



RESEARCH AT MOTE
MARINE LABORATORY



Elkhorn coral (*Acropora palmatta*)

Mote's International Coral Gene Bank provides essential infrastructure to:

- Act as a "Noah's Ark" of living genetic material
- House broodstock for ongoing sexual reproductive efforts
- Maintain genetic diversity for restoration populations
- Amplify existing robust and resilient genotypes
- Eliminate collections of wild colonies for research purposes
- Study and preserve corals for resilient reef restoration

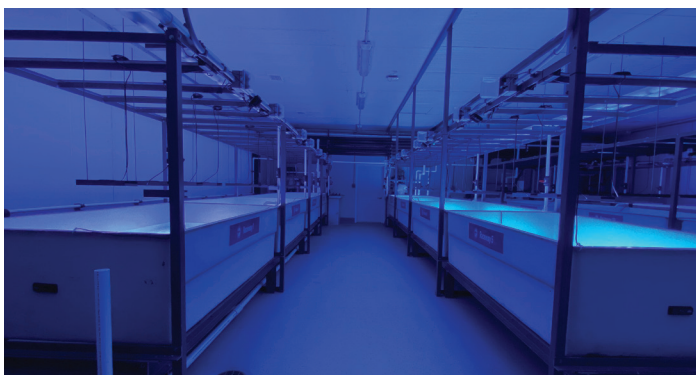
MOTE MARINE LABORATORY'S INTERNATIONAL CORAL GENE BANK

Infrastructure established to preserve coral species and genetic diversity to repopulate the world's coral reefs

Corals around the world are experiencing unprecedented levels of mortality leading to the threat of regional extinction of many coral species. Mote Marine Laboratory has created a one-of-a-kind large-scale, land-based living coral gene bank that will serve as a "Noah's Ark" to preserve species and genetic diversity for future research, propagation and restoration. Mote's strategy is to maintain dozens of different genotypes of at least 30 coral species per region, maintained in triplicate. These corals represent the parents of future generations, which will be used for resilience-based research and large-scale coral restoration. Implementing Mote's vision begins with a focus on coral species endemic to Florida and the Caribbean, with plans to eventually expand to include genera that are endemic to other regions around the globe. Mote's coral genotype holdings currently consist of over 1,600 genotypes from 17 species, with approximately 3,600 additional genotypes from 3 species that will be added over the next two years.

MOTE'S STATE-OF-THE-ART GENE BANK

Mote's International Coral Gene Bank facility is located in an environmentally hardened building with redundant power and re-circulating seawater systems on the 200-acre Mote Aquaculture Research Park campus ~20 miles inland from the coast. The current holding facility contains four separate life-support systems thus ensuring genetic preservation through independent redundancy among the raceways. Mote's Gene Bank contains 100% emergency generator backup and enough supplies on site to conduct three complete water changes during any emergency situation. Each of the four systems contains four raceways, measuring 4' x 8' x 3', with an independent sump for maintaining optimal seawater chemistry conditions. The entire Gene Bank has the capacity to contain approximately 7200 gallons (27,250 liters) of seawater and can hold up to 500 reproductive-sized corals for focusing on coral spawning initiatives, or at least 15,000 small fragments of corals (the size used for research, propagation, gene banking, and outplanting for restoration purposes). The system is temperature controlled and monitored using a computer automated controller system providing real-time data and automatic alarm notifications. Environmental regulation of the seawater provides the optimal environmental conditions for coral survival, growth, and reproduction. Parameters for each raceway can be modified to suit the needs for species-specific requirements and region-specific environmental conditions.



ABOVE: Two of the four independent series of raceways within the gene bank.



LEFT: Mountainous Star coral (*Orbicella faveolata*).

RIGHT: Mote's land-based spawning system that mimics environment cues to elicit coral spawning.

INTEGRATION OF MOTE'S LAND-BASED CORAL SPAWNING LABORATORY

Mote's International Coral Gene Bank is outfitted with a separate dedicated coral spawning laboratory with the capacity to hold several ex-situ coral spawning systems. These systems are programmed to follow seasonal variations in temperature, light, and lunar cues to allow for coral spawning year-round. Complete control of these parameters provides the necessary cues to produce gametes (eggs and sperm) and elicit spawning for controlled fertilization. The ability to create sexually produced corals within a controlled environment increases the adaptive potential of populations that will be used to restore our world's coral reefs, thus increasing resiliency through these assisted reproductive events.

GOALS

Mote's International Coral Gene Bank will

- i) provide a safe-haven for corals that are on the brink of local and regional extinction,
- ii) maintain genetically diverse broodstock for future generations of corals,
- iii) ensure genetic diversity within restoration populations,
- iv) create thousands of new corals through assisted sexual reproduction,
- v) eliminate the need for harvesting corals in the wild for research-based purposes, and
- vi) encourage the study and preservation of corals for biomarker development and resilient reef restoration activities.