C OCEAN

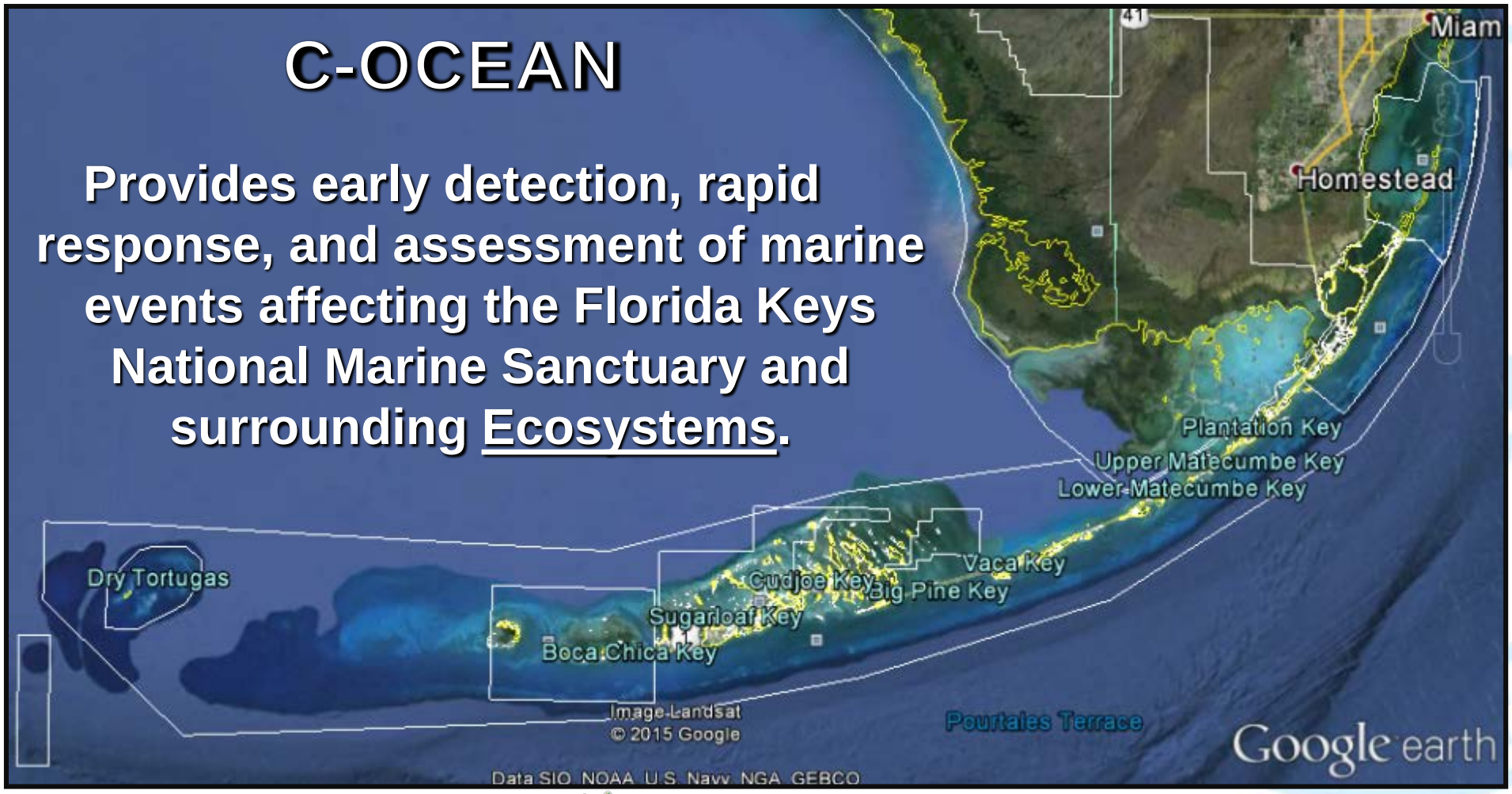
COMMUNITY-BASED OBSERVATIONS OF COASTAL ECOSYSTEMS AND ASSESSMENT NETWORK

NATIONAL MARINE SANCTUARIES
FLORIDA KEYS

MOTE MARINE LABORATORY

C-OCEAN

Provides early detection, rapid response, and assessment of marine events affecting the Florida Keys National Marine Sanctuary and surrounding Ecosystems.



C-OCEAN

COMMUNITY-BASED OBSERVATIONS OF COASTAL ECOSYSTEMS AND ASSESSMENT NETWORK

MOTE MARINE LABORATORY

MOTE.ORG

C-OCEAN TIMELINE

1997 — Rapid Biotic Assessment (RBAT)

1999 — Marine Ecosystem Event Response and Assessment (MEERA)

2003 — Volunteer Harmful Algal Bloom (HAB) Monitoring

2004 — Florida Keys Coral Bleaching Early Warning Network BleachWatch

2006 — KADO HAB Monitoring

2015 — C-OCEAN

C-OCEAN
COMMUNITY-BASED OBSERVATIONS OF COASTAL ECOSYSTEMS AND ASSESSMENT NETWORK

How does C-OCEAN help "Protect Our Reefs"?

- Community Outreach of Marine Events
- Fostering the community's sense of ownership in marine conservation
- Community Involvement…."Citizen Science"
- Early and Rapid Feedback to Resource Managers

OBJECTIVES AND ORGANIZATION

Marine Observer Network

Utilize knowledge, availability, and willingness of the community frequently on or around the water to provide valuable information.

Project Coordinator

Gather and evaluate information regarding the overall health of and significant changes to the marine environment.

Response Efforts

Ensure that prompt action is taken and coordinate response efforts to investigate significant events.

Webpage & Reports

Provide information to marine resource managers, environmental professionals, and the community.

Marine Observer Network

ANYONE can report – NO training, NO membership

Commercial and Recreational Fisherman

Divers and Snorkelers

Environmental Groups

Educators

Researchers

Residents

REPORT THE FOLLOWING UNUSUAL SIGHTINGS:


Coral Bleaching


Invasive Species


Mammal Strandings


Diseased Fish & Fish Kills


Algal Blooms


Pollution & Marine Debris


Sick or Injured Sea Turtles


Discolored Water


Wildlife Violations


Vessel Groundings

WWW.MOTE.ORG/COCEAN

Cory Walter | (305) 395-8730 | cwalter@mote.org

Response Efforts

Forward Information to Appropriate Agency

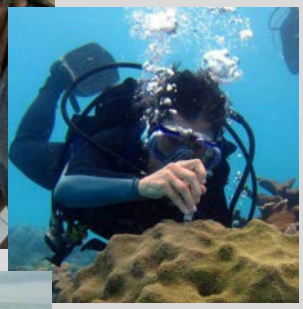
Oil Spills
Wildlife Violations
Vessel Groundings
Mammal Strandings

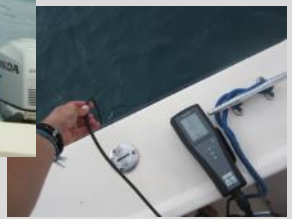
Initiate Response Effort

Assist Ongoing Research or Response Efforts

Missions:

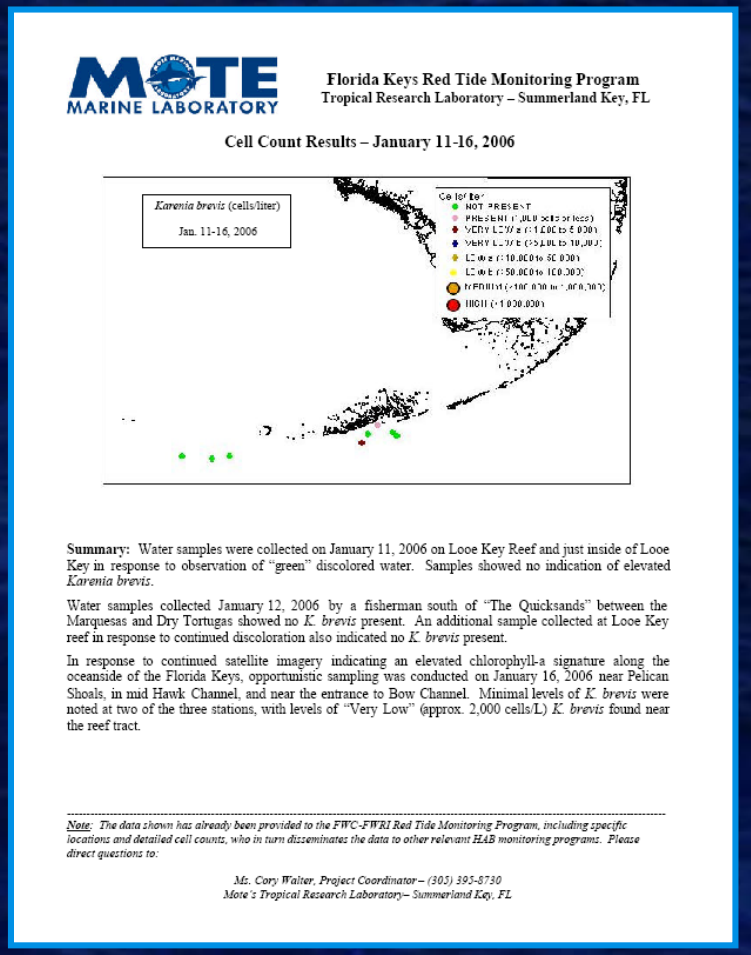
Determine biological extent
Assess spatial extent
Collect, analyze & ship samples
Follow duration of event
Report findings rapidly





C-OCEAN Event Reports

- Location of the Event
- Summary of Reports and Observations
- Response Efforts
- Photos



MOTE MARINE LABORATORY

Florida Keys Red Tide Monitoring Program
Tropical Research Laboratory – Summerland Key, FL

Cell Count Results – January 11-16, 2006

Karenia brevis (cells/liter)

Jan. 11-16, 2006

Summary: Water samples were collected on January 11, 2006 on Looe Key Reef and just inside of Looe Key in response to observation of "green" discolored water. Samples showed no indication of elevated *Karenia brevis*.

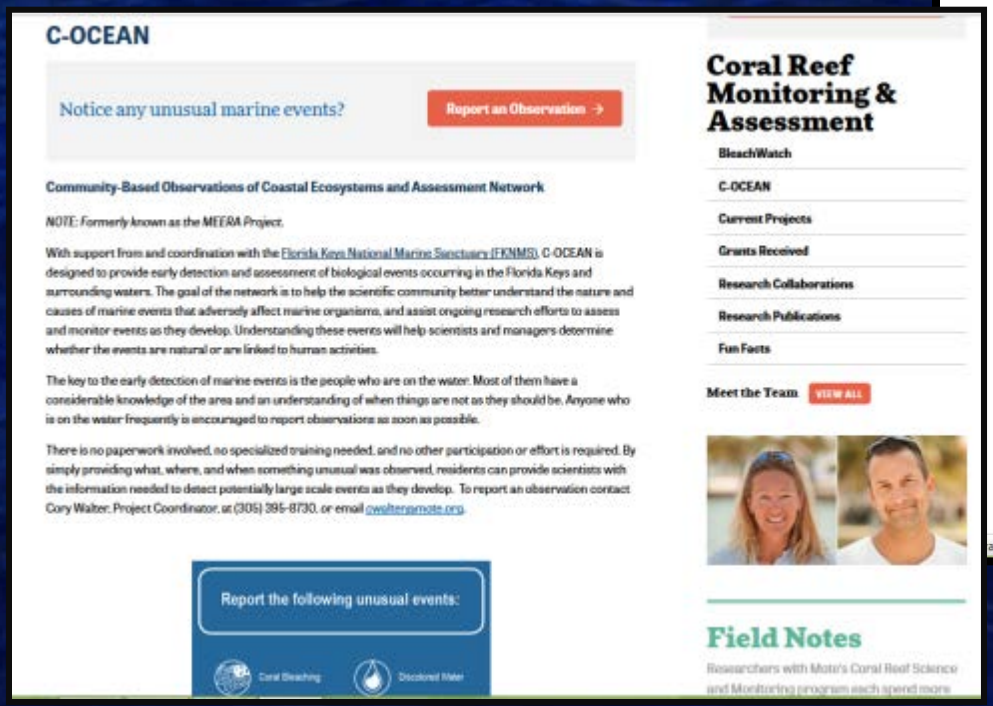
Water samples collected January 12, 2006 by a fisherman south of "The Quicksands" between the Marquesas and Dry Tortugas showed no *K. brevis* present. An additional sample collected at Looe Key reef in response to continued discoloration also indicated no *K. brevis* present.

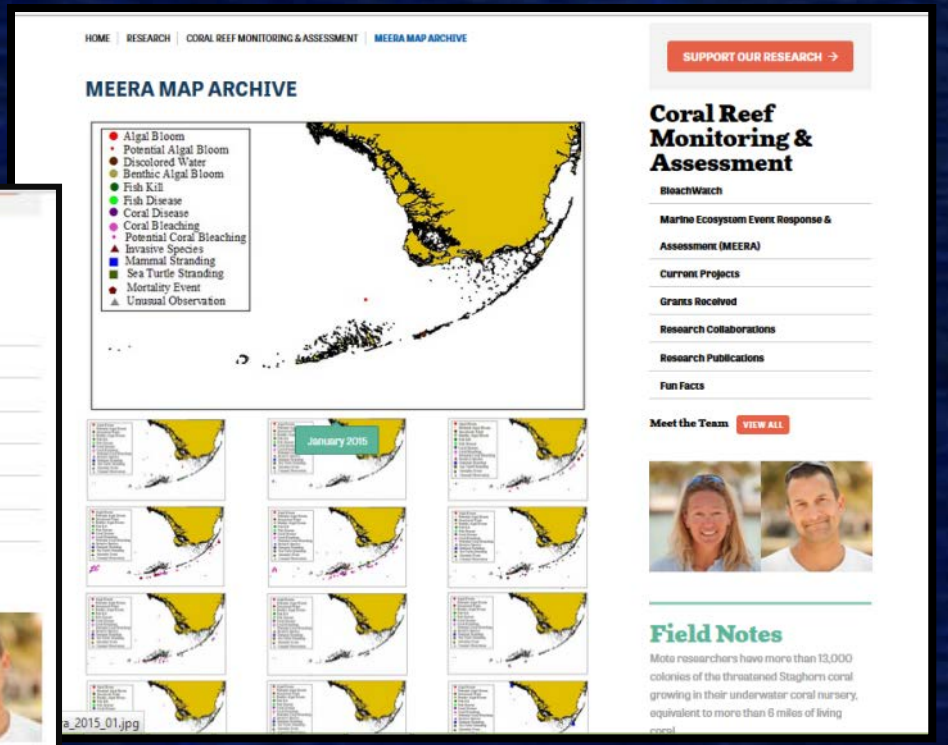
In response to continued satellite imagery indicating an elevated chlorophyll-a signature along the oceanside of the Florida Keys, opportunistic sampling was conducted on January 16, 2006 near Pelican Shoals, in mid Hawk Channel, and near the entrance to Bow Channel. Minimal levels of *K. brevis* were noted at two of the three stations, with levels of "Very Low" (approx. 2,000 cells/L) *K. brevis* found near the reef tract.

Note: The data shown has already been provided to the FWC-FWRI Red Tide Monitoring Program, including specific locations and detailed cell counts, who in turn disseminates the data to other relevant HAB monitoring programs. Please direct questions to:

Ms. Cory Walter, Project Coordinator – (305) 395-8730
Mote's Tropical Research Laboratory– Summerland Key, FL

C-OCEAN Website





www.mote.org/COCEAN

Outreach Efforts

- Red Tide

  Winter months (December-March)

- Coral Bleaching and Disease

  Summer months (June-October)

- Fish Kills

  Extreme temperatures changes

  Wind driven events

- University of Georgia – “Ecology of human pathogens in coastal waters”
- Woods Hole Oceanographic Institution – “Microbial symbionts of corals.”
- Smithsonian Field Station - “Impacts of macroalgae and cyanobacteria on coral recruitment and survival”
- Florida International University – “Adaptive responses in gene expression to thermal stress in coral.”
- University of Texas at Austin – “Addressing genetic constraints to coral recovery in the Florida Keys.”
- NOAA/AOML – “Coral restoration in natural ocean acidification refugia”.
- Mote Marine Laboratory – “Infection Dynamics of the coral pathogen Vibrio coralliilyticus”
- Harbor Branch Oceanographic Institution – “Investigation of novel compounds from marine sponges.”
- Mote Marine Laboratory – “Factors controlling transmission of White-band Disease in corals.”
- University of North Florida – “Synergistic effects of simultaneous exposure to Mosquito Control Pesticides with other pesticides on coral in the Florida Keys National Marine Sanctuary.
- Smithsonian Field Station – “Chemical ecology of black band disease”.
- University of Richmond-“ A mass bleaching event involving clionaid sponges”

“A mass bleaching event involving clionaid sponges”

Reef sites

A mass bleaching event involving clionaid sponges

Fig. 1 a Non bleached (typical) *Cliona varians* forma *incrustans* growing over a *Montastrea cavernosa* colony (photograph by M. Hill). b, c Representative examples of bleached *C. varians* observed in October 2015 (photographs by C. Walter)

The Caribbean sponge *Cliona varians* forma *incrustans* harbors dense intracellular populations of Clade G *Symbiodinium* (Fig. 1a; Hill 1996). Symbioses between bioeroding clionaids and *Symbiodinium* spp. are typically unaffected by the environmental stressors that induce bleaching in corals (e.g., Schönberg and Suwa 2007). However, in October 2015 we observed widespread *C. varians* bleaching on reefs at 12–15 m in the lower Florida Keys (Fig. 1b, c; Electronic Supplementary Material Fig. S1). The cause of sponge bleaching appears related to water temperature. Average daily temperatures >31 °C persisted for 10 days (5–15 September) with a maximum temperature >32 °C. Sponge bleaching became obvious around the first week of October. While bleaching in *C. varians* can be induced artificially (Hill and Wilcox 1998), this appears to be the first report of a mass bleaching event involving clionaid sponges under natural conditions. Disrupting the symbiosis may have consequences for reef health if sponge filtration efficiency is impaired, rates of bioerosion are compromised, or non-native symbionts establish residency. Interestingly, the shallow-water *C. varians* forma *varians* did not bleach at an adjacent inshore site despite experiencing 17 days with average temperatures >33 °C and maximum temperatures >41 °C. While differential bleaching susceptibilities may exist among individuals and clionaid species, the observations reported here indicate that sponge–*Symbiodinium* symbioses can be destabilized by environmental stressors in a manner similar to corals. These observations are troubling given increasing intensity and frequency of warming events, the abundance of sponges in reef ecosystems, and the essential ecological role they play in coral reef productivity.

References

Hill MS (1996) Symbiotic zooxanthellae enhance boring and growth rates of the tropical sponge *Anthosigmella varians* forma *varians*. Mar Biol 125:649–654

Hill MS, Wilcox TM (1998) Unusual mode of symbiont acquisition after bleaching in the tropical sponge *Anthosigmella varians*: acquisition of different zooxanthellae strains? Symbiosis 25:279–289

Schönberg CHL, Suwa R (2007) Why bioeroding sponges may be better hosts for symbiotic dinoflagellates than many corals. In: Custódio MR, Lôbo-Hajdu G, Hajdu E, Muricy G (eds) Porifera research: biodiversity, innovation and sustainability. Museu Nacional, Rio de Janeiro, pp 569–580

Electronic supplementary material The online version of this article (doi:10.1007/s00338-016-1402-7) contains supplementary material, which is available to authorized users.

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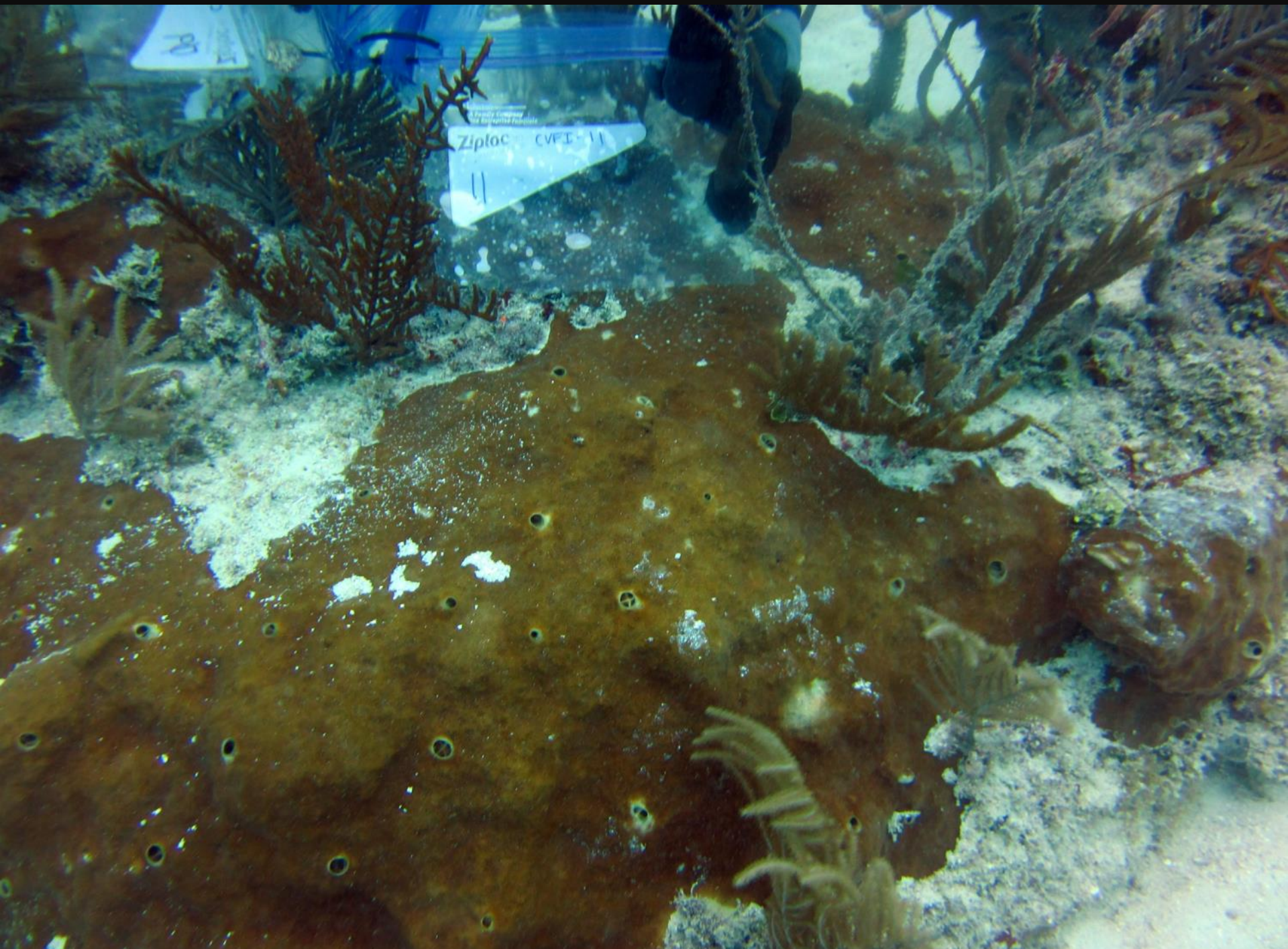
Coral Reefs (2016) 35:153
DOI 10.1007/s00338-016-1402-7

Hill M, Walter C, Bartels E (2016) Coral Reefs, 35(1): 153.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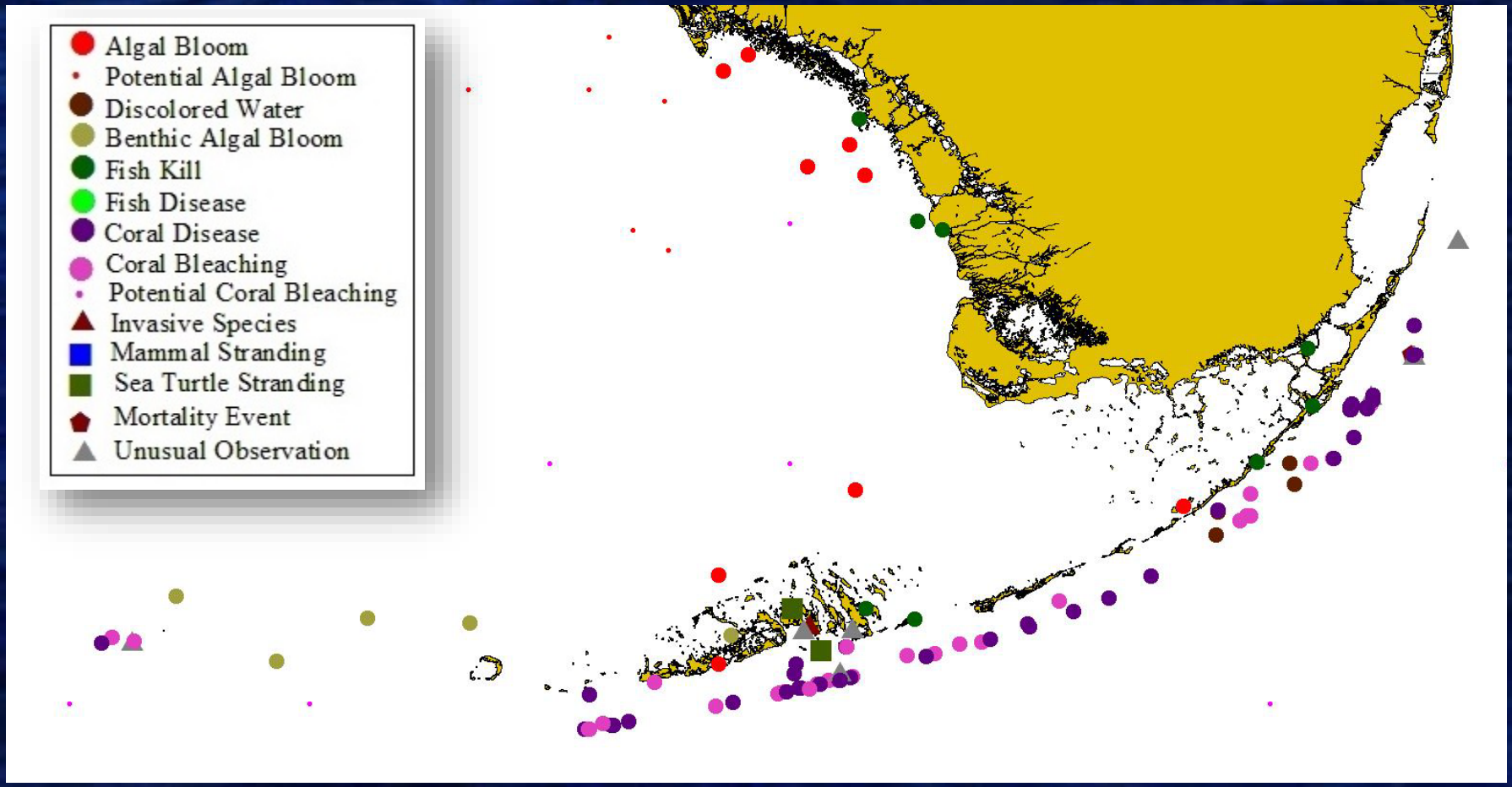
C-OCEAN Reported Observations

January 1, 2016 – September 30, 2016



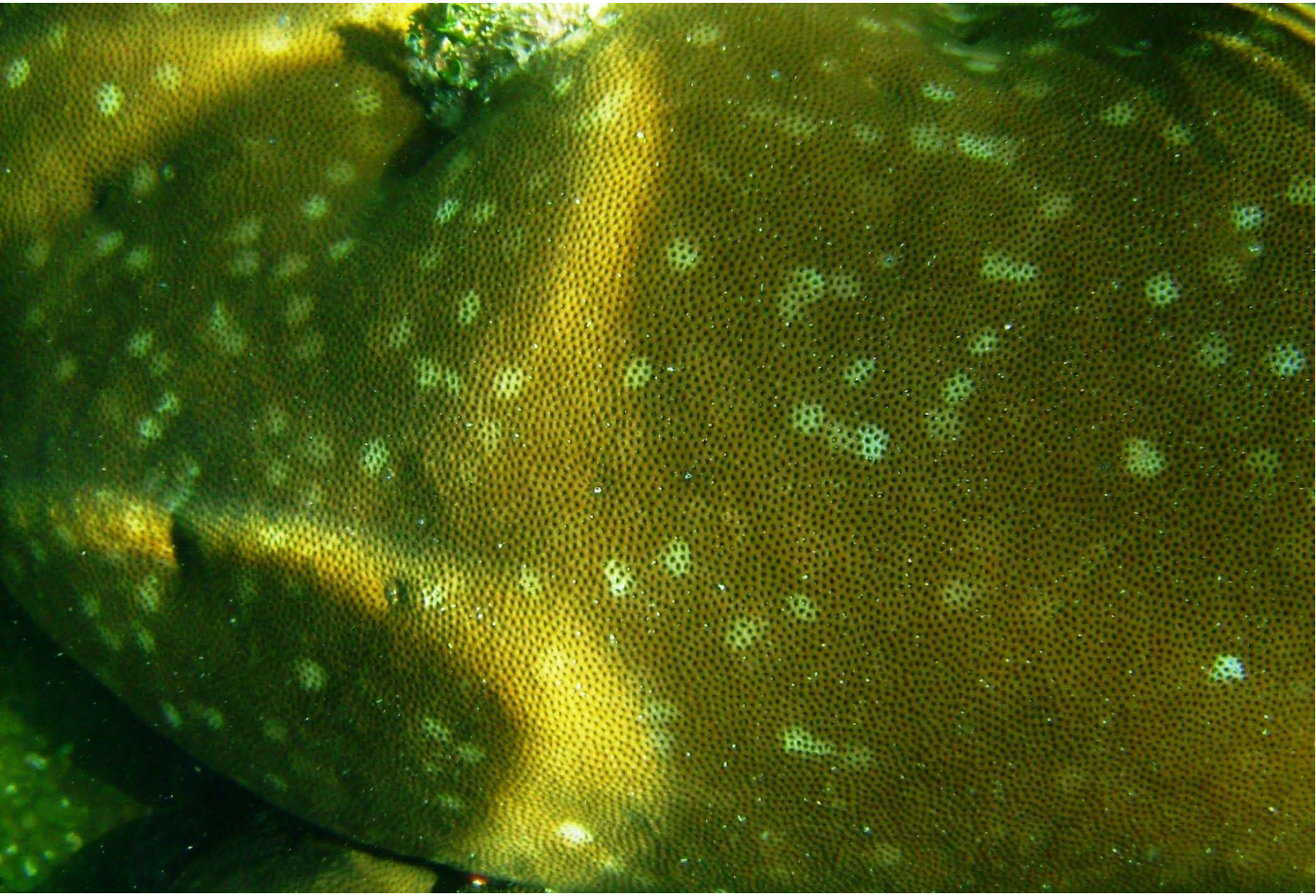
C-OCEAN Reported Observations

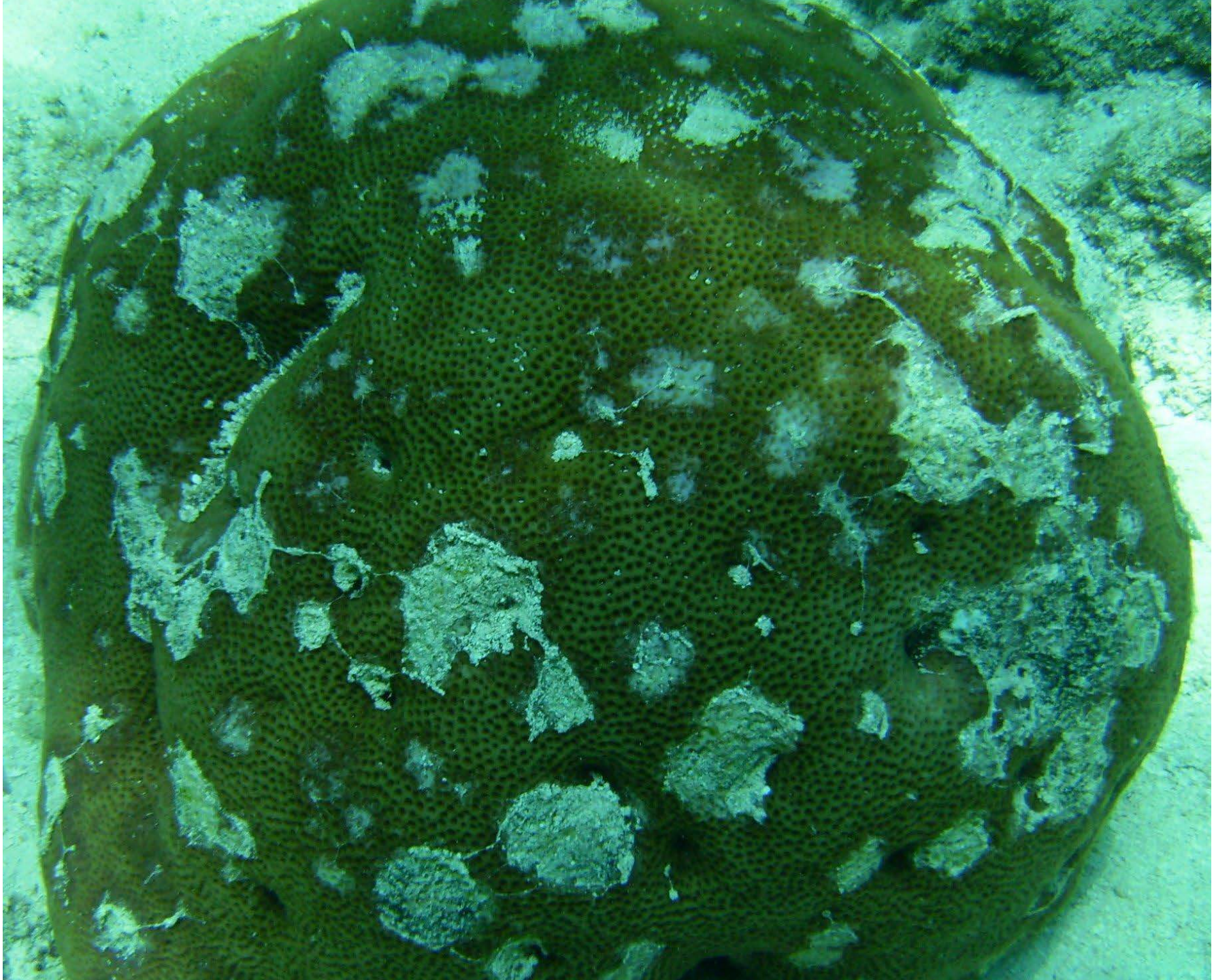
January-September 30, 2016

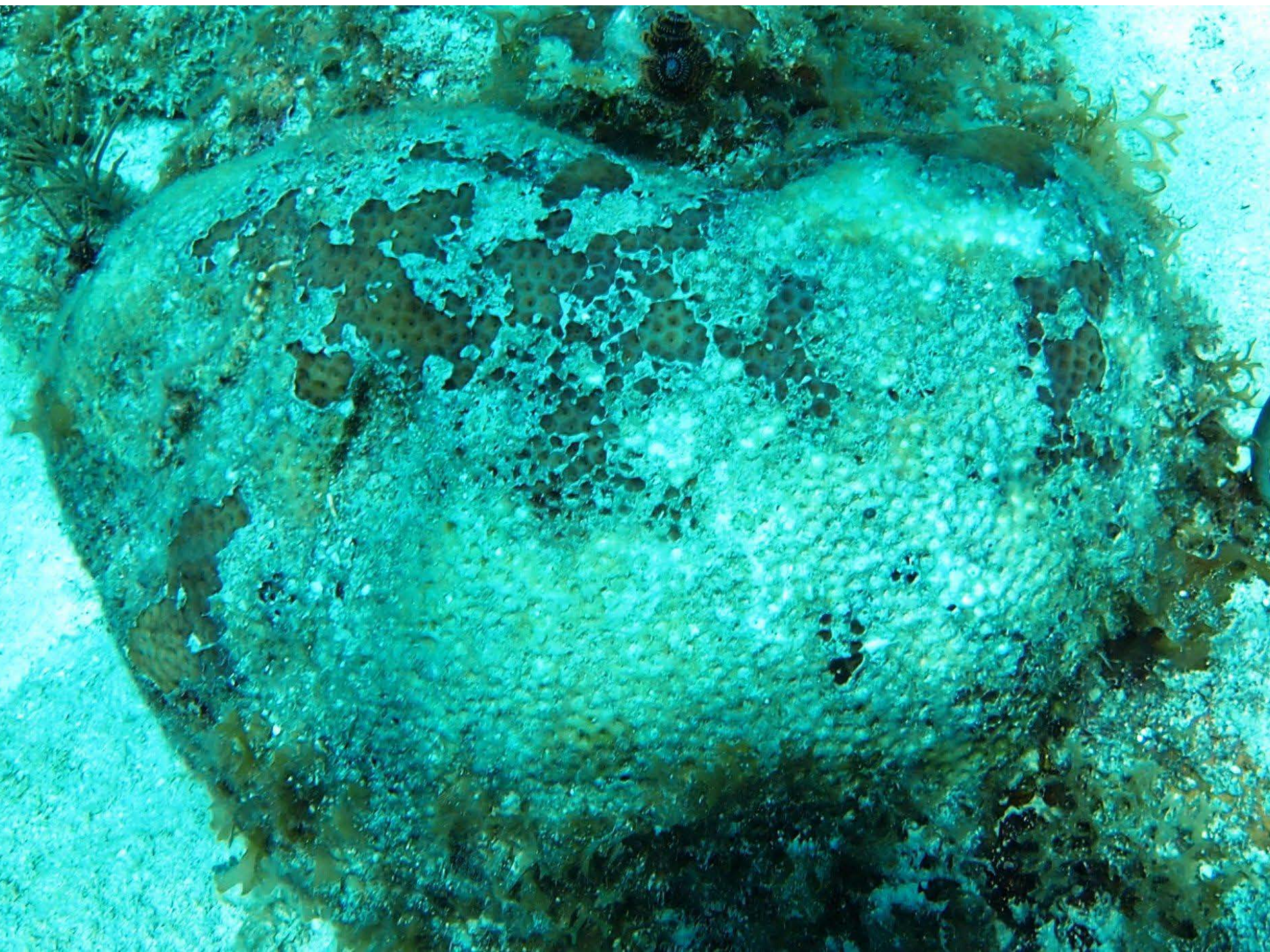
Coral Disease	57
Coral Bleaching	44
Algal Blooms / Discolored Water	24
Fish Disease / Fish Kill	8
Potential Events	51
Other Unusual Observations	17
Total	**201**

White-Blotch Syndrome on *Siderastrea siderea*

- Starts as blemishes and circular lesions from Yellow-tail Damselfish bites (first described by Glynn 1973).
- Most heal within two weeks of initial blemish.
- In some colonies – lesions fail to heal?
- Tissue necrosis occurs within circular blemishes and then expands outwards.
- Entire colony is engulfed in numerous expanding lesions.
- Eventually, entire colony dies.
- Similar patterns observed on *Acropora palmata* – often confused with White-pox disease.







Upper Keys Coral Disease

- **<u>Grecian Rocks (FWC)</u>-7/16/16**
  - Multiple diseases on at least nine species: *Colpophyllia natans*, *Pseudodiploria strigosa*, *Diploria labyrinthiformis*, ***Meandrina meandrites***, ***Dichocoenia stokesii***, *Siderastrea siderea*, *Montastraea cavernosa*, *Orbicella annularis*, and *Eusmilia fastigiata.*
  - Diseases: White Plague, Black Band Disease, "White Blotch", and other indistinguishable white diseases.

- **<u>Carysfort (FWC)</u>- 7/21/16**
  - "White Blotch" disease on *Siderastrea siderea* was up to 69%.
  - Noted on colonies of all sizes
  - Mortality 25% (recently infected colonies) to 95%
  - Noted disease is migrating south and west as far as Molasses

- **<u>Pennekamp SP</u> – 7/14/16** Darkspot disease prevalent on 2-5% of the *Siderastrea siderea* at Cannon Patch

FKNMS: Upper Keys

Grecian Rocks
7/16/16

Large *Colpophyllia natans* colony #1 at Grecian Rocks mooring ball #12 photographed in 2012.

Colpophyllia natans colony #1 photographed with active unknown "White Blotch" disease lesions 7/16/2016.

FKNMS: Upper Keys

Grecian Rocks
7/16/16

- Unknown “White Blotch” disease lesions on *Diploria labyrinthiformis* colony #1. Top left and right: multifocal white lesions with bare skeleton at the center; Bottom: central multifocal lesion near colony edge with bare exposed skeleton with turf algae at center

FKNMS: Upper Keys

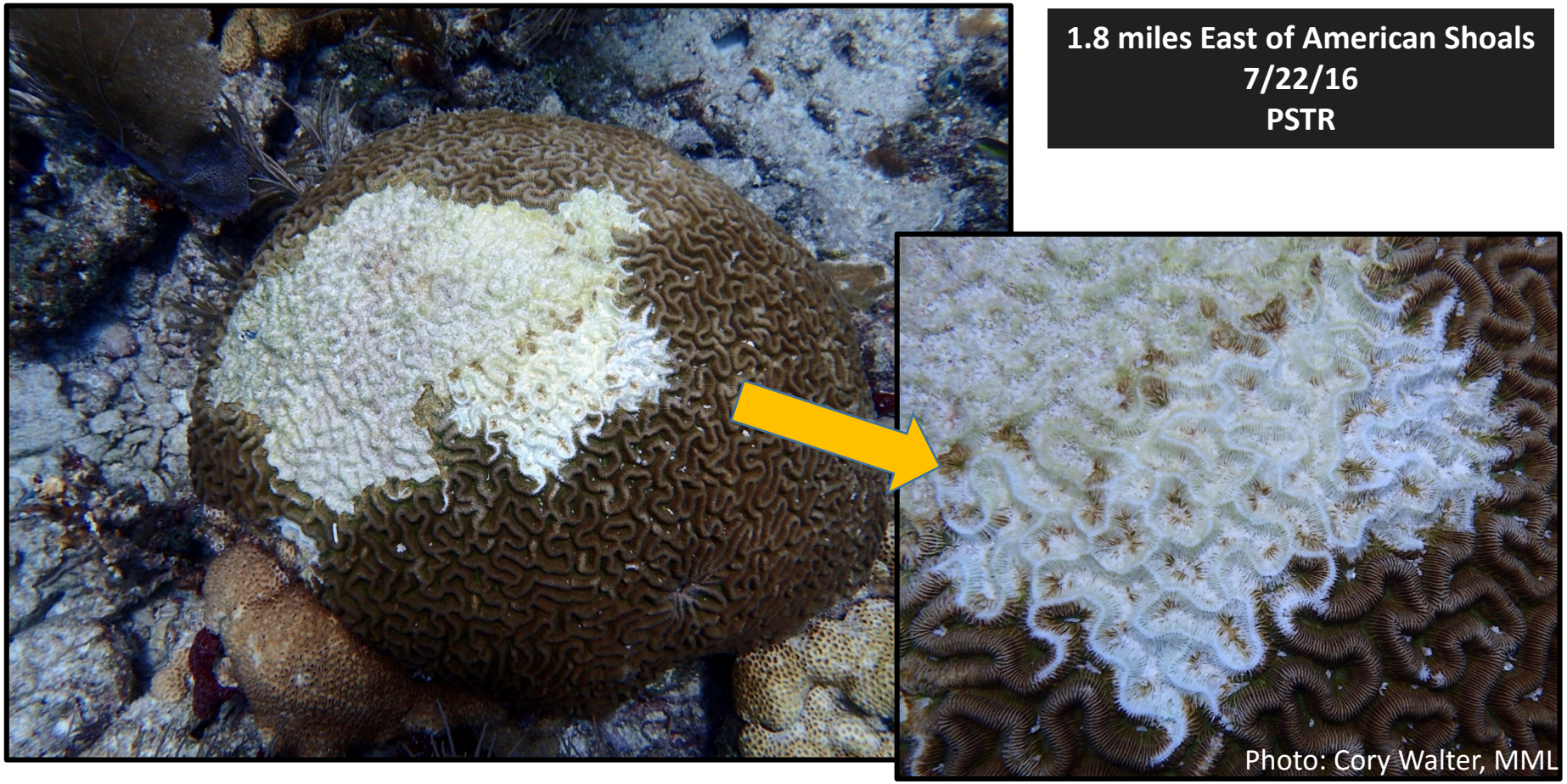
Grecian Rocks
7/16/16

- *Montastraea cavernosa* colony #5 with unknown white disease. Lesions appear unlike other disease lesions observed at the site. Multifocal central and peripheral lesions are characterized by undulating margins of white bleached polyps followed by exposed bare skeleton with greenish turf algae

FKNMS: Upper Keys

Benwood
9/12/16

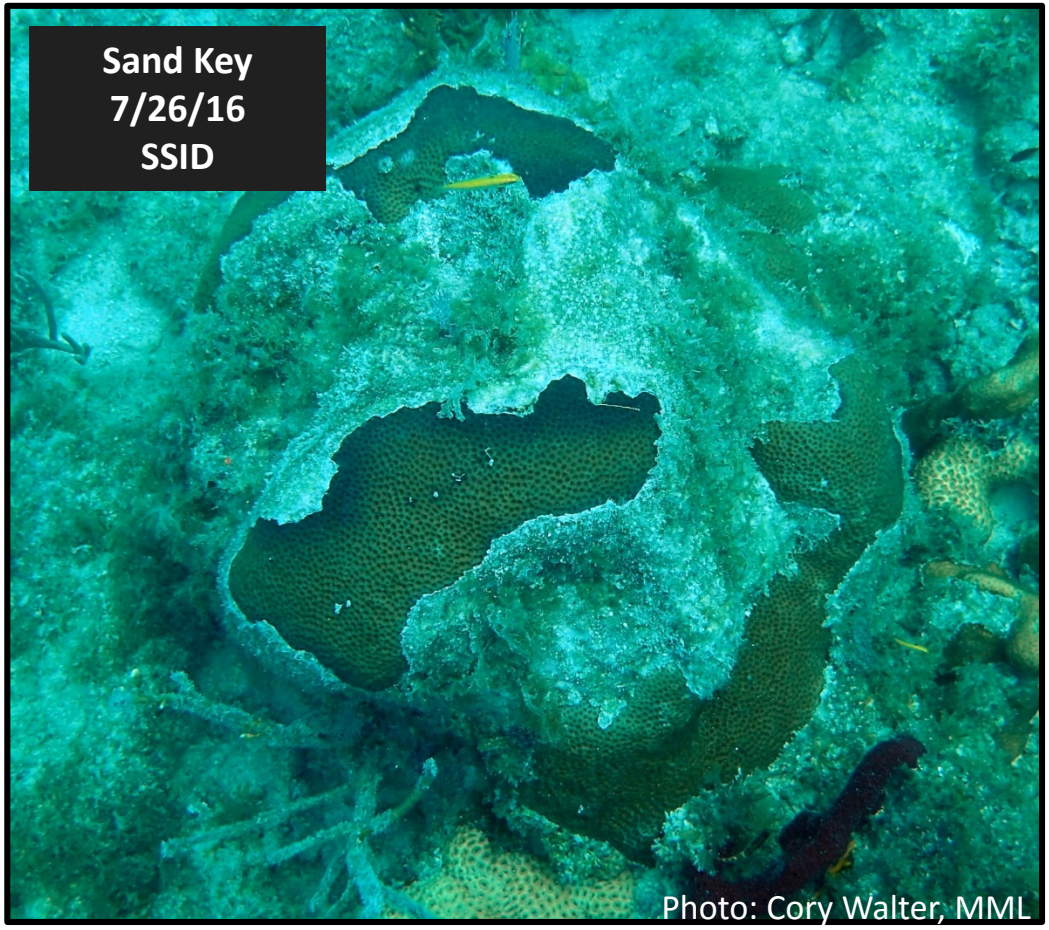
FKNMS: Lower Keys



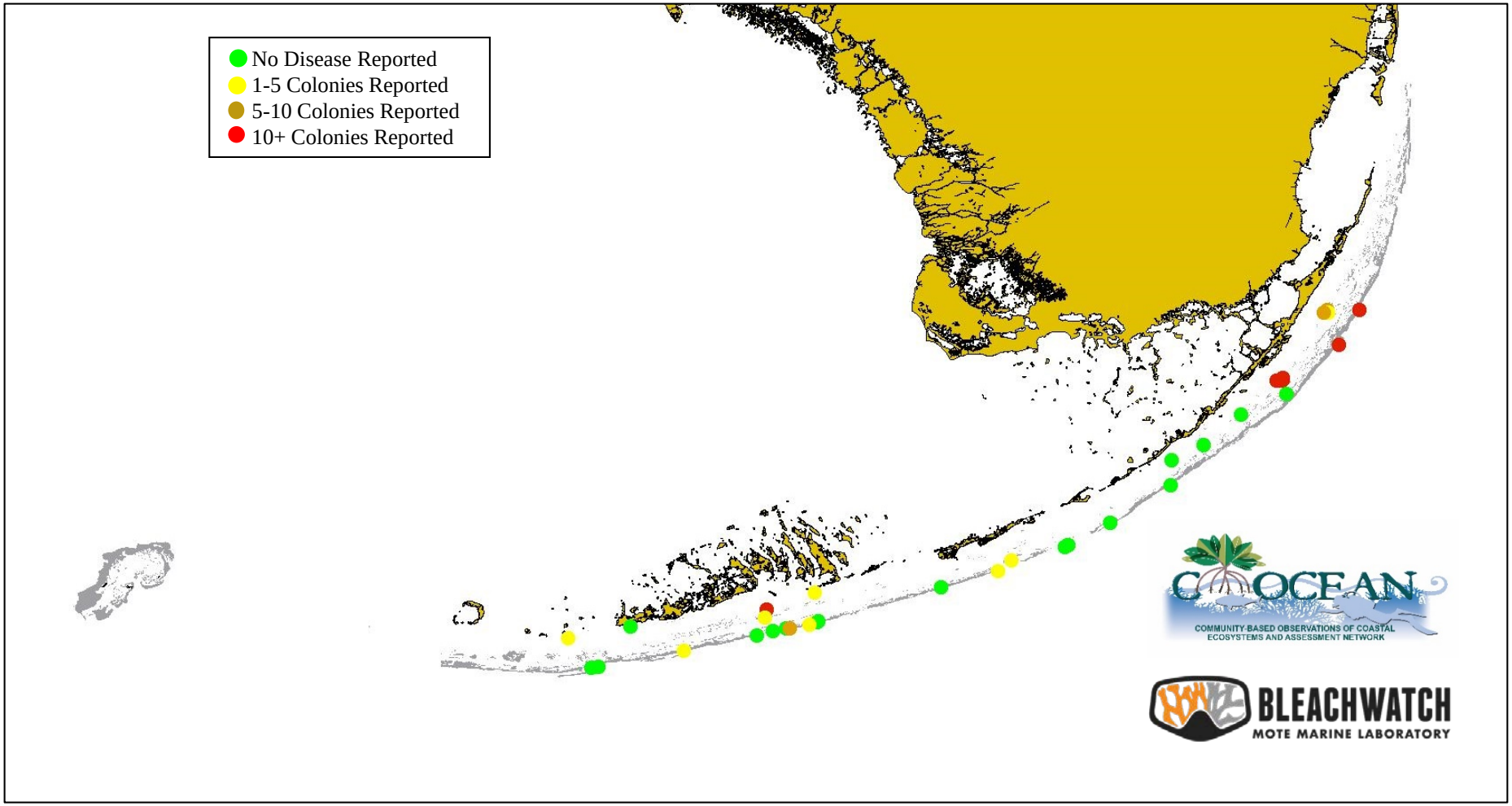
1.8 miles East of American Shoals
7/22/16
PSTR

Photo: Cory Walter, MML

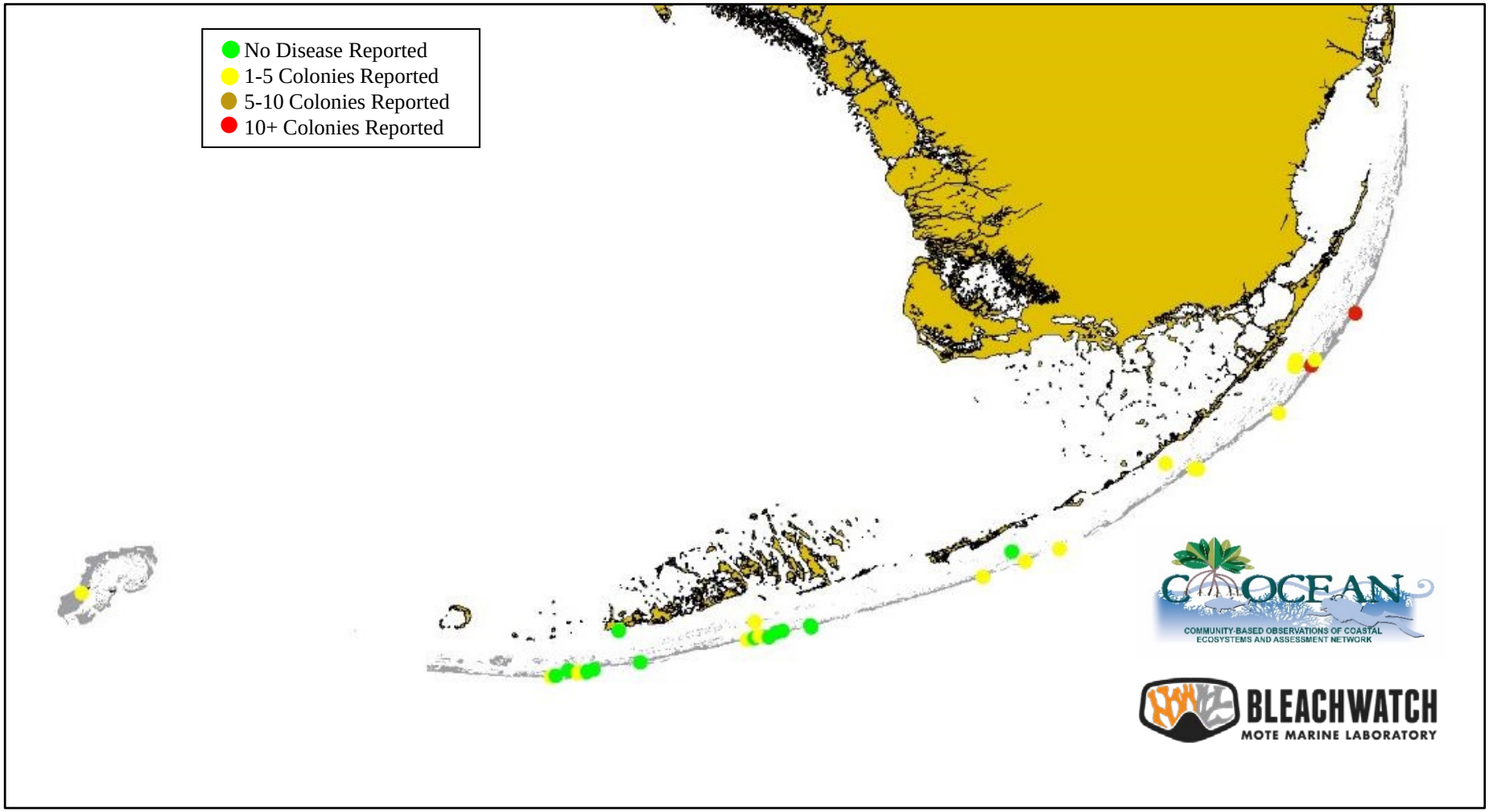
FKNMS: Lower Keys



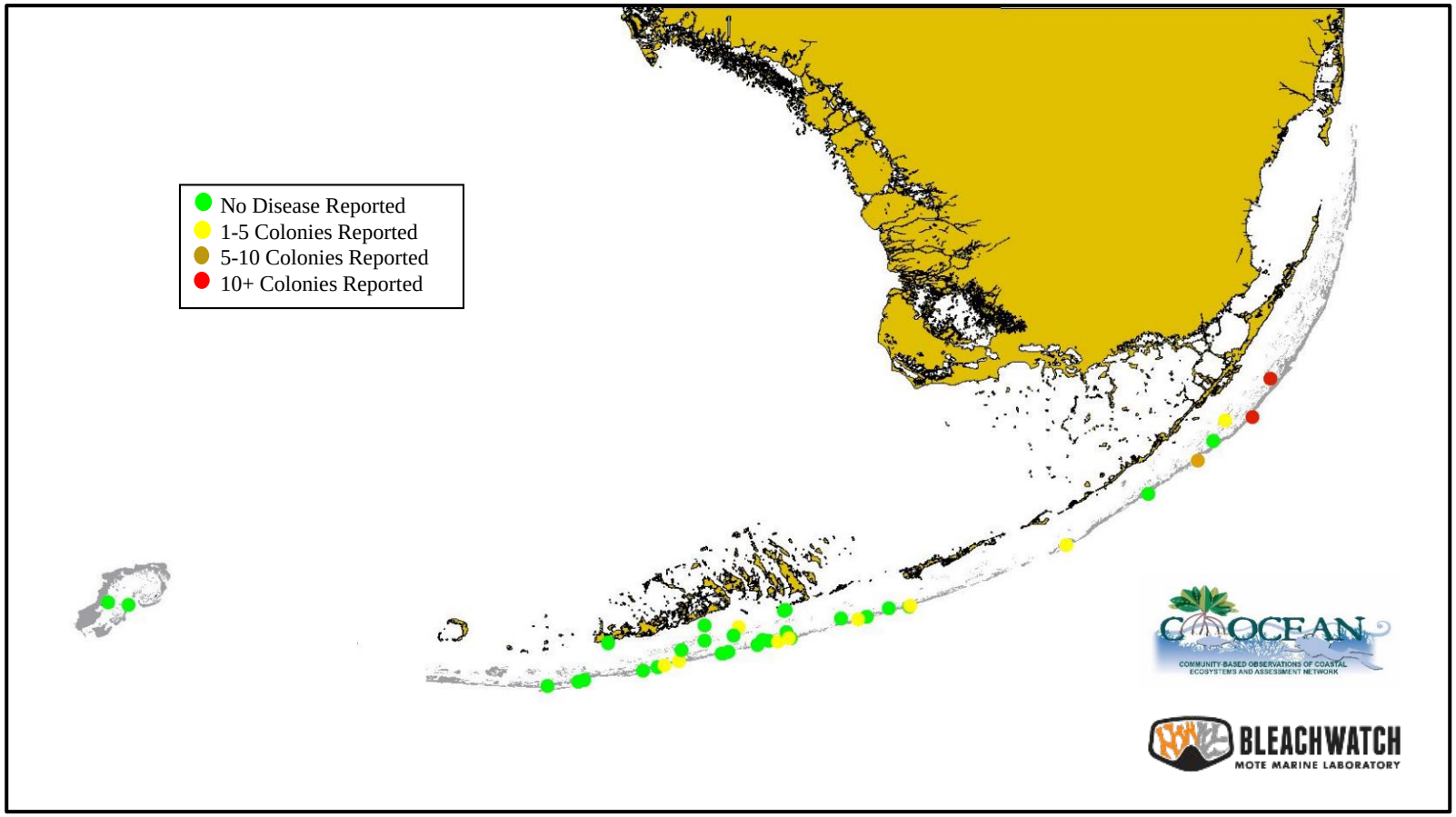
Coral Disease Reports for the Florida Keys
May-July 2016



Coral Disease Reports for the Florida Keys
July 7-August 17, 2016



Coral Disease Reports for the Florida Keys
August 19-September 21, 2016



Recent Report Sources

Researchers:

Florida Wildlife Research Institute (FWRI),
Mote Marine Laboratory (MML)
South Florida Coral Reef Initiative (SEFCRI)
Coral Reef Watch Alert Network (CRW)
Coral Restoration Foundation (CRF)
The Nature Conservancy (TNC)
Keys Marine Lab (KML)

State and Federal Agency Personnel:

Department of Environmental Protection (DEP)
NOAA Harmful Algal Bloom Bulletin
FKNMS
State and National Park Service

Dive Shops:

Tilden's Dive Center
Abyss Dive Center
Pennekamp Snorkel Tours
Dive Key West

Marine Educators and Ecotourism Groups:

MarineLab
FKNMS Team OCEAN
Key West Wildlife Center
Reef Relief
Boy Scouts "Order of the Arrow"
Ocean Reef Nature Center
Key West Power Squadron


THANK YOU
FLORIDA
4 REEF
Protect Our Reefs
&
C-OCEAN OBSERVERS!