.

Downie, J. C., Hinshaw, V., & Laver, W. G. (1977). The ecology of influenza: isolation of type 'A' influenza viruses from Australian pelagic birds. *Australian Journal of Experimental Biology and Medical Science*, 55(6), 635-643.

European Food Safety Authority (EFSA), European Centre for Disease Prevention and Control (ECDC), & European Union Reference Laboratory for Avian Influenza (EURL/AI), Adlhoch, C., Fusaro, A., Gonzales, J. L., Kuiken, T., ... & Baldinelli, F. (2021). Avian influenza overview December 2020–February 2021. *EFSA Journal*, 19(3), e06497.

European Centre for Disease Prevention and Control (ECDC) (2023). Risk assessment H5 clade 2.3.4.4b viruses. <https://www.ecdc.europa.eu/en/infectious-disease-topics/z-disease-list/avian-influenza/threats-and-outbreaks/risk-assessment-h5>

Food and Agriculture Organisation of the United Nations (FAO) (2023). Scientific Taskforce on Avian Influenza and wild birds statement July 2023. <https://www.fao.org/3/cc6936en/cc6936en.pdf>

Lane, J. V., Jeglinski, J. W., Avery-Gomm, S., Ballstaedt, E., Banyard, A. C., Barychka, T., ... & Votier, S. C. (2023). High pathogenicity avian influenza (H5N1) in Northern Gannets: Global spread, clinical signs, and demographic consequences. *Ibis*. <https://doi.org/10.1111/ibi.13275>

Klaassen, M., & Wille, M. (2023). The plight and role of wild birds in the current bird flu panzootic. *Nature Ecology & Evolution*, 7, 1541-1542.

Lang, A. S., Lebarbenchon, C., Ramey, A. M., Robertson, G. J., Waldenström, J., & Wille, M. (2016). Assessing the role of seabirds in the ecology of influenza A viruses. *Avian Diseases*, 60(1s), 378-386.

Lo, F. T., Zecchin, B., Diallo, A. A., Racky, O., Tassoni, L., Diop, A., ... & Monne, I. (2022). Intercontinental spread of Eurasian highly pathogenic avian influenza A (H5N1) to Senegal. *Emerging Infectious Diseases*, 28(1), 234.

Molini, U., Yabe, J., Meki, I. K., Ouled Ahmed Ben Ali, H., Settypalli, T. B., Datta, S., ... & Dundon, W. G. (2023). Highly pathogenic avian influenza H5N1 virus outbreak among Cape cormorants (*Phalacrocorax capensis*) in Namibia. *Emerging Microbes & Infections*, 12(1), 2167610.

Petersen, E. S., Petry, M. V., Durigon, E. & Araújo, J. (2015). Influenza detected in *Macronectes giganteus* in two islands of South Shetlands, Antarctica. INCT-APA Annual Activity Report 01/2015, 35-38.

Pohlmann, A., Stejskal, O., King, J., Bouwhuis, S., Packmor, F., Ballstaedt, E., ... & Harder, T. (2023). Mass mortality among colony-breeding seabirds in the German Wadden Sea in 2022 due to distinct genotypes of HPAIV H5N1 clade 2.3.4.4b. *Journal of General Virology*, 104(4), 001834.

Rijks, J. M., Leopold, M. F., Kühn, S., in 't Veld, R., Schenk, F., Brenninkmeijer, A., ... & Beerens, N. (2022). Mass mortality caused by highly pathogenic influenza A (H5N1) virus in Sandwich terns, the Netherlands, 2022. *Emerging Infectious Diseases*, 28(12), 2538-2542.

Wille, M., Huang, Y., Robertson, G. J., Ryan, P., Wilhelm, S. I., Fifield, D., ... & Lang, A. S. (2014). Evaluation of seabirds in Newfoundland and Labrador, Canada, as hosts of influenza A viruses. *Journal of Wildlife Diseases*, 50(1), 98-103.

World Health Organization (WHO) (2022). Assessment of risk associated with recent influenza A(H5N1) clade 2.3.4.4b viruses. <https://cdn.who.int/media/docs/default-source/influenza/avian-and-other-zoonotic-influenza/h5-risk-assessment-dec-2022.pdf>

World Organization for Animal Health (WOAH), & International Union for Conservation of Nature (IUCN) (2022). Avian influenza and wildlife: Risk management for people working with wild birds. <https://www.woah.org/en/document/avian-influenza-and-wildlife-risk-management-for-people-working-with-wild-birds/>

Key Further Resources

[Convention on the Conservation of Migratory Species of Wild Animals \(CMS\). Scientific Task Force on Avian Influenza and Wild Birds](#)

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

[Food and Agriculture Organisation of the United Nations \(FAO\): Global AIV with Zoonotic Potential situation update \(includes full list of wild bird species\)](#)

[FAO: Managing large-scale high pathogenicity avian influenza \(HPAI\) outbreaks in wild birds](#)

[WHO Global Influenza Programme Monthly Risk assessment summaries of influenza at the human-animal interface](#)

[Scientific Committee on Antarctic Research \(SCAR\): Biological Risk Assessment of Highly Pathogenic Avian Influenza in the Southern Ocean](#)

[Centers for Disease Control and Prevention: Recommendations for Worker Protection and Use of Personal Protective Equipment \(PPE\) to Reduce Exposure to Novel Influenza A Viruses Associated with Severe Disease in Humans](#)

Suggested citation:

Serafini, P.P.; Vanstreels, R.E.T.; Uhart, M.; Dewar, M.; Wille, M.; Roberts, L.; Black, J.; Jiménez-Uzcátegui, G.; Baker, H.; Michael, S.; Gartrell, B.; Gamble, A.; Younger, J.; Lopez, V.; Work, T. 2023. *Guidelines for working with albatrosses and petrels during the high pathogenicity avian influenza (HPAI) H5N1 panzootic*. Agreement on the Conservation of Albatrosses and Petrels (ACAP), 11 pages. Available from <https://www.acap.aq/resources/disease-threats/avian-flu>



Avian influenza and Wildlife

Risk management for people working with wild birds

Purpose

The purpose of this article is to provide guidance to people who handle wild birds on measures to reduce disease risks associated with avian influenza virus strains. The guidance takes a One Health approach by considering the health of wildlife, poultry and people.

Impacts of the ongoing avian influenza outbreaks on wildlife

The recent outbreaks of avian influenza virus strains of the subtype H5N1 have raised concern for wildlife conservation due to their unusual impact on wild birds, including several endangered species, and transmission to mammals. The most recent wave of infection spread began in October 2021, and to date thousands of outbreaks (including poultry and wildlife) have been recorded worldwide. Events have been predominantly reported in North America (56%) and Europe (34%). In addition to massive mortalities in seabirds, aquatic birds, and raptors, there are reports of infections in wild mammals such as foxes, otters, and seals, which is relatively unusual for H5 strains. Although the current outbreaks have been linked to a low number of human infections, involving mild symptoms, all H5N1 strains pose zoonotic risks.

This article was initiated by the World Organization for Animal Health's Working Group on Wildlife (Karesh, W; Uhart, M; Hofmeyer, M; Sleeman, J, Ryser-Degiorgis, MP, Murata, K; and Woods, R), and lead by Marcela Uhart. ¹This article is supported by the International Union for Conservation of Nature (IUCN) Species Survival Commission's (SSC) Wildlife Health Specialist Group (WHSG).

What is avian influenza?

Avian influenza is a disease caused by *Influenza A virus* (AIV). AIV can infect birds and mammals, including humans, and is transmitted effectively through respiratory aerosols, faeces and bodily fluids, whether directly (host-to-host proximity) or indirectly (contaminated water or objects). Most AIV infections are asymptomatic or only cause mild symptoms to their hosts.

Avian influenza virus (AIV) strains

AIV strains are divided into subtypes based on two surface proteins: hemagglutinin (subtypes H1–H18) and neuraminidase (subtypes N1–N11). A multitude of hemagglutinin-neuraminidase combinations is possible, with some subtypes being more prevalent in specific hosts: H1N1 and H3N2 are frequent in humans, H3N2 in dogs, H3N8 in horses, H17N10 and H18N11 only infect bats, etc. Birds are susceptible to a broad variety of AIV strains from subtypes H1–H16 and N1–N9.

There are also two categories of AIVs defined by their ability to infect and cause disease and death in domestic chickens: low pathogenicity and high pathogenicity. Only some AIVs subtypes (H5 and H7) are classified as high pathogenicity (HPAI) though other subtypes such as H9 may cause significant disease. AIVs can be classified by both the pathogenicity category and subtype (e.g. LPAI H3N2 or HPAI H5N1).

Aquatic birds, especially waterfowl (Anseriformes, e.g., ducks, teals, geese, swans) and Charadriiformes (e.g., shorebirds, gulls, terns, skuas, auks), are considered natural hosts of low pathogenicity strains of AIV (LPAI), mostly with little ill effect.

Some specific LPAI virus strains can spill over from wild bird populations into poultry, and to date, strains of H5 or H7 subtype have demonstrated the potential to evolve into high pathogenicity viruses leading to severe disease and high mortality.

Some AIVs subtypes (both LPAI and HPAI strains, mostly H5 and H7 subtypes but also some H9 and H10 strains) have been associated with disease in humans and other mammals ranging from mild illness to severe disease.

Recommendations

- To protect susceptible species, detected or suspected cases of AIV should be brought to the attention of Veterinary Authorities in accordance with national regulations. Authorities are required to report any HPAI viruses detected in poultry, wild birds or other non-poultry species to the World Organisation for Animal Health (WOAH). In addition, any LPAI viruses shown to infect and cause severe consequences in humans must also be reported to WOAH.² Reporting of other AI viruses in wildlife to WOAH is voluntary and highly encouraged. Notifying AIV disease occurrences helps to better monitor, understand, and control its spread.
- If there is evidence of unusual sickness and/or deaths of wild birds (especially aquatic birds and raptors) or mammals (especially carnivores), local animal health and wildlife conservation authorities should be notified immediately to ensure that appropriate investigation is conducted. If any HPAI or LPAI strains of concern, as outlined above, are detected, national authorities will notify WOAH as appropriate.
- There is no benefit to be gained in attempting to control the virus in wild birds and mammals through culling or habitat destruction. Instead, measures should be taken to improve monitoring, surveillance, and biosecurity (see items below), especially in areas of congregation of aquatic birds and raptors such as breeding colonies, roosts, migratory stopover sites, shared foraging grounds and where these birds may come in contact with poultry.
- In preparation for potential HPAI outbreaks in wildlife, scientists, wildlife managers and animal health agencies should work jointly on increasing surveillance efforts (increasing awareness and enabling a reporting mechanism) and preparing an emergency response plan that enables quick investigation and minimises risk of spread. Coordination with scientists and government authorities in neighbouring countries and particularly those that share migratory bird flyways is highly encouraged.
- Sites where wild birds congregate may be at risk of exposure via migratory birds or accidental introduction by human activities (e.g. ringers, researchers and tourism) and should thus be in an increased state of alertness.
- Wildlife professionals should avoid contact with domestic birds, especially commercial poultry farms, for 48 hours prior to and after handling wild birds or mammals.

² In accordance with Article 10.4.1.3 of the WOAH Terrestrial Animal Health Code

- Where possible, field sites should be monitored prior to undertaking any handling activity to inspect for sickness or deaths of wildlife. If there is strong evidence of unusual sickness or deaths, handling of wildlife should be avoided until local animal health and wildlife conservation authorities have ruled out an HPAI outbreak.
- Handling of wildlife at or near wild bird aggregation/breeding sites should be avoided in countries/regions where HPAI outbreaks have been recorded in 2021–2022 (see situation reports at <https://www.woah.org/en/disease/avian-influenza/#ui-id-2> and real-time updated information at <https://wahis.woah.org/>).
- Any person handling ill or dead wild animals must follow strict health and safety measures, including being properly trained, regular and proper washing of hands and wearing full Personal Protective Equipment (PPE) including facemask, eye cover, and gloves.
- Boots, clothes, field equipment and gear should be disinfected prior to arrival and again after departure from sites where wildlife will be or has been handled, and always before visiting any other site. Surfaces should be cleaned with soap/detergent and water to remove dirt, and then sprayed with or soaked in disinfectant (e.g., Safe4, 1% Virkon, 10% bleach, 60-90% ethanol, 60-90% isopropyl alcohol). Disinfectants should not be applied to the environment, sick animals, or carcasses.
- Before and after working with animals or coming into contact with their secretions, hands and arms should be washed with abundant soap and water. Hand sanitizer (gel with 60 to 90% ethanol concentration) can be applied to reinforce disinfection but should not replace proper handwashing.
- Used/soiled items such as gloves, facemasks, syringes, and other biohazardous waste should be placed in double bags or purpose-made containers (e.g., sharps disposal containers for needles), sprayed with disinfectant prior to leaving the field site, and discarded as medical/contaminated waste at an appropriate facility (or if not available, burned).
- Visiting several different congregation areas of wild birds (e.g. waterfowl, seabirds, raptors) in one continuous outing should be avoided. If this is not possible, hygiene and disinfection procedures as referenced above should be reinforced before moving between areas.
- It is advisable to keep a log of visits to field sites, especially congregation areas of aquatic birds and raptors (e.g., breeding colonies, roosts, migratory stopover sites, foraging grounds, etc.). This information might be useful for later investigation of unusual disease or mortality events by allowing investigators to trace back contacts and potential sources of infection.

Resources

World Organisation for Animal Health (WOAH) updates on avian influenza in animals (types H5 and H7): <https://www.woah.org/en/disease/avian-influenza/#ui-id-6>
<https://www.woah.org/app/uploads/2021/03/low-pathogenic-avian-influenza-viruses-all-subtypesinfection-with.pdf>

Joint OIE-FAO Scientific Network on Animal Influenza (OFFLU) situation updates and statements on avian influenza: <https://www.offlu.org/>

Convention on the Conservation of Migratory Species of Wild Animals Northern Winter 2021-2022 statement in response to die-offs of wild birds in UNESCO and Ramsar Sites: https://www.cms.int/sites/default/files/uploads/avian_influenza_0.pdf

Food and Agriculture Organization of the United Nations (FAO) Global Avian Influenza Viruses with Zoonotic Potential situation update <https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential/en>

FAO Recommendations for affected countries and those at risk <https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential/recommendations/en>