NOAA Deep Dive: Florida Coral Reef Bleaching Event

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National Oceanic and Atmospheric Administration

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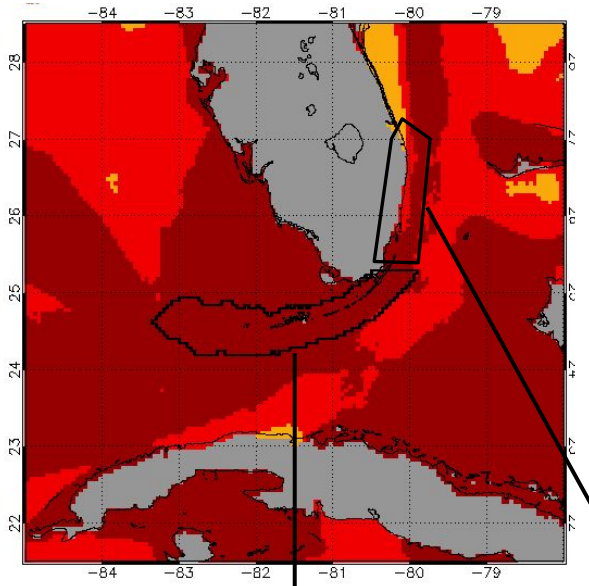
Florida Coral Bleaching-Level Heat Stress

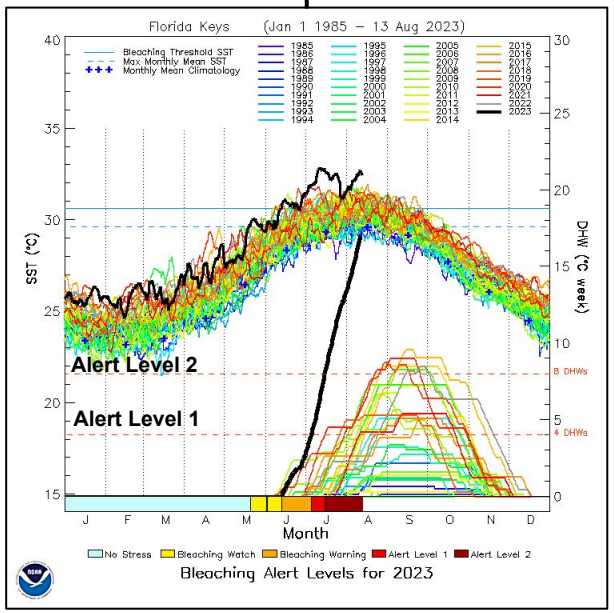
- Unprecedented bleaching-level heat stress impacting all of Florida's Coral Reef
- Heat stress developed earlier than ever before by 5-6 weeks
- Sea Surface Temperatures for Florida Keys Virtual Station have been higher than previous record value for 27 of past 36 days
- Southeast Florida has never before reached Alert Level 2 conditions
- Most extreme heat stress in lower/middle Florida Keys

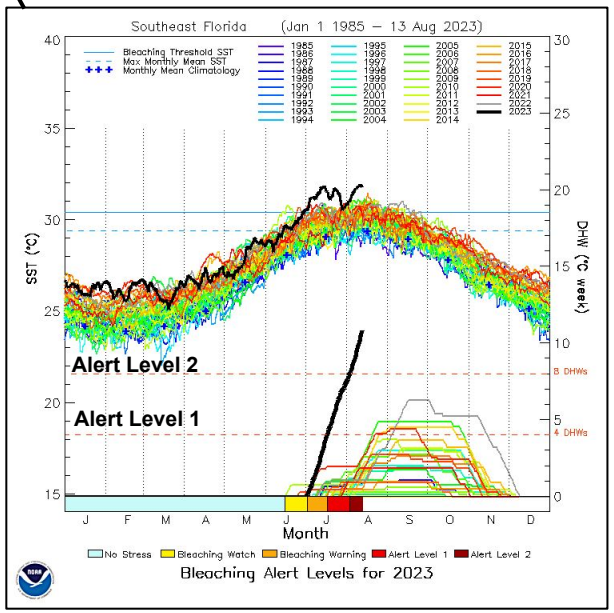


No stress
Bleaching Watch
Bleaching Warning
Bleaching Alert Level 1
Bleaching Alert Level 2

Bleaching Alert Level 1
Significant bleaching likely

Bleaching Alert Level 2
Severe bleaching and significant mortality likely



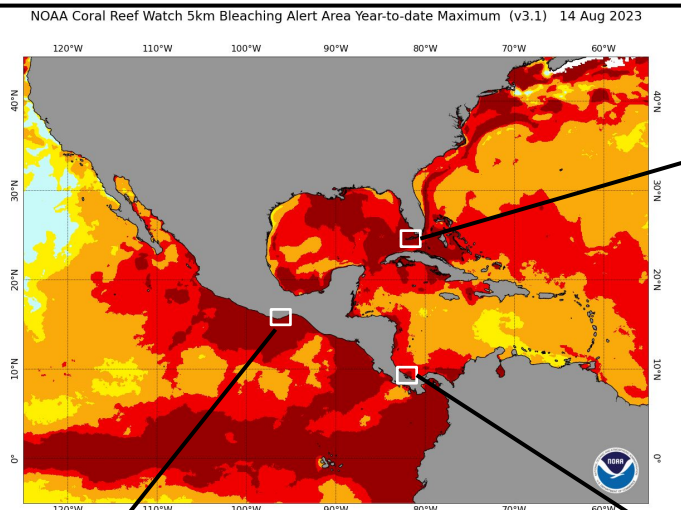


Year-to-Date Bleaching Alert Area

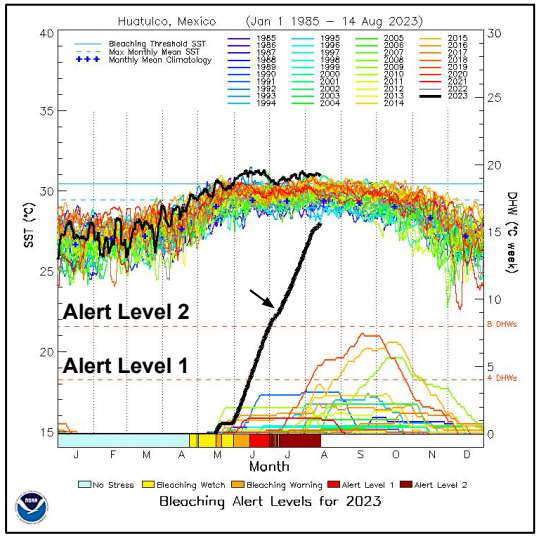
- No stress
- Bleaching Watch
- Bleaching Warning
- Bleaching Alert Level 1
- Bleaching Alert Level 2

Bleaching Alert Level 1
Significant bleaching likely

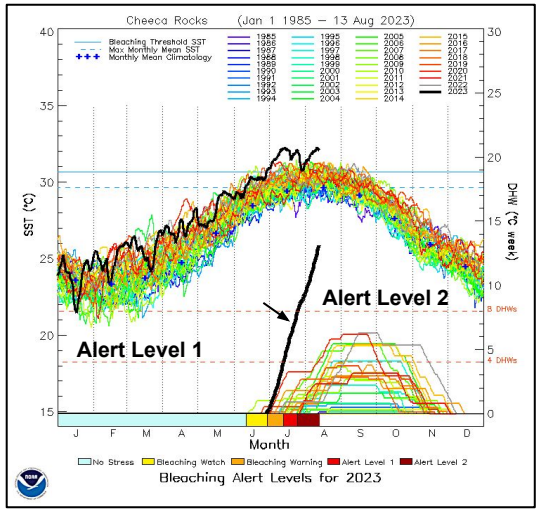
Bleaching Alert Level 2
Severe bleaching and significant mortality likely



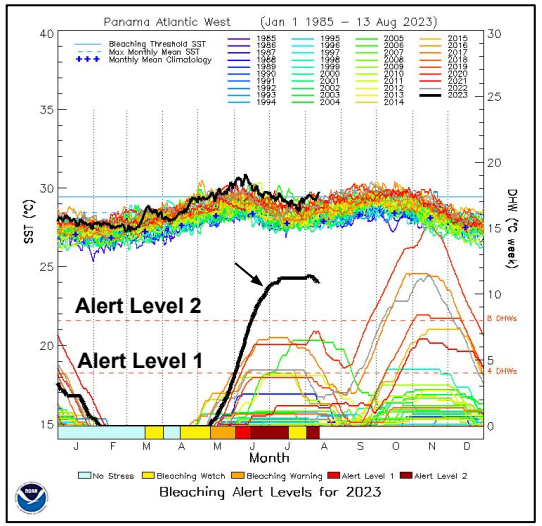
Huatulco Reef, Mexican Pacific. 13 July 2023. Mass bleaching of *Pocillopora* reef. Image credit: A. Lopez-Perez. Arrow on plot shows when photo was taken.



Cheeca Rocks, Florida Keys. 24 July 2023. Image credit: G. Kolodziej/NOAA. Arrow on plot shows when photo was taken.



Bocas del Toro, Caribbean Panama. 14 July 2023. Image credit: J. Sanchez. Arrow on plot shows when photo was taken.

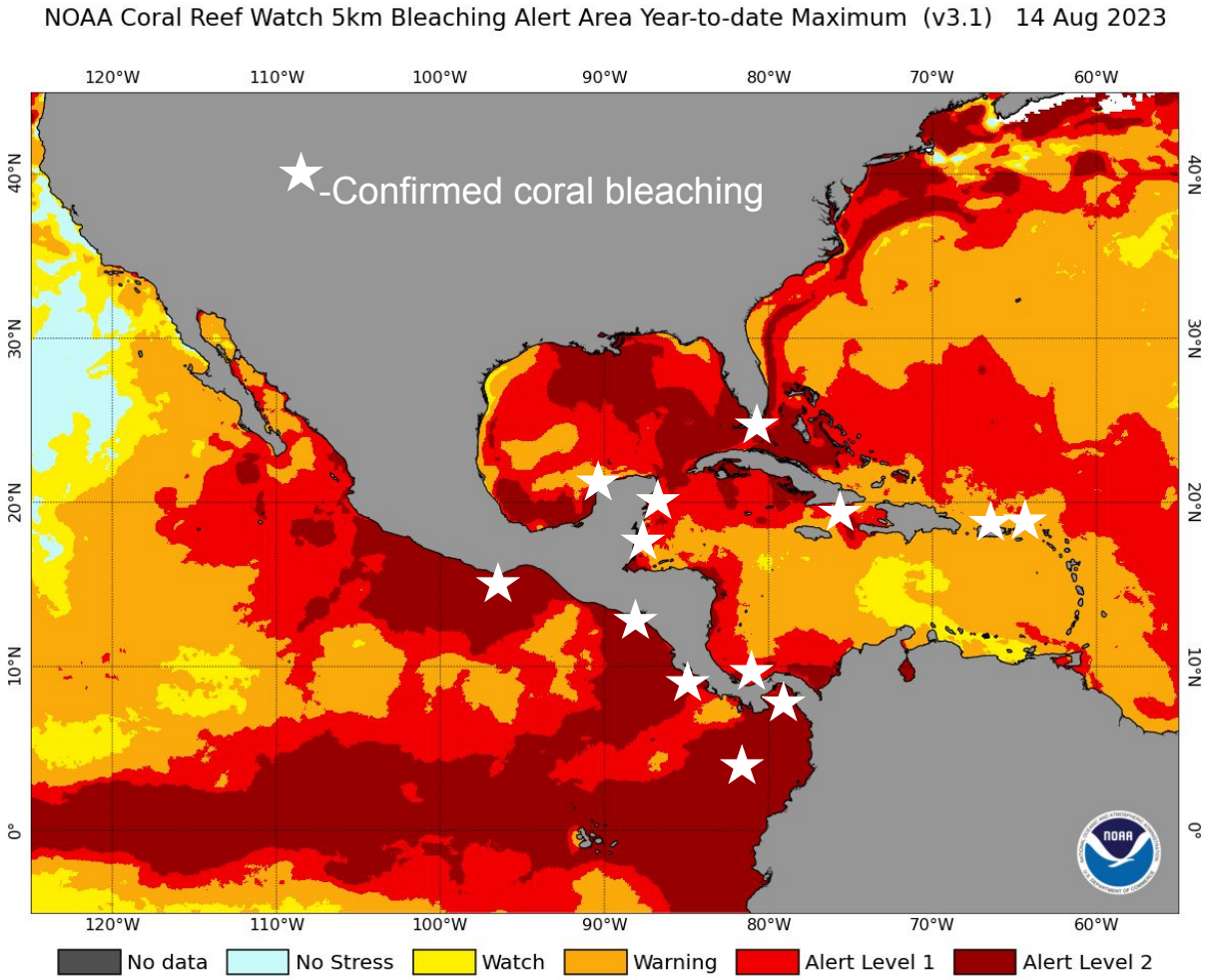


All unbleached areas are recent, heat-driven mortality of *Acropora cervicornis*, which is listed as threatened under the Endangered Species Act.

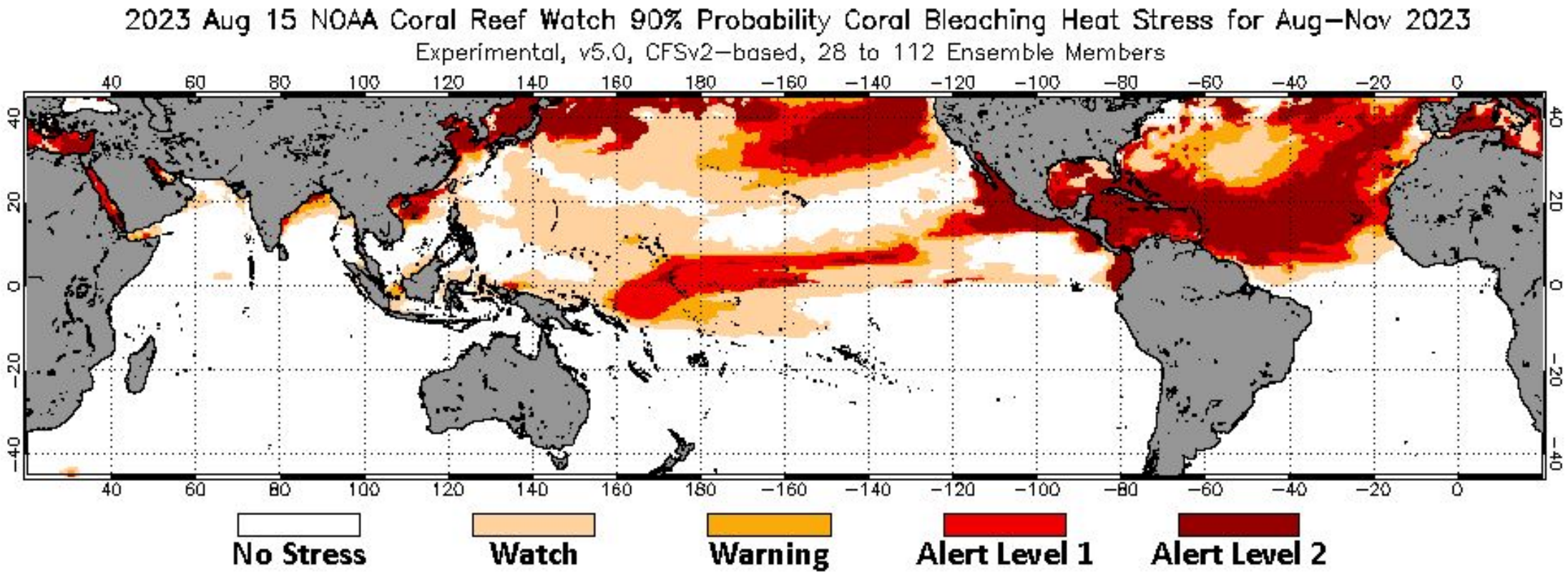
Year-to-Date Bleaching Alert Area

Confirmed coral bleaching

- 5 countries in Eastern Tropical Pacific
  - Mexico
  - El Salvador
  - Costa Rica
  - Panama
  - Columbia
- 7 countries/territories in Atlantic
  - Florida
  - Mexico (both sides of Yucatan)
  - Panama
  - Belize
  - Cuba
  - Puerto Rico
  - US Virgin Islands



Modeled Four-Month Coral Bleaching Outlook (Updated weekly)



Coral Reef Watch Summary

- Large-scale heat stress and coral bleaching event underway, impacting two ocean basins and multiple countries

- All sites in Caribbean and Atlantic are experiencing:
  - ***Sea Surface Temperatures as high, or higher than ever before in satellite record***
  - ***Accumulation of heat stress earlier than ever before***

- Entirety of Florida Keys experiencing Alert Level 2 conditions
  - Some sites already exposed to 2 times greater amount of heat stress than when mortality is expected to begin
  - Take-home: ***Corals in Florida are experiencing extreme levels of heat stress that have never been experienced before***

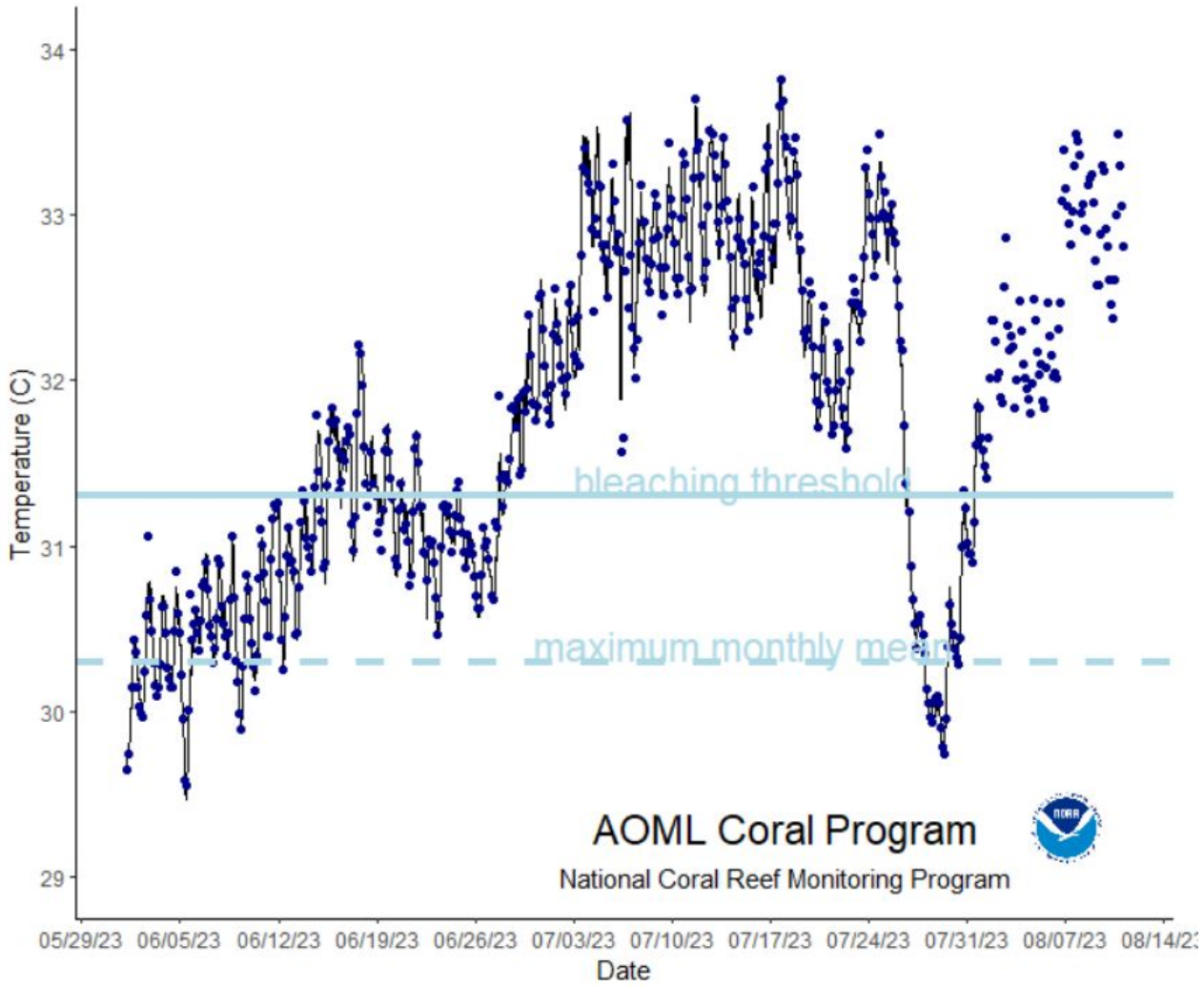
- Outlook product predicts intensifying heat stress across entire Caribbean
  - **Caribbean-wide bleaching event may begin in a matter of days to weeks**
  - Alert Level 2 conditions predicted for majority of Caribbean coral reef sites by end of September

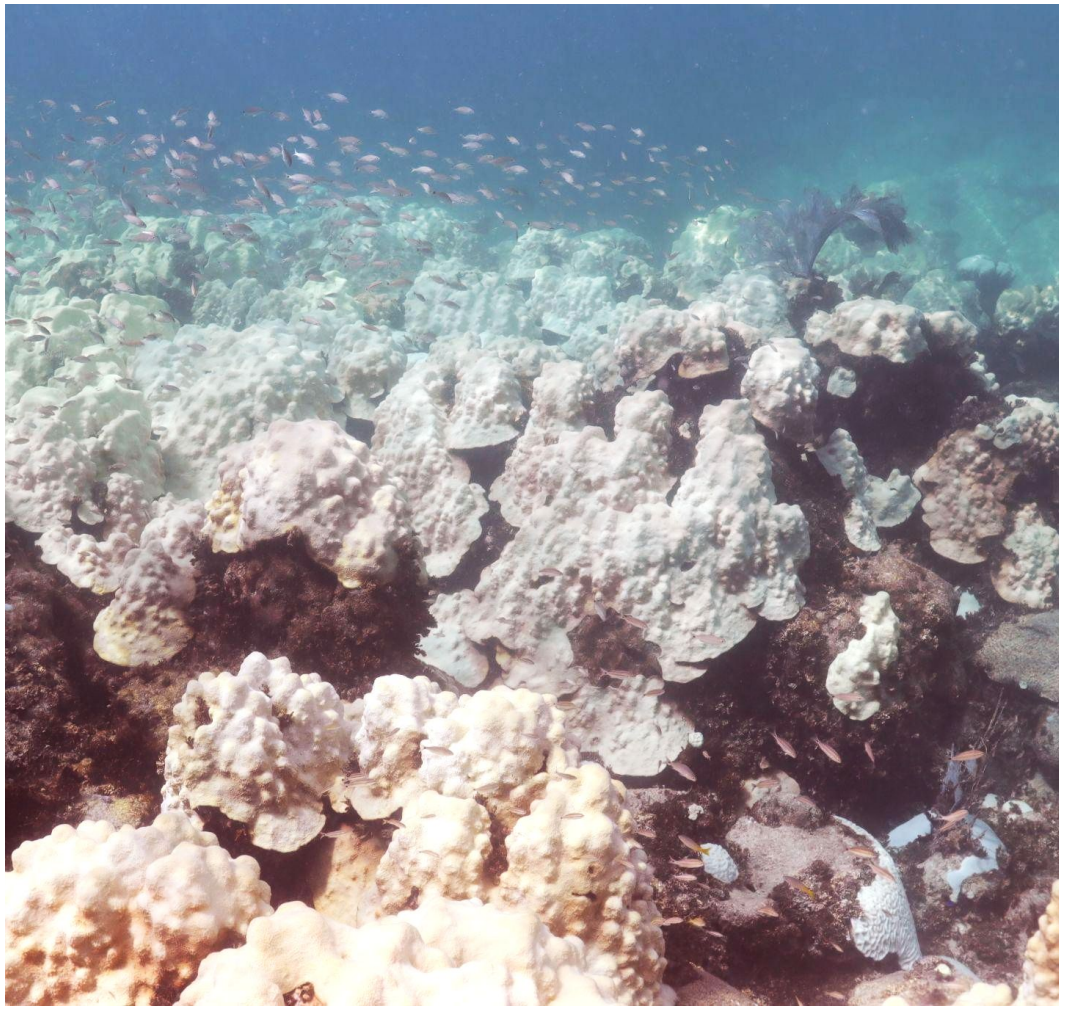
Cheeca Rocks, FKNMS

Cheeca Rocks

- ***Resilient site with high coral cover***
- ***Climate sentinel site for NOAA's National Coral Reef Monitoring Program***
- ***More than a decade of environmental and ecological data have driven science***
- ***A Mission: Iconic Reefs restoration site***

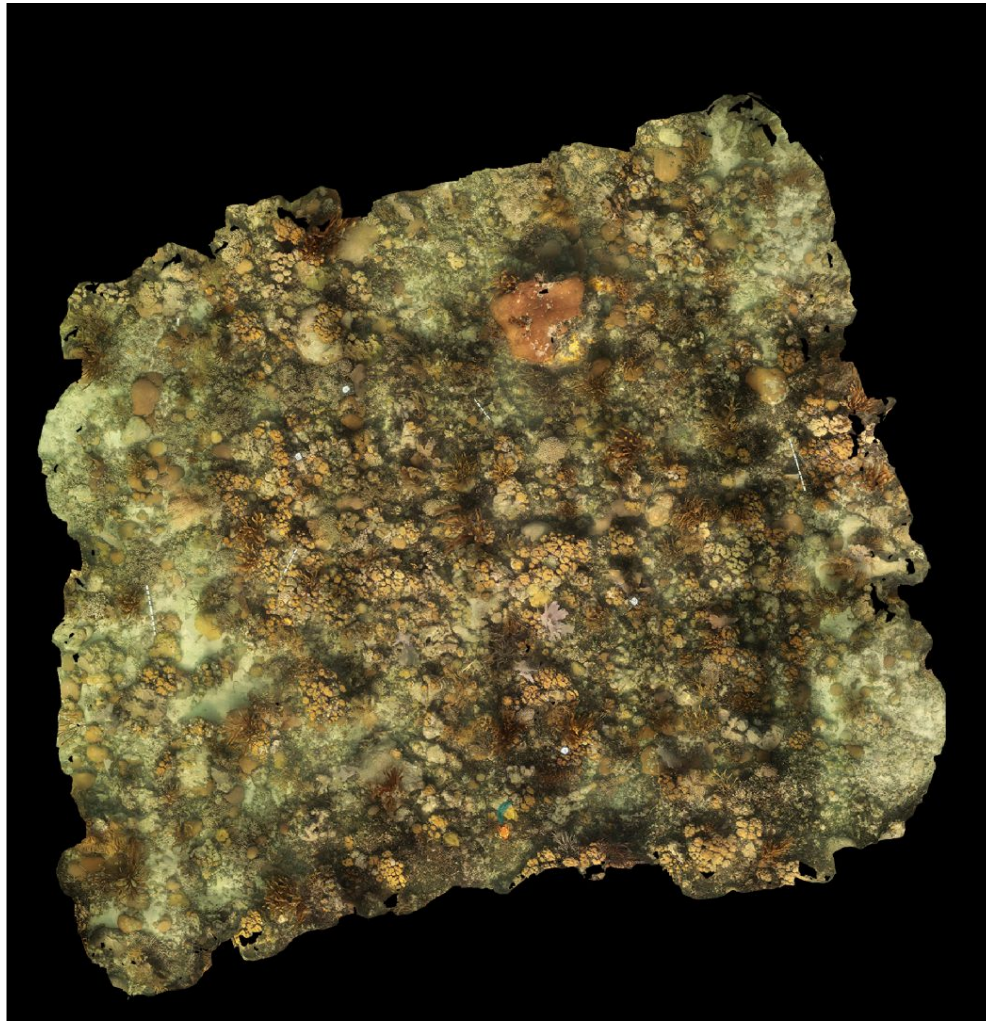
Bleaching at Cheeca Rocks



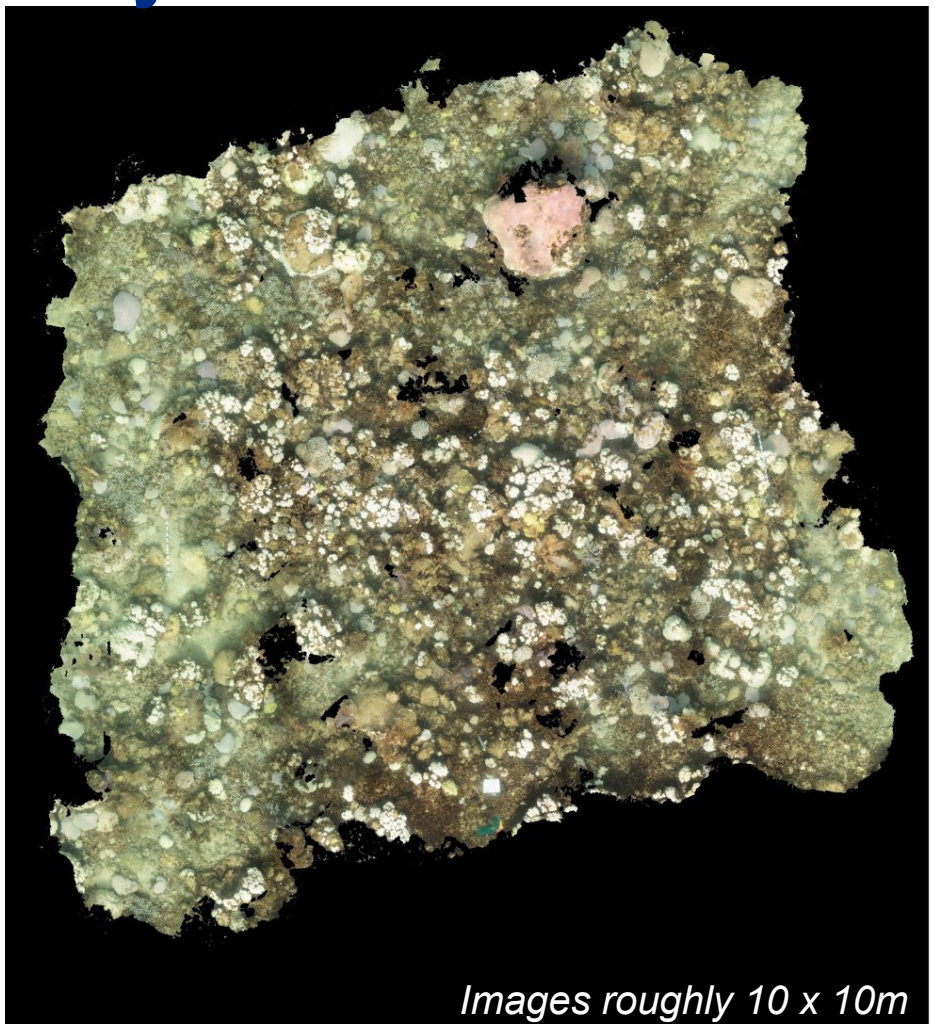


Bleaching at Cheeca Rocks

June 30

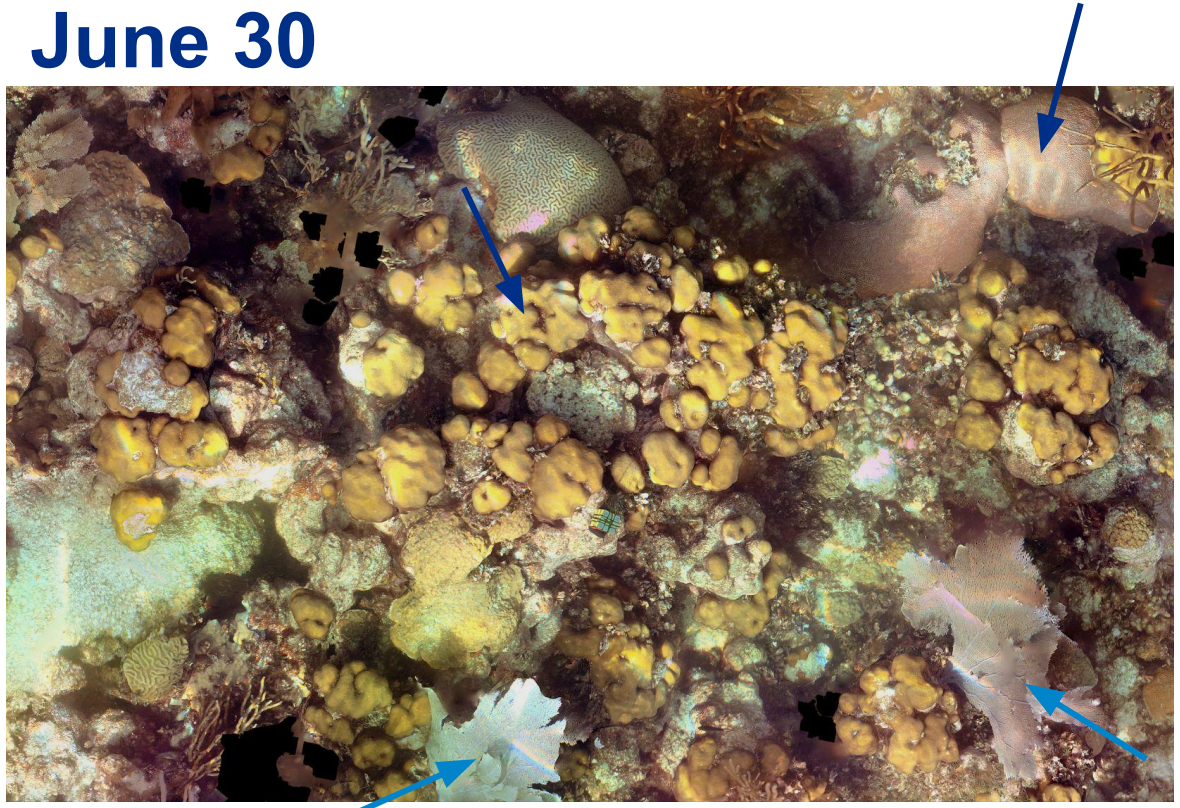


July 24

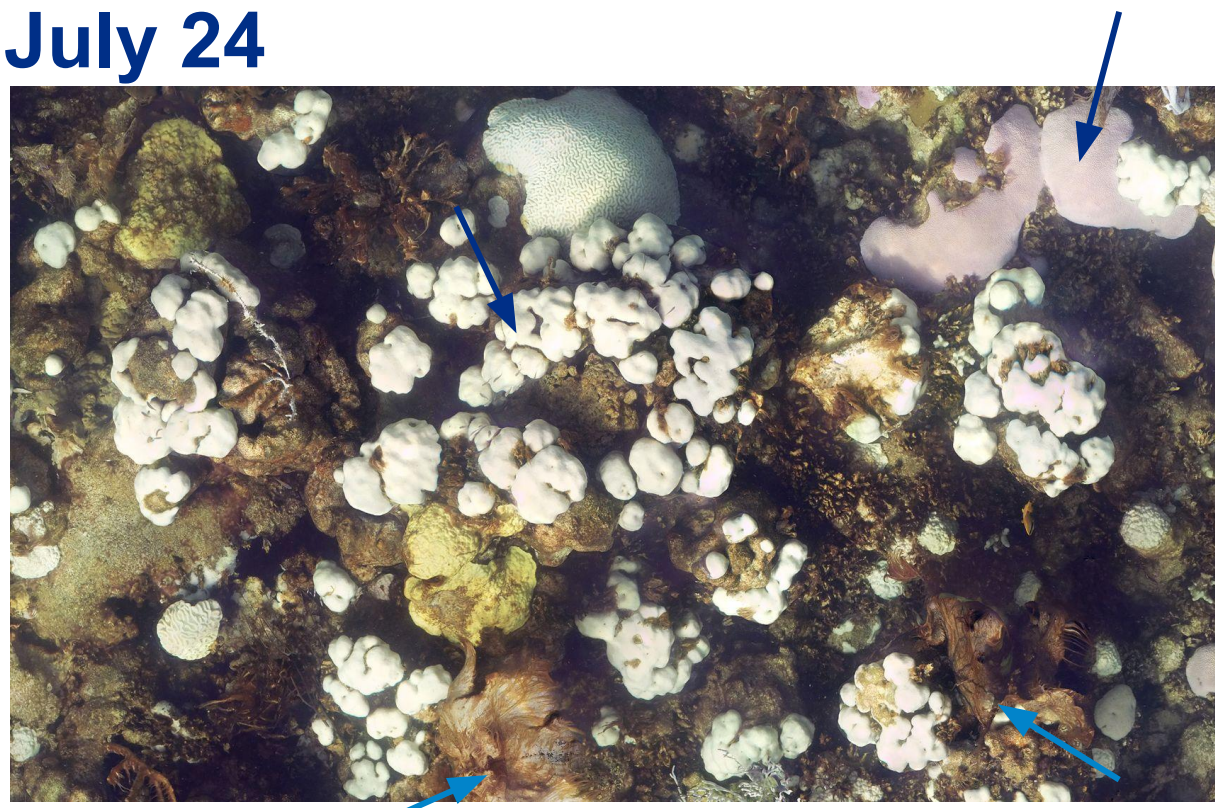


Impacts on the ecosystem

June 30



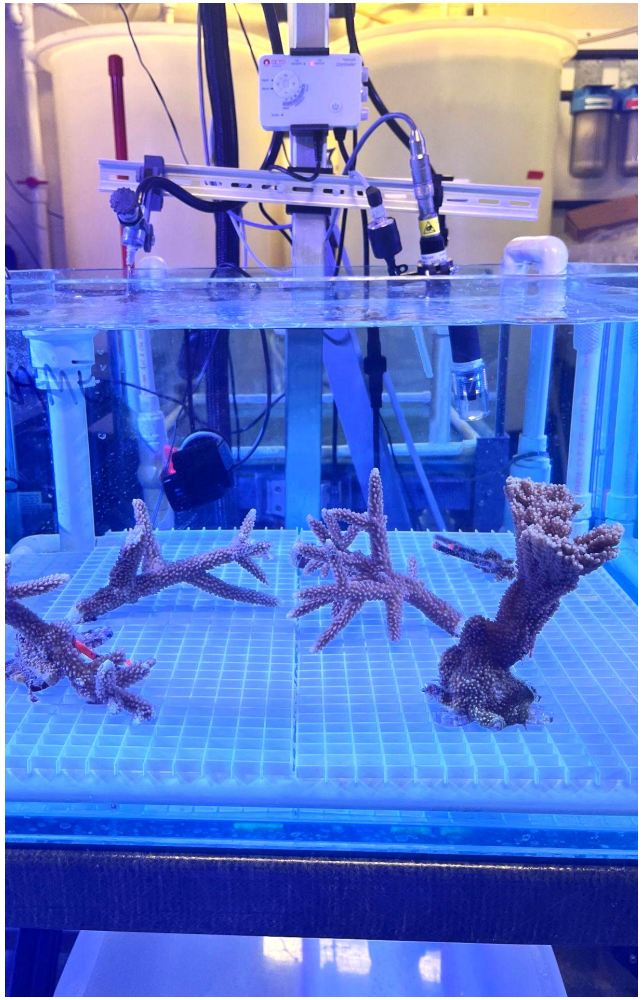
July 24



All hard coral species are bleached or pale

Soft corals such as sea fans have died

Solution-driven science for restoration



Performance assessment

Different genotypes have different tolerances

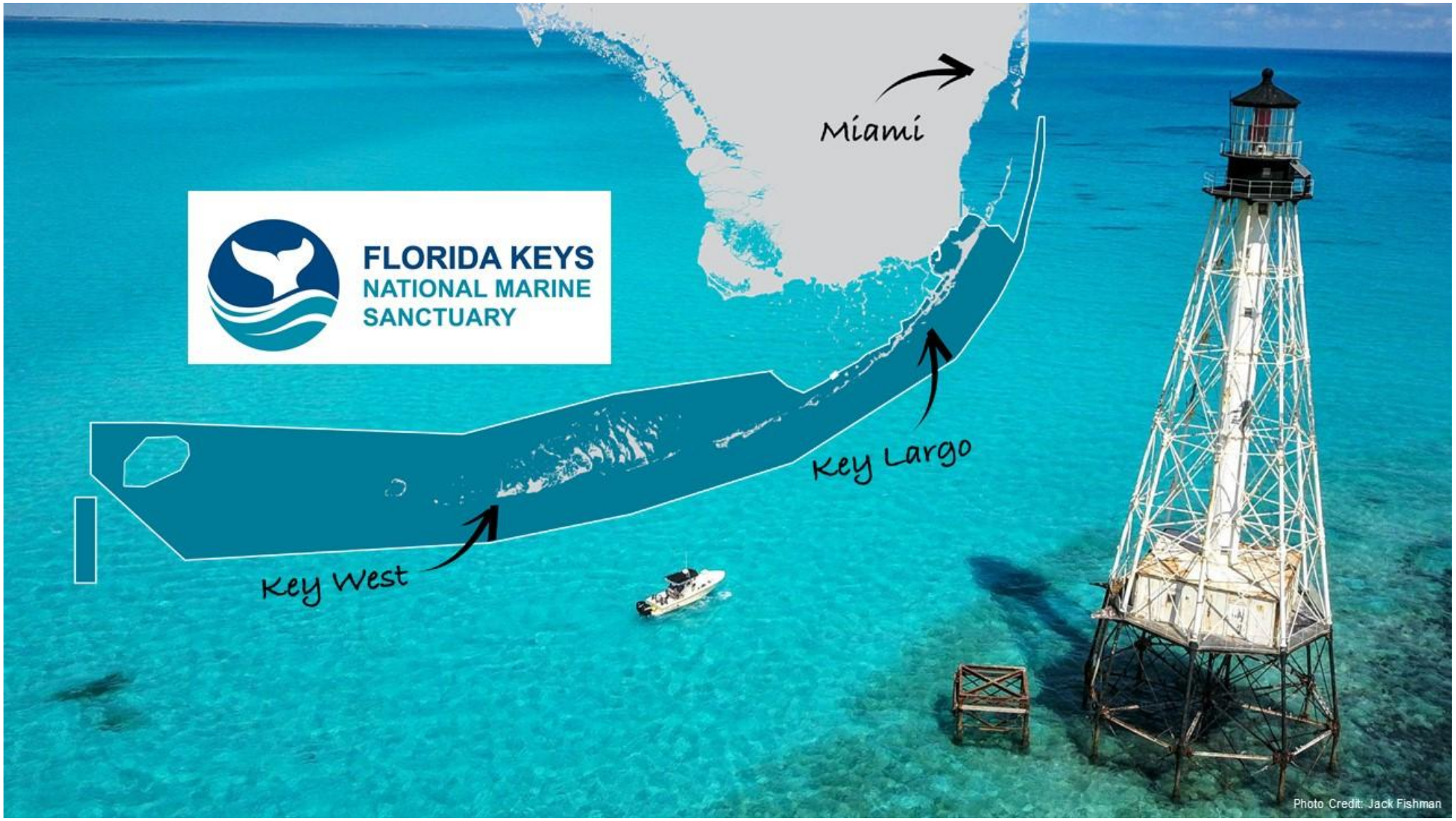
Automation for restoration

Increase efficiency and decrease costs

Stress hardening

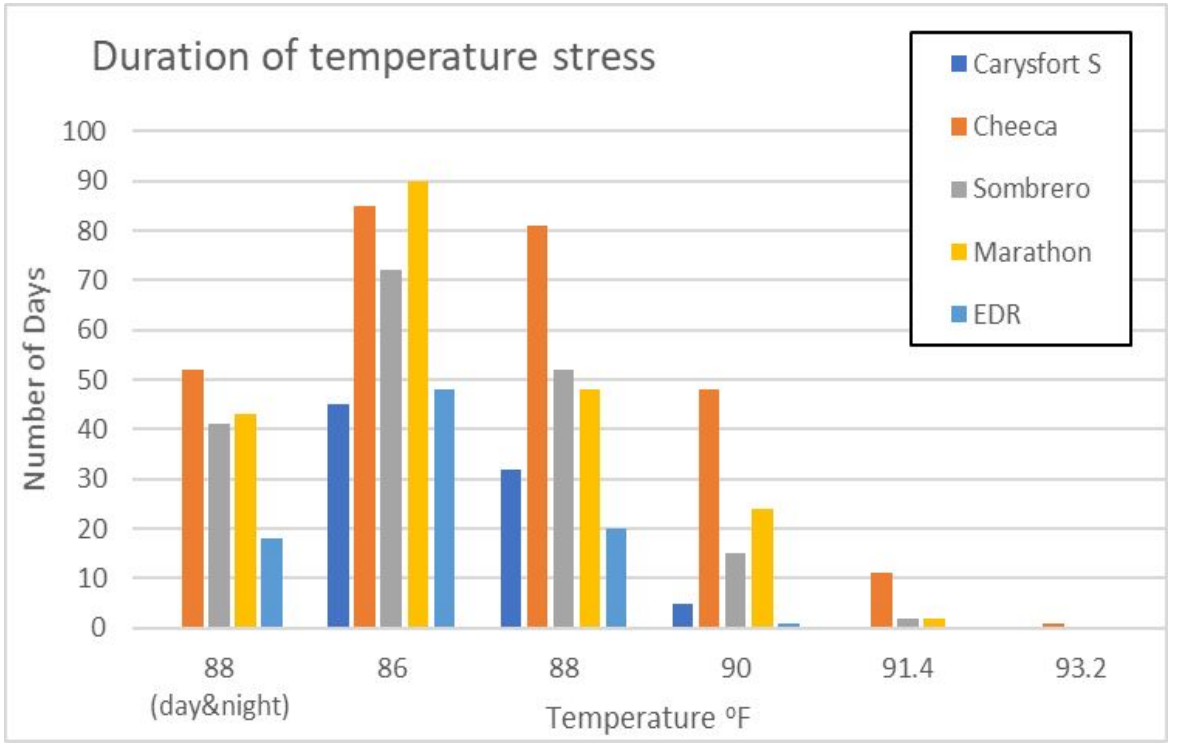
Naturally prepare corals for stress in the wild

Florida Keys National Marine Sanctuary




LIFE CYCLE
MISSION:
ICONIC REEFS
CARYSFORT REEF
HORSESHOE REEF
CHEECA ROCKS
SOMBRERO REEF
NEWFOUND HARBOR
LOOE KEY REEF
EASTERN DRY ROCKS
1
Site Preparation
REEFS
20 YEARS
500,000 CORALS
$100 MILLION
2
Coral Propagation,
Rearing and Planting
3
Thousands of Algae-Eating
Grazers
4
Stewardship
and Maintenance
5
Monitoring and
Adaptive Management
Goal:
Self-Sustaining

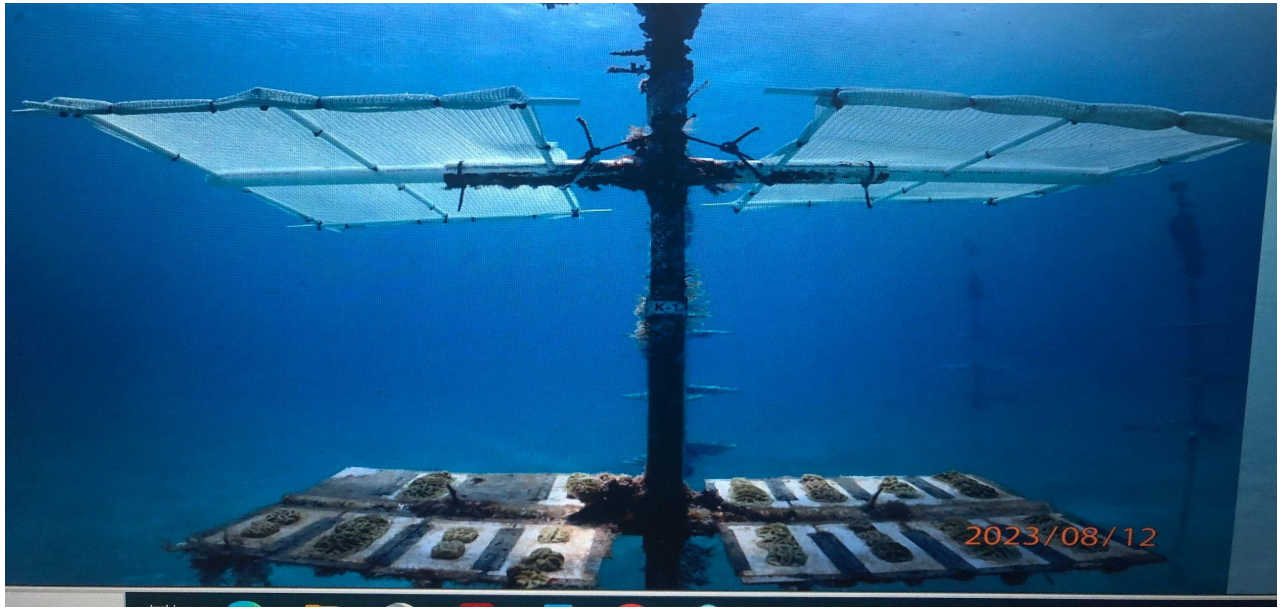
Variable stress, variable impacts



Rethinking restoration: operationalizing research

- ID & propagate resilient genotypes
- ID resilient sites
- Research
  - Symbiont shuffling
  - Selective breeding
  - Stress hardening/acclimation
- Novel outplant strategies
- Minimize stress
  - shading
  - predator control
  - herbivory

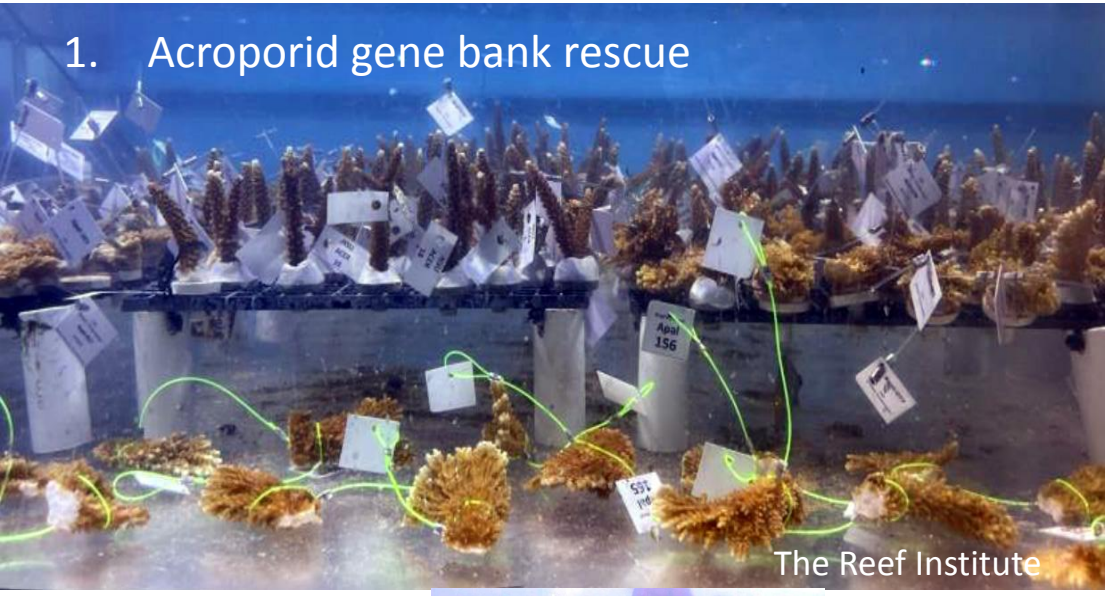
Reef Renewal: Genotypic variation in bleaching resilience



Reef Renewal: Shading nursery structures

Nursery Rescue:
to deep water or onto land

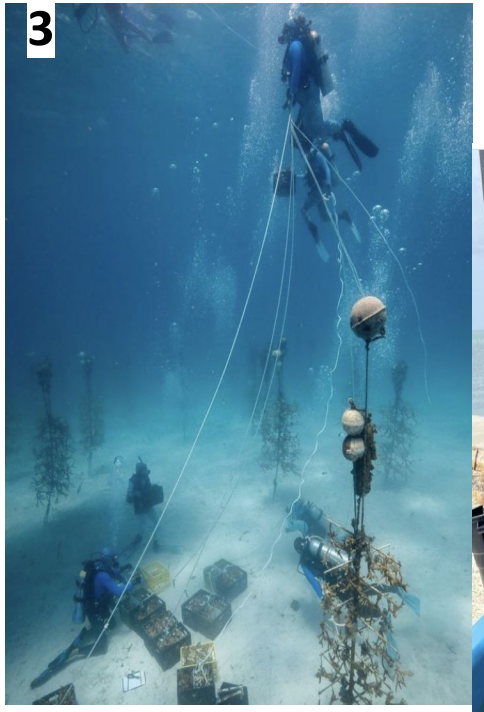
1. Acroporid gene bank rescue



CRF Coral Bus to transport corals

Production stock: moving coral ropes from nearshore nursery (20 feet) to offshore (70 feet) refugia

Acropora spawning Hub: Reef Renewal to FLAQ



Corals maintained at 82-85 ° F

Tavernier nursery (shallow water) to Keys Marine Lab (KML)

For More Information

Media resources:
https://research.noaa.gov/2023/08/15/media-resources-deeper-dive-into-coral-bleaching-event/

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