



FLORIDA'S CORAL REEF: 2023 CORAL BLEACHING RESPONSE

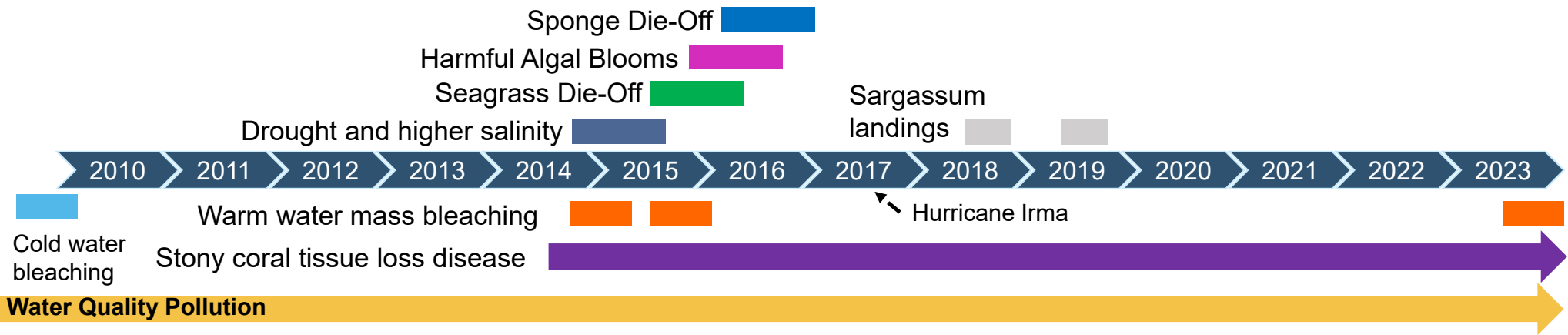
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Miccosukee Hotel, Miami, FL | April 25, 2024



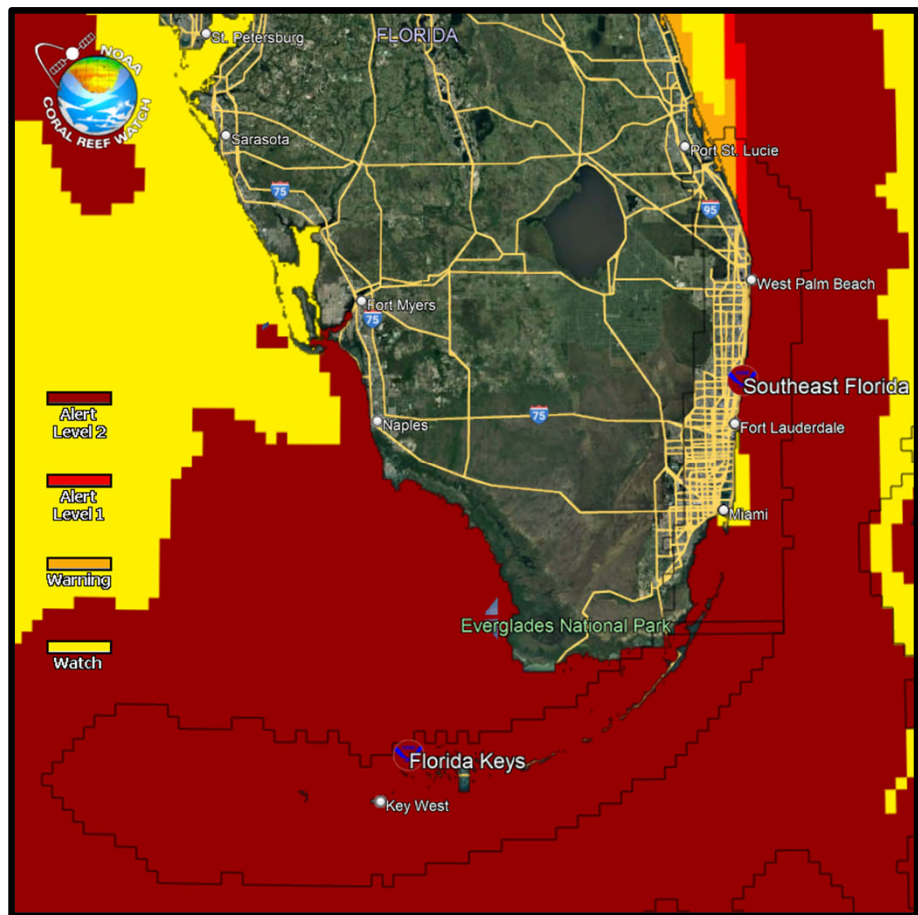
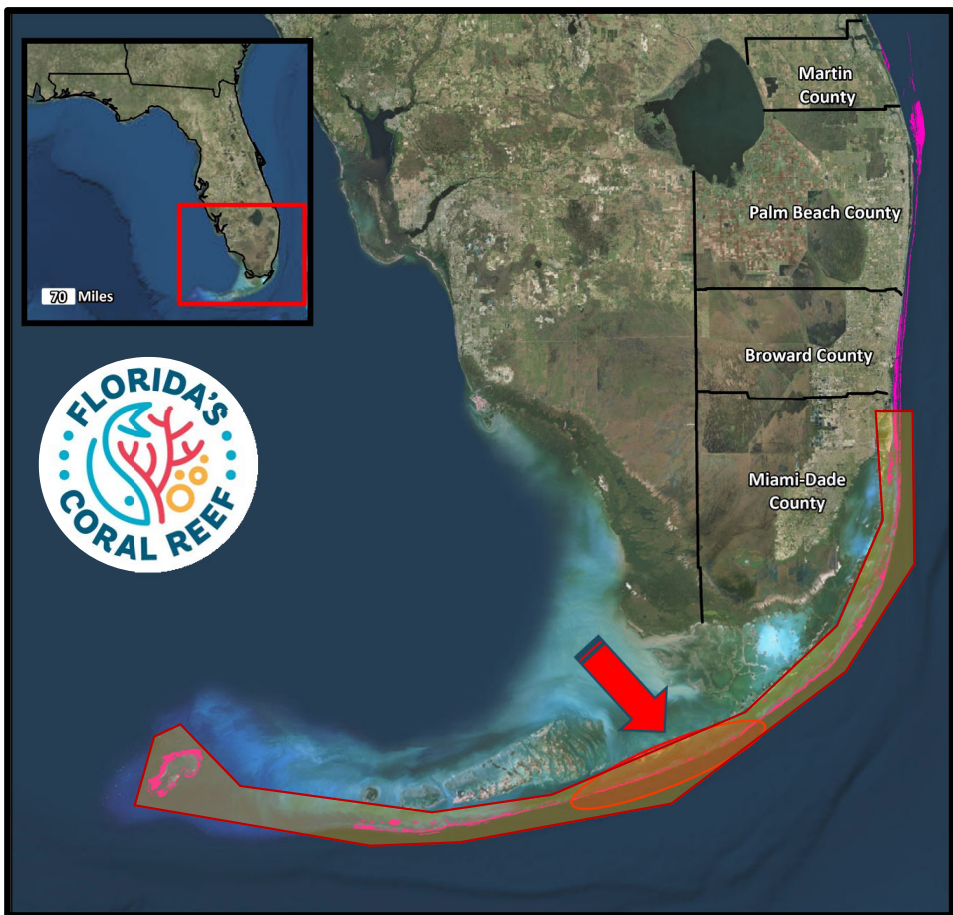
FLORIDA'S CORAL REEF ENVIRONMENTAL AND BIOLOGICAL STRESSORS OVER TIME





FLORIDA'S CORAL REEF

2023 BLEACHING





FLORIDA'S CORAL REEF RESILIENCE PROGRAM (FCRRP) LEVERAGING EXISTING NETWORKS

Coral Rescue and Propagation and Restoration Networks:

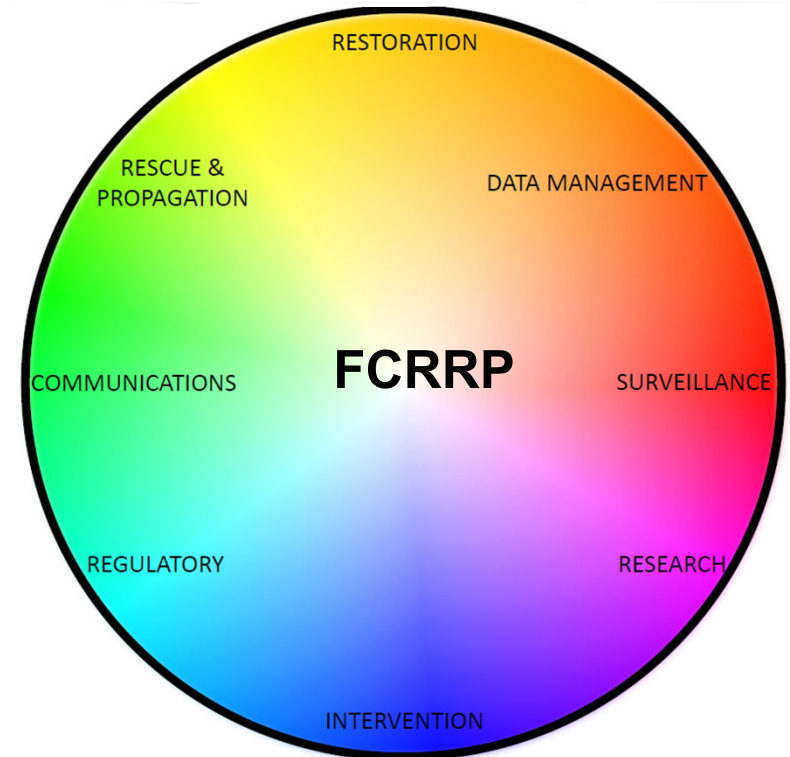
- Rapidly coordinated to implement conservation actions.
- Collated emergency triage funding needs.

Leadership Network:

- Collaborated to ensure that funding was made available to practitioners:
 - Approximately \$1 million in federal funding.
 - Approximately \$3 million in state funding.

Communications and Outreach Network:

- Rapidly developed common talking points and coordinated media requests.





NURSERY EVACUATIONS

ENDANGERED SPECIES ACT (ESA)-LISTED CORAL COLLECTIONS

Evacuated thousands of corals from **in situ** nurseries to land-based facilities

- Focused first on Acroporids:
 - ESA-listed.
 - Limited genotypes remain.
 - Exhibited signs of stress rapidly.
 - Traditional 'rescue' species were well represented in land-based holding.
- Supplemental collections of known (or assumed) unique genetic individuals of *Acropora palmata* and *Dendrogyra cylindrus*.



Healthy Elkhorn Coral

Bleached Elkhorn Coral



Source: T: FWC
FWRI; B: K. Fusco,
Mote Marine Lab



NURSERY EVACUATIONS

ESA-LISTED CORAL COLLECTIONS



Source: The Florida Aquarium

Evacuee Care:

- At least seven facilities held evacuated corals.
- **HeaRT (Heat Response Teams).**
 - Aquarists from eight institutions across four states and the Bahamas assisted with coral care.
- **In situ** practitioners learned land-based care “on the job.”



INTERVENTIONS

SMALL TRIALS AND MONITORING

Physical Interventions:

- Moved some nurseries into deeper water or areas of higher circulation:
 - Florida Keys National Marine Sanctuary (FKNMS) designated a “special use area” using emergency authorities.
- Shading experiments:
 - Permitting challenges for fixed structures.
 - Considered vessel-tended shades for priority nursery and outplant locations.



Source: I. Kuffner, United States Geological Survey (USGS)



INTERVENTIONS

SMALL TRIALS & MONITORING

Other Actions:

- Supplemental feeding (**considered**).
 - Passive: Glowsticks to attract zooplankton.
- Corallivore removal:
 - Snail collection derbies held at sites where predation is known to cause extensive mortality.
- Monitoring to assess the event and identify hardy corals, resilient locations, etc.
 - NOAA survey across all Mission: Iconic Reef sites:
 - Approximately 22% survivorship of 1,500 outplanted *Acropora cervicornis* colonies.
 - Boulder, massive and brain coral outplants may have fared better.



Source: Florida Fish and Wildlife Commission's (FWC) Fish and Wildlife Research Institute (FWRI)



LESSONS LEARNED

PATH FORWARD

Florida's Bleaching Response Preparation

Overall: Focus on preservation of genetic diversity rather than preservation of biomass.

Limit large-scale evacuations.

Permanently establish deeper nurseries.

Consider refocus from Acroporids to other corals and organisms.

Reframe communications: Restoration is only one piece of the puzzle!

National Academies of Science: Interventions to Increase the Resilience of Coral Reefs

Genetic and Reproductive:

- Supportive breeding and managed selection and breeding.
- Genetic manipulation: Corals and symbionts.

Physiological:

- Stress manipulations: Corals, symbionts and microbiome.
- Antibiotics and phage therapy to reduce pathogens.

Coral Population and Community:

- Managed relocation: Assisted gene flow, migration, etc.

Environmental:

- Shading: Marine and atmospheric.
- Mixing of cool water.

THANK YOU



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