

## Training the Next Generation of Reef Restoration Practitioners



# **Training the Next Generation of Reef Restoration Practitioners**

Final Report

Prepared By:

Diego Lirman

Dalton Hesley

University of Miami  
Rosenstiel School of Marine, Atmospheric, and Earth Science  
Department of Marine Biology and Ecology  
4600 Rickenbacker Causeway, Miami, FL 33149

May 2025

**Completed in Fulfillment of PO# C3D495 for**

**Florida Department of Environmental Protection  
Coral Protection and Restoration Program  
8000 N Ocean Dr.  
Dania Beach, FL 33004**

**This report should be cited as follows:**

**Lirman D, Hesley D. 2025. Training the Next Generation of Reef Restoration Practitioners.  
Florida Department of Environmental Protection. Dania Beach, FL. 11 pp.**

This report was funded through a contract agreement from the Florida Department of Environmental Protection's (DEP) Coral Protection and Restoration Program. The views, statements, findings, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida or any of its subagencies.



## **Acknowledgements**

We would like to thank the Florida Department of Environmental Protection's Coral Protection and Restoration Program for the opportunity and support. We would also like to thank all project partners and principal investigators for their contributions; Diego Lirman's Coral Restoration Lab at the University of Miami (UM), Andrew Baker's Coral Reef Futures Lab at UM, Brian Walker's GIS Spatial Ecology Lab at Nova Southeastern University, Margaret Miller with SECORE International, Shannon Jones with the Phillip and Patricia Frost Museum of Science, Josh Patterson's Patterson Lab at the University of Florida, and Mark Ladd's Coral Research and Assessment Lab at the National Oceanic and Atmospheric Administration. Lastly, we would like the undergraduate and graduate students for their passion, enthusiasm, and research activities.

## **Management Summary**

This project aimed to identify, train, and deploy the next generation of reef restoration practitioners through internships by leveraging the University of Miami (UM) Rosenstiel School of Marine, Atmospheric, and Earth Science's graduate program and coral research collaborators through the Southeast Florida Coral Reef Restoration Hub. To integrate our activities, we introduced a cross-cutting restoration traineeship program where undergraduate and graduate students from UM complete internships hosted by the various Restoration Hub partners and work collaboratively across institutions. This year's Restoration Hub program included 7 different partners across 6 institutions, who supported a total of 6 undergraduate student interns and 10 graduate student interns. In addition to these critical professional development opportunities, the student's internships advance local coral research and reef restoration efforts through their independent projects with Restoration Hub collaborators. This traineeship program also helped strengthen and expand collaborations between leading institutions and organizations in the fields of coral conservation, research, and restoration through the Restoration Hub itself. The demonstrated success of this project highlights the need for continued investment in meaningful student opportunities to both meet the growing need for coral restoration practitioners and advance coral research and conservation efforts. Without funding support like this, it is very likely that these internships would not have been offered and students would have ended up in other regions and/or disciplines. The Restoration Hub project is unique and impactful as benefits the local, scientific, and coral reef community alike.

**Executive Summary (max 1 page)**

Given the emerging and complex environmental issues facing Florida's Coral Reef, there is a growing need for coral scientists and reef restoration practitioners. The future of coral reefs will require a community of well-rounded, highly trained scientists with a breadth of knowledge and practical skills to help understand, conserve, and restore them. This project aimed to address that by identifying, training, and deploying the next generation of reef restoration practitioners through the Southeast Florida Coral Reef Restoration Hub. The "Restoration Hub" is a consortium of partners and principal investigators across Florida that came together through Florida DEP funding in 2019 by combining research, education, and coral propagation and restoration activities into a coordinated restoration program for Miami-Dade and Broward Counties. To integrate our activities, we introduced a cross-cutting restoration traineeship program where undergraduate and graduate students from the University of Miami (UM) completed internships hosted by the various Restoration Hub partners and worked collaboratively across institutions. While the specific project outcomes vary year-to-year, the final outcomes of the project are available immediately upon completion of the research to managers and practitioners and help guide and inform future restoration practices in Florida and elsewhere. This year's Restoration Hub program included 7 different partners across 6 institutions; Diego Lirman's Coral Restoration Lab at the UM, Andrew Baker's Coral Reef Futures Lab at UM, Brian Walker's GIS Spatial Ecology Lab at Nova Southeastern University, Margaret Miller with SECORE International, Shannon Jones with the Phillip and Patricia Frost Museum of Science, Josh Patterson's Patterson Lab at the University of Florida, and Mark Ladd's Coral Research and Assessment Lab at the National Oceanic and Atmospheric Administration. These partners and principal investigators supported a total of 6 undergraduate student interns; Joseph Curcio, Rebekka Koop, Madison Praxl, Stella Bilder, Massima Ponce, and Lily Moore as well as 10 graduate student interns; Cristina Lingvay, Alexandra Howard, Muxin Jiang, Joshua Yang, Alec Danko, Lily Bingham, Sierra Tompkins, Danielle Tengberg, Jacqueline Squires-Sperling, and Lucy Ehrenclo. The internships provided meaningful, real-world professional development opportunities for young scientists while simultaneously advancing coral research and active reef restoration through their independent projects and internship contributions. This traineeship program also helped strengthen and expand collaborations between leading institutions and organizations in the fields of coral conservation, research, and restoration through the Restoration Hub. To date, this program has trained >30 students that obtained Master of Professional Science (MPS) and Master of Science (MS) degrees and now hold jobs at local, state, and federal agencies focused on various aspects of reef restoration or continued their career as doctoral students. As members of each internship cohort get underway in their careers in coral conservation, management, and restoration, the positive impact of this program is amplified.

## Table of Contents

|                                      |   |
|--------------------------------------|---|
| 1. Background and Introduction ..... | 4 |
| 2. Methods.....                      | 5 |
| 3. Results.....                      | 5 |
| 4. Discussion.....                   | 7 |

## 1. BACKGROUND AND INTRODUCTION

Given the emerging and complex environmental issues facing Florida's Coral Reef, there is a growing need for coral scientists and reef restoration practitioners. The future of coral reefs will require a community of well-rounded, highly trained scientists with a breadth of knowledge and practical skills to help understand, conserve, and restore them. This project aimed to address that by identifying, training, and deploying the next generation of reef restoration practitioners through internships by leveraging the University of Miami (UM) Rosenstiel School of Marine, Atmospheric, and Earth Science's graduate program and coral research collaborators through the Southeast Florida Coral Reef Restoration Hub.

The UM Rosenstiel School's Master of Professional Science (MPS) graduate degree is an accelerated program that was developed in response to employer demands for well-rounded, highly trained employees with a breadth of knowledge and practical skills to address emerging environmental issues. Students complete their curriculum in two semesters and then complete an independent capstone project through an internship to provide them with the training and real-world experience necessary for careers in today's professional science job market. The "Restoration Hub" is a consortium of partners and principal investigators across Florida that came together through Florida Department of Environmental Protection's (FDEP) Coral Protection and Restoration Program funding in 2019 by combining research, education, and coral propagation and restoration activities into a coordinated restoration program for Miami-Dade and Broward Counties.

To integrate our activities, we introduced a cross-cutting restoration traineeship program where undergraduate and graduate students from UM complete internships hosted by the various Restoration Hub partners and work collaboratively across institutions. Project funding is used to both create the new student internship positions and facilitate the programming between the various institutions and principal investigators. While the specific project outcomes vary year-to-year, the final outcomes of the project are available immediately upon completion of the research to managers and practitioners and guide and inform future restoration practices in Florida and elsewhere.

The internships provide meaningful, real-world professional development opportunities for young scientists while simultaneously advancing coral research and active reef restoration through their independent projects and internship contributions. This traineeship program also helped strengthen and expand collaborations between leading institutions and organizations in the fields of coral conservation, research, and restoration through the Restoration Hub.

The 2024 – 2025 FDEP-funded project continued, improved, and expanded the highly successful Restoration Hub program where >30 graduate students from the UM have completed MPS and MS theses now focused on reef restoration at multiple institutions and restoration groups in Florida. Our goals for this year's Restoration Hub were to:

- 1) Improve the Restoration Hub traineeship structure and resources
- 2) Expand the network of Restoration Hub host institutions and principal investigators

- 3) Increase the number of internship opportunities by including undergraduate students
- 4) Advance coral research and active reef restoration through internship activities and independent projects, and
- 5) Provide meaningful training, lab, and field experience opportunities to budding coral scientists

## 2. METHODS

The project began by reestablishing and expanding our Restoration Hub network of institutions and principal investigators. This year's Restoration Hub program included 7 different partners across 6 institutions;

- 1) Diego Lirman's Coral Restoration Lab at UM
- 2) Andrew Baker's Coral Reef Futures Lab at UM
- 3) Brian Walker's GIS Spatial Ecology Lab at Nova Southeastern University
- 4) Margaret Miller with SECORE International
- 5) Shannon Jones with the Phillip and Patricia Frost Museum of Science
- 6) Josh Patterson's Patterson Lab at the University of Florida, and
- 7) Mark Ladd's Coral Research and Assessment Lab at the National Oceanic and Atmospheric Administration

Once the internship hosts and positions were determined, our UM team worked with them to advertise to the student body and recruit candidates through the available email lists and internship boards. The announcements included the details provided by each Restoration Hub partner interested in hosting an intern as well as expectations for the program (Deliverable 2.a). Candidates were asked to submit a CV and letter of interest citing which specific internship(s) they were applying for through an online platform (Deliverable 2.d). The applications were then shared through via portal with the Restoration Hub partners so they could review, set up interviews, and select their own candidate.

Once each Restoration Hub partner had selected and hired their intern(s), we worked with them to provide basic reef restoration ecology, coral husbandry, and restoration resources for the student cohort. Additionally, each host organization provided hands-on training and exercises tailored to their specific research lab and activities. Once the students were fully on-boarded and trained, host labs worked with them to outline an independent research study that they could carry out during their internship and complete a final report on. Once the internships and research projects were complete, each graduate student presented their capstone project activities to the UM faculty as a requirement of the MPS program.

## 3. RESULTS

This project supported a total of 6 undergraduate student interns; Joseph Curcio, Rebekka Koop, Madison Praxl, Stella Bilder, Massima Ponce, and Lily Moore as well as 10 graduate student interns; Cristina Lingvay, Alexandra Howard, Muxin Jiang, Joshua Yang, Alec Danko, Lily Bingham, Sierra Tompkins, Danielle Tengberg, Jacqueline Squires-Sperling, and Lucy Ehrenclou.

As a result, this project produced an array of novel research studies through the Restoration Hub's MPS graduate student internships ranging from the impact of sound on coral larval settlement (Figure 1) to the effects of different grazer assemblages on coral husbandry (Figure 2). Both the undergraduate and graduate students worked to complete a final report on their activities and impacts at the conclusion of their internship (Deliverable 4.b).



**Figure 1:** Title slide of final capstone project presentation by student intern with SECORE International given as part of MPS graduate program requirement.





**Figure 2:** Title slide of final capstone project presentation by student intern with NOAA Fisheries given as part of MPS graduate program requirement.

Once their internships and final reports were complete, the MPS graduate students presented on their independent studies to the UM faculty as part of their degree requirements. To help disseminate their findings, the FDEP team was invited to tune in to the student presentations and the presentations were recorded for further dissemination (Deliverable 4.c). Additionally, a final presentation overviewing the entire Restoration Hub project and impact was given to FDEP managers and the Disturbance Advisory Committee on May 21<sup>st</sup>, 2025 (Deliverable 1.c).

#### 4. DISCUSSION

This Restoration Hub project and program serves a unique role of simultaneously fostering future marine scientists and advancing ongoing coral research and restoration. The project funding helps meaningfully increase access to the field of coral restoration research through new, paid internship positions with leading investigators and institutions. The positive impact of these mentors and professional development opportunities is evident in the successful career paths that have followed. To date, this program has trained >30 students that obtained MPS and Master of Science degrees who went on to obtain jobs at local, state, and federal agencies focused on various aspects of reef restoration or continued their career as doctoral students.

This project also helps strengthen and expand collaborations between principal investigators at the forefront of restoration science. Through regular Restoration Hub meetings with investigators and interns, updates, ideas, and resources were exchanged to help advance our collective efforts to conserve and restore Florida's Coral Reef. The student interns supported ongoing research and restoration efforts while also launching novel investigations to gain meaningful, real-world experience. Their independent research

projects both advanced our understanding of coral reef restoration and opened additional avenues for continued investigation. The Restoration Hub project engaged the public too through social media platforms to provide updates, raise public awareness, and encourage action.

The demonstrated success of this project highlights the need for continued investment in meaningful student opportunities to both meet the growing demand for coral restoration practitioners and advance coral research and conservation efforts. Without funding support like this, it is very likely that these internships would not have been available and students would have ended up in other regions and/or disciplines. The Restoration Hub project is therefore uniquely impactful as it benefits the local, scientific, and coral reef community alike.