# Coral Reefs in the USVI: Do They Have a Future?

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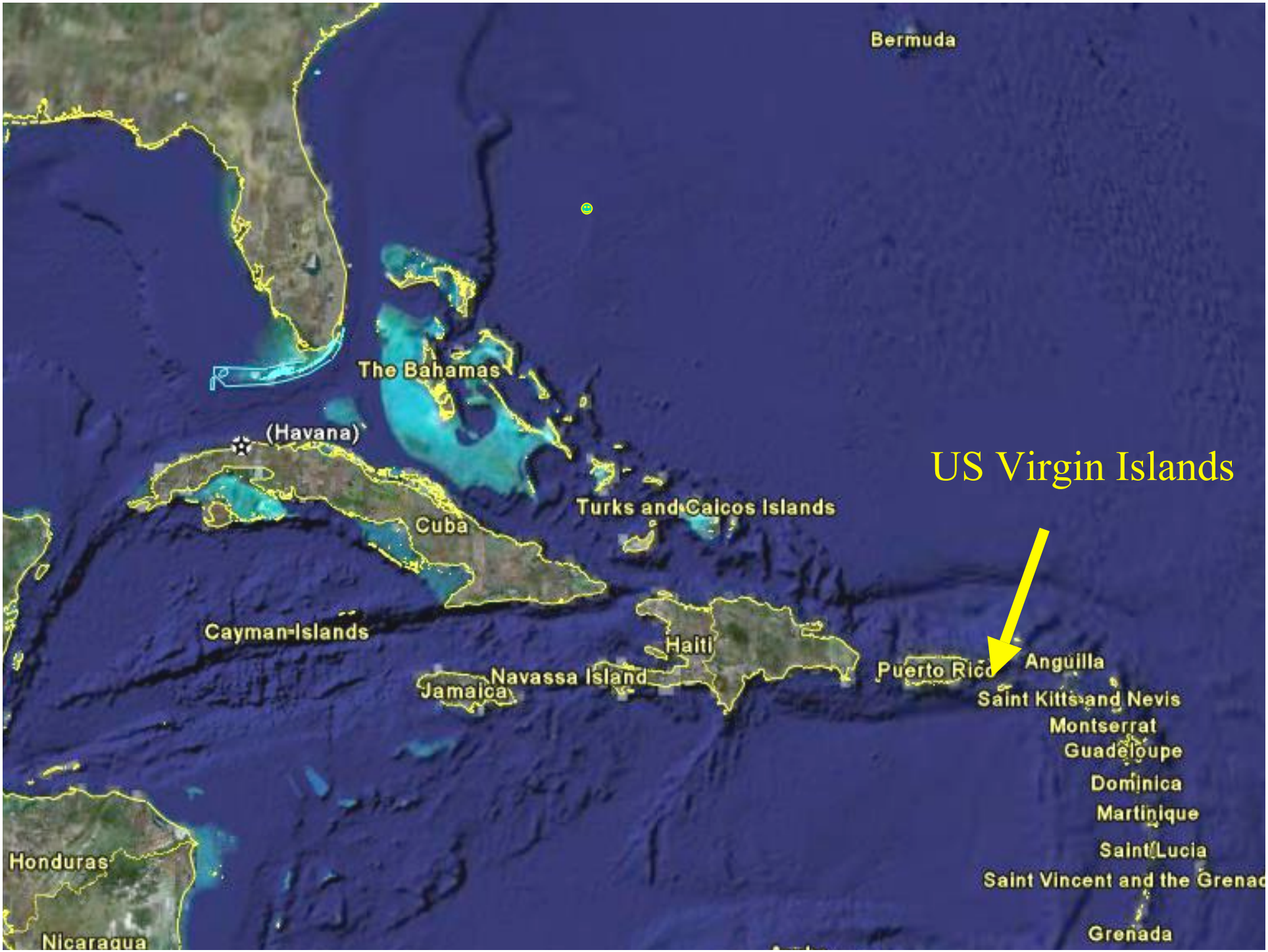
USGS


Bermuda
The Bahamas
(Havana)
Cuba
Turks and Caicos Islands
US Virgin Islands
Cayman Islands
Haiti
Navassa Island
Jamaica
Puerto Rico
Anguilla
Saint Kitts and Nevis
Montserrat
Guadeloupe
Dominica
Martinique
Saint Lucia
Saint Vincent and the Grenad
Grenada
Honduras
Nicaragua

# 18% of the world's coral reefs will likely be "lost" by 2030

Where have all the corals gone??
Changes in most important species

Acropora palmata

Montastraea annularis

Why these two species are so important

REEF ARCHITECTURE

Habitat for fishes, turtles, other species

Future Seascape in the USVI will depend largely on these 2 species

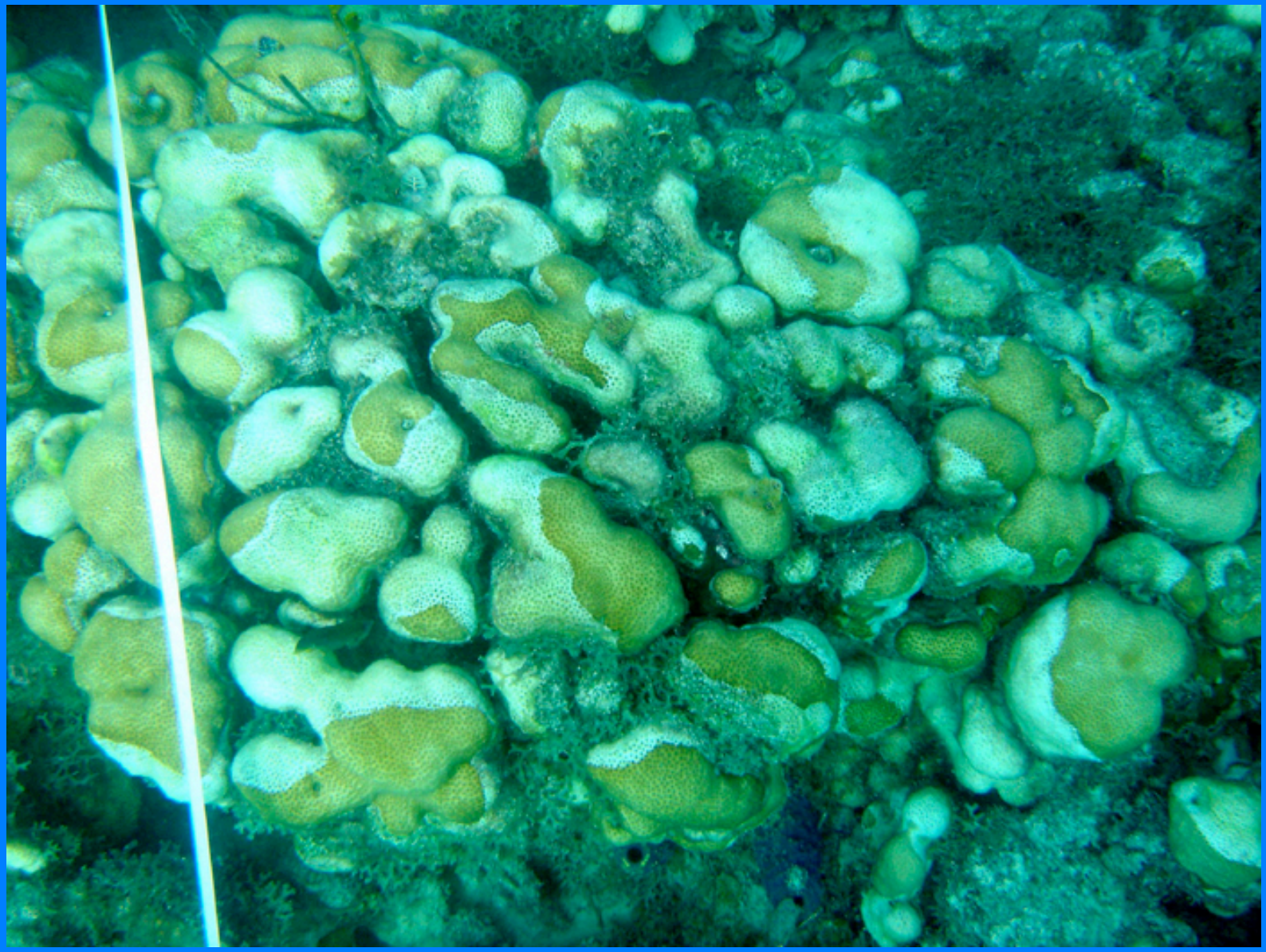
Listed as “Threatened” in 2006
White band disease and hurricanes

# Caribbean Coral Bleaching Event--2005

# LONG-TERM MONITORING—FREQUENCY INCREASED

4 reef sites –St. John; 1 reef site-St. Croix
Permanent, randomly selected transects
Coral Cover (not individual colonies)

# MORTALITY FROM DISEASE, NOT BLEACHING



White Plague


45% loss

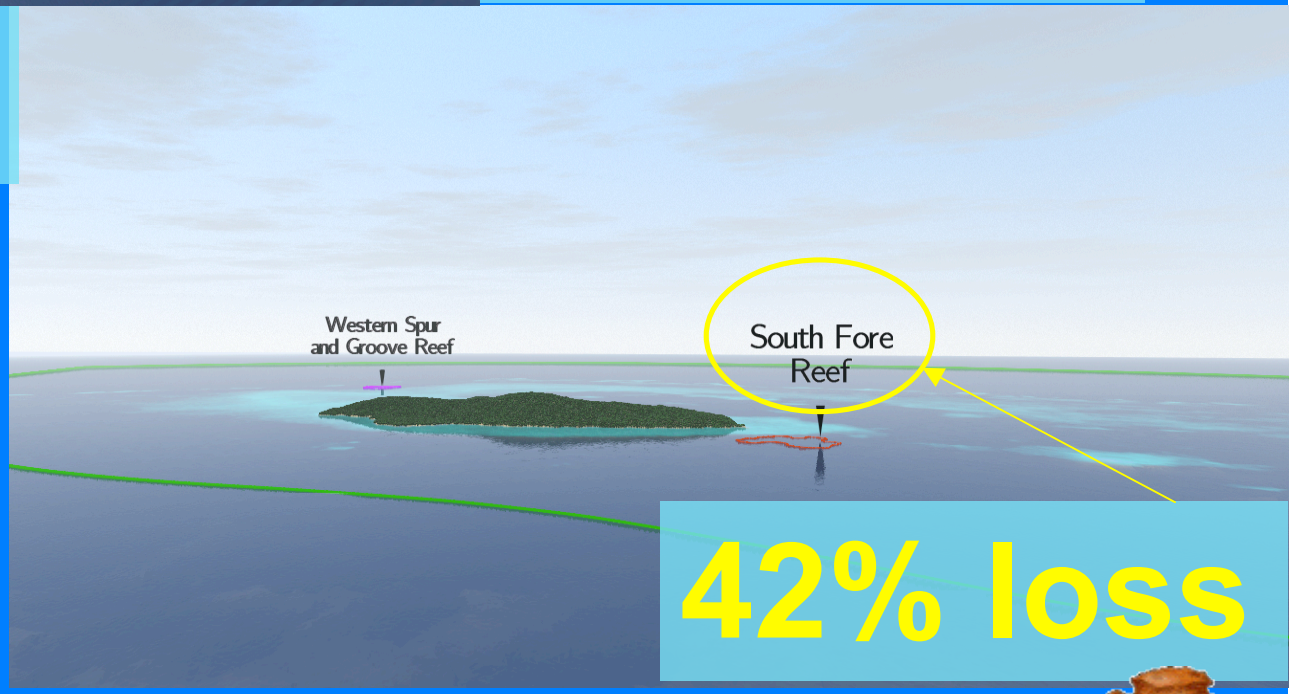
53% loss

62% loss

55% loss

AVERAGE LOSS

51.5%




42% loss

South Florida/Caribbean Network I&M Program


53% loss

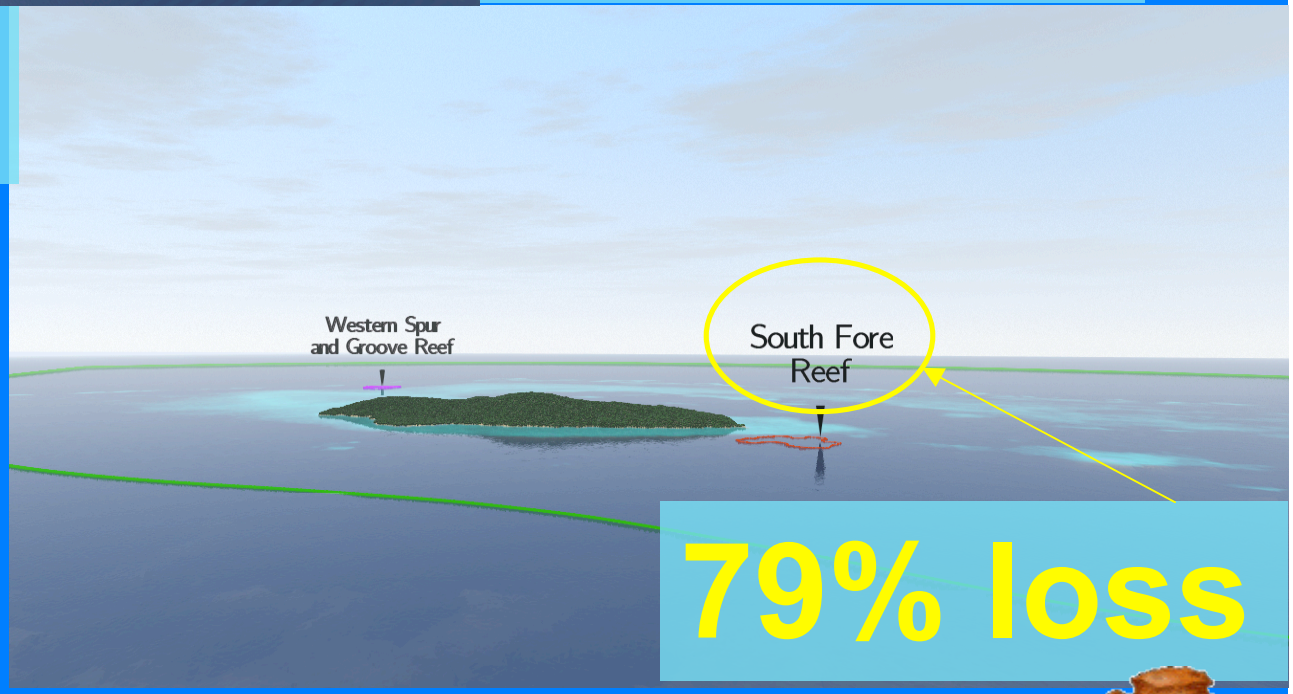
55% loss

65% loss

53% loss

AVERAGE LOSS

61.1%



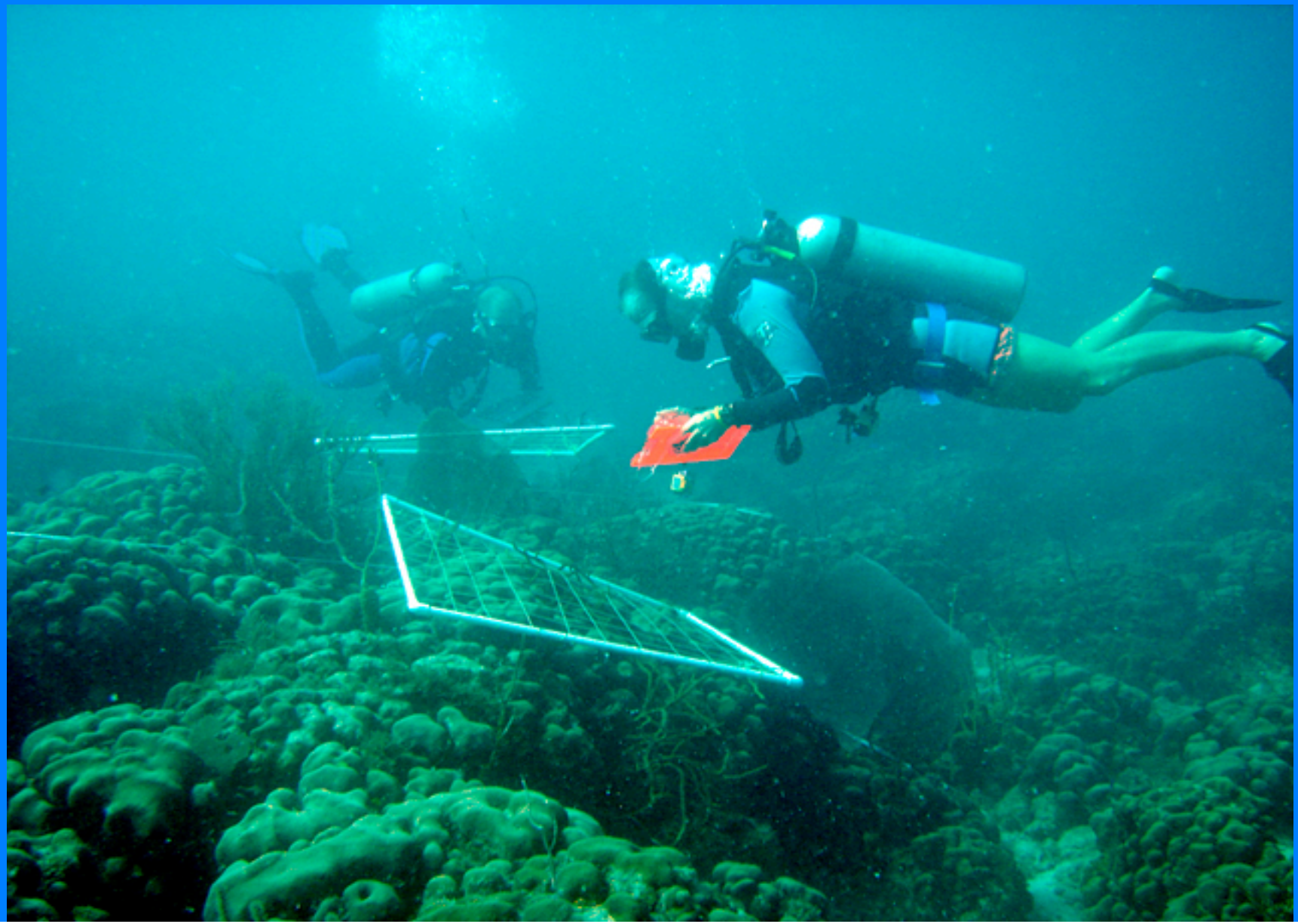

79% loss

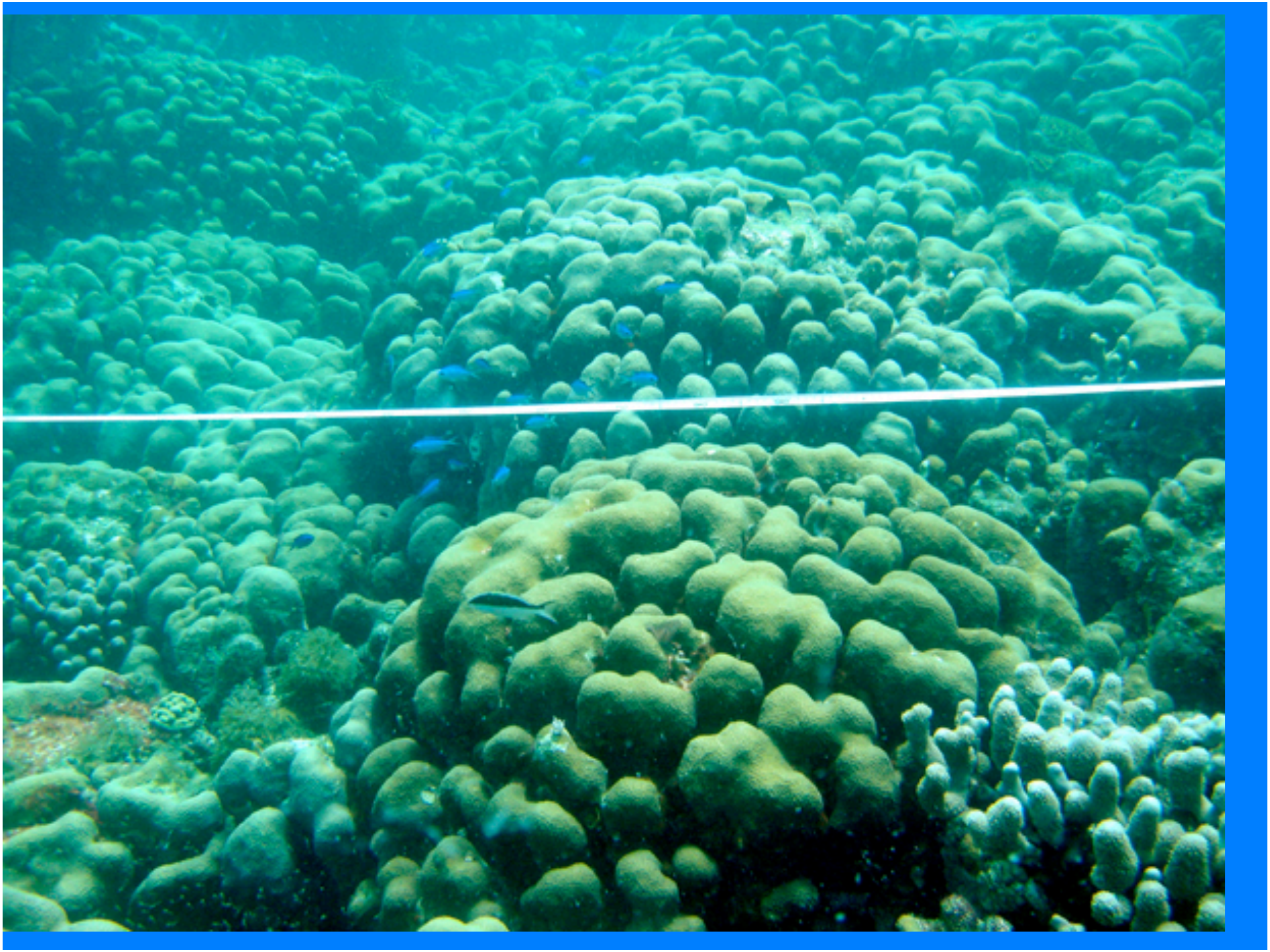
South Florida/Caribbean Network I&M Program

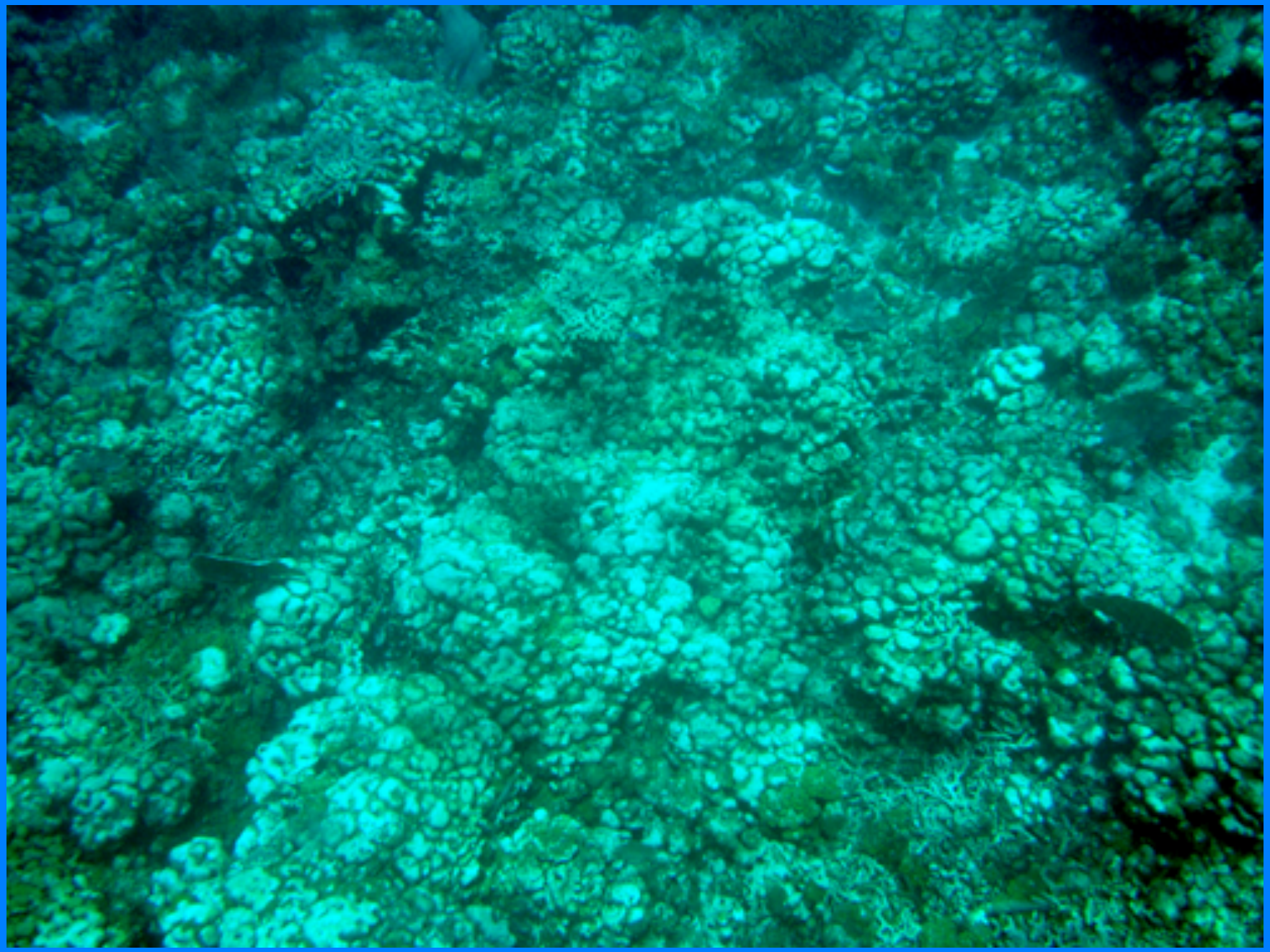
# Effects 2005 Bleaching and Subsequent Disease

- Average of c. 96% of total coral cover bleached—over 90% of the *Mac*x bleached (most is *M.annularis*)
- Over 90% of the disease lesions and the area killed by disease occurred on *Mac*x
- Relative abundance of *Mac*x went from 79.2% to 58.6%

# Tektite Reef---BEFORE and AFTER



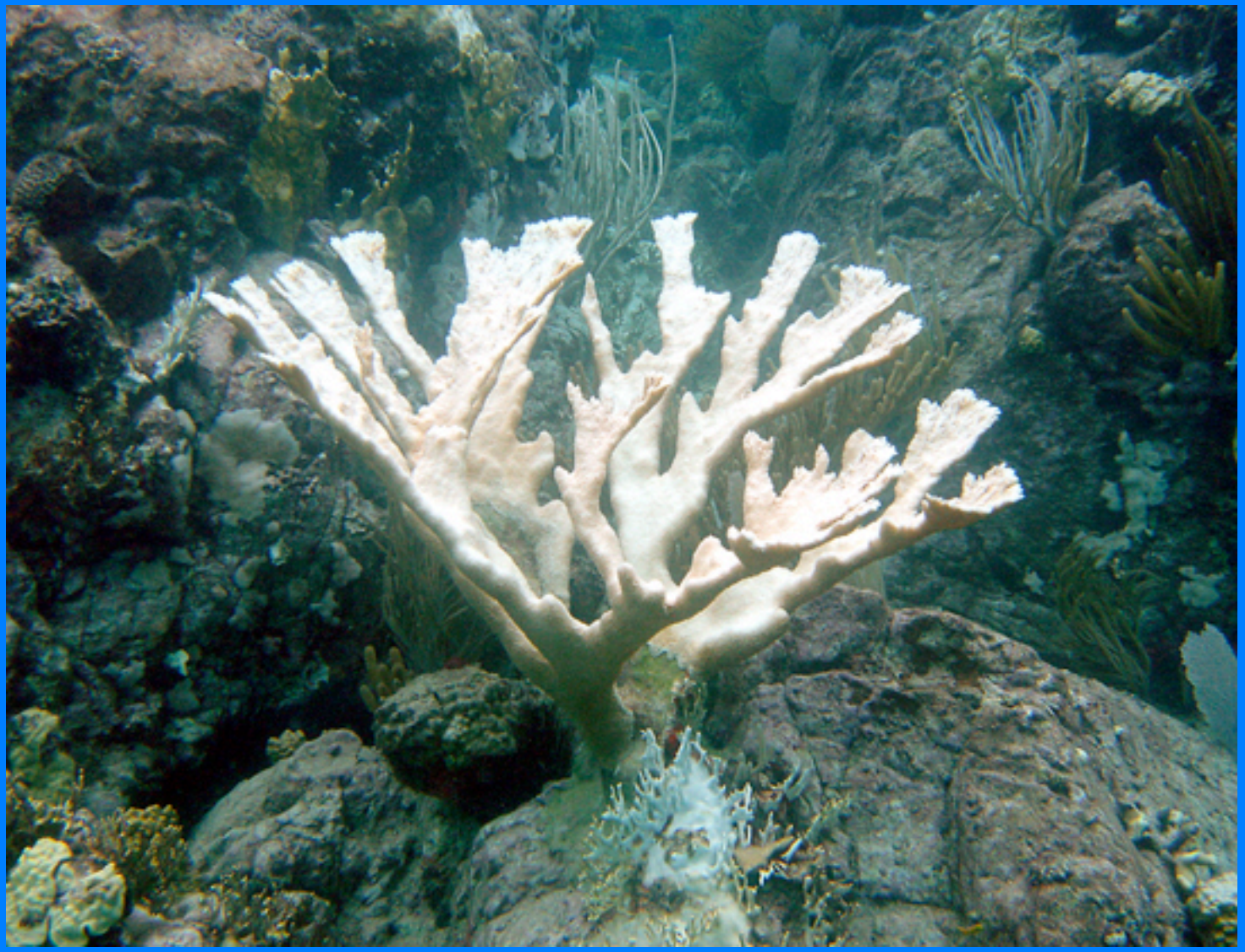




# Different and Changing Perspectives

- USVI reefs from average of 21.4% coral cover down to 10.3% after 1 yr and then 8% after 2 yrs
- BIGGEST DECLINE EVER-NO OTHER STRESSOR HAS CAUSED SO MUCH LOSS IN SUCH A SHORT TIME

# First record of elkhorn bleaching in USVI

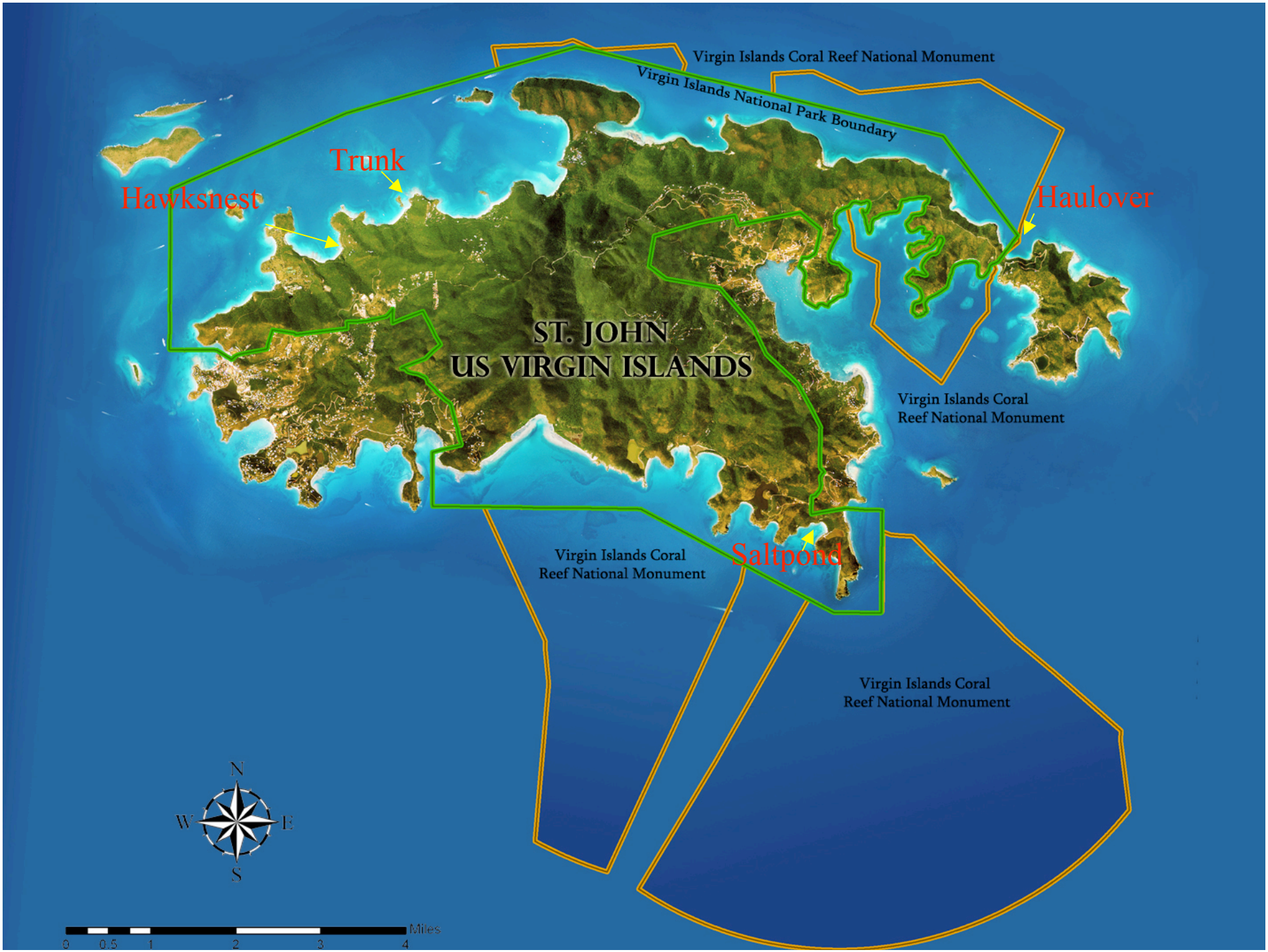


# Monthly Monitoring of individual *Acropora palmata* colonies

**460+** individual *A. palmata* colonies

**4** sites within Virgin Islands National Park

Disease, physical damage, other factors that could limit recovery


Virgin Islands Coral Reef National Monument
Virgin Islands National Park Boundary
Trunk
Hawksnest
Haulover
ST. JOHN
US VIRGIN ISLANDS
Virgin Islands Coral
Reef National Monument
Saltpond
Virgin Islands Coral
Reef National Monument
Virgin Islands Coral
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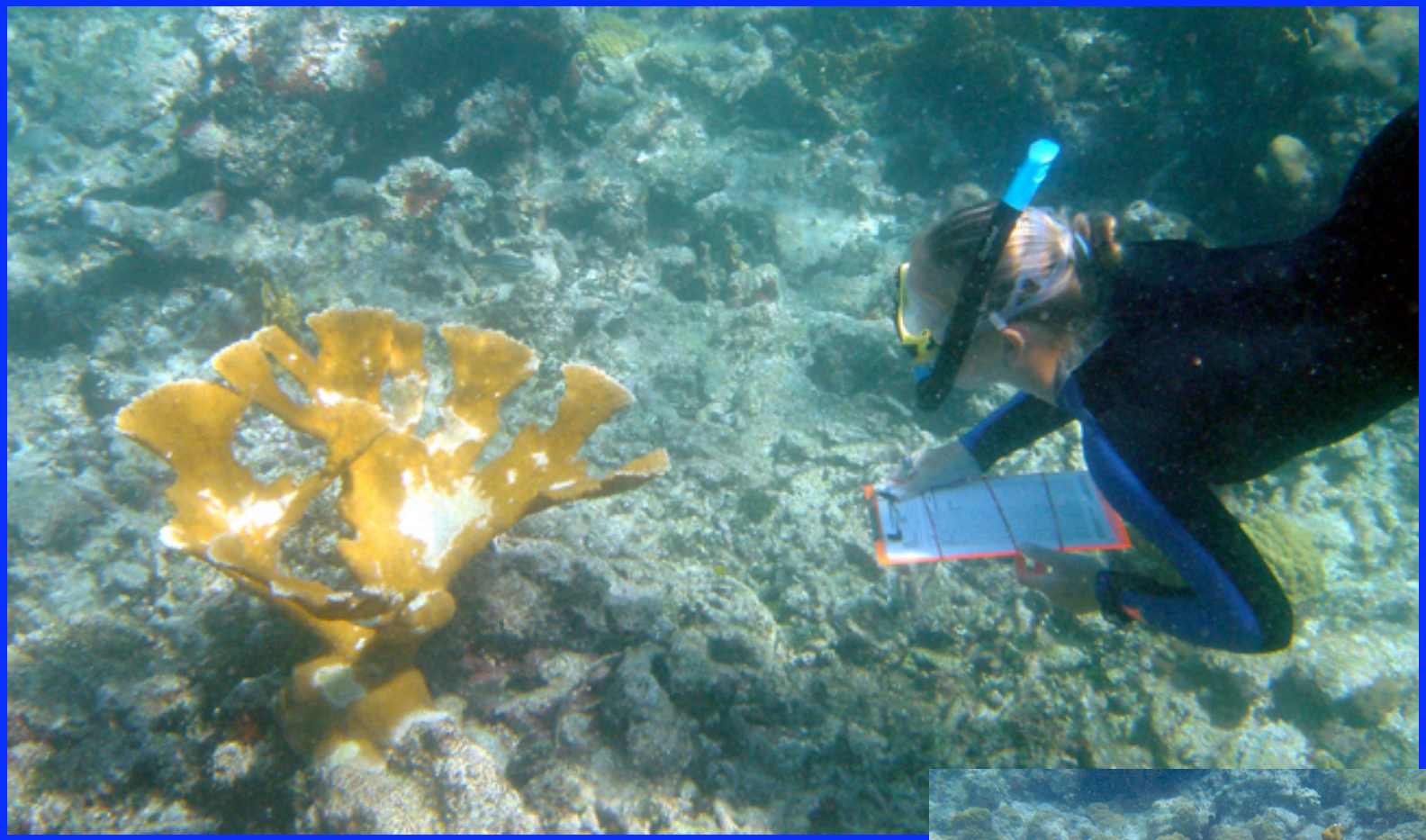
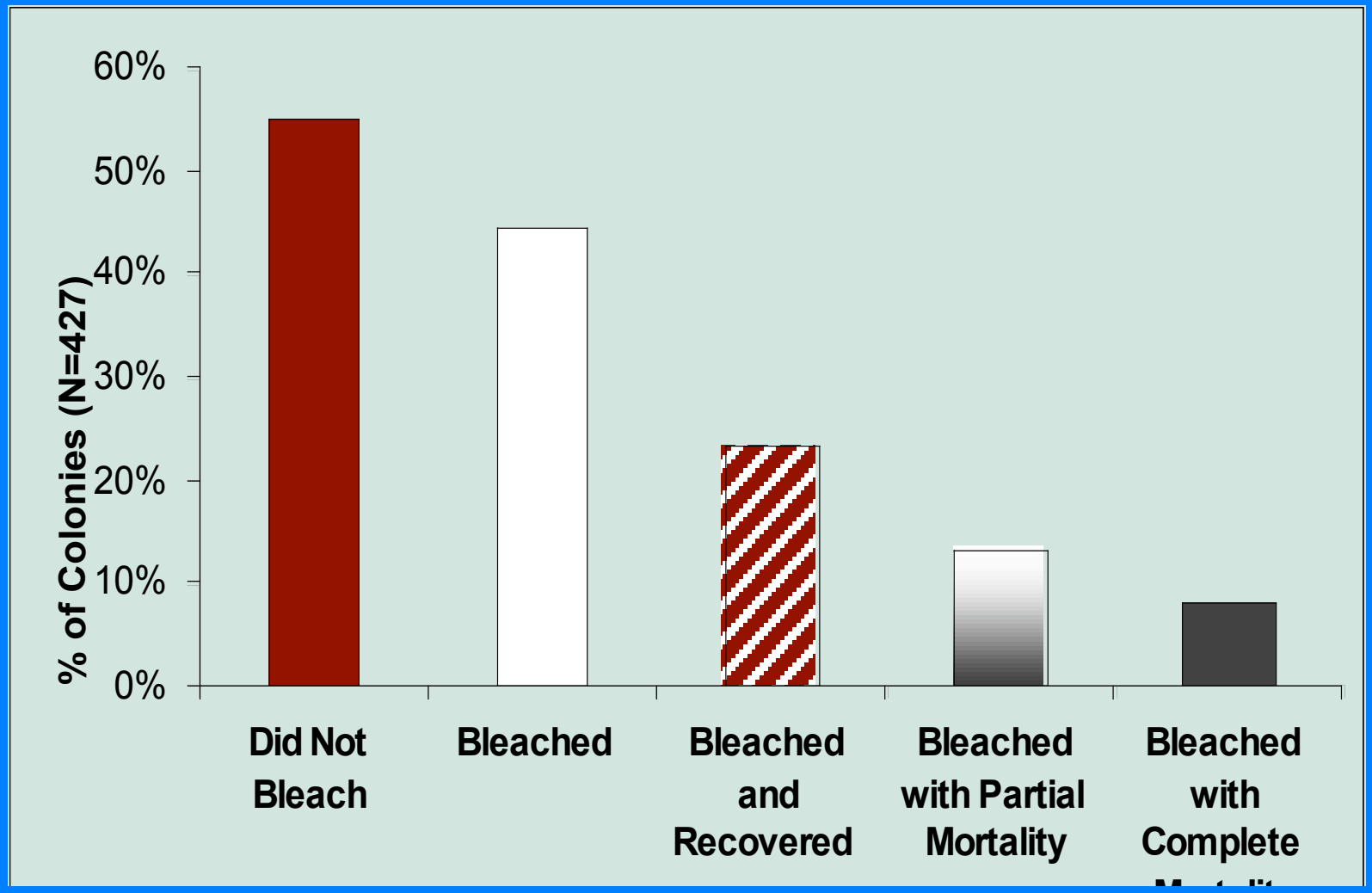


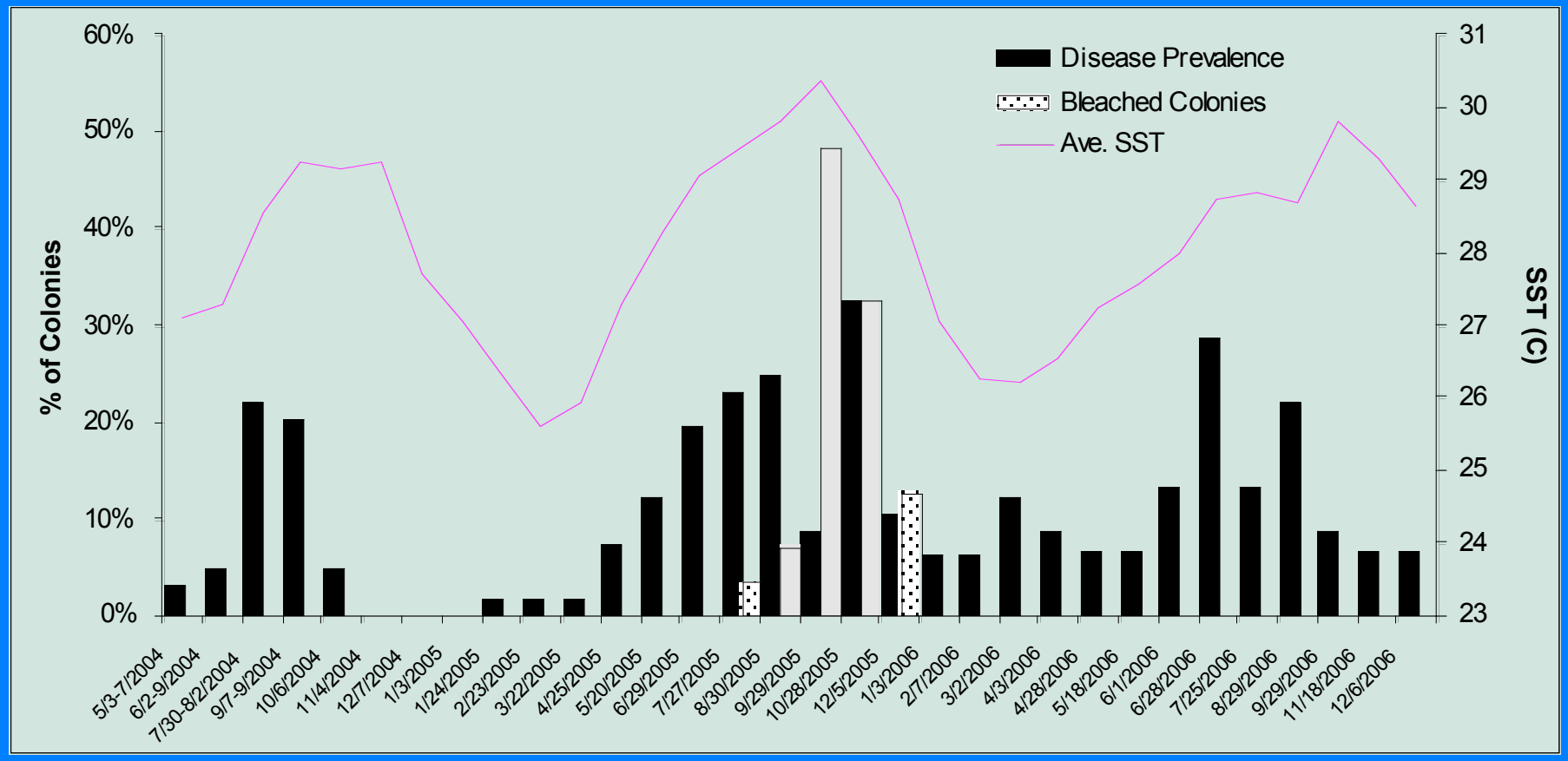
- Diseases have caused more mortality than bleaching at some sites

- Vulnerable to physical damage

# Response of elkhorn coral at St. John study sites



# Hawknest:
# Bleaching, Temperature and Disease



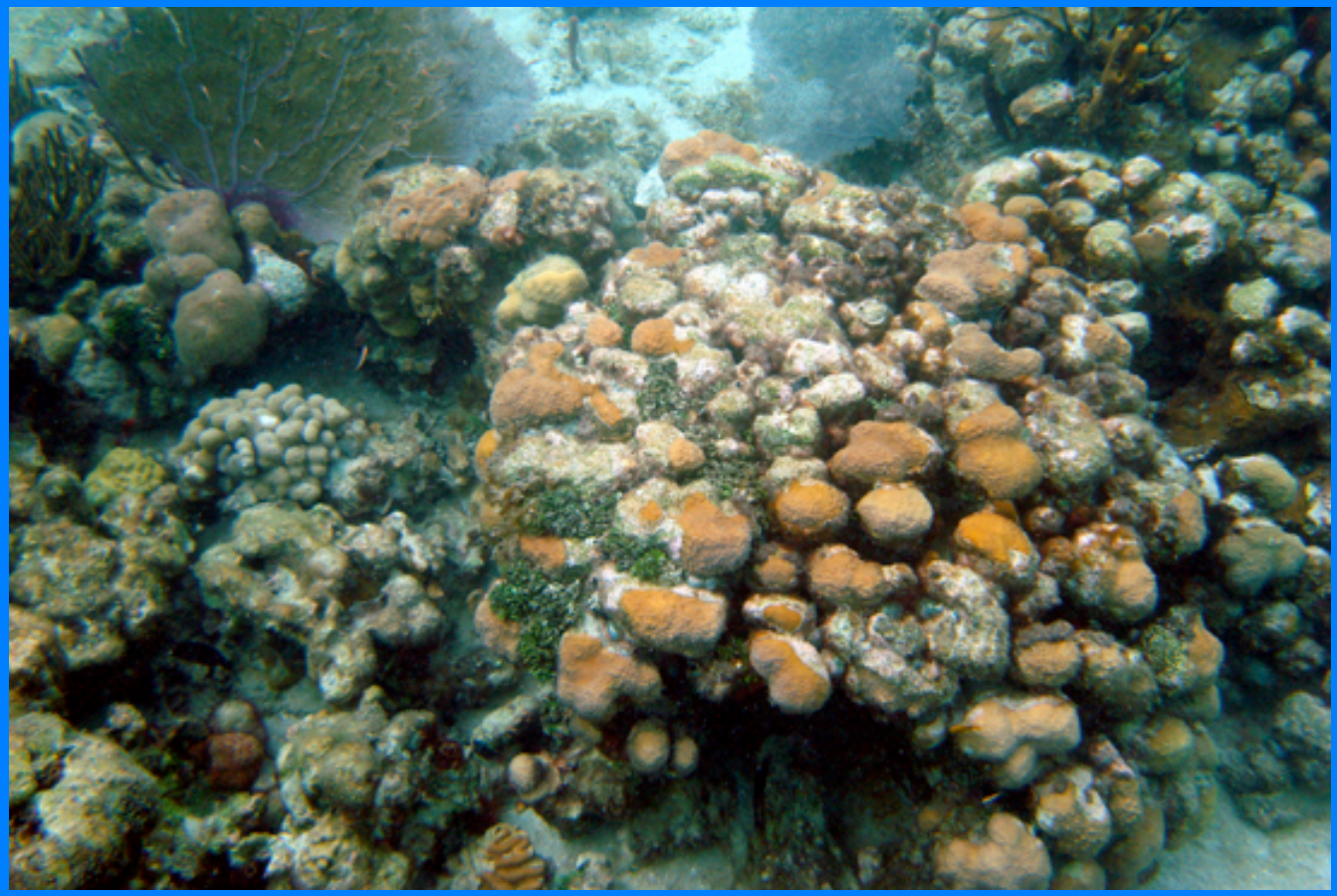
# Results of Elkhorn Monitoring

- Disease prevalence ranged from 0 to 52%
- Mostly “white pox”, very little white band
- Did not see more disease at most heavily visited site (Trunk Bay)
- Uncertain pathogen (*S. marcescens*)
- No clear evidence of recovery

# A COMPARISON—

## *A. palmata vs. M. annularis*

- Depth range and current abundance
- Asexual reproduction (dispersal potential)

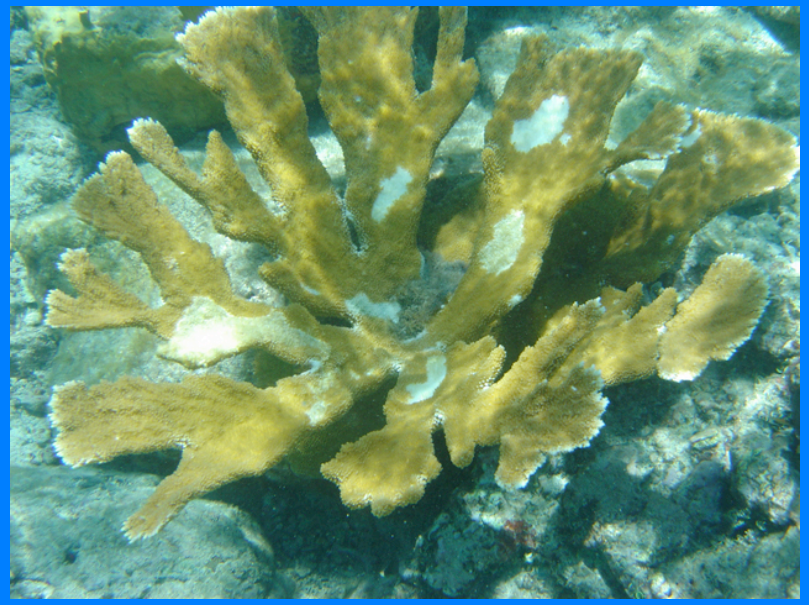


# Fragmentation of *A.palmata*

- Sexual recruitment—need more info. on both species
- Genotypes of *A.palmata*—43 out of 48

# MORE REASONS WHY *A.p.* MIGHT HAVE A BETTER CHANCE

- Faster growth rates and healing rates
- Recovery from storms, physical damage
- Bleaching—more seen on *M. annularis*
- EFFECTS OF DISEASE-
- Plague vs. pox (less wbd now)



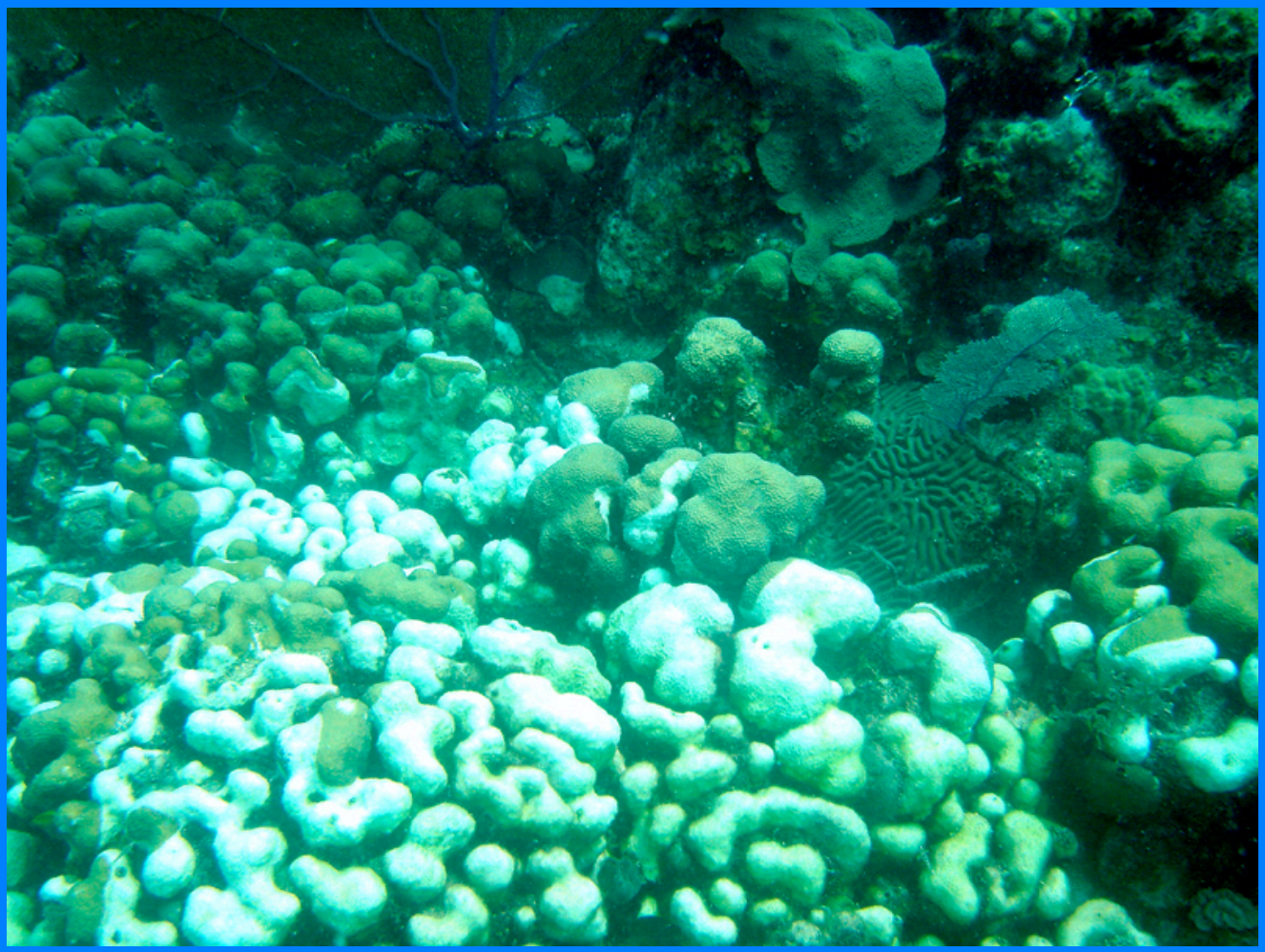

2002


2003

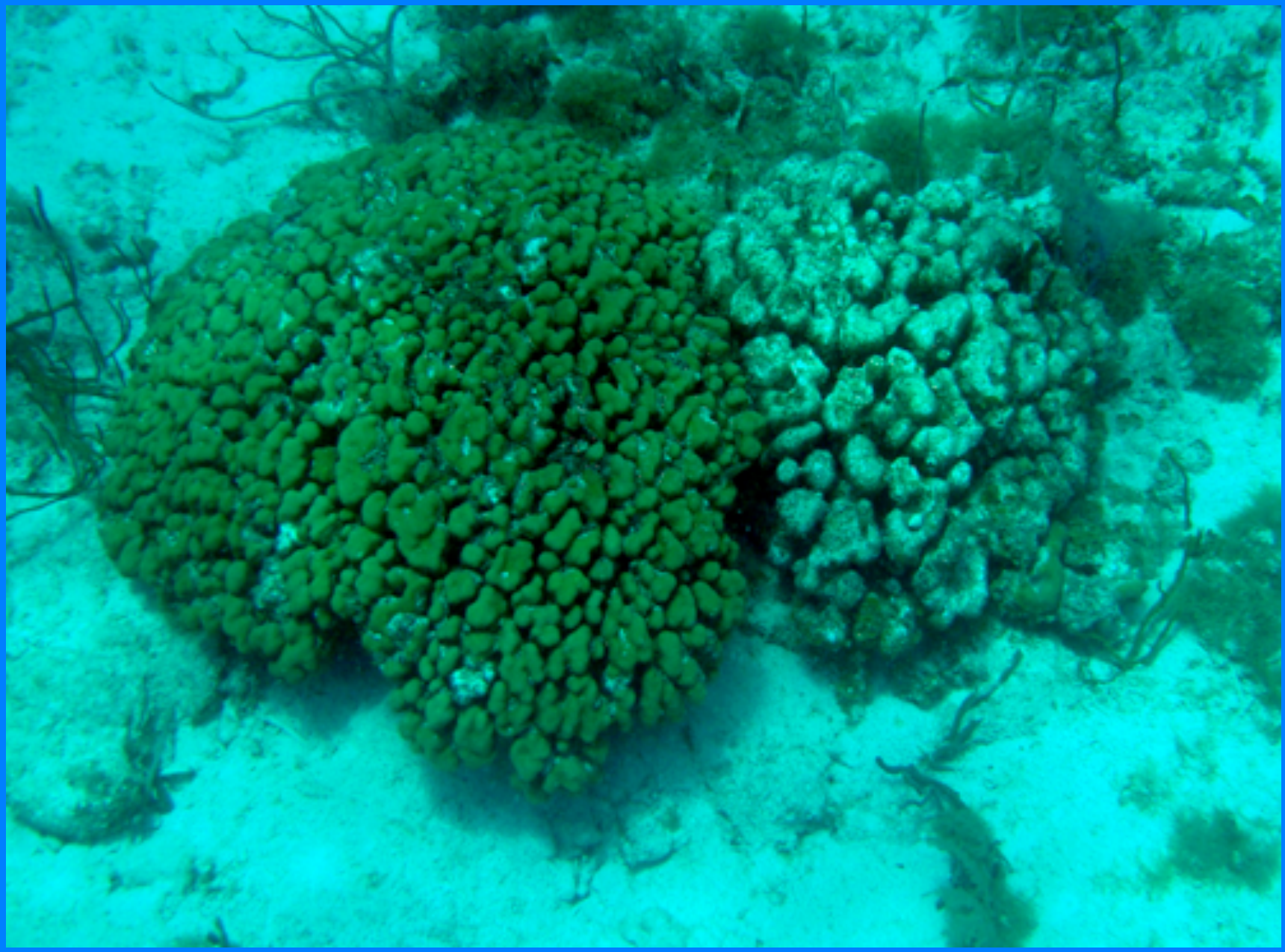

2007


2008

# Regrowth over white pox lesions but not over white plague lesions

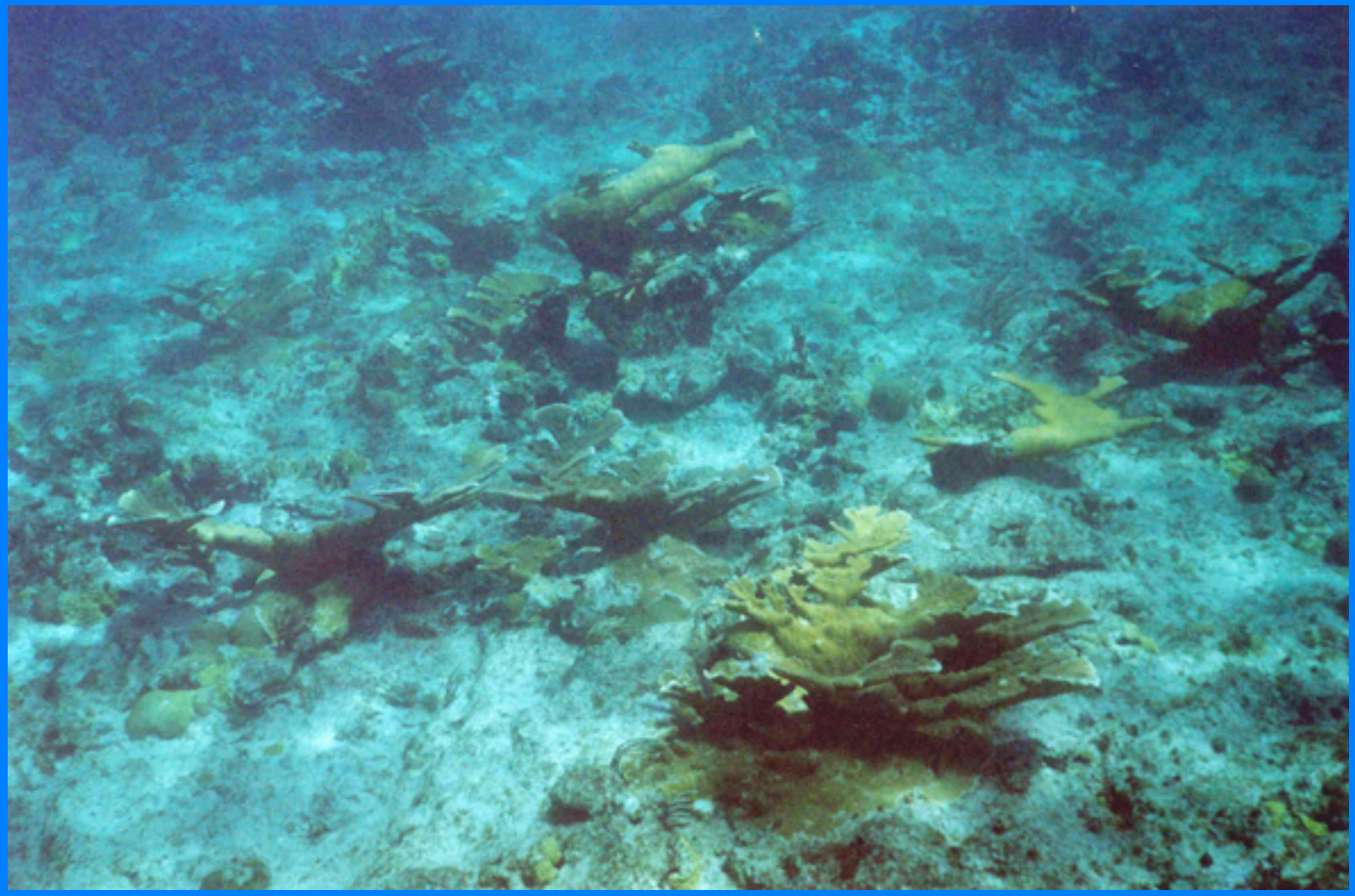


# Colony Differences



# What does recovery look like?

- Recovery back to initial *conditions* (at some ill-defined time in the past)

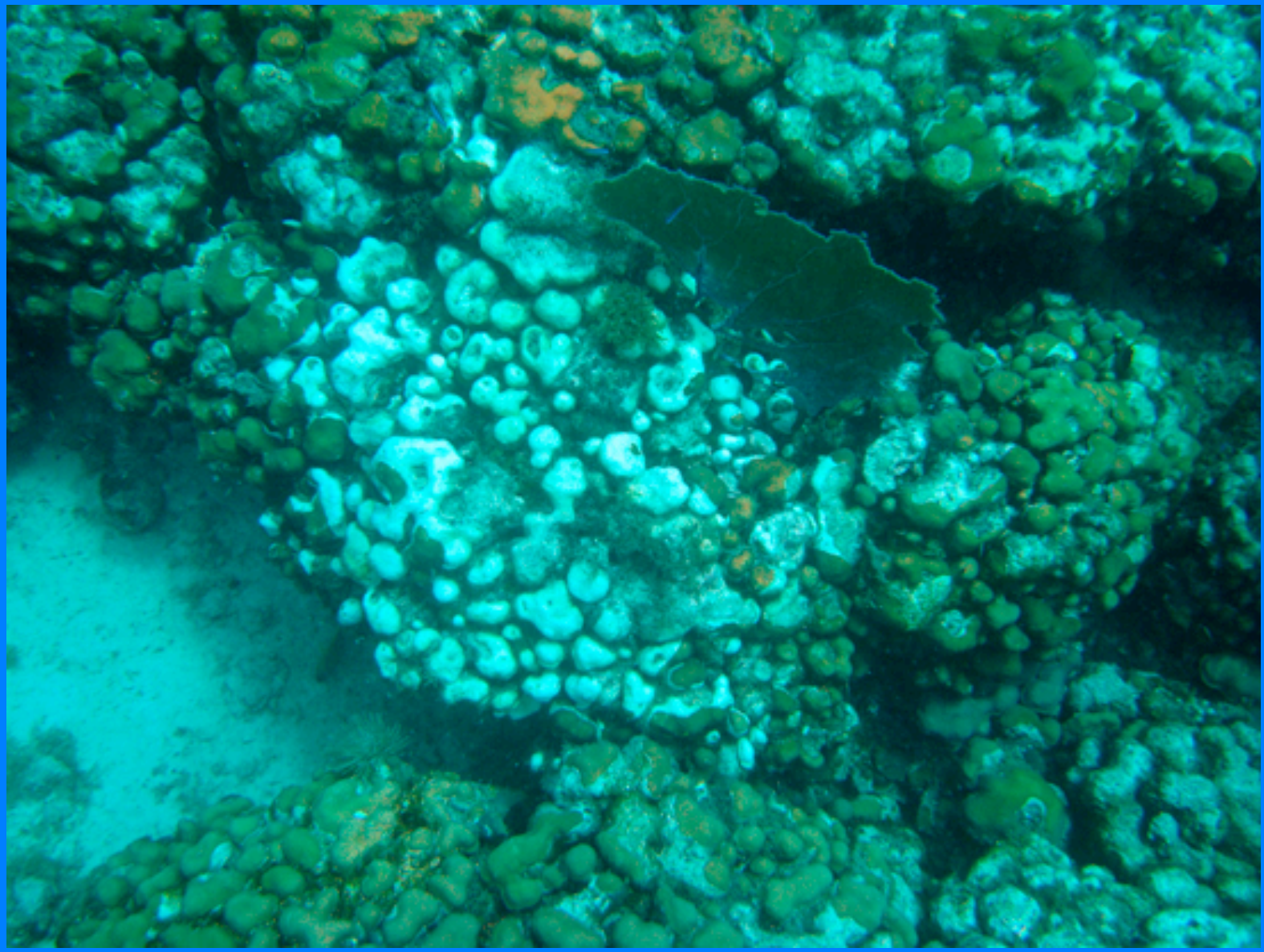


# Not many places like this!!

# WHAT IS NEXT??

- More Caribbean wide bleaching and disease episodes
- More storms, more intense storms, ocean acidification??

# Another disease outbreak?

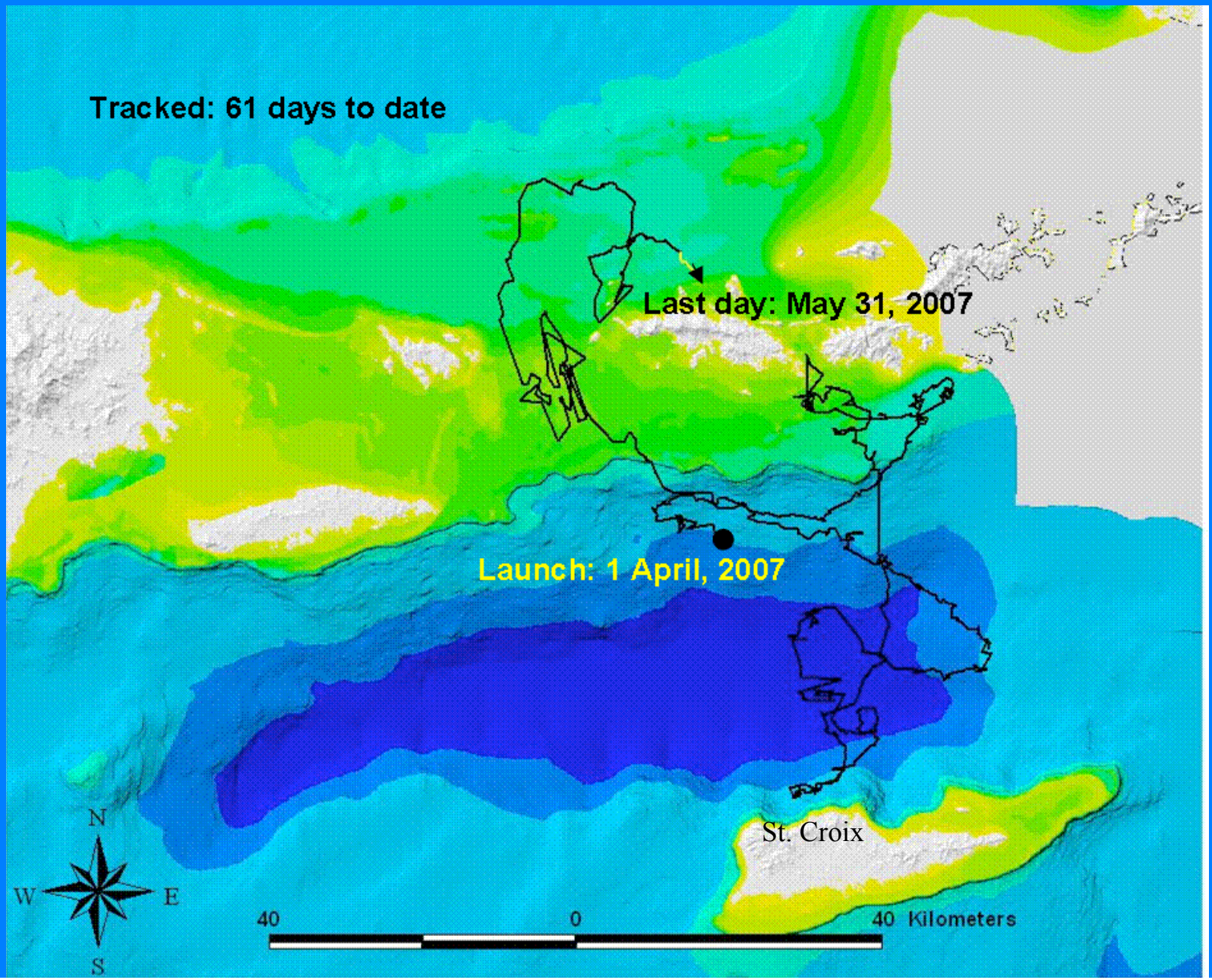


# Acute local vs. chronic regional stress

# Need to understand links between human activities and diseases

CSI: ST. JOHN

# Connecting the Dots



# Endangered turtle over threatened coral species

# FACING AN UNCERTAIN FUTURE

# ACKNOWLEDGEMENTS


- Jeff Miller (NPS)
- Erinn Muller and Tony Spitzack (formerly USGS)
- US Geological Survey, National Park Service, National Oceanic and Atmospheric Administration (CRES), Disney Wildlife Conservation Fund, Friends VINP
- M. Mouse and many other