

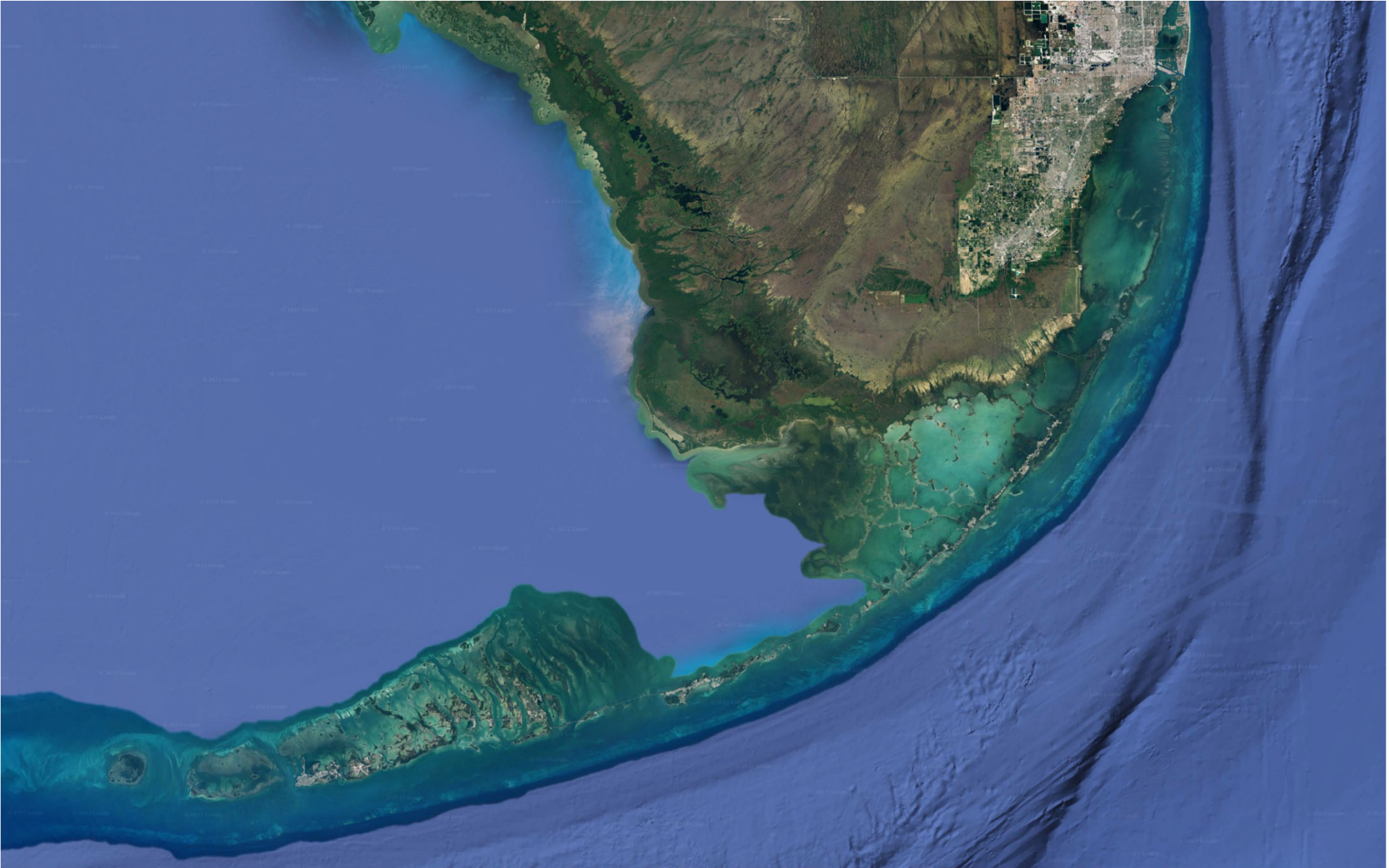


Florida's  
Coral  
Reef

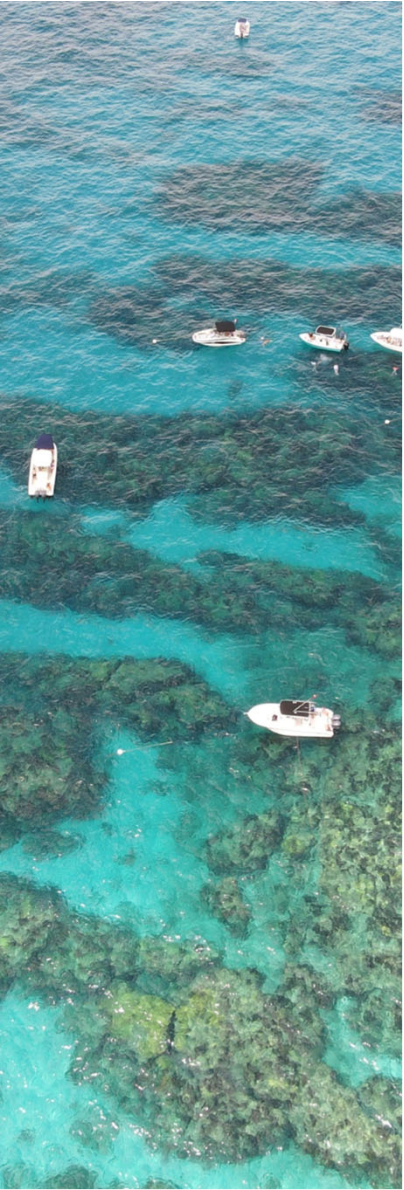
# 2023 Marine Heatwave Impacts and response

Chris Kelble, AOML



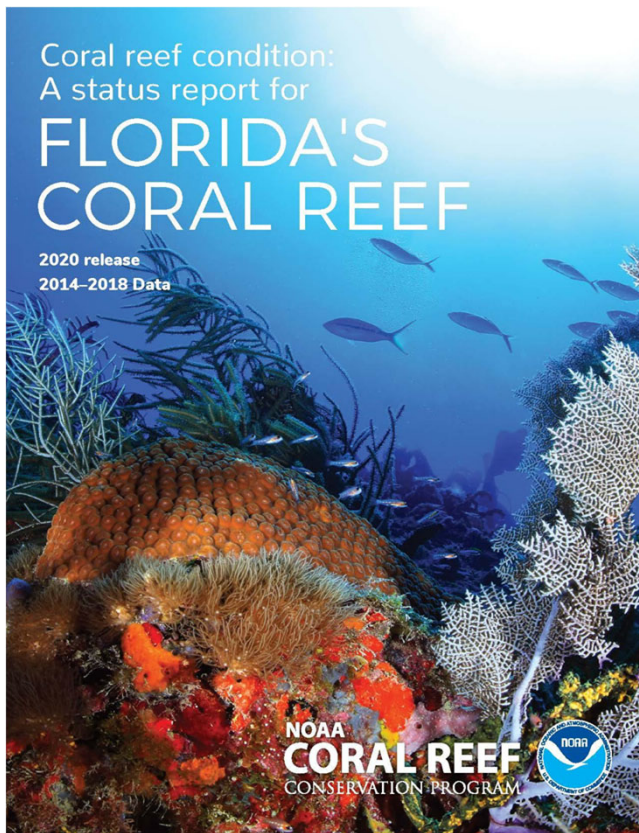








# National Coral Reef Monitoring Program



## FLORIDA'S CORAL REEF IS IMPAIRED

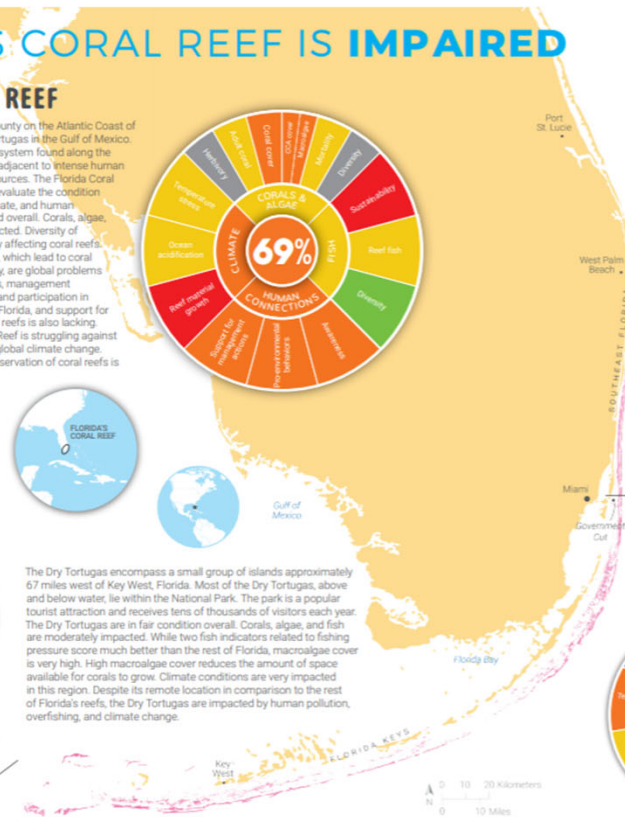
### FLORIDA'S CORAL REEF

Florida's Coral Reef extends from Martin County on the Atlantic Coast of Florida, through the Keys, and to the Dry Tortugas in the Gulf of Mexico. The Florida Coral Reef is the only coral reef system found along the coast of the continental United States. It is adjacent to extensive human development and is heavily used for its resources. The Florida Coral Reef was divided into three sub-regions to evaluate the condition of four categories—corals & algae, fish, climate, and human connections. Florida's Coral Reef is impaired overall. Corals, algae, and fish in the system are moderately impacted. Diversity of fishes is good. Climate is a factor negatively affecting coral reefs. Temperature stress and ocean acidification, which lead to coral bleaching and less coral growth respectively, are global problems seen locally in Florida. Despite these threats, management actions can make a difference. Awareness and participation in pro-environmental behaviors are lacking in Florida, and support for management actions that may improve the reefs is also lacking. These conditions show that Florida's Coral Reef is struggling against threats, such as pollution, overfishing, and global climate change. Public participation in preservation and conservation of coral reefs is needed to protect Florida's Coral Reef.

### DRY TORTUGAS



The Dry Tortugas encompass a small group of islands approximately 67 miles west of Key West, Florida. Most of the Dry Tortugas, above and below water, lie within the National Park. The park is a popular tourist attraction and receives tens of thousands of visitors each year. The Dry Tortugas are in fair condition overall. Corals, algae, and fish are moderately impacted. While two fish indicators related to fishing pressure score much better than the rest of Florida, macroalgae cover is very high. High macroalgae cover reduces the amount of space available for corals to grow. Climate conditions are very impacted in this region. Despite its remote location in comparison to the rest of Florida's reefs, the Dry Tortugas are impacted by human pollution, overfishing, and climate change.



### What do the scores mean?

<b>90-100% Very Good</b> All or almost all indicators meet reference values. Conditions in these locations are unimpacted or minimally impacted or have not declined. *Human connections are very high.	<b>60-69% Impaired</b> Few indicators meet reference values. Conditions in these locations are very impacted or have declined considerably. *Human connections are lacking.
<b>80-89% Good</b> Most indicators meet reference values. Conditions in these locations are lightly impacted or have lightly declined. *Human connections are high.	<b>0-59% Critical</b> Very few or no indicators meet reference values. Conditions in these locations are severely impacted or have declined substantially. *Human connections are severely lacking.
<b>70-79% Fair</b> Some indicators meet reference values. Conditions in these locations are moderately impacted or have declined moderately. *Human connections are moderate.	<b>Insufficient Data</b> Not scored

\*Human connections data are only collected at the overall Florida level, not the sub-region level.

### SOUTHEAST FLORIDA



The Southeast Florida reefs, located north of the Keys, stretch along the Atlantic coast of Florida. This area is heavily populated and has been altered by human development and agriculture. The reefs here are ecologically different than the other reefs of the Florida Coral Reef. The Southeast Florida reefs are impaired, meaning that they are very impacted by human activities. Corals, algae, and fish are in critical condition, while climate is moderately impacted. Restoration of these reefs is needed to improve overall conditions.

### FLORIDA KEYS



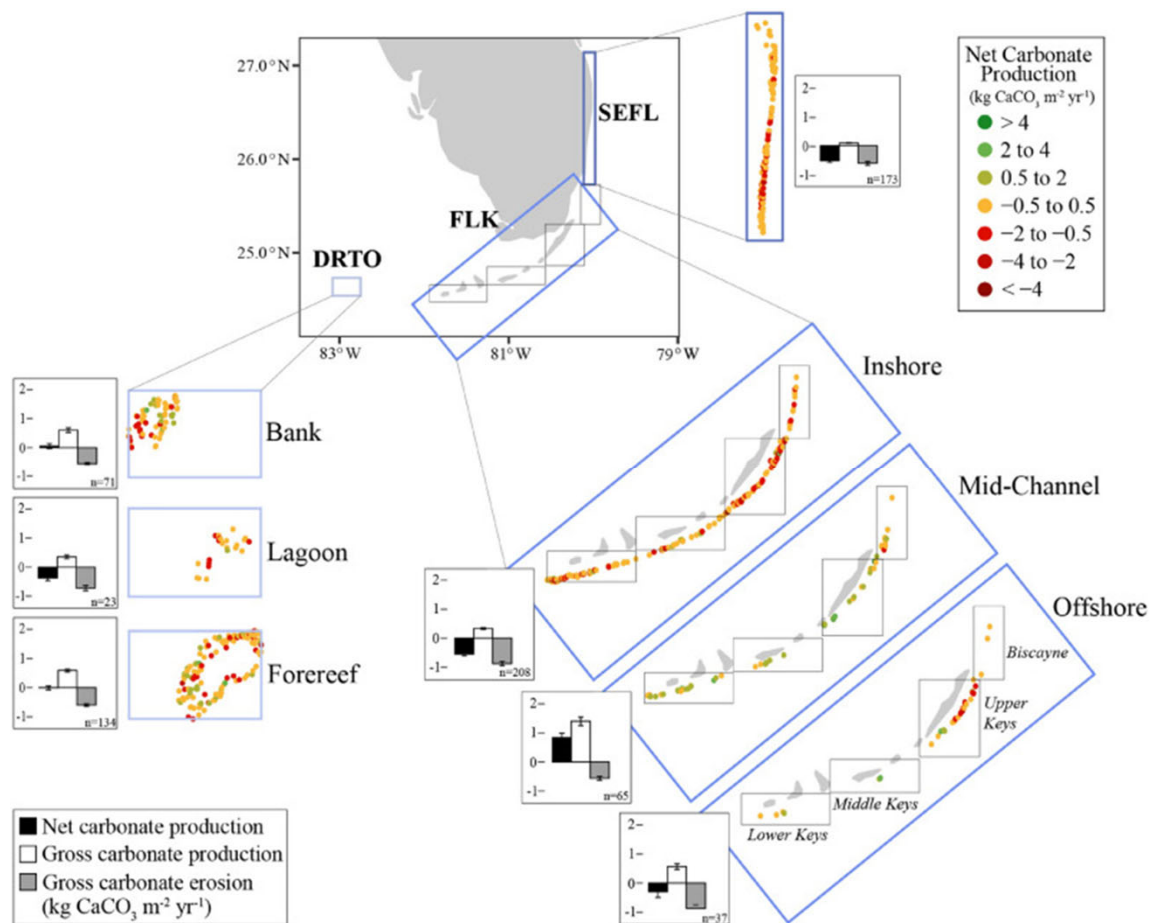
The Florida Keys is a chain of islands stretching south of Miami and just past Key West. The reefs of the Keys stretch well beyond the populated islands that most people are familiar with. Human development and reef use are characteristic of this area. The Keys reefs are in fair condition overall. Corals, algae, and fish are moderately impacted. While coral cover has declined on many reefs in the Keys, some offshore reefs have remained relatively healthy, which justifies a higher adult coral density score in this region. Climate conditions are impaired. Despite the heavy recreation and fishing, the reefs are only moderately impacted.



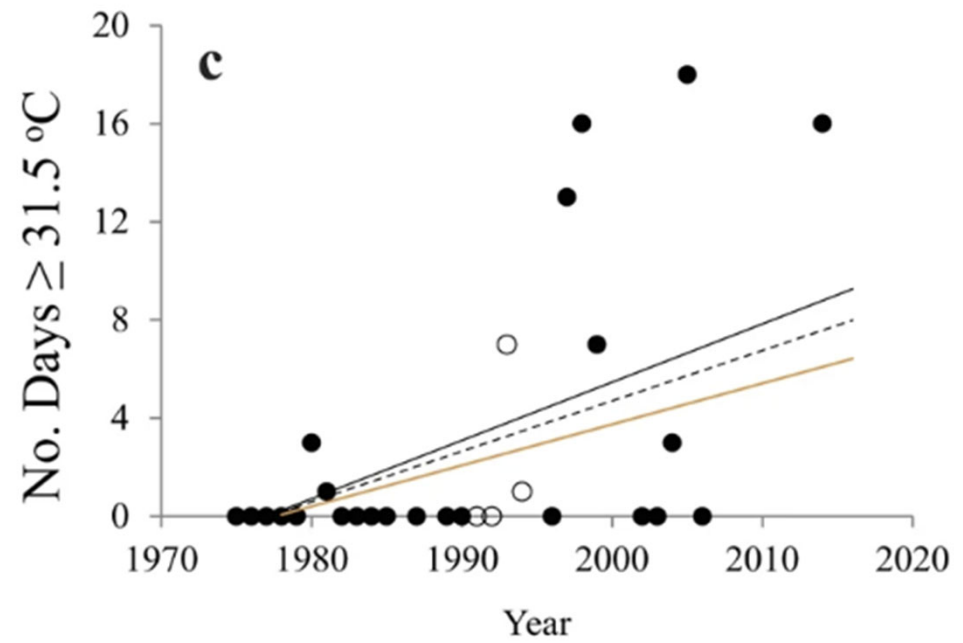
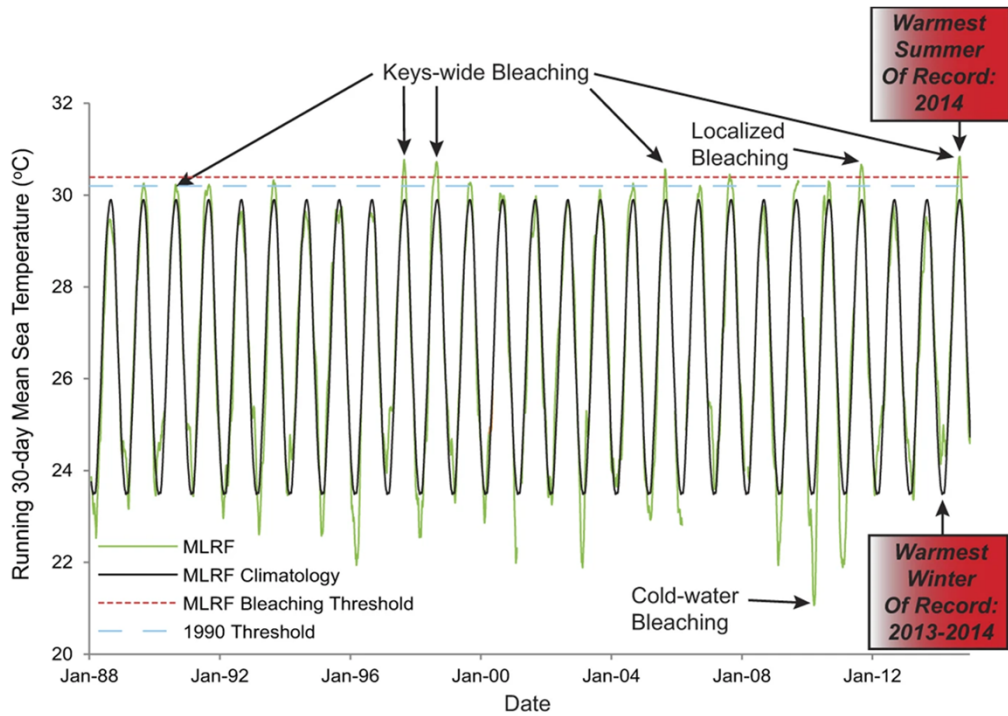
Florida Keys *Decline and current state*



# A carbonate budget perspective







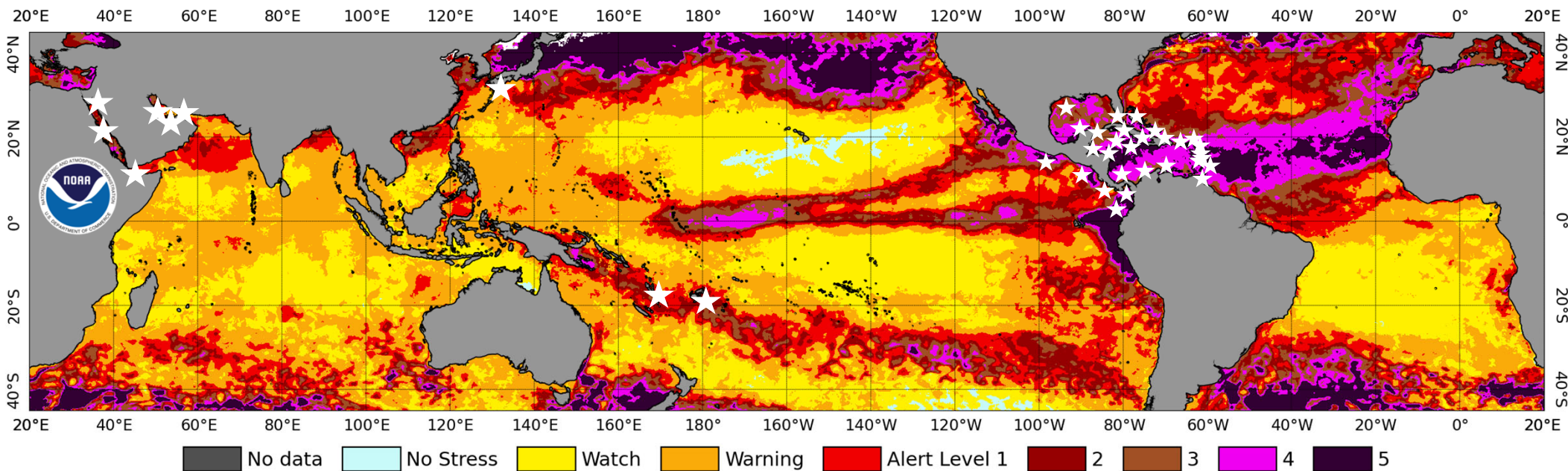


...and then

**This summer happened**



NOAA Coral Reef Watch 5km Bleaching Alert Area Year-to-date Maximum (v3.1) 7 Nov 2023



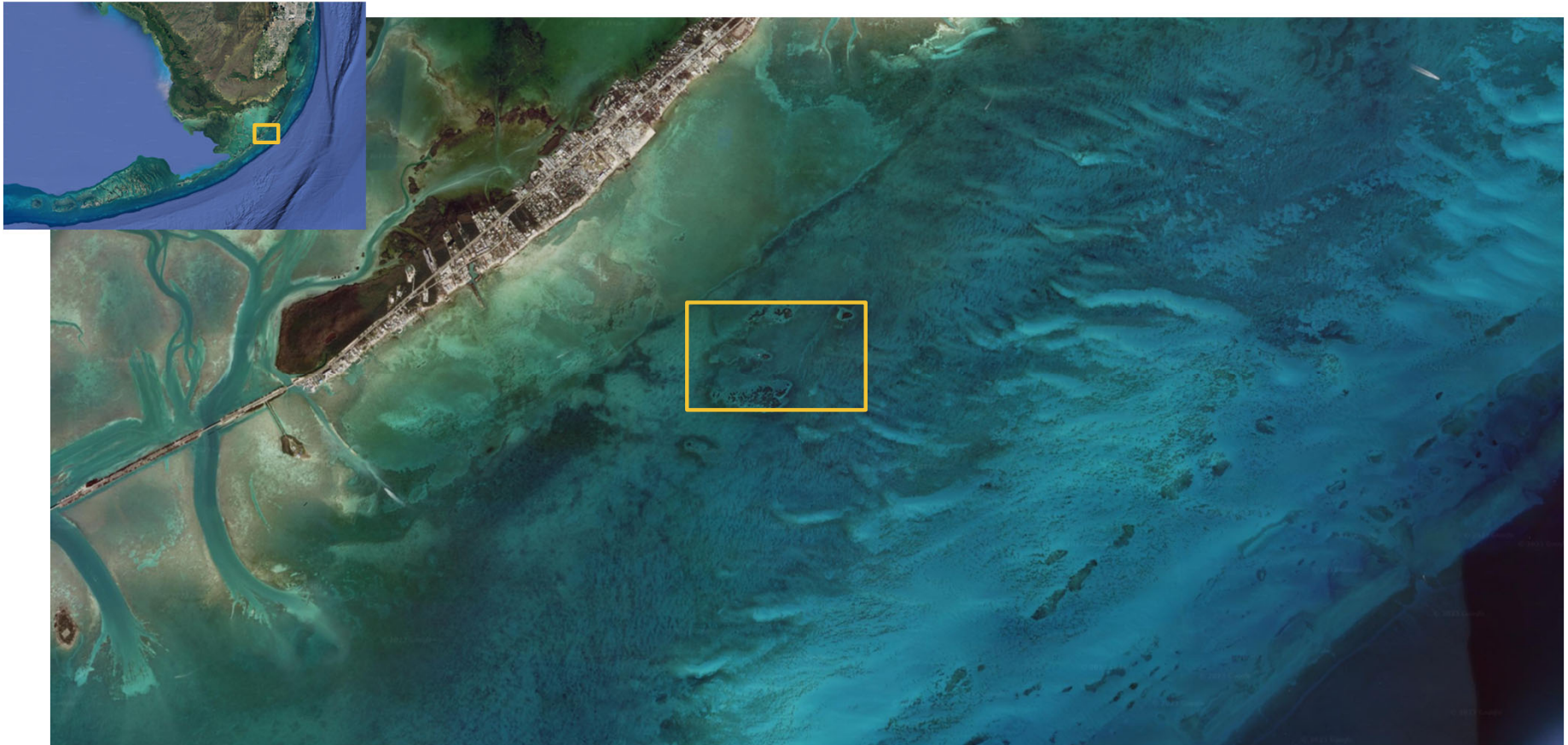
**Near-global mass bleaching event has materialized in past 6 months**  
***At least 35 countries/territories in 5 different oceans/seas***



**Summer 2023** *Warm water bleaching*

*Manzello, Coral Reef Watch*

# Cheeca Rocks, Florida Keys National Marine Sanctuary



**Summer 2023** *Warm water bleaching*



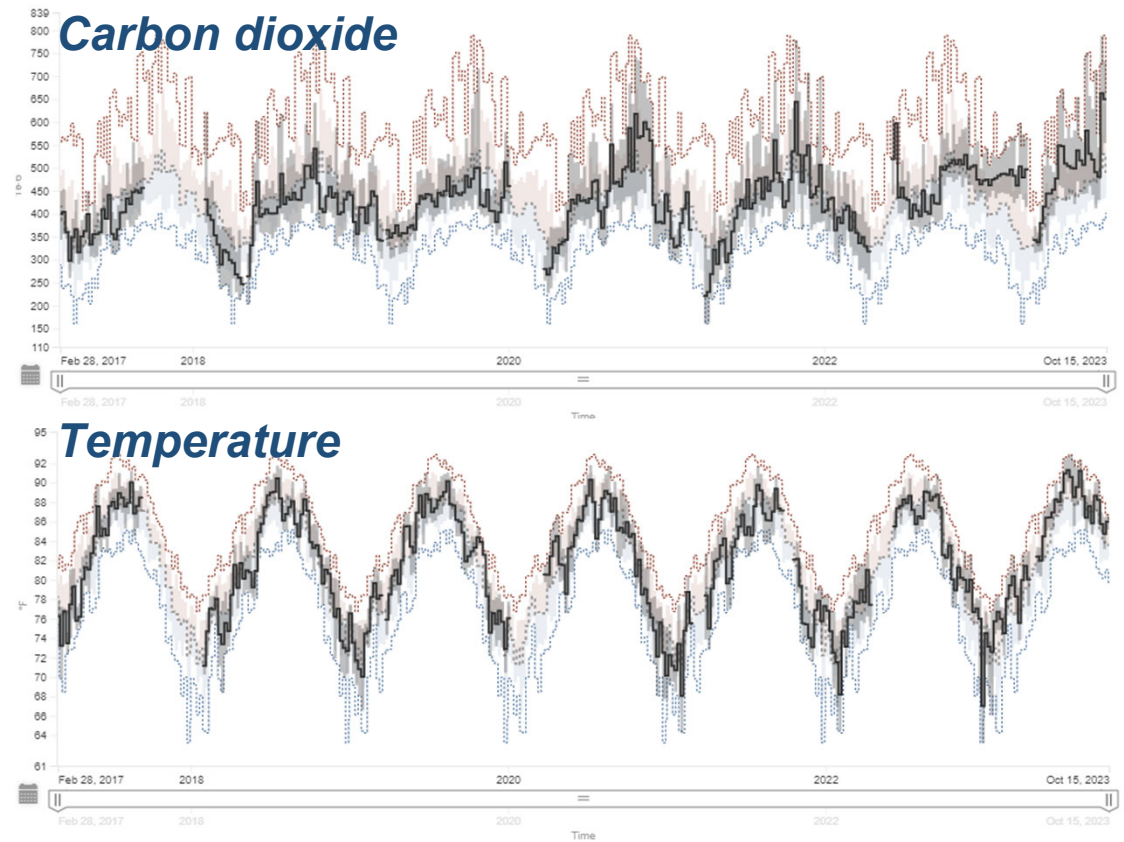
# Cheeca Rocks: services, science, management

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



**Summer 2023** *Warm water bleaching*

# NCRMP Monitoring at Cheeca Rocks

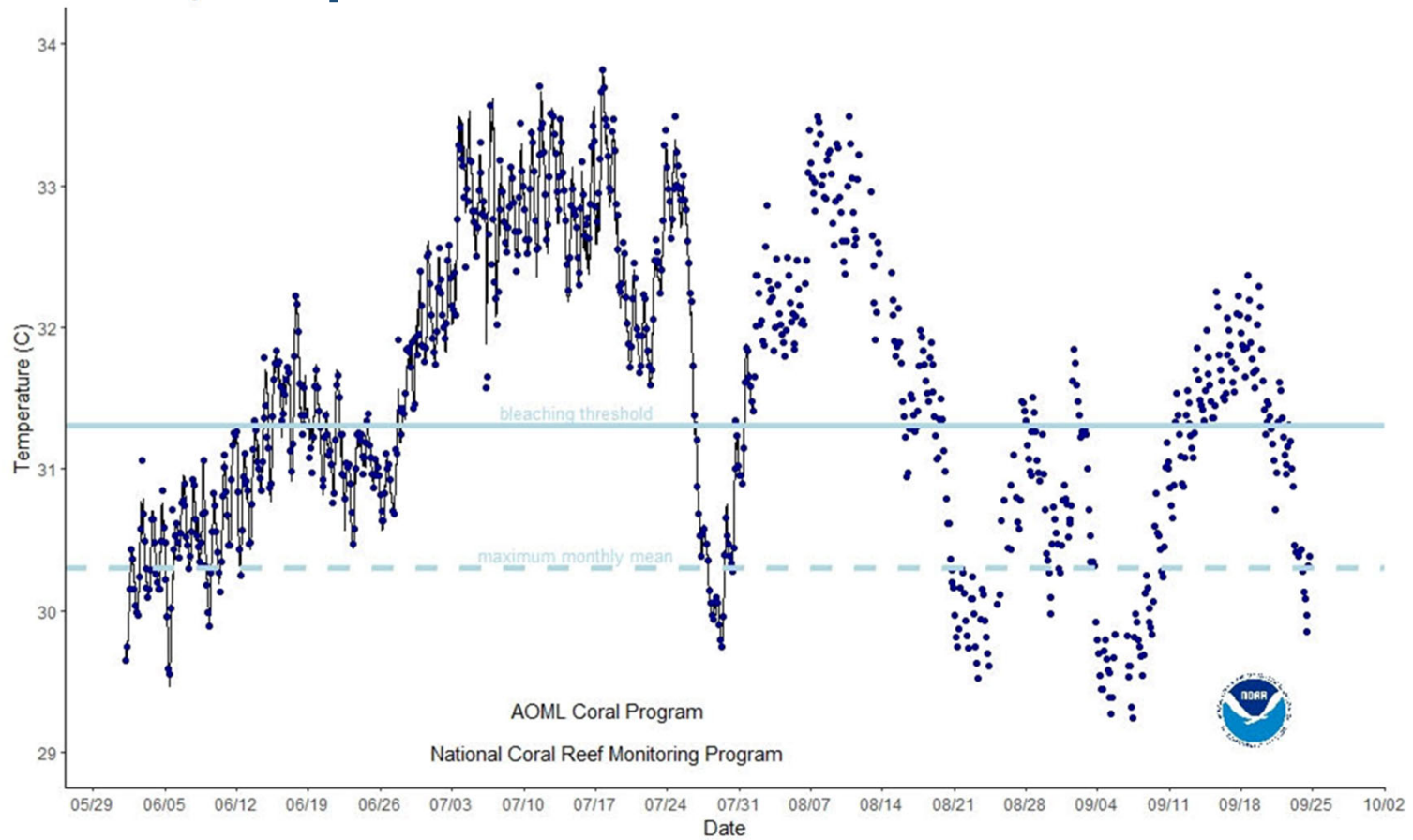


Summer 2023 *Warm water bleaching*

SECOORA data portal

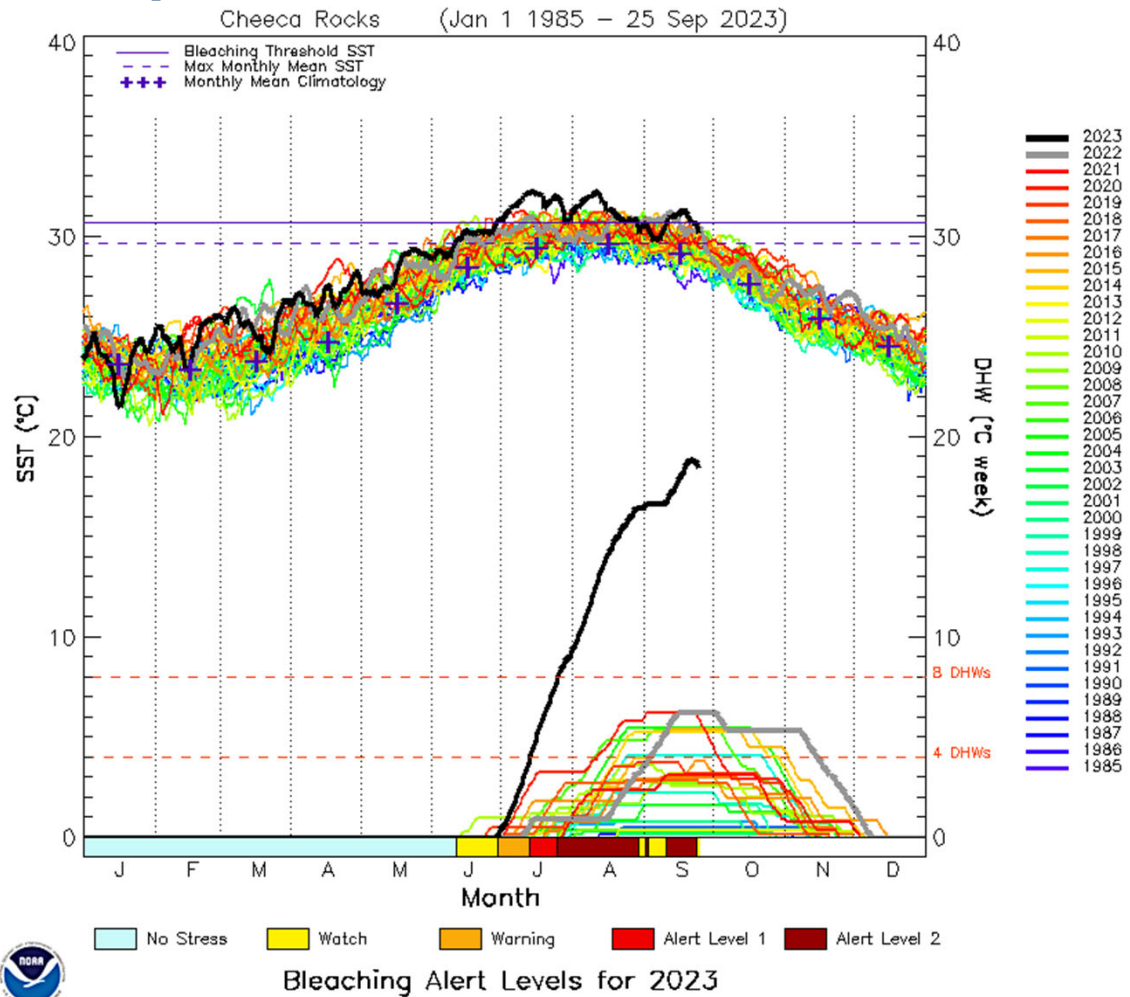


# Water temperature at Cheeca Rocks



**Summer 2023** *Warm water bleaching*

# Unprecedented thermal stress



Summer 2023 Warm water bleaching

Coral Reef Watch



## At the surface



**Summer 2023** *Warm water bleaching*

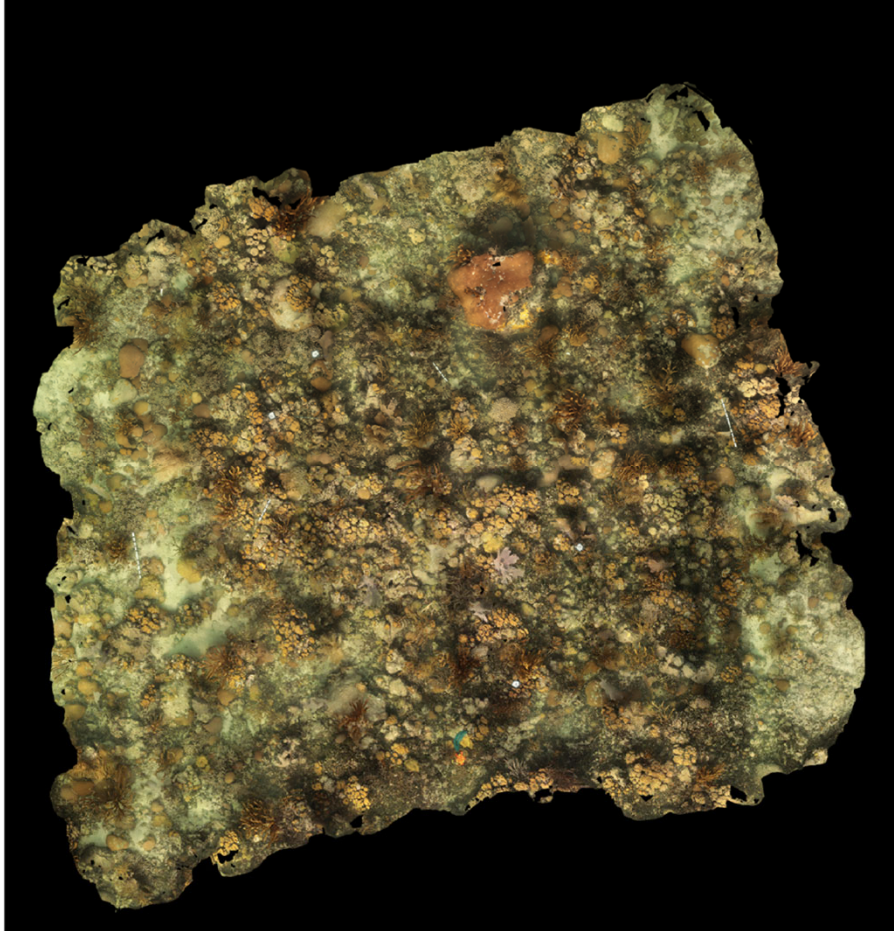
# Underwater



**Summer 2023** *Warm water bleaching*

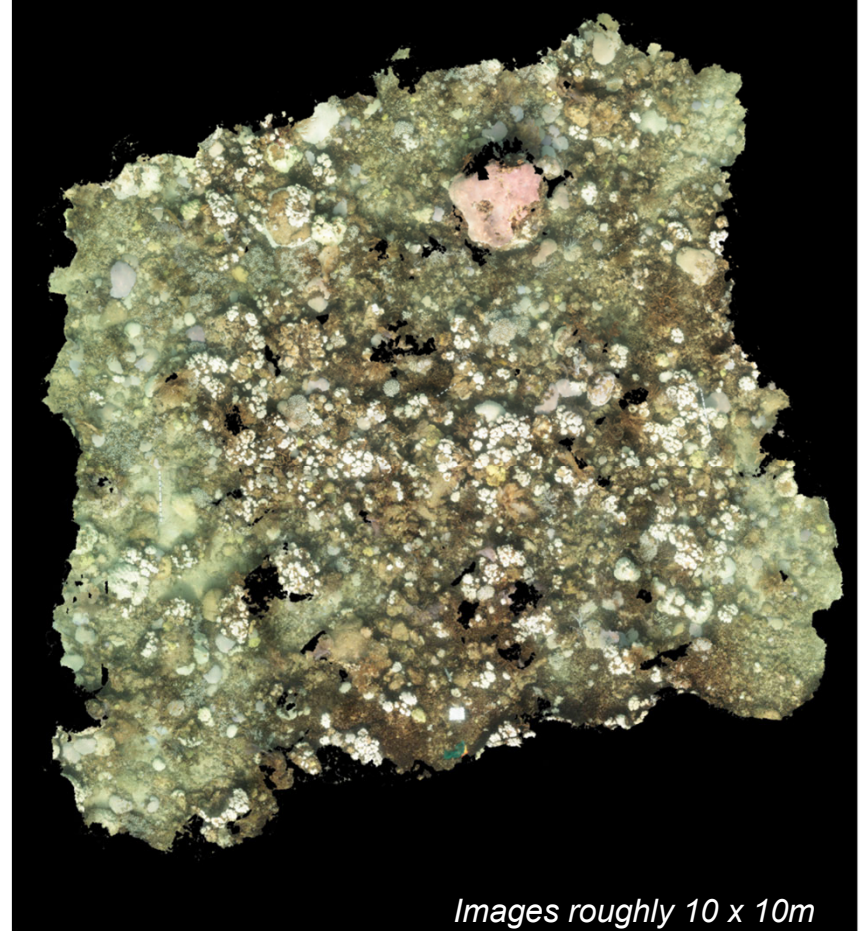


## 3D NCRMP Monitoring since 2012



**June 30**

**Summer 2023** *Warm water bleaching*



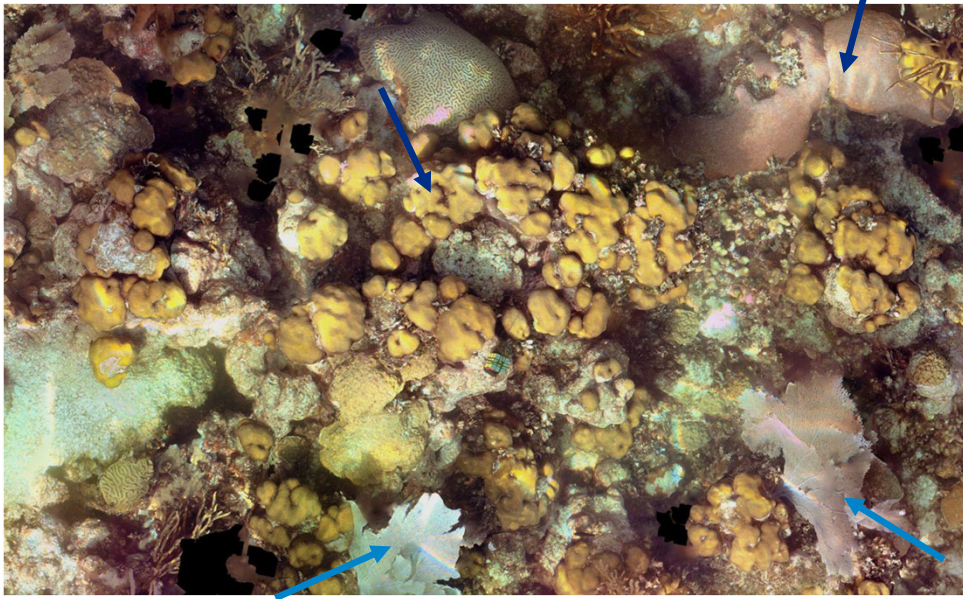
**July 24**

*Images roughly 10 x 10m*

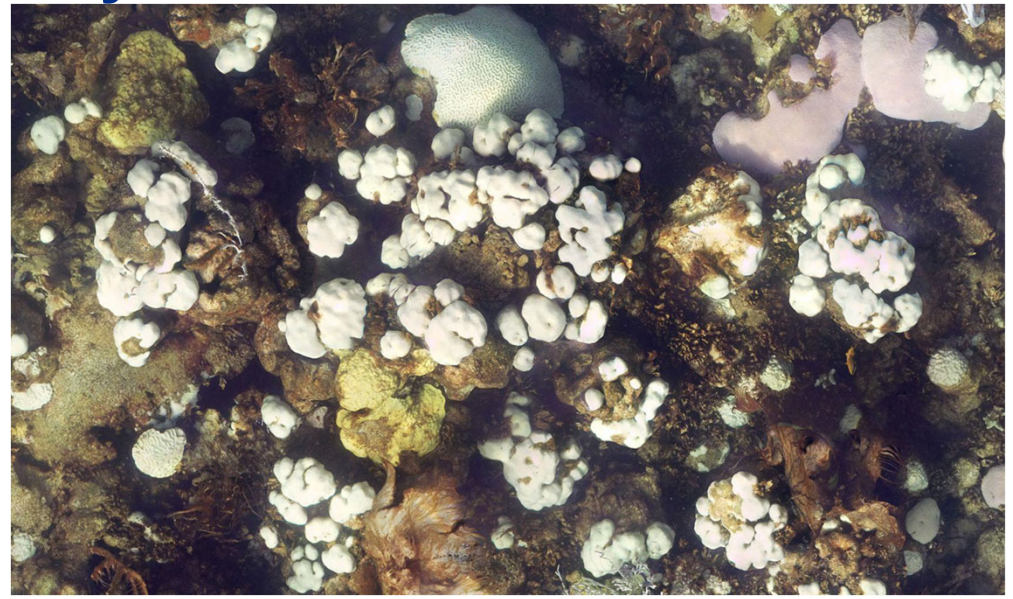




**June 30**



**July 24**



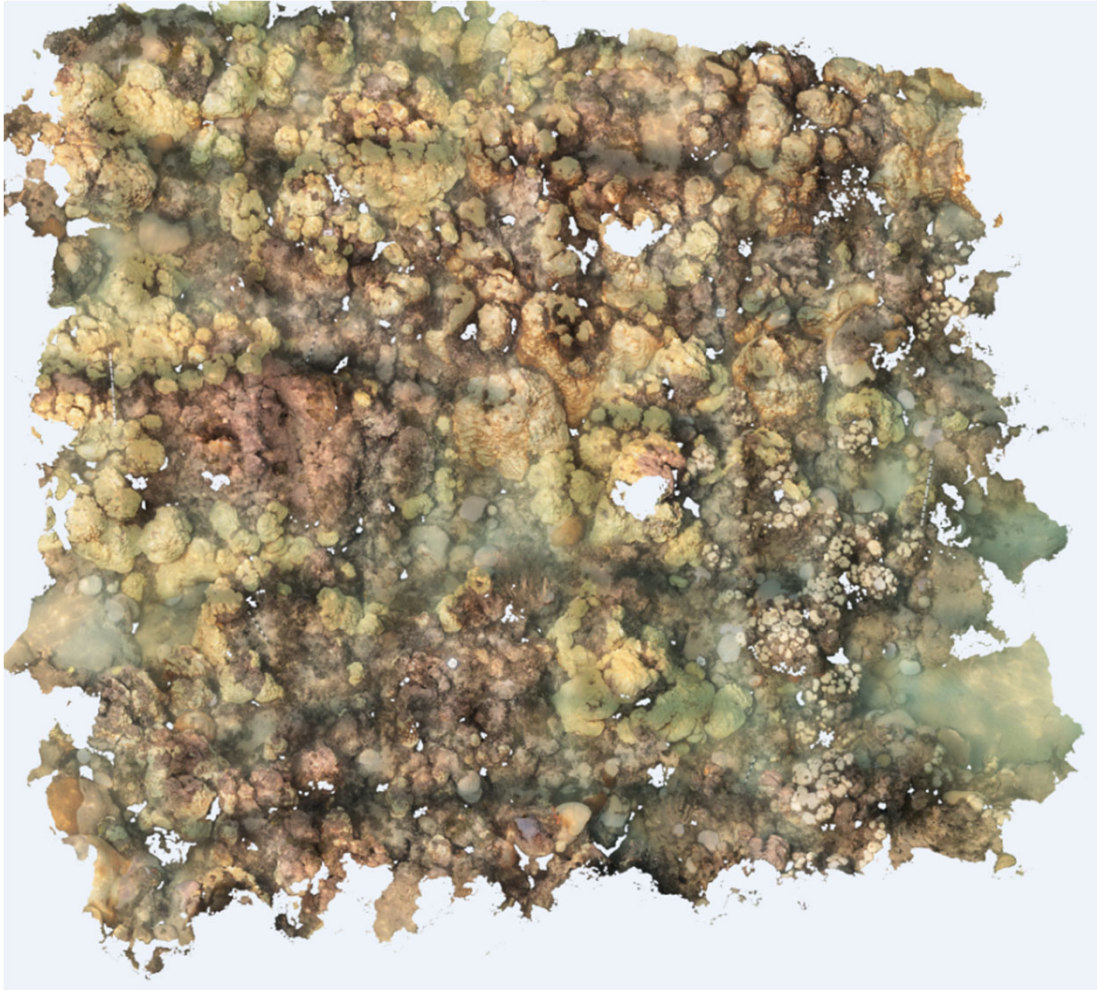
***All hard coral species are bleached or pale  
Soft corals such as sea fans have died***



**Summer 2023** *Warm water bleaching*



## Monitoring of loss and recovery



Summer 2023 *Warm water bleaching*



