

The Value of Coral Reef Infrastructure

Coral reefs span an estimated 3,400 miles of United States coastline, dramatically mitigating storm surge and flooding for houses, businesses and city infrastructure across coastlines from Florida and the Caribbean to Hawaii and the greater U.S. Pacific. Despite covering one percent of the Earth's surface, reefs host an estimated 25% of marine species, making them drivers of fisheries and tourism, fueling entire economies.

Coral reefs can absorb up to **97% of wave energy**¹

Flood risk reduction benefits valued at
\$2.6 billion
annually across the U.S.²

Recreational fishing created
\$509 million
in economic impact in Florida alone in 2016³

\$1.97 billion
in economic impacts from tourism in the Florida Keys National Marine Sanctuary alone in 2019⁴

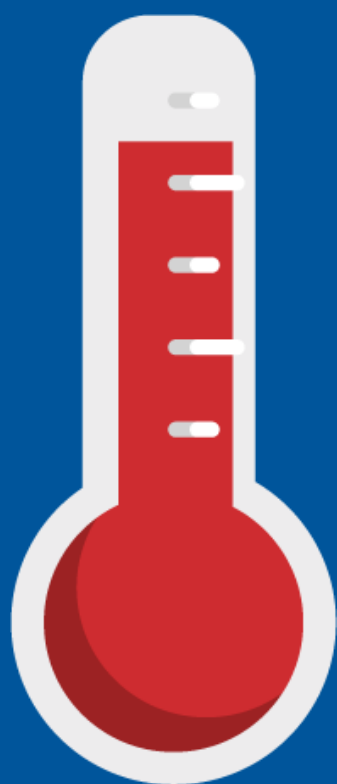
*These estimated values of the economic benefits and impacts of coral reefs annually reflected in 2024 US dollars

Graphic: NOAA/OAR

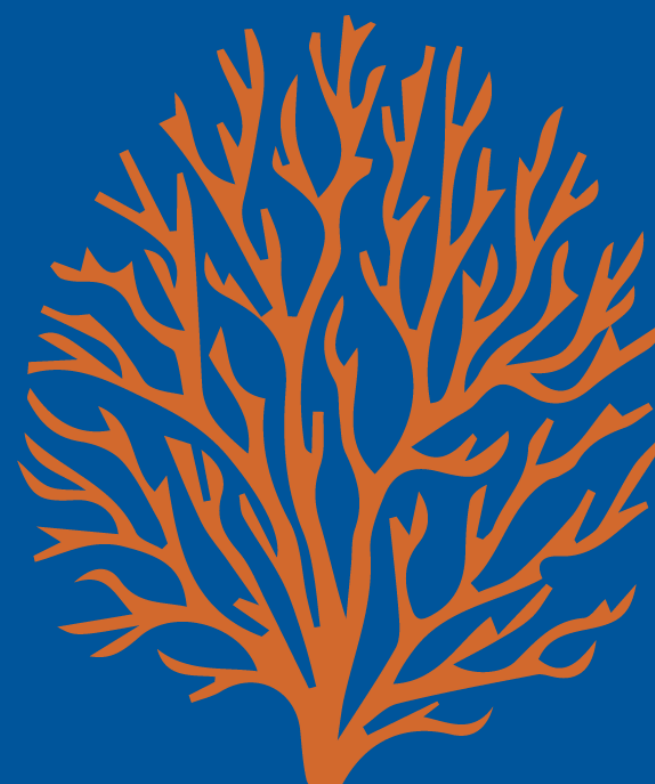
Increasingly acidic oceans, above-average sea surface temperatures, and rapidly spreading coral diseases are among the major stressors threatening corals. These rising environmental stressors are outpacing the ability of reefs to adapt naturally - but we can still do something about it.

25%

of the Earth's live coral cover has been lost in the last 30 years⁵



99%
of Atlantic coral reefs have experienced bleaching-level heat stress since 2023⁶



70%
of Florida's 350-mile barrier reef is eroding⁷

¹ Ferrario et al., 2014. The effectiveness of coral reefs for coastal hazard risk reduction and adaptation, *Nature Communications* 5(3794) (2014).

² Storlazzi et al. Estimated benefits U.S. coral reefs provide annually, valued in 2010 USD, *U.S. Geological Survey Open-File Report 2019-1027*, (2019).

³ Wallmo, K, et al. Economic Impact Analysis of Recreational Fishing on Florida Reefs. *NOAA Technical Memorandum CRCP 41*, 11 (2021).

⁴ Gazal, K. et al. Economic Impacts of Visitor Spending in Ocean Recreation in the Florida Keys National Marine Sanctuary. *Water* 14(2), 198 (2022).

⁵ Towle, E et al. NOAA Coral Reef Conservation Program Coral Reef Condition: A Status Report for Florida Coral Reefs. *NOAA Coral Reef Conservation Program (CRCP)*, 1 (2020).

⁶ Thiem, H. How does 2023-24 global coral bleaching compare to past events?, *Climate.gov*. (2024).

⁷ Morris, J et al. Low net carbonate accretion characterizes Florida's coral, *Sci Rep* 12, 19582. (2022).

Our team at AOML is comprised of ecologists, molecular biologists, engineers, chemists, computer programmers, modelers and students committed to advancing research that enhances the resilience of reef-building coral species and maximize the success of restoration efforts. Working across the breadth of projects, we focus our efforts on three main areas:



1. Sustained Ocean Observations

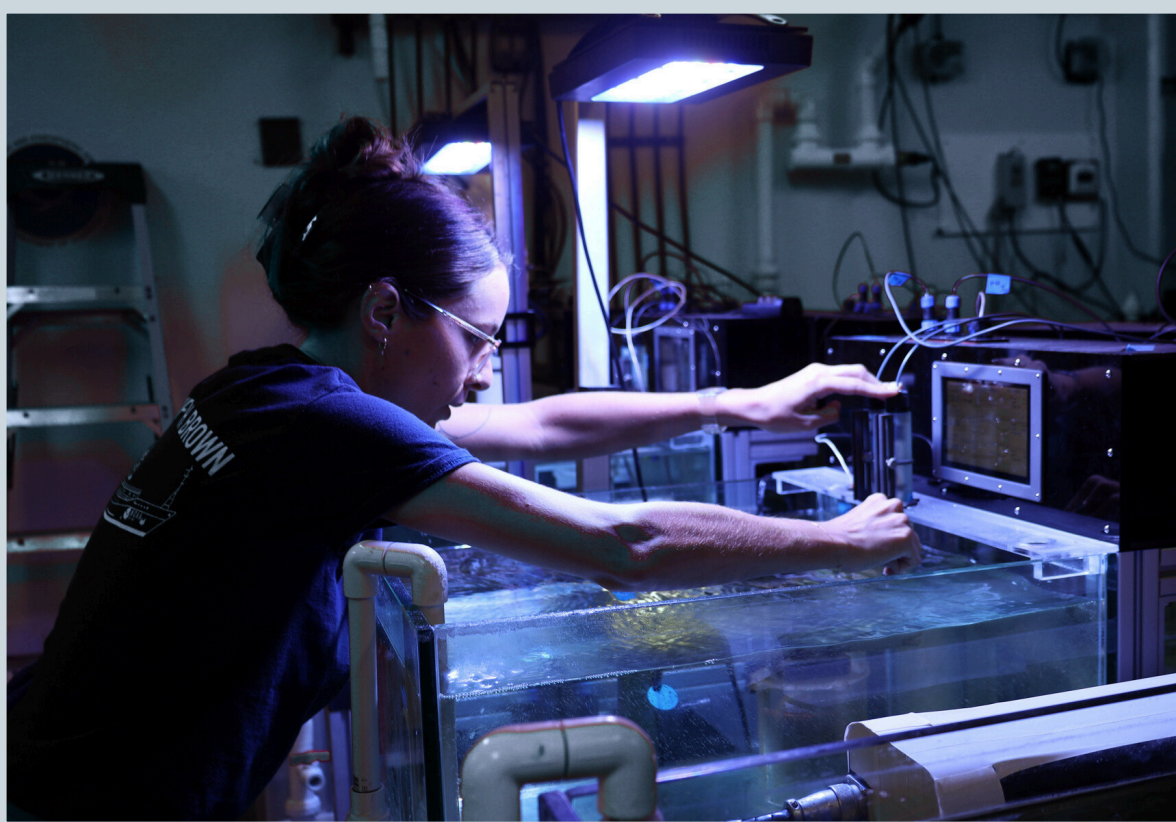


Leading one of the longest-running coral reef monitoring efforts in the US

Tracking ecosystem changes over decades allows us to evaluate reef health, identify drivers of decline, and provide robust management recommendations. As part of NOAA's National Coral Reef Monitoring Program (NCRMP), our team has monitored reefs across Flower Garden Banks, Florida, Puerto Rico and the U.S. Virgin Islands since 2013.



2. Understanding Coral Resilience

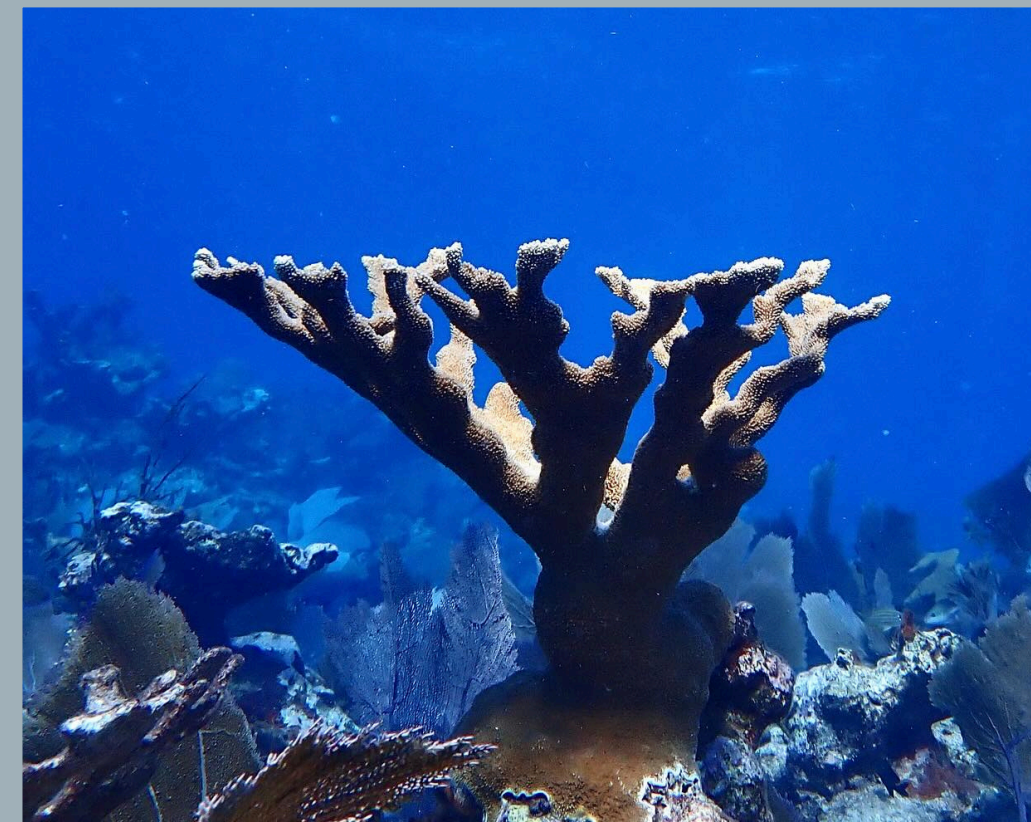


Actively stress-testing and hardening reef-building corals

In our state-of-the-art Experimental Reef Lab, our team is manipulating ocean conditions in independent aquaria to stress-test reef-building coral species and identify thresholds to specific environmental stressors including ocean acidification, above-average temperatures and coral diseases.



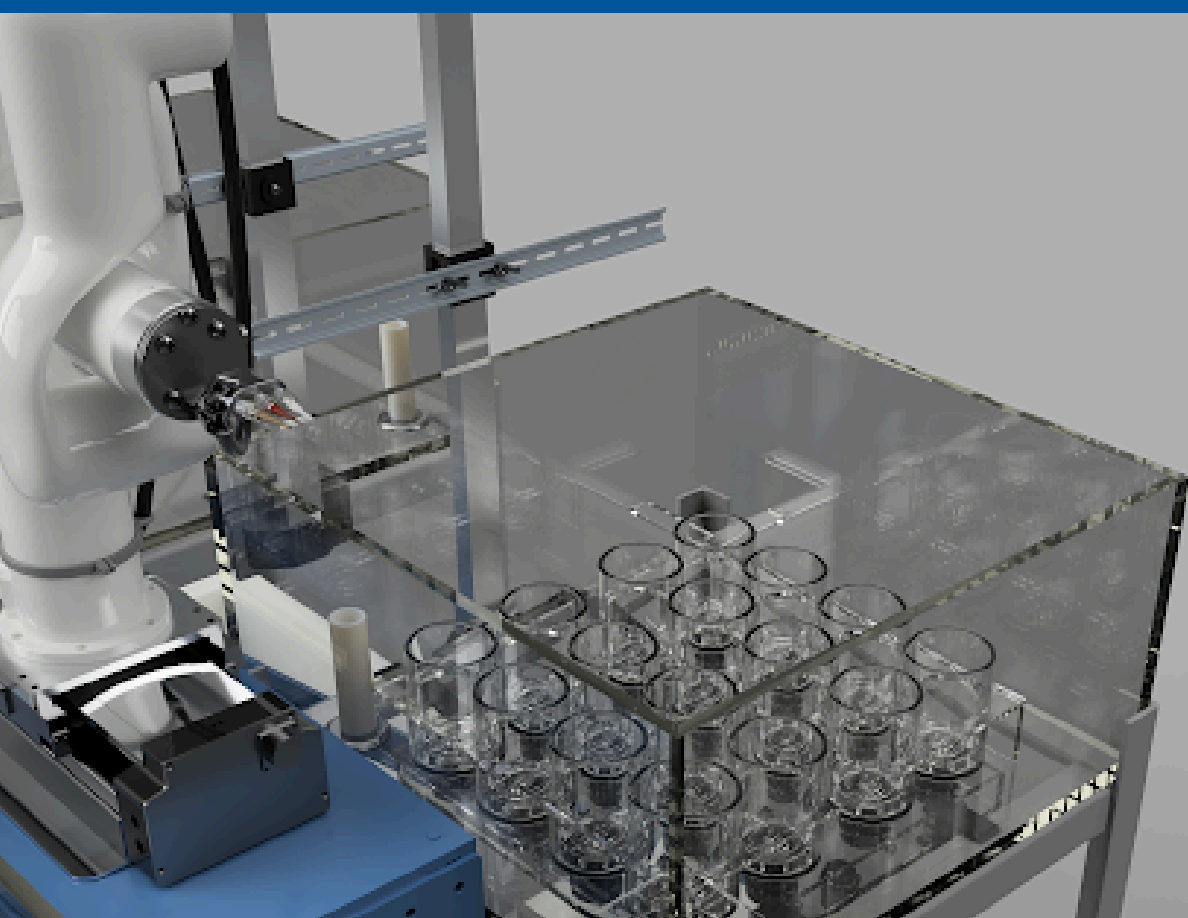
3. Enhancing Coral Restoration



Fueling restoration efforts, informing key management decisions

In collaboration with managers and restoration practitioners, we aim to stress-harden key species through experimentation to enhance corals' resiliency, automate coral propagation and increase their growth rates. We also monitor ocean conditions and inform best management for NOAA's ambitious Mission: Iconic Reefs restoration project throughout the Florida Keys.

Innovating **customizable and scalable technologies** to expand the research we are able to perform



We are integrating
**Robotic Automation and
Advanced Aquaculture
control systems** to test
reef-building corals'
response to ocean
conditions

Explore Our Research:



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