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	DPLUS133
Project title	Streamlining Ascension Island's Marine Turtle Monitoring Programme for Long-Term Sustainability
Territory(ies)	Ascension Island
Lead Partner	University of Exeter
Project partner(s)	Ascension Island Government Conservation & Fisheries Directorate
Darwin Plus grant value	£58,798
Start/end dates of project	1st August 2021 – 30th September 2023
Reporting period (e.g. Apr 2022-Mar 2023) and number (e.g. Annual Report 1, 2)	AR2 (Apr 2022 – Mar 2023)
Project Leader name	Sam Weber
Project website/blog/social media	
Report author(s) and date	Sam Weber & Liliana Poggio Colman (24th April 2023)

1. Project summary

Ascension Island supports the second largest nesting population of endangered green turtles in the Atlantic Ocean and the largest nesting colony of any marine turtle species in the UKOTs. The population has been monitored using standard methods since the 1970s which has documented its dramatic recovery from historical exploitation. As one of the longest-running initiatives of its kind, data from the Ascension Island Marine Turtle Monitoring Programme (AIMTMP) is used extensively for regional and global status assessments of this species. However, with exponential increases in numbers of nesting turtles in recent years, existing monitoring loads are becoming increasingly unsustainable for the local Government. Without action, there is a risk that monitoring will cease or be downgraded, with unknown implications for data veracity. In this project, we aim to streamline the AIMTMP to ensure its continuity whilst operating within local capacity constraints. To achieve this, a combination of simulation-based modelling and innovative statistical methods will be used to develop monitoring protocols that offer the best compromise between efficiency and power to detect future trends. In parallel, the project will also review new technologies that have the potential to deliver a step change in terms of automation and efficiency over longer timescales.

2.   Project stakeholders/partners

This project was developed as a collaboration between the University of Exeter and Ascension Island Government Conservation and Fisheries Department in response to a pressing need to streamline Ascension's current marine turtle monitoring programme. Ascension Island Government identified the problem and worked with University of Exeter researchers to design a project that addressed local needs. AIG have continued to provide the Lead Partner with marine turtle monitoring data during Y2 of the project, including effort data (person hours invested in monitoring) that can be used to assess the 'cost' and efficiency of current and future monitoring protocols. The Project Leader spent 1 month on Ascension Island in Y2 Q4 which provided an opportunity to review project progress with managers in AIG and work alongside fieldworkers to understand current monitoring challenges.

In addition to its local objectives, the project also has the potential to learn from and contribute to a wider field of research on improving monitoring of large sea turtle populations. To facilitate this, in Y2 Q4 the project team hosted a workshop on '*Future technologies for large-scale monitoring of marine turtle nesting populations*' at the 41st International Seas Turtle Symposium (see below for details), attended by >100 technical specialists and sea turtle conservationists. The workshop provided an opportunity to present project goals and collate experience, knowledge and perspectives on emerging technologies in marine turtle population monitoring to inform Output 3 (Technology Review).

3.   Project progress

3.1   Progress in carrying out project Activities

1.1 Reanalyse all existing marine turtle monitoring data for Ascension Island using Bayesian state-space models.

This activity was completed in Y1.

1.2 Prepare an updated status assessment for the Ascension Island Green Turtle for publication in the peer-reviewed literature.

Results of Output 1.1 have been deposited in the *State of the World's Turtles* (SWoT) online database (www.seaturtlestatus.org/) where they are publicly available. Following conversations with AIG during visit during a visit by the Project Leader in Y2 it was determined that publication of an updated status assessment for the Ascension Island green turtle population in the peer-reviewed literature would be better delayed until the end of the 2023/2024 nesting season, once an overdue full census of all the island's 31 nesting beaches can be carried out. Current population estimates are based on monitoring carried out at a subset of index sites and assume that the proportional distribution of nesting across all sites is known and constant, which has not been validated since 2017 due to capacity constraints. The Project Leader and Director of AIGCFD discussed options for resourcing a full census in 2023/2024, including provision of postgraduate research students from the University to support local staff. Publication of monitoring data was a secondary goal of the project and delaying it will not impact on the overall outcome.

2.1 – 2.3 Simulation based modelling and statistical evaluation of alternative monitoring protocols

As detailed in Section 10 and in two recent change requests submitted to and approved by Darwin, limited progress has been made on these key modelling activities during Y2 due to ongoing staffing issues caused by the Project Leader's move to a permanent teaching positioning at the University of Exeter. A six-month no-cost Ascension has been agreed with Darwin during which the Project Leader will commit time to finalise the necessary analyses once current teaching commitments subside. As detailed in AR1, much of the analytical code needed to complete these outputs has been written and

tested; however, some dedicated time is required to finalise the models and synthesise the findings and recommendations.

2.4 *Gather data on person hours currently expended on green turtle monitoring under the existing protocol at different points in the nesting season.*

Monitoring effort (person-hours spent) data has been routinely collected by AIG Conservation & Fisheries Department throughout the 2022/23 nesting season as part of ongoing marine turtle monitoring work. Effort data will be used to parameterise a cost-benefit analysis of alternative monitoring protocols.

2.5 *Report methodology used for streamlining the Ascension Island Marine Turtle Monitoring Programme for publication in the peer-reviewed literature.*

Cannot be completed until results of Activities 2.1 – 2.3 are available. Synthesis and reporting of findings will now be conducted in a six-month extension period approved by Darwin.

3.1 *Undertake a structured literature review of new or emerging methods for marine turtle population monitoring.*

A preliminary literature review was undertaken in preparation for the international workshop described below and will be extended and refined based on the discussions at the meeting.

3.2 *Host an online workshop/webinar focussing on the application of new technologies for monitoring high density turtle nesting populations.*

This activity has been completed to a higher level than originally envisaged. In Q4 of Y2, project manager Dr Liliana Colman hosted a workshop/side event entitled '*Future technologies for large-scale monitoring of marine turtle nesting populations'* at the 41st International Sea Turtle Symposium in Cartagena, Columbia (Appendices 1 & 2; also see conference programme for Workshop 11 at https://www.ists41cartagena.org/program/workshops-meetings/). The workshop was attended by >50 technology specialists, conservation managers, students, and sea turtle researchers from 20 countries and aimed to review opportunities and challenges for embracing new and emerging technologies in monitoring high density nesting populations. The workshop featured 3 case study presentations that described practical experience of applying technology such as drones and thermal imaging in sea turtle population monitoring. Participants then divided into groups for open forum discussion focussed around four key questions relating to the application of technologies for sea turtle population monitoring (see Appendix 1). Each group provided notes that were then presented to the meeting and collated by the project team for later synthesis.

3.3 *Collate findings and conclusions of (3.1) and (3.2) into a Technology Roadmap for the AIMTMP.*

Final synthesis of the results of 3.1 and 3.2 will be completed during a six month extension approved by Darwin.

3.2   **Progress towards project Outputs**

Output 1. *The status of the Ascension Island green turtle nesting population is updated and population estimates are made widely available.*

This output has been completed as planned. The entire 45-year green turtle monitoring dataset has been reanalysed using novel statistical methods to update the previous status assessment completed in 2012 (Annex 3). The results of the analysis have been deposited in the State of the World's Turtles online database (https://www.seaturtlestatus.org/) and updated figures have been included in the Ascension Island Green Turtle Monitoring database as per original indicators.

Output 2. *The efficiency of alternative monitoring protocols is evaluated through simulation-based modelling.*

Following significant and unavoidable changes in project staffing arrangements described in Section 10, limited progress has been made on this key output during the current reporting period. As such, we are currently behind where we had planned to be at this stage. While much of the analytical code needed to complete these outputs has been written and tested (described in AR1), additional time is required to finalise the models and synthesise the findings and recommendations. A final, six month no-cost extension (until September 2023) has been approved by Darwin which should be sufficient to complete the necessary work, although it is unlikely that the methodology and results will be published in the peer-reviewed literature in that timeframe based on current journal processing times.

Output 3. *Novel technologies that may one day supplement or replace existing monitoring methods are reviewed and assessed for suitability and field readiness.*

This output is now approaching completion. A major international workshop was hosted in Y2Q4 which has provided a comprehensive overview of the current state of knowledge, emerging ideas and best practice on incorporating technologies into monitoring of high-density sea turtle nesting populations (see Appendices 1 & 2). The workshop did not identify any emerging technologies that had not already been identified through a review of the scientific literature but nevertheless provided useful first-hand experience of trialling these techniques in the field. Key themes emerging from the workshop were that, while technologies such as drones equipped with thermal imaging cameras are being incorporated into monitoring and research, they may not be appropriate in all contexts and further validation studies are needed before they are adopted more widely. The results of the workshop are currently being synthesised with literature sources and will form the basis of Ascension-specific recommendations made in the final Technology Review report.

3.3 Progress towards the project Outcome

As a result of ongoing staffing and capacity issues experienced during Y2 (Section 10), the project is still someway short of achieving its overall objective of recommending a streamlined, statistically robust monitoring protocol for adoption by Ascension Island Government. Nevertheless, much of the important groundwork has been laid. A revised green turtle population status assessment has been produced, which forms the starting point for future monitoring simulations, and many of the code tools needed to undertake these simulations have been written and tested. Based on the preliminary results of these analyses we have been able to recommend an interim protocol (focussed on capturing peak and tails) which has been adopted by AIG during the 2022/23 nesting season and has helped reduce monitoring burden. Further refinement and integration of model outputs will take place during a six-month extension granted by the Darwin Initiative, and we remain confident that Outcome 0.1 will be achieved in full. Given current journal processing times it is less certain that the methodology and results of these analyses will be published in the scientific literature within the lifetime of the project, but this will remain a longer-term objective.

3.4 Monitoring of assumptions

0.1 *Assumes that a reduced monitoring protocol can be identified that achieves an acceptable level of statistical power.*

Comments: This assumption cannot be evaluated until the results of the simulation-based modelling are available.

2.1 *Assumes that Bayesian population models applied in other taxa are compatible with green turtle nesting data from Ascension Island.*

Comments: Although several modelling outputs are yet to be completed, this assumption has so far held. The project has been aided in this regard by access to code from a recent publication led by another research team at the University of Exeter, which specifically applied Bayesian population models to marine turtle monitoring data collected at another site. These code tools have been adapted and extended as part of the current project and have proven to be highly flexible and robust for our purposes.

3.2 Assumes that there is sufficient engagement [in a planned monitoring workshop] from the marine turtle research community and that invited participants can attend remotely.

Comments: This assumption has held. The workshop on '*Future technologies for large-scale monitoring of marine turtle nesting populations'* hosted by the project team at the 41st International Sea Turtle Symposium was attended by > 50 people from 20 countries.

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

Finalisation and adoption of recommended monitoring programmes is required before the project can demonstrate tangible benefits for biodiversity conservation in the UKOTs. However, the ultimate objective that the project is working towards – ensuring the long-term sustainability of a flagship biodiversity monitoring programme – will make a lasting contribution to conservation management on Ascension Island. Assuming that a streamlined protocol can be developed, Ascension Island Government will be able to divert limited resources into practical conservation action while continuing to fulfil its monitoring commitments under multilateral environmental agreements, such as the Convention on Biological Diversity (e.g. "*7(b) Monitor, through sampling and other techniques, the components of biological diversity*…"). Although alternative monitoring protocols are yet to be formally evaluated for statistical power, based on preliminary findings we have been able to recommend a moderately reduced protocol which has been adopted by AIG and has lessened monitoring burden during the 2022/23 nesting season. The remaining modelling steps will help to further refine and rationalize this recommendation to ensure that future monitoring achieves the optimum balance between efficiency and power.

5.   Gender equality and social inclusion

The project core team comprises of two senior staff members involved in decision making (Dr Sam Weber, University of Exeter and Dr Diane Baum, Ascension Island Government) of which one is male and one is female. A female project manager (Dr Liliana Colman, University of Exeter) has also been employed during Y2 of the project working on specific output (Output 3).The gender of conservation interns involved in collecting and reporting monitoring and effort data varies year-to-year, but during Y2 has consisted of 5 females and 2 males.

Please quantify the proportion of women on the Project Board[1].	50%
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].	50%

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[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.

6. Monitoring and evaluation

The project has a simple structure, consisting of two partners, a small number of well-defined outputs and a clear pathway to impact which has greatly simplified the M&E process. M&E is primarily carried out by the Project Leader in consultation with Ascension Island Government (Director of Conservation & Fisheries) where appropriate. The indicators for Output 1 are clear, measurable and have been largely achieved (inclusion of updated population size estimates in the Ascension Island Marine Turtle Monitoring Database and State of the World's Turtle Database), pending the publication of the update trend in the peer-reviewed literature. This output is a necessary starting point for simulating future scenarios, so its completion is essential towards achieving the overall project outcome.

Output 2 (modelling alternative monitoring protocols) represents the main deliverable of the project and will be measured through the publication of a report outlining alternative monitoring scenarios. As described in Section 3, models for this output are not yet finalised, so M&E to this point has primarily been an internal process of checking and validating model outputs. Once a reliable set of outputs is obtained, M&E will shift towards a two-way exchange between data collectors in AIG and analysts at UoE to ensure that final outputs meet local needs.

Completion of Output 3 (Technology Roadmap) will also be verified through the delivery of a report to Ascension Island Government assessing the applicability and field readiness of transformative technologies in marine turtle monitoring. Although the report is not yet finalised, both fundamental elements of it (expert workshop and literature review) have been completed and verified by the Project Leader. This report will be shared with managers in AIG for feedback in Y3 a basis for wider partner evaluation. Although not strictly needed to achieve the project's overall outcome, Output 3 was requested by partners in AIG to provide a longer-term perspective on streamlining monitoring through greater use of technology and automation. It therefore remains an important component of the project's longer-term impact and legacy.

Ultimately, achievement of the project's overall outcome depends upon the adoption of a statistically well justified and streamlined marine turtle monitoring protocol by Ascension Island Government, and this remains the best indicator of success. Although too early to judge this outcome, an interim protocol has already been adopted based on preliminary findings, demonstrating how project recommendations can be rapidly implemented on the ground.

7. Lessons learnt

No specific lessons have been learned during Y2 of the project. However, the ongoing disruption caused by changes in the employment status of the Project Leader have highlighted the risks of building a project around the skillset and expertise of a specific individual. In accordance with the risk-based framework recently introduced by Darwin, future projects should evaluate the impact associated with changes in the availability named members of the project team and assess how easily their skills could be replaced if needed.

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

Comment: *Consider the assessment of the gender balance amongst the team involved in the monitoring effort, project management and decision making of the project to identify any potential barriers to gender equality.*

Action: A more detailed assessment of gender balance in the wider project team has been included in Section 5.

Consider including more detailed evidence of progress to give better understanding to reviewers of how project planning and technical cooperation amongst international and UKOTs teams happens.

Action: This is an understandable comment. Unfortunately, the more technical aspects of this project, including software tools and statistical code used for evaluating alternative monitoring protocols, are currently in development and are not possible to append as evidence in a form that will be meaningful to reviewers. Limited progress has been made on these outputs during Y2 (see Section 3 & 10); once a reliable set of model simulations are produced these will be submitted to AIG for consultation on the optimum monitoring protocol. The final report submitted to AIG and appended to the Darwin final report will contain summaries of modelling outputs and methodologies as evidence that the work was completed, but these outputs are not currently in a form that is possible to share.

9.   Risk Management

No additional risks have arisen during the reporting period. As described in Section 10, the major impact on this project has been from changes in the employment status of the Project Leader which has severely limited capacity to complete key outputs. This risk was described in the first annual report and was not envisaged during project design. We have taken several steps to resolve it, including recruitment of a replacement and extending the project timeline (with Darwin approval) to reflect unforeseen time and capacity constraints.

10.   Other comments on progress not covered elsewhere

As detailed in first annual report and subsequent change requests approved by Darwin, this project has been impacted by ongoing staffing issues caused by the project leader's move to a permanent faulty position in Y1 and the difficulty in finding a replacement with a similar skillset. Following a lengthy recruitment process, a replacement (Dr Lilian Poggio Colman) was appointed to deliver the outputs of two Darwin-funded projects that the Project Leader was either leading or managing (DPLUS113). Dr Colman has successfully delivered the technology review aspects (Output 3) of the current project to a higher level than originally planned (see Section 3); however much of her time has been devoted to familiarising herself with and working on the second project, which is more aligned with her skillset. Consequently, we have failed to effectively resource the key numerical modelling outputs of this project (Output 2). We have discussed these issues with the Darwin Secretariat and have agreed that the only practical course of action is for the Project Leader to personally commit some time to finalising the remaining analyses once teaching and other work commitments subside at the end of the spring semester. A six month no-cost extension has been approved by Darwin to provide the necessary time for this work to be completed.

11.   Sustainability and legacy

The project's original exit strategy remains valid and achievable. The streamlined protocol developed through the project will form the basis for all future marine turtle monitoring on Ascension Island, ensuring the continuity of this important dataset as it adapts to shifting priorities and resource constraints in the Territory. While it is not possible to predict how local capacity might change in the longer-term, by rationalising the Ascension Island Marine Turtle Monitoring Programme and demonstrating efficiency in achieving its monitoring objectives, the project aims to maintain support for the programme through future changes in leadership at AIG. As discussed in Section 3, an interim streamlined protocol has already been adopted by AIG based on preliminary analyses and is already delivering efficiency savings. This protocol will be further refined and rationalised during the remaining modelling steps, providing a robust, quantitative basis for future monitoring activities.

12.   Darwin Plus identity

Darwin Plus funding was acknowledge on introductory material and outputs relating to the *'Future technologies for large-scale monitoring of marine turtle nesting populations'* workshop held at the International Sea Turtle Symposium in Colombia (see Annex 1).

13.   Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	No
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	Yes (Dr Sam Weber, ████████████████)
Has the focal point attended any formal training in the last 12 months?	Yes (Diversity and Inclusion in higher education, Feb 2022).
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 50% (1) Planned: 0% (0)
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? This project has a very small number of core staff involved and has not raised any safeguarding issues or opportunities for learning.	
Does the project have any developments or activities planned around Safeguarding in the coming 12 months? If so please specify.	

14. Project expenditure

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

Project spend (indicative) in this financial year	2022/23 D+ Grant (£)	2022/23 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL	33,815.00	31,289.76		

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

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

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

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 2021 - March 2022	Actions required/planned for next period
Impact Ascension Island continues to generate reliable green turtle population estimates that contribute to global and regional status assessments while freeing up limiting resources for practical conservation action and applied research.		The project has produced an updated status assessment and population estimate for the Ascension Island green turtle colony, which has been shared locally and with global databases. Simulation-based modelling of future population trends from this starting point will enable the development of streamlined monitoring protocols.	
Outcome Ascension Island Government adopts a streamlined green turtle monitoring protocol that achieves clearly defined monitoring objectives while better reflecting local capacity constraints.	0.1. By **the end of the project,** a streamlined monitoring protocol is adopted by Ascension Island Government resulting in a reduction in total time allocated to monitoring. 0.2. Methodology used to rationalize the AIMTMP is published in the peer-reviewed literature.	Limited further progress has been made towards achieving outcome level indicators during Y2 due to substantial staffing issues described in Section 10. A 6 month no-cost extension has been granted by Darwin to complete the remaining work.	• Simulate future green turtle nesting data using observed time series as a starting point. • Compare ability of alternative monitoring schemes to detect simulated trends and identify most parsimonious design.
Output 1. The status of the Ascension Island green turtle nesting population is updated and population estimates are made widely available.	1.1 By **Q1 of Y2,** a re-analysis of the 42-year nesting time series presenting up-to-date trends and population estimates is published in the peer-reviewed literature. 1.2 By **Q1 of Y2,** population data are submitted to the State of the World Turtles (SWOT) online repository.	This output was largely completed during Y1. Green turtle nesting data for the period 1978-2022 has been analysed to generate an updated status assessment and results deposited in the SWOT online repository (www.seaturtlestatus.org) and AIG Marine Turtle Monitoring Database (see Annual Report 1 for evidence). As described in Section 3, the project team feel that it would be more beneficial to delay publication of the updated status assessment in the peer-reviewed literature until an overdue full island census can be completed in 2023/24. This is necessary to correct for any recent shifts in the distribution of nesting activity and would likely be requested by reviewers anyway. However, a report containing the updated status has been provided to AIG as evidence of completion (see Annual Report 1).	

Project summary	SMART Indicators	Progress and Achievements April 2021 - March 2022	Actions required/planned for next period
Activity 1.1 Reanalyse all existing marine turtle monitoring data for Ascension Island using Bayesian state-space models.		Re-analysis of monitoring data has been completed.	No further work required.
Activity 1.2. Prepare an updated status assessment for the Ascension Island Green Turtle for publication in the peer-reviewed literature.		Results of status assessment completed.	Incorporate results into final project report.
Output 2. The efficiency of alternative monitoring protocols is evaluated through simulation-based modelling.	2.1 By **Q4 of Y2**, at least six alternative monitoring designs are evaluated for resource efficiency versus statistical power to detect trends.	Limited progress has been made on this Output in Y2 for reasons explained in Section 10. However basic software tools required for the analysis have been written, including code to generate alternative sampling designs and to simulate nest counts around the seasonal mean curve. These tools are not currently in a form that can be readily shared as evidence, but we ultimately plan to make them available online via the GitHub code repository with a summary in the final report submitted to AIG.	
Activity 2.1. Using the current population estimate as a starting point, simulate future marine turtle nesting data assuming a range of long-term trends.		Initial simulations have been run but require refinement to properly capture autocorrelated natural variability in nesting numbers.	Refine methods and simulate future nesting data assuming either a stable population size or varying rates of exponential decline.
Activity 2.2. Assess the power of alternative sampling regimes to detect simulated trends using Bayesian state-space models.		A simplified analysis has been written assessing how accuracy of estimated nest counts for a single nesting beach/year varies as a function of monitoring effort.	Upscale analysis to integrate observation errors for multiple beaches and across years to assess power to detect simulated trends.
Activity 2.3. Carry out a cost-benefit analysis of alternative monitoring protocols by comparing statistical power versus person-hours required to implement them.		No progress to report.	Carry out cost benefit analysis.
Activity 2.4. Gather data on person hours currently expended on green turtle monitoring under the existing protocol at different points in the nesting season.		Estimates of monitoring effort collected by Ascension Island Government.	Continue to collect effort data wherever feasible.
Activity 2.5. Report methodology used for streamlining the Ascension Island Marine Turtle Monitoring Programme for publication in the peer-reviewed literature.		No progress to report.	Write up results of the streamlining analysis once results are available.
Output 3. Novel technologies that may one day supplement or replace existing monitoring methods are reviewed and assessed for suitability and field readiness.	3.1 A desk-based literature review is shared with Ascension Island Government by **Q4 of Y2**. 3.2 Remote workshop on future monitoring techniques for high	A workshop on '*Future technologies for large-scale monitoring of marine turtle nesting populations*' was hosted at the 41st International Sea Turtle Symposium in Cartagena, Columbia in March 2023 (Q4 Y2). The workshop was attended by >**50 people** from **20 countries**, including working at major nesting populations in Costa Rica, Guinea Bissau & USA (see Appendices 1 & 2 and symposium programme at https://www.ists41cartagena.org/program/workshops-meetings/). The outcome of expert discussions from the workshop are currently being	

Project summary	SMART Indicators	Progress and Achievements April 2021 - March 2022	Actions required/planned for next period
	density turtle nesting populations is held in **Q4 of Y2** and attended by representatives from at least **4 globally-important colonies.**	synthesised with a review of published examples in the literature to develop a bespoke "Technology Roadmap" for AIG.	
3.1 Undertake a structured literature review of new or emerging methods for marine turtle population monitoring.		Preliminary review conducted in preparation for the ISTS stakeholder workshop but not yet available to share.	Finish writing literature review.
3.2 Host an online workshop/webinar focussing on the application of new technologies for monitoring high density turtle nesting populations.		Workshop hosted in person at the 41st International Sea Turtle Symposium (see Appendix 1)	Finish synthesising workshop key themes and recommendations.
3.3 Collate findings and conclusions of (3.1) and (3.2) into a Technology Roadmap for the AIMTMP.		Both key elements (3.1 & 3.2) have been completed but require synthesising and polishing into final report of Ascension-specific recommendations.	Finish synthesising 3.1 and 3.2 into Technology Roadmap.

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

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
Impact: Ascension Island continues to generate reliable green turtle population estimates that contribute to global and regional status assessments while freeing up limiting resources for practical conservation action and applied research.			
Outcome: Ascension Island Government adopts a streamlined green turtle monitoring protocol that achieves clearly defined monitoring objectives while better reflecting local capacity constraints.	0.1. By **the end of the project,** a streamlined monitoring protocol is adopted by Ascension Island Government resulting in a reduction in total time allocated to monitoring. 0.2. Methodology used to rationalize the AIMTMP is published in the peer-reviewed literature.	0.1. Revised monitoring protocol incorporated into the Green Turtle Species Action Plan; green turtle nesting data and logs of person hours allocated to monitoring recorded in the AIG Marine Turtle Monitoring Database. 0.2 Published paper or in press manuscript.	0.1 Assumes that a reduced monitoring protocol can be identified that achieves an acceptable level of statistical power. Also assumes that Ascension Island Government is able to recruit conservation interns and thus has the capacity to trial the revised protocol in 2021/2022. To mitigate this risk we have included a specific budget to contribute to the T&S of interns during the 2021/2022 nesting season.
Outputs: **1.** The status of the Ascension Island green turtle nesting population is updated and population estimates are made widely available.	1.1 By **Q1 of Y2**, a re-analysis of the 42-year nesting time series presenting up-to-date trends and population estimates is published in the peer-reviewed literature. 1.2 By **Q1 of Y2**, population data are submitted to the State of the World Turtles (SWOT) online repository.	1.1 Published paper or in press manuscript; updated nesting statistics are deposited in the Ascension Island Green Turtle Monitoring database. 1.2 Data are accessible via the SWOT website.	1.1-1.2 This output is based on established methods meaning there are no important assumptions.
2. The efficiency of alternative monitoring protocols is evaluated through simulation-based modelling.	2.1 By **Q4 of Y2**, at least six alternative monitoring designs are evaluated for resource efficiency versus statistical power to detect trends.	2.1 Report shared with Ascension Island Government; Published paper or in press manuscript	2.1 Assumes that Bayesian population models applied in other taxa are compatible with green turtle nesting data from Ascension Island.

| 3. Novel technologies that may one day supplement or replace existing monitoring methods are reviewed and assessed for suitability and field readiness. | 3.1 A desk-based literature review is shared with Ascension Island Government by **Q4 of Y2**. 3.2 Remote workshop on future monitoring techniques for high density turtle nesting populations is held in **Q4 of Y2** and attended by representatives from at least **4 globally-important colonies.** | 3.1 & 3.2: Technology Roadmap shared with Ascension Island Government and published on AIG website. | 3.1 There are no important assumptions associated with this output. 3.2 Assumes that there is sufficient engagement from the marine turtle research community and that invited participants can attend remotely. Initial expressions of interest have already been obtained from researchers working in India, USA, Australia and Costa Rica. |

Activities

1.3 Reanalyse all existing marine turtle monitoring data for Ascension Island using Bayesian state-space models.

1.4 Prepare an updated status assessment for the Ascension Island Green Turtle for publication in the peer-reviewed literature.

2.1 Using the current population estimate as a starting point, simulate future marine turtle nesting data assuming a range of long-term trends.

2.2 Assess the power of alternative sampling regimes to detect simulated trends using Bayesian state-space models.

2.3 Carry out a cost-benefit analysis of alternative monitoring protocols by comparing statistical power versus person-hours required to implement them.

2.4 Gather data on person hours currently expended on green turtle monitoring under the existing protocol at different points in the nesting season.

2.5 Report methodology used for streamlining the Ascension Island Marine Turtle Monitoring Programme for publication in the peer-reviewed literature.

3.1 Undertake a structured literature review of new or emerging methods for marine turtle population monitoring.

3.2 Host an online workshop/webinar focussing on the application of new technologies for monitoring high density turtle nesting populations.

3.3 Collate findings and conclusions of (3.1) and (3.2) into a Technology Roadmap for the AIMTMP.

Annex 3: Standard Indicators

Table 1   Project Standard Indicators

DPLUS Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DPLUS Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DPLUS-C13	Persons attending the Future Technologies workshop at the International Sea Turtle Symposium	Number of webinar attendees.	People	Female (28) Male (25) International (53)	0	53	0	53	53
DPLUS-C02	Updated status assessment for the Ascension Island green turtle.	Number of new conservation or species stock assessments published	Number	Taxa (Fauna) Regional	1	0	0	1	1
DPLUS-B02	Revised monitoring protocol for the Ascension Island green turtle adopted.	Number of new/improved species management plans available and endorsed	Number	Languages (English) Typology (Monitoring)	0	0	1	0	1

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?	X
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Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	X
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
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	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	