NOAA Coral Reef Watch and the 2023-2024 Mass Bleaching Event:
The Importance of Post-Bleaching Monitoring to Understand Causation of Coral Mortality

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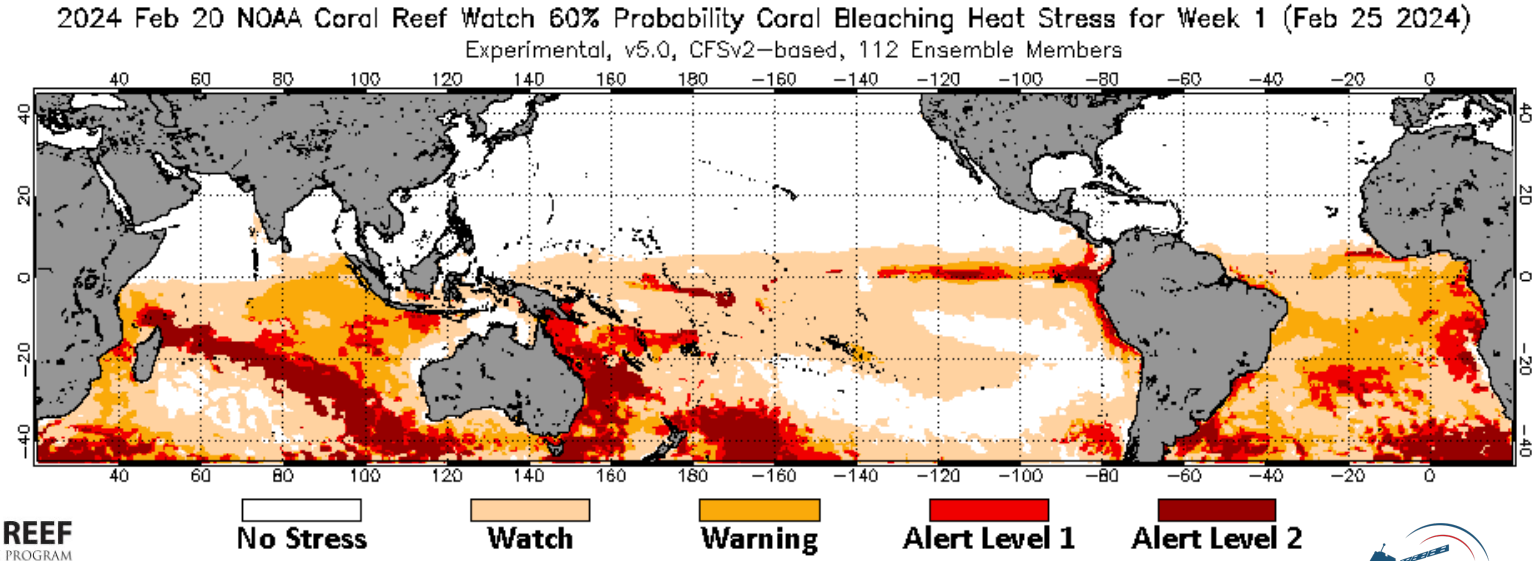
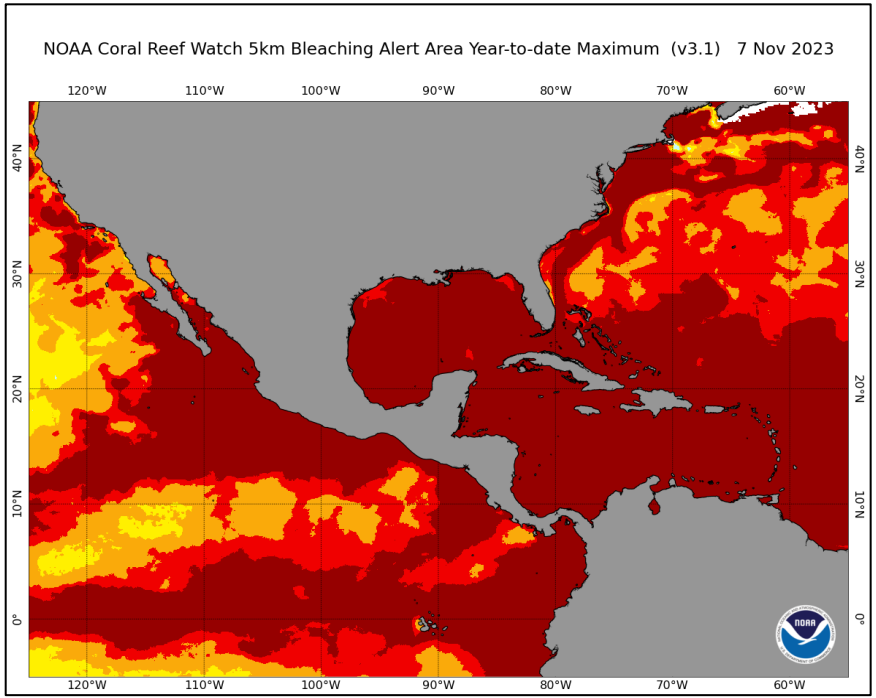
NOAA Coral Reef Watch



Bleaching Alert Levels: *A New Reality*

Bleaching Alert Level 1
Reef-Wide Bleaching

Bleaching Alert Level 2
Reef-Wide Bleaching with Mortality of Heat-Sensitive Corals



Caribbean Max Bleaching Alert Levels

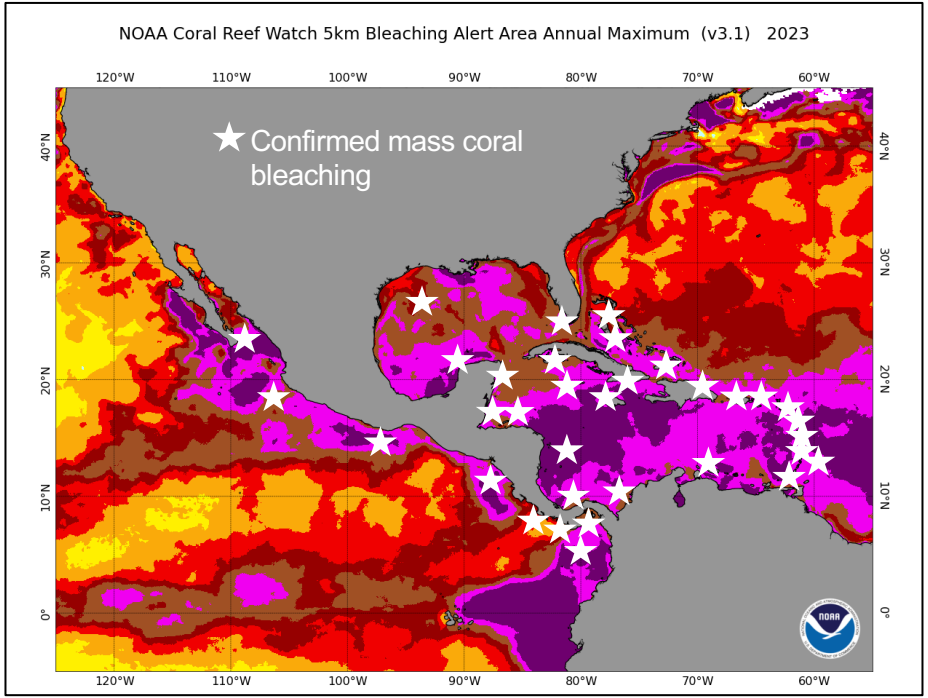
Bleaching Alert Level 1
Reef-Wide Bleaching

Bleaching Alert Level 2
Reef-Wide Bleaching with Mortality of Heat-Sensitive Corals

Bleaching Alert Level 3
Multi-Species Mortality

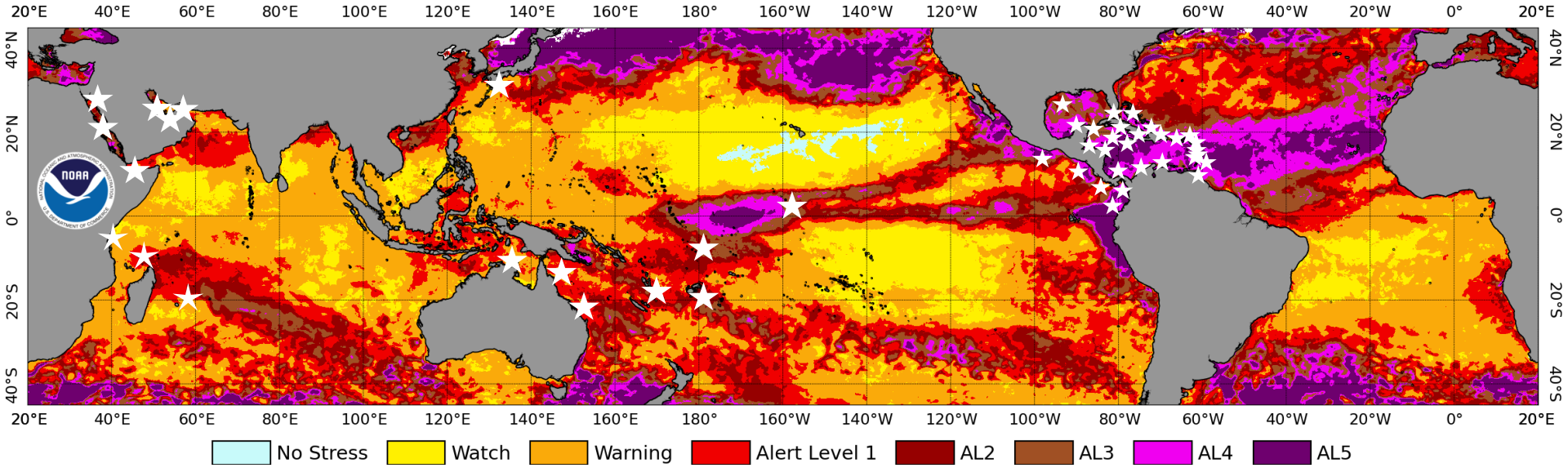
Bleaching Alert Level 4
Severe, Multi-Species Mortality (> 50% of corals)

Bleaching Alert Level 5
Near Complete Mortality (> 80% of corals)



Scale of 2023-2024 Mass Coral Bleaching Event

NOAA Coral Reef Watch 5km Bleaching Alert Area Maximum (v3.1) 1 January 2023 - 14 February 2024



<u>Near-global</u> mass bleaching event has developed in past 12 months

At least 41 countries/territories in 5 different oceans/seas

The Importance of Post-Bleaching Monitoring

- A significant fraction of the mortality from a bleaching event **may not be driven by the actual bleaching**
- This provides an opportunity to save more corals
- The more we can learn from how these events plays out, the more we can intervene in the future

The Importance of Post-Bleaching Monitoring: *Coral Disease Outbreaks*

Coral Reefs (2009) 28:925–937
DOI 10.1007/s00338-009-0531-7

REPORT

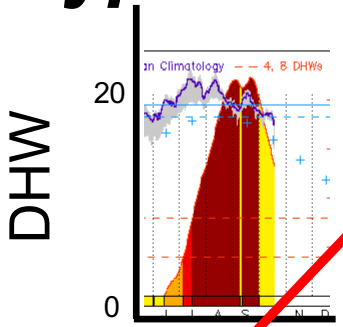
Coral disease following massive bleaching in 2005 causes 60% decline in coral cover on reefs in the US Virgin Islands

J. Miller · E. Muller · C. Rogers · R. Waara · A. Atkinson · K. R. T. Whelan · M. Patterson · B. Witcher

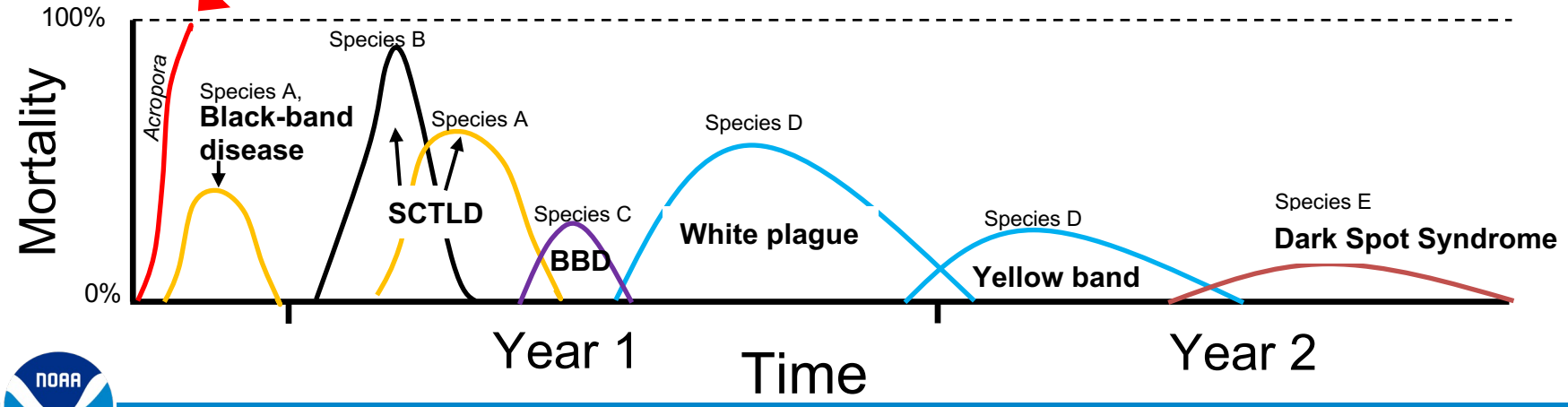
- Many of the corals in the US Virgin Islands actually survived the 2005 bleaching event
- Post-bleaching disease outbreak is what led to a 60% decline in coral cover in two years after heat stress stropped

Knowledge is Power

Hypothetical Community Response to Heat



- We already know *Acropora* drop-dead quickly and require rapid intervention
- But, other species have variable responses….
- Different diseases have different amelioration strategies and virulence/impact
  - *SCTLD more urgent than dark-spot-syndrome*
- Different species can be prioritized based on ecological importance and risk
  - *Orbicella* > *Porites astreoides, Siderastrea radians*
- **Provides intervention time-line**, rather than panicked attempt to do everything, everywhere at the same time



The Importance of Post-Bleaching Monitoring: *Corallivory*

- Coral-eating snails can form aggregations and decimate the survivors!
  - Indo-Pacific *Drupella* form aggregations on corals that resisted bleaching (Bruckner et al. 2017)
  - Caribbean *Coralliophila* specifically target *Acropora* colonies with damage or disease (Bright et al. 2015)

- Removing corallivores is a well-known, viable intervention to save corals recovering from bleaching (e.g., Williams et al. 2014; Shaver et al. 2018; Rogers and Plagányi 2022)

Final Thoughts…

- To save bleaching survivors, we must first understand the timing of subsequent disease and corallivore outbreaks

- We need as much monitoring data as possible both during bleaching and **for at least 2 years after the heat stress subsides**
  - Allows identification of resilient reefs, species, and genotypes
  - Provides blueprint for how to save corals during the next, **inevitable** coral bleaching event

- Preventing a local extinction could be as simple as picking snails off recovering corals!!

Thank you from the NOAA Coral Reef Watch Team!!

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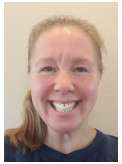

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