REEF RESTORATION & ADAPTATION PROGRAM

Enhanced Heat Tolerance in Corals

This intervention aims to unlock understanding of heat tolerance in corals, to underpin selective breeding of corals with enhanced resilience for reef restoration.

Existing research supports substantial capacity to increase growth rates and heat tolerance of corals using assisted evolution approaches (managed or selective breeding, conditioning, microbiome manipulation). We are focused on critical research to determine the full scope for enhancement and the trade-offs associated with any enhancement. This is required to understand risks and benefits of seeding adapted coral at scale.

Chiefly, we are focused on:

- genetic basis of key traits and genome sequencing
- breeding methods to increase heat tolerance
- development of algal symbionts and probiotics to enhance health and heat tolerance

Outcomes to Date

- **Performed heat stress tests on more than 2000 individual coral colonies. Results indicate thermal history and short-term heat stress are key predictors of how much heat a coral can survive**
- **Demonstrated that thermal tolerance can be enhanced via breeding of coral colonies selected from reefs based on their temperature and bleaching history**
- **Coral larvae in aquaculture inoculated with heat-evolved symbiotic algae had improved thermal tolerance with minimal trade-offs**
- **Completed the successful removal and replacement of wild coral symbionts with lab grown symbionts allowing year-round capacity to test new types of coral-symbiont pairings**
- **Over 900 bacteria isolated and screened, with 72 showing promise for coral probiotic treatment**

Next Steps:

- DNA sequencing to determine the genetic markers associated with thermal threshholds
- Testing growth and survival of corals bred for tolerance, in the wild
- Testing the survival of corals inoculated with heat tolerant algae, on the Reef

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