

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	DPLUS102
Project title	Saving Tristan's only native tree and its associated unique buntings
Territory(ies)	Tristan da Cunha
Lead Partner	Royal Society for the Protection of Birds (RSPB)
Project partner(s)	Conservation Department, Tristan Government Centre for Agriculture and Bioscience International (CABI)
Darwin Plus grant value	£306,653
Start/end dates of project	July 2020 – March 2024
Reporting period (e.g. Apr 2022-Mar 2023) and number (e.g. Annual Report 1, 2)	April 2022 – March 2023 Annual Report 3
Project Leader name	Andy Schofield
Project website/blog/social media	N/A
Report author(s) and date	David Kinchin-Smith (RSPB), Norbert Maczey (CABI) and Trevor Glass (TDC Conservation) 28 April 2023

1. Project summary

This project is an urgent intervention to prevent the collapse of the *Phyllica* forest ecosystem, and the global extinction of unique bunting species in Tristan da Cunha. Invasive alien species are one of the greatest threats to the archipelago's biodiversity. Over the course of the past decade, an invasive scale insect (*Coccus hesperidum*) has infested Tristan's only native tree species, *Phyllica arborea*, smothering and killing many on Tristan, Nightingale and Inaccessible Island World Heritage Site (WHS), (Figure 2). Endemic large-billed *Nesospiza* buntings, evolved to specialise on the fruit of *Phyllica* trees, are threatened with extinction due to insufficient availability of habitat and food. Invasive New Zealand flax (*Phormium tenax*) presents a further pressure to the *Phyllica* habitat on Inaccessible WHS, and has the ability to outcompete the island's native species.

In close collaboration with international experts and Tristan's Conservation Department, we will select, safely test, and release at least two biocontrol agents in heavily infested *Phyllica* stands on the three northern islands (see map, Figure 1) to sustainably manage invasive scale numbers. We will also control invasive flax on Inaccessible Island and build local capacity in specialist rope access skills. These actions will, in the long-term, deliver significant biodiversity benefits, facilitate

the restoration of the *Phylica* forest ecosystem - making it more resilient in a changing climate - and safeguard threatened bunting species.

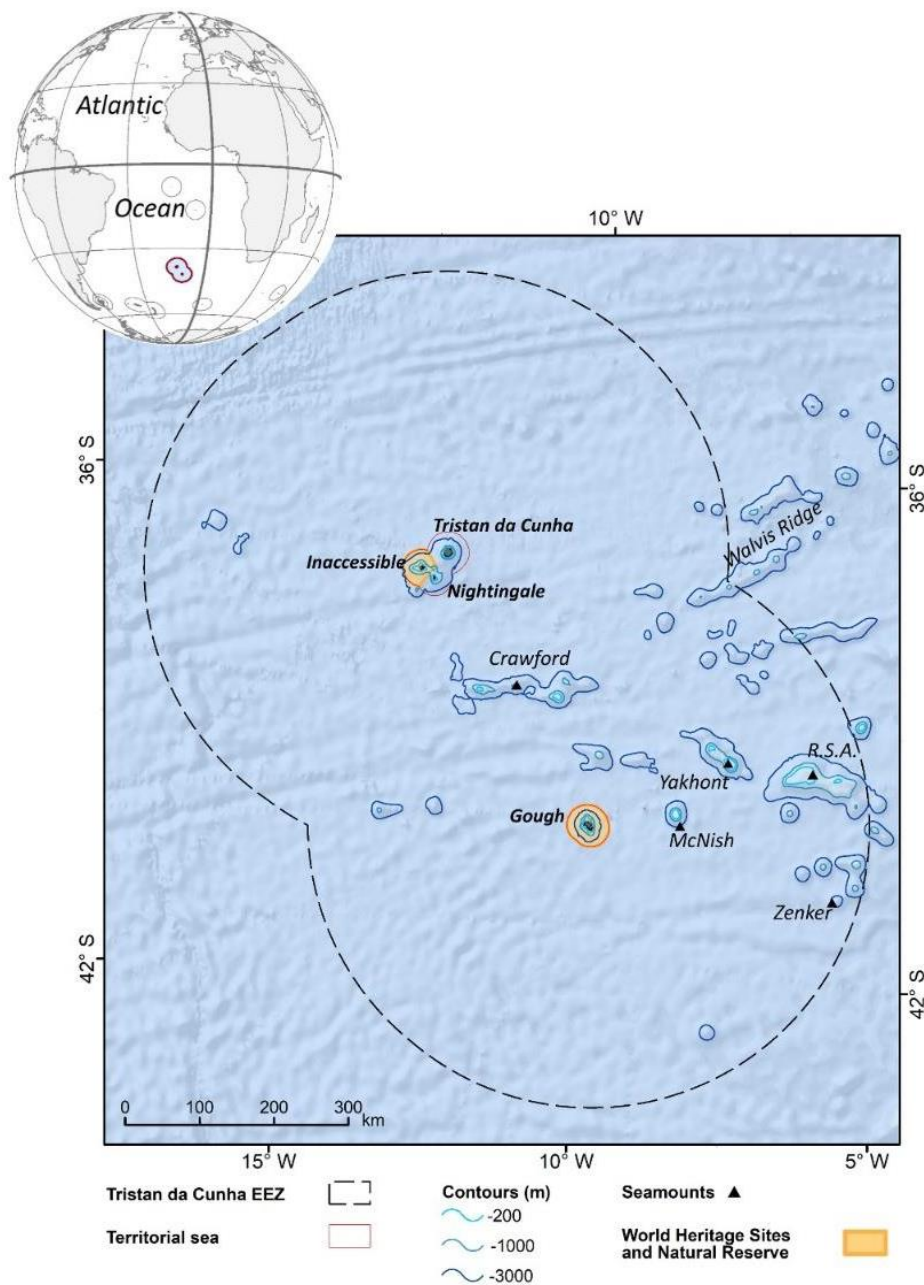


Figure 1. (above) Tristan da Cunha archipelago is the world's most remote inhabited island group, located almost half-way between South America and South Africa. The project will work on the three main northern islands: Inaccessible, Nightingale and Tristan.

Figure 2. (left) The devastation on Nightingale from invasive scale insects and the two storms in 2019.

2. Project stakeholders/partners

The partnership is made up of the **Conservation Department** within the **Tristan da Cunha Government**, the Centre for Agriculture and Bioscience International (**CABI**), **Fera Science** and the Royal Society for the Protection of Birds (**RSPB**). Each partner brings unique knowledge and experience to the project, providing technical skills, expert knowledge in biocontrol agents (BCAs) and invasive species, experience of working with Territories and on-the-ground conservation knowhow. Last year the partnership was extended to include the **Agriculture Department** on Tristan, utilising the skillset of the team to propagate seedlings for the new *Phyllica* nursery on the island. This addition has been really successful with Natasha Glass (Horticulturist), saying “being able to grow certain plants and trees for conservation has been a highlight for me and something that I would love to continue to do in the future”.

This project has largely had to proceed with remote supervision and training because of travel restrictions and associated long quarantine times. It was a real achievement to successfully test, rear and transport a biocontrol agent (BCA) to Tristan in the first year, with the conservation team successfully establishing a culture and making initial releases on Nightingale Island. However, progress stalled after this and so a visit was critical in this penultimate year. **Dr Norbert Maczey (CABI)** was able to visit Tristan and Nightingale in January 2023 and had these reflections:

‘Remote training and supervision of the local activities via Zoom and other media worked very well and allowed the establishment and maintenance of the parasitoid culture and first releases of the agent on Nightingale. However, because nobody based on Tristan has got any previous experience working with insects, the team still struggled with some specific tasks such as finding sufficient scales for upscaling numbers of the parasitoid for more substantial releases and providing evidence for its establishment. These minor but still important difficulties could quickly be sorted out when the ease of travel restrictions made visits feasible again. Although the logistics of travel still only allowed a comparably short field visit, this was sufficient to improve the applied methodology significantly. Hands on training and joint setting up of upscaled cultures resulted in the successful production of almost 1,000 parasitoids within a month after the visit leading to improved releases at all target sites. The onsite collaboration with the conservation team on Tristan worked extremely well and jointly we managed to keep the project on track’

Trevor Glass (TDC Conservation Lead) says *‘Norbert’s visit was incredibly useful. We hadn’t realised quite how damaging the scale insects were on Tristan, affecting many plants as well as *Phyllica*. No one knew what a scale insect was before this project, but the community are now very aware of them. We’re very keen that Norbert can come out to the island again because we learned a lot from his visit’*.

Full team meetings have continued throughout this year (**Annex 4.1**), generally planned for critical times (e.g. receiving a new shipment of wasps, prior to releases, following a visit etc.). These have been supplemented by more regular discussions throughout the year with individual partners to ensure project activities remain on track and issues are identified before they escalate.

3. Project progress

3.1 Progress in carrying out project Activities

The activities which have not commenced to date as per the project timeline, or which have already been completed, have not been reported on below.

'Tristan', 'Nightingale' and 'Inaccessible' refer to the three northern islands in the group – 'Island' has been removed to avoid repetition.

Output 1. Suitable biological control agents for *C. hesperidum* on Tristan selected, risk assessed and tested

*1.2 Analysis of pre-project survey and literature survey to match agents to scale taxon present on Tristan; this includes climate matching of previous successful control projects of *C. hesperidum* with the conditions present on Tristan*

Two additional species/strains of parasitoid wasps potentially suitable for the control of *C. hesperidum* and a release on Tristan were brought into culture during 2022. Trap plants (*Citrus* sp.) infested with *C. hesperidum* enabled us to find parasitoids belonging to the genus *Coccophagus* and a species more closely related to our initial biological control agent (BCA) *Microterys nietneri*. This species turned out to be *M. seyon*, and collected specimens were used to build up a culture in 2022 to allow a more detailed assessment of the species. We also obtained a population of our main agent, *M. nietneri* from Cornwall/Scilly which should be well climate matched to the conditions on Tristan.

1.3 Selection of suitable and readily available agents, including use of agents commercially available and agents currently used in other research institutes

During 2022, we focussed efforts on obtaining an outdoor population of *M. nietneri*, in the belief that these would be climatically better suited for a release on Tristan compared with the current culture of this species bred over many generations indoors. Because we had failed in the previous year to obtain *M. nietneri* from trap plants, we tried to find this species through field surveys instead. There are historical records of *M. nietneri* from St Helena, which are complemented through more recent photographic evidence. Unfortunately, visits to St Helena in February and November 2022 as part of another Darwin Plus project proved unsuccessful, despite obtaining scale infested branches showing signs of parasitism and sweep netting at sites which had previously had records of the species. However, we eventually succeeded in collecting *M. nietneri* from another scale species in Cornwall/Scilly in September 2022. Although numbers were initially very low, we managed to start a culture based on these specimens originating from a coastal environment, climatically well matched to the conditions on Tristan.

The population of *M. nietneri* from Cornwall readily attacks *C. hesperidum*, including both the strain collected from the UK and scales originally obtained from Tristan. Only due to severe time constraints (the culture was only established in December 2022) a relatively small number of the outdoor strain of *M. nietneri* could be produced for shipment to Tristan in January 2023. Of around 150 specimens, roughly 50 survived the almost two-week journey to Tristan. These survivors were initially propagated separately from the parasitoids already in culture on the island. However, after a first generation both strains were mixed to maximise genetic diversity before a release on Nightingale, to increase chances of establishment.

*1.5 Culturing of *C. hesperidum* from Tristan at CABI for testing and mass rearing of agents*

The culture of *C. hesperidum* from Tristan was maintained throughout the project year in CABI's quarantine facilities in Egham, Surrey. Scales from this culture were used confirm that the new outdoor strain of *M. nietneri* can readily attack the scale population present in the Tristan Group and to bulk up numbers of this control agent for shipment to Tristan in January 2023.

*1.6 Survey in SA for additional agents; the survey will focus on areas with significant citrus growing where *C. hesperidum* is widespread*

Surveys for *C. hesperidum* and associated parasitoids were conducted by Prof. Martin Hill, Director of the Centre for Biological Control (CBC) at Rhodes University (see **Annex 4.2** for survey report). Unfortunately, neither the first (conducted in Y2) nor second round of surveys (conducted in the latter half of 2022) succeeded in obtaining any of the target genera, despite finding eight distinct species. We therefore decided to stop activities in South Africa at this stage and to concentrate on outdoor populations of *M. nietneri* in combination with the ladybird *Nephus reunioni* (see activity 1.7 for more information) as the best approach for the duration of this project. The main reason for this decision was not to jeopardise the potentially sufficient control impact of *M. nietneri* with the release of a very closely related species which may compete.

1.7 Risk assessment for selected agents with a focus on published host specificity records

A risk assessment for *M. seyon* was conducted during 2022. Although we believe *M. seyon* would be a suitable agent for the control of *C. hesperidum* on Tristan, we decided against its use because the species has not been recorded from anywhere in Africa, and if accidentally introduced to South Africa after introduction to Tristan, unwanted ecological side effects cannot be entirely ruled out.

During a visit to Tristan by Dr Jill Key in February 2022, specimens of a ladybird species associated with *C. hesperidum* on *Phyllica* were collected (**Annex 4.3**). These were identified as *N. reunioni*, a known predator of scale insects. The species was thought not to be present on Nightingale, and a risk assessment (**Annex 4.4**) showed the risk of transferring this species to the island to be minimal. As a secondary, non-competing BCA, around 100 individuals were released in an infested stand of *Phyllica* on Nightingale (**Annex 4.5**).

1.8 Efficacy testing of agents in quarantine at Egham UK looking into infestation rates and rates of encapsulation by the target species

During last year we conducted experiments to assess the climatic suitability of *M. seyon*, which formed the bases of a master thesis. Results of this study indicate that this species may be potentially better climate matched to the conditions prevailing on Tristan compared to *M. nietneri* because reproductivity seems to indicate a species adapted to lower temperatures. Although reproductivity at 17°C is not significantly different to *M. nietneri*, the latter is performing better at 25°C. Results of this thesis, became part of a risk assessment (RA) for *M. seyon* for its specific use as a control agent for *C. hesperidum* on Tristan.

We can expect that the outdoor population of *M. nietneri* obtained from Cornwall can at least as efficiently attack *C. hesperidum* on Tristan as the strain initially obtained from a commercial provider. Therefore, extensive efficacy tests were not required, but we still confirmed that the new strain was developing readily on scales of the population present on Tristan. For reasons stated previously, a culture of *M. seyon* will not be established on Tristan in this project and efforts will remain focussed on *M. nietneri*. However, *M. seyon* remains a potentially viable back-up if required in the future.

Output 2. Tristan Council and community understand and approve of selected control agent release

2.1 Tristan Conservation Department screen educational video and share publicity materials to Council and with community. Community engagement lead visits Tristan in Q2 of years 2 and 3 to engage Council, school children and community members via public meetings, informal discussions, classroom teaching and film screening.

Most unfortunately, the first on-island visit by an expert for this project was cut short due to the vessel leaving earlier than expected. This meant a planned ten-day visit became less than four. Planned activities such as giving a presentation on biological control to the local school and providing training to the conservation team on conducting Pest Risk Assessments, will now take place next year.

Despite the lack of time, valuable training was still delivered on:

- Demonstrating to the team how to spot, collect and release the ladybird species *Nephus reunioni*

- Giving advice on how to improve productivity culturing of the *Microterys* wasps
- Discussing with Neil Swain from the Department for Agriculture the damage caused on potato by the potted snake millipede *Blaniulus guttulatus* (still in e-mail exchange with Neil about this)

Each point will be expanded on later in the report.

2.2 The PRA is submitted to APHA for independent scrutiny, and their feedback then provided direct to Tristan Council both in writing and via a phone explanation.

Even though it has been decided not to release *M. seyon* due to the reasons stated previously, a risk assessment is in the process of being completed for the species.

2.4 Visiting expert conducts pest assessments on potato crops of at least 8 growers, as well as the Agriculture Department vegetable production polytunnel, providing immediate verbal feedback and a follow-up report.

The visiting expert carried out a pest assessment of the potato crop on 31st January alongside Head of the Department of Agriculture, Neil Swain. Unfortunately, there was not time to visit the Department's polytunnels, but this will hopefully go-ahead next year. For a short report of the potato crop assessment, see **Annex 4.6**. CABI remain in email contact with Neil to provide guidance.

Neil has similarly been in contact with Fera to discuss the use of *Encarsia Formosa* for the control of glasshouse whitefly which is a major pest on Tristan. The risk assessment has been completed for its release (**Annex 4.7**) and there are plans to trial this BCA next year.

Output 3. Selected control agent reared under controlled conditions on Tristan

3.1 Rearing of agents for release at CABI

Over the last year, we maintained three separate cultures of *Microterys* taxa: *M. nietneri* from a commercial culture, *M. nietneri* from an outdoor population collected in Cornwall and *M. seyon* obtained from trap plants set out in Egham, Surrey. All cultures are still available for further work in 2023/24. Approximately 150 wasps of the *M. nietneri* outdoor population were transported to Tristan in January 2023 to establish a culture on-island for eventual release.

3.5 Training of biosecurity staff on Tristan how to rear control agents followed by remote supervision after the training

Training was mainly provided in person during a visit to the Island in January 2023, supplemented by remote advisory meetings. The team on Tristan was shown how to implement some improvements to the rearing approach of parasitoid wasps and how to scale up their production. In addition, hands on demonstrations were provided on how to find, collect, store, transport and release the ladybird *N. reunioni*, which is already present in large numbers on Tristan, but has not yet established on Nightingale Island.

3.6 Culturing of agents on Tristan in person and under remote supervision by FERA and CABI

Mainly identical as in 3.5. There is no real difference between rearing and culturing of the control agents during the last project year. During the winter months the focus was on maintenance of the cultures and providing them with sufficient scales. Whereas in the summer this focus shifted on to scaling up production of BCAs to obtain sufficient wasp numbers for release on Nightingale, Inaccessible and Tristan itself. At one stage the parasitoid culture on Tristan died out during austral Winter 2022 and had to be re-established through a new shipment of wasps (reared at CABI's facilities) in August 2022.

Output 4. Control agents released and successfully established on Tristan da Cunha, Inaccessible & Nightingale Islands

For fieldwork photos taken during the trip to Nightingale Island on 30th January 2023, see **Annex 4.8**.

4.1 Training of biosecurity staff on Tristan how to culture, release and monitor control agents

The project team on Tristan is now well experienced in culturing and releasing the control agent, and so minimal additional training was required. It has become apparent that it will be too difficult for the team to fit in any significant monitoring work due to limited opportunities to visit Nightingale and other pressing activities when visiting the island. There also appears to be a high natural population dynamic in place regarding infestation levels caused by *C. hesperidum* on Nightingale, making monitoring without expert supervision very challenging. Early during the last project year, it was almost impossible to detect the presence of this pest species on the island. However, by January 2023 the pest species had



Figure 3 - *Coccus hesperidum* on *Phylica arborea* on Nightingale Island (30/01/23) © N. Maczey

become relatively common once again (Fig 3), despite lacking any evidence that the control agent had become established. A simplified monitoring protocol has been discussed and put in place to observe establishment on Tristan itself, where regular changes of scale densities will be observed following a first release of the wasps on the island in March 2023.

4.3 Follow on shipments and releases of agent(s) to cover all three target islands

After a collapse of the culture on Tristan during winter last year, an additional shipment of c. 200 wasps was transported in August 2022 to jumpstart the culture again. Due to the long journey, only a small number of these wasps survived but this was sufficient to build up a new culture. These were supplemented by a shipment of ca. 150 wasps from the Cornish outdoor population in January 2023. Of these, around 50 specimens survived the transport and culturing of these on Tristan was equally successful. After a first generation was bred separately, both cultures were merged to obtain a genetically diverse wasp population aiming to increase chances of establishment after release.

By the end of February 2023, almost 1,000 wasps of this mixed population were in culture on Tristan, and releases on Nightingale and Tristan took place February-end to early-March. Releases on Tristan took place in an area called Pigbite where infestation rates by *C. hesperidum* on *Phylica* are currently very high. Around 520 wasps were released on Nightingale, split across two sites (Nursery and First Ponds) as they were during the releases in 2021. To increase chances of establishment for future releases, wasps will be contained within sleeves made of light fabric around infested branches to keep the agents in close vicinity to the target scales. The sleeves remain in place for two weeks and then removed from the tree. If sea state allows, a release is planned on Inaccessible Island in the next few weeks before autumn sets in.

The specialised scale feeding ladybird *N. reunioni* was first discovered by the visiting scientist Jill Key during a visit to the island in January 2022. The presence of the species on plants (*Phylica arborea*, *Empetrum rubrum*) heavily infested with *C. hesperidum* was confirmed at the start of 2023. The beetle is very abundant and large numbers can be collected on Tristan. Checks (sweep netting, beating) revealed that the species didn't appear to be established on Nightingale, so 108 beetles from Tristan were released in January 2023. Although *N. reunioni* is very abundant on Tristan, it currently doesn't seem to exert significant control on *C. hesperidum*. It is not clear at this stage whether this could be because this agent may have only very recently arrived on the islands.

4.4 Monitoring of establishment by local staff once every year in late summer/early autumn

Up until early 2023, BCA releases had only been conducted on Nightingale Island and therefore surveys for establishment could only be done on this island. On 30th of January 2023, an intensive search for establishment (handsearching for emergence holes, infested scales and sweep netting for wasps) was conducted but no signs of the wasp being present could be detected. One single, partially damaged scale was found, but this could have been accidentally

damaged or picked at by one of the smaller songbirds present on Nightingale. In addition, branches of scale infested *Phylica* were collected on that day and placed in four emergence boxes at the biosecurity facilities on Tristan. No wasps could be observed, but several thrips emerged from these. Specimens of these were brought to the UK for identification. More thrips of the same species were sweep netted from *Phylica* during the visit to Nightingale.

In addition, two entomopathogenic fungi (EPF) attacking the invasives scales were recorded on Nightingale. One *Akanthomyces* species is attacking *C. hesperidum*. A second fungus attacking *Hemiberlesia rapax* belongs to the genus *Microcera*. All fungi observed were collected and are currently being brought into culture for a more detailed identification. It can be assumed that the EPFs on the scales found in the Tristan Group have been brought in accidentally along with their hosts. It is very likely that all of them are very host specific and there is no negative side-effect to be expected through their establishment on the islands.

4.5 Monitoring of impact (infestation rates of C. hesperidum)

This has been the activity most significantly impacted by Covid. Due to the visit in January 2023 being the first from a biocontrol expert in this project, the collection of baseline data looking at infestation rates before the release of a control agent has not been possible. Despite simplifying the monitoring procedure last year, monitoring of insect population densities requires specialist experience. This, combined with limited opportunities to visit target sites and limited team capacity, means detailed monitoring simply isn't practical. The logistical difficulties of shipping control agents to Tristan, and challenges with mass rearing and release on the target islands, also slowed down the overall control programme to a degree that it will be not possible to have the target pest *C. hesperidum* fully controlled by the end of the project. We will, however, still be able to establish the control agents as planned and are confident to prove their establishment by the end of the project. Scale infestation rates will be able to be monitored during planned visits by our experts towards the end of next year.

Output 5. Invasive New Zealand flax closest to *Phylica* habitat controlled on Inaccessible Island World Heritage Site, with an increased local capacity to undertake control activities

This was the final year of NZ Flax control work under the BEST 2.0+ grant. This work will be continued as part of a larger package of invasive plant control on the Tristan Group in the new Darwin project, *Enabling invasive plant eradications and long-term management in Tristan*. Going forwards, progress of flax work will therefore be updated in reports from DPLUS191 rather than DPLUS102.

5.2 All island plateau flax, and the top 50m of invaded cliff beneath the plateau, is cleared of flax in year one

Due to the challenges stated in previous reports around plant numbers and logistics of accessing some areas, it was not possible to clear all flax from the target area. The team continued working on the heavily infested "Waterfall Ridge", continuing on from their efforts of removing 65% of plants from the 'Ridge' and 95% of plants from the 'Plateau' last year. Numbers of plants removed were as follows: Large (101), Medium (149) and Small (246). Waterfall Ridge is now largely cleared of flax plants and so efforts next season will be to move onto the next infested area of cliff, as well as carrying out drone surveys of the 'cleared' areas (and rest of the island) to give a clear idea of what remains of this invasive species on Inaccessible.

5.3 Experienced flax control team revisit Inaccessible in year two to re-check and re-control year one clearings where necessary

Cleared sites revisited last year contained several new seedlings and so were treated with herbicide. Returning to these sites this season showed plants remained and herbicide had had negligible effects. Therefore, the focus going forwards will be on manual removal with minimal herbicide usage.

5.4 One Tristanian resident accompanies the experienced flax team on each visit to Inaccessible Island and receives on-the-job training

Christiaan Gerber joined the flax team for a third season, spending a further 204 hours on the ropes during his time on Inaccessible Island. After three seasons, Christiaan has now attained 447 rope hours progressing well towards the target of 1,000 hours to achieve his IRATA Level 2 qualification. The flax team lead put additional effort in this season, training Christiaan in Level 2 techniques and rescues, putting his knowledge into practice in the field to ensure he is a strong Level 2 when it comes to doing his assessment.

Output 6. Community nursery of scale-free *Phyllica* trees established on Tristan for Nightingale reforestation

6.1 Phyllica nursery established on Tristan

Tristan's community *Phyllica* nursery was established last year, with the work led by Natasha Glass and Kelly Swain of the Agriculture Department. The team have had great success over the last year, as well as learning some lessons, all of which have been captured in a helpful document (**Annex 4.9**).

6.2 Successful mass-propagation of Phyllica seedlings in nursery by Tristanian team

Unfortunately, cuttings taken from *Phyllica* trees have been unsuccessful, with no roots showing after a month in a propagator. However, growing from seed has produced 157 healthy small trees which are now ready to be taken over to Nightingale and planted in cleared areas. A further 50 seedlings are underway in a heated vitopod propagator to provide the next generation of trees. Interestingly, the team found they had little success with germination until they started using soil from Nightingale itself, rather than commercially bought compost.

6.3 Ground cleared of scrub and prepared in previously forested areas of Nightingale by Tristanian team

A team is due to visit Nightingale in April 2023 to continue scrub clearance work and plant the 157 trees currently in the nursery.

3.2 Progress towards project Outputs

Output 1. Suitable biological control agents for *C. hesperidum* on Tristan selected, risk assessed and tested

See section 3.1, Output 1. Output 1 is on track, with all indicators on track to be completed by the end of the project.

Three suitable control agents have now been identified and selected from a range of sources (*M. nietneri*, *M. seyon* and *N. reunioni*) (Indicator 1.1). *M. nietneri* was previously tested and found to be a suitable agent and testing of *M. seyon* this year showed it to exert similar control (Indicator 1.2). Both parasitoids have been found to be highly effective against *C. hesperidum* (inc. strains from the UK and Tristan), and an outdoor strain of *M. nietneri*, located and cultured this year, should be even more effective as it will be better climate-matched to conditions on Tristan (Indicator 1.3). PRA's have been completed for each agent (Indicator 1.4). The decision to not use *M. seyon* was taken as it may compete with *M. nietneri* reducing the effectiveness of control. There are also no records of the species in Africa and so unwanted ecological side effects could not be ruled out should it accidentally be transported back to the continent.

Output 2. Tristan Council and community understand and approve of selected control agent release

See section 3.1, Output 2. Output 2 is largely on track, and should visits go ahead in the final year, will be achieved by the end of the project.

The community engagement lead visited at the start of the project year and continued to have informal discussions and answer questions from the community about the project (Indicator 2.1). Unfortunately, the visit from CABI was shorter than planned and school lessons/public presentations are now planned to take place in the final project year. Despite it being decided not to release *M. seyon* due to the reasons stated previously, a risk assessment is in the process of being completed for the species (Indicator 2.2). Although already present on Tristan,

a risk assessment of *N. reunioni*, for the transfer of the species to Nightingale, was submitted to the Administrator and Council, showing the risk to be negligible, with the transfer subsequently being supported (Indicator 2.3). CABI carried out a pest assessment of the potato crop in January 2023, feeding back to Neil Swain (Agriculture Department Lead). Neil has also been in contact with Fera to discuss the control of glasshouse whitefly, with plans to trial the BCA *E. Formosa* next year (Indicator 2.4).

Output 3. Selected control agent reared under controlled conditions on Tristan

See section 3.1, Output 3. Output 3 is largely in track, with Indicator 3.4 now not necessary for this project given the significant quantities of *C. hesperidum* discovered on Tristan itself.

The pop-up cages have proved effective at rearing *M. nietneri*, with c.1,000 wasps produced in February 2023 (Indicator 3.1). The polytunnel from this project will be re-purposed for the expansion of the *Phyllica* nursery. Despite losing the BCA culture in austral winter 2022, new wasps were transported out, later supplemented by those from the outdoor strain collected in the UK, re-establishing a more robust, genetically diverse culture (Indicator 3.2). Tristan Conservation Department successfully reared c.1,000 wasps in February 2023 following a visit from CABI where rearing methodology was fine-tuned (Indicator 3.3). Of these c.1,000, a higher proportion were females meeting the target for the penultimate year of the project (Indicator 3.5).

Output 4. Control agents released and successfully established on Tristan da Cunha, Inaccessible & Nightingale Islands

See section 3.1, Output 4. Output 4 is on track with Indicator 4.2 slightly behind schedule, but we are still hopeful that it will be achievable by project end.

Despite losing the culture and it only being possible to transport wasps back out to the island in August 2022, the team reared enough to make substantial releases on Nightingale and Tristan in Feb/Mar 2023 (Indicator 4.1). We are hopeful that a further release will be made on Inaccessible Island in the next few weeks before autumn sets in and weather conditions deteriorate.

As releases had only previously been made on Nightingale, and due to the limited opportunities to visit the island for the team, it has not been possible to extensively monitor infestation rates of *C. hesperidum* at release sites (Indicator 4.2). Due to unforeseen natural population fluctuations, monitoring has become a specialist activity which is unrealistic to expect the Tristan team to complete. CABI conducted extensive surveys for the BCA on Nightingale in January 2023 but found no evidence for its establishment. However, it will hopefully be possible for experts to confirm this during their next visit, following large releases this year and further planned releases in the final project year.

Output 5. Invasive New Zealand flax closest to *Phyllica* habitat controlled on Inaccessible Island World Heritage Site, with an increased local capacity to undertake control activities

See section 3.1, Output 5.

The flax team continued to concentrate their efforts clearing the remainder of the heavily infested "Waterfall Ridge" area. A total of 496 flax plants (246 small, 149 medium, 101 large) were removed this year, largely clearing this area of flax (Indicators 5.1 - 5.4). Work will continue on Inaccessible as part of the new DPLUS191 project, with year 1 focussed on drone surveys of 'cleared' areas (and the remainder of the island) to ascertain the extent of the species and targeting areas accordingly.

Christiaan Gerber joined the team for a third season and has now amassed 447 rope hours putting him almost halfway towards his target of 1,000 hours for an IRATA level 2 qualification (Indicator 5.4).

Output 6. Community nursery of scale-free *Phyllica* trees established on Tristan for Nightingale reforestation

See section 3.1, Output 6. Output 6 is on track, with some indicators slightly behind schedule and some slightly ahead.

The nursery team are making good progress with 157 young, healthy *Phyllica* trees successfully grown from seed and ready to be planted on Nightingale at the next available opportunity (Indicator 6.1). Unfortunately, cuttings taken have not rooted and so the target of 500 seedlings is behind schedule (Indicator 6.2). However, the team have learned to now concentrate their efforts on growing plants from seed which will speed up the process, and there are a further 50 seedlings underway in a heated vitopod propagator. A clearing/planting team will be travelling to Nightingale when sea state next allows to clear more scrub and plant the 157 young trees (Indicator 6.3). They will also monitor the health of trees planted last year (Indicator 6.4).

3.3 Progress towards the project Outcome

Outcome: Sustainable community-supported control of *Coccus hesperidum* successfully established, community nursery created and invasive flax buffer provided that enables recovery and planting of *Phyllica* trees, restoration of seed-setting and ultimately increased food availability for *Nesospiza* buntings.

This year was a story of two halves with limited progress during the cooler months and the parasitoid culture dying out. Fortunately, the latter half of the year was very successful with a parasitoid culture re-established on island with a genetically diverse population of *M. nietneri* (mix of glasshouse and outdoor strains) better adapted to Tristan's climate. Following a visit from CABI, wasp production was enhanced and around 1,000 were reared by February 2023 with substantial releases on Nightingale and Tristan. A release on Inaccessible is planned for April 2023 when sea state allows the crossing. Intensive surveys by the expert from CABI suggests that the BCA has not yet established on Nightingale, but recent releases will give the best chance of success.

The community *Phyllica* nursery has proved very successful with 157 small trees now ready to be planted in cleared areas of Nightingale; this will hopefully take place in April 2023. Elsewhere, the flax eradication team had another successful season clearing plants from the most heavily infested area of Inaccessible. There is real need for aerial drone surveys to confirm the extent of the flax, as well as further clearance work to remove all known plants. This work will continue as part of DPLUS191.

Indicator 0.1 In year four at least one control agent successfully established on each of the three northern islands in compliance with Tristan legislation and Council permissions.

Substantial releases of *M. nietneri* have now been made on Nightingale and Tristan, with future releases planned for Inaccessible. The recent visit from CABI was especially useful for helping the team on Tristan improve the rearing methodology, producing more wasps than at any stage of the project so far. This bodes well for future releases and successfully establishing the agent on each of the islands, which is yet to be confirmed.

Transfer of the ladybird species *N. reunioni* (a known scale predator) was approved by Council with the risk of this species to be minimal. As a predator rather than a parasitoid, the hope is that the species will act as a secondary BCA without competing with *M. nietneri*, which other parasitoids may do.

Indicator 0.2 In year four, lower densities of *C. hesperidum* and 10% reduction in sooty mould cover of foliage recorded on *Phyllica* compared to 2020 baseline.

As mentioned in the previous report, it was not possible for the Conservation team to obtain baseline data in the first year of the project. Due to the limited opportunities to get to the outer islands, and other pressing priorities for the team when there, it will not be possible to measure a change in density of *C. hesperidum* in this project. CABI's visit also showed the scale insect to exhibit quite dramatic natural population fluctuations, making it very difficult for a non-expert to measure the specific impact of the BCA. In the final year, there are plans to make releases inside cloth sleeves on scale infested branches on Tristan to maximise the chance of

establishment. By taking a photo before and after the sleeve is applied, there is an opportunity for the team to measure the effectiveness of the BCA.

Indicator 0.3 No New Zealand flax is recorded on the plateau of Inaccessible Island or top 50m of surrounding cliff by end of year 2

After refocussing efforts last year to 'Waterfall Ridge', thought to be the most heavily infested area of flax on the island, the team cleared the remainder with a total of 496 plants removed this year. This was the final season of work under EU BEST 2.0+ but the work will continue as part of DPLUS191 for the next three years. One of the priorities next year will be to carry out detailed drone surveys over cleared areas and the rest of the island to confirm the extent of the flax.

Indicator 0.4 3 Tristan Conservation Department staff (2 male / 1 female) trained and able to successfully rear, release and monitor a biological control agent

The team on Tristan is now well-experienced at rearing and releasing the BCA *M. nietneri*. CABI's in-person guidance has helped the team improve their methodology and they are now capable of producing many more wasps than they have done previously (c.1,000 in February 2023). CABI's training also showed the team how to locate and collect the ladybird predator *N. reunioni* on Tristan, for releases of this secondary BCA on the outer islands. A simplified monitoring procedure, releasing wasps on specific infested branches on Tristan (see earlier point - 0.2), has been devised by CABI and will be trialled by the team next year.

Indicator 0.5 Within 3-5 years of project start, increased number of seeds/fruits recorded on *Phyllica* compared to 2021 baseline, and population density of buntings stabilised.

Observations by the Conservation team from visits to Nightingale Island suggests the population of Wilkins' Buntings remains stable but still worryingly low (c. 20-50 individuals). There is a real need for a comprehensive survey of the species which RSPB personnel are discussing with TDC Conservation Department. Due to limited opportunities for the team to visit the outer islands and other competing works (as mentioned previously), it has not been possible to establish a baseline for *Phyllica* fruits/seed number. However, the conservation team have reported regeneration of forest where storms destroyed vast swathes in 2019, and young *Phyllica* trees from the community nursery will further bolster these areas, increasing available seed for the buntings.

Indicator 0.6 At least 125 *Phyllica* trees planted in priority sites on Nightingale Island by end of year 4

The community nursery has proved very successful and there are now 157 young *Phyllica* trees ready to be planted in priority sites on Nightingale; planting will hopefully go ahead in April 2023. A further 50 seedlings are underway in a heated vitopod propagator. Unfortunately, the team couldn't get cuttings from last year to take root, so they will now focus on growing new plants from seed.

3.4 Monitoring of assumptions

All key assumptions are outlined in the log-frame (**Annex 1**). Most of the identified assumptions that have been tested have held true, with the following exceptions:

Assumption: Environmental conditions allow establishment of agents (which is highly likely as testing will have aimed to replicate conditions on Tristan as much as possible)

Comments: Following the first focussed surveys by an expert in this project, evidence of establishment could not be confirmed. However, the only releases made prior to this year had been in early autumn in far from ideal conditions so the likelihood of establishment was low. With a new outdoor strain of *M. nietneri* (more suited climatically to conditions on Tristan) and substantial releases made in good summer conditions, everything is in place to hopefully confirm establishment next year.

Assumption: Unmapped first-hand reports from February 2019 team on flax presence on the island plateau suggest that full removal is possible.

Comments: Much of the island is very difficult to survey on foot, and time-consuming when using ropes, so it is difficult to estimate the number of remaining plants. A comprehensive drone survey next year (as part of DPLUS191) will show the extent of the flax and enable the clearing team to focus efforts for the next three years, aiming to clear the island of this highly invasive species.

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

The project continues to make good progress on a key environmental issue for the Territories. Invasive species were identified as a core biodiversity challenge by 57% of the respondents to Defra's Call for Evidence on 'Safeguarding the Environment in British Overseas Territories' (second only to the threat from economic development as an issue). Invasive scale insects and flax are identified as a threat in Tristan's Biodiversity Action Plan, and the project is delivering against this plan under Objective 4: The impact of invasive species is reduced or eliminated.

Unfortunately, establishment of the biocontrol agent could not be confirmed this year. This is the only long-term solution for controlling the invasive scale insect, protecting and restoring vital *Phyllica* forest habitat for the Critically Endangered Wilkins' Bunting. However, successful releases of a more genetically diverse and resilient strain of the BCA on Nightingale and Tristan (and hopefully Inaccessible in April 2023) in ideal conditions this year, should maximise any chance of this. Something that the visit from CABI this year has highlighted is how much we still don't know about non-native insect pests in the Tristan Group and their potential impacts. Only with future visits and comprehensive surveys will we know the full extent of biosecurity issues, planning future works to protect native species and thereby improving climate resilience.

5. Gender equality and social inclusion

This project continues to achieve its gender-based indicator of training 2 male / 1 female members of staff from the Conservation Department in rearing, releasing and monitoring BCAs. This year, school leavers Shannon Swain and Kieran Glass (1:1) have been taken on as apprentices with the Conservation Department, assisting the team with rearing and releasing *M. nietneri*, as well as shadowing the expert from CABI during his visit. Additional funding has been used to pay for Natasha Glass (one of the *Phyllica* nursery team) to help the team clear and plant the young trees on Nightingale. Shannon will also be helping with this work which traditionally on Tristan is a more male-dominated activity. The flax team had two new members of staff this year making it a 2:2 male:female ratio. Overall, the project is achieving a 50/50 gender ratio.

Please quantify the proportion of women on the Project Board ¹ .	2:5 (Female:Male)
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 .	2:1 (Female:Male)

6. Monitoring and evaluation

Monitoring and evaluation are primarily led by the RSPB, with partners feeding into the process. The logframe and timetable are continually referenced to monitor project progress and identify delays, and partners self-evaluate and feed into overall project monitoring during more formal partner meetings and regular informal catch ups. Full team meetings have generally been planned for critical periods this year (e.g. receiving a new shipment of wasps, prior to releases, pre- and post-visit etc.), to effectively coordinate these key activities.

The primary indicators of achievement are the establishment of at least one biocontrol agent on three of the northern islands, removal of flax and propagation of *Phyllica* seedlings; all are being measured quantitatively via monitoring protocols or mapping activities. Following comprehensive surveys on Nightingale this year by the expert from CABI, there is no evidence of establishment of the parasitoid. This visit also confirmed a high natural population fluctuation of *C. hesperidum* which the conservation team had thought was as a result of previous BCA

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.

releases. This fluctuation makes any impact of a BCA incredibly difficult for a non-specialist to quantify, making our initial plan of measuring impact against a baseline impossible; this will no doubt affect our ability to measure the achievements for certain Outcome indicators. However, there is a good chance that substantial releases made this year by the team will establish, which will be confirmed by expert visits next austral summer.

CABI have provided a simplified methodology for the conservation team to monitor BCA impact on specific infested tree branches close to the settlement on Tristan. By taking a photograph prior to release and releasing the wasps in specialised cloth sleeves around the branch, the hope is that taking a photograph two weeks later when the sleeve is removed will show evidence of parasitised scales.

7. Lessons learnt

- Even with the technology in place to supervise the project team on Tristan remotely, it is essential to support this with in-person visits. Thanks to the flexibility shown by Darwin, we have coped very well with the restrictions imposed by Covid, but the lack of direct hands-on training during the first part of the project has been difficult to manage.
- CABI had less than four days on the island, but the impact of this visit cannot be understated. By fine-tuning the rearing methodology, the conservation team were able to produce c.1,000 wasps for release a few weeks after the visit; the most wasps produced so far in the project and the first releases since April 2021.
- Observations made over this year have shown that *C. hesperidum* on Tristan have a high natural population dynamic, making monitoring any impact of a BCA incredibly difficult for non-specialists. Monitoring will therefore shift from quantifying any reduction to monitoring sites for establishment of the agent. Ultimately, establishment will provide a long-term solution to controlling *C. hesperidum* and subsequent sooty mould on the islands, protecting the *Phyllica* forest.
- Observations on the three Northern islands have shown that current infestation rates are significantly worse on Tristan than Nightingale or Inaccessible. The expert also found trees free of *C. hesperidum* to be in poor health with die-back of branches, usually with a significant infestation of the scale species *Hemiberlesia rapax* (but no sooty mould). Tristan was therefore prioritised for releases of the BCA this year. Field visits in the final year by experts from CABI and Fera will confirm what further biocontrol work will be needed once *M. nietneri* establishes (see next point).
- The recent visit to Tristan by CABI revealed that there are additional emerging problems regarding the attack of endemic and native plants on the Tristan Group by insect pests, which will need to be addressed urgently:
 - On Tristan, infestation of at least one endemic and two native fern species by scale insects (*C. hesperidum* and *S. coffeae*) is widespread. *C. hesperidum* is also heavily infesting *Phyllica* on Tristan itself resulting in a significant build-up of sooty mould on almost all plants at lower altitudinal levels. The same is true for the native berry bush (*Empetrum rubrum*), which is suffering to such a degree, that collecting the berries is not viable anymore.
 - Whilst looking into establishment of the control agent on Nightingale it was discovered that *Phyllica* is also attacked by another insect pest, a thrips species, of which considerable numbers could be obtained using emergence boxes. Specimens of this species have been brought back to the UK for identification.
 - There are at least two entomopathogenic fungi present on Nightingale and/or Tristan attacking the scales (one on *C. hesperidum*, *H. rapax* and *S. coffeae* each). The ones on *H. rapax* and *C. hesperidum* have so far only been observed on Nightingale but are likely to be present on Tristan as well. The one on *S. coffeae* attacking an endemic fern has so far only been observed on Tristan. The fungus on *H. rapax* is itself attacked on Nightingale by a mycoparasite (*Polycephalomyces* sp.). Samples of all have been taken back to the UK for identification.

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

Comment: *The project reported that the complete removal of flax plants is unlikely over the lifetime of the project, but it is not clear whether this might be possible with the additional funding raised by the project.*

Full removal of flax has not been possible despite the additional EU BEST 2.0+ funding. However, the extra two years of work have been integral for continuing the work, providing ongoing training to the Tristanian member of the team, and understanding the seedbank of the species. A further three years of flax removal will be funded through the new DPLUS191 project, which will include a comprehensive drone survey of the island to ensure more targeted removal with the aim of eradicating all known plants on the island by the final year.

Comment: *The project introduction comments that Nesospiza buntings are threatened with extinction, but focuses on Wilkins' Bunting in the Report. Are there concerns over the other species, Inaccessible Finch (Nesospiza acunhae), and are numbers of this species being monitored?*

The concerns aren't as great for *N. acunhae* as Inaccessible Island didn't experience the loss of *Phylica* forest as Nightingale Island did following the storms in 2019. The smaller billed buntings on both islands are less reliant on *Phylica* fruits and are more generalist feeders, eating invertebrates and seeds from sedges. Due to lack of capacity in Tristan's Conservation Department (four full-time staff members including one administrative assistant), it is not feasible to regularly survey these species. However, RSPB are discussing options for funding a comprehensive re-survey of *N. wilkinsi* which may be expanded to *N. acunhae*.

Comment: *The propagation of Phylica by school children is no longer required, with the activity replaced by one or more morning sessions, and the possibility of older children helping in the nursery. The reviewer would encourage the project to involve children on the nursery, and wonders if there are other educational materials/activities associated with the project to engage all the children more deeply in its work.*

Since the last report, two school leavers, Shannon Swain and Kieran Glass have been taken on as apprentices in the Conservation Department. Shannon and Kieran have assisted in rearing the wasps, making releases, collecting ladybirds, and will assist in planting the *Phylica* trees on Nightingale when the team are able to make it over. RSPB are currently in discussion with Tristan Government about how to turn these apprentice positions into full-time members of staff to increase capacity in the Department.

Natasha Glass of the Agriculture Department has produced a helpful document summarising the process of germinating and growing *Phylica* seedlings. There are plans to share this with the school and to host the children at the nursery to hopefully inspire them to become future horticulturists.

Comment: *The community nursery for Phylica trees has been established, but it is not clear whether there will be sufficient seedlings for basic establishment trials to be undertaken, before the seedlings are transplanted into the forest.*

Trees planted on Nightingale (before this was added as a new Output of the project) have established on the island despite already showing signs of scale infestation. As scale numbers are currently relatively low on Nightingale due to natural population fluctuations, the hope is that the 157 young trees ready to be planted will have the best chance of establishment, especially as they will be planted in areas where substantial wasp releases have been made earlier this year.

9. Risk Management

See previous comments regarding experts being able to visit Tristan and difficulty of monitoring impact of BCA for non-specialists.

10. Other comments on progress not covered elsewhere

- Tristan's interim Administrator, Sean Burns, very sadly passed away in March 2023. Lorraine Repetto has stepped in as acting Administrator before a new official is appointed and travels to the island later this year.
- See previous comment in '7. Lessons Learnt' regarding a change of monitoring protocol due to the difficulty for non-specialists to measure any impact of a BCA, and limited opportunity for experts to visit the islands.
- As a profit-making organisation, Fera Science do not align with Darwin's T & Cs. They have therefore been moved from delivery partner to consultant for the remainder of project.

11. Sustainability and legacy

The project is a very welcomed and urgently needed intervention to prevent the collapse of the *Phyllica* forest ecosystem and associated buntings. The work is recognised as a priority by Island Council and the community, and good communications with Tristan have been key to delivering the workplan with minimal delays this year. Bringing the Agriculture Department into the project, with the creation of the *Phyllica* nursery last year, has been very successful at fostering community pride in Tristan's only native tree and desire to protect it. Having school-leavers, Shannon and Kieran assist with project activities this year has generated more interest and trust in the project due to getting the younger generation involved. They have both had an opportunity to assist in rearing the wasps and make releases, as well as shadowing the expert from CABI when on island, meaning more members of the community are receiving specialist training.

Although brief, the visit from CABI in January 2023 was incredibly valuable. Not only did it get certain project activities back on track which had stalled, but it also gave members of the Conservation team and community an opportunity to ask questions about the project. Trevor Glass (Conservation Lead) has since commented how all the community are now aware of scales insects and how the visit really demonstrated quite how damaging insect pests can be. This visit certainly bodes very well for a longer visit by CABI and Fera personnel in the final project year.

It has become apparent this year that planned monitoring work relating to scale density, sooty mould coverage and *Phyllica* fruit number is not going to be possible for the Tristan team to complete. However, assuming that recent BCA releases establish on Tristan and Nightingale, and further releases can be made (including on Inaccessible), the exit strategy remains largely unchanged: A sustainable means of controlling *C. hesperidum*, allowing recovery of *Phyllica* forest and safeguarding the few remaining Wilkins' Buntings. There is a commitment to continue the *Phyllica* nursery beyond the project which will ensure a stock of healthy, scale-free young trees to reforest areas lost to storm damage in 2019.

12. Darwin Plus identity

The Darwin identity continues to be positively regarded within the community on Tristan da Cunha and there is a good understanding of Darwin, particularly within the Fisheries and Conservation Departments. Approximately 10% of the community have worked directly on a Darwin project, and project updates are given at the fortnightly Government Department meetings.

The project, alongside the Darwin handle or hashtag, has been promoted on Twitter by both [Tristan Admin](#) and [Tristan Nature](#): both accounts run by Tristan Government with a combined audience of over 14,000. Project documentation has also included the Darwin Plus logo where possible.

An RSPB blog was written in December 2022 covering the fantastic work of Natasha Glass and Kelly Swain in the setting up of the community *Phyllica* Nursery on the island, acknowledging the importance of Darwin Plus funding:

[Meet two inspiring horticulturists fighting to save a Critically Endangered bird from extinction - Conservation Action - Our work - The RSPB Community](#)

13. Safeguarding

The RSPB have clear safeguarding policies and procedures (updated in January 2022) which apply to our international work and includes appropriate annual training for all our staff members working internationally. We now have an internal Global Safeguarding Subgroup who oversee and advise on our international safeguarding work. This group includes staff with extensive safeguarding experience as well as representation from staff posted overseas working with partners and local communities. A Safeguarding Good Practice Guide (**Annex**) has also been produced to assist our partners with strengthening current policies and procedures.

Has your Safeguarding Policy been updated in the past 12 months?	No (updated Jan '22)
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	No
Has the focal point attended any formal training in the last 12 months?	N/A
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 75% [6] Planned: N/A
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses.	No
Does the project have any developments or activities planned around Safeguarding in the coming 12 months? If so please specify.	No

14. Project expenditure

To be completed once financial reports have been received from partners

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				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL				

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

To be completed once financial reports have been received from partners

	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 (£)		

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

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

File Type (Image / Video / Graphic)	File Name or File Location	Caption, country and credit	Online accounts to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No

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</p> <p>Healthy <i>Phylica</i> forests cover their available habitat niche on the northern islands of Tristan da Cunha and sustain their maximum possible populations of endemic <i>Nesospiza</i> buntings for long-term resilience</p>		<p>Substantial releases of wasps in heavily infested stands of <i>Phylica</i> on Nightingale and Tristan (planned for Inaccessible in April '23 if sea allows); transfer of scale-predatory ladybird to Nightingale; 157 young <i>Phylica</i> trees ready to be transported to and planted on Nightingale; heavily infested 'Waterfall Ridge' area of Inaccessible cleared of NZ Flax.</p>	
<p>Outcome</p> <p>Sustainable community-supported control of <i>Coccus hesperidum</i> successfully established, community nursery created and invasive flax buffer provided that enables recovery and planting of <i>Phylica</i> trees, restoration of seed-setting and ultimately increased food availability for <i>Nesospiza</i> buntings.</p>	<p>0.1 In year four at least one control agent successfully established on each of the three northern islands in compliance with Tristan legislation and Council permissions</p> <p>0.2 In year four, lower densities of <i>C. hesperidum</i> and 10% reduction in sooty mould cover of foliage recorded on <i>Phylica</i> compared to 2020 baseline</p> <p>0.3 No New Zealand flax is recorded on the plateau of Inaccessible Island or top 50m of surrounding cliff by end of year 2</p> <p>0.4 3 Tristan Conservation Department staff (2 male / 1 female) trained and able to successfully rear, release and monitor a biological control agent</p> <p>0.5 Within 3-5 years of project start, increased number of seeds/fruits recorded on <i>Phylica</i> compared to 2021 baseline, and population density of buntings stabilised.</p>	<p>See section 3.3.</p> <p>Substantial releases (c.1,000 total) of <i>M. nietneri</i> on Tristan and Nightingale (planned for Inaccessible soon) of more resilient climate-matched strain. Establishment not yet confirmed.</p> <p>Due to natural population fluctuation of <i>C. hesperidum</i>, monitoring of scale density very challenging for non-specialists. Monitoring will now focus on establishment of the agent on the three northern island instead.</p> <p>The 2023 field season removed 496 flax plants, largely clearing the heavily infested 'Waterfall Ridge' area of plants. Three more years of flax control work as part of DPLUS191.</p> <p>Training of TDC Conservation extended to two school-leavers who have assisted in rearing and releasing the BCA, as well as sourcing infested</p>	<p>First release of <i>M. nietneri</i> on Inaccessible and further releases on Tristan and Nightingale using cloth sleeves to increase chances of establishment.</p> <p>Monitoring of establishment of the BCA on all three northern islands – assisted by CABI/Fera personnel.</p> <p>ID and further research into specimens acquired by CABI on January 2023 trip.</p> <p>Ongoing assessment of bunting populations.</p> <p>Continuation of NZ Flax control work as part of DPLUS191.</p> <p>Clearing areas of scrub and planting the 157 young <i>Phylica</i> trees on Nightingale. Continued production of <i>Phylica</i> seedlings for nursery.</p>

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	0.6 At least 125 <i>Phylica</i> trees planted in priority sites on Nightingale Island by end of year 4	branches for the culture and predatory ladybirds for Nightingale. 157 young <i>Phylica</i> successfully produced in nursery and ready to be planted on Nightingale. 50 new seedlings underway in propagator.	
Output 1. Suitable biological control agents for <i>C. hesperidum</i> on Tristan selected, risk assessed and tested	<p>1.1 At least three suitable control agents identified and selected from commercial, research and wild South African sources by end of Q4 in year three</p> <p>1.2 One control agent tested through standardised methods and under controlled conditions in Q3 of year one, and at least one further agent by Q2 of year two</p> <p>1.3 At least one control agent demonstrated to be highly effective against the <i>C. hesperidum</i> strain present on Tristan by end of Q2 of year two</p> <p>1.4 PRA on one tested and recommended control agent completed by end of Q3 in year one, and of all tested and recommended agents by Q3 of year two</p>	<p>See section 3.2, Output 1.</p> <p>1.1 Surveys continued in SA and the UK for BCAs. An outdoor strain of <i>M. nietneri</i> was sourced from Cornwall/Scilly and brought into culture, before being transported to Tristan to establish a more resilient, genetically diverse culture for releases. A scale predator ladybird (<i>N. reunioni</i>) was identified from Tristan samples, with c.100 transferred to Nightingale as a secondary control.</p> <p>1.2 <i>M. nietneri</i> previously tested and brought into culture on Tristan. Testing of <i>M. seyon</i> finished this year, with the species suitably climate matched to Tristan</p> <p>1.3 <i>M. nietneri</i> highly effective against <i>C. hesperidum</i> strain on Tristan, rearing c.1,000 wasps this year. New outdoor strain sourced in the UK should be better climate-matched to conditions on Tristan and therefore a more effective control.</p> <p>1.4 Risk assessment completed for <i>N. reunioni</i> and in the process for <i>M. seyon</i>, despite releases being decided against on Tristan due to possible competing effects on <i>M. nietneri</i> and because of not being recorded in Africa.</p>	
Activity 1.1. Identification of scale insect from samples collected on Tristan; use of molecular methods to identify the strain/subspecies present on Tristan.		Complete	N/A
Activity 1.2. Analysis of pre-project survey and literature survey to match agents to scale taxon present on Tristan; this includes climate matching of previous successful control projects of <i>C. hesperidum</i> with the conditions present on Tristan.		Complete – Outdoor strain of <i>M. nietneri</i> sourced in UK and brought into culture on Tristan	N/A

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Activity 1.3. Selection of suitable and readily available agents, including use of agents commercially available and agents currently used in other research institutes.		Complete – <i>M. nietneri</i> used alongside <i>N. reunionil</i> (<i>M. seyon</i> back up BCA)	N/A
Activity 1.4. Shipment of living scale insects from Tristan to quarantine at CABI to test agents on the correct target taxon.		Complete	N/A
Activity 1.5. Culturing of <i>C. hesperidum</i> from Tristan at CABI for testing and mass rearing of agents.		Complete	Culture of <i>C. hesperidum</i> will be maintained
Activity 1.6. Survey in SA for additional agents; the survey will focus on areas with significant citrus growing where <i>C. hesperidum</i> is widespread.		Complete – Eight parasitoids sourced but no target species	N/A
Activity 1.7. Risk assessment for selected agents with a focus on published host specificity records.		Completed for <i>M. nietneri</i> , <i>N. reunioni</i> and underway for <i>M. seyon</i>	N/A
Activity 1.8. Efficacy testing of agents in quarantine at Egham UK looking into infestation rates and rates of encapsulation by the target species.		Complete - Testing of <i>M. seyon</i> this year (<i>M. nietneri</i> previously)	N/A
<p>Output 2. Tristan Council and community understand and approve of selected control agent release</p>	<p>2.1 <i>Publicity materials and video are submitted to Tristan Council and screened for public viewing by Tristan Conservation Department in Q2 of Yr1. At least 75% of Tristan Council members, at least 75% of Tristan school classes, and at least 50 Tristanians have face-to-face discussions with community engagement lead in Q2 of years two and three</i></p> <p>2.2 <i>Independent opinion on first PRA produced by APHA and explained to Tristan Council via phone, by end of Q3 in year one, and subsequent PRAs by Q3 of year two</i></p> <p>2.3 <i>Tristan Council and community approval granted for introduction, rearing and release of one tested and recommended control agent by end of</i></p>	<p>See section 3.2, Output 2.</p> <p>2.1 Community engagement lead visited Tristan in Q1 last year, continuing informal discussions with community about the project. A visit from CABI was shorter than expected meaning school lessons/public presentations have been delayed until the final project year.</p> <p>2.2 Risk assessment completed for <i>N. reunioni</i> demonstrating to Council that the risk of transferring the species to Nightingale to be minimal. Despite it being decided not to release <i>M. seyon</i>, a risk assessment is being completed for the species should it be required in the future.</p> <p>2.3 <i>M. nietneri</i> previously approved by Council for rearing and release and <i>N. reunioni</i> approved this year due to the species already being present on Tristan and risk of transfer to outer islands minimal</p> <p>2.4 CABI carried out a pest assessment of the potato crop in January 2023, feeding back to Neil Swain (Agriculture Department Lead). Neil has also been in contact with Fera to discuss the control of glasshouse whitefly, with plans to trial the BCA <i>Encarsia Formosa</i> next year.</p>	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	<p><i>year one and of all tested and recommended agents by Q3 of year two</i></p> <p><i>2.4 Potato crop pest assessments completed for at least 8 growers (4 male / 4 female), as well as the Agriculture Department vegetable production polytunnel, and potential for benefits from biocontrol evaluated, by end of year four</i></p>		
Activity 2.1. Tristan Conservation Department screen educational video and share publicity materials to Council and with community. Community engagement lead visits Tristan in Q2 of years 2 and 3 to engage Council, school children and community members via public meetings, informal discussions, classroom teaching and film screening.		Community engagement lead and CABI visits this year, answering project-related questions	Follow-up visit from CABI, joined by Fera, giving community presentations and biocontrol-related school lesson
Activity 2.2. The PRA is submitted to APHA for independent scrutiny, and their feedback then provided direct to Tristan Council both in writing and via a phone explanation.		Complete for <i>M. nietneri</i> and APHA not required for <i>N. reunioni</i> as already present on island	N/A – <i>M. seyon</i> not to be released during this project
Activity 2.3. Tristan Council meeting discusses PRA and approves issue of an environmental permit by the 'Administrator in Council'.		Complete – permit previously provided for <i>M. nietneri</i> and <i>N. reunioni</i> provided this year	N/A
Activity 2.4. Visiting expert conducts pest assessments on potato crops of at least 8 growers, as well as the Agriculture Department vegetable production polytunnel, providing immediate verbal feedback and a follow-up report.		Potato crop assessment carried out by CABI and polytunnel discussions taking place with Fera remotely	Follow up visit to Tristan by CABI/Fera. Trial of <i>E. formosa</i> ?
Output 3. Selected control agent reared under controlled conditions on Tristan	<p><i>3.1 Rearing facilities established on Tristan to allow repeated releases without long-distance imports by the end of year one</i></p> <p><i>3.2 At least one well suited control agent brought into permanent culture under controlled rearing conditions on Tristan by end of year one</i></p>	<p>See section 3.2, Output 3.</p> <p>3.1 Pop-up cages proved effective at rearing <i>M. nietneri</i> with c.1,000 wasps produced in February 2023. The polytunnel from this project will be re-purposed for the expansion of the <i>Phyllica</i> nursery.</p> <p>3.2 Despite losing the BCA culture in austral winter 2022, new wasps were transported out, later supplemented by those from the outdoor strain collected in the UK, re-establishing a more robust, genetically diverse culture.</p>	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	<p>3.3 Three Tristan Conservation Department staff (2 male / 1 female) trained in rearing control agents by the end of year one</p> <p>3.4 At least 14 school children (7 female / 7 male) involved in propagating/growing plants for the control agents by the end of year one, and subsequent rearing by Q3 of year two</p> <p>3.5 Production of at least 300 female control agents for release by the end of year one and 500 females in years three and four</p>	<p>3.3 Tristan Conservation Department successfully reared c.1,000 wasps in February 2023 following a visit from CABI where rearing methodology was fine-tuned.</p> <p>3.4 This indicator is now not deemed necessary for the project given the significant quantities of <i>C. hesperidum</i> discovered on Tristan itself. However, school-leavers Shannon Swain and Kieran Glass have been taken on as apprentices with the Conservation Department and have assisted with sourcing scales, rearing and releasing wasps.</p> <p>3.5 Of the c.1,000 produced this year, a higher proportion were females meeting the target for the penultimate year of the project.</p>	
Activity 3.1. Rearing of agents for release at CABI quarantine facilities using several chambers to keep individual agents separated and supply population of scales uninfected		Ongoing at CABI's facilities, with two batches of wasps transported to Tristan this year	Continued rearing of outdoor strain of <i>M. nietneri</i>
Activity 3.2. Development of training material and rearing protocols for Tristan, including photographic identification guide for the species involved in word format and as PowerPoint presentation		Complete for <i>M. nietneri</i> . CABI expert showed team on Tristan how to collect <i>N. reunioni</i> during visit	N/A – Efforts focussed on <i>M. nietneri</i> and <i>N. reunioni</i> for project remainder
Activity 3.3. Establishment of polytunnel rearing facilities on Tristan		Pop-up cages sufficient for rearing <i>M. nietneri</i>	N/A – Polytunnel repurposed for Phylica nursery
Activity 3.4. First shipment of approved agent(s) on Tristan and establishment in prepared rearing facilities on the island		Complete for <i>M. nietneri</i> . Outdoor strain mixed with glasshouse strain	Continued culturing of <i>M. nietneri</i>
Activity 3.5. Training of biosecurity staff on Tristan how to rear control agents followed by remote supervision after the training		In-person training provided by CABI, fine-tuning rearing methodology	Continued culturing of <i>M. nietneri</i>
Activity 3.6. Culturing of agents on Tristan in person and under remote supervision by FERA and CABI		Continued culturing of <i>M. nietneri</i>	Visit by CABI and Fera to provide in-person supervision
Output 4. Control agents released and successfully established on Tristan da	4.1 At least one well suited control agent released in at least two sites with	See section 3.2, Output 4.	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
Cunha, Inaccessible & Nightingale Islands	<p><i>heavy infestations of C. hesperidum on one of the islands in Q4 of year one and in each of the three islands by the end of year four</i></p> <p><i>4.2 Annual Q4 monitoring of infestation rates of C. hesperidum at release sites shows at least one control agent established in at least one site by end of year three, and on all three islands by end of year four</i></p>	<p>4.1 Despite losing the culture earlier in the year, the team on Tristan were able to make substantial releases of wasps in two sites on both Tristan and Nightingale. We're hopeful that a further release will be made on Inaccessible in April 2023.</p> <p>4.2 Due to natural population fluctuations of <i>C. hesperidum</i>, it has not been possible for the team to monitor infestation rates beyond simple observations. CABI's surveys on Nightingale found no evidence for establishment which is not unexpected as previous releases were made in not ideal conditions, heading into autumn.</p>	
Activity 4.1. Training of biosecurity staff on Tristan how to culture, release and monitor control agents		Fine-tuning rearing methodology produced c.1,000 wasps. Team also trained in collecting <i>N. reunioni</i>	Further in-person training delivered by CABI/Fera on Tristan in Q3/Q4
Activity 4.2. First release of agent(s) on at least two sites on one of the target islands		Complete	N/A
Activity 4.3. Follow on shipments and releases of agent(s) to cover all three target islands		Two further shipments of <i>M. nietneri</i> required to maintain culture. Releases made on Nightingale and Tristan	Releases on Inaccessible and further releases of <i>M. nietneri</i> on Tristan and Nightingale
Activity 4.4. Monitoring of establishment by local staff once every year in late summer/early autumn		Extensive survey by CABI on Nightingale found no evidence of establishment (or from emergence boxes)	Repeat survey from CABI/Fera in Q3/Q4 on all three islands should conditions allow
Activity 4.5. Monitoring of impact (infestation rates of <i>C. hesperidum</i>) by local staff once every year in late summer/early autumn		Observations showed infestation rates to be more severe on Tristan than Nightingale – high natural population fluctuation	Monitoring of <i>C. hesperidum</i> infestation rates by CABI/Fera during Q3/Q4 visit
Output 5. Invasive New Zealand flax closest to <i>Phyllica</i> habitat controlled on Inaccessible Island World Heritage Site, with an increased local capacity to undertake control activities	<p><i>5.1 All flax plants present on island plateau are mapped and removed in Q4 of year one</i></p> <p><i>5.2 The 2019 baseline map of cliff flax presence is updated and the top 50m</i></p>	<p>See section 3.2, Output 5.</p> <p>5.2 496 flax plants removed (246 small, 149 medium and 101 large) from "Waterfall Ridge", largely clearing this heavily infested area of plants.</p> <p>5.3 Year 2 'cleared' sites which had been treated with herbicide revisited. Herbicide shown to have negligible effect with re-growth of seedlings in areas.</p>	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	<p><i>of invaded cliff beneath plateau is cleared of flax in Q4 of year one</i></p> <p><i>5.3 All year one plateau and cliff clearings re-checked and re-controlled where necessary in Q4 of year two (repeat in Q4 of year three)</i></p> <p><i>5.4 Local trainee demonstrates year on year improvement in rope access skills</i></p>	<p>5.4 Christiaan Gerber joined the team for a third season and has now amassed 447 rope hours putting him almost halfway towards his target of 1,000 hours for an IRATA Level 2 qualification. Flax team lead tested him on Level 2 content to better prepare him.</p>	
<p>Activity 5.1. Experienced flax control team visit Inaccessible Island in year one to complete island plateau flax mapping and update the 2019 cliff flax map baseline</p>		<p>Completed year 1</p>	<p>N/A</p>
<p>Activity 5.2. All island plateau flax, and the top 50m of invaded cliff beneath the plateau, is cleared of flax in year one</p>		<p>496 flax plants removed</p>	<p>Removal work to continue as part of DPLUS191</p>
<p>Activity 5.3. Experienced flax control team revisit Inaccessible in year two to re-check and re-control year one clearings where necessary (repeat in year three)</p>		<p>Flax team returned for third field season in December 2022</p>	<p>Flax team return in summer 2023</p>
<p>Activity 5.4. One Tristanian resident accompanies the experienced flax team on each visit to Inaccessible Island and receives on-the-job training</p>		<p>Trainee completed third field season – 204 hours gained on ropes</p>	<p>Trainee returns in summer 2023</p>
<p>Output 6. Community nursery of scale-free <i>Phylica</i> trees established on Tristan for Nightingale reforestation</p>	<p><i>6.1 Two-person nursery team, a weather-resistant polytunnel and at least 250 seedlings planted, all in place by end of Q1 (year 3)</i></p> <p><i>6.2 500 healthy <i>Phylica</i> seedlings established by end of year 3</i></p> <p><i>6.3 Five-person planting team (roughly 50/50 split taking into account nursery team gender split) in place by Q2 end (year 4). Enough previously forested areas cleared/prepared on Nightingale for a minimum of 125 tree seedlings by Q3 end (year 4)</i></p>	<p>New project Output. See section 3.2, Output 6.</p> <p>6.2 157 young, healthy <i>Phylica</i> trees ready to be planted on Nightingale. A further 50 seedlings underway in heated propagator. Cuttings haven't rooted so the target of 500 seedlings is behind schedule.</p> <p>6.3 Clearing/planting team will be travelling to Nightingale when sea state next allows to continue scrub clearance and plant the 157 young trees.</p> <p>6.4 Trees planted last year (prior to this becoming a project output) will be monitored for health during planting visit.</p>	

Project summary	SMART Indicators	Progress and Achievements April 2022 - March 2023	Actions required/planned for next period
	<i>6.4 Continued maintenance of planted <i>Phylica</i> trees on Nightingale to ensure maximum survival by project end</i>		
Activity 6.1. <i>Phylica</i> nursery established on Tristan		Complete	N/A
Activity 6.2. Successful mass-propagation of <i>Phylica</i> seedlings in nursery by Tristanian team		157 young trees ready to be planted. 50 seedlings underway in propagator	Upscaling of production focussing on germinating from seed rather than cuttings
Activity 6.3. Ground cleared of scrub and prepared in previously forested areas of Nightingale by Tristanian team		Not started as per project timeline	Clearing to begin in Q1 of Y4
Activity 6.4. Oldest, most robust nursery <i>Phylica</i> trees planted in suitably prepared, previously forested areas of Nightingale by project end		Not started as per project timeline	Planting to begin in Q1 of Y4

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: Healthy <i>Phyllica</i> forests cover their available habitat niche on the northern islands of Tristan da Cunha and sustain their maximum possible populations of endemic <i>Nesospiza</i> buntings for long-term resilience			
<p>Outcome:</p> <p>Sustainable community-supported control of <i>Coccus hesperidum</i> successfully established, community nursery created and invasive flax buffer provided that enables recovery and planting of <i>Phyllica</i> trees, restoration of seed-setting and ultimately increased food availability for <i>Nesospiza</i> buntings.</p>	<p>0.1 In year four at least one control agent successfully established on each of the three northern islands in compliance with Tristan legislation and Council permissions</p> <p>0.2 In year four, lower densities of <i>C. hesperidum</i> and 10% reduction in sooty mould cover of foliage recorded on <i>Phyllica</i> compared to 2020 baseline</p> <p>0.3 No New Zealand flax is recorded on the plateau of Inaccessible Island or top 50m of surrounding cliff by end of year 2</p> <p>0.4 3 Tristan Conservation Department staff (2 male / 1 female) trained and able to successfully rear, release and monitor a biological control agent</p> <p>0.5 Within 3-5 years of project start, increased number of seeds/fruits recorded on <i>Phyllica</i> compared to 2021 baseline, and population density of buntings stabilised.</p> <p>0.6 At least 125 <i>Phyllica</i> trees planted in priority sites on Nightingale Island by end of year 4</p>	<p>0.1 Environmental permits. Rearing and release reports. Assessment report of control agent population establishment.</p> <p>0.2 Assessment report of sooty mould cover on <i>Phyllica</i> trees. Photographic evidence.</p> <p>0.3 Flax assessment report. Photographic evidence</p> <p>0.4 Biological control agent Training, Release & Monitoring reports verified by CABI and Fera. Feedback forms. Photographic evidence.</p> <p>0.5 Assessment report of fruit yield and seed setting (recruitment). Bird population monitoring data.</p> <p>0.6 Nursery/planting staff timesheets. Photographic evidence</p>	<p>By the end of the project a decline of the pest species and tree coverage by sooty mould should start to be reflected in the recorded data. Recovery of <i>Phyllica</i> trees and bird populations can only be measured and verified several years after the termination of project however as part of long-term monitoring activities.</p> <p>Assumption: Tristan Conservation Department and the RSPB continue monitoring beyond the life of the project. This holds true as RSPB and Tristan Conservation have a long-term monitoring work programme which is not dependent on further project-funding, so will be able to deliver on this. We also commit to reporting the results to Darwin Plus / DEFRA post grant.</p>
<p>Output 1. Suitable biological control agents for <i>C. hesperidum</i> on Tristan selected, risk assessed and tested</p>	<p>1.1 At least three suitable control agents identified and selected from commercial, research and wild South</p>	<p>1.1 Literature Review. South African survey report.</p> <p>1.2 Efficacy testing results report</p>	<p>Assumption: Suitable control agents matching the target pest can be identified. This is highly likely as the different strains of <i>C. hesperidum</i> have</p>

Project summary	SMART Indicators	Means of verification	Important Assumptions
	<p>African sources by end of Q4 in year three</p> <p>1.2 One control agent tested through standardised methods and under controlled conditions in Q3 of year one, and at least one further agent by Q2 of year two</p> <p>1.3 At least one control agent demonstrated to be highly effective against the <i>C. hesperidum</i> strain present on Tristan by end of Q2 of year two</p> <p>1.4 PRA on one tested and recommended control agent completed by end of Q3 in year one, and of all tested and recommended agents by Q3 of year two</p>	<p>1.3 Efficacy testing results report</p> <p>1.4 Pest Risk Assessments.</p>	<p>been successfully controlled under a wide range of environmental conditions. Indeed, <i>C. hesperidum</i> is one of the best assessed pest species in the world regarding associated parasitoids and other natural enemies. The CABI Invasive Species Compendium alone lists more than 40 parasitoids and predators for this target pest.</p> <p>Suitable control agents can be obtained from existing cultures or through field surveys. This is highly likely as some agents are commercially available and more are in use in agricultural research institutes with which CABI has long-established contacts. Additional species can relatively easily be sourced during field surveys in particular from citrus growing areas, where <i>C. hesperidum</i> can be frequently found. The methodology for required surveys is already established at CABI and will draw on substantial past experiences in controlling this species.</p>
<p>Output 2. Tristan Council and community understand and approve of selected control agent release</p>	<p>2.1 Publicity materials and video are submitted to Tristan Council and screened for public viewing by Tristan Conservation Department in Q2 of Yr1. At least 75% of Tristan Council members, at least 75% of Tristan school classes, and at least 50 Tristanians have face-to-face discussions with community engagement lead in Q2 of years two and three</p> <p>2.2 Independent opinion on first PRA produced by APHA and explained to</p>	<p>2.1 Photographs from public meetings and school talks. Publicity materials demonstrating biocontrol agents. Educational pack for school. Short educational video. Trip report.</p> <p>2.2 APHA Opinion document. Tristan Council meeting minutes</p> <p>2.3 Environmental Permits</p> <p>2.4 Potato crop & Agriculture Department polytunnel pests report. Potential biocontrol report</p>	<p>Possible community fears about the introduction of a parasitoid wasp can be allayed. This is highly likely as Tristan Council has already formally approved this project application, Tristan Conservation Department is a core partner, the RSPB has excellent long-term community links and thus understanding of local concerns, and clear communications will demonstrate that the (likely) agents are c.2mm long and harmless to humans and the wider environment.</p>

Project summary	SMART Indicators	Means of verification	Important Assumptions
	<p>Tristan Council via phone, by end of Q3 in year one, and subsequent PRAs by Q3 of year two</p> <p>2.3 Tristan Council and community approval granted for introduction, rearing and release of one tested and recommended control agent by end of year one and of all tested and recommended agents by Q3 of year two</p> <p>2.4 Potato crop pest assessments completed for at least 8 growers (4 male / 4 female), as well as the Agriculture Department vegetable production polytunnel, and potential for benefits from biocontrol evaluated, by end of year four</p>		<p>The potato crop is largely all grown close together at the 'patches', so assessments conducted with 8 growers will be sufficient to provide insights and lessons for all growers of this staple crop.</p>
<p>Output 3. Selected control agent reared under controlled conditions on Tristan</p>	<p>3.1 Rearing facilities established on Tristan to allow repeated releases without long-distance imports by the end of year one</p> <p>3.2 At least one well suited control agent brought into permanent culture under controlled rearing conditions on Tristan by end of year one</p> <p>3.3 Three Tristan Conservation Department staff (2 male / 1 female) trained in rearing control agents by the end of year one</p> <p>3.4 At least 14 school children (7 female / 7 male) involved in propagating/growing plants for the control agents by the end of year one, and subsequent rearing by Q3 of year two</p>	<p>3.1 Photographic evidence of rearing facilities</p> <p>3.2 Rearing protocols. Photographic evidence</p> <p>3.3 Training protocol provided as annex to second annual project report</p> <p>3.4 Teacher feedback in second annual project report.</p> <p>3.5 Results from rearing protocols provided in second annual project report</p>	<p>Pest Risk Assessment ensures that no native species are harmed by the control agent. To date, no native scale insects have ever been recorded for the Tristan group, but further surveys by a world-leading entomologist, and rigorous testing as part of the PRA process, will provide extremely high levels of confidence in this assumption.</p> <p>Control agents can be reared and cultured under controlled conditions. This is highly likely as standardised rearing protocols for both parasitoid and predatory control agents of <i>C. hesperidum</i> exist.</p> <p>Tristan Conservation Department able to work closely with the Island school. This is highly likely as occurs frequently already.</p>

Project summary	SMART Indicators	Means of verification	Important Assumptions
	3.5 Production of at least 300 female control agents for release by the end of year one and 500 females in years three and four		
Output 4. Control agents released and successfully established on Tristan da Cunha, Inaccessible & Nightingale Islands	<p>4.1 At least one well suited control agent released in at least two sites with heavy infestations of <i>C. hesperidum</i> on one of the islands in Q4 of year one and in each of the three islands by the end of year four</p> <p>4.2 Annual Q4 monitoring of infestation rates of <i>C. hesperidum</i> at release sites shows at least one control agent established in at least one site by end of year three, and on all three islands by end of year four</p>	<p>4.1 Release reports. Photographic evidence.</p> <p>4.2 Annual monitoring reports. Final report includes post-release evaluation.</p>	<p>Suitable weather conditions allow field releases.</p> <p>Environmental conditions allow establishment of agents (which is highly likely as testing will have aimed to replicate conditions on Tristan as much as possible)</p>
Output 5. Invasive New Zealand flax closest to <i>Phyllica</i> habitat controlled on Inaccessible Island World Heritage Site, with an increased local capacity to undertake control activities	<p>5.1 All flax plants present on island plateau are mapped and removed in Q4 of year one</p> <p>5.2 The 2019 baseline map of cliff flax presence is updated and the top 50m of invaded cliff beneath plateau is cleared of flax in Q4 of year one</p> <p>5.3 All year one plateau and cliff clearings re-checked and re-controlled where necessary in Q4 of year two (repeat in Q4 of year three)</p> <p>5.4 Local trainee demonstrates year on year improvement in rope access skills</p>	<p>5.1 Plateau flax presence map. Control team report. Photographic evidence.</p> <p>5.2 Updated cliff flax map. Control team report. Photographic evidence.</p> <p>5.3 Monitoring trip report. Updated plateau and cliff flax presence maps. Photographic evidence.</p> <p>5.4 Baseline skills assessment on rigging techniques, gear inspection and rope management. Trainer's report.</p>	<p>Tristan Government retains this as a key priority. Highly likely as included in the project at Tristan's specific request and a key action of the World Heritage Site management plan.</p> <p>Suitable weather conditions enable timely team drop-off and pick-up, plus working conditions on the island plateau. Control therefore to be conducted in the Tristan summer (Jan-March) to maximise good weather.</p> <p>Unmapped first-hand reports from February 2019 team on flax presence on the island plateau suggest that full removal is possible.</p> <p>COVID-19 travel restrictions allow for the flax team to travel to Tristan in Q4 of Yr1. This will be a direct voyage from South Africa to Inaccessible Island, with</p>

Project summary	SMART Indicators	Means of verification	Important Assumptions
			the potential not to stop at Tristan da Cunha entirely, so is less likely to be affected by global travel restrictions.
Output 6. Community nursery of scale-free <i>Phyllica</i> trees established on Tristan for Nightingale reforestation	<p>6.1 Two-person nursery team, a weather-resistant polytunnel and at least 250 seedlings planted, all in place by end of Q1 (year 3)</p> <p>6.2 500 healthy <i>Phyllica</i> seedlings established by end of year 3</p> <p>6.3 Five-person planting team (roughly 50/50 split taking into account nursery team gender split) in place by Q2 end (year 4). Enough previously forested areas cleared/prepared on Nightingale for a minimum of 125 tree seedlings by Q3 end (year 4)</p> <p>6.4 Continued maintenance of planted <i>Phyllica</i> trees on Nightingale to ensure maximum survival by project end</p>	<p>6.1 Nursery staff timesheets, photographic evidence</p> <p>6.2 Nursery staff timesheets, photographic evidence, <i>Phyllica</i> tending protocols</p> <p>6.3 Planting team timesheets, photographic evidence</p> <p>6.4 Photographic evidence</p>	<p>Successful propagation of <i>Phyllica</i> seedlings – Trevor Glass already has had success with this, so this is likely</p> <p>Environmental conditions allow establishment and survival of young <i>Phyllica</i> trees once planted in affected areas – planting can occur during releases of control and in areas where control is already established to protect young trees from scale insect</p>
<p>Activities (each activity is numbered according to the Output that it will contribute towards, for example, 1.1, 1.2 and 1.3 are contributing to Output 1)</p> <p>1.1. Identification of scale insect from samples collected on Tristan; use of molecular methods to identify the strain/subspecies present on Tristan</p> <p>1.2. Analysis of pre-project survey and literature survey to match agents to scale taxon present on Tristan; this includes climate matching of previous successful control projects of <i>C. hesperidum</i> with the conditions present on Tristan</p> <p>1.3. Selection of suitable and readily available agents, including use of agents commercially available and agents currently used in other research institutes</p> <p>1.4. Shipment of living scale insects from Tristan to quarantine at CABI to test agents on the correct target taxon</p> <p>1.5. Culturing of <i>C. hesperidum</i> from Tristan at CABI for testing and mass rearing of agents</p> <p>1.6. Survey in SA for additional agents; the survey will focus on areas with significant citrus growing where <i>C. hesperidum</i> is widespread</p> <p>1.7. Risk assessment for selected agents with a focus on published host specificity records</p> <p>1.8. Efficacy testing of agents in quarantine at Egham UK looking into infestation rates and rates of encapsulation by the target species</p>			

Project summary	SMART Indicators	Means of verification	Important Assumptions
<p>2.1. Tristan Conservation Department screen educational video and share publicity materials to Council and with community. Community engagement lead visits Tristan in Q2 of years 2 and 3 to engage Council, school children and community members via public meetings, informal discussions, classroom teaching and film screening.</p> <p>2.2. The PRA is submitted to APHA for independent scrutiny, and their feedback then provide direct to Tristan Council both in writing and via a phone explanation.</p> <p>2.3. Tristan Council meeting discusses PRA and approves issue of an environmental permit by the 'Administrator in Council'.</p> <p>2.4. Visiting expert conducts pest assessments on potato crops of at least 8 growers, as well as the Agriculture Department vegetable production polytunnel, providing immediate verbal feedback and a follow-up report.</p> <p>3.1. Rearing of agents for release at CABI quarantine facilities using several chambers to keep individual agents separated and supply population of scales uninfected</p> <p>3.2. Development of training material and rearing protocols for Tristan, including photographic identification guide for the species involved in word format and as PowerPoint presentation</p> <p>3.3. Establishment of polytunnel rearing facilities on Tristan</p> <p>3.4. First shipment of approved agent(s) on Tristan and establishment in prepared rearing facilities on the island</p> <p>3.5. Training of biosecurity staff on Tristan how to rear control agents followed by remote supervision after the training</p> <p>3.6. Culturing of agents on Tristan in person and under remote supervision by FERA and CABI</p> <p>4.1. Training of biosecurity staff on Tristan how to culture, release and monitor control agents</p> <p>4.2. First release of agent(s) on at least two sites on one of the target islands</p> <p>4.3. Follow on shipments and releases of agent(s) to cover all three target islands</p> <p>4.4. Monitoring of establishment by local staff once every year in late summer/early autumn</p> <p>4.5. Monitoring of impact (infestation rates of <i>C. hesperidum</i>) by local staff once every year in late summer/early autumn</p> <p>5.1. Experienced flax control team visit Inaccessible Island in year one to complete island plateau flax mapping and update the 2019 cliff flax map baseline</p> <p>5.2. All island plateau flax, and the top 50m of invaded cliff beneath the plateau, is cleared of flax in year one</p> <p>5.3. Experienced flax control team revisit Inaccessible in year two to re-check and re-control year one clearings where necessary (repeat in year three)</p> <p>5.4. One Tristanian resident accompanies the experienced flax team on each visit to Inaccessible Island and receives on-the-job training</p> <p>6.1. <i>Phyllica</i> nursery established on Tristan</p> <p>6.2. Successful mass-propagation of <i>Phyllica</i> seedlings in nursery by Tristanian team</p> <p>6.3. Ground cleared of scrub and prepared in previously forested areas of Nightingale by Tristanian team</p> <p>6.4. Oldest, most robust nursery <i>Phyllica</i> trees planted in suitably prepared, previously forested areas of Nightingale by project end</p>			

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

This project is in Year three of a four-project. I have therefore only filled out the 'Total to date' column with a cumulative total for the project so far

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	3 Tristan Conservation Department staff (2 male / 1 female) trained and able to successfully rear, release and monitor a biological control agent	Number of people from key national and local stakeholders completing structured and relevant training	People	Women:Men				2:3	1:2 (exceeded target)
DPLUS-A04	Two-person nursery team, a weather-resistant polytunnel and at least 250 seedlings planted, all in in place by end of Q1 (year 3) Local trainee demonstrates year on year improvement in rope access skills	Number of local/national organisations with improved capability and capacity as a result of project	Number of organisations	Conservation and Agriculture Departments				2	2
DPLUS-B06	Potato crop pest assessments completed for at least 8 growers (4 male / 4 female), as well as the Agriculture Department vegetable production polytunnel, and potential for benefits from biocontrol evaluated, by end of year four	Number of Local Stakeholders and Local Communities (people) with strengthened (recognised/clarified) tenure and/or rights	People	Women:Men Potato growers				4:4	4:4
DPLUS-C01	PRA on one tested and recommended control agent completed by end of Q3 in year one, and of all tested and recommended agents by Q3 of year two	Number of best practice guides and knowledge products published and endorsed	Number	BCA Risk Assessments				3	3
DPLUS-D03	Tristan Council and community approval granted for introduction, rearing and release of one tested and recommended control agent by end of year one and of all	Number of policies with biodiversity provisions that have been enacted or amended	Number of instruments	TDC Government Research Permits				2	2

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
	tested and recommended agents by Q3 of year two								

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)

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?	✓
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	✓
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.	
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.	✓
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.	
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 15)?	
Have you involved your partners in preparation of the report and named the main contributors	✓
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	