



Darwin Initiative, Darwin Plus and Illegal Wildlife Trade Challenge Fund Covid-19 Rapid Response Round - Final Report

*Due within two months of the end date of the Rapid Response Round project
(maximum 6 pages)*

Project reference	CV19RR02
If linked with an ongoing project, please include that project reference here (e.g. IWT001)	
Project title	Establishing wildlife health and disease monitoring in the Falkland Islands
Country/ies	Falkland Islands
Lead organisation	SAERI
Partner institution(s)	NA
Start/end date of project	04 Jan 2021 – 31 March 2021
Which fund was this project relevant to?	Darwin Plus
Grant value (£)	57,500
Project Leader name	Dr Alastair Baylis
Report author(s) and date	Dr Alastair Baylis and Dr Haseeb Randhawa Final version: 11 May 2021

1. Project Summary

The Covid-19 pandemic has exposed how vulnerable humanity is to emerging infectious diseases, and has highlighted the absence of coordinated wildlife health and disease surveillance and management – including in UKOTs, which are home to over 90% of UK biodiversity.

Covid-19, like all seven of the identified coronaviruses, is likely of zoonotic origin, being closely related to a virus found in bats. Hence, information on wildlife health and disease is crucial in the Covid-19 context, because environmental changes attributed to human activity has profoundly increased the incidence and emergence of zoonosis - diseases that are maintained in wild animal populations and passed to humans directly (e.g., Lassa Fever) or have evolved from wildlife and spread between humans (e.g., measles, mumps, HIV and Severe Acute Respiratory Syndrome (SARS) viruses). Indeed, 60% of emerging infectious diseases are zoonotic in origin² and Covid-19 is just one spill-over event - arguably the tip of the iceberg. To understand and prevent future catastrophic zoonotic (and indeed reverse zoonosis) events, it is critical that the Falkland Islands have the infrastructure and a coordinated framework to enable wildlife health and disease to be assessed and monitored. Currently, the Falkland Islands lacks the capacity for wildlife disease monitoring. CV19RR02 will increase the capacity of the Falkland Islands to monitor and help to predict and mitigate wildlife disease outbreaks by providing the laboratory equipment for the Falkland Islands to extract, amplify, and purify DNA. The project location was the Falkland Islands (Fig 1).



Fig 1: Location of the Falkland Islands.

2. Project Achievements

Please refer to Appendix 2 and Appendix 3 for a comprehensive list of individuals contacted.

The project will establish a wildlife health and disease strategy for the FI and blueprint for other UKOTs. It will provide the infrastructure for future monitoring for wildlife pathogens.

Owing to the short project time frame, the key project aims and indeed legacy of CV19RR02, was to purchase equipment to facilitate wildlife disease screening and monitoring in the Falkland Islands. It is important to clarify that the concept of disease monitoring and surveillance differs from responding to wildlife disease outbreaks – the latter is reactionary, the former is intended to understand diseases present in wildlife, so that risk to wildlife, livestock and humans can be evaluated.

The CV19RR02 project involved four work packages (WP).

WP1 Y1Q4

Aim: Collate existing published data on wildlife health and disease. Identify gaps, and establish a collaborative, integrated approach to wildlife health and disease studies at the Falkland Islands.

The main deliverable of WP1 was a review of wildlife disease in the Falkland Islands. This review is published on our website and can be accessed [here](#). The cover page is also appended to this report as [Appendix 1](#).

To ensure that our project would be integrated and of use to the wider research community, we reached out to members of the Falkland Islands Wildlife Disease Meeting Group (WDMG), which developed a Falkland Islands protocol for responding to wildlife disease outbreaks, and held a workshop in order to better understand how the project could provide the best resource for the WDMG. To date, disease screening in the Falkland Islands has largely been undertaken by visiting researchers, given resources and expertise on-island are limited. We reached out to several researchers including Dr A. Gamble from the Centre for Evolutionary and Functional Ecology (CEFE, CNRS-Montpellier University, France), Dr A. Duncan from Detroit Zoological Society, and Prof S. Piertney (Aberdeen University & SAERI Board of Directors), to ask for their advice on what equipment would enhance wildlife disease research capacity in the Falkland Islands. Finally, we also reached out to the Falkland Islands Government (FIG) Department of Agriculture, Veterinary Services, SAERI, and the King Edward Memorial Hospital (KEMH). The details of these meetings are provided in [Appendix 2](#).

WP2 Y1Q4

Aim: Develop a webGIS database for Falklands wildlife health and disease

There have been numerous disease outbreaks in the Falkland Islands, but the information relating to these outbreaks are typically contained within unpublished reports that have not been collated and are not readily available. To support the WDMG in particular, we developed a webGIS database that contains all suspected and known wildlife disease outbreaks in the Falkland Islands, dating back to the 1960s. The webGIS project page can be accessed [here](#).

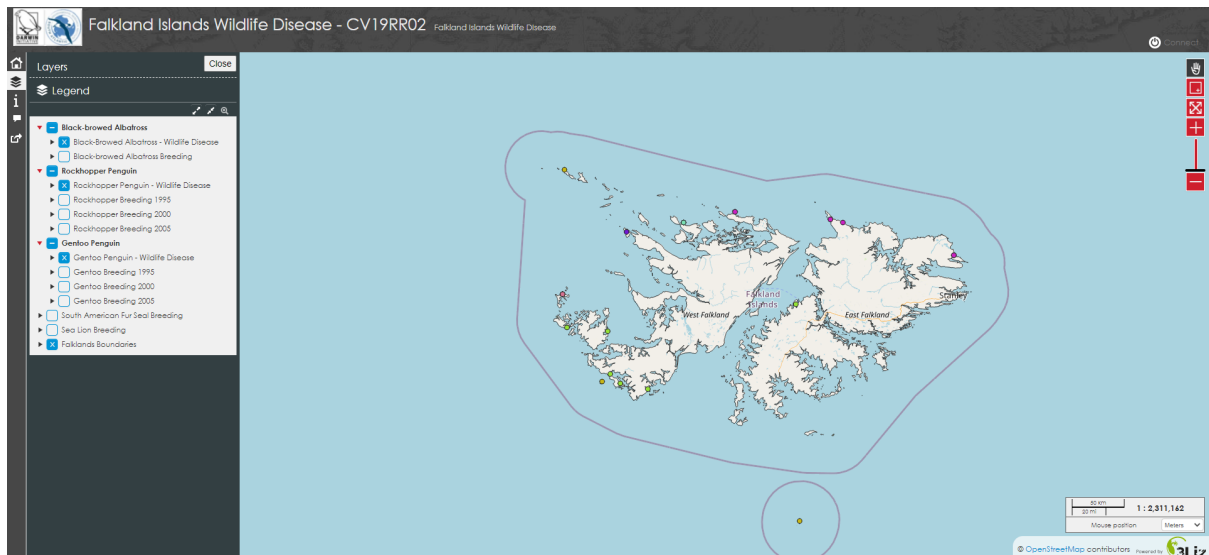


Fig 2: Screen shot from the publicly available webGIS Wildlife Disease page.

WP3 Y1Q4

Aim: Collect samples from seal and seabird breeding colonies

We collected opportunistically and collated samples from a number of sites and species. The samples collected and collated include feral cats (*Felis catus*), South American fur seals (*Arctocephalus australis*), and kelp gull (*Larus dominicanus*). These samples are being stored in a freezer for future analysis.

WP4 Y1Q4

Aim: Infrastructure for pathogen testing in-place.

Brief summary:

The majority of the project budget was dedicated to the purchase of capital equipment. Initially, we explored the option of providing disease testing capability in the field. However, after consultation (described in WP1 and [Appendix 2](#)), we recognised that a longer-lasting benefit to the Falkland Islands would be to purchase equipment that could be used across departments and disciplines, and that would enable the first steps of sample preparation to be undertaken in the Falklands. That is, it was recognised that equipment that supported a coordinated, collaborative, multidisciplinary approach to animal-human health would be of the greatest benefit to the Falkland Islands, and have a lasting project legacy. This approach

will enable samples to be more easily shipped overseas to more specialized, commercial laboratories.

Detailed description:

Given the poorly studied ecosystems of the Falkland Islands, the lack of on-island molecular facilities, and the difficulties and costs associated with shipping samples overseas for molecular analyses, we considered two avenues in terms of equipment.

The first consisted of setting up a portable lab by investing in a MinION, a portable real-time DNA and RNA sequencing device. During discussions with Prof Piertney regarding MinION he advised that this device is cheap, but the Flow Cells required for sequencing were expensive with a short shelf life. Furthermore, this device is most suitable for long reads, such as genome or mitogenome sequencing, given its relatively high error rate compared to traditional Sanger sequencing for targeted sequencing. Due to the cost of Flow Cells, using these for targeted small fragment sequencing, such as barcoding or sequencing of individual genes, is somewhat unnecessary.

The second avenue focused on DNA extraction, PCR amplification and purification, thus making it possible to export stable DNA for sequencing off-islands. Given our generous, yet limited, budget, we deemed that we could maximise breadth of usage by providing facilities to extract, amplify, and purify DNA for off-island sequencing. The hope is to maximise usage of this facility by providing a one-stop basic service and consider expanding the services on offer in the future depending on needs.

[Safeguarding and gender equality statement](#)

SAERI has a comprehensive safeguarding policy that formally outlines policy principles and responsibilities within the organization and includes a designated safeguarding office (DSO). SAERI is incorporating safeguarding as part of our organizational induction procedures for all new employees and all incumbent staff and expected to be conversant with all our policies including safeguarding.

The project team were of mixed genders (40 % male). The project worked closely with FIG staff and stakeholders of mixed gender, which ensured an equal gender representation wherever possible (Appendix 2). In the SAERI office, the current staff cohort is 60% female and 40% male, and SAERI has an equal opportunities policy as part of its internal policy framework.

[How your project delivered value for money?](#)

Having a focused direction, we had discussions with two lab managers (one in Canada and one in New Zealand), in addition to Prof Piertney, to identify equipment needs. A determination that planning for a self-contained lab while avoiding duplication of services was necessary.

Discussions with the KEMH microbiology lab indicated that once the Covid-19 pandemic runs its course and that testing requirements come to an end, the Real-time PCR machine and software currently reserved for Covid-19 testing could become available to external users. Therefore, purchasing real-time PCR equipment was not necessary and would have been redundant.

Due to cost considerations, advice regarding purchasing refurbished equipment was sought. Wherever possible, we shopped around to secure quotes from more than one company ([Appendix 3](#)). The details of which companies were approached and dates are listed in appendix 3, appended to this document. However, Cambridge Scientific (CS) was the only company to respond to a pricing request within a reasonable time frame, was the only company to provide refurbished options at a lower cost, offered SAERI a discount on all Eppendorf products, and offered SAERI a bundle discount (in addition to the Eppendorf discount). The discount came in the form of free electrophoresis gel trays/combs, discount on centrifuge rotors, discount on filter for fume hood, and a discount on the entire invoice. A final list of equipment purchased and cost is appended to this document as [Appendix 4](#).

While outside of the project time-frame, we will publicise the new facilities in the local newspaper, on our website and on twitter once the equipment is in-place (expected by mid-2021). We will host a meeting with the WDMG to explain the new capabilities this equipment offers and provide a workshop for all potential on-island users. Using our international contacts, we will also publicise the increased capacity to undertake genetic analysis in the Falkland Islands to the international research community. SAERI, in collaboration with the KEMH, will provide adequate training and inductions to all users.

How we ensured the equipment would be managed, maintained and made accessible

We originally intended for equipment to be housed at SAERI. However, as the list of equipment was refined, we sought alternate options for laboratory space. Initial consultations involved the Department of Agriculture, Veterinary Services, Public Works Department and KEMH regarding housing this facility in the short- and medium-term. Recently, it was agreed that the new molecular facilities will be housed in the soon to be redeveloped Pathology lab of the KEMH and access to all non-KEMH scientists will be provided according to a yet to be determined protocol. Furthermore, the KEMH will provide technical support through the Senior Medical Engineer. The footprint of every piece of equipment purchased through the C-19 Rapid Response Round grant was calculated and taken into account in the first design phase for the redevelopment of the Pathology lab.

To reduce the potential for cross contamination, the redeveloped KEMH Pathology lab will have separate entrances to the Pathology lab and to the Molecular Suite. Furthermore, given the increased number of users and diversity of samples to be processed, the Molecular Suite will be split into a pre-PCR (DNA Extraction), PCR Amplification, and Post-PCR rooms with office space to reduce the risks of cross-contamination.

While outside of the project time-frame, the availability of consumables will affect the use of these molecular facilities. Having a supply of consumables accessible for Falkland Islands-based and visiting scientists is crucial to ensure the lab operates smoothly and its use is maximised. Ordering these on a per project basis is problematic given shipping costs and potential delays associated with air and sea freight. Therefore, it is proposed that a 'Users Committee' be identified (including representatives from each user group [NGOs, FIG Departments, SAERI, external users, PhD students]) to identify the basic supplies required (e.g. chemicals, PCR kits, tubes, gloves, micropipette tips, etc). Specific consumables such as individual extraction kits and primers will need to be supplied by individual users. To

facilitate accounting, it is proposed that the lab functions under a 'Club Model', whereby each 'user group' would pay an annual fee in cash or in-kind (e.g. KEMH might provide space in the Microbiology lab and technical expertise) in exchange for free access to consumables (up to a certain quantity; TBD by the 'user group'). A tiered membership system could be implemented, whereby heavy users contribute more, but also gain greater access to consumables by reducing the unit costs for respective tiers. Once a Member's supplies are depleted, access to consumables is granted at cost (no overheads). External users would be required to pay the full cost (including overheads) to access consumables. Terms of Reference for this model would need to be drafted following consultation with potential users.

In summary, our project achieved what it set out to do.

AIM	ACHIEVEMENT MEASURED BY	WHAT WAS ACHIEVED
WP1: Collate existing published data on wildlife health and disease. Identify gaps, and establish a collaborative, integrated approach to wildlife health and disease studies at the Falkland Islands	The successful completion of a report to be submitted to Falkland Islands Government and publicly available on-line	Review of wildlife disease in the Falkland Islands can be found here and the cover page is also appended to this report as Appendix 1 . The report was submitted to D. Blake - FIG Environment Unit (via email on 11/05/2021). We also successfully completed a small workshop that consisted of the WDMG, with input from international experts. A protocol for wildlife disease response already exists, and therefore the measured indicated 'report detailing guidelines for disease monitoring and management' was not appropriate.
WP2: Develop a webGIS database for Falklands wildlife health and disease	webGIS project page for Falklands wildlife health and disease.	webGIS project page can be accessed here
WP 3: Collect samples from seal and seabird breeding colonies	completion of a report that details field work, which will be made publicly available on-line.	We opportunistically collected and collated samples from a number of species, as is detailed above. However, as

		described below in ‘Lessons Learnt’ the collection of biological samples was premature
WP 4: Infrastructure for pathogen testing in-place.	successful procurement of laboratory equipment	We successfully procured laboratory equipment (Appendix 4).

Building capacity and resilience with UKOT: Our project enhanced Falkland Islands capacity to carry out future work on wildlife disease. Costs associated with molecular research have generally been high or prohibitive in the Falkland Islands due to a reliance on external labs. This equipment will allow on-island scientists to complete in excess of 50% of the processing of samples for sequencing or molecular purposes; from sample to stable DNA. DNA is much easier and cheaper to ship and does not require storage in hazardous chemicals during shipping. Reducing the costs will increase our national capability across a number of disciplines, including wildlife health surveillance, by increasing the number of samples we are able to process annually. This will enable us to address more complex research questions and will increase the speed with which critical data becomes available to decision makers. This equipment will expand our scientific capabilities to provide baseline data to support decision and policy making relating to wildlife diseases, human health, fisheries research, and pedigree mapping, to name but a few.

3. Lessons learnt

We are a Falkland Islands grown institution. This project would not have been feasible if it were being undertaken by a non-UKOT organization. Being a UKOT organization where the project is being implemented, has several advantages. We had a team that was based permanently in the Falkland Islands, which included a molecular ecologist (Dr H. Randhawa), a ready-made network of stakeholders and existing channels of open communication with FIG, and members of the WDMG. The WDMG is comprised of an ACAP representative, a Department of Agriculture veterinarian, a Falklands Conservation Representative, a FIG Environmental Unit representative and a South Georgia Government representative. Our good working relationship with various organizations and departments was pivotal in adapting and overcoming challenges in the short project time-frame, which was crucial to ensuring project legacy. In particular, consultations with the Public Works Department and KEMH regarding housing the equipment facility in the short- and medium-term, while guaranteeing access to the wider research community.

In-country data management expertise (with robust in-country data management systems) was vital to this project. We are fortunate to have the expertise available on-island that provides support for the Falkland Islands data portal and webGIS, which brought great benefit to the project in the form of developing a project webGIS page. The centralized publicly accessible data portal for the whole of the Falklands was important for project legacy and post project sustainability and it is hoped that the WDMG will adopt and oversee the CV19RR02 webGIS project page.

Also, we found it extremely valuable to be able to access international expertise for advice at various stages of the project. In particular, Dr A. Gamble, Dr A. Duncan, and Prof S. Piertney. Given the project time-frame was short, it worked well having a small core group leading the project.

The challenges encountered surround the short project time frame. These include the time taken for companies to respond to enquiries (1 month), which presumably stems from work challenges associated with Covid-19, but meant that purchasing equipment had to be undertaken in the final stages of the project ([Appendix 4](#)). Additionally, the work package dedicated to sampling wildlife, while valuable, was perhaps premature. It would have been better to have a clear pathway for when samples would be analysed, prior to collection.

4. Other comments and feedback