

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Project Reporting Information Note"

[\(https://dplus.darwininitiative.org.uk/resources/information-notes/\)](https://dplus.darwininitiative.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 2022

Darwin Plus Project Information

Project reference	DPLUS127
Project title	Improving reef resilience through sustainable fishery management on Diego Garcia
Territory(ies)	British Indian Ocean Territory (BIOT)
Lead partner	Zoological Society of London
Project partner(s)	Bangor University and University of Guam
Darwin Plus grant value	314,019.42
Start/end dates of project	01/08/2021 – 30/06/2024
Reporting period (e.g. Apr 2021-Mar 2022) and number (e.g. Annual Report 1, 2)	01/08/2021 – 30/04/2022 Annual Report 1
Project Leader name	Dr David Curnick
Project website/blog/social media	N/A
Report author(s) and date	Dr David Curnick (ZSL) Dr Claire Collins (ZSL) Dr Brett Taylor (University of Guam) Dr Ronan Roche (Bangor University) 30/04/2022

1. Project summary

Coral reefs are threatened by localised fishing pressure, pollution and disease, in addition to global climatic change. Effective management of local threats has been shown to significantly improve reef resilience to climate change impacts.

The Morale, Welfare and Recreation Department (MWR) of the US Military provides daily fishing opportunities to personnel on Diego Garcia, targeting ecologically important and vulnerable coastal predators, such as groupers, and removing over 20t of fish annually. The fishery is poorly documented, and its impact on reef health is unknown, as is the sustainability of current extraction rates. Furthermore, current fishing guidelines lack clarity and are too complicated to be effectively enforced (Spalding 2018). In addition, there is a larger shore-based (creel) fishery primarily undertaken by the ~2,000 support staff. This fishery remains poorly understood and unregulated. Stakeholders across both fisheries are generally disengaged with conservation and science work in the territory. It is imperative that both fisheries are conducted sustainably, recognising the ecological importance and rarity of the British Indian Ocean Territory's (BIOT) near-pristine reefs; whilst providing opportunities for the community on Diego Garcia to engage and become active stakeholders in reef conservation.

This project aims to: systematically review the impact of the fisheries on Diego Garcia's reefs; identify spatial and temporal hotspots for biodiversity across the atoll (e.g. spawning behaviour); and ascertain the understanding of existing fisheries regulations and marine conservation amongst island personnel. It will also determine the societal importance of both fisheries, and how the social benefits differ between island stakeholder groups. This project will therefore provide the ecological and social baselines needed to develop implementable guidelines to improve fishery management. These will benefit all island personnel as a more sustainable fishery model safeguards long-term fishery persistence and the provision of social benefits, whilst minimising impacts to local marine biodiversity.

Spalding M (2018). 2018 Annual Report, Chief Science Advisor, BIOT Administration. 27th September 2019.

2. Project stakeholders/partners

The BIOT administration (BIOTA)

The BIOTA has been a key partner since the project's inception, with the initial project proposal reviewed by the Chief Science Advisor and the BIOT Environment Officers. The key liaison between the project and the BIOTA over the last year of the project has been through Milly Fellows, the standing Environment Officer in the BIOT. Unfortunately, as our expedition had to be postponed, all communication between ourselves and the BIOTA has thus far been restricted to video conferences, calls or email. Ahead of our proposed expedition in Y1Q4, we submitted an official application for a scientific expedition to the BIOT. This application has since been adjusted considering the postponement and will be resubmitted in Y2Q1 ahead of the proposed expedition in Y2Q2.

Military and contractors

Despite our inability to travel to Diego Garcia, we have been in contact with the Commodore, Captain Joel Stewart, providing early advice on the management of the fisheries. However, most of our planned engagement with on-island military and contractors will take place during our expeditions. Across our expeditions, we will ensure that all personnel in the BIOT are given opportunities to engage with the project, highlighting positive ways their efforts can make a difference to the environment in which they live. Engagement activities will include presentations (across multiple venues), focus groups, questionnaires, and project t-shirts for key personnel.

Other researchers

This project was developed to be highly complementary to the broader research activities being undertaken across the BIOT by the Bertarelli Programme in Marine Science (BPMS). One positive outcome from the expedition postponement is that we have had more time to build collaborations with other researchers, such as colleagues at the University of Oxford, to collect samples and data on their behalf as part of our field activities later in 2022, thus maximising the overall impact of the Darwin Plus grant.

3. Project progress

3.1 Progress in carrying out project activities

All necessary expedition planning (e.g., permit applications), diving risk assessments and advanced equipment procurement has been completed. We have also designed our social survey plan (i.e., our participatory mapping approach). This was developed in conjunction with the Environment Officer and the Marine Management Organization

(MMO), who are undertaking a complimentary project within the fishery, funded by the Blue Belt fund. This plan has also subsequently been reviewed and approved by the University of Exeter's ethics committee. Additionally, we have reviewed all available MWR (2007-2021) and creel survey data (2017) and curated them into two standardised datasets ready for further analysis in conjunction with field data. Our planned report into the creel survey data has been slightly delayed (will be completed in Y2Q1) as the data were received much later than expected.

Otherwise, progress has been significantly impacted by the need to postpone our first expedition. We were originally due to fly to Diego Garcia on the 18th of January 2022 (returning on the 25th of February) to conduct our first baseline socio-ecological survey on the impact of recreational reef fishing. However, shortly before we were due to depart, there was a significantly and highly impactful omicron induced covid surge in Guam. This resulted in the University of Guam prohibiting all international travel and fieldwork for their staff and thus Dr Brett Taylor was denied permission to travel. As Dr Taylor is a key member of the team for this project and will play major roles on multiple of the project's components (especially those pertaining to Output 2), we decided it was better to delay the expedition and ensure that we can still deliver all aspects of our logframe. We therefore rescheduled the expedition to February/March 2022 and were due to fly to Diego Garcia on the 25th of February (and return on the 25th of March).

Unfortunately, a week before we were due to fly, one of our team members contracted Covid-19. For them to travel to Diego Garcia, they would have needed to test negative on PCR prior to travel. However, given that many people can test positive on PCR for weeks (if not months) after infection, it was unlikely that they would have been permitted to travel. Additionally, as Covid-19 severely impacts the respiratory system, even if they had been cleared for travel, their ability to SCUBA dive shortly after infection would have likely been severely compromised. Asking them to do so would have been very high-risk.

On these grounds, we asked BIOTA if we could push the expedition back a few more weeks to give our team member the time needed to recover. However, given the escalating geo-political situation in Ukraine, demand for flights between Bahrain and the military base on Diego Garcia rose significantly. Flights on this route were already running on a severely restricted schedule (~2 or 3 a month) and scientists/civilians became a very low priority. We were offered potential flights on the 11th of March but were warned that these flights were in high demand (high chance of being subsequently bumped for military personnel) and had no guarantee of a return flight.

Understandably, teamwork, family and personal commitments in April and May meant this was not a viable option. It is also worth noting that this would have also likely resulted in project expenditure increasing and spanning financial years, without any time to submit a Change Request Form.

As a final alternative, we also explored the possibility of boarding military flights in Japan to get to Diego Garcia. However, at the beginning of February, Japan restricted entry to non-nationals and thus meant we would not be able to transit between the commercial airport and military airports in Tokyo. Therefore, this option was also not available to us.

We therefore collectively decided to postpone the expedition to (i) maintain the health and safety of all team members, (ii) to deliver on the project logframe (running the expedition without Dr Taylor would have severely impacted our deliverables as his expertise would have been lost and running the trip with one fewer diver would have limited the number of sites we could have surveyed), and (iii) to be as financially efficient

as possible. We therefore submitted a Budget Change Request on the 23rd of February. This was subsequently approved on the 10th of March 2022.

3.2 Progress towards project Outputs

Progress towards all outputs has been hampered by the delayed expedition. Here, we report against the activities under each output.

Output 1: Characterisation of the ecological impact of the two fisheries on DG.

Thus far, progress on this output has been limited to desk-based reviews of existing data available from MWR. We have reviewed the available data and curated them into a standardised data set. As part of an MSc project in summer 2022, these data will be paired with life-history data for two snapper species *Lutjanus bohar* and *Lutjanus gibbus* (sampled in the northern atolls of the Chagos Archipelago) to estimate the impact of current extraction rates around Diego Garcia for these species.

We have also consulted with the Environment Officer and recommended that some minor changes are made to the MWR reporting requirements to maximise the value and utility of the data already being collected. This includes reporting the numbers of individuals landed, alongside the already reported weights of fish landed. This has been actioned and we plan to review the data generated during our visit in Y2Q2.

We have received the 2017 creel survey data but are awaiting the 2016 data. The 2017 data have been reviewed, curated, and analysed. However, the production of a short report on these data was delayed whilst we awaited the 2016 data. However, as no progress has been made on acquiring those data, we intend to finish the report early in Y2Q1. If the remaining data are subsequently provided, we will update the analysis and report accordingly.

Our participatory mapping approach has been designed in conjunction with the Environment Officer and the MMO. The survey will be now implemented on our first expedition in Y2Q2 (originally planned for Y1Q4).

Output 2: Classification of ecologically significant periods and locations for vulnerable reef fish

As previously stated, the MWR data has been curated but the participatory mapping data needed for these classifications will now not be collected until our expedition in Y2Q2. All other activities under this output will take place on or after the first expedition in Y2Q2.

Output 3: Recommendations of best management options made available through application of a risk-based mitigation framework

All activities under this output will take place on or after the first expedition in Y2Q2. See logframe for more details.

Output 4: Raised awareness, understanding and appreciation of marine biodiversity and conservation among the DG community.

The baseline ecological awareness and understanding survey was initially planned on our expedition in Y1Q4. This activity, which is core to this output, will now take place on our rearranged expedition in Y2Q2. After the baseline surveys have been conducted, our

interventions and education materials will be implemented, and their impact measured on subsequent expeditions.

3.3 Progress towards the project Outcome

Outcome: Improved socio-ecological understanding of Diego Garcia's reef fisheries to inform sustainable fishery management, supported by island stakeholders.

Limited progress has been made to the overall outcome thus far, given the postponing of our first expedition. Despite this, we have continued to build relationships with key island personnel and have designed and coordinated all the survey protocols with project stakeholders ready for implementation in September 2022 (Y2Q2). We have also supported BIOTA in the review and revision of their Fishing Rules Flyer and General Fisheries Leaflet. These materials will be disseminated after our baseline socioecological survey has been conducted.

We are very confident that, despite the delays, we will achieve our Outcome by the end of the project. Key to this is being able to run our first expedition later this year. Where we can, we have put in place several contingency plans to ensure that the revised expedition will go ahead, including highlighting possible replacements for key team member should one of us contract Covid-19, and being flexible on dates of travel.

3.4 Monitoring of assumptions

The delays experienced by our project can be attributed to two issues, Covid-19 and data delays. These were both highlighted as key assumptions in our original project proposal.

Assumption 1. Travel to access DG is not significantly restricted due to COVID-19 related restrictions

As outlined previously, we were significantly delayed due to a team member contracting Covid-19, the emergence of the omicron variant and the tightening of travel restrictions. This was further compounded by the global geo-political landscape. We did not account for the possible impact of a large-scale conflict in our original list of assumptions. Moving forward, we must consider this risk when planning work on Diego Garcia, which is an active and strategic military base. BIOT is currently accessible again and colleagues are now travelling to and from Diego Garcia for other projects. However, should the global situation escalate, then travel could be limited again and delay the project further. In this ever-changing geo-political landscape, we plan to review the situation monthly and adjust the plan accordingly.

Assumption 2. Timely provision of creel survey data from BIOTA/Chief Science Officer.

Despite having an agreement in principle, we did not receive the creel survey data until four months into the project. Additionally, we have only ever received one of the two years of data we believe to have been collected. This has severely limited the utility of the data and our ability use it to inform our own project surveys.

Nearly all other assumptions are yet to be tested, given the postponement of the expedition.

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

This project aims to address a key conservation management concern in the BIOT – the poorly understood fisheries on Diego Garcia and their impact on this important Ramsar site (1077) – and will contribute significantly to the BIOTA’s conservation priorities (<https://biot.gov.io/environment/>). The project also directly addresses the BIOT Biodiversity Action Plan for shallow coral reefs, which identifies a pressing need for assessment of Diego Garcia’s recreational fisheries and suggests a precautionary approach to management in the absence of existing data and maintaining or increasing current fishery restrictions. Progress towards these has been limited thus far, given the aforementioned delays. However, we are confident that the delays will not significantly impact our ability to meet the original aims and objectives of the project and inform these key management strategies and priorities.

5. OPTIONAL: Consideration of gender equality issues

All partners are committed to providing equal opportunities in the fields of science, technology, engineering, and mathematics (STEM). This will be particularly considered when recruiting students and providing training opportunities.

We are aware of several aspects of Diego Garcia’s social structures that may impact on participant representativeness and the accuracy of data collected. As a military base, the hierarchical system in place affects all elements of inhabitants’ work and social lives. We will adopt strategies to ensure that participation is not restricted by rank or gender. For example, we will use both formal and informal channels (e.g. snowball sampling between contractors) to recruit participants for our surveys whilst on Diego Garcia. Second, for all methods, we will consider the potential inclusion of bias driven by these social structures. For example, we will conduct focus groups with participants from similar military ranks, with facilitators trained in recognising issues arising from power imbalances, e.g. the halo effect (Nyumba et al. 2018). We will also ensure that tools and study locations are suited to participants. For example, engagement activities will be held within local community villages.

The team will regularly evaluate the methods and outputs and actively work to ensure no harm arises from either.

O. Nyumba, T., Wilson, K., Derrick, C.J. and Mukherjee, N., 2018. The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and evolution*, 9(1), pp.20-32.

6. Monitoring and evaluation

Regular team meetings have ensured that project progress has been routinely reviewed and project decisions made through consultation with all team and stakeholder partners. As we prepare for the expeditions in September 2022 (Y2Q2) and March 2023 (Y2Q4), regular monthly team meetings will be taking place, alongside periodic meetings with the BIOT Environment Officer.

As per our original proposal, we plan to evaluate (i) changes in ecoliteracy and awareness through attitude and awareness surveys on each expedition, (ii) the impact of new logbook reporting protocols, and (iii) changes in fisher behaviour (logbooks) and reef condition (SCUBA surveys). However, these evaluations are contingent on baseline data being collected during the first expedition. As such, we expect to be able to provide a more comprehensive update during the next report.

7. Lessons learnt

This has been a challenging year for the project. Whilst we are confident that we have done everything in our power to mitigate potential issues and delays, some broader geopolitical issues were out of our control. Nonetheless, moving forward, we have identified replacements for each team member, should we be in a position whereby a team member contracts Covid-19 before our next expedition. Further, we have fully prepared our participatory mapping approach and have discussed with the Environment Officer the possibility of delivering these materials remotely, if absolutely necessary. For future projects operating in and out of key military bases, we will certainly consider the potential of wider geo-political instability more during the planning phase.

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

As this is our first annual report, here we respond to the feedback we received when our project was funded:

Feedback 1 - Please clarify whether the [REDACTED] of specialist kit from the Brett Taylor lab equates to the full cost of purchasing the kit or hire of the kit

This equates to the cost of purchasing the kit.

Feedback 2 - Clarify whether Dr Taylor's new affiliation has been confirmed

Yes, Dr Taylor took up a new position as an Assistant Professor at the University of Guam Marine Laboratory in April 2021, shortly before the onset of this project.

Feedback 3 - Comment on whether any reef fish work has previously been undertaken through the Bertarelli Programme in Marine Science

There have been several reef fish projects funded through the BPMS over the last few years. However, these have been predominantly focussed on the northern atolls of the Chagos Archipelago, with very little research undertaken around Diego Garcia (except for a couple of sites that have been historically surveyed and those form part of our survey plan in this project). For a summary of the recent work undertaken in the Chagos Archipelago, please see Hays et al. 2020.

Hays, GC., et al. 2020. A review of a decade of lessons from one of the world's largest MPAs: conservation gains and key challenges. *Marine Biology*, 167(11), pp.1-22.

Feedback 4 - explain how fisherfolk have been engaged so far (HYR)

A shore-based creel fisher survey was undertaken in 2016 and 2017 by the then Environment Officer. These data remain unpublished, but the 2017 data have now been reviewed by this project. The data generated is limited, but a short report will be produced in early Y2Q1.

Informal discussions were had with fishers by the PI, Dr Curnick, during previous expeditions to Diego Garcia in 2015 and 2019. Those expeditions focussed predominately on sharks and yellowfin tuna but gave the opportunity to discuss broader fisheries management issues informally with those stakeholders. Those discussions informed the scope and nature of this project. Since then, we have discussed the project directly and indirectly (i.e., through the Environment Officer or colleagues working on Diego Garcia for another Darwin+ funded project on plastics) with key fishers within the

island community and the community liaison officers. To our knowledge, the project has been well received thus far.

Feedback 5 - review the logframe Means of Verification as it is not always clear how they relate to the proposed indicators

We have made a couple of changes to the means of verification in the logframe below. These are highlighted in yellow.

9. Other comments on progress not covered elsewhere

N/A

10. Sustainability and legacy

We have had little chance to increase project interest amongst island personnel or increase local capacity and awareness. We hope to address this on each of our expeditions as part of our engagement plan. Through our project, we hope to ultimately present a set of management recommendations that have been co-developed with island stakeholders and assessed for feasibility using data collected throughout the project. By co-developing these management options and ensuring they are rigorously assessed, we greatly enhance the likelihood of successful implementation and community compliance.

11. Darwin identity

Darwin Plus logos will be displayed on all presentations and materials delivered during our visits to Diego Garcia. Subject to acquiring the necessary permissions, we plan to write a series of blogs over the course of the project based on our field activities. We will ensure that Darwin Plus is well referenced in any such material, as it the sole funder of this project.

As we haven't been to Diego Garcia yet, we haven't been able to ascertain the level of understanding of Darwin Plus on the island. However, all stakeholders that we have been communicating with remotely are fully briefed on the project and aware of the funding source.

Given the current geopolitical situation surrounding BIOT, we have refrained from posting about the project on social media.

12. Impact of COVID-19 on project delivery

See the *Project Summary* for details on how COVID-19 has impacted our planned fieldwork.

13. Safeguarding

Please tick this box if any safeguarding violations have occurred during this financial year.

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2021 – 31 March 2022)

Project spend (indicative) in this financial year	2021/22 D+ Grant (£)	2021/22 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	████████	████████	██████	
Consultancy costs	██████	██████	██████	
Overhead Costs	████████	████████	██████	
Travel and subsistence	████████	██████	██████	Approved through March 2022 Change Request Form
Operating Costs	██████	██████	██████	Approved through March 2022 Change Request Form
Capital items	████████	████████	██████	Approved through March 2022 Change Request Form
Others (Please specify)	██████	██████	██████	Approved through March 2022 Change Request Form
TOTAL	████████	████████	██████	Approved through March 2022 Change Request Form

15. **OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes**

N/A

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the correct template (checking fund, type of report (i.e. Annual or Final), and year) and deleted the blue guidance text before submission?	X
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	X
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk 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.	N/A
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.	N/A
Have you involved your partners in preparation of the report and named the main contributors	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	