Darwin Plus Main: 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 2024

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)	- 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 2023-Mar 2024) and number (e.g. Annual Report 1, 2)	01/07/2023 – 31/03/2024 Annual Report 2
Project Leader name	Amandine [redacted]
Project website/blog/social media	- facebook.com/FalklandsWildlifeHealth - twitter.com/FIWildHealth
Report author(s) and date	Amandine [redacted] 30/04/2024

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

Engagement of the FIG was discussed during regular dedicated **in-person meetings** with the FIG Veterinary Services (Zoe Fowler and collaborators) and Environmental Department (Denise Blake 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. **Exchange of protocols and data related** to wildlife disease surveillance and response, in particular in the context of the HPAI panzootic.
2. **Collaborative applications to external funding** to improve local facilities.

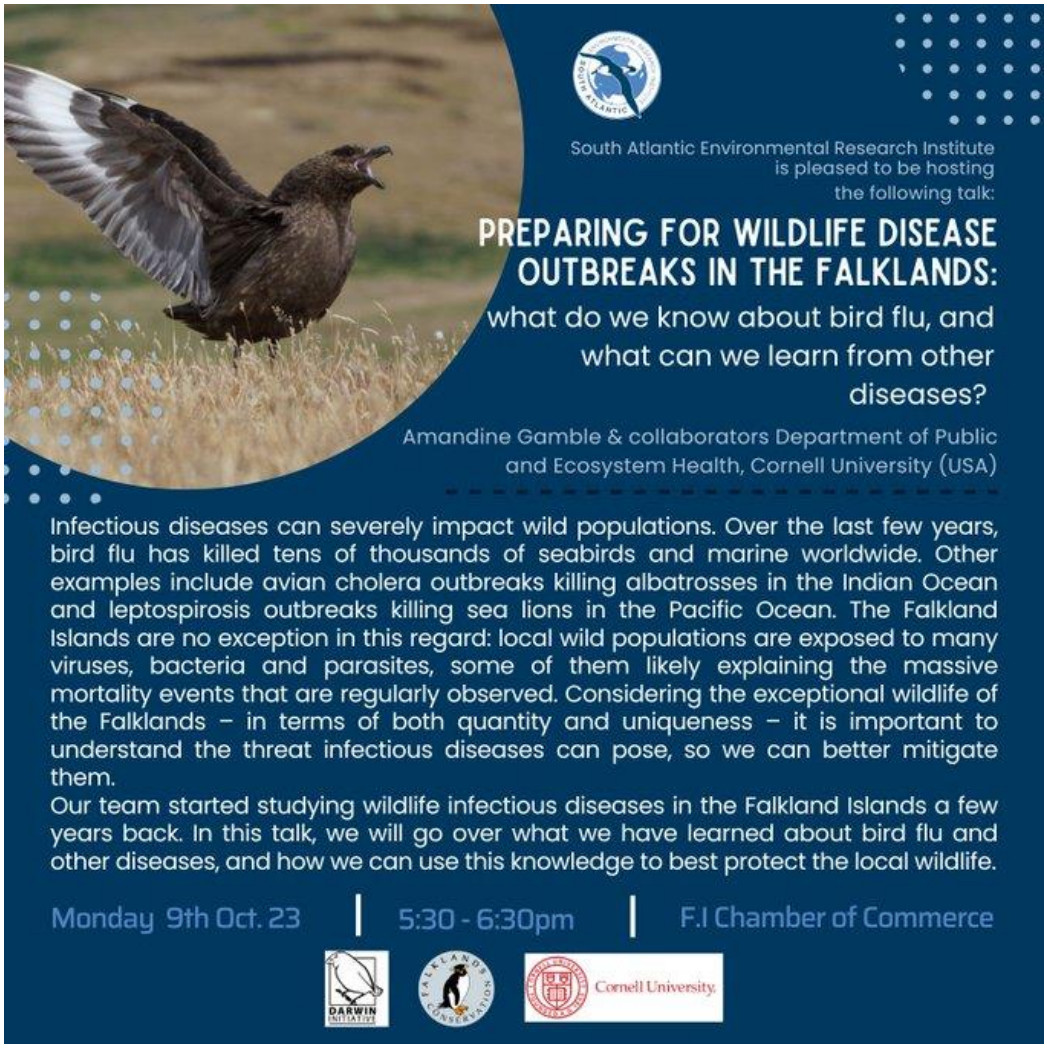

Figure 2. Flyer of the public talk and discussion session led in Stanley by the project team (advertised on Facebook, X and on Falklands Radio, and attended by ~50 people, corresponding to the full capacity of the seminar room).

Engagement of private landowners was discussed **during site visits**. These included, in addition to the sites sampled in 2022/2023:

- 1 site from which data and samples were collected as a response to suspected wildlife disease outbreaks (Carcass Island).
- 6 new sites for which baseline data and samples were collected (West Point Island, Hummock Island, Pebble Island, Bleaker Island, Sealion Island, Dunbar).

The trend observed last year regarding community engagement was confirmed, with **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**, **reported directly to the project team**, or directly observed by the project team while conducting routine fieldwork. This allowed us to investigate 3 suspected wildlife disease outbreaks in 2023/2024 (Figure 1). We also collected data and samples from 7 apparently healthy sites (no massive mortality event reported) (Figure 1) that nevertheless revealed the wider circulation of HPAI and pox (those results will be reported in the final report to be submitted in September 2023 once all the samples have been analysed). Laboratory analyses of the collected samples are ongoing – results are shared with the FIG Veterinary Services and the involved landowners as soon as they are available.

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. In parallel, real-time data exchange between the FIG Veterinary Services and the project team allowed both parties to trigger rapid responses (policy responses by closing HPAI-infected sites and research response by conducting targeted field investigations).

In parallel with our efforts to connect with the local community, we also widely **engaged with international institutions**. Project member Amandine Gamble joined the High Pathogenicity H5N1 Avian Influenza Intersessional Group of the Agreement for the Conservation of Albatrosses and Petrels (ACAP). We also maintained regular interactions with the Antarctic Animal Health Network of the Scientific Committee for Antarctic Research (SCAR), which project members Amandine Gamble and Thierry Boulinier are member of. We are pursuing efforts to engage with the international community as international conferences and will present the project outputs and lead workshops at the International Albatross and Petrel Conference and the International Seabird Group Conference in the coming months.

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), as detailed below.

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 [**Error! Reference source not found.Mean of Verification 1.1**; detailed database will be made public by the end of the project]. In 2022/2023, we added samples from 1,356 individuals from 9 bird species from 5 islands, and in 2023/2024, 1,712 individuals from 16 species [**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 are currently being analysed in the laboratory.

Laboratory analyses (Activities 1.3-4)

The laboratory analyses have been **started but are delayed**. As of the end of Year 2, **samples have been screened for antibodies against 3 pathogens (influenza viruses, flaviviruses, paramyxoviruses) over the 6 expected** (the 3 formers, in addition to coronaviruses, *Pasteurella* bacteria, *Toxoplasma* parasites). This delay is due to (1) the administrative delays accumulated in Year 1, and (2) a refocus on influenza viruses considering the ongoing HPAI panzootic (instead of analyses a subset of samples for all the pathogens, we have put the priority on analyzing all the samples for several subtypes of influenza viruses). These analyses have revealed the wider circulation of HPAI than thought based on lethal case detection only, with variations across species and sites [**Mean of Verification 1.3**; detailed database will be made public by the end of the project]. Screening by PCR is ongoing, although the suspected presence of HPAI material in the samples has constrained us to relocate part of the analyses to a physical containment level 3 laboratory, generating delays in the analyses. We also collected direct observations in the field regarding pox virus incidence.

Data base (Activity 1.5)

The data base now contain all the field data and is being updated in real-time as laboratory data are being produced [**Mean of Verification 1.5**; detailed database will be made public by the end of the project].

Increased knowledge on the epidemiological dynamics and their drivers (Activities 2.1-4 and 3.1-5)

We made significant progresses in our understanding of the circulation, and drivers of the circulation, of influenza viruses. The exploration of the spatial and temporal patterns in the incidence of influenza viruses (Figure 3, [**Means of Verification 2.1,2,4 and 3.1**; complete

maps will be made public by the end of the project]) revealed variations across species and islands, easily explained by the ecology of the concerned species (e.g., high incidence in scavengers like skuas and caracaras, wider spread in species with larger home ranges like skuas…) [**Means of Verification 3.3,5**; final results will be made public by the end of the project] .

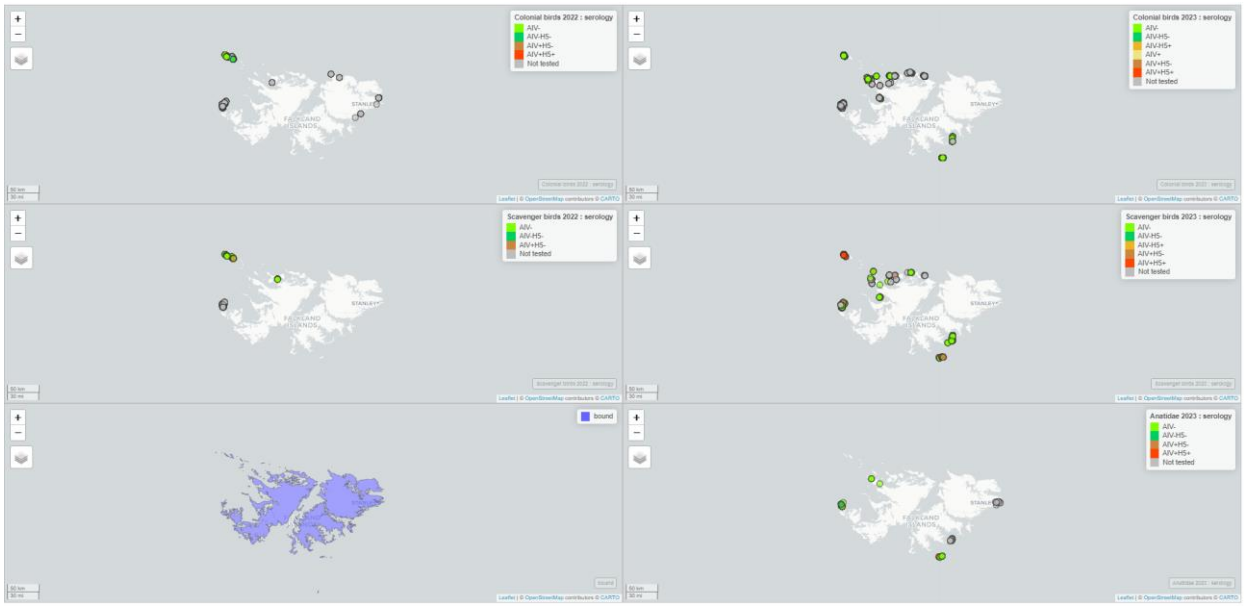

Figure 3. Screenshot of the dynamic map of influenza antibody detection, informing on the incidence of the virus. Left and right panels show 2022/2023 and 2023/2024 respectively. The top, middle and bottom panels show colonial birds, scavengers and anatids respectively. Colours indicate the serological status of the birds.

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 2022/2023. Since then, we have continuously been exchanging with the FIG Veterinary Services to exchange data and update protocols. In Year 1, we worked 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], and with the SCAR Antarctic Animal Health Network to produce **guidelines for the surveillance and response to potential HPAI outbreaks** [**Mean of Verification 4.3**; general guidelines published in Dewar et al., 2023, *Antarctic Science* and Dewar et al. 2023, *SCAR*; detailed protocols in progress]. This work is being revised based on what we learned from the HPAI outbreaks in the region over Year 2.

Community engagement and capacity building (Activities 4.4-6)

Activities related to community engagement and capacity building are **on track** and built upon the efforts initiated during Year 1. Regarding engagement of the local community, we organized a **public talk and discussion session** on the HPAI in the FI (**Figure 2**; [**Means of Verification 4.4 and 4.5**]) in Stanley (FI), which was highly attended (~50 people, including key stakeholders; see Section 2) and followed up by an interview for Falklands Radio. Regarding engagement of the global community, we also organized several **workshops** on the topic of surveillance and monitoring responses to HPAI as part of an international conference (to be delivered in the coming months) mixing research and conservation institutions ([**Means of Verification 4.4 and 4.6**). 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 press articles and TV interviews (see Annex 4) aimed at increasing awareness around the topic of wildlife disease in the **general public**.

3.2 Progress towards project Outputs

Database on potential pathogen detection and quantification in the seabirds of the FI (Output 1)

Field data and sample collection and census is **on track** and has been highly successful so far. **Our sample bank went from 407 to 3,475 individual birds, expanding from 6 to 16 bird species, and from 1 to 12 sites within the FI** [**Indicators 1.1-2**]. 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 Boulinier CEFE) enabling us to increase our field team. 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 is enriching our mechanistic understanding of pathogen dynamics in the FI (Outputs 2-3).

The laboratory analyses of the samples collected prior to the project and during Years 1 and 2 have been started but are still delayed. We have, however, obtained key results for the success of the project, including data on HPAI and pox virus incidence, in addition to previous results on the presence of flaviviruses and paramyxoviruses in the FI [**Indicators 1.3,5**].

Increased knowledge of epidemiological dynamics in the FI based on the mapping of potential pathogen occurrence across species, space and time (Output 2)

We are currently aggregating and synthesizing all the results into a dynamic visualization framework that highlights patterns of pathogen prevalence across space, time, and species for the pathogens for which we obtained data as part of Output 1 (**Figure 3**) [**Indicators 2.1-4**]. We have been able to identify clear patterns that we are now using to identify likely drivers of those pathogen dynamics.

Increased knowledge of the likely drivers and consequences of infectious agent dynamics in the system (Output 3)

In parallel with the data aggregation and synthesis effort of Output 2, we are currently developing theoretical models aimed at formalizing the hypothetic drivers of epidemiological dynamics, including impact of infection on the hosts, host species community composition, ecological traits of the host species, and host connectivity [**Indicators 3-3.5**].

Improved disease surveillance and response system via increased local engagement and capacity and revised protocols (Output 4)

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 was notably highlighted by high participation in public talks delivered by the team in the FI [**Indicators 4.5**]. 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. Electronic material will be shared publicly in the coming months.

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).

In Year 1, we highlighted two important challenges:

First, on the administrative side, we have been experiencing **delay in the signature of the Collaboration Agreement**, which was eventually resolved. We are still catching up with the activities that depended on fund and sample transfer (laboratory analyses).

Second, the **ongoing HPAI panzootic**, which could have threatened access to field sites. To overcome this, we worked hand-in-hand with the FIG Veterinary Services to define protocols enabling data and sample collection in conditions that were safe for both the wildlife and the people involved. This allowed us to continue our work despite the introduction of HPAI to the FI in October 2023.

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. However, the suspected presence of HPAI material in the samples has constrained us to relocate part of the analyses to a physical containment level 3 laboratory, generating delays in the PCR analyses (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; Year 1 data also suggest the presence of a flavivirus; Year 2 data confirmed the introduction of HPAI (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. This was completed by samples from 3,068 individual birds collected over the 2 field campaigns for Years 1 and 2 (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, and we have secured access to a physical containment level 3 laboratory for the samples at risk (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 worked on adjusted protocols (as part of Activities 4.2-3, initially scheduled for Year 2 but moved to Year 1 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 Antarctic Animal Health Network (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). This was addressed through a change request (CR23-009), which was accepted.

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 reinforced the connection of our work with ACAP through the fact that project member Amandine Gamble joined the ACAP High Pathogenicity H5N1 Avian Influenza Intersessional Group. This has led to more frequent exchanges with other members of the ACAP community, including frequent updates on the insights generated by this project.

We have also 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 the end of the project will keep on supporting the FI commitment to the strategic objectives listed above. We are also currently working 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. We are notably finalizing a gift agreement of $250K USD from a private company dedicated to this purpose – contact with this company was possible through our outreach work. We will use this funding to deploy field laboratories and train international staff to use it. This will be facilitated by the wide network of collaborators of the research team.

5. Gender Equality and Social Inclusion (GESI)

The project team working on the development and delivery of this project involves both women and men. For instance, out field team for the 2022/2023 campaign was led by a woman, and involved 2 women and 2 men, from institutions from 3 different countries. All the project products are be made freely available to anyone, independently of gender or other individual characteristic 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 be given to ensure that project products to not promote gender bias. For instance, we use inclusive language and diverse illustrations. The same consideration is be given to other individual characteristics such as ethnicity or socioeconomic background.

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

GESI Scale	Description	Put X where you think your project is on the scale
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	X
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing	

[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.

	unequal power relationships and seeking institutional and societal change	

Within the project team, we aim for our team members to all have equal access to opportunities. We are proud for instance for having trained 2 early career researchers with no previous field experience to field work up to full autonomy, and to have given the opportunities to present their own specific contributions to conferences and through scientific publications. Outside of the project team, we aim to empower local community with capacity to lead epidemiological surveillance without depending on external institutions. This year, we notably widely exchanged with, and trained when needed, inhabitants of remotes islands in the FI to safely collect samples for HPAI surveillance, building upon the protocols shared by the FIG. By the end of the project, we aim to expand this to laboratory analyses notably by providing training to local staff, in the FI and in other territories, empowering the local community to run the full data acquisition pipeline independently of external institutions.

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 consist 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 thorough the end of the project. In addition, we planned to 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 – this aspect has mostly been implemented informally, but we are in the process of recruited a student to dedicate his time to this.

7. Lessons learnt

After this 2nd year, we reiterate what we identified after the 1st year. 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)

We appreciate the feedback received on previous report. As suggested by the review of the Year 1 report, we have clarified the report of the outputs.

9. Risk Management

The main adjustments the project had to make were related to introduction of HPAI to the FI. We have detailed above how we have accounted for this new risk by shifting our priorities and developed adjusted protocols (see Section 3). This has allowed to pursue the project as planned.

10. 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. Years 1 and 2 have focused on knowledge acquisition and community engagement (see Sections 2 and 2). We are now focusing on (1) training of local staff and (2) identification of pathways to financial sustainability. We notably received £6,000 from the Antarctic Science International Bursary (ASIB) to invest and deploy sequencing equipment in the FI (which will remain on site after the end of the project). We are currently working on field-implementable protocols. As mentioned above, we are also finalizing a gift agreement of $250K USD from a private company dedicated to deploying additional field laboratory equipment and train staff to use it in the FI and beyond.

11. 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).

12. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	~~Yes/~~No
Have any concerns been reported in the past 12 months	~~Yes/~~No
Does your project have a Safeguarding focal point?	Yes~~/No~~ Amandine [redacted] (project leader) [redacted] Robert [redacted] (University of Glasgow Safeguarding Officer) [redacted]
Has the focal point attended any formal training in the last 12 months?	Yes~~/No~~ Amandine Gamble, January 2024, Cornell University induction process Sexual and Related Misconduct (Full Course)
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.	
Please describe any community sensitisation that has taken place over the past 12 months; include topics covered and number of participants. Nothing to report.	
Have there been any concerns around Health, Safety and Security of your project over the past year? If yes, please outline how this was resolved. Nothing to report.	

13. Project expenditure

The numbers below are based on the previsions of the accepted change request CR23-009.

Table 1: Project expenditure during the reporting period (1 April 2023 – 31 March 2024)

Project spend (indicative) in this financial year	2023/24 D+ Grant (£)	2023/24 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]			
Consultancy costs				
Overhead Costs				
Travel and subsistence				Draft (some expenses still being processed)
Operating Costs				Draft (some expenses still being processed)
Capital items				
Others (Please specify)				
TOTAL	**80,148.97**	**79,000.00**		

Table 2: Project mobilised or matched funding during the reporting period (1 April 2023 – 31 March 2024)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)		[redacted]	
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

14. Other comments on progress not covered elsewhere

In parallel with the activities funded by the BCF, we also implemented these synergistic activities:

Development of a high-throughput screening approach for the simultaneous detection of multiple potential pathogens – Our team has developed a new tool for the simultaneous screening of samples against several potential pathogens at the same time from small volumes of sample. The development of this tools produced successful preliminary results (Bralet et al., in preparation). In this context, we have chosen to invest more time in the finalization of the development of this tool in the short term, instead of analyses samples for individual potential pathogens, postponing molecular analyses to later this year, but multiplying the outputs we will get from the same samples. This part of the project is led by the CEFE partner and benefits from matched funding from the Agence National pour la Recherche (Project ECOPATHs led by Thierry Boulinier) and the work of PhD Student Tristan Bralet (CEFE).

Development of a novel typing approach from non-purified bacterial samples – Our team has developed a new protocol enabling bacterial typing (i.e., identification below the species level) directly from swab samples, without having to culture the bacteria (simplifying field and lab work logistics, and improving staff safety). This protocol has been applied to Pasteurella multocida, the agent avian cholera, and demonstrated the cross-species transmission of P. multocida between highly affected albatrosses, scavenging skuas, and introduced rodents (Gamble et al. in preparation). This part of the project is led by the CEFE and UofG partners and benefits from matched funding from the Royal Society (Project 'Contribution of introduced species to multi-host epidemiological dynamics' led by Amandine Gamble) and the work of PhD Student Augustin Clessin (CEFE).

Development of a focused study on the molecular ecology of avian pox viruses – Recurrent outbreaks of avian pox viruses have been detected in the seabirds of the Falkland Islands over the last decades. Why do avian pox viruses keep on reemerging, and how they spread across sites and species remains unknown. We developed a focused study aiming at using phylogenetic tools to address those questions (Emerit et al. in preparation). We acquired additional matched funding for this focused study. This funding also allowed to purchase a field sequencer (Oxford Nanopore technology) to enable on-site genetic characterisation of the pathogen if an outbreak were to occur. This part of the project is led by the UofG partner and benefits from matched funding from the Antarctic Science International Bursary (Project 'Ecology of pox viruses in a Subantarctic seabird community' led by Amandine Gamble) and the work of Master Student Julia Emeri (Cornell University) and PhD Student Augustin Clessin (CEFE).

Development of a complementary project on the role of bird movements in pathogen spread – We developed a new project aimed at collecting focused ecological data to better understand mechanisms of pathogen spread within the Falkland Islands. This study will look at the movements of bird populations suspected to play a particular role in pathogen spread (scavenging skuas and non-breeding albatrosses). This part of the project is led by the UofG partner and benefits from matched funding from Cornell University (Amandine Gamble's start-up fund) and the work of Research Intern Léo Streith (UofG). Implementation is scheduled for November 2023 to March 2024, and is conditional on the local HPAI situation.

15. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

As our final report is coming soon (September 2024), we will submit final, curated material then.

Annex 1: Report of progress and achievements against logframe for Financial Year 2023-2024

Project summary	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
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	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).	
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	**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	**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
Output 1. Database on potential pathogen detection and quantification in the seabirds of the FI	Slightly delayed. Activities related to indicators 1.1-2 are on track. Activities related to indicator 1.3-5 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).	
Indicator 1.1. Banked samples listed and gathered at the CEFE, CNRS partner, ready for laboratory analyses [Year 1, Quarter 2]	Completed (n = 807 individual birds).	
Indicator 1.2. Novel samples for Y1 gathered (~750 samples) [Y1, Q4] and Y2 (~250 samples) [Y2, Q4]	Year 1 completed (n = 1,459 individual birds – higher than expected thanks to matched funding enabling more staff). Year 2 completed (n = 1,712 individual birds – higher than expected thanks to matched funding enabling more staff).	
Indicator 1.3. Dataset of antibody quantification (immunoassays) for 6 families of infectious agents, across > 7 seabird species across the archipelago [Y1, Q4]	In progress – Year 1 samples screened for 3/6 infectious agents. Year 2 samples screened for 1/6 infectious agents.	Finalization of the analysis for priority pathogens (influenza viruses and paramyxoviruses)

Project summary	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Indicator 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]	In progress – Delayed as the suspected presence of HPAI material in the samples has constrained us to relocate part of the analyses to a physical containment level 3 laboratory, generating delays in the PCR analyses.	Physical containment level 3 laboratory secured, finalization of the analyses for priority pathogens (influenza viruses and paramyxoviruses)
Indicator 1.5. Update of data base with results from samples collected in Y2 [Y2, Q4]	In progress	Finalization of the analyses for priority pathogens (influenza viruses and paramyxoviruses)
Output 2. Increased knowledge of epidemiological dynamics in the FI based on the mapping of potential pathogen occurrence across species, space and time	Following delays from Output 1, but key material already available	
Indicator 2.1. Prevalence map for 6 families of infectious agents for > 7 species [Y2, Q1]	In progress – Available for 3 pathogens	Follows Output 1
Indicator 2.2. Temporal series of the incidence of key infectious agents on selected sites [Y2, Q1]	In progress – Available for 1 pathogen	Follows Output 1
Indicator 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]	In progress – Available for 1 pathogen	Follows Output 1
Indicator 2.4. Update of analyses with results from samples collected in Y2 [Y2, Q4]	In progress – Available for 1 pathogen	Follows Output 1
Output 3. Increased knowledge of the likely drivers and consequences of infectious agent dynamics in the system	Following delays from Output 1, but key material already available	
Indicator 3.1. Ecological data gathered from the partner (for > 7 seabird species, 10 years and 10 sites across the FI) [Y2, Q2]	Done	
Indicator 3.2. Estimates of infectious agent impact (% mortality explained) on seabird demography for each detected infectious agent [Y2, Q2]	In progress	Follows Output 2
Indicator 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]	In progress – Key insights available for HPAI	Follows Output 2
Indicator 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]	In progress – Key insights available for HPAI	Follows Output 2

Project summary	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Indicator 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]	In progress – Key insights available for HPAI	Follows Output 2
Indicator 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]	In progress – Key insights available for HPAI	Follows Output 2
Output 4. Improved disease surveillance and response system via increased local engagement and capacity and revised protocols	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.	
Indicator 4.1. Identification of the likely principal infectious threats posed to the seabirds of the FI, and appropriate surveillance protocol [Y2, Q4]	In progress – Key insights available for HPAI	Follows Output 3
Indicator 4.2. Revision of the procedure for unusual observation reporting [Y2, Q4]	In progress – Done but needs to be updated based on most recent results notably in light of the ongoing HPAI outbreaks	Follows Output 3
Indicator 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]	In progress – Done but needs to be updated based on most recent results notably in light of the ongoing HPAI outbreaks	Follows Output 3
Indicator 4.4. Production of outreach material (at least one flyer and one video) [Y1, Q2]	In progress – Workshop and talk material recorded	A student hired to lead this task
Indicator 4.5. At least two public talks attended by 50 people each [Y2, Q4]	Done	
Indicator 4.6. At least one workshop attended by 10 people [Y2, Q4]	Done	More workshops schedules for Year 3
Indicator 4.7. Synthesis of the available material (protocols, outreach and training) and actors' engagement [Y3, Q1]	Scheduled for Year 3	

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	**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)	**0.1.** Dataset available through FI IMS-GIS data centre and the FI Wildlife Disease Group **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	- 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	**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 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]	**1.1.** Samples available at SAERI and CNRS (depending on the analyses) **1.2.** Additional samples available **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 **1.4.** Dataset of infectious agent genetic material quantification available on a data portal published via a public facing webGIS project page **1.5.** Database updated with data from new samples [Y2, Q2]	- 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	**2.1.** Prevalence map for 6 families of infectious agents for > 7 species [Y2, Q1]	**2.1.** Incidence map shared with collaborators, published on the project	- At least one infectious agent was detected (pilot data from banked samples

dynamics in the FI based on the mapping of potential pathogen occurrence across species, space and time	**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]	webpage, and updated webGIS database (developed by SAERI in the context of the 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]	suggest that at least two of the targeted infectious agents are present on the FI)
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]	**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	- Ecological data are available (most of the data are already available at SAERI, FC and MARE and only need to be compiled)

4. Improved disease surveillance and response system via increased local engagement and capacity and revised protocols	**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]	**4.1.** List of pathogens of interest published on the project website and distributed to the relevant actors **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	- The local actors are willing to engage (several collaborators have already expressed their support of the project)

Activities

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.

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

DPLUS Indicator number	Name of indicator	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 *Surveillance and monitoring responses to Highly Pathogenic Avian Influenza (HPAI)*	People	Male Female	27 20				47
DPLUS-A01	People who attended (in-person) the public talk and discussion session *Infectious disease in the Falklands wildlife: what are the threats, and where do we go from there?*	People	Male Female	30 20				50
DPLUS-A01	People who attended (in-person) the public talk and discussion session *Preparing for wildlife disease outbreaks in the Falklands*	People	Male Female	30 20				50
DPLUS-A07	Institutions with enhanced awareness and understanding of wildlife infectious disease and associated biodiversity and local community issues	Government institutions	National, environmental	3	4			5
DPLUS-B05	Number of people with increased participation in suspected wildlife disease outbreak reporting	People	Male Female	7 9	10 11			30
DPLUS-C05	Contribution with 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	1 1			4
DPLUS-C12	Social Media presence	Highest number of views	Twitter Facebook	24.7K 27	10K 56			50K
DPLUS-C13	People who view the recordings of the workshop *Surveillance and monitoring responses to Highly Pathogenic Avian Influenza (HPAI)*	Number of views	None	356	56			300
DPLUS-C15	Number of Media related activities	Number of publications	TV Radio Podcast Online press	1 0 1 1	1 1 0 3			10

Table 2 Publications

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, 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)
The risk of highly pathogenic avian influenza in the Southern Ocean: a practical guide for operators and scientists interacting with wildlife	Scientific peer-reviewed publication	Dewar M. L., Wille M., **Gamble A.**, Vanstreels R., Boulinier T., Smith A., Varsani A., Ratcliffe N., Black J. & Lynnes A. (2023).	Female	Australia	Antarctic Science	https://doi.org/10.1017/S0954102023000342
No evidence for highly pathogenic avian influenza virus H5N1 (clade 2.3.4.4b) in the Antarctic region during the austral summer 2022/23.	Scientific preprint	Lisovski S., Günther A., Dewar M., Ainley D., Arce R., Ballard G., Belliure J., **Boulinier T.,** Bennison A., Cary C., **Catry P., Clessin A.,** Connan M., Cox A., Cristina J., Elrod M., Ferreiro I., Fowler Z., **Gamble A.**, Hurtado J., Jongsomjit D., Lejeune M., Lescroël A., Li A., Morandini V., Moratorio G., Militão T., Moreno P., Perbolianachis P., Pennycook J., Schmidt A. E. Smyth, L., Soutullo A., Tornos J., Varsani A., Herzschuh U., Beer M. & Wille M. (2023)	Male	Germany	BioRxiv	https://doi.org/10.1101/2023.10.24.563692
Connectivity of marine predators over the Patagonian Shelf during the highly pathogenic avian	Scientific preprint	Riaz J., Orben R. A., **Gamble A.**, Tierney M., **Catry P.,** Granadeiro J. P., Campioni L. & **Baylis A. M. M.** (2023)	Male	Australian	BioRxiv	https://doi.org/10.1101/2023.12.12.570574

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, 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)
influenza (HPAI) outbreak						

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.	x
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
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.	