DPLR4\1045

Darwin Plus Local - Final Report (1)

Officer: Linzi Ogden

Section 1 - Darwin Plus Local Project Information (Essential)

Project Reference Number

DPLR4\1045

Q1. Project Title

No Response

Overseas Territory(ies)

☑ Cayman Islands

Lead Organisation or Individual

Dr Gretchen Goodbody Gringley, Central Caribbean Marine Institute

Partner Organisation(s)

None

Value of Darwin Plus Local Grant Award

£49,955.00

Project Start Date

01 October 2024

Project End Date

31 March 2025

Project Leader Name

Dr Gretchen Goodbody-Gringley

Project Website/Twitter/Blog etc.

reefresearch.org

Report Author(s)

Dr Gretchen Goodbody-Gringley & Abbie Dosell

Report Date

29 April 2025

Project Summary

No Response

Project Outcomes

Checked	**Biodiversity: improving and conserving biodiversity, and slowing or reversing biodiversity loss and degradation;**
Checked	**Climate Change: responding to, mitigating and adapting to climate change and its effects on the natural environment and local communities;**
Checked	**Environmental quality: improving the condition and protection of the natural environment;**
Unchecked	**Capability and capacity building: enhancing the capacity within OTs, including through community engagement and awareness, to support the environment in the short- and long-term.**

Section 2 - Project Outcomes (Essential)

On a scale of 1 (high – outcome substantially exceeded) to 5 (low – outcome substantially did not meet expectation), how successful do you think your project has been?

⦿ 2 - Outcome moderately exceeded

Project outcomes and justification for rating above

At the beginning of October 2024 CCMI's coral nursery housed 17 colonies of Acropora cervicornis representing three unique genotypes. During this project, we have fragmented these colonies, expanding the nursery's population to 117 coral fragments. The three genotypes included successfully survived the 20 degree heating weeks that occurred during the 2023 mass bleaching and continue to demonstrate high levels of resilience. Upon commencement of the project, only a few corals of each genotype were included in the nursery, upon completion each genotype is represented by 30-45 corals in the nursery. This increase allows for more frequent genetic mixing, which is crucial for enhancing resilience against multiple environmental stressors.

Over the past six months, our team has conducted monthly monitoring visits focused on health assessments, coral growth measurements, and nursery maintenance. The health assessments consist of visually assessing the health of each fragment noting if it is healthy, pale, bleached, diseased, missing, or dead.

Not only is the total number of fragments in the nursery above the target number for this project (100), but the

health and resilience of these corals also further highlights the success of the project restoration efforts. By measuring the total linear extension (TLE) of each fragment, we have determined an average growth rate of 0.8 cm per day across all nursery corals. Furthermore, an unexpected outbreak of an unknown coral disease threatened the health of many of the corals in the nursery, however, all infected colonies showed full recovery within eight weeks. Given that CCMI's nursery supports some of the last remaining A. cervicornis around Little Cayman, consistent monitoring is critical for the preservation and restoration of this critically endangered species.

Supporting Evidence - file(s) upload

CCMI_Image1
29/04/2025
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jpg 422.67 KB

CCMI_Image2
29/04/2025
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jpg 282.98 KB

CCMI_Fig1
29/04/2025
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CCMI_Fig2
29/04/2025
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jpg 58.05 KB

Supporting Evidence - links to published document/online materials

Image 1: Nursery frame at the start of the project.
Image 2: Same frame at the end of the project showing CCMI research team attaching new fragments.
Fig. 1. mean % of corals representing each health state in the nursery.
Fig. 2. Relative growth (% of original size) for original fragments in the nursery up to the time of fragmentation.

Publication 1: Le Gall, L, Johnson, J, Goodbody-Gringley, G (In Review) Extirpation of Acropora cervicornis genotypes from a coral nursery during the 2023 marine heatwave undermines conservation efforts. Frontiers in Marine Science

CCMI Social Media @Reefresearch:
Instagram: https://www.instagram.com/reefresearch/?hl=en
Facebook: https://www.facebook.com/reefresearch
YouTube: https://www.youtube.com/user/ccmireefresearch

Project Challenges

One unexpected challenge was an outbreak of an unknown coral disease. While warming sea temperatures remain a constant threat to restoration success, we were fortunate to experience minimal impacts from thermal stress this year. However, the sudden appearance of a disease resembling white pox in five colonies from two of the three genotypes was unlike anything previously observed in our nursery. In response, we increased monitoring efforts to closely track disease progression and coral health. Additionally, we had contingency plans in place to isolate affected corals on separate frames to prevent the disease from spreading. Remarkably, within just eight weeks, the affected colonies showed full recovery, with the white spots fading completely. The survival of these corals is crucial for preserving the genetic diversity of A. cervicornis in Little Cayman, making this recovery a significant success. Weather conditions also posed a considerable challenge throughout the project. While strong winds are expected during the winter months, they continued to disrupt fieldwork. Hurricane Rafael in early November, followed by extreme winter winds, limited our ability to access the nursery. Additionally, rough conditions increased the risk of coral fragments breaking or dislodging from their frames. Despite these setbacks, our team remained flexible and took every opportunity to conduct nursery visits. During

each visit, we ensured that frames were securely fastened to minimise movement and prevent damage in rough weather.

Lessons Learned

i)
• Planning ahead
o Always having a tentative date on the calendar for the next nursery visit
o Consistent monitoring/visits
 Made nursery maintenance and upkeep more manageable
 Able to catch disease early on and adapt accordingly
 Able to adjust maintenance plan based upon findings
• Fragmenting process
o Thoroughly prep supplies – do as much as possible on land before entering the water
o Plan location of each coral – know which coral fragment is going where
o Make directions clear and have specific roles for all involved ahead of fieldwork to improve efficiency
Mix genotypes on each frame to increase resiliency to stressors on that frame and allow for monitoring of different genotype responses to conditions
• Communications
o The public is very interested in restoration, our coral nursery, updates, etc.
o Restoration is an area where the public engage well, likely because they can see tangible, on-the-ground conservation gain
• iii)
o We have a well-established procedure that's worked for 12 years and continues to work for us
 Maybe visit more frequently – twice a month
 Broaden species in nursery
• iv)
o Realistic timeframe – plan fragmenting around weather/avoid hurricane season
o Make a thorough fragmenting plan (same as above)
o Know the genotypes of your corals
 Ability to mix genotypes = increased resiliency

Section 3 - Project Finance (Essential)

Project Expenditure

Project Spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total actual Darwin Plus Costs (£)	Variance %	Comments (please explain significant variances)
Staff Costs	[redacted]			
Consultancy Costs				
Overhead Costs				
Travel and Subsistence				
Operating Costs				

Capital Items	[redacted]		
Others			
Total	49,955.00	49,957.92	0.00%

Please provide a short narrative summary on project finances.

Project finances were expected, no unexpected additional costs or underspend were incurred. The project delivered in line with the proposed budget.

Section 4 - Contribution of Project to Darwin Plus Programme Objectives

Please select up to **one** indicator that applies within **each group/indicator list (A, B, C, D)** and report your results for that indicator in the text box underneath. If you do not have relevant results to report for any of the indicators in a particular group, you can leave them blank.

Please also submit some form of evidence (above) to demonstrate any results you list below, where possible.

Group A: Capability and Capacity - Core Darwin Plus Standard Indicators (select one)

Unchecked	**DPLUS-A01: Number of people from key national and local stakeholder groups completing structured and relevant training.**
Unchecked	**DPLUS-A02: Number of secondments or placements completed by individuals of key local and national stakeholders.**
Unchecked	**DPLUS-A03: Number of local/national organisations with improved capability and capacity as a result of project.**
Unchecked	**DPLUS-A04: Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.**
Unchecked	**DPLUS-A05: Number of trainers trained reporting to have delivered further training by the end of the project.**

Group A Indicator Results

N/A

Group B: Policies, Practices and Management- Core Darwin Plus Standard Indicators (select one)

Unchecked	**DPLUS-B01: Number of new/improved habitat management plans available and endorsed.**
Unchecked	**DPLUS-B02: Number of new/improved species management plans available and endorsed.**
Unchecked	**DPLUS-B03: Number of new/improved community management plans available and endorsed.**
Unchecked	**DPLUS-B04: Number of new/improved sustainable enterprises/ community benefits management plans available and endorsed.**
Unchecked	**DPLUS-B05: Number of people with increased participation in local communities / local management organisations (i.e., participation in Governance/citizen engagement).**
Unchecked	**DPLUS-B06: Number of Local Stakeholders and Local Communities (people) with strengthened (recognised/clarified) tenure and/or rights.**

Group B Indicator Results

N/A

Group C: Evidence and Best Practices - Core Darwin Plus Standard Indicators (select one)

Unchecked	**DPLUS-C01: Number of best practice guides and knowledge products published and endorsed.**
Unchecked	**DPLUS-C02: Number of new conservation or species stock assessments published.**
Unchecked	**DPLUS-C03: New assessments of habitat conservation action needs published.**
Unchecked	**DPLUS-C04: New assessments of community use of biodiversity resources published.**
Unchecked	**DPLUS-C05: Number of projects contributing data, insights, and case studies to national Multilateral Environmental Agreements (MEAs) related reporting processes and calls for evidence.**

Group C Indicator Results

N/A

Group D: Sustainable Benefits to People, Biodiversity and Climate - Core Darwin Plus Standard Indicators (select one)

Unchecked	**DPLUS-D01 Hectares of habitat under sustainable management practices.**
Unchecked	**DPLUS-D02: Number of people whose disaster/climate resilience has been improved.**
Unchecked	**DPLUS-D03: Number of policies with biodiversity provisions that have been enacted or amended.**

Group D Indicator Results

N/A

Section 5 - Project Partnerships, Wider Impacts and Contributions

Project Partnerships

Although the project had no formal partners, knowledge sharing and stakeholder engagement is an essential element of the project to increase the impact of our results. Our research will be shared with technical experts and non-technical audiences through the Reefs Go Live campaign, mini documentary and associated social media campaign. Additionally, the project outcomes will be included in CCMI's regular report and presentation provided to the Cayman Island DoE.

Wider Impacts and Decision Making

CCMI works closely with the Cayman Islands Department of Environment (DoE) and will provide an update on the project to the DoE to inform them of the project results. Similarly, as monitoring of the three thermos-tolerant genotypes continues, this information will be regularly fed-back to the DoE as they continue to develop the National Coral Nursery Policy for the Cayman Islands.
Additionally, the results of this project have been incorporated in CCMI's education and outreach programmes, notably the 2025 season of Reefs Go Live. Episode 3 of Reefs Go Live which will be broadcast on 9th May 2025 focussed on CCMI's restoration programme and other Darwin local project 'Mapping Endangered Coral Species in Little Cayman' and will communicate both project findings to a global audience of over 100,000 viewers. This episode will also feature a 1-minute mini documentary outlining both projects, their results and how this informs coral reef conservation. Reefs Go Live aims to communicate scientific research to a wide audience in an easily digestible and engaging format, this increases understanding of the project results and their applicability across the world, while also encouraging ocean stewardship and environmentally conscious decision making to the wider public.

Sustainability and Legacy

The results of this project will be maintained through CCMI's business-as-usual restoration programme and form the basis of future projects, continuing our research into evidence-based and resilience-focussed restoration practices. Maintenance of the 117 fragments in the nursery will be continued as part of CCMI's core activities, while project proposals are already in development to build upon this work and investigate depth-tolerance of the corals in the nursery, which could determine if deeper reefs and nursery sites could be used as potential refuge areas during periods of increased water temperatures in the future to reduce coral bleaching and associated mortality.

Section 6 - Communications & Publicity

Exceptional Outcomes and Achievements

Following the 2023 global coral bleaching event, coral reefs and restoration projects globally suffered severe coral loss. The Cayman Islands experienced the most prolonged marine heatwave on record (over 20 weeks), which causes substantial changes to coral reef communities. However, three specific genotypes of the critically endangered Acropora cervicornis in the Central Caribbean Marine Institute (CCMI)'s coral nursery survived these extreme conditions. Given this coral's typical sensitivity to warmer waters, these results provided hope in the face of mass coral loss.

With thanks to the UK Government's Darwin Plus programme, CCMI has built upon these findings to increase the genetic stock of these thermally tolerant corals, adding an addition 100 fragments. The corals in CCMI's nursery represent some of the last wild Acropora cervicornis in Little Cayman and are crucial for preserving genetic diversity. The fragments in CCMI's nursery are growing well – at a rate of nearly 1cm per day and successfully recovered from an outbreak of an unknown disease within 8 weeks.
The increase in these thermally tolerant individuals in CCMI's nursery provide substantial hope for increasing the resilience and diversity of Cayman's coral reefs and preserving the population of critically endangered Acropora cervicornis.

Photo, video or graphic to be used for publicity and communications.

Please upload at least one relevant and engaging image, video or graphic that you consent to be used alongside the above text in Defra, JNCC or NIRAS communications material.

CCMI_Nursery_1
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CCMI_Nursery_CloseUp
29/04/2025
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mp3 5.95 MB

CCMI_Nursery_TLEData3
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mp3 6.14 MB

CCMI_Nursery_4_2
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mp3 13.15 MB

CCMI_Nursery_4_- frame at 0m46s
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jpg 201.17 KB

Photo, video, and/or graphic captions and credits.

CCMI_Nursery_TLEData3 – Central Caribbean Marine Institute (CCMI) Researcher Dr Jack Johnson taking total linear extension (TLE) measurements of Acropora cervicornis corals in the CCMI coral nursery, Little Cayman, Cayman Islands. Credit: CCMI

CCMI_Nursery_4 (and still frame) – Central Caribbean Marine Institute (CCMI)'s coral nursery in Little Cayman showing high levels of surrounding biodiversity. Credit: CCMI

CCMI_Nursery_Closeup – CCMI's Coral nursery in Little Cayman, restocked with over 100 fragments of highly resilient Acropora cervicornis genotypes that have survived marine heatwaves and coral disease outbreaks. Credit: CCMI

CCMI_Nursery_1 – CCMI Researcher, Nicole Rotelle conducting health monitoring on Acropora cervicornis coral fragments in the CCMI coral nursery in Little Cayman, Cayman Islands.

I agree for the Biodiversity Challenge Funds Secretariat, Administrator, and/or JNCC to publish the content of this section.

⊙ Yes, I agree for the BCFs Secretariat and/or JNCC to publish the content of this section.

Please list any accounts that you would like tagged in online posts here. This can include project pages, partners' pages or individuals' accounts for any of the following platforms: LinkedIn, Facebook, Twitter, or Instagram.

Instagram:
@reefresearch

Twitter:
@reefresearch

Facebook:
CCMI - Central Caribbean Marine Institute

Section 7 - Darwin Plus Contacts

Please tick here to confirm that you have read and acknowledge the BCF's Privacy Notice on how contact details will be used and stored and that you have sought agreement from anyone that you are sharing personal details with us on their behalf.

⊙ I confirm I have read the Privacy Notice and have consent to share the following contact details

Project Contact Details

Project Contact Name	Gretchen Goodbody Gringley & Abbie Dosell
Role within Darwin Plus Project	Project Leader & Application Lead
Email	[redacted]
Phone	
Do you need further sections to provide additional contact details?	⊙ No