

Assessing the Long-Term Growth and Survival of Boulder Corals Outplanted in the Florida Keys

Lindsay J. Spiers, William C. Sharp

Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Marathon, FL, USA

Coral reef restoration has increasingly been using reef building boulder corals to restore the structure and function of the reef, however multiyear monitoring remains rare. The coral outplanting experiment discussed here monitored three boulder coral species routinely used in restoration (*Montastrea cavernosa*, *Pseudodiploria clivosa*, and *Orbicella faveolata*) over a six-year period (2019-2025). We outplanted 120 colonies of each species in equal numbers at two reef habitats (offshore and inshore) across three reef locations in the upper and middle Florida Keys. We sourced half of the corals from an in situ coral nursery and half from an ex situ facility. In total there were 10 outplants of each species from each source per site. Colonies at each site were randomly distributed equidistant from each other in an approximately 4m by 20m rectangular matrix along the reef edge and then monitored regularly for growth and survival at 1-week, 2-weeks, 6-weeks, and 12-weeks post-outplant with particular interest in the presence of disease and other sources of potential mortality. Colonies showed evidence of intense finfish predation during the initial surveys, but predation had decreased by 12-weeks post-outplant, and many colonies demonstrated tissue healing and recovery. After the initial 12 weeks, we periodically surveyed these corals through 287 weeks post-outplant. Surveys documented longer-term coral survival rates, colony growth, incidence of disease, and other sources of mortality. Initial analyses indicated that coral survival and growth were dependent on a variety of factors, many of which interacted, including coral species, site location, reef habitat, coral source (in situ vs ex situ), and early predation. We saw intense bleaching in 2023 which resulted in species specific mortality but also total recovery in corals originally thought to be dead. This study highlights the importance of long-term outplant monitoring that can track corals as they are exposed to a suite of stressors including predation, disease, and bleaching over time to better assess restoration success.