

Monitoring Thermally Preconditioned *Pseudodiploria clivosa* Post-Outplanting

Alexandra Zelaya¹, Krista V. Laforest¹, Robert F. Whitehead¹, Sharla Sugierski², and Nicole D. Fogarty¹

¹Center for Marine Science, University of North Carolina Wilmington, Wilmington, NC, USA

²Florida Fish and Wildlife Conservation Commission, Marathon, FL, USA

Florida's coral reefs have experienced widespread bleaching and mortality during thermal stress events in recent years, emphasizing the urgent need for innovative restoration strategies. This study evaluates whether thermal preconditioning of *Pseudodiploria clivosa* recruits, produced and reared in an ex situ spawning facility, improves thermal resistance and resilience once outplanted to the Florida Keys. In the months prior to outplantation, 144 recruits were periodically exposed to an elevated temperature of 32 °C, a threshold where mass mortality has been observed. The same number of recruits were maintained at an ambient temperature of 28 °C. Following laboratory preconditioning, corals were outplanted to two Mission Iconic Reef sites, Newfound Harbor and Looe Key Reef. Field monitoring spans four seasonal timepoints—July, October, January, and May—to assess growth, survival, bleaching, and physiological health. In addition to standard monitoring protocols for outplants, a noninvasive instrument known as the Coral In Situ Metabolism and Energetics (CISME) system was used to quantify respiration and photosynthesis of coral recruits underwater. The CISME requires a seal around the recruit for accurate measurements. Therefore, we opted to use Coral Loks by Reef Cells which allow temporary removal of the recruit from the receiver that is secured to the reef. Additionally, using this project as an example, we collaborated with Seacamp to develop coral restoration curriculum and student engagement activities that allow hands-on participation in coral conservation. By combining controlled laboratory treatments with in situ physiological monitoring and outreach, this project aims to identify cost-effective restoration approaches that enhance coral tolerance to future ocean warming events. It also aims to educate students about the threats to corals and strategies to restore them. Findings will contribute to science-based guidelines for integrating pre-exposure techniques into active restoration. They will also inform scalable practices that may promote coral survival under increasing climate stress, thus supporting the long-term recovery of Florida's Coral Reefs.