DPLR4\1010

Darwin Plus Local - Final Report (1)

Officer: Linzi Ogden

Section 1 - Darwin Plus Local Project Information (Essential)

Project Reference Number

DPL00096

Q1. Project Title

No Response

Overseas Territory(ies)

☑ Bermuda

Lead Organisation or Individual

Living Reefs Foundation

Partner Organisation(s)

Coral Spawning Lab

Value of Darwin Plus Local Grant Award

£49,922.00

Project Start Date

01 October 2024

Project End Date

31 March 2025

Project Leader Name

Dr. Samia Sarkis

Project Website/Twitter/Blog etc.

www.livingreefs.org

Report Author(s)

Dr. Samia Sarkis

Report Date

18 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;**
Unchecked	**Environmental quality: improving the condition and protection of the natural environment;**
Checked	**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

i)What has changed as a result of the project: Living Reefs Foundation now has the capacity to hold and condition coral parent colonies for extended periods of time in situ under conditions favouring their reproduction. This translates into a structured spawning programme with an anticipated reliable release of gametes/larvae enabling the implementation of research projects investigating early life stage requirements for culture. Previously, Living Reefs Foundation relied on natural environmental conditions, bringing parent colonies from the field in situ a few days prior to spawn due to a lack of appropriate broodstank tank system; gamete/larval release was not consistent and entrained delays in the implementation of research projects, at times postponed until the next yearly spawning season.

ii) The overall objective of the project was to install a coral conditioning system which enables precise control of key environmental parameters for the reliable gametogenic development of parent colonies and the release of viable eggs/larvae producing a steady supply of corals for reef restoration. This has been achieved. 1 Coral

system installed, 1 LRF staff trained in its management, 1 SOP guide prepared
iii) There were no recommended improvements in our feedback letter.

Supporting Evidence - file(s) upload

BIO-CSL Instruction manual
30/04/2025
12:58:53
docx 14.69 MB

10. J. Cragg and S. Sarkis with completed system.jpg
30/04/2025
12:29:45
jpg 2.62 MB

11. J. Cragg Programming system
30/04/2025
12:29:37
jpg 2.89 MB

9. J. Cragg and LRF staff finishing assembly
30/04/2025
12:28:10
jpg 2.18 MB

7. System accessories unpacked
30/04/2025
12:28:00
jpg 2.63 MB

6. system in place ready to assemble
30/04/2025
12:27:41
jpg 2.86 MB

4. Opening creightljpeg
30/04/2025
12:27:41
jpg 3.35 MB

5. Transferring system to hatcheryjpeg
30/04/2025
12:27:37
jpg 2.4 MB

3 Unloading creight on site
30/04/2025
12:27:08
jpg 2.58 MB

1 hatchery pre system
30/04/2025
12:26:45
jpg 3.11 MB

Supporting Evidence - links to published document/online materials

1. Photos of the Living Reefs Foundation hatchery pre and post installation of the coral spawning system uploaded in the previous section provide evidence of the installed system. A test run was made with Coral Spawning Lab partner (Dr. Jamie Craggs) to programme the equipment and automate temperature cycles, food dosage, lunar cycle, etc. At the same time, the standard operating procedure (SOP) was updated and fine tuned as a reference for Living Reefs Foundation staff during operation. BIO-CSL instruction manual available to LRF is attached in previous section.
2. S. Sarkis of Living Reefs Foundation (LRF), J. Craggs of Coral Spawning Lab and Nick Bridel of TMC made final arrangements for shipping and on site visit during the Reef Futures 2024 Meeting in Cancun (Dec 2024) and posted on the LRF linked in page https://www.linkedin.com/company/103416013/admin/dashboard/
3. Jamie Craggs visit was posted on LRF instagram @bdalivingreefs (tagging biodiversity challenge funds)
4. A power point presentation to Bermuda-based donors was given Feb 25, including the introduction to the coral spawning system.
5. Government officials of the Department of Environment and Natural Resources were kept up to date throughout the process (T. Warren, J. Welch and J. Pitt) and invited for further explanations on the system.

Project Challenges

A. The major challenge was in the scheduling of the shipping, custom clearing, delivery of the system to Bermuda and Dr. J. Craggs' availability within the project time frame.
This was resolved as follows: The manufacturing of the system frame and ordering of equipment was efficiently managed by Nick Bridel at the Tropical Marine Centre (U.K.) and the system was ready for shipment earlier than expected. This allowed for ample time to receive in Bermuda, and install the system in the hatchery prior to the arrival of J. Craggs, with a Bermuda crew. This saved a considerable amount of time and J. Craggs' visit could focus on the final assembly of equipment, such as lights, chiller/heater, UV, dosage pumps, black out door, connection to seawater and freshwater systems, and RO system, followed by the programming needed and training of LRF staff. The standard operating procedures were updated by J. Craggs and S. Sarkis on site, and finalised remotely by J. Craggs.
B. The second major challenge was the tightness of the space and entry into the lab. This was resolved by clear communication beforehand between S. Sarkis and J. Craggs. S. Sarkis sent accurate measurements with photos, and J. Craggs modified the dimensions of the system to accommodate height of the system. S. Sarkis hired a delivery crew (this was not anticipated) to unload and transfer the system into the hatchery. It would not have been possible without professional help, and the system was installed without any damages incurred.

Lessons Learned

i) Communication between the manufacturer (TMC), Living Reefs Foundation, the shipping company and Jamie Cragg worked very well and enabled the implementation of the project within the expected time frame.
ii) The timing of the visit:To coincide with the Bermuda coral spawning season, LRF staff would have benefited from the training component later in the spring (May), to become more familiar with the system through repeated use and testing with live coral colonies, and resolve unexpected glitches when using automated components and apps.
Increased clarity on what the system entails: Some components of the system are irrelevant to LRF's immediate needs; although they have the potential to be useful at a later date, it would have been preferable to purchase when needed, as storage space is very limited at the hatchery, and there is concern that poor storage will result in damage.
iii) Budgeted and planned a second visit by CSL once live corals were in the system, but this did not coincide with the timing of the grant.
iv) Recommendations: Plan to advance the project as much as possible locally before the consultant's visit to have as much quality time with the consultant as possible. Be clear on the wifi requirements for programming and running the system to make sure the system operates fully. Make sure you speak in person with the overseas partner beforehand to iron out all details, as you go through installation requirements.

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	[redacted]
Travel and Subsistence	
Operating Costs	

Capital Items	[redacted]		
Others			
Total	49,922.00	46,218.43	-8%

Please provide a short narrative summary on project finances.

The total costs remained within the project budget, and are lower than anticipated overall. This is due in great part to the lower cost of the coral system due to the exclusion of VAT (20% of capital costs initially), and to the lower cost obtained through a new manufacturer (TMC).
However, on site costs were higher for:
a. Travel and subsistence- time of travel occurred during a holiday period when accommodation was at a premium.
b. Operating costs - Electrical system was found faulty prior to installation and needed repair; unexpected ceiling structure damage required the assistance of an external contractor.
c. Other costs- increased wifi capacity to operate the system. Wifi was planned for programming the system, but it was not clear at the onset that it was needed continuously to operate the system. Arrangements were made for the programming, but not for operating.

Consultancy costs for J. Craggs include 5 days for site visit (including 1 day travel) plus 2 days for remote assistance.

Request for approval- Staff costs: S. Sarkis worked 2 additional days (not budgeted) to organise and oversee the installation of the coral spawning system prior to the arrival of J. Craggs, and work on the adaptation of the Standard Operating Protocol to suit LRF's needs. Approval is requested to pay for her additional time ([redacted]

per day); this would increase budgeted staff cost to [redacted] and total costs to [redacted]

Contributions in-kind by LRF and CSL were as per the proposal.

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)

Checked	**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

1 trained from LRF

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)

Checked	**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

1 Standard Operating Protocol for the conditioning of coral broodstock. This has been drafted and will be published once tested during research summer 2025..

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

i) Coral Spawning Lab (CSL) ,the project's partner, engaged early on in the planning for system design, installation, and procurement of the equipment. CSL and LRF worked closely throughout. The system's smaller components were assembled on site and system was programmed by CSL and LRF. A run-through the system management and operation resulted in testing the SOP with modifications completed by J. Cragg and S. Sarkis, and in training 1 LRF staff.Due to the timing of the visit and the March 30 grant deadline, training of LRF staff in ex situ broodstock conditioning with live corals in the system is planned remotely (June).
ii) The Department of Environment and Natural Resources is involved in that the LRF hatchery is located within the complex of Marine Resources Division. They are continuously updated on changes in the capacity for coral research and new protocols tested and implemented.
iii) Strengths: Extensive dialogue between LRF and CSL was ongoing prior to and during the proposal writing, and provided a good base to identify potential issues in shipping and installation.
Challenges: Due to the busy schedule of both parties and the short duration of the grant period which laid outside of Bermuda's coral spawning season, timing and duration of the site visit was not optimal, but sufficient to provide LRF with the know-how.
Achievements: Installing the system in a very compact hatchery space!
iv)Technical specialists: TMC provided a service above and beyond their remit, including training LRF in the use of the system's dosage app.

Wider Impacts and Decision Making

At this point, this is not applicable.

However, Bermuda is implementing a Marine Spatial Plan which includes coral restoration activities (S. Sarkis of LRF is on the scientific committee). By having an ex situ system for spawning corals and enabling research and restoration, the scope of activities considered for implementation is widened and potentially contributes to a more comprehensive implementation management plan.

Sustainability and Legacy

Living Reefs Foundation has the budget to fund at least two staff to focus on coral spawning and culture of early life stages ex situ for the next 12 months. This will provide results and leverage to secure further funding. The Darwin Plus Local award for the installation of the coral spawning system has been instrumental in securing these funds and attracted much interest in the Bermuda-based corporate sector. A site visit by a Corporate donor is planned May 13, 2025 to view the new system; it is anticipated that this will attract further funding.

Section 6 - Communications & Publicity

Exceptional Outcomes and Achievements

A short video clip on the installation of the system is available 'DPL00096LRF'.

Description: Bermuda's Living Reefs Foundation (LRF) partners with Coral Spawning Lab (CSL) to build the island's capacity in controlled spawning and culture of massive corals. With careful planning, many zoom

meetings, and hands-on plumbing, drilling, gluing, J. Craggs (CSL) and S. Sarkis (LRF) managed to successfully install the high-tech coral spawning system in a very compact hatchery space! Since 2018, LRF has focused on developing hatchery-based techniques for restoration. However, scaling up has been limited by the current reliance on natural spawning events, subject to environmental factors. By manipulating key drivers in coral reproduction with CSL's system, LRF increases its capacity to produce a supply of juvenile corals for reef recovery and nature- based breakwater solutions. Thanks to the assistance of true professionals in the UK (N. Bridel of the Tropical Marine Centre) and Bermuda's BEST shipping and delivery service, LRF's new coral spawning system is ready for the 2025 season. LRF is focusing on conditioning Bermuda's massive coral species including the brain and star coral species, key reef builders of Bermuda's coral system to spawn ex situ, to culture larvae and spat for research and restoration. This is a major step forward in implementing our two signature programmes, the Coral Garden Initiative and the Blue Barrier Programme, made possible through the Darwin Plus Local award.

Potential for further publicity: Currently the Coral Spawning System is installed with seawater flowing; it takes at least one month for the system filtration to be suitable for holding live corals. The plan is to introduce live corals at the beginning of June. At this time, we will produce a short video clip to showcase our new system and the daily operations required to maintain and condition corals in Bermuda, which we can share with the Biodiversity Challenge Fund.

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.

DPLR4_1010LRFmovie first slide
30/04/2025
20:26:52
png 1.81 MB

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

Please note the file is too large to be attached in previous section (62MB).
DPLR4_1010movie first slide screenshot is uploaded as evidence. Please advise on how to send full movie.

Description of movie:
DPLR4_1010LRF. Installation of CSL's coral spawning system at the Living Reefs Foundation's hatchery in Bermuda- photo credits: S Sarkis, C Evans.

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.

LRF linked in: https://www.linkedin.com/company/103416013/admin/page-posts/published/
LRF instagram: @bdalivingreefs

Coral spawning lab linked in: https://www.linkedin.com/company/coral-spawning-lab/?originalSubdomain=uk

Tropical Marine Centre Facebook page.

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	Samia Sarkis
Role within Darwin Plus Project	Project Leader
Email	[redacted]
Phone	
Do you need further sections to provide additional contact details?	⊙ No