Guidelines for working with albatrosses and petrels during the high pathogenicity avian influenza (HPAI) H5Nx panzootic – **November 2024**

Agreement on the Conservation of Albatrosses and Petrels

ACAP Intersessional Group on High Pathogenicity Avian Influenza H5Nx

Relevant information on high pathogenicity avian influenza viruses (HPAIV) H5Nx

1. The panzootic[1] of high pathogenicity avian influenza viruses (HPAIV) of the subtype H5Nx that started in 2021 has killed hundreds of thousands of seabirds worldwide, with significant impacts on some albatross populations.
2. Birds infected with HPAIV H5Nx commonly display one or more of the following signs: unusual behaviour, neurological abnormalities, conjunctivitis, and respiratory distress.
3. Humans and a diversity of mammals are susceptible to HPAIV H5Nx infection, and the current risk is considered "low to moderate" for persons occupationally or otherwise exposed to HPAI H5N1 infected birds (including albatrosses and petrels).
4. Biosecurity[2] is essential to prevent unintentional dissemination of the virus to and among bird and mammal populations and to protect human health.

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[1] "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).

[2] "Biosecurity" refers to a set of management and physical measures designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population.

Background and motivation

The ongoing panzootic of high pathogenicity avian influenza viruses (HPAIV) started in 2021 and has since caused the death of millions of birds and spread to six continents. The HPAIV clades involved in this panzootic are primarily of the subtype H5N1; however, other H5Nx subtypes such as H5N5 and H5N8 have also been reported. While HPAIV H5Nx have been recognized as a threat to the poultry industry since their emergence in 1996, a genetic shift occurred in 2021 which led to a surge in cases among wild birds, especially seabirds. There has been a dramatic expansion in the taxonomic diversity of known susceptible species, which now comprise birds and mammals of more than 356 species across 21 orders (for a detailed list, refer to https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic- potential/bird-species-affected-by-h5nx-hpai/en). In addition to the enormous impact on wild birds, HPAIV H5Nx has affected a wide diversity of mammals, including several wild marine mammal groups such as pinnipeds and cetaceans, and domestic cattle in the USA (EFSA et al. 2024, CDC 2024).

HPAIV H5Nx outbreaks may occur among seabird populations in the Southern Hemisphere during the 2024/2025 summer, when most of these birds will congregate to breed. Therefore, sites where ACAP species congregate or breed may be at risk of exposure via migratory birds and authorities should remain alert to this possibility. Although the primary introduction route of the virus in seabird colonies has been through natural pathways (e.g. Bennison et al. 2024), accidental introduction by human activities (tourism, fisheries, research, etc.) must also be considered as a potential risk. For detailed information on breeding sites of ACAP species, please refer to https://www.acap.aq/acap-species.

During the 2023-2024 austral summer, significant outbreaks of HPAIV H5N1 affected ACAP species. It is estimated that over 10,000 chicks and several thousand adult black-browed albatross (*Thalassarche melanophris*) died at the Falkland Islands (Islas Malvinas)[3], as a result of an HPAIV H5Nx outbreak (Kuepfer & Stanworth 2024). Additionally, the death of 58 adults and a significant decrease in breeding success was recorded for wandering albatross (*Diomedea exulans*) at South Georgia (Islas Georgias del Sur)[3] (Bennison et al. 2024). Furthermore, a number of isolated cases of HPAIV H5Nx infection have been recorded in Procellariiformes throughout Europe, Africa and the Americas. For a detailed compilation of confirmed HPAIV H5Nx detections in Procellariiformes, please refer to https://acap.aq/resources/disease-threats/avian-flu.

The potential impact of HPAIV H5Nx on ACAP species is a 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 these viruses motivated the creation of an intersessional group of experts on epidemiology, disease risk assessment and management, who could advise ACAP on issues related to the ongoing panzootic of high pathogenicity avian influenza H5Nx. This group has been extensively engaged, since July 2023, to develop updated versions of the guidelines, released in November 2023 and November 2024, to guide an appropriate and competent response by ACAP member countries and to identify appropriate mitigation measures to minimize the potential threat of spreading HPAIV among populations of ACAP species.

[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

Indications of an outbreak and clinical signs of HPAIV H5Nx infection

In general, the first indication of HPAIV H5Nx affecting seabirds and marine mammals may be unexplained deaths leading to a higher than usual mortality rate, especially of multiple species, and clustered in space and time. Clinical signs of HPAIV H5Nx infection differ among species, and little is known about how the disease manifests in Procellariiformes. However, it is most likely to be similar to what has been documented in other seabirds.

The most common and recognized clinical signs in seabirds include:

- Atypical behaviour such as unusual docility, landing at unusual 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 seabird 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 (e.g., amnesic and paralytic shellfish poisoning, Newcastle disease, mycoplasmosis, Marek's disease, botulism, infectious bronchitis) which highlights the importance of collecting and testing samples from affected animals to confirm the diagnosis.

Risk for human health

Humans are also susceptible to HPAIV H5Nx infection. However, while previous clades of the virus had a high case-fatality rate (as high as 50-60%), the clades that have recently spread globally (referred to as "clade 2.3.4.4b") have infrequently been detected in humans, despite the tens of thousands of poultry outbreaks. When humans have been infected with clade 2.3.4.4b, they have had mild infections (e.g. conjunctivitis) and generally recovered (Wille & Barr 2024). For these reasons, the risk is considered "low" for the general public and "low to moderate" for those occupationally or otherwise exposed to H5Nx-infected birds, mammals, or contaminated environments. Therefore, caution is warranted for those conducting field activities with seabirds such as albatrosses and petrels, including appropriate use of personal protective equipment (PPE) and adequate disinfection of gear and equipment used in the field. Additionally, persons presenting clinical signs of any respiratory disease or other flu-like symptoms should not visit seabird colonies. Seasonal flu vaccination is also warranted as it may reduce the risk of reassortment amongst human and avian influenza viruses (ECDC 2024; EFSA et al. 2024; WHO 2024).

Recommendations for ACAP Parties representatives, government authorities and breeding site managers

The evolving nature of HPAIV H5Nx requires that the recommended measures outlined below be regularly reviewed and updated as new scientific data and epidemiological insights become available. As the virus continues to adapt in terms of transmission dynamics and geographic spread, it is essential that management strategies remain flexible and responsive to the latest developments. This document will be regularly revised in alignment with emerging evidence, ensuring that interventions are continually updated and optimized to mitigate impacts on wildlife populations and ecosystems.

These guidelines are general and aimed at wildlife managers and the general public; more specific guidelines will be needed for national, regional, or local (specific breeding sites or island groups) responses and especially for field workers who deal directly with HPAIV H5Nx outbreaks.

Recommendations before an HPAIV H5Nx outbreak occurs

1. **Enhance multidisciplinary and institutional collaboration at the local and national levels.** In preparation for potential HPAIV H5Nx outbreaks, multidisciplinary teams comprising scientists, wildlife managers, and animal health agencies should work jointly with national governments on increasing surveillance efforts in wildlife, minimizing disturbance (especially when/where populations are more stressed, e.g., breeding seasons/sites), increasing awareness and enabling a streamlined reporting and response mechanism.
2. **Increase surveillance and sampling efforts in wildlife.** Where feasible, enhance surveillance and sampling efforts for the early detection of HPAIV H5Nx infection in wild birds and mammals encountered dead or showing clinical signs, especially at breeding sites of ACAP species and other vulnerable seabirds.
3. **Communicate proactively about the risks involved and how to recognize and report suspected cases.** Ensure that the following are clearly and continuously communicated to the local community, tourism agencies and guides, managers, and scientists: (a) the risks posed by HPAIV H5Nx to human, animal health, and conservation; (b) how to prevent human exposure and avoid human-mediated spread of HPAI viruses; and (c) how to recognize and report suspected HPAIV H5Nx cases in wild and domestic animals and humans. Communication should be proactive and ongoing.
4. **Prepare an outbreak response plan.** Prepare and maintain updated outbreak response plans that enable quick investigation of potential HPAIV cases and outbreaks and minimizes the risk of spread.
    a. The plan should ensure that if suspected cases of HPAIV H5Nx infection occur, the necessary authorizations/permits for data and sample collection, transport, and carcass disposal will be issued in a timely manner.

b. Coordination with national reference laboratories is recommended to ensure that laboratory testing capacity is in place to detect HPAIV H5Nx quickly and accurately in samples from wildlife, including ACAP species.

c. Outbreak response plans should be revised and updated periodically, and teams working with seabirds should review them frequently to ensure familiarity with their content.

5. **Establish biosecurity plans for sites where ACAP species breed or congregate.** Such plans should include protocols or guidelines on (a) an initial assessment upon approaching/arriving at the site; (b) biosecurity measures to be adopted when there is no evidence of HPAIV H5Nx presence; and (c) biosecurity measures and data/sample collection procedures if there are sick or dead animals that could be due to HPAIV H5Nx infection.

   a. The initial assessment should be conducted upon approaching/arrival at a breeding or aggregation site, before entering the colony area or handling birds. This could include a survey using binoculars or drones to check for animals with clinical signs and atypical mortality. If the site accommodates multiple species, and particularly if it includes both birds and mammals, the survey should include as many of the species and areas of overlap as possible. At vulnerable locations with frequent tourist visits such as Antarctica, the initial assessment should be performed by a staff member experienced in avian biology and behaviour before tourist landing. For example, see the protocols put forth by the International Association of Antarctica Tour Operators (IAATO).

   b. If there is evidence of sick or dead animals, tourists should not be allowed to land at/visit the site. In addition to tourism, other non-essential activities, especially those that involve closely approaching birds or mammals, should also be suspended. A clear procedure for notification of government authorities should be established in advance. Whenever possible, additional information obtained during the initial assessment (number, species, age/stage, and clinical signs of the animals, including photographs and videos) should also be reported to authorities.

   c. 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 biosecurity measures be implemented as a precaution. A tiered approach is recommended to improve cost-effectiveness of resources and reduce PPE fatigue (see Recommendation 15, below, and Annex 1). It is particularly important that personnel going to apparently unaffected sites ensure they do not accidentally introduce HPAIV H5Nx via field gear or equipment that was inadequately disinfected after use at affected sites. When planning fieldwork, unaffected sites should always be visited first. Setting up decontamination stations on the entry/exit points (or upon return to the vessels) is recommended for sites with a large number of visitors or where repeated visits will be undertaken for fieldwork.

   d. Field protocols with a checklist of clear instructions for field personnel and tourism operators may be helpful to ensure that biosecurity procedures are consistently followed (for example, see protocols put forth by IAATO).

e. Biosecurity plans should account for differences in geography, accessibility, history of HPAIV H5Nx detections, proximity or links to poultry and other potential sources of infection, logistics of diagnostic testing, and feasibility of mitigation measures. In many cases, site-specific plans or recommendations may be necessary to ensure that the plan is feasible and effective.

6. **Coordinate with other countries.** Coordination with scientists or government authorities in neighbouring countries and particularly those that share migratory bird flyways is highly encouraged.

Recommendations during and after an HPAIV H5Nx outbreak

7. **Do not attempt to control HPAIV H5Nx in wild birds through culling of wildlife or habitat destruction.** There is no evidence that these approaches are effective in preventing HPAIV, and they are in fact thought to be counterproductive. There is 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).

8. **Provide field personnel and the general public with effective means to promptly report to local authorities any observations of sick or dead birds and marine mammals.** If HPAIV H5Nx 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. Preferably, reporting should be possible even at remote locations and outside of business hours (e.g., phone hotline, website, mobile application, etc.).

9. **Provide adequate training and equipment to teams that will conduct sampling of wild birds and mammals to confirm the presence of HPAIV H5Nx.** It is important to ensure strict biosecurity during sample collection, storage, transportation, and testing of samples, as well as during the disposal of carcasses and disinfection or disposal of clothing and equipment.

    a. It is important to involve local animal health and environmental authorities in the decision-making process for authorizing fieldwork. The authorization process may indicate the full PPE requirements and re-evaluation of research necessities. Recommended PPE includes: properly-fitted unvented or indirectly vented safety goggles, disposable gloves (latex, nitrile, etc.), boots or boot covers, masks or approved respirators (N95, KN95, PFF-2, etc.), fluid-resistant coveralls and head cover or hair cover.

    b. Coordination with national reference laboratories is recommended to ensure that high-quality samples are collected, adequately stored, and transported, ensuring the reliability of diagnostic test results. The use of lysis buffers or RNA preservation solutions (e.g., RNA/DNA Shield, RNAlater, NucleoProtect) may assist in the detection of HPAIV H5Nx in ACAP species and other seabirds and marine mammals. In addition to

the inactivation 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.

c. Personnel repeatedly working at sites where disease outbreaks and mass mortality of wildlife have occurred may experience psychological distress and should have access to mental health support services.

10. **Report confirmed cases to international organisations promptly and correctly.** Reporting confirmed cases of HPAIV to the World Organisation for Animal Health (WOAH) is mandatory and is essential to communicate the effects of the virus at an international level. When possible, full genome sequencing should be performed on detected viruses and the results should be shared via international platforms, such as GenBank. This information is critical for improving understanding of how these viruses spread and change and whether they may threaten humans and other species.

11. **Personnel handling ACAP species and other Procellariiformes accidentally found on-board fishing or other vessels should adopt measures to protect themselves from potential exposure to HPAIV H5Nx.** It may not be possible to determine whether the bird is infected with HPAIV H5Nx, and a precautionary approach should be adopted. Guidelines for fishers on how to handle birds on vessels have been made available by ACAP. Bycatch mitigation procedures and compliance should be prioritized to minimize albatross and petrel mortality in fisheries and to avoid contact with birds that might be infected with HPAIV H5Nx. If birds are still alive, it is recommended that appropriately trained staff, wearing available PPE (at least gloves, eye protection and a mask), 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 the relevant authority should be contacted for guidance on protocols for the storage and disposal of carcasses. For vessels without this requirement, carcasses should be disposed of overboard by staff wearing PPE including gloves, eye protection, and a mask. Personnel touching birds should wash hands thoroughly with soap and water after doing so, even if gloves were used. Areas of the boat where bird guano may have splashed should be flushed with abundant seawater.

12. **Personnel collecting guano in areas where ACAP species and other Procellariiformes breed should also adopt measures to protect themselves from potential exposure to HPAIV H5Nx and other potential pathogens.** Fresh guano of infected birds is like to contain infectious virus, and a precautionary approach should be adopted. Personnel involved in the extraction, transport, and processing of guano should wear at least gloves, a mask, eye protection (googles), and wash hands thoroughly with soap and water as soon as possible after handling and before eating. Additional considerations may also be considered by managers and authorities to maximize the safety of personnel and reduce the risk of virus dispersal (e.g., confirmation of negative testing of birds at site, time-lag between bird presence and guano harvest, etc.).

13. **Research and monitoring of the demographic and ecological impacts of HPAIV H5Nx on wildlife should be encouraged.** This is particularly important in or near affected colonies of ACAP species, or in areas where birds of affected species congregate. If possible, these data should be obtained using methods that cause minimal disturbance and that do not involve entering breeding colonies or handling birds (observation from remote vantage points, fixed-point cameras, drones, etc.). Surveillance (count/check for ill or dead animals) should be undertaken where there is an ongoing outbreak. If affected animals are found, at a minimum the number of dead/ill individuals of each species at each site and date should be recorded. Samples for diagnostic testing should be collected as much as local risk assessments, budgets, and permits allow. If tagged birds are affected, ring numbers should be recorded and reported to ringing organizations.

14. **Blanket suspension of all research and monitoring activities due to biosecurity concerns is not advisable.** This can create an information "blackout" whereby the detection and documentation of the impacts of HPAIV H5Nx is not possible. In addition, such suspensions can have significant impacts on long-term research and monitoring efforts that are vital for species' conservation. Instead, these activities should be reviewed on a project-by-project basis to determine whether biosecurity measures can be adopted to ensure the adequate mitigation of risks associated with HPAIV H5Nx while maintaining the continuity and viability of high-priority research and monitoring.

15. **Outbreak response procedures should follow decision workflows and tiered approaches that are sensitive to the ongoing situation and circumstances.** National Regulatory Authorities should consider limiting access to or closing adjacent sites during an ongoing outbreak and decision workflows should be planned for local authorities to control the risk of indirect spread or contamination. To improve cost-effectiveness of resources and reduce PPE fatigue, biosecurity protocols may benefit from incorporating a tiered approach, with the PPE requirements and activity restrictions being proportionate to the virus exposure risk in the field (with requirements becoming increasingly stricter when suspected/confirmed cases of HPAIV H5Nx have been recorded in the region/country/site) and to the field activities that will be performed (with requirements being stricter for activities involving the collection of biological samples from birds compared to activities that involve minimal or no handling of birds). See examples of proposed tiered approaches in Annex 1.

16. **A standby period should be adopted before normalising field activities at a site after the conclusion of an HPAIV H5Nx outbreak.** HPAIV could remain viable and contagious in the environment for several days, possibly even weeks, particularly in humid and cold environments, and in freshwater (Ramey et al. 2020). A standby period of at least 14 days (after the last field visit where no sick animals or atypical mortality were recorded) should be respected before normal field activities can be resumed at a previously affected site. After this waiting period, PPE (gloves, mask, and eye protection) should still be worn in these areas and good hand hygiene applied.

17. **Carcass removal and disposal may be useful to mitigate the spread of HPAIV H5Nx, however the potential indirect impacts and risks of this strategy should be considered on a case-by-case basis.** The removal and disposal of seabird and marine mammal carcasses may reduce the exposure of susceptible predators and scavengers, including ACAP species such as giant petrels (*Macronectes* spp.). 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. Therefore, it should only be conducted 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, presence and conservation status of scavenging species, approval requirements by governing authorities and requirement for permits and the feasibility of decontaminating equipment and vehicles used to transport and dispose of carcasses.
18. **Vaccination is unfeasible for the mitigation of impacts of HPAIV H5Nx for most ACAP species.** Vaccination against HPAIV H5Nx has been implemented for some wildlife species such as the critically endangered California condor (*Gymnogyps californianus*). However, this was done under specific emergency response conditions and should be considered as an exceptional case. Vaccination has limitations and may prove to be ineffective or impractical for seabird populations, including ACAP species. Few, if any, HPAIV vaccines prevent infection with the virus and almost none stop virus shedding, transmission, and spread. At best, vaccination prevents disease and deaths and reduces the rate of spread. Additionally, vaccination programs can create additional evolutionary pressure, potentially accelerating the selection of genetic mutations, leading to changes in the transmissibility and pathogenicity of the virus. Surveillance would therefore be important to ensure the vaccine remains matched to the dominant virus clade, 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 would require weighing potential benefits with risks linked to disturbance to colonies and potential contribution to mechanical spread of the virus during handling of birds for vaccination. It is valid to consider that vaccination is not possible for most species at the population level. All vaccines currently commercially available were developed for poultry and are not validated for wild birds. It is unknown what level and duration of antibody protection they provide, nor the number of repeat doses that would be required in non-domestic species. The existing vaccines must also be injected into each individual bird and, depending on the vaccine's effectiveness and objective, a large proportion of each population would probably need to be vaccinated with at least one dose and likely more. If vaccination is deemed vital to the survival of a population, these challenges would need to be overcome with sufficient planning and preparation (WOAH 2024). However, current vaccines and their application requirements may prove limiting at this time.

Final remarks

ACAP species already face a conservation crisis with ongoing threats worldwide, such as mortality from bycatch in fisheries (Baker et al. 2024). The longevity and low reproductive output of ACAP species may slow the rate of population recovery in the face of disease, especially when significant adult mortality occurs. Considering the impacts that the HPAIV H5N1 outbreaks had on some ACAP species during the 2023-2024 austral summer, and the arrival and spread of the virus in the Subantarctic and Antarctic region, the ACAP Intersessional Group on High Pathogenicity Avian Influenza H5Nx herein presented its updated guidelines for working with albatrosses and petrels.

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 the Council of Managers of National Antarctic Programs (COMNAP), the Committee for Environmental Protection (CEP), International Association of Antarctica Tour Operators (IAATO) and the wider Antarctic community to develop detailed recommendations and guidelines in preparation for outbreaks of HPAIV H5Nx in the region. 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 virus through human activity, and surveillance and monitoring. A central reporting database was also established in 2023-24 for the Southern Ocean by the AWHN (https://scar.org/library-data/avian- flu). The COMNAP/SCAR Joint Expert Group for Human Biology and Medicine (JEGHBM) has also developed guidelines and recommendations for human health and safety in the Antarctic region. The ACAP HPAI H5Nx 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 because although the majority of species listed in ACAP occur in the Antarctic and sub-Antarctic regions, the guidelines are valid for other areas that harbor species listed in ACAP (for example: 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 congregate).

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Additional Key Resources

Agreement on the Conservation of Albatrosses and Petrels (ACAP). Resources and updates online regarding HPAI in Procellariiformes - https://www.acap.aq/resources/disease-threats/avian-flu

Centers for Disease Control and Prevention (CDC). 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 - https://www.cdc.gov/flu/avianflu/h5/worker-protection-ppe.htm

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ANNEX 1. Examples of tiered approach applied in specific guidelines for a group of islands:

Biosecurity Handbook 2024-25, Updated May 2024, for South Georgia (Islas Georgias del Sur)[3], Section 9:

9.6. Personal Protective Equipment (PPE) for science activities

Biosecurity and PPE recommendations have been scaled and are proportionate with risk. They are designed both to protect individuals and prevent spread between sites and species. For science activities, minimum PPE requirements will be identified in project specific RAPs, but individuals may choose to adopt a more precautionary approach.

Level 1 PPE - Fluid resistant face mask, disposable coveralls or outerwear i.e. oilskin jacket and trousers and eye protection to be worn. Disposable gloves or alcohol hand cleaner used between individuals. Footwear and outer wear to be decontaminated between sites / areas of high wildlife density with appropriate biocide.

Level 1 PPE will be appropriate for the majority of work which involves working in close proximity or handling wildlife.

Level 2 PPE - Tyvek 400 / fluid resistant suit, FFP2 mask and visor/eye protection or Sundstrom respirator, non-porous boots. Double layered disposable latex gloves used between individuals and outer glove changed each time. Footwear and outer wear to be decontaminated between sites / areas of high wildlife density with appropriate biocide.

Level 2 PPE may be required for some specific high-risk activities which involve handling or invasive sampling of animals suspected of HPAI.

Individuals must don and remove PPE correctly for it to be effective. All individuals should complete training before using level 1 or level 2 PPE. The World Health Organisation offers online training. See - https://openwho.org/courses/IPC-PPEEN?locale=en.

Full Biosecurity Handbook Available at: https://gov.gs/wp-content/uploads/2024/06/Biosecurity_Handbook_May-2024_FINAL.pdf

2024 Tiered Approach discussed with New Zealand Department of Conservation:

1. Tiered context based HPAI occupational exposure risk

Context Level 0	Context Level 1
No HPAI detected in NZ/NZ territories- considered absent.	HPAI has been detected in NZ/NZ territories

2. Tiered activity based occupational HPAI exposure risk

	Activity	Examples
Activity Level 0	No contact with birds or associated fomites	- OfÏce based work - Observational research work - Farmers (non-poultry) - General public in birdlife areas
Activity Level1	Contact with apparently healthy birds (no disease/mortality) and associated fomites	- Pigeon fanciers, pet owners, backyard poultry owners, etc - Veterinary staff - Zoo staff, rescue centre staff etc - Commercial fishers and conservation workers who may have contact with wild birds/marine mammals - Egg processors - Vaccinators - Meat Processors - Poultry workers - Surveillance sample collectors
Activity Level 2	Contact with birds/ sick/dead possibly due to HPAI and associated fomites.	- Veterinary staff - Zoo staff, rescue centre staff etc - Commercial fishers and conservation workers who may have contact with wild birds/marine mammals - Collection of samples or subproducts from infected or deceased animals - Zoos/Rescue centres - Poultry farm workers - Laboratory staff - Road or roadside workers who remove dead birds from the road or roadside

Activity Level 3	Contact with birds/mammals sick/dead and associated fomites in places known to have HPAI	- Workers involved in the slaughter or disposal of infected animals, or in disinfection of contaminated sites, sampling of IP`s or suspected properties - Conservation workers who may have contact with wild birds/marine mammals - Zoos/Rescue centres - Veterinary staff - Road or roadside workers who remove dead birds from the road or roadside - Healthcare workers, including clinicians, public health responders, medical laboratory workers, and staff handling clinical waste. - Laboratory staff

3. Matrix of tiered context-based and occupational activity-based HPAI exposure risk determining tiered personal protective equipment (PPE) levels

		Context L0	Context L1
	Activity L0	PPE L0	PPE L0
	Activity L1	PPE L0	PPE L1
	Activity L2	PPE L1	PPE L2
	Activity L3	NA	PPE L3

4. Tiered occupational personal protective equipment (PPE)

	PPE and disinfection procedures
PPE Level 0	BAU high personal hygiene should be maintained in the field (eg hands, arms, and face should be washed with water and detergent, rinsed, and hand sanitiser applied to hands, after fieldwork).
PPE Level 1	*Previous level, plus:* BAU biosecurity. Gloves (nitrile or latex) and eye protection should be worn. Footwear (closed and waterproof) and clothes should be changed and, at the end of fieldwork, cleaned and disinfected (eg using SteriGene) before re-using.
PPE Level 2	*Previous level, plus:* Enhanced levels of biosecurity, facial mask (PFF2, N95 or KN95), protective eyewear, and protective clothing (preferably Tyvek/plastic overalls or waders).

PPE Level 3	*Previous level, plus:* Two layers of gloves (nitrile or latex) and full-body waterproof clothing (disposable Tyvek overall). Hair should be covered by the overall's hood. There should be no gap between gloves and sleeves (use tape if necessary). Fitted face mask

5. Personal Protective Equipment (PPE) and Its Use for HPAI Exposure

1. **Gloves**
   Latex or nitrile gloves must be worn when handling animals or objects (such as tools, equipment, or bedding) that could be infected with or exposed to HPAI.
2. **Double Gloves**
   Double−gloving is recommended when handling tasks involve higher risks, such as exposure to high viral loads or invasive procedures where gloves might tear.
3. **Facial Mask (PFF2, N95, or KN95), protective eyewear**
   A well−fitted mask should be worn during activities with potential exposure to aerosolized virus particles or fluid splashes.
4. **Designated Footwear (Closed and Waterproof)**
   Use designated footwear whenever possible to prevent the transfer of the virus between sites. If not feasible, wear footwear that can be thoroughly cleaned and disinfected.
5. **Coveralls**
   Coveralls provide full coverage of underclothing and skin, helping prevent contamination. These should be cleaned and disinfected after each use.
6. **Tyvek Disposable Coveralls**
   Disposable coveralls are preferred as they can be discarded on−site or off−site, eliminating the need for cleaning and disinfection.
7. **Fitted Face Mask**
   A fitted face mask is mandatory when encountering high viral loads, especially in aerosolized environments or where fluid splashes are likely.