



Climate Change: What Can Coral Reef Managers Do To Address Coral Bleaching?

U.S. Coral Reef Task Force – 16

“A Reef Manager’s Guide to Coral Bleaching”

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Reef Manager's Guide



A Reef Manager's Guide to **CORAL BLEACHING**



Paul Marshall and Heidi Schuttenberg



- **Need for management response**
- **Guide Offers a Framework**
- **Local Management Actions**
- **Examples of Local Actions**



Possible Management Actions



- Utilize *in situ* and remote sensing observations to predict and plan for bleaching events
- Communicate observations to the public, scientists and other managers – engage the public
- Target research at specific questions
- Apply the concept of *Reef Resiliency* in planning



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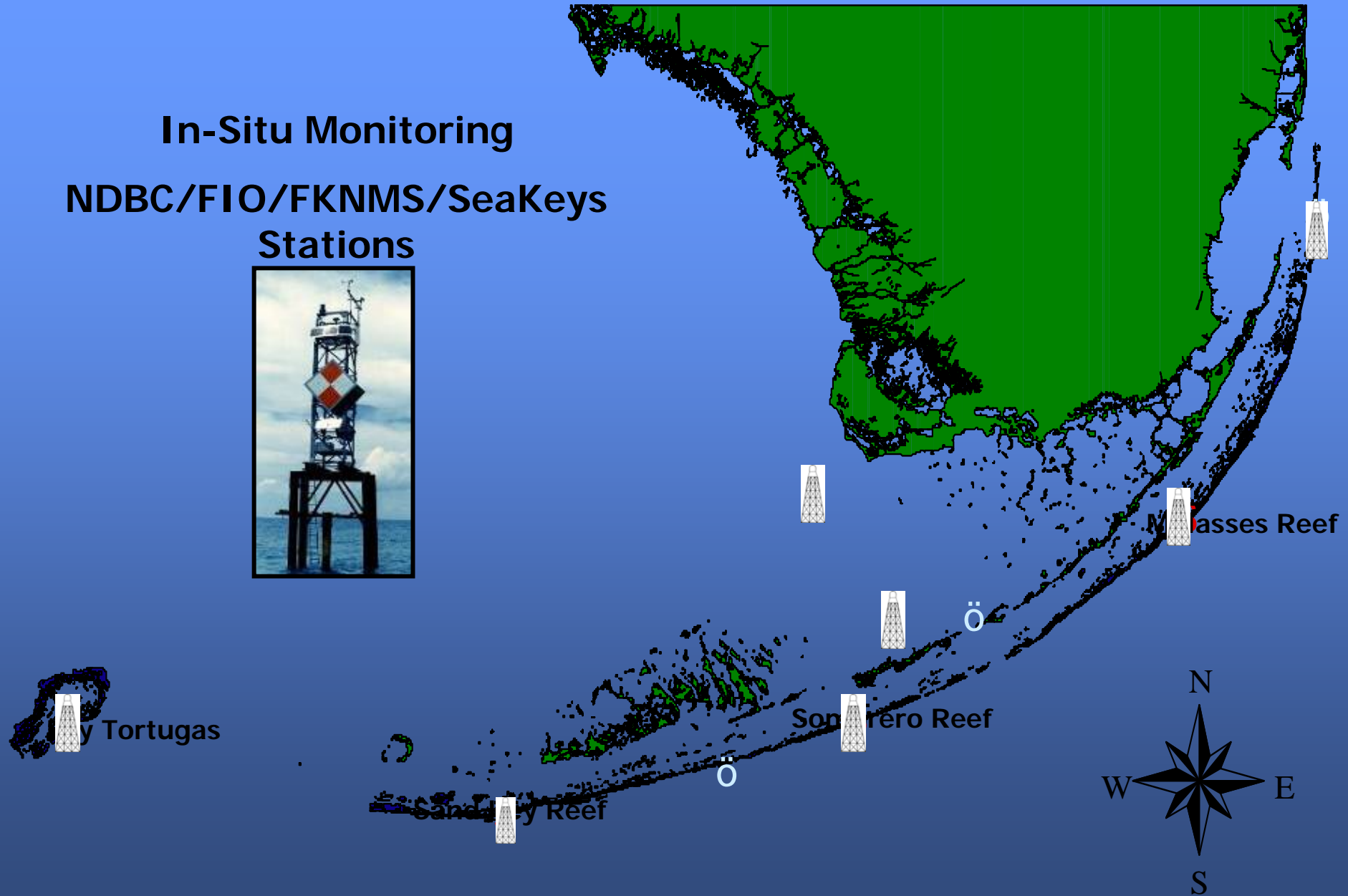


In predicting coral bleaching events

- **Doldrum conditions for extended periods**
- **Low Cloud cover**
- **Minimal water circulation**
- **Elevated Sea Surface temperatures**
- **Has increased the public's confidence in science and government**



In-Situ Monitoring NDBC/FIO/FKNMS/SeaKeys Stations



Thermograph Locations in the FKNMS

- 32 meters to record water temperature
- 7 CMAN Stations along reef tract and Florida Bay

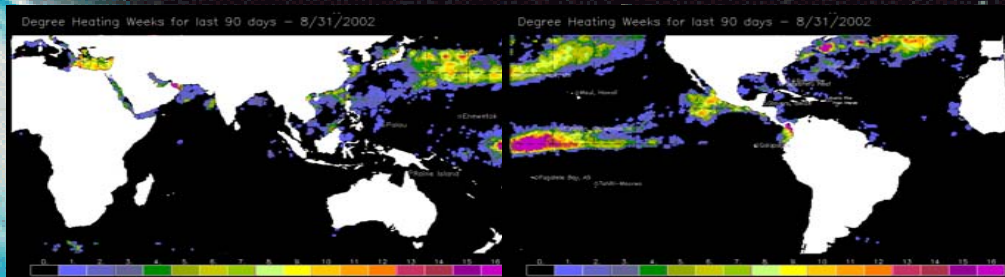
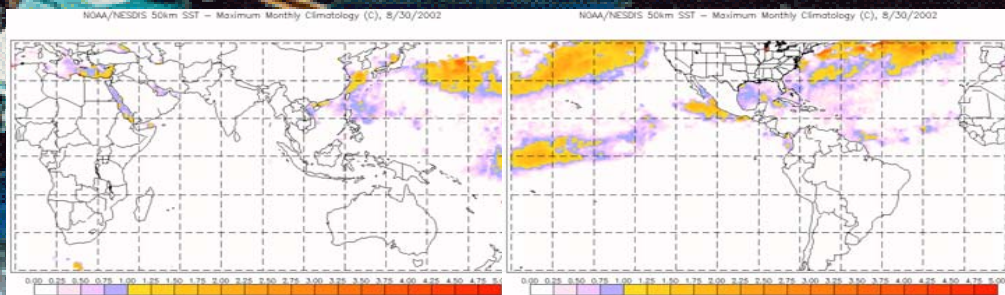
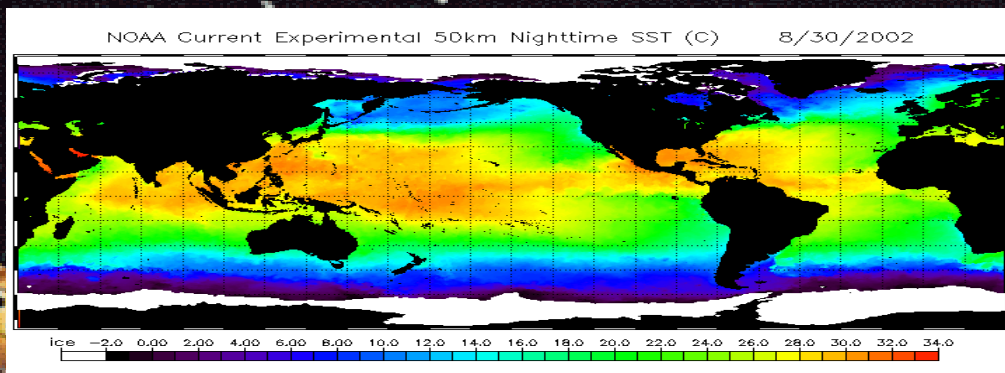
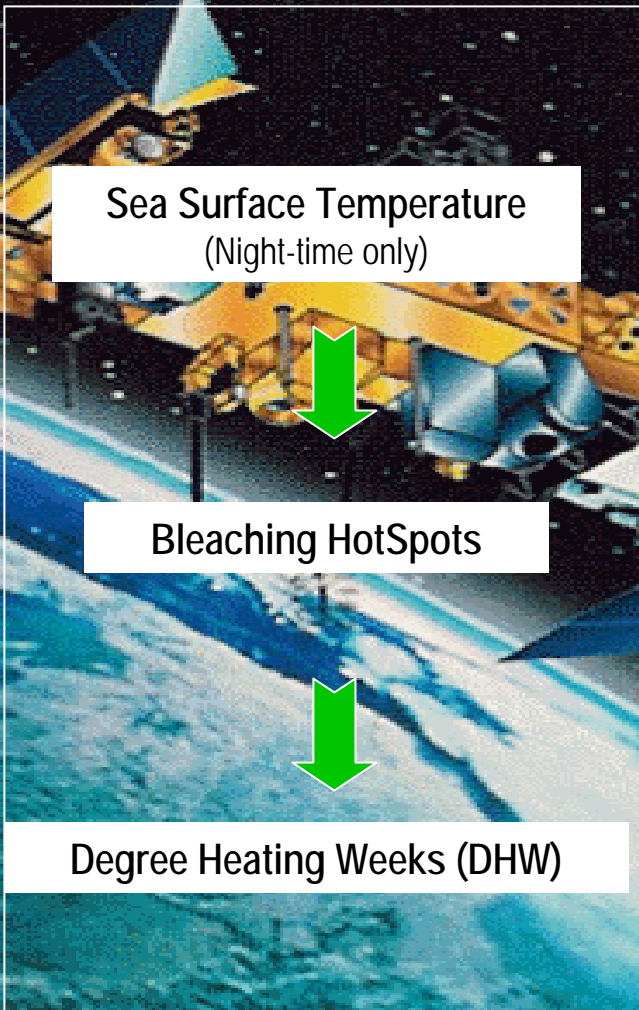




NOAA Coral Reef Watch Program

Satellite Near Real-Time Coral Bleaching HotSpot Products

(Twice-weekly at 50km resolution)



<http://coralreefwatch.noaa.gov>



Global Earth Observing System of Systems

- **Coral Bleaching – example of GEOSS application**
- **Highlights importance of local observations**
- **Integrated into global ocean observing systems**
- **Provides a global early warning system**



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Florida Keys Coral Bleaching Early Warning Network

“BleachWatch”

Erich Bartels

Cory Walter



Florida Keys “Bleach Watch” Early Warning Network

- Provides an “Early Warning” for coral bleaching events within the FKNMS and surrounding waters.
- Provides FKNMS with a “Current Conditions” overview, including recent volunteer observations and other environmental monitoring data.
- Involves the community in monitoring coral reef health.

Florida Keys Early Warning Network
MML / FKNMS

Routinely Review Existing Environmental Monitoring Data
NOAA

Train and Coordinate Volunteer Observer Network "BleachWatch"
MML / FKNMS / TNC

Climate

Remote Sensing
"HotSpot" Maps
"DHW" Maps
SST's

In-Situ Data
NDBC
FIO/SeaKeys

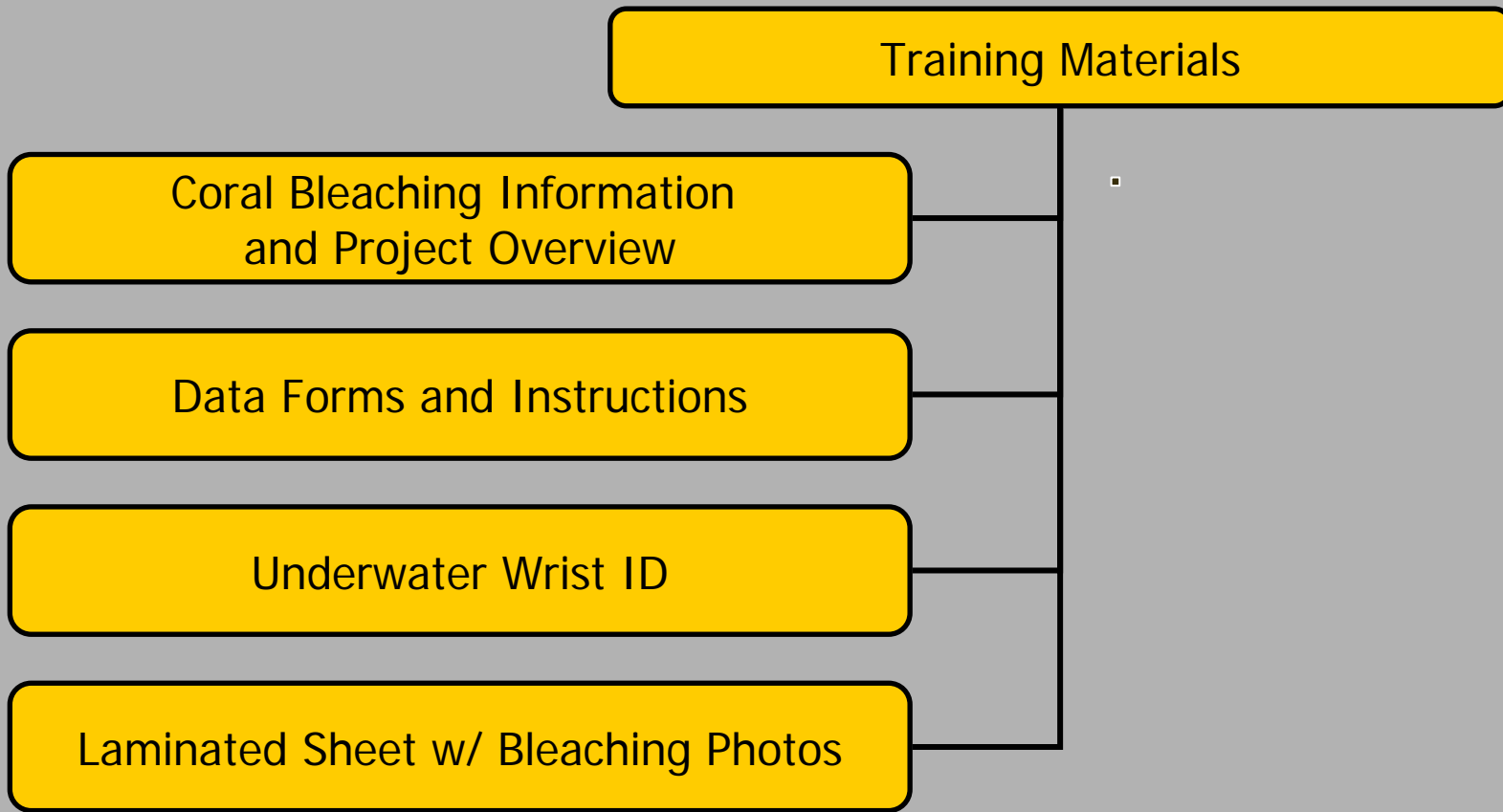
Community

Professional

Scientific

Synthesize Data and Observations and report "current conditions" to FKNMS/NOAA

Volunteer Observer Training and Coordination



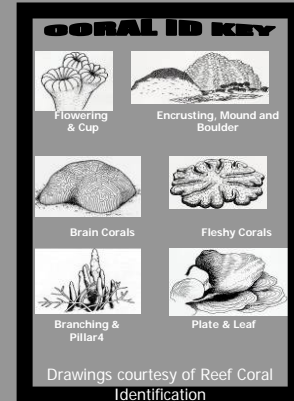
Bleaching Observations

- Severity of Bleaching



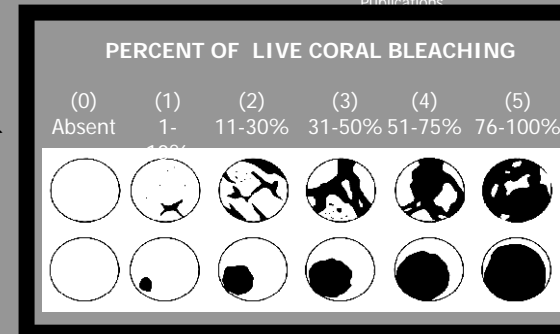
- Types of Corals Bleached

Coral ID Table



- Percent of Bleached Corals

Percent Cover/Bleaching Table



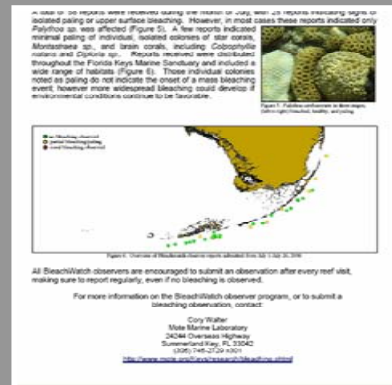
Current Conditions Report

Available online:

www.mote.org/Keys/bleaching.phtml

Updated According to Environmental Conditions

- Sea Temperature Information
- Relevant Weather Conditions
- NOAA's HotSpot Maps and DHW Maps
- Summary of Field Data from Observers
- Photos





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Why do we need targeted research?

- **Multiple stressors affecting corals**
 - **Identify levels of multiple stressor influences**
- **Coral diseases are secondary symptoms**
 - **Need to be proactive**
 - **Investigating the symptoms of healthy corals**
- **Scientific debate is good – but not at the sake of taking action**



Bleaching Can Promote Coral Disease Outbreaks

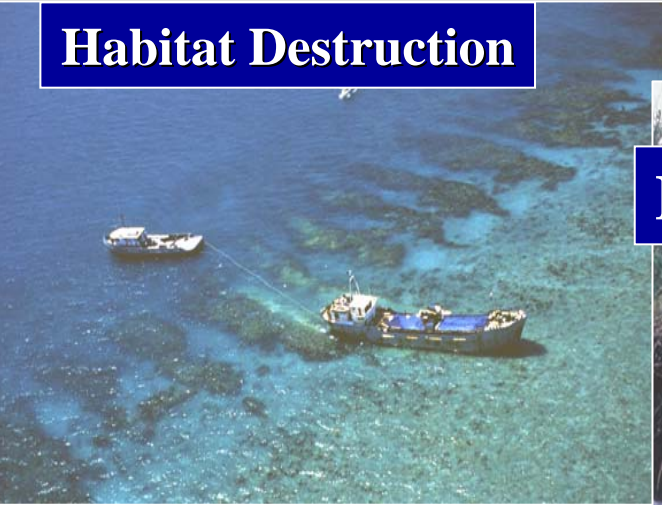
Inshore patch reefs
Middle Florida Keys

Marilyn E. Brandt
University of Miami



Suspected Causes of Coral Decline

Habitat Destruction



Coral Diseases



Pollution



Overfishing



Massive Algal Blooms



Intense Coastal Development



Ocean Dumping



Introduction of Marine Exotics



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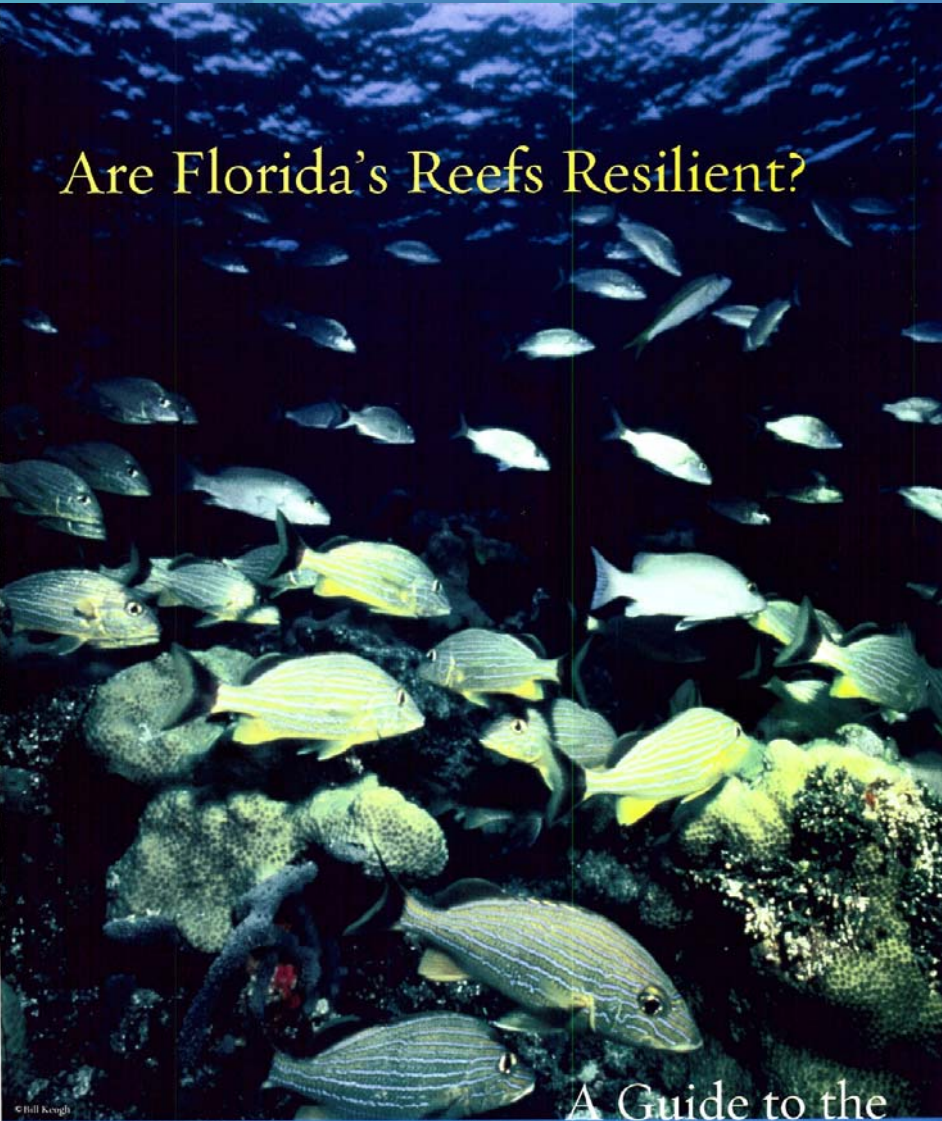


Florida's Reef Resilience Program

www.nature.org/florida



Are Florida's Reefs Resilient?



A Guide to the
Florida Reef Resilience Program

Threats to Florida's Reefs

- global climate change, including:
 - warming seas
 - rising seas
 - more powerful, more frequent storms
- coral diseases
- overfishing and fishing gear impacts
- pollution
- coastal development
- boat groundings
- diver and swimmer impacts

Threats to Florida's reefs



coral bleaching



boat grounding effects



diver and swimmer impacts



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How can I get involved?

Everyone who knows and loves the reef has a role to play in the Florida Reef Resilience Program:

- Recreational and commercial divers with long-term perspectives on reef health can provide input to resilience mapping efforts.
- Divers can report current coral bleaching, disease outbreaks, algal blooms and other out of the ordinary events.
- Fishers can report marine events, such as algal blooms and coral spawning.
- All reef users should know and obey rules and regulations designed to prevent damage to living corals.
- In 2006 and 2007, anyone can participate in Florida Reef Resilience Program Workshops to learn more about the program.

For more information contact:

The Nature Conservancy
 Florida Reef Resilience Program
 P.O. Box 420237
 Summerland Key, FL 33042
 (305) 745 8402

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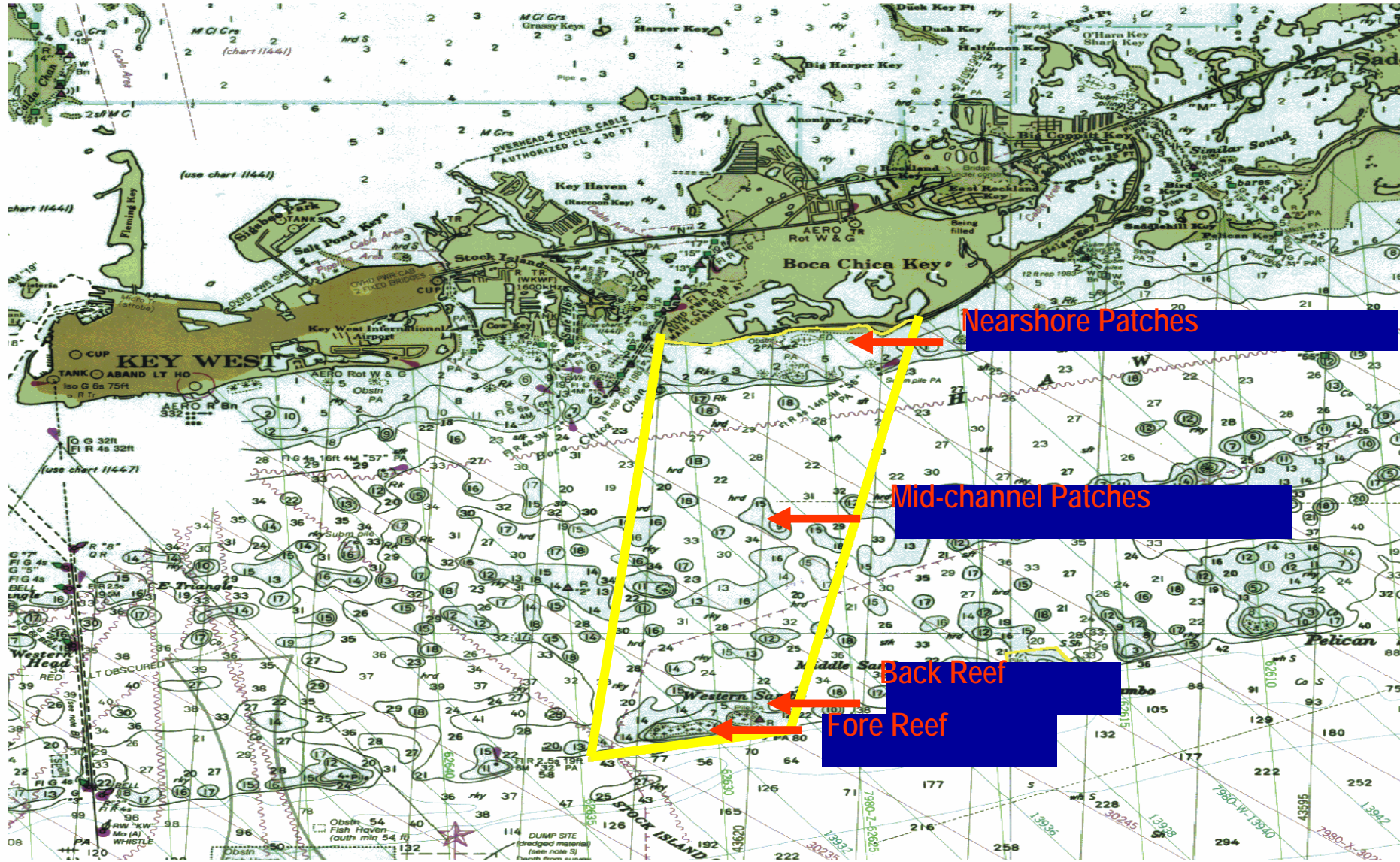
nature.org/florida



The Florida Reef Resilience Program is the product of discussions between the State of Florida, the National Oceanic and Atmospheric Administration, The Nature Conservancy and the Great Barrier Reef Marine Park Authority. A parallel program is in progress at Australia's Great Barrier Reef, and the two programs are designed to complement one another and to inform coral reef conservation around the globe. The Nature Conservancy thanks: The Ocean Fund of Royal Caribbean International and Celebrity Cruises, the Garden Restaurant Foundation, the Curtis and Edith Museum Foundation, and the Beachfront Foundation for their generous financial support of the Florida Reef Resilience Program.

Western Sambo Ecological Reserve

Examples of Resilient Reefs



Mid-channel Patch Reefs





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Managing in a changing climate Next steps?

Guide = framework

- **Local Action Strategies**
- **Management plans**
- **MPA network planning**
- **Protect WQ & herbivory**
- **Increase capacity**
- **Field testing**
- **Shared learning**

Questions?

