

Developing Realistic Science-Based Performance Standards for *Acropora* Relocation Efforts

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To date, there are no published records of long-term, successful nursery outplant projects, or transplanting of *Acropora* spp. into natural reef habitats or successful *Acropora*-based reef restoration programs in Florida. While there has been exceptional success in growing and propagating *Acropora* in both land-based and in-water nurseries, outplanting efforts have been met with poor results.

For instance, at the Aquarius Research Station on Conch Reef in the FKNMS, *A. cervicornis* survivorship was low for coral transplants obtained from the local Coral Restoration Foundation (CRF) field nursery (> 50%). Mortality was even higher for transplants obtained from other nurseries and wild populations, while transplants cultured in a land-based aquarium had the highest mortality at the Aquarius site. Analysis of early CRF outplants in the FKNMS and noted there is high initial survivability of *Acropora* outplants from nursery grown corals, however, fewer than 20% of these corals have lived longer than about four years and those that survived have exceedingly high levels of tissue loss and partial mortality. More recently, all *Acropora* restoration projects in the Florida Keys were catastrophically impacted by the summer of 2023 marine heatwave and coral bleaching event with many sites recording 100% mortality, especially in the lower Keys.

Thus, understanding the cause of potential outplanting bottlenecks must be unraveled through hypothesis-driven experimental programs and long-term efficacy monitoring before they can be considered “successful.” A key portion of this experimental work is to potentially select for disease resistant, bleaching resistant, predator resistant, cold-water tolerant, and/or rapid growth genotypes of *Acropora* that may be most suitable for site-specific restoration programs. For instance, little is known as to why *A. cervicornis* survivorship of the same genotypes is highly variable with respect to depth and habitat on the same reef, even those presumed to be heat tolerant and bleaching resistant. Even outplants that survive bleaching stress one year many later be impacted by a subsequent bleaching event. Same has been seen with corals that are apparently white-band disease resistant only later to succumb to the same (?) disease. Until these basic questions are answered, restoration and mitigation using *Acropora* species in Florida will be a Sisyphean task.