

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Project Reporting Information Note"
(<https://darwinplus.org.uk/resources/information-notes>)

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2023

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Plus Project Information

Project reference	DPLUS167
Project title	Pathogens as a threat to seabirds in the Falkland Islands
Territory(ies)	Falkland Islands
Lead Partner	University of Glasgow
Project partner(s)	<ul style="list-style-type: none"> - South Atlantic Research Institute - Falklands Conservation - Marine and Environmental Sciences Centre Centre for Functional and Evolutionary Ecology
Darwin Plus grant value	£98,135.00
Start/end dates of project	01/07/2022 – 30/06/2024
Reporting period (e.g. Apr 2022-Mar 2023) and number (e.g. Annual Report 1, 2)	01/07/2022 – 31/03/2023 Annual Report 1
Project Leader name	Amandine Gamble
Project website/blog/social media	<ul style="list-style-type: none"> - facebook.com/FalklandsWildlifeHealth - twitter.com/FIWildHealth
Report author(s) and date	Amandine Gamble 29/04/2023

1. Project summary

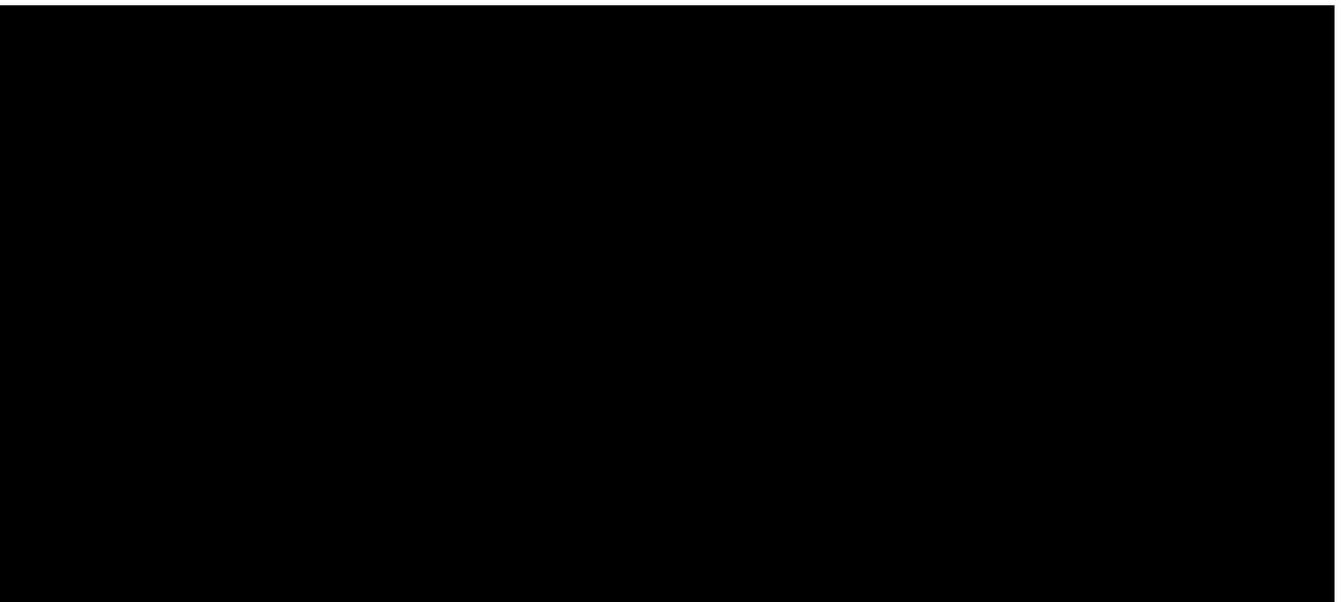
Infectious diseases are increasingly acknowledged as a threat to biodiversity conservation. The ongoing highly pathogenic avian influenza (HPAI) panzootic, which is estimated to have caused the death of tens of thousands of wild birds and mammals, a likely very large underestimate, illustrates the need for better wildlife disease surveillance and response systems.

In the Falklands Islands (FI), recurrent seabird die-offs have been reported, but their cause(s) remain elusive. Considering the importance of the FI for avian populations (with 122 species, including 8 globally threatened species and 3 endemic species, and 23 Important Bird and Biodiversity Areas), and, reciprocally, the importance of avian populations for the identity and economy (notably via tourism) of the FI, it is critical for this territory to be equipped to lead appropriate surveillance and response to wildlife disease outbreaks. In particular, as HPAI spreads through South America, the FI wildlife is expected to take a hard toll – it is critical to build the capacity to detect the virus, understand its transmission pathways and assess its impact on the local wildlife. This also holds true for other pathogens susceptible to cause wildlife mortality events such as avian cholera *Pasteurella*, poxviruses, etc...

This project aims to investigate the presence of seabird pathogens on the archipelago, characterize their dynamics across species, space and time, as well as their impact on the local seabird populations. Based on this novel knowledge and capacity building, this project will improve surveillance and response protocols against infectious diseases in the Falkland Islands. To reach this objective, we will:

1. Build a database on potential pathogen detection and quantification in the seabirds of the FI through biological sample collection and laboratory analyses.
2. Increase our knowledge of epidemiological dynamics in the FI through the description of the patterns revealed by the biological data generated by the project.
3. Increase our understanding of the likely drivers and consequences of infectious agent dynamics in the system through statistical models exploring associations between ecological and epidemiological patterns.
4. Improve disease surveillance and response system by engaging with local and international stakeholders, optimizing field protocols and laboratory analysis pipelines, and building local capacity.

To do so, the project team includes both local and international partners, and works with a network of stakeholders including private landowners and governmental and non-governmental organizations in the Falkland Islands and abroad (**Figure 1**).



2. Project stakeholders/partners

This project is led by a consortium of local non-governmental institutions and international academic institutions providing scientific expertise and capacity.

Locally, the project itself is based on demand stemming from SAERI, a local non-governmental institution leading research in the FI. It also involves Falklands Conservation, a local non-governmental institution leading ecosystem monitoring and conservation programs. It is also supported by the Falkland Islands Government (FIG).

Year 1 of the project was focused on creating and strengthening collaborations between the project partner and local stakeholders, in particular the FIG and private landowners.

Engagement of the FIG was discussed during dedicated **in-person meetings** with the FIG Veterinary Services (Zoe Fowler and collaborators) and Environmental Department (Mike Gervais and collaborators). The interest of the FIG for the project was confirmed by the attendance of the several representatives to the **public talk and discussion session** led by the project team in Stanley (**Figure 2**). This public talk and discussion session also attracted members of the broader community, including conservation experts, media and tourism specialists, and visiting researchers, and other inhabitants and visitors of Stanley. Perspectives from those discussions include:

1. **Planification of training opportunities** for FIG staff (and other members of the community) to conduct epidemiological investigations and laboratory analyses – to be organized in 2023/2024.
2. **Exchange of protocols and data related** to wildlife disease surveillance and response.
3. **Collaborative applications to external funding** to improve local facilities.
4. Discussions of potential **long-term contributions of FIG** in wildlife disease surveillance and response by providing funding or staff to ensure the legacy of the project.

South Atlantic Environmental Research Institute
is pleased to be hosting
the following talk:

*Infectious disease in the
Falklands wildlife:*

**WHAT ARE THE THREATS, AND WHERE
DO WE GO FROM THERE?**
Amandine Gamble & collaborators
Research Fellow, University of Glasgow (Scotland) & Cornell University
(USA)

SUMMARY:
Considering the exceptional wildlife of the Falklands – in terms of both quantity and uniqueness – it is important to understand the threat infectious diseases can pose, so we can better mitigate them. This requires dedicated ecological and epidemiological investigations to which the whole community can contribute. This workshop will be divided into two parts:
(1) **Talk** – Behind the scene: how do we study wildlife disease in the field and in the lab? I will present the work our team is currently leading to better understand how infectious diseases can emerge and spread in the Falklands and in other subantarctic islands.
(2) **Discussion** – Moving forward together: how can people in the Falklands contribute to wildlife disease surveillance? In an open discussion format, we will talk about how to facilitate knowledge and data sharing within the Falklands community to improve infectious disease surveillance, prevention and response.

Date: Thursday 5th Jan. 2023
Time: 6.30pm
Venue: FI Chamber of
Commerce

CONTACT FOR FURTHER INFO:
✉ info@saeri.ac.fk
☎ 27234

DARWIN INITIATIVE
FALKLANDS CONSERVATION
University of Glasgow
Cornell University

Figure 2. Flyer of the public talk and discussion session led in Stanley by the project team (advertised on [Facebook](#) and [Twitter](#), and attended by ~50 people, corresponding to the full capacity of the seminar room).

Engagement of private landowners was discussed **during site visits**. These included, in addition to the sites we were already planning to visit for routine data and sample collection:

- 4 sites from which data and samples were collected as a response to suspected wildlife disease outbreaks in 2022/2023 (Saunders Island, and 3 sites on East Falklands).
- 1 site for which baseline data and samples was collected in 2023/2024 (on East Falklands).
- 4 sites for which baseline data and samples will be collected in 2023/2024 (Dyke Island, West Point Island, Pebble Island, and Bleaker Island).

Overall, the increased engagement with the FIG and private landowners resulted in a **more direct involvement of the academic partners in the investigation of suspected wildlife disease outbreaks, considerably increasing the capacity to lead those investigations** (previously led primarily by the FIG Veterinary Services). Suspected wildlife disease outbreaks were either **reported to the project team via the FIG Veterinary Services** (3/5 cases), **reported directly to the project team** (1/5 cases), or directly observed by the project team while conducting routine fieldwork (1/5 cases). This allowed us to investigate 5 suspected

wildlife disease outbreaks in 2022/2023 (**Figure 1**). Those would otherwise not have been investigated (beyond HPAI screening) due to limited staff within the FIG Veterinary Services. Laboratory analyses of the collected samples are ongoing – results will be shared with the FIG Veterinary Services and the involved landowners as soon as they are available. This also allowed us to collect baseline data and samples from 1 extra site in 2022/2023, and to schedule the collection of baseline data and samples from 4 additional sites in 2023/2024 (**Figure 1**).

The fact that a suspected wildlife disease outbreaks was directly reported by a landowner to the project team, and the fact that several landowners have expressed interest, or even actively initiated contacts with the research team, regarding the possibility to collect baseline data and samples from their sites are particularly rewarding and illustrate the engagement of the community in wildlife disease surveillance and response.

We also developed new collaborations with other research and conservation programs within the FI to collect additional data to better understand pathogen transmission within the FI ecosystem:

- To study the potential role of introduced rodents as reservoir of seabird pathogens, we will collaborate with the *New Island Restoration* Project (led by Ross James and funded by the Darwin Plus Initiative) and the *Remove Disease* Project (led by Thierry Boulinier and funded by the BiodivERsA initiative).
- To study the potential for pathogen spread between seabirds and terrestrial birds, we will collaborate with the *Johnny Rook* Project (led by Katie Harrington).

Those interactions highlighted the need for the international partners involved in the project to spend time on site for in-person interactions with the local community.

During Year 2, we aim to keep on **increasing local community interest and engagement** into the study of wildlife disease, **strengthen the created local collaborations**, and **engage with international institutions**. Such institutions include BirdLife International, the Royal Society for the Protection of Birds, the Nature Conservancy, the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research (SCAR), and the Joint Nature Conservation Committee (JNCC). To do so, we will draw upon existing collaborations (e.g., with members for the project team being involved in SCAR or collaborating with JNCC staff) as well as creating new collaborations through international events (e.g., International Seabird Group conference 2023, and contacts made during the 2022 edition).

3. Project progress

3.1 Progress in carrying out project Activities

The project is **overall on track**, with slight changes in the relative scheduling of the different activities (some being delayed, and some being moved forward). Activities for Year 1 were focused on 4 aspects: (1) field data and sample collection and centralization (activities 1.1-2), (2) laboratory analyses (activity 1.3), (3) revision of the procedures for the reporting and investigation of suspected wildlife disease outbreaks (activities 4.2-3), and (4) community engagement and capacity building (activities 4.4-6).

Field data and sample collection and centralization (Activities 1.1-2)

Field data and sample collection and census is **on track**.

We have recovered banked samples from 807 individuals from 6 bird species from New Island (**Table 1**; [**Mean of Verification 1.1**; detailed database will be made public by the end of the project]).

New samples were collected from 1,356 individuals from 9 bird species from 5 islands (**Table 2**; [**Mean of Verification 1.2**; detailed database will be made public by the end of the project]).

For each sampled individual, plasma samples and mucosal swabs were collected. The plasma samples will be screened for pathogen-specific antibodies (indicative of past infection), and mucosal swabs for pathogen genetic material (indicative of current infectious status). All the samples are stored at CEFE (France) and ready for laboratory analyses.

Fieldwork in Year 2023/2024 is already largely planned (e.g., research permits obtained in 2022 valid until 2024, risk assessment and operating procedures from 2022/2023 to be re-used as a basis for 2023/2024, etc...).

Table 1. Banked samples. Those samples were collected on New Island (FI) prior to the project.

Species	2017/2018	2018/2019
Black-browed albatross	150	130
Southern rockhopper penguin	90	100
Imperial shag	74	70
Brown skua	30	34
Gentoo penguin	50	40
Magellanic penguin	4	25
Slender-billed prion	0	0
Striated caracara	0	0
Necropsy (various species)	7	3
Total (807 individuals)	405	402

Table 2. Samples collected during the 2022/2023 field campaign.

Species	New Island	Steeple Jason	Grand Jason	Saunders Island	East Falklands
Black-browed albatross	337	25	30	0	0
Southern rockhopper penguin	239	20	20	0	9
Imperial shag	115	17	20	0	6
Brown skua	47	21	20	0	0
Gentoo penguin	120	25	25	7	17
Magellanic penguin	60	20	30	0	0
Slender-billed prion	53	0	0	0	0
Wilson’s storm petrel	0	0	2	0	0
Striated caracara	60	8	16	20	0
Necropsy (various species)	33	5	6	7	19
Total (1459 individuals)	1064	141	169	34	51

Laboratory analyses (Activity 1.3)

The laboratory analyses of the samples collected prior to the project and during Year 1 have been **started but are delayed**. As of the end of Year 1, **samples have been screened for antibodies against 2 pathogens (influenza viruses and flaviviruses) over the 6 expected** (the two formers, in addition to paramyxoviruses, coronaviruses, *Pasteurella* bacteria, *Toxoplasma* parasites). These analyses have revealed the recent circulation of a flavivirus, with variations across species and sites [**Mean of Verification 1.3**; detailed database will be made public by the end of the project]. They have however excluded the recent circulation of an influenza virus. The delay in the laboratory analyses has been caused by the delays in the signature of the Collaboration Agreement (see Section 10), which has blocked the purchase of laboratory consumables to conduct these analyses, which are to be conducted by one of the project partners. **This issue should be resolved in the coming weeks, which would allow us to resume consumable purchase and laboratory analyses, under the assumption that our Change Request for rolling over unspent fund from Year 1 to Year 2 is accepted (currently under review; see Section 3.4).**

Revision of the procedures for the reporting and investigation of suspected wildlife disease outbreaks (Activities 4.2-3)

Activities related to the revision of the procedures for the reporting and investigation of suspected wildlife disease outbreaks (indicators and activities 4.2-3) were **moved forward in response to high likelihood of HPAI introduction to the FI** in the coming months. This follows the dramatic HPAI outbreaks recorded in wild bird populations of the Northern Hemisphere in 2022, and the rapid spread of the virus in South America in early 2023.

Within the FI community, we have been working with the local institutions (in particular FIG, SAERI and FC) to revise the reporting and subsequent investigations procedures during **in-person and online meetings and exchanges on protocol drafts [Mean of Verification 4.2; unpublished / in progress]**. At the broader scale of the Southern Ocean, we have been working with the SCAR Wildlife Health Monitoring Group to produce **guidelines for the surveillance and response to potential HPAI outbreaks [Mean of Verification 4.3; general guidelines published in Dewar et al., 2022, *Open Science Framework*; detailed protocols in progress]**. This work will be kept on in the coming months and will notably include a detailed risk assessment of HPAI introduction to the Southern Ocean led by an HPAI working group within SCAR (in which 2 members of the project team are involved).

Community engagement and capacity building (Activities 4.4-6)

Activities related to community engagement and capacity building are **on track**. Regarding engagement of the local community, we organized a **public talk and discussion session** on the topic of wildlife disease in the FI (**Figure 2; [Means of Verification 4.4 and 4.5; recording to be posted online]**) in Stanley (FI), which was highly attended (~50 people, including key stakeholders; see Section 2). Regarding engagement of the global community, we also organized a **workshop** on the topic of surveillance and monitoring responses to HPAI as part of an international conference (International Seabird Group Conference, August 2022, Ireland) mixing research and conservation institutions (**[Means of Verification 4.4 and 4.6; recordings available on YouTube]**). Future workshops will be organized with the FI with a deeper focus on capacity building and technical aspects. These activities were completed by **in-person meetings** aimed at interacting with key **stakeholders** (see Section 2) and various **outreach activities** including contribution to a TV documentary, a press article, and a podcast (see Annex 4) aimed at increasing awareness around the topic of wildlife disease in the **general public**.

3.2 Progress towards project Outputs

Field data and sample collection and centralization (Outcomes 1.1-2)

Field data and sample collection and census is **on track** and has been highly successful so far. **Our sample bank went from 407 to 2,266 individual birds, expanding from 6 to 9 bird species, and from 1 to 5 sites within the FI**. This surpassed our expectations as we targeted samples from 750 new individuals but reached more than twice this number. This was notably permitted by matched funding (*Remove Disease* project, BiodivERsA initiative, granted to Thierry Boulonier CEFÉ) enabling us to increase our field team. This will give us flexibility in case of challenge in Year 2, for instance if the introduction of HPAI to the FI limits or prevents the 2023/2024 field campaign. By covering a diversity of species and sites, those samples will allow us to explore associations between ecological and epidemiological patterns in the study system, which will be critical in enriching our mechanistic understanding of pathogen dynamics in the FI (Outcomes 2-3).

Laboratory analyses (Outcome 1.3)

The laboratory analyses of the samples collected prior to the project and during Year 1 have been **started but are delayed**. We have, however, obtained key results for the success of the project. Previous immunological analyses had confirmed the recent circulation of a paramyxovirus and does not support the recent circulation of *Pasteurella* bacteria. **New immunological analyses have in addition confirmed the recent circulation of a flavivirus and does not support the recent circulation of influenza viruses**. The likely absence of influenza viruses in the system is a critical piece of information for the risk assessment of HPAI introduction in the FI, as this suggests that local population are naïve to the virus and will likely be highly susceptible.

Revision of the procedures for the reporting and investigation of suspected wildlife disease outbreaks (Outcomes 4.2-3)

Activities related to the revision of the procedures for the reporting and investigation of suspected wildlife disease outbreaks (indicators and activities 4.2-3) were **moved forward in response to high likelihood of HPAI introduction to the FI** in the coming months.

Community engagement and capacity building (Activities 4.4-6)

Activities related to community engagement and capacity building are **on track** and were overall highly successful, resulting in a significant increase of community engagement, including notably the local government and private landowners, facilitating the investigations of suspected wildlife disease outbreaks (see Section 2). This local trend was accompanied by a similar one on the global scale as HPAI outbreaks have brought people's attention to wildlife disease. We have been capitalizing on this trend to engage with both the wildlife research and conservation community and the general public.

3.3 Progress towards the project Outcome

Our project aims to build a framework for the long-term monitoring of seabird pathogens in the FI, including practical tools and shared knowledge (outreach and training), and rooted in a network of local and international collaborators. We are **on track to reach this objective** as demonstrated by the obtention of novel biological data, and a wide interest of the local and global community for wildlife infectious disease, resulting in the facilitation of the investigations of suspected wildlife disease outbreaks (see Sections 2 and 3.1-2).

The project has however been facing two important challenges.

First, on the administrative side, we have been experiencing **delay in the signature of the Collaboration Agreement**, which has in turn delayed expenses and might result in the loss of unspent fund if our Change Request is not accepted (see Section 3.4, Assumption 9). This has had limited consequence for now as the **delayed expenses** concern operating costs related to activities mostly scheduled for Year 2. However, losing the unspent funds are lost, would considerably reduce the quantity of analyses we can run, hence the quality of the inference we can make and the translatability of the framework we would propose. The Change Request is currently under review; if it is accepted, we are confident that we would achieve the targeted Outcome by the end of the project.

Second, the **ongoing HPAI panzootic** is having a severe impact on wildlife, and on the wildlife research and conservation community. On one hand, it **represents a threat to wildlife health and to the possibility to conduct field investigations**. This later point would have a limited impact on our project considering that we have surpassed our expectations for data and sample collection during Year 1 (see Section 3.2), although getting data and samples from a second year would increase the robustness of our conclusions. In this context, we have been working at developing field protocols that could be implemented even in the context of an HPAI outbreak, and with the objective of collecting data on the said outbreak (see Section 3.1). On the other hand, the HPAI panzootic has **increased the interest** of both the wildlife research and conservation community and the general public for wildlife disease, which has probably facilitated the community engagement activities conducted as part of our project (see Section 2). As of the end of Year 1, the main consequence has been a shift in priorities towards our ability to respond to a potential HPAI outbreak in the FI, contributing to the Outcome of the project.

3.4 Monitoring of assumptions

Assumption 1. Data acquisition pipeline is functional (from sample acquisition and data compilation to laboratory analyses)

Comment. Still holds true: the results from the first laboratory analyses have been obtained without any unexpected challenge (see Section 3).

Assumption 2. At least one infectious agent was detected (pilot data from banked samples suggest that at least two of the targeted infectious agents are present on the FI)

Comment. Still holds true: there is now evidence that three of the targeted infectious agents are present in the FI. Pilot data suggested the presence of a paramyxovirus and a poxvirus; new data also suggest the presence of a flavivirus (see Section 3).

Assumption 3. The local actors are willing to engage (several collaborators have already expressed their support of the project)

Comment. Still holds true: this was confirmed by several means such as high attendance to an international workshop and a local public talk and discussion session on the topic of wildlife infectious disease and the willingness of various actors to facilitate the investigation of wildlife disease outbreaks (see Sections 2 and 3).

Assumption 4. Banked samples are available for analyses (1,500 identified samples are currently available at CEFE)

Comment. Still holds true: samples from 407 individual birds (corresponding to > 2,000 samples) are available at CEFE and listed in an appropriate data base (see Section 3).

Assumption 5. Laboratories for analyses are accessible

Comment. Still holds true: the results from the first laboratory analyses have been obtained without any unexpected challenge (see Section 3).

Assumption 6. Protocols are functional (protocols for 5 of the 6 targeted infectious agents have already been validated for use on seabird samples by the project partners)

Comment. Still holds true: the results from the first laboratory analyses have been obtained without any unexpected challenge (see Section 3).

Assumption 7. Ecological data are available (most of the data are already available at SAERI, FC and MARE and only need to be compiled)

Comment. Still holds true: part of the data has only been shared between the project partners; data exchange will be finalised once the Collaboration Agreement has been signed.

Assumption 8 (new). In the event of an HPAI outbreak in the FI, field data and sample collection will still be possible

Comment. Still holds true: the FIG Environmental Department has so far supported the possibility to maintain field investigations in the event of an HPAI outbreak, provided that appropriate biosecurity measures are respected (for the safety of both wildlife and people), and that field investigations are justified. Such field investigations would notably help understand the transmission pathways of the virus and assess its impact on the local wildlife, informing response to the outbreak. We have started working on adjusted protocols (as part of Activities 4.2-3, initially scheduled for Year 2 but moved forward in response to the high likelihood of HPAI introduction to the FI in the coming months). This notably involves (1) interactions with the FIG Environmental Department and Veterinary Services, and (2) risk assessment and guideline production led by the SCAR Wildlife Health Monitoring Group (in which 2 of the project team members are involved; see Section 3).

Assumption 9 (new). Our Change Request for rolling over unspent fund from Year 1 to Year 2 is accepted (currently under review).

Comment. The signature of the Collaboration Agreement has been delayed, which has been delaying expenses (related to Operating costs only). We would like to roll over the unspent fund (£49,088.97) from the 2022/2023 financial year to the upcoming 2023/2024 financial year. Our project involves 5 international partners: University of Glasgow in the United Kingdom, SAERI and FC in the FI, CEFE in France, and MARE in Portugal. Those institutions all have specific demands regarding the Collaboration Agreement, and some showed unexpectedly long processing times. All the partners have now agreed on the last version of the Collaboration Agreement, so we expect it to be signed by May 2023. The delay in the signature of the Collaboration Agreement has delayed some of the expenses. In particular, we have not been able to transfer their funds to the partners. It has also delayed some expenses related to activities to be conducted in the partner institutions (notably consumables for laboratory analyses). The rejection of this Change Request would result in a loss of £49,088.97 dedicated to operating costs, in particular consumables and reagents for laboratory analyses. This would considerably reduce the quantity of analyses we can run. The planned analyses would allow us to produce a data set exploring (1) the presence of a set of relevant pathogens within the seabird community of the FI, and (2) the spatial and temporal dynamics of the detected pathogens. These data would be then used to infer the ecological drivers of pathogen distribution within the seabird community of the FI, conduct a risk assessment of pathogen introduction and spread, and propose appropriate surveillance and response protocols. Without the requested funding, we would have to cancel some of the planned analyses. For instance, we would have to focus on one specific pathogen, instead of considering of set of relevant pathogens. Considering the current global context, we would probably focus on avian influenza (as a highly pathogenic strain of the virus is currently decimating seabird populations worldwide and spreading through South America, and is very likely to reach the FI in the coming months). We would however have to cancel analyses considering other important pathogens such as avian cholera, avian pox, and avian paramyxoviruses. This would impact all the outputs of the projects, which would then only apply to one pathogen, instead of the five initially planned. This

would also impact the transferability of the project insights to other systems as considering several pathogens would allow us to capture processes involved in the dynamics of pathogens with different modes and chains of transmission.

4. Project support to environmental and/or climate outcomes in the UKOTs

The expected outputs of this project will enrich our understanding of the threat posed by pathogens to globally significant seabird populations in the FI. This novel knowledge will be used to improve response to pathogen outbreaks in the FI, in parallel with improving capacity locally through community engagement and training. This project will thus directly support the **FI Environment Strategy**, in particular with regard to the “Biodiversity and Ecosystem Integrity” and “Science and Innovation” objectives. Accordingly, this project is supported by the FIG.

Globally, considering the exceptional avian community present in the FI, this project will also support FIG’s commitments to the **Convention on Biological Diversity**. In particular this project will directly address the articles 7 (Identification and Monitoring), 12 (Research and Training), 13 (Public Education and Awareness), 17 (Exchange of Information) and 18 (Technical and Scientific Cooperation) of the convention. The project will also contribute to the Convention on the **Conservation of Migratory Species of Wild Animals** by bringing insights on the impact of pathogens carried and potentially spread by migratory species. Finally, all the genetic data generated will be managed following the **Nagoya Protocol** on Access and Benefit Sharing.

The **Agreement on the Conservation of Albatrosses and Petrels** (ACAP) has recognized the potential impact of infectious diseases on this group of seabirds, and has rightfully encouraged actions to improve knowledge and management of diseases of concern; i.e. “...review evidence for impacts of pathogens and parasites on ACAP species and effectiveness of mitigation measures”; “... implement long-term disease surveillance programs” and “...thoroughly investigate albatross disease/mortality events when they occur”.

We have already made significant progress to support the FI into their achievement of strategic long-term outcomes for the natural environment.

Through the **collection of baseline data and samples critical to survey the occurrence of wildlife pathogens** in the FI (see Section 3, activities 1.1-3), the project is on track to:

- Contribute to article 7 (Identification and Monitoring) of the Convention on Biological Diversity.
- Serve as a basis to “implement[ing] long-term disease surveillance programs” as encouraged by ACAP.

Through our work on the **procedures for the reporting and investigation of suspected wildlife disease outbreaks** (see Section 3, activities 4.2-3), the project is on track to:

- Contribute to articles 18 (Technical and Scientific Cooperation) of the Convention on Biological Diversity.
- Contribute to the “implement[ation of] long-term disease surveillance programs” and “investigat[ion of] albatross disease/mortality”.

Through **community engagement and capacity building** (see Section 3, activities 4.4-6), the project is on track to:

- Contribute to articles 12 (Research and Training), 13 (Public Education and Awareness), and 17 (Exchange of Information) of the Convention on Biological Diversity.

The activities scheduled for Year 2 will keep on supporting the FI commitment to the strategic objectives listed above. During Year 2, we will also work at the scaling-up of the project to initiate changes in surveillance programs and response protocols to disease outbreaks inside, but also outside of the FI. This will be facilitated by the wide network of collaborators of the research team. This network includes academic and conservation partners worldwide (e.g., BirdLife International, the Royal Society for the Protection of Birds, the Nature Conservancy and the National Nature Reserve of the French Southern Lands, the Wildlife Health Monitoring

Group of the SCAR). In particular, communication with the ACAP will be facilitated through collaborations with JNCC.

5. Gender equality and social inclusion

The project team working on the development and delivery of this project involves both women and men. For instance, our field team for the 2022/2023 campaign was led by a woman, and involved 5 women and 2 men, from 3 different nationalities. All the project products are made freely available to anyone, independently of gender or other individual characteristics such as ethnicity or socio-economic background. When organizing events involving the community (outreach events and workshops) we target women and men equally by using complementary announcement channels (online blog, radio and newspaper advertising, mailing lists), and participation is open to anyone independently of gender. In line with this, efforts have been made to identify the communication channel the most widely used in the FI, and led us to create a Facebook page. We also joined several Facebook community groups capturing the diversity of inhabitants and visitors of the FI (e.g., Falkland Islands Community Board, Falkland Islands Pictures...) where we stay in touch with the community and share project communications.

Consideration is also given to ensure that project products do not promote gender bias. For instance, we use inclusive language and diverse illustrations. The same consideration is given to other individual characteristics such as ethnicity or socioeconomic background. For instance, project products will also be translated in different languages to increase their impact within and outside of the FI community. For instance, our documentary on TF1 (episodes [1](#), [2](#), [3](#), [4](#), [5](#), [6](#), [7](#), [8](#) and [9](#)) is now available in French and to be translated in English; our [interview in Polar Journal](#) available in English, French and German (see Annex 4).

Please quantify the proportion of women on the Project Board ¹ .	1/5
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ² .	2/5

6. Monitoring and evaluation

Monitoring of project progress and indicators is a key part of the role of all project staff but in particular is the responsibility of the project leaders, and the other project principals. Budget dedicated to M&E primarily consists in staff time. In particular, for each output, we monitor and review **database entry** and **result publication**, in addition to **meetings, and outreach and training event reports**. We track progress in community awareness and capacity building through **attendance** of in-person events and **post analytics** for online content. We compare those with the SMART indicators and Means of Verification of the logframe. Based on this approach, the project is on track to reach the targeted Outcome, despite slight changes in the relative scheduling of the different activities (some being delayed, and some being moved forward; see Section 3). Those changes are due to (1) delay in the signature of the Collaboration Agreement, slowing down expenses related to activities to be conducted in partner institutions and (2) shifted priorities towards the surveillance and response to a potential HPAI outbreak in the FI (see Section 3).

We will maintain this strategy through Year 2. In addition, now that the communication pipeline has been established, we will implement regular surveys shared with the stakeholders of the projects aiming at assessing their understanding of the project results and their confidence contributing or leading infectious disease surveillance and response in the future.

¹ A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

² Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

7. Lessons learnt

The project is on track so far, notably due to successful (1) field data and sample collection campaigns (see Section 3) and (2) local community engagement (see Sections 2 and 3). This could only be achieved thanks to the involvement of local institution in the project (SAERI and FC) and long periods of time spent by the project leader on site.

In-person interactions and close interactions with the local community appeared to be critical to the success of the project. The involvement of an anthropologist in the project (see Section 10) has helped make progress on these points. It notably pointed towards values shared by the local community, including a worry around “parachute science” and, on the contrary, a strong interest for long-term research built together with the community, which perfectly aligns with the objectives of the project.

The implementation of the project could have been optimized by:

- Transferring a larger part of the budget to on-site institutions to facilitate field expenses. However, this would also have been challenged by the delays in the signature of the Collaboration Agreement, as this has prevented funding transfer from the lead partner to the other partners (but see below).
- Expecting longer delays in the signature of Collaboration Agreement. This could probably be avoided in the future by starting to work on the Collaboration Agreement earlier (we started working on it a month before the start of the project) or by making the start of the project coincide with the start of the financial year (to have a full year to solve this issue instead of only a few months).

8. Actions taken in response to previous reviews (if applicable)

Here is our response to the reviews provided in the Award Letter.

While reviewing your application, the Darwin Plus Advisory Group also identified some areas in *which your application could have been stronger. Although the comments below are not requirements for funding, they may help strengthen your project. We would therefore recommend you incorporate them into your project:*

- *In terms of sustainability, while this project would provide an important set of data on disease etc, it is not clear whether this information has been asked for by an agency that will use it in the future. If it has, it is not clear how it will be funded;*
Response – The project was actually suggested by SAERI, the local research institution. It was then proposed to, and supported by Falklands Conservation and the Falkland Islands Government. We understand the concerns regarding the sustainability of the project. We propose the following actions to maximize the chances of this initiative to be sustainable:
 - Strengthening connections with governmental organisations with capacity and financial support to run laboratory analyses, notably the Agency for Plant and Animal Health.
 - Training local partners for field investigations and initial laboratory analyses to be run on-site, by locals.
 - Building an international network of experts, including working groups of stable institutions (World Organisation for Animal Health, Wildlife Disease Association, Scientific Committee for Antarctic Research, etc...) and academic partners. The idea is that with a wide network of experts, comes more expertise but also more funding opportunities.
- *It is not clear how much of a priority investigating infectious diseases is, compared to addressing other potential harms on seabird populations, including bycatch, lack of resource availability, habitat loss, invasive species and pollution; are the same infectious diseases seen on other islands, or is this is a problem in the Falklands in particular because there are livestock and humans?*
Response – Infectious diseases are indeed a threat among others. We believe this project has a high value though, as this particular threat is understudied, despite the strong impact infectious disease can have on wild populations. Examples include the

current avian influenza epidemic affected seabirds of the Northern Hemisphere (see Falchieri et al. 2022, <https://doi.org/10.1002/vetr.2311>), the recurrent avian cholera outbreaks recorded in water birds of the Indian Ocean and Arctic (see Jaeger et al. 2018, <https://doi.org/10.1371/journal.pone.0197291>). Infectious diseases might also interact with other threats. For instance, introduced species can be responsible for the introduction or emergence of pathogens, or act as pathogen reservoirs (see talk by Gamble et al. 2022; Appendix 2). This project thus fits into an overall effort to help seabird population build resilience through a better understanding of the threats they encounter and how to mitigate them.

- *Overall the logframe is robust, but some improvements could strengthen it:*
 - *Indicator 1.1 would benefit from being made more specific.*
Response – Indicator 1.1 now states as “Banked samples listed and gathered at the CEFE, CNRS partner, ready for laboratory analyses”.
 - *Indicators 0.1 and 0.2 need some clarification.*
 - *0.1: what exactly will be measured and how?*
Response – Regarding the evidence base, we will measure pathogen prevalence through different laboratory methods (immunological and molecular), and report those on the project website. Regarding the tools for surveillance, we will publish a set of web-based applications based on epidemiological models tailored to the Southern Ocean ecosystem to explore optimal infectious disease surveillance and response protocols under different epidemiological scenarios.
 - *0.2: what kind of implementation will be measured and how?*
Response – We propose the following proxies to measure community engagement into wildlife pathogen monitoring:
 - Number of field observations reported (to avoid confounded effects between observation effort and infectious disease outbreak occurrence, and to ensure the collection of both detection and non-detection data, we will encourage people to report the observation of both potential infectious disease outbreaks, and apparently healthy populations, at least for long-term actors such as island managers).
 - Proportion of potential infectious disease outbreaks investigated (from the initial report to field investigation and laboratory characterisation).
 - *Under Output 4, how will the "increased capacity" or increased engagement be measured?*
Response – Engagement and capacity will be measured using the following proxies:
 - Size of the reached community (integrating the size of the project mailing-list and the number of followers on social media).
 - Number of participants in outreach (e.g., talks) and training (e.g., workshops) activities.
 - Number of trained people available on the territory for field investigations and laboratory activities.

9. Risk Management

The potential introduction of HPAI to the FI represent a risk not accounted for a year ago, as it only recently emerged in wildlife. We have detailed above how we have accounted for this new risk by shifting our priorities and developed adjusted protocols (see Section 3).

10. Other comments on progress not covered elsewhere

We have been working on the improvement of community involvement through **anthropological survey**. To do so, we have established a new collaboration with the Social Anthropology Laboratory (France). This new component of the project is led by PhD student Keltoum Boumedjane and funded through matched funding (France). It includes a field survey aimed at understanding practical aspects of people’s engagement into biosecurity, such as

personal and professional motivations, most used communication channels, etc. As stated above (Section 7), this aspect of the project has already been extremely beneficial in facilitating interactions with the local community.

11. Sustainability and legacy

The project is expected to equip the FI with skills and resources to efficiently monitor and respond to seabird diseases and maintain high scientific standards. Year 1 as focused on community engagement (see Section 2). The baseline data produced as part of this project will also be foundational to future assessment of seabird health in the FI. In Year 2, we will focus on (1) training of local staff and (2) identification of pathways to financial sustainability (see Section 2).

12. Darwin Plus identity

Our project has a clear identity (“Falklands Wildlife Health”), and Darwin Plus is identified as the principal funder of this project. References to Darwin Plus are included in all media (either directly in the media, e.g., scientific presentations, or via centralization of the relevant media on the project webpages with references to Darwin Plus).

13. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	Yes/No
Have any concerns been investigated in the past 12 months	Yes/No
Does your project have a Safeguarding focal point?	Yes/No Amandine Gamble (project leader) [REDACTED] Robert.Partridge (University of Glasgow Safeguarding Officer) [REDACTED]
Has the focal point attended any formal training in the last 12 months?	Yes/No Amandine Gamble, July 2023, University of Glasgow induction process Equality & diversity essentials Fire safety training Health, safety & wellbeing induction Implementing reasonable adjustments Introduction to general data protection regulation Information security Research integrity
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 20 % [1/5] Planned: 20 % [1/5]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. Nothing to report.	
Does the project have any developments or activities planned around Safeguarding in the coming 12 months? If so please specify. Nothing to report.	

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2022 – 31 March 2023)

Project spend (indicative) in this financial year	2022/23 D+ Grant (£)	2022/23 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL	6,707.00	17,986.03		

* The signature of the Collaboration Agreement has been delayed, which has been delaying expenses (related to Operating costs only). The delay in the signature of the Collaboration Agreement has delayed some of the expenses. In particular, we have not been able to transfer their funds to the partners. It has also delayed some expenses related to activities to be conducted in the partner institutions (notably consumables for laboratory analyses). We have submitted a Change Request (under review) requesting to roll over the unspent fund (£49,088.97) from the 2022/2023 financial year to the upcoming 2023/2024 financial year. This is discussed in Sections 3.3 and 3.4.

Table 2: Project mobilising of matched funding during the reporting period (1 April 2022 – 31 March 2023)

	Matched funding secured to date	Total matched funding expected by end of project
Matched funding leveraged by the partners to deliver the project.		
Total additional finance mobilised by new activities building on evidence, best practices and project (£)		

Annex 1: Report of progress and achievements against logframe for Financial Year 2022-2023 – if applicable

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
<p>Impact: Improved monitoring of seabird pathogens in the FI, influencing management decisions to improve wildlife health. Improved response to disease outbreaks through increased knowledge of the baseline epidemiological situation</p>		<p>Improved reporting of suspected wildlife disease outbreaks through increased community engagement and strengthen collaborations with local institutions (see Sections 2 and 3). Increased knowledge of pathogen occurrence in the FI wildlife (see Section 3).</p>	
<p>Outcome: Framework for the long-term monitoring of seabird pathogens in the FI, including practical tools and shared knowledge (outreach and training), and rooted in a network of local and international collaborators</p>	<p>0.1. Evidence base (data base and novel biological insights) and tools (protocols and statistical tools) to inform surveillance protocols and decision-making 0.2. Functional framework for wildlife pathogen monitoring developed and implemented (published material, trained personnel, long-term collaboration established)</p>	<p>0.1. Gathered banked samples, collected new samples, and started leading laboratory analysed 0.2. Engaged with the community (in particular the government and private landowners), discussed protocol revisions and capacity building</p>	<p>0.1. Finalise sample collection and laboratory analyses, conduct statistical analyses 0.2. Finalise protocol revisions, deliver training, finalise the identification of a sustainable laboratory analysis pipeline, identify pathways to financial sustainability</p>
<p>Output 1. Database on potential pathogen detection and quantification in the seabirds of the FI</p>	<p>1.1. Banked samples listed and gathered at the CEFE, CNRS partner, ready for laboratory analyses [Year 1, Quarter 2] 1.2. Novel samples for Y1 gathered (~750 samples) [Y1, Q4] and Y2 (~250 samples) [Y2, Q4] 1.3. Dataset of antibody quantification (immunoassays) for 6 families of infectious agents, across > 7 seabird species across the archipelago [Y1, Q4] 1.4. Dataset of infectious agent genetic material quantification (PCR) of key infectious agents (2 to 5 depending on which were detected by</p>	<p>Slightly delayed. Activities related to indicators 1.1-2 are on track. Activities related to indicator 1.3 are slightly delayed as a consequence of (1) adjustment of the activities in response to high likelihood of HPAI introduction to the FI in the coming months and (2) administrative delays caused by the signature of the Collaboration Agreement (activity to be conducted in one of the partner institutions, to which more laboratory consumables will be delivered once the Collaboration Agreement signed).</p>	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	immunoassay); generated using the equipment acquired by SAERI in the context of the Covid19 Rapid Response project CV19RR02 [Y1, Q1] 1.5. Update of data base with results from samples collected in Y2 [Y2, Q4]		
Activity 1.1. Census of banked samples (expected n = 1462 samples).		Completed (n = 807 individual birds)	
Activity 1.2. Sample collection in the field (expected n = 750 samples in year 1 and n = 250 samples in year 2).		Year 1 completed (n = 1,459 individual birds – higher than expected thanks to matched funding enabling more staff)	Year 2 fieldwork to be conducted
Activity 1.3. Immunological analyses of all the samples for all the infectious agents.		In progress – Year 1 samples screened for 2/6 infectious agents	Finalization of the analysis of banked and Year 1 samples. Year 2 samples to be screened after the field campaign
Activity 1.4. PCR analyses of the samples collected in sites with antibody-positive individuals (based on results of activity 1.2).		Scheduled for Year 2	
Activity 1.5. Database update with samples from year 2.		Scheduled for Year 2	
Output 2. Increased knowledge of epidemiological dynamics in the FI based on the mapping of potential pathogen occurrence across species, space and time	2.1. Prevalence map for 6 families of infectious agents for > 7 species [Y2, Q1] 2.2. Temporal series of the incidence of key infectious agents on selected sites [Y2, Q1] 2.3. Synthesis of the spatiotemporal patterns of incidence for all the targeted infectious agents; publication of at least one peer-reviewed publication [Y2, Q1] 2.4. Update of analyses with results from samples collected in Y2 [Y2, Q4]	On track. Scheduled for Year 2	
Activity 2.1. Cleaning and mapping of the immunological and PCR data.		Scheduled for Year 2	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Activity 2.2. Estimation of infectious agent incidence across species, space and time by integrating immunological and PCR data.		Scheduled for Year 2	
Activity 2.3. Redaction of the report and publication presenting the patterns of infectious agent incidence across species, space and time.		Scheduled for Year 2	
Activity 2.4. Analyses update with results from samples from year 2.		Scheduled for Year 2	
Output 3. Increased knowledge of the likely drivers and consequences of infectious agent dynamics in the system	3.1. Ecological data gathered from the partner (for > 7 seabird species, 10 years and 10 sites across the FI) [Y2, Q2] 3.2. Estimates of infectious agent impact (% mortality explained) on seabird demography for each detected infectious agent [Y2, Q2] 3.3. Estimates of the effect of host community composition on infectious agent incidences (probability of outbreak in the colony and island as a function of community composition) [Y2, Q2] 3.4. Estimates of host ecological traits on infectious agent incidences (probability of outbreak in the colony and island as a function of the traits of the seabird species present) [Y2, Q3] 3.5. Estimates of host connectivity on infectious agent spread (probability of outbreak in the colony and island as a function of connectivity with other colonies and islands) [Y2, Q3] 3.6. Synthesis of the drivers and consequences of infectious agent dynamics in the system; publication of at least one peer-reviewed publication [Y2, Q3]	On track. Scheduled for Year 2	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Activity 3.1. Ecological data compilation and cleaning.		Scheduled for Year 2	
Activity 3.2. Statistical analyses linking infectious agent incidence to demographic dynamics.		Scheduled for Year 2	
Activity 3.3. Statistical analyses linking host community composition to infectious agent incidence.		Scheduled for Year 2	
Activity 3.4. Statistical analyses linking host ecological traits to infectious agent incidence.		Scheduled for Year 2	
Activity 3.5. Modelling of the relationship between host connectivity to infectious agent incidence.		Scheduled for Year 2	
<p>Output 4. Improved disease surveillance and response system via increased local engagement and capacity and revised protocols</p>	<p>4.1. Identification of the likely principal infectious threats posed to the seabirds of the FI, and appropriate surveillance protocol [Y2, Q4] 4.2. Revision of the procedure for unusual observation reporting [Y2, Q4] 4.3. Development of standardized protocols for proactive pathogen monitoring tailored to the FI and aligned with the guidelines of the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research [Y2, Q4] 4.4. Production of outreach material (at least one flyer and one video) [Y1, Q2] 4.5. At least two public talks attended by 50 people each [Y2, Q4] 4.6. At least one workshop attended by 10 people [Y2, Q4] 4.7. Synthesis of the available material (protocols, outreach and training) and actors' engagement [Y3, Q1]</p>	<p>On track. Activities related to indicators 4.2-3 were moved forward in response to high likelihood of HPAI introduction to the FI in the coming months. Activities related to indicators 4.4-6 are on track. Other activities are scheduled for Year 2.</p>	
Activity 4.1. Result synthesis and surveillance protocol redaction.		Scheduled for Year 2	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Activity 4.2. Revision of the procedure for unusual observation reporting.		In progress – Scheduled for Year 2 but moved forward to account for the risk of HPAI introduction to the FI	
Activity 4.3. Coordination of the protocol with the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research.		In progress – Scheduled for Year 2 but moved forward to account for the risk of HPAI introduction to the FI	
Activity 4.4. Outreach material production.		In progress – Workshop and talk material recorded	Produce and centralize online material focused on the FI system
Activity 4.5. Public talk organization and delivery.		In progress – Led a local public talk and discussion session (attended by ~50 people, including stakeholders and the broader community)	Deliver a 2 nd public talk focused on the project outputs and perspectives
Activity 4.6. Workshop organization and delivery.		In progress – Organized an international workshop on HPAI in seabirds (attended by ~45 people, recordings viewed by ~350 people)	Deliver a technical workshop
Activity 4.7. Synthesis of the project products.		Scheduled for Year 2	

Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	SMART Indicators	Means of verification	Important Assumptions
Impact: Improved monitoring of seabird pathogens in the FI, influencing management decisions to improve wildlife health. Improved response to disease outbreaks through increased knowledge of the baseline epidemiological situation			
Outcome: Framework for the long-term monitoring of seabird pathogens in the FI, including practical tools and shared knowledge (outreach and training), and rooted in a network of local and international collaborators	<p>0.1. Evidence base (data base and novel biological insights) and tools (protocols and statistical tools) to inform surveillance protocols and decision-making</p> <p>0.2. Functional framework for wildlife pathogen monitoring developed and implemented (published material, trained personnel, long-term collaboration established)</p>	<p>0.1. Dataset available through FI IMS-GIS data centre and the FI Wildlife Disease Group</p> <p>0.2. Standardized protocols available on the project page and distributed to the relevant actors (research community, conservation institutions and governmental institutions); FI integrated into the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research</p>	<ul style="list-style-type: none"> - Data acquisition pipeline is functional (from sample acquisition and data compilation to laboratory analyses) - At least one infectious agent was detected (pilot data from banked samples suggest that at least two of the targeted infectious agents are present on the FI) - The local actors are willing to engage (several collaborators have already expressed their support of the project)
Outputs: 1. Database on potential pathogen detection and quantification in the seabirds of the FI	<p>1.1. Banked samples listed and gathered at the CEFE, CNRS partner, ready for laboratory analyses [Year 1, Quarter 2]*</p> <p>1.2. Novel samples for Y1 gathered (~750 samples) [Y1, Q4] and Y2 (~250 samples) [Y2, Q4]</p> <p>1.3. Dataset of antibody quantification (immunoassays) for 6 families of infectious agents, across > 7 seabird species across the archipelago [Y1, Q4]</p> <p>1.4. Dataset of infectious agent genetic material quantification (PCR) of key infectious agents (2 to 5 depending on which were detected by immunoassay); generated using the equipment acquired by SAERI in the context of the Covid19 Rapid Response project CV19RR02 [Y1, Q1]</p> <p>1.5. Update of data base with results from samples collected in Y2 [Y2, Q4]</p>	<p>1.1. Samples available at SAERI and CNRS (depending on the analyses)</p> <p>1.2. Additional samples available</p> <p>1.3. Dataset of antibody quantification available on a data portal published via a public facing webGIS project page; report submitted to the relevant actors and the Darwin Initiative</p> <p>1.4. Dataset of infectious agent genetic material quantification available on a data portal published via a public facing webGIS project page</p> <p>1.5. Database updated with data from new samples [Y2, Q2]</p>	<ul style="list-style-type: none"> - Banked samples are available for analyses (1,500 identified samples are currently available at CEFE) - Laboratories for analyses are accessible - Protocols are functional (protocols for 5 of the 6 targeted infectious agents have already been validated for use on seabird samples by the project partners)
2. Increased knowledge of epidemiological dynamics in the FI based on the mapping of potential pathogen	<p>2.1. Prevalence map for 6 families of infectious agents for > 7 species [Y2, Q1]</p> <p>2.2. Temporal series of the incidence of key infectious agents on selected sites [Y2, Q1]</p>	<p>2.1. Incidence map shared with collaborators, published on the project webpage, and updated webGIS database (developed by SAERI in the context of the</p>	<ul style="list-style-type: none"> - At least one infectious agent was detected (pilot data from banked samples suggest that at least two of the targeted infectious agents are present on the FI)

<p>occurrence across species, space and time</p>	<p>2.3. Synthesis of the spatiotemporal patterns of incidence for all the targeted infectious agents; publication of at least one peer-reviewed publication [Y2, Q1] 2.4. Update of analyses with results from samples collected in Y2 [Y2, Q4]</p>	<p>Covid19 Rapid Response project CV19RR02) 2.2. Temporal series shared with collaborators and available on the project webpage, and updated webGIS database 2.3. Report submitted to the relevant actors and the Darwin Initiative 2.4. Maps and temporal series updated with results from samples collected in Y2 [Y2, Q2]</p>	
<p>3. Increased knowledge of the likely drivers and consequences of infectious agent dynamics in the system</p>	<p>3.1. Ecological data gathered from the partner (for > 7 seabird species, 10 years and 10 sites across the FI) [Y2, Q2] 3.2. Estimates of infectious agent impact (% mortality explained) on seabird demography for each detected infectious agent [Y2, Q2] 3.3. Estimates of the effect of host community composition on infectious agent incidences (probability of outbreak in the colony and island as a function of community composition) [Y2, Q2] 3.4. Estimates of host ecological traits on infectious agent incidences (probability of outbreak in the colony and island as a function of the traits of the seabird species present) [Y2, Q3] 3.5. Estimates of host connectivity on infectious agent spread (probability of outbreak in the colony and island as a function of connectivity with other colonies and islands) [Y2, Q3] 3.6. Synthesis of the drivers and consequences of infectious agent dynamics in the system; publication of at least one peer-reviewed publication [Y2, Q3]</p>	<p>3.1. Dataset available through FI IMS-GIS data centre 3.2. Table of estimates of infectious agent impact on seabird demography available on the project webpage 3.3. Table of estimates of host community composition on infectious agent incidences available on the project webpage 3.3. Table of estimates of host ecological traits on infectious agent incidences available on the project webpage 3.5. Table of estimates of host connectivity on infectious agent spread available on the project webpage 3.6. Report submitted to the relevant actors and the Darwin Initiative</p>	<p>- Ecological data are available (most of the data are already available at SAERI, FC and MARE and only need to be compiled)</p>
<p>4. Improved disease surveillance and response system via increased local engagement and</p>	<p>4.1. Identification of the likely principal infectious threats posed to the seabirds of the FI, and appropriate surveillance protocol [Y2, Q4]</p>	<p>4.1. List of pathogens of interest published on the project website and distributed to the relevant actors</p>	<p>- The local actors are willing to engage (several collaborators have already expressed their support of the project)</p>

<p>capacity and revised protocols</p>	<p>4.2. Revision of the procedure for unusual observation reporting [Y2, Q4] 4.3. Development of standardized protocols for proactive pathogen monitoring tailored to the FI and aligned with the guidelines of the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research [Y2, Q4] 4.4. Production of outreach material (at least one flyer and one video) [Y1, Q2] 4.5. At least two public talks attended by 50 people each [Y2, Q4] 4.6. At least one workshop attended by 10 people [Y2, Q4] 4.7. Synthesis of the available material (protocols, outreach and training) and actors' engagement [Y3, Q1]</p>	<p>4.2. Updated procedure for unusual observation reporting published by the FI Wildlife Disease Group 4.3. Protocols published on the project website and distributed to the relevant actors 4.4. Outreach material available on the project website 4.5. Public talk recording available on the project website 4.6. Workshop report and material available on the project website 4.7. Report submitted to the relevant actors and the Darwin Initiative</p>	
<p>Activities</p> <ol style="list-style-type: none"> 1.1. Census of banked samples (expected n = 1462). 1.2. Sample collection in the field (expected n = 750 in year 1 and n = 250 in year 2). 1.3. Immunological analyses of all the samples for all the infectious agents. 1.4. PCR analyses of the samples collected in sites with antibody-positive individuals (based on results of activity 1.2). 1.5. Database update with samples from year 2. 2.1. Cleaning and mapping of the immunological and PCR data. 2.2. Estimation of infectious agent incidence across species, space and time by integrating immunological and PCR data. 2.3. Redaction of the report and publication presenting the patterns of infectious agent incidence across species, space and time. 2.4. Analyses update with results from samples from year 2. 3.1. Ecological data compilation and cleaning. 3.2. Statistical analyses linking infectious agent incidence to demographic dynamics. 3.3. Statistical analyses linking host community composition to infectious agent incidence. 3.4. Statistical analyses linking host ecological traits to infectious agent incidence. 3.5. Modelling of the relationship between host connectivity to infectious agent incidence. 3.6. Redaction of the report and publication presenting the associations between ecological conditions and infectious agent incidence. 4.1. Result synthesis and surveillance protocol redaction. 4.2. Revision of the procedure for unusual observation reporting. 4.3. Coordination of the protocol with the Wildlife Health Monitoring Group of the Scientific Committee for Antarctic Research. 4.4. Outreach material production. 4.5. Public talk organization and delivery. 4.6. Workshop organization and delivery. 4.7. Synthesis of the project products. 			

*Indicator 1.1 was edited as a response to the review provided in the Award Letter.

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

DPLUS Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DPLUS Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DPLUS-A01	People who attended (in-person) the workshop <i>Surveillance and monitoring responses to Highly Pathogenic Avian Influenza (HPAI)</i>	Number of people from key international stakeholders engaged with	People	Male Female	27 20				100
DPLUS-A01	People who attended (in-person) the public talk and discussion session <i>Infectious disease in the Falklands wildlife: what are the threats, and where do we go from there?</i>	Number of people from key local stakeholders engaged with	People	Male Female	30 20				100
DPLUS-A07	Institutions with enhanced awareness and understanding of wildlife infectious disease and associated biodiversity and local community issues	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated local community issues	Government institutions	National, environmental	3				5
DPLUS-B05	Number of people with increased participation in suspected wildlife disease outbreak reporting	Number of people with increased participation in local communities / local management organisations	People	Male Female	7 9				30
DPLUS-C05	Contribution with data, insights, and case studies to national Multilateral Environmental Agreements (MEAs) related reporting processes and calls for evidence	Number of projects contributing data, insights, and case studies to national Multilateral Environmental Agreements (MEAs) related reporting processes and calls for evidence	MEAs	Convention on Biological Diversity ACAP	1 1				4

DPLUS Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DPLUS Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DPLUS-C12	Social Media presence	Social Media presence	Highest number of views	Twitter Facebook	24.7K 27				50K
DPLUS-C13	People who view the recordings of the workshop <i>Surveillance and monitoring responses to Highly Pathogenic Avian Influenza (HPAI)</i>	Number of webinar attendees	Number of views	None	356				1000
DPLUS-C15	Number of Media related activities	Number of Media related activities	Number of publications	TV Podcast Online press	1 1 1				10

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Recommendations for combatting the incursion of Highly Pathogenic Avian Influenza (HPAI) into North Atlantic seabird populations: an interim report from the 15 th International Seabird Group conference.	Scientific peer-reviewed publication	Cunningham, E. J. A., Gamble, A., Hart, T., Humphreys, E. M., Philip, E., Tyler, G., & Wood, M. J. (2022).	Female	British	Seabird Group	<u>Seabird</u>
The Risk of Avian Influenza in the Southern Ocean: A practical guide	Scientific preprint	Dewar, M., Wille, M., Gamble, A., Vanstreels, R., Boulinier, T., Smith, A., Varsani, A., Ratcliffe, N., Black, J., Lynnes, A., Barbosa, A., & Hart, T.	Female	Australian	Open Science Framework	<u>OSF</u>
Surveillance and monitoring responses to Highly Pathogenic Avian Influenza (HPAI)	Workshop recordings	Gamble, A., Philip, E., & Wood, M. J.	Female	French/Australian	YouTube	<u>YouTube</u>

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the correct template (checking fund, type of report (i.e. Annual or Final), and year) and deleted the blue guidance text before submission?	x
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	x
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	NA
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	x
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	NA
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 15)?	NA
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	