2024 *Acropora* Recovery Implementation Team Priorities

Recovery Action 5b: Identify and Map Genotypes

The Galaxy CoralSNP *Acropora* genotyping bioinformatics pipeline and database (https://coralsnp.science.psu.edu/galaxy/), the development of which was funded by NOAA, has been previously housed at Penn State University. However, this crucial tool for acroporid research and management is in need of a new home and proper curation into the future. *This is a crucial and time-sensitive need*. A viable, long-term solution is needed for housing this resource - ideally in a public forum. This tool is of utmost importance as most other aspects of species recovery such as inventory, restoration, and tracking recovery criteria are dependent on this database.

Recovery Action 6d: Develop Ex Situ Conservation of Corals and Symbionts

Ex situ gene banking of *Acropora* is a high and urgent priority. Its importance is particularly heightened given the severe coral bleaching event that caused mass mortality of acroporids on reefs throughout Florida during summer 2023. Furthermore, this priority is emphasized by the expected imminent recommendation from the incipient Florida *A. palmata* population management plan (F3P; Rodriguez-Clark et al.) to prioritize banking of all Florida *A. palmata* 'founder' genets (estimated only ~ 150 left). Efforts to collect and live-bank all of the remaining *A. palmata* founders in Florida have been instrumental in preserving remaining genetic diversity. Cryo-archive storage for *Acropora* species is an underutilized strategy for effectively preserving genetic diversity. Coordinated efforts and additional investments in collections and training in cryopreservation techniques are needed to build the banks.

Recovery Action 5a: Range-wide Monitoring

The need persists for sustained demographic and synoptic monitoring of *Acropora* populations to support ESA requirements, restoration strategies, and conservation efforts (e.g., 5-year status reviews, genetic inventory, population management plans, gene banking). To accomplish this task successfully, secure funding streams are needed to sustain these efforts throughout all jurisdictions. ARIT has identified that the acroporid populations within Florida are well documented, in part because there are so few remaining wild colonies. Additionally, the USVI has foundational support to conduct essential surveillance and demographic monitoring, but this support needs to be sustained through time. Finally, a significant knowledge gap within the population demographics of acroporids is the status of these species in Puerto Rico. ARIT has identified the need to prioritize support for Puerto Rico to better understand the distribution of acroporids within this region. Synoptic surveys could be conducted in conjunction with collections for live and cryo gene banks.

Recovery Actions 6c: Enhance Genotypic Diversity in Known Genotypically Depauperate Populations, and 11: Proactive Climate Adaptation/Acclimation to Increased Climate Stress

Observations after the 2023 heat wave indicate that there are little to no 'native' wild acroporid populations left in Florida. Building resilience to climate change through the utilization of genetically resilient genotypes or by implementing interventions that build resilience within acroporid populations is a priority for restoration activities and strategies. ARIT recommends additional support such as funding and research efforts to further advance knowledge and capacity and furthermore supports genetic rescue and assisted evolution as options for advancing climate adaptation/acclimation.

Recovery Action 11: Research and Develop Mechanisms to Enhance Adaptation/Acclimation of Elkhorn and Staghorn Corals to Increases in Climate Stress

Survival of acroporids during the thermal stress event of 2023 was variable around the Caribbean. For example, high levels of bleaching and mortality were observed in regions in Florida with the highest temperatures. However, acroporids were exposed to high temperatures in other areas of the Caribbean with higher evidence of recovery. Therefore, there is a need to understand why some corals survived the thermal stress event of 2023 and identify other biotic and anthropogenic variables which may have impacted survival (e.g., water quality, cross reef location/distance to shore/distance to channels, temperature stress and duration, UV). A meta-analysis of reef scale projects could determine factors contributing to the decline of acroporids, especially *A. palmata*, including water quality parameters (e.g., total nitrogen, total phosphorus, salinity, chlorophyll-a concentrations), temperature, degree heating weeks, UV/light intensity, disease prevalence, bleaching history, and genetics. Several data sources currently exist that could be leveraged including AGRRA, long-term monitoring of *A. palmata* conducted by NOAA/FWC, MIR mosaics, and models created by van Woesik and Banister (see Banister et al. 2024).

Action 8: Respond to, Control, and Minimize Effects of Disease Events

Several interventions and therapies have been developed to treat diseases that affect non-acroporid species such as ointments laced with amoxicillin to treat

stony coral tissue loss disease (SCTLD), probiotics acquired from apparently disease resistant colonies, and an antimicrobial ointment to treat black band disease. Recent summer disease events have resulted in high acroporid mortality within in situ nurseries, outplant populations, and remnant wild populations. Coordinated research is needed to test the effectiveness of established therapies and other novel therapies to treat diseases on acroporids in the lab.

Action 6aii: Develop and Implement Guidelines/Policies for Risk Management of Population Restocking.

Building from the *A. palmata* Population Management Strategy being developed through a National Marine Sanctuary Foundation/NOAA Capacity Grant and the Smithsonian, there is a need to also create a parallel population management plan/strategy for the US Virgin Islands and Puerto Rico. As coral population enhancement and restoration efforts increase in scale and geographic spread, there is a need to organize these efforts to enhance the likelihood of successful coral reproduction and minimize the risk for genetic issues like inbreeding. Utilizing genetic information, data will support initial modeling, gathering information, and developing a strategy to create the management plan.