Darwin Plus Main & Strategic: 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 2025

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Plus Project Information

Scheme (Main or Strategic)	Main
Project reference	DPLUS184
Project title	Mitigating the Impacts of Climate Change on Sea Turtle Populations
Territory(ies)	Cayman Islands
Lead Organisation	Cayman Islands Department of Environment (CIDoE)
Project partner(s)	University of Exeter
Darwin Plus grant value	£396,989
Start/end dates of project	1st April 2023 – 31st September 2026 (per approved change request – see section 14)
Reporting period (e.g. Apr 2024-Mar 2025) and number (e.g. Annual Report 1, 2)	Apr 2024 – Mar 2025
Project Leader name	Jane Hardwick / Joseph Roche Chaloner
Project website/blog/social media	@doecayman and @exetermarine (Instagram)
Report author(s) and date	Jane Hardwick, Joseph Roche Chaloner, Alejandro Prat Varela, Liliana Colman, Janice Blumenthal, Brendan Godley, Annette Broderick. 30th April 2025.

1.   Project summary

The climate is changing at an unprecedented rate, posing threats to both biodiversity and human welfare. Small islands are particularly vulnerable to climate change due to their size, isolation, and relatively simple ecosystems. Nevertheless, these very characteristics render small islands ideal models for studying and addressing climate change impacts.

The Cayman Islands are three inhabited islands located in the northwest of the Caribbean Sea (Grand Cayman, Little Cayman and Cayman Brac) (Figure 1). The islands are low lying and flat, making them extremely vulnerable to sea level rise and storm impacts. Climate change is considered one of the main threats to local biodiversity, including both terrestrial and marine ecosystems.

Sea turtle populations in the Cayman Islands are currently recovering after being driven to near-extinction by centuries of over-exploitation. Although the threat of legal take has been eliminated and illegal take reduced, turtle populations now face new threats, including coastal development and the escalating impacts of climate change.

Sea turtles are particularly vulnerable to climate change, with impacts expected to affect all their life stages. Because they exhibit temperature-dependent sex determination (TSD) – in which the sex of hatchlings is determined by the incubation temperatures – increases in temperatures are predicted to cause a significant shift toward female-biased populations. As global temperatures continue to rise, this could result in near-total feminisation of populations, threatening their long-term viability.

Higher incubation temperatures are also expected to cause reductions to hatching success. In addition, climate change is projected to increase the frequency and intensity of extreme weather events, which could cause nest inundation and loss of important nesting habitats through coastal erosion. Sea level rise poses additional threats by flooding low-lying beaches, thus reducing the nesting area available for sea turtles.

This project aims to improve understanding of climate change impacts on sea turtle populations in the Cayman Islands and explore strategies to safeguard future populations. The outputs of the project will allow quantitative assessment of potential impacts and identify mitigation options, which can be incorporated into Cayman's conservation strategies and management plans. This locally specific information is essential for informing policy decisions and galvanising action.
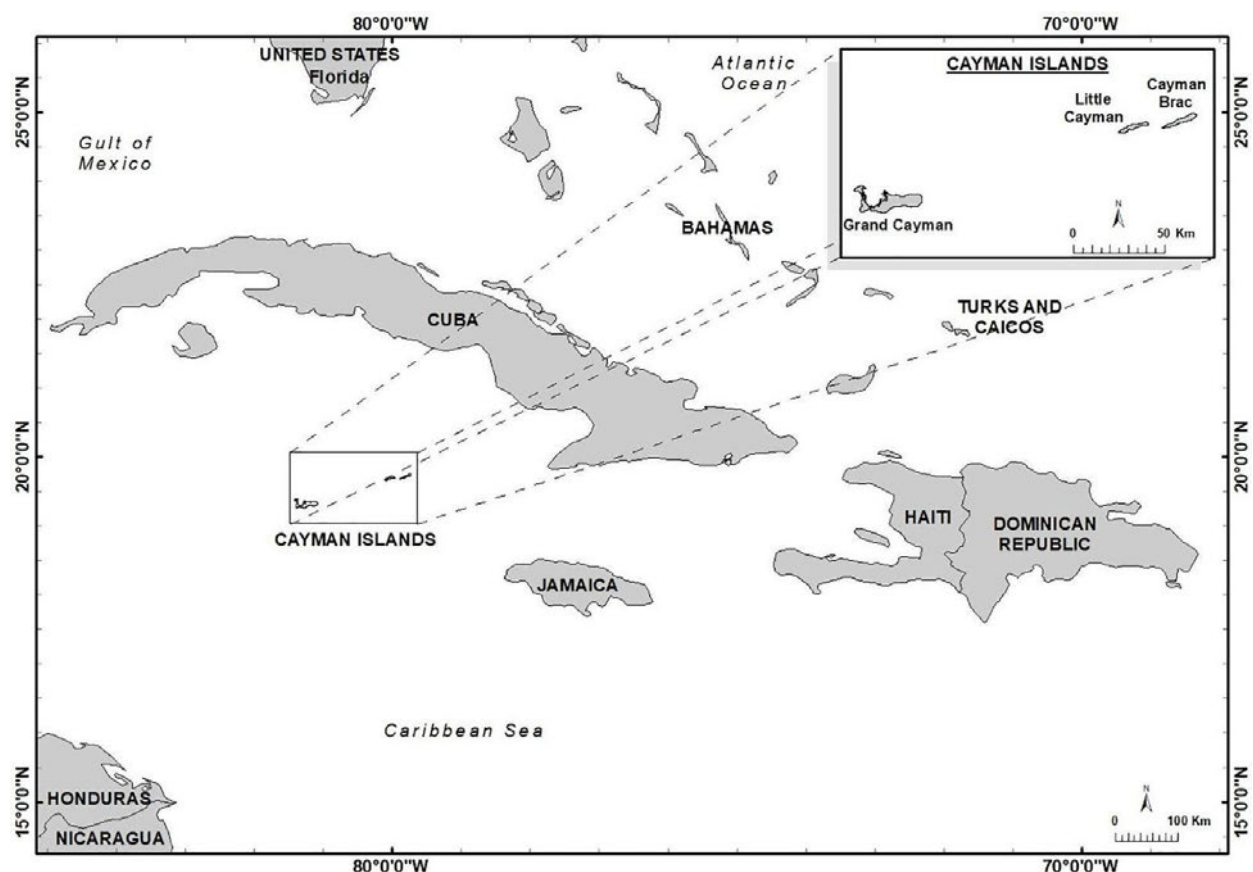
Figure 1. The location of the Cayman Islands in the Caribbean Sea.

2. Project stakeholders/partners

The project is led by the Cayman Islands Department of Environment (CIDoE) and was developed in partnership with researchers from the University of Exeter, who have over 30 years' experience in the field of sea turtle conservation. The University of Exeter team helped establish the Cayman Islands sea turtle nest monitoring programme 1998 and ongoing collaboration between CIDoE and University of Exeter has resulted in two successful previous Darwin projects. The current project builds on that long-term partnership to tackle new threats to the survival of sea turtles in the Cayman Islands.

In addition to leading research outputs, the University of Exeter provides strategic project management support and collaborates with CIDoE to ensure that research outputs are strongly

Darwin Plus Main & Strategic Annual Report Template 2025

aligned with answering key management questions. Teams are in regular contact throughout the year and the University of Exeter team visits the Cayman Islands annually for team meetings focused on designing and refining methodologies, planning activities, and assessing project progress.

In April/May 2023, Project Partners Professor Brendan Godley and Professor Annette Broderick from the University of Exeter and Project Advisor Dr. Janice Blumenthal visited the Cayman Islands to formally launch the project. Their visit included collaboratively reviewing methodologies and planning the first season of fieldwork, engaging with stakeholders, and building capacity. In September 2023, the postdoctoral researcher Dr. Liliana Colman undertook a working visit to participate in fieldwork implementation and ensure alignment between data collection protocols and analyses. In April/May 2024, the CIDoE and University of Exeter teams held a further series of collaborative working meetings in the Cayman Islands, to review initial results, guide the second season of data collection, and incorporate lessons learned from Year 1.

Throughout the first two years of the project, we actively involved stakeholders and the public. This has included engagement with other Government agencies, presenting annually to our extensive network of community volunteers, media engagements, and organising a department-wide turtle tagging and outreach event. Public turtle nest excavations have also been conducted for school groups, the public, and the Ministry of Sustainability and Climate Resiliency. We also assisted the National Trust for the Cayman Islands on the creation of a new school curriculum on climate change impacts in the Cayman Islands, featuring sea turtles as one of the case studies.

Figure 2. Dr. Liliana Colman presenting the Y1 findings at a public meeting in April 2024.

Figure 3. Dr. Jane Hardwick presenting nesting trend data for the Cayman Islands at a public meeting in April 2025.

Darwin Plus Main & Strategic Annual Report Template 2025
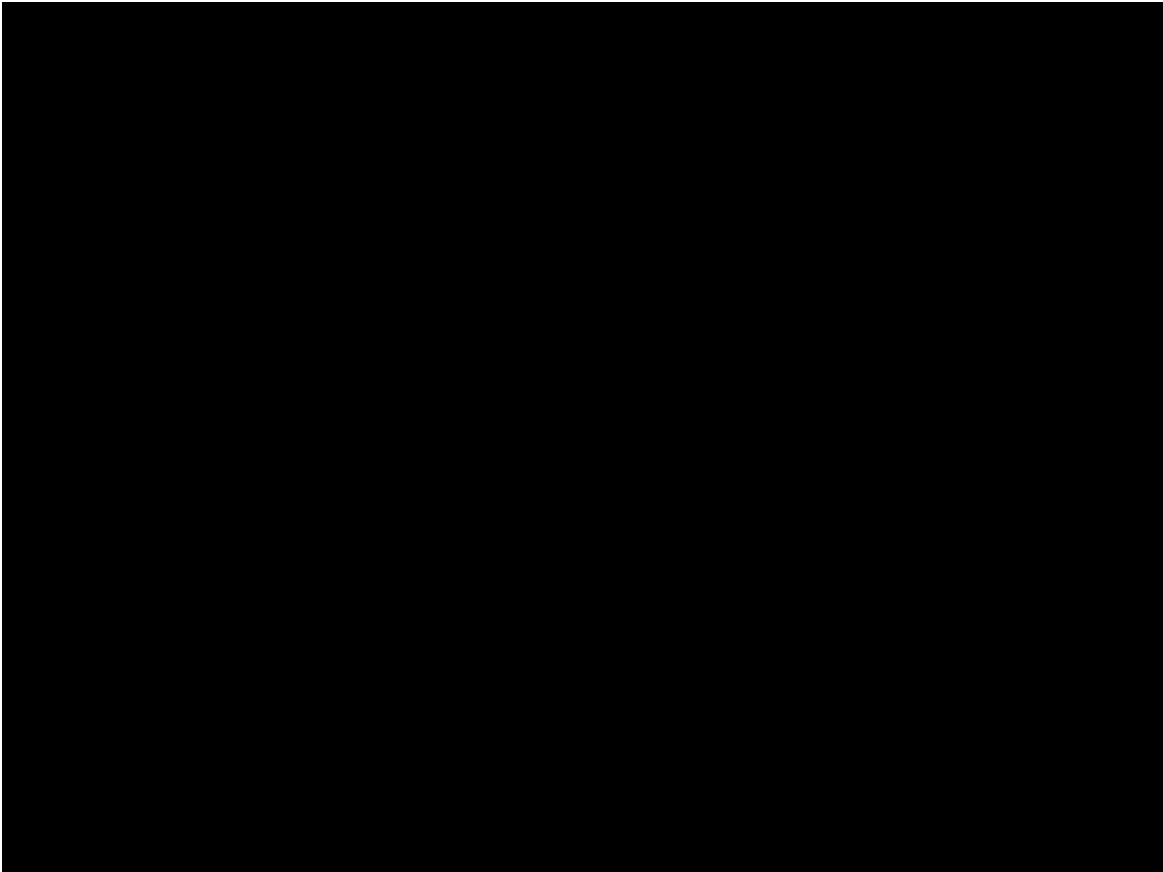
3.   Project progress

3.1   Progress in carrying out project Activities

Progress is summarised below for all activities that were scheduled for Y2 according to the agreed implementation timetable, as well as activities planned for subsequent years for which there is early progress to be reported.

Output 1: Cayman-specific predictions for climate-related turtle nesting beach loss and temperature effects on turtle nests produced and published, for use in mitigation (Output 2) and management (Output 3)

1.1. Recruitment and successful appointment of field leaders (Y1, Q1) and postdoctoral researcher (Y1, Q2) and field leaders with relevant experience

Appointment of a postdoctoral researcher was completed in Y1 Q2. Field leaders were appointed prior to field seasons, for both Y1 and Y2.

1.2. Nesting patterns over time are examined using existing GIS mapping data and nesting habitat/nest inundation rates over time are examined to identify areas of high vulnerability

A manuscript has been prepared entitled "Population Recovery and Rising Temperatures: Phenology Shifts of Sea Turtles in the Cayman Islands", presenting a 26-year analysis of nesting phenology and population trends for green and loggerhead turtles in the Cayman Islands. Over 26 years, nesting by green and loggerhead turtles in the Cayman Islands has shifted earlier in response to warmer sea surface temperatures, with green turtles also exhibiting a longer nesting season—changes likely influenced by both climate and population recovery. Understanding these phenological shifts is key for evaluating potential future responses to climate change.

Spatial analysis of nesting patterns and inundation rates is in progress to identify vulnerable nesting beaches.

1.3. DTMs created to show historic and current beach profiles and SLR will be examined and modelled to predict future climate change will impact nesting beach habitat

In both 2023 and 2024, Digital Terrain Models were constructed for four beaches that have the highest density of nesting for both green and loggerhead sea turtles. Drone flights were conducted at the beginning of each nesting season, following weather events that were likely to have had a significant impact on the beach (1 Hurricane in 2023 (Idalia) and 2 Hurricanes in 2024 (Beryl and Helene), and at the end of the nesting season. These models will inform all GIS related outputs of the project.

To construct the models, an Unmanned Aerial Vehicle (UAV) and survey-grade GPS equipment were utilised and each of the four beaches required one flight. Surveyed ground control points were collected to further enhance horizontal and vertical accuracies using a Trimble R8s GNSS receiver and Trimble TSC controller. For data processing we used Pix4D Mapper photogrammetry software to create an orthomosaic and Digital Surface Model (DSM) of each beach.

For the GIS analysis and beach elevation model production we utilised ArcGIS Pro version 3.2.2. As the end goal of this stage of the project is to create a Digital Terrain Model (bare-ground model), ArcGIS Pro was first used to remove all areas that are unsuitable to be used for DTM production such as vegetation, buildings, water, beach chairs, etc. The data was resampled to a 1m resolution raster surface and each cell was subsequently converted to a point shapefile representing the cell centre. Points were removed when at a location unsuitable for DTM production and the resulting effective area points were assigned the elevation value of the DSM at that location. Points along the shoreline at 1m intervals were added to the effective

5

area dataset. Large gaps of no data (>~250 m2) were 'filled' with a grid of points from LIDAR-derived elevation data acquired in 2021. Smaller no data gaps were filled by interpolation during the raster creation process. A triangulated irregular network (TIN) model was created to interpolate between all points and a resulting DTM at 1m resolution was created from the TIN. The DTM for each beach was then clipped to an effective area that included all possible nesting habitat within the beach system.

1.4. Historic and current records of climate and storm impacts will be examined and modelled to predict how future climate warming and increase storminess could impact hatchling sex ratios, hatch success and nest inundation/loss of nesting habitat

Hatch success has been evaluated and sex ratio estimated for the 2023 and 2024 nesting seasons and projections made for potential changes under various warming scenarios, showing a concerning trend toward increased feminisation and decreased hatch success under both "middle of the road" and extreme warming scenarios.

Analysis is ongoing to identify nesting locations least vulnerable to storm impacts and cooler beach locations.

Figure 5. Nest relocation due to beach erosion after Hurricane Helene (2024).

Output 2: Evidence-based protocols developed, trialled, and implemented to reduce nest loss due to SLR and protect populations from reduced hatch success and skewed sex ratios

2.1 Historic and current records of erosion will be examined and modelled alongside inundation and nest loss data to determine when nest relocation may be required

Identification of nesting locations most vulnerable to storm impacts is ongoing, based on drone imagery of erosion coupled with nest failure data and impact of wash over from excavations.

Darwin Plus Main & Strategic Annual Report Template 2025

2.2 Sea Turtle Nest Monitoring Protocol updated to include current relocation practises based on findings of 2.1

Data collection to support this output is ongoing and this will be completed towards the end of the project timeline.

2.3 Hatchling sex ratios are analysed using temperature logger data from at least 100 nests per season (50 C. mydas and 50 C. caretta nests) over 2 seasons

During the first two field seasons, (May to October 2023 and 2024), a total of 270 temperature loggers were placed in *in-situ* turtle nests in Grand Cayman (n = 122 for loggerhead turtle nests and n = 148 for green turtle nests), surpassing our target of 50 temperature logger nests per season for each species. Due to an extension of the project, we are now able to add a third season of data to increase the reliability of our results. Over the two seasons, a total of 49 in-nest data loggers were excluded from sex ratio analysis as they either could not be recovered (nests lost due to storms), the nest had failed to hatch, or the temperature logger itself malfunctioned.

We used the temperature within the nests, hatching size, incubation duration and hatching success to predict sex ratios, considering the known relationship between constant temperature and sex ratios derived from laboratory studies. Data from multiple beaches showed that nests in 2023 and 2024 were predicted to be producing female-skewed sex ratios for both species and there was a difference in the predicted sex ratios between the years for loggerhead turtles, but not for green turtles.

In addition to the temperature loggers within nests, 41 long term (year-round) control temperature loggers are being utilised to compare beaches and shading across the 3 islands, and twice per year, 36 additional short-term controls are added to identify any variability across sites. The long-term controls are changed over/data retrieved every 3 to 4 months.

2.4 Hatchling sex ratios are analysed alongside environment variables and climate projections to determine future scenarios

Nests with monitored temperature, and modelling with 'embryogrowth' R package, which considers past air temp and SST, allowed reconstruction of past and present parameters. We estimated current median incubation temperature at our site as well as incubation temperatures under middle-of-the road and extreme warming scenarios.

Due to significant temperature variation observed in 2023 and 2024, collecting a third season of field data in 2025 will be essential to strengthen projections and account for interannual variability.

2.5, 2.6 Nest cooling techniques are evaluated, tested, and monitored, Cayman Islands National Sea Turtle Nest Monitoring Protocol updated based on findings in 2.5

In Y3 Q1, an experiment to identify cooling effects of different shade types is being undertaken. This study will compare shading of three coastal vegetation types. Results will inform both nest management outlined in the Sea Turtle Nest Monitoring Protocols, and may also be used when updating other policy documentation to encourage planting of vegetation on nesting beaches as a method of cooling, and reducing erosion.

Output 3: Policy framework developed for coastal management and sea turtle conservation which can be used for decision-making in the Cayman Islands and as a model for other OTs

3.1 Species Action Plan for Marine Turtles updated in order to outline most vulnerable areas of the islands in terms of erosion and SLR and to provide actionable steps to protect sea turtle populations from climate change

Data collection to support this output is ongoing.

3.2 and 3.3 Meetings with and updating key stakeholders: National Conservation Council, Central Planning Authority, Development Control Board, Department of Planning, Cayman Islands Tourism Association, beachfront property owners' associations, Department of Tourism and Presentation for the Ministry of Sustainability and Climate Resiliency

Members of the National Conservation Council have attended meetings in April 2023 and April 2024, and the Ministry of Sustainability and Climate Resiliency have attended an online zoom Lunch n Learn in May 2023, and a nest excavation in November 2023. Further meetings to share the project progress with other stakeholders will take place this year.

Output 4: Results are widely shared through local and international outreach programme with sea turtles as a flagship species for sustainable coastal zone management

4.1 Production of resource packs for schools, preparation of presentation for schools and arranging school group field trips to observe how data are collected and why it is important

In Y1, we assisted with the National Trust school curriculum, which included resources on climate change, including impacts on sea turtles (a video and worksheet) which was published online in March 2024 (see Table 2).

During Y2, educational activities included 2 school presentations (October 2024 and March 2025), an educational booth at the Sea Turtle Festival at the Cayman Turtle Centre (June 2024) and 8 school nest excavations with a total of 118 students. A further 6 school group nest excavations were planned but cancelled due to inclement weather; additional events will take place in 2025.

4.2 Creation of a dedicated page on the CIDoE website, CIDoE outreach to assist with regular social media posts, leaflet production and distribution, press releases, video production, and TV and radio interviews

A radio interview (Z99) was conducted in June 2024 and produced a magazine article (WhatsHotCayman) (Table 2). The production of a CIDoE webpage is in progress.

4.3 Organising public meetings across each island each year to keep the public up to date on the research

Public outreach meetings have been held in both Grand Cayman and Little Cayman annually in April/May since the start of the project and in Cayman Brac in 2024 to present some of the previous year's findings.

4.4 Preparing research presentations at 2 international conferences

Results were presented at the 43rd International Sea Turtle Society Symposium in March 2025, with a poster titled ("*Trends in Nesting Phenology of Green and Loggerhead Turtles in the Cayman islands: A 26 Year Perspective*") and an oral presentation titled ("*Impacts of Storm Surge on Green and Loggerhead Turtle Nests on a Low-Lying Caribbean Island*") (Table 2). Further findings are planned for another conference in 2026.
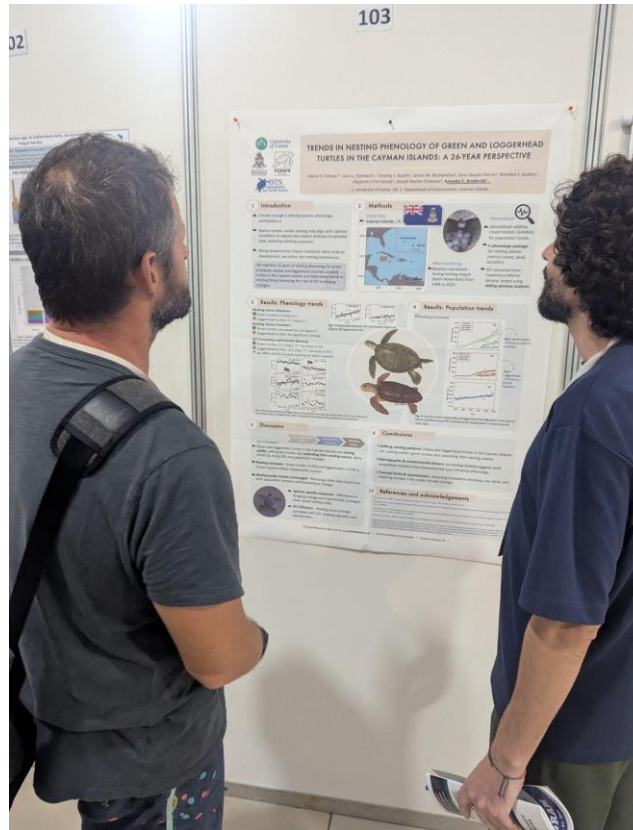
Figure 6. Poster presented at the International Sea Turtle Symposium in Ghana (March 2025)

4.5 Preparing 2 papers for submission based on research findings

The first manuscript produced under the project has been reviewed by all co-authors and is ready for submission. It reports on nesting phenology of green and loggerhead turtles in the Cayman Islands and ties in with Output 1.2 (examining nesting patterns over time). A second publication will be prepared in 2025/2026.

3.2 Progress towards project Outputs

Output 1. Cayman-specific predictions for climate-related turtle nesting beach loss and temperature effects on turtle nests produced and published, for use in mitigation (Output 2) and management (Output 3)

Work toward this output is progressing according to the timeframe and we expect that it will be delivered in full. Analyses on the effects of temperature on sea turtle nests are underway, with the data collected in 2023 and 2024 fully processed. Modelling of the relationship between nest temperatures and environmental variables has also been completed with data from the first two field seasons; data collection for the third field season will begin in May 2025. Cayman-specific predictions for climate-related turtle nesting beach loss are also well underway, based on collection of drone imagery during the 2023 and 2024 nesting seasons and a planned third season in 2025.

Output 2. Evidence-based protocols developed, trialled, and implemented to reduce nest loss due to SLR and protect populations from reduced hatch success and skewed sex ratios.

In 2023 and 2024, we conducted data collection specifically aimed at informing evidence-based protocols. Data from these two seasons were analyzed, presented, and discussed during the April 2025 Steering Group Meetings. Based on these discussions, the following actions were agreed:

- Collect third season of temperature data in 2025, including green and loggerhead turtle nests, long-term controls, and short-term controls, with particular attention to assessing the effect of natural vegetation type on sand temperature and hatch success, and identifying potential key "refugia" for the in-situ protection or relocation of nests.
- Given significant inter-annual temperature variation, analyse three seasons of nesting data to determine the critical thresholds above which interventions are required
- Monitor temperature under various conditions for nests which must be relocated due to storm activity
- Conduct an experiment with temperature loggers to determine cooling effects of different vegetation types, so these can be recommended in DoE planning reviews and/or policy documentation.

These decisions were made with careful consideration of the ethical implications of intervening in a small, recovering population. Any interventions must be guided by robust evidence and a clear understanding of potential unintended consequences.

Output 3. Policy framework developed for coastal management and sea turtle conservation which can be used for decision-making in the Cayman Islands and as a model for other OTs

Work is on track to produce results for policy development.

Output 4. Results are widely shared through local and international outreach programme with sea turtles as a flagship species for sustainable coastal zone management

The majority of research results are preliminary stages and therefore too early to be shared; however, we have worked to raise local interest and ownership of the project through engagement of stakeholders, the public, and volunteers.

3.3 Progress towards the project Outcome

Outcome: *Cayman Islands' turtles are safeguarded from habitat loss, skewed sex ratios, and reduced hatch success in the face of climate change, and serve as a flagship for enhanced coastal management*

Progress toward the project outcome is on track as we successfully appointed project staff, completed the first two seasons of data collection, and carried out initial analyses. This, in concert with the CIDoE's experience in public consultation, will facilitate safeguarding of the Cayman Islands sea turtle populations through evidence-based management efforts.

3.4 Monitoring of assumptions

Data loggers are deployed and sufficient high-quality field data is collected to allow mapping and modelling

We anticipate exceeding our project target of collecting temperature logger data from 200 green and loggerhead turtle nests. Collection and processing of drone data for Digital Terrain Models has also proceeded on schedule.

Cayman Islands government decision-makers are willing to incorporate results into national policy
The applicant organisation (CIDoE) is directly responsible for the development of Sea Turtle Nest Monitoring Protocols and drafts conservation plans and reviews coastal development applications to assess environmental impacts under delegated authority from the Cayman Islands National Conservation Council.

No major disruption occurs during data collection, e.g., hurricanes that may impact biology and logistics

10

Each year, storms have resulted in the loss of a small proportion of temperature loggers. While the potential remains for future storms to significantly impact the project, most loggers have been retrieved to date and important data have been obtained on the impact of tropical storms and hurricanes on incubation temperature and habitat loss – an important consideration in the face of increasingly frequent and severe extreme weather events.

A suitable candidate with experience needed for climate modelling applies and is available for the duration of the project
A highly-qualified candidate was recruited and began work on the project as scheduled.

Historic climate data and SLR data are obtained
We have obtained historic climate data from the Cayman Islands National weather service as well as sea surface temperatures and SLR data from NOAA and will be sourcing publicly available international data.

Non-lethal indirect methods of estimating sex ratios and modeling future nest temperatures are sufficiently robust
Based on literature, these models are suitable for estimating hatchling sex ratios.

A large enough sample size is obtained to infer accurate sea turtle sex ratios for the Cayman Islands
Based on nest counts in recent years and the results of the first field season, the desired sample size should be obtained by the end of the project.

Effective interventions are identified which are viable under local conditions and within the current capacity of the CIDoE
We will prioritise strategies which require minimum intervention and maximal dividend per unit resource. The project has a strong educational component which will allow collaboration with beachfront property owners on low-cost strategies e.g. maintenance of native vegetation.

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

Sea turtles in the Cayman Islands continue to face significant threats from habitat loss due to coastal development and the emerging impacts of climate change.

The urgency of addressing these threats has been highlighted in the recent CEFAS/UKCEH Climate Change Risk Assessment for the Cayman Islands and in the Cayman Islands Climate Change Policy 2024-2050, both of which identify "disruption of turtle distribution and population dynamics" as one of the top three highest-rated climate change risks to the territory.

To date, the project has made substantial progress in collecting management-relevant data, including evaluating the effects of storms on critical turtle nesting beaches and determining sex ratios and hatch success for turtle nests during two nesting seasons.
These data will allow for the development of evidence-based protocols to mitigate the impacts of climate change on sea turtle populations and will be instrumental in the drafting of future management plans.

This work directly supports the implementation of strategic actions outlined in the Climate Change Policy, which prioritises the adoption of Conservation Plans for protected species impacted by climate change, particularly sea turtles.

The project also supports the UK and the Cayman Islands Government in meeting commitments under the Cayman Islands Environmental Charter, Multilateral Environmental Agreements, Global Goals for Sustainable Development, and the Convention on Biological Diversity.

5. Gender Equality and Social Inclusion (GESI)

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

The CIDoE and UoE have demonstrated commitment to gender equality and social inclusion in our collaborative efforts. Notably, the Director of the Department of Environment, CIDoE and University of Exeter Project Leaders, and post-doctoral researcher are female.

The project is led by the UK Overseas Territory partner, ensuring that it is designed to meet the specific needs identified by the Cayman Islands Government and that decisions are made based on local experience and priorities.

The lead partner organisation's adherence to the Gender Equality Law of 2011 ensures fair recruitment practices and equal remuneration for employees of all genders. The University of Exeter's awards, such as the Athena Swan Silver Award and Race Equality Charter Bronze award, underscore their commitment to equality and being an equal opportunities employer.

Our efforts have included a focus on ensuring a diverse and inclusive interview process, with the recruitment of a postdoctoral researcher and three overseas field staff from middle-income Latin American countries, maintaining a gender balance of 3 females and 1 male. Additionally, efforts have been directed towards building capacity among Caymanians, including Department of Environment staff, interns, and volunteers.

Recognizing the importance of incorporating diverse perspectives in addressing climate change, we prioritise the inclusion of women and citizens of small island nations. By embracing these perspectives, we aim to ensure that our climate solutions are inclusive, equitable, and sustainable. Our commitment to inclusive engagement will persist in the advanced phases of the project, which will focus on consultation, outreach and policy development

6. Monitoring and evaluation

Monitoring is through team meetings of fieldwork staff held regularly during the fieldwork season, regular email contact between CIDoE and University of Exeter, steering group meetings held remotely, and in-person meetings at the beginning of the project (April 2023) and the beginning of Y2 (April 2024) and year 3 (April 2025). Additionally, the Post-Doctoral Researcher visited the Cayman Islands in October 2023, facilitating her knowledge of

the project environment, communication among the partners, and planning for data collection and analysis.

A number of key indicators show progress of the project: these include the appointment of key staff, completion of the first two field seasons (with associated metrics such as number of temperature loggers deployed), completion of initial analyses, and presentation of results. All of these have been outlined in the logical framework, which has allowed us to assess how the project is progressing.

The project has involved an initial phase intensive data collection, with more extensive stakeholder consultation and public education scheduled to take place in subsequent reporting periods.

Results from the project will be incorporated into CIDoE protocols and the Cayman Islands legal framework, ensuring that knowledge gained during the course of the project contributes to the project outcome.

7.   Lessons learnt

To date, the project has progressed mostly as planned. However, several operational challenges were encountered and addressed.

For nests containing temperature loggers, important variables, including clutch size, distance from the high-water mark, and shading, have also been analysed using the two-year data set. Shading has been found to be a complex variable, as both the type and amount of shading varied between nests. To better characterize shading for nests with temperature loggers, photographs will be used to classify both the degree of shading and the plant species providing the shade, making the project stronger.

We also encountered unexpected issues with some TinyTag temperature loggers, where battery corrosion occurred over the winter period as a result of long-term field deployment (approximately six months) in the sand. TinyTag replaced the affected units and provided service kits to enable battery changes for the remaining loggers. As a precautionary measure, we have adjusted our protocol to reduce the duration that control loggers are left in situ before replacement, minimizing the risk of future data loss. These issues did not impact overall data collection for the reporting period.

High storm activity during the 2024 nesting season led to the loss of 4 nests containing temperature loggers due to storm surge and erosion. In addition, 6 nests with temperature loggers failed to hatch due to inundation and 4 long term control sand temperature loggers were displaced/lost and later replaced following storm events. Although nest loss is unfortunate, the data gathered from this season will be important for informing future management decisions.

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

The review of last year's Annual Report requested that we report on how Hurricane Beryl (July 2024) affected the project in this year's report. We address this in Section 9: Risk Management.

9.   Risk Management

In our project application, we identified hurricanes and tropical storms as a likely threat with potentially major impacts. We anticipated that such events might delay field activities but noted that fieldwork would resume afterward. While such events may impact the project, one of our key objectives is to capture the impacts of extreme weather events, providing valuable data on habitat change and clutch loss or inundation. Storm activity experienced thus far during the project has highlighted this anticipated risk and benefit.

During the 2024 nesting season, high storm activity resulted in the failure (0% hatch) of 5 loggerhead nests and 1 green turtle nest with temperature loggers due to inundation, so data from these were unusable. Two additional loggerhead nests and two green turtle nests with temperature loggers were lost completely (washed away) due to beach erosion.

Four long term control sand temperature loggers were also lost in storms, but later replaced.

Storm activity also impacted school group excavations, leading to cancelation of 6 planned events.

To assess the impacts of storms on nesting habitat, drone surveys were conducted shortly after Hurricane Beryl and Helene, across all four focus beaches. Digital Terrain Models (DTMs) were successfully constructed from these post-storm flights, providing detailed imagery of beach changes. This imagery, combined with nest failure data, will guide updates to nest management and relocation protocols in future seasons.

10.   Scalability and durability

The sustainability and legacy of the project will be ensured through stakeholder engagement, capacity building, and using project results to inform government policies.

- **Capacity Building and Training**: CIDoE staff and local research assistants have been trained to collect nest temperature data, ensuring capacity is created for long-term monitoring efforts.

- **Policy Updates and Integration**: When research efforts are complete, relevant policy documents and protocols will be updated to include actionable steps for protecting sea turtles from the impacts of climate change, in line with obligations outlined in the project application and the Cayman Islands Climate Change Policy.

- **Stakeholder Engagement**: We will continue to engage key governmental and non-governmental stakeholders to collaboratively integrate sea turtle climate change concerns into broader coastal development planning. Consultations have already begun but will increase as results become available for discussion.

- **Public Engagement and Awareness**: Throughout the project, the public will be involved and consulted. Public engagement, particularly with young people, will foster a commitment to sea turtle conservation in particular and sustainable coastal management in general, and be integral to the project's continued success.

11.   Darwin Plus identity

The Darwin Plus is recognised as supporting a clear and cohesive project, evaluating and mitigating the impacts of climate change on sea turtle populations in the Cayman Islands, within the context of the successful CIDoE sea turtle monitoring program.

The Cayman Islands public is likely to be familiar with the Darwin Initiative due to other projects taking place here. We aim to continue to raise the profile locally and internationally through the duration of the project, by recognising that the project was funded by the UK government through the Darwin Plus, and using the logo in all associated materials.

Darwin Plus Main & Strategic Annual Report Template 2025

12. Safeguarding
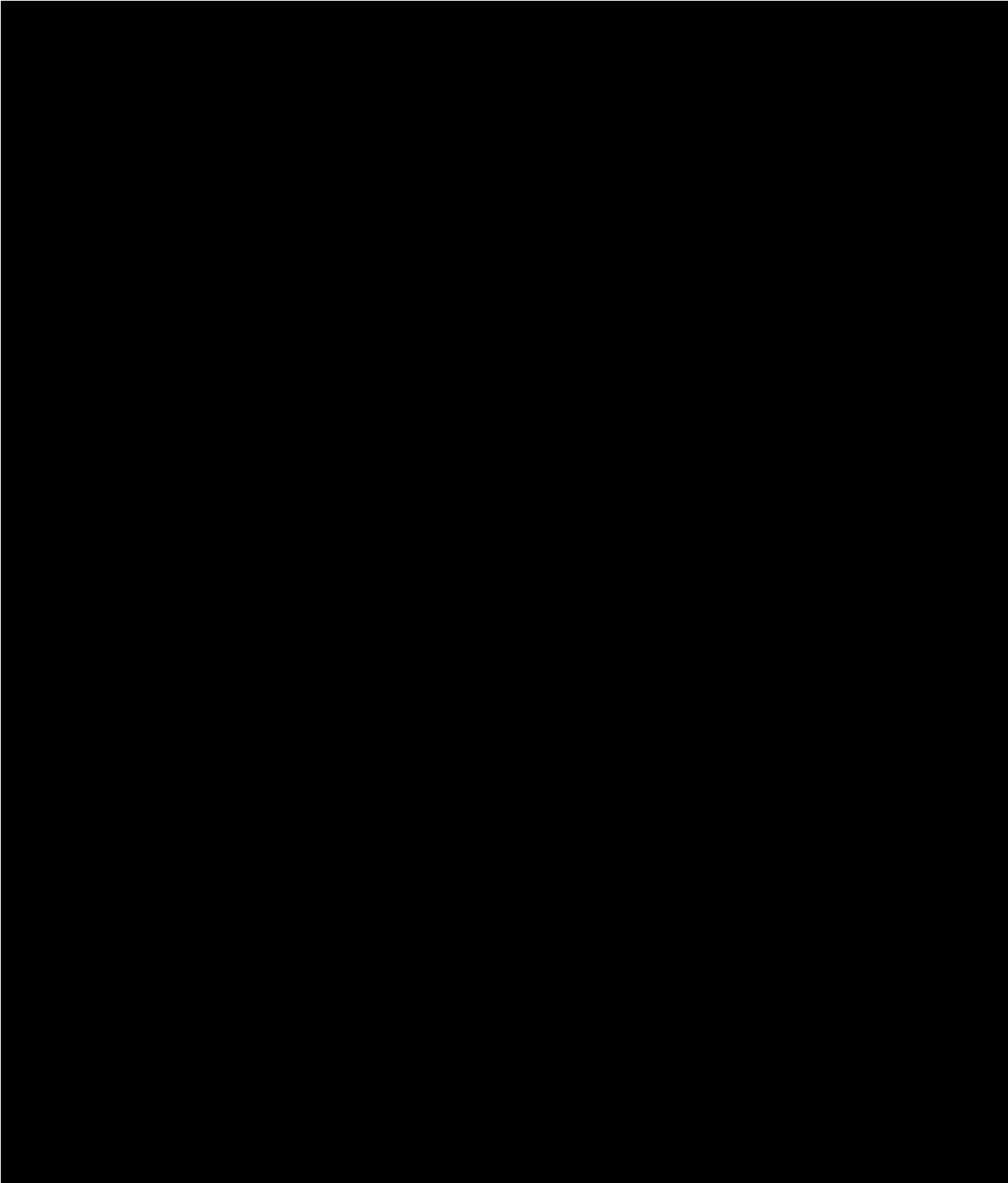
13. Project expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2024 – 31 March 2025)

Project spend (indicative) in this financial year	2024/25 D+ Grant (£)	2024/25 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	143,324	143,324		

Table 2: Project mobilised or matched funding during the reporting period (1 April 2024 – 31 March 2025)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)	■■■■■■	■■■■■■	University of Exeter and Cayman Islands Department of Environment
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

14. Other comments on progress not covered elsewhere

A six-month project extension was approved to accommodate maternity leave for the postdoctoral researcher, with deadlines adjusted for the deliverables she was involved in to allow for completion of all planned work.

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 to edit and use the following for various promotional purposes (please leave this line in to indicate your agreement to use any material you provide here).

The Darwin Plus Project *Mitigating the Impacts of Climate Change on Sea Turtle Populations* has brought together the Cayman Islands Department of Environment (DoE) and the University of Exeter in a collaboration which builds on the DoE's 28 years of experience in local sea turtle nesting beach monitoring and the University of Exeter's expertise in evaluating the effects of climate change on marine turtles.

A key achievement of the project to date has been the successful deployment of 270 temperature loggers in sea turtle nests in the Cayman Islands. These loggers record sand temperature during incubation — a critical factor, as sea turtle sex is determined by temperature. Warmer nests produce mostly female hatchlings, and with global temperatures rising, that balance is starting to shift. Early results from the Cayman Islands already show a strong female bias, especially for green turtles, raising concerns about the long-term stability of turtle populations if males become increasingly rare.

In addition to studying temperature effects, the team also carried out high-resolution 3D mapping of key nesting beaches to better understand threats posed by coastal erosion and storms. These surveys show how beach profiles change over the nesting season and after major storms, providing new insight into the impact of sea level rise and increasingly intense weather.

Going forward, the project team will continue collecting field data, finalize their analyses, and begin developing evidence-based management strategies aimed at supporting the resilience of sea turtle populations and ensuring sustainable management of coastal habitats in the face of climate change.

File Type (Image / Video / Graphic)	File Name or File Location	Caption including description, country and credit	Social media accounts and websites to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
Image	Nesting Green Turtle	Researcher Alejandro Prat-Varela places a TinyTag temperature logger into a green turtle nest in the Cayman Islands. Credit: Cayman Islands Government	@doecayman @exetermarine	Yes
Image	TinyTag Loggers Ready	TinyTag temperature loggers set up and ready to deploy into turtle nests in the Cayman Islands. Credit: Cayman Islands Government	@doecayman @exetermarine	Yes

Annex 1: Report of progress and achievements against logframe for Financial Year 2024-2025

Project summary	Progress and Achievements April 2024 - March 2025	Actions required/planned for next period
Impact Mitigation of climate change impacts on sea turtle nesting populations in the Cayman Islands		████████████
Outcome Cayman Islands' turtles are safeguarded from habitat loss, skewed sex ratios, and reduced hatch success in the face of climate change, and serve as a flagship for enhanced coastal management		
Outcome indicator 0.1 Baseline data collected and mapping and modeling completed to produce an evidence-based assessment of the effects of climate change on sea turtle nesting habitat availability, sex ratio, and hatch success in the Cayman Islands, including vulnerable areas and high priority beaches for protection **(Y4 Q1 – this date and others formatted in bold were modified via our approved change request)**.	The project is currently in the data collection phase and therefore it is relatively early to report against outcome level indicators. However, Y1 and Y2 fieldwork and initial mapping and modelling has set a firm foundation.	Data collection and analysis will continue in Y3.
Outcome indicator 0.2 National Sea Turtle Nest Monitoring Protocols include tested Cayman-specific methods to mitigate climate threats **(Y4 Q1)**, resulting in hatch success maintained above 65% and sex ratio stabilised at ±10% of the baseline identified through the project or at an optimal level determined through modeling **(Y3 Q4)**.	Given the significant inter-annual variability in temperatures and the vulnerability of small populations to inappropriate interventions, ongoing monitoring, analysis, and discussions will be necessary to assess the appropriateness of these thresholds and to determine the appropriate actions that may need to be taken or recommended in response.	Data collection and analysis will continue in Y3
Outcome indicator 0.3 Through a consultative process, the Cayman Islands Species Action Plan for Marine Turtles and other key turtle conservation and climate change policy documents are updated with actionable steps for the protection of Cayman Islands sea turtle populations from climate impacts **(Y4 Q1)**.	Work toward policy outcomes will commence once fieldwork and analysis have been completed	Via stakeholder engagement and collection of robust scientific data, we are setting a strong foundation for future policy making and management efforts.
Output 1. Cayman-specific predictions for climate-related turtle nesting beach loss and temperature effects on turtle nests produced and published, for use in mitigation (Output 2) and management (Output 3)		
Output indicator 1.1 3D DTMs produced, including estimated proportion of nests inundated/lost under various sea level rise	Digital Terrain Models (3D DTMs) have been created for key green and loggerhead turtle nesting beaches in Grand	In May 2025, we will commence collection of drone footage for Y3 of the project.

(SLR) scenarios and increased storm activity/beach erosion, safe and vulnerable locations, and key habitats for protection (Y2 Q2).	Cayman, to be used in mapping and modelling efforts in the next phase of the project; this work will continue in 2025.	
Output indicator 1.2 Baseline hatchling sex ratios determined for the three islands across a selection of beaches **(Y3 Q4).**	Sex ratios have been estimated for both species for the 2023 and 2024 nesting seasons and further fieldwork will be conducted during 2025	Deployment of temperatures during the 2025 nesting season, continued analysis and modelling.
Output indicator 1.3 Models produced to predict how climate change scenarios may impact sex ratios and hatching success as well as to estimate optimal nest incubation temperatures to ensure population persistence **(Y4 Q1).**	Based on Y1 and Y2 results, preliminary climate change scenario models have been developed and will be refined as additional data are collected.	Data collection and analysis will continue in Y3
Output indicator 1.4 An evaluation is produced of observed and predicted phenological and location shifts for turtle nesting, along with their consequences for mitigation and management (e.g. areas of beach/land for protection as refugia or male- producing beaches) (Y3 Q2).	Analysis of 26 years of data on nesting phenology and population trends is complete and a manuscript is ready for submission	Future analyses will investigate spatial distribution of nesting and vulnerability to inundation and identify potential refugia
Output 2. Evidence-based protocols developed, trialled, and implemented to reduce nest loss due to SLR and protect populations from reduced hatch success and skewed sex ratios		
Output indicator 2.1. As appropriate, at least two robust practical adaptation measures are developed to reduce nest loss and maintain appropriate nest temperature: these may include interventions such as relocation of nests from vulnerable beaches or manipulation of incubation temperatures via planting native vegetation, artificial shading or water sprinklers (Y3, Q3). Choice will be based on preliminary results from season 1 and further informed by season 2.	In Y3 Q1 an experiment using 3 different natural shade types will be undertaken to determine their effects on sand temperatures.	Conduct a detailed analysis of shading to identify potential natural refugia
Output indicator 2.2. Cayman Islands National Nesting Beach Monitoring Protocols are updated and Sea Turtle Climate Change Monitoring and Mitigation Protocols are created to include practical adaptation measures (e.g. criteria for nest relocation or shading of nests or indicators of when these interventions would be necessary in the future) **(Y4 Q2).**	Y1 and Y2 data collection is complete and Y3 data collection has begun; therefore, we are on track to complete these protocols by the end of the project.	Complete Y3 data collection and analysis.
Output indicator 2.3 Protocols are implemented, ensuring that hatch success remains above 65%, and sex ratios are maintained	Scheduled for Y4 (Q2)	Complete Y3 data collection and analysis.

at ±10% of the baseline identified through the project or at optimal levels based on population modelling **(Y4 Q2).**		
Output 3. Policy framework developed for coastal management and sea turtle conservation which can be used for decision-making in the Cayman Islands and as a model for other OTs.		
Output indicator 3.1 Consultation and engagement has taken place with key stakeholders and government decision-makers: National Conservation Council, Ministry of Sustainability and Climate Resiliency, Central Planning Authority, Development Control Board, Department of Planning, beachfront property owners' associations, Department of Tourism, including meetings in Y1, Q1, Y2, Q2 and Y3, Q4.	To date, meetings have taken place with various stakeholders and we have engaged with the public, beachfront property owners and community volunteers. More extensive consultation is planned once initial data collection is complete, to guide management planning and implementation.	Schedule meetings with stakeholder groups that have not yet been consulted.
Output indicator 3.2 Cayman Islands Species Action Plan for Marine Turtles updated to include actionable steps to protect sea turtles from loss of nesting habitat and other impacts of climate change **(Y4, Q1).**	Scheduled for Y4 Q1.	Complete Y3 data collection and analysis.
Output indicator 3.3 Conservation Plan and Species Action Plan for Marine Turtles, and other relevant policy documents updated **(Y4, Q2** or first statutory update of documents), enabling effective reviews of coastal development applications by the Cayman Islands Department of Environment (CIDoE) and legally binding recommendations by the Cayman Islands National Conservation Council for the protection of sea turtle critical habitat (NCC).	Scheduled for Y4 Q1 or first statutory update of document.	Complete Y3 data collection and analysis.
Output 4. Results are widely shared through local and international outreach programme with sea turtles as a flagship species for sustainable coastal zone management.		
Output indicator 4.1 School Outreach Campaign – teacher resource packs produced on sea turtles, climate change, and sustainable coastal development for primary and secondary schools (1 resource pack for primary schools (Y2 Q1), 1 resource pack for secondary school (Y2 Q1), at least 6 school presentations, at least 8 field events for schools (Y1 – 3).	In Y1, we partnered with the National Trust for the Cayman Islands to assist with creation of a new climate change curriculum for Cayman Islands schools, using sea turtles as a flagship species for sustainable coastal zone management. In Y2, 2 school presentations and 8 educational field events took place and further educational efforts will be undertaken in the next phase of the project.	Schedule additional presentations and field events in Y3

Output indicator 4.2 Media Outreach Campaign conducted to inform the public of climate-related threats to sea turtles and the necessity of sustainable coastal zone management and climate change response (Y1 – 3). At least 2 press releases per year (Y1,Q1; Y1;Q3; Y2,Q1; Y2;Q3; Y3, Q1; Y3;Q3).	There were a number of media outreach efforts undertaken, including a radio interview (Z99), a magazine article (What's Hot Cayman), and various social media posts through the nesting season.	Additional press releases and social media scheduled for Y3
Output indicator 4.3 A minimum of three public meetings (one on each island) held in Y1,Q2 to outline the aims of the project and gather public input and in Y3, Q3 to present results and gather feedback.	Meetings were carried out in Y1 and Y2 to train volunteers and inform the public about the project.	Schedule public meetings for Y3.
Output indicator 4.4 Findings presented at 2 international conferences, including a regional OT conference (estimates Y2,Q2, **Y4,Q2**), and a minimum of 2 papers will be published from the study (Y2,Q3; **Y4;Q2**).	Phenology results were presented at the 43rd International Sea Turtle Society Symposium in 2025 and a paper has been prepared for submission.	Preparation of a second manuscript

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

Project Title: Mitigating the impacts of climate change on sea turtle populations

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
Impact: Mitigation of climate change impacts on sea turtle nesting populations in the Cayman Islands (Max 30 words)			
Outcome: (Max 30 words) Cayman Islands' turtles are safeguarded from habitat loss, skewed sex ratios, and reduced hatch success in the face of climate change, and serve as a flagship for enhanced coastal management	0.1 Baseline data collected and mapping and modeling completed to produce an evidence-based assessment of the effects of climate change on sea turtle nesting habitat availability, sex ratio, and hatch success in the Cayman Islands, including vulnerable areas and high priority beaches for protection ████ **Y4 Q1** 0.2 National Sea Turtle Nest Monitoring Protocols include tested Cayman-specific methods to mitigate climate threats (████ **Y4 Q1** resulting in hatch success maintained above 65% and sex ratio stabilised at ±10% of the baseline identified through the project or at an optimal level determined through modeling ████ **Y3 Q4** 0.3 Through a consultative process, the Cayman Islands	0.1 Database of baseline data, digital terrain maps (**DTMs**) showing past and present nests, habitat loss model results and sex ratio model results 0.2 Text of National Sea Turtle Nest Monitoring protocols 0.3 Text of Cayman Islands Species Action Plan for Marine Turtles and other relevant policy documents, minutes of stakeholder and decision-maker meetings, archive of media and outreach materials on the project website.	Data loggers are deployed and sufficient high quality field data is collected to allow mapping and modelling CIDoE has an annual sea turtle monitoring programme which has been in continuous operation since 1998, minimising risks for data gathering Cayman Islands government decision-makers are willing to incorporate results into national policy The applicant organisation (CIDoE) is directly responsible for the development of Sea Turtle Nest Monitoring Protocols and drafts conservation plans and reviews coastal development applications to assess environmental impacts under delegated authority from the Cayman Islands National Conservation Council.

Project Title: Mitigating the impacts of climate change on sea turtle populations

	Species Action Plan for Marine Turtles and other key turtle conservation and climate change policy documents are updated with actionable steps for the protection of Cayman Islands sea turtle populations from climate impacts ▮▮ **Y4 Q1**		No major disruption occurs during data collection, e.g., hurricanes that may impact biology and logistics
Outputs: **1.** Cayman-specific predictions for climate-related turtle nesting beach loss and temperature effects on turtle nests produced and published, for use in mitigation (Output 2) and management (Output 3)	1.1 3D DTMs produced, including estimated proportion of nests inundated/lost under various sea level rise (**SLR**) scenarios and increased storm activity/beach erosion, safe and vulnerable locations, and key habitats for protection (Y2 Q2) 1.2 Baseline hatchling sex ratios determined for the three islands across a selection of beaches ▮▮ **Y3 Q4** 1.3 Models produced to predict how climate change scenarios may impact sex ratios and hatching success	1.1 UoE employment records for employment of post-doctoral researcher, DTM outputs and project reports/scientific papers 1.2 Temperature logger data from ~200 nests for loggerhead (*C. caretta*) and green (*C. mydas*) sea turtles, project report/scientific papers 1.3 Climate model output and project reports/ journal submission email 1.4 Model output and project reports/journal submission email	A suitable candidate with experience needed for climate modelling applies and is available for the duration of the project The project partners will advertise the position in appropriate channels for maximum visibility Historic climate data and SLR data are obtained Non-lethal indirect methods of estimating sex ratios and modeling future nest temperatures are sufficiently robust

Project Title: Mitigating the impacts of climate change on sea turtle populations

	as well as to estimate optimal nest incubation temperatures to ensure population persistence (████ **Y4 Q1** 1.4 An evaluation is produced of observed and predicted phenological and location shifts for turtle nesting, along with their consequences for mitigation and management (e.g. areas of beach/land for protection as refugia or male-producing beaches) ████ **Y3 Q4**		
2. Evidence-based protocols developed, trialled, and implemented to reduce nest loss due to SLR and protect populations from reduced hatch success and skewed sex ratios	2.1 As appropriate, at least two robust practical adaptation measures are developed to reduce nest loss and maintain appropriate nest temperature: these may include interventions such as relocation of nests from vulnerable beaches or manipulation of incubation temperatures via planting native vegetation, artificial shading or water sprinklers (Y3, Q3). Choice will be based on preliminary results from season 1 and further	2.1 Results and photographs of at least 2 practical adaptation trials 2.2 Text of updated National Sea Turtle Monitoring protocols 2.3 Monitoring results from Y3	A large enough sample size is obtained to infer accurate *C. caretta* and *C. mydas* sea turtle sex ratios for the Cayman Islands Based on recent years nest counts, the desired sample size should be obtained Effective interventions are identified which are viable under local conditions and within the current capacity of the CIDoE We will prioritize strategies which require minimum intervention and maximal dividend per unit resource. The project has a

Project Title: Mitigating the impacts of climate change on sea turtle populations

	informed by season 2. 2.2 Cayman Islands National Nesting Beach Monitoring Protocols are updated and Sea Turtle Climate Change Monitoring and Mitigation Protocols are created to include practical adaptation measures (e.g. criteria for nest relocation or shading of nests or indicators of when these interventions would be necessary in the future) ▮ **Y4 Q2** 2.3 Protocols are implemented, ensuring that hatch success remains above 65%, and sex ratios are maintained at ±10% of the baseline identified through the project or at optimal levels based on population modelling ▮ **Y4 Q2**		strong educational component which will allow collaboration with beachfront property owners on low-cost strategies e.g. maintenance of native vegetation
3. Policy framework developed for coastal management and sea turtle conservation which can be used for decision-making in the Cayman Islands and as a model for other OTs	3.1 Consultation and engagement has taken place with key stakeholders and government decision-makers: National Conservation Council, Ministry of Sustainability and Climate Resiliency, Central Planning Authority, Development	3.1 Text of Species Action Plan 3.2 Text of other relevant policy documents 3.3 Attendance register, meeting minutes and feedback forms	Policy makers are amenable to implementing change based on the outcome of the research The Cayman Islands Department of Environment is the lead partner on this project and the Ministry of Sustainability and Climate Resiliency have made it

Project Title: Mitigating the impacts of climate change on sea turtle populations

	Control Board, Department of Planning, beachfront property owners' associations, Department of Tourism, including meetings in Y1, Q1, Y2, Q2 and Y3, Q4 3.2 Cayman Islands Species Action Plan for Marine Turtles updated to include actionable steps to protect sea turtles from loss of nesting habitat and other impacts of climate change ▮▮▮ ▮▮ Y4 Q1 3.3 Conservation Plan and Species Action Plan for Marine Turtles, and other relevant policy documents updated ▮▮▮ first statutory update of Y4 Q2 documents), enabling effective reviews of coastal development applications by the Cayman Islands Department of Environment (CIDoE) and legally binding recommendations by the Cayman Islands National Conservation Council for the protection of sea turtle critical habitat (NCC)	3.3 Attendance register, meeting minutes and feedback forms 3.4 Meeting minutes	high priority to have new climate change policy implemented

Project Title: Mitigating the impacts of climate change on sea turtle populations

4. Results are widely shared through local and international outreach programme with sea turtles as a flagship species for sustainable coastal zone management	4.1 School Outreach Campaign – teacher resource packs produced on sea turtles, climate change, and sustainable coastal development for primary and secondary schools (1 resource pack for primary schools (Y2 Q1), 1 resource pack for secondary school (Y2 Q1), at least 6 school presentations, at least 8 field events for schools (Y1 – 3) 4.2 Media Outreach Campaign conducted to inform the public of climate-related threats to sea turtles and the necessity of sustainable coastal zone management and climate change response (Y1 – 3). At least 2 press releases per year (Y1,Q1; Y1;Q3; Y2,Q1; Y2;Q3; Y3, Q1; Y3;Q3) 4.3 A minimum of three public meetings (one on each island) held in Y1,Q2 to outline the aims of the project	4.1 Copies of materials, photographs, schedule of school names, year groups, presentation dates, and number of students reached (Target 500 students engaged) 4.2 Up to date project website, copies of newspaper articles (Target 12 print/online news articles), videos, leaflets, radio and TV interviews (Target 6 broadcast items), and social media posts (Target 30 substantive items across the project duration) 4.3 Minutes of public meetings (Target 6; 300 attendees), photographs, social media posts 4.4 Conference proceedings, copies of scientific publications or submission emails	Wider society, including schools are prepared to engage with the project International conferences persist, at least in online format

Project Title: Mitigating the impacts of climate change on sea turtle populations

		and gather public input and in Y3, Q3 to present results and gather feedback 4.4 Findings presented at 2 international conferences, including a regional OT **Y2 Q4** conference (estimates ██████ **Y4 Q2** and a minimum of 2 papers will be published from the study ██████████ **Y2 Q4** **Y4 Q2**		

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. Each activity should start on a new line and be no more than approximately 25 words.)

1.1. Recruitment and successful appointment of field leaders (Y1, Q1) and postdoctoral researcher (Y1, Q2) and field leaders with relevant experience

1.2. Nesting patterns over time are examined using existing GIS mapping data and nesting habitat/nest inundation rates over time are examined to identify areas of high vulnerability

1.3. DTMs created to show historic and current beach profiles and SLR will be examined and modelled to predict future climate change will impact nesting beach habitat

1.4. Historic and current records of climate and storm impacts will be examined and modelled to predict how future climate warming and increase storminess could impact hatchling sex ratios, hatch success and nest inundation/loss of nesting habitat

2.1 Historic and current records of erosion will be examined and modelled alongside inundation and nest loss data to determine when nest relocation may be required

2.2 Sea Turtle Nest Monitoring Protocol updated to include current relocation practises based on findings of 2.1

Project Title: Mitigating the impacts of climate change on sea turtle populations

2.3   Hatchling sex ratios are analysed using temperature logger data from at least 100 nests per season (50 *C. mydas* and 50 *C. caretta* nests) over 2 seasons
2.4   Hatchling sex ratios are analysed alongside environment variables and climate projections to determine future scenarios
2.5   Nest cooling techniques are evaluated, tested, and monitored
2.6   Cayman Islands National Sea Turtle Nest Monitoring Protocol updated based on findings in 2.5
3.1   Species Action Plan for Marine Turtles updated in order to outline most vulnerable areas of the islands in terms of erosion and SLR and to provide actionable steps to protect sea turtle populations from climate change
3.2   Meetings with and updating key stakeholders: National Conservation Council, Central Planning Authority, Development Control Board, Department of Planning, Cayman Islands Tourism Association, beachfront property owners' associations, Department of Tourism
3.3 Presentation for Ministry of Sustainability and Climate Resiliency
4.1 Production of resource packs for schools, preparation of presentation for schools and arranging school group field trips to observe how data are collected and why it is important
4.2 Creation of a dedicated page on the CIDoE website, CIDoE outreach to assist with regular social media posts, leaflet production and distribution, press releases, video production, and TV and radio interviews
4.3 Organising public meetings across each island each year to keep the public up to date on the research
4.4 Preparing research presentations at 2 international conferences
4.5 Preparing 2 papers for submission based on research findings

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

Please see the Standard Indicator guidance for more information on how to report in this section, including appropriate disaggregation.

DPLUS Indicator number	Name of indicator	If this links directly to a project indicator(s), please note the indicator number here	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DPLUS-A07	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated local community issues	Government Institutions	Government	Government Organisation type	1	1	1	2	3
DPLUS-C07	Number of projects contributing evidence to biodiversity conservation or associated community benefits to policy/regulation/standards consultations.	Number	People	Community/subnational/ national /international.	0	0	1	0	1
DPLUS-C15	Number of Media related activities.	Number	Number	Internet/Print/Radio/Television, and subnational/ national /international	7	6	12	13	25
DPLUS-C17	Number of unique papers submitted to peer reviewed journals	Number	Number		0	1	1	0	2
DPLUS-C19	Number of other publications produced	Number		Annual downloads, publication typology	1	3	3	0	7

Table 2 Publications

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Sea Turtles and Climate Change in Cayman (Video Resource)	YouTube Video	Bella Rooney / National Trust Cayman (2024)	Female	Caymanian	National Trust, Cayman Islands (2024)	https://www.youtube.com/watch?v=vBWoqUIgU0g
Sea Turtles and Climate Change (Worksheet)	Worksheet	Bella Rooney / National Trust Cayman (2024)	Female	Caymanian	National Trust, Cayman Islands (2024)	https://www.nationaltrust.ky/lesson/sea-turtles-and-climate-change
Impossible Journeys: The Plight of Cayman's Nesting Sea Turtles	Magazine Article	Judy Hurlston (2024)	Female	Caymanian	Cayman Islands Department of Environment (2024) and Whats Hot Cayman (Magazine) (2024)	https://doe.ky/impossible-journeys-the-plight-of-caymans-nesting-sea-turtles/

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, scheme, type of report (i.e. Annual or Final), and year) and **deleted the blue guidance text** before submission?	X
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	X
Is your report more than 10MB? If so, please consider the best way to submit. One zipped file, or a download option, is recommended. We can work with most online options and will be in touch if we have a problem accessing material. If unsure, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	X
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	X
Have you provided an updated risk register? If you have an existing risk register you should provide an updated version alongside your report. If your project was funded prior to this being a requirement, you are encourage to develop a risk register.	NA
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 15)?	X
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.	