

# Coral disease dynamics in the USVI: finding resistance in a sea of sickness

Erinn Muller

Program Manager, Staff Scientist  
Coral Health and Disease Program

Mote Marine Laboratory





# Why are reefs important?

Coral reefs are dying

Carysfort Reef, Florida Keys



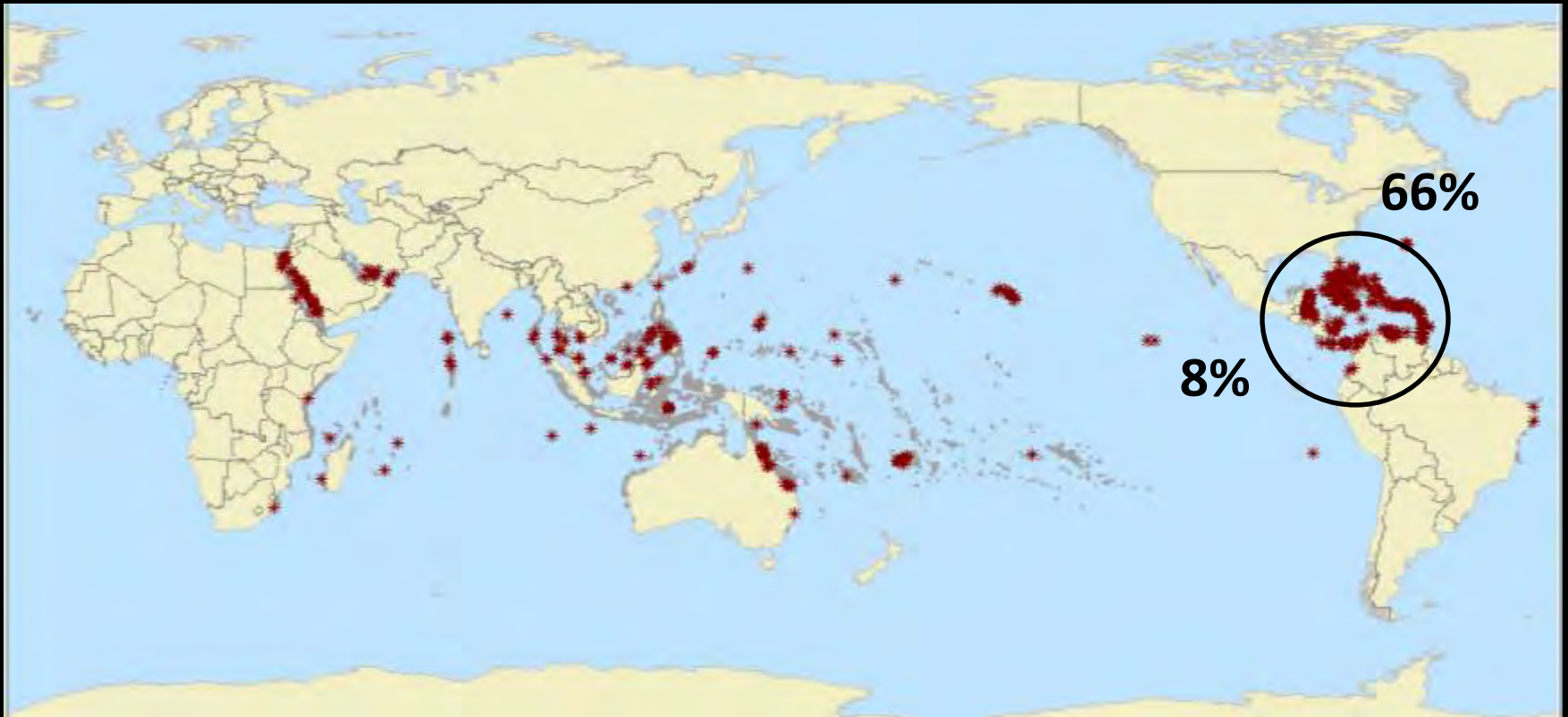
1980



2011

# Caribbean is a disease hotspot

- Coral reef
- Coral-disease occurrence



# CORAL DISEASE

**BLACK BAND**



**WHITE BAND**



**DARK SPOT**



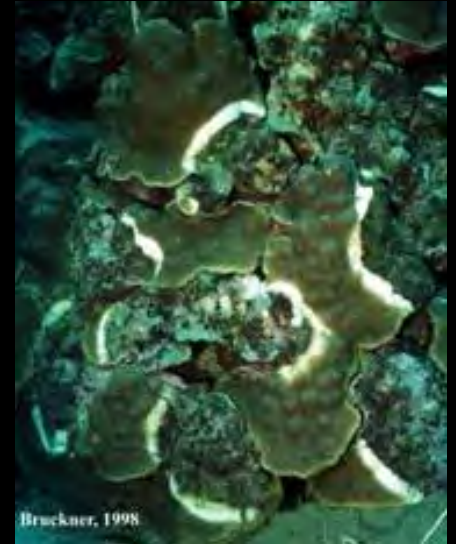
**WHITE PLAGUE**



**WHITE POX**

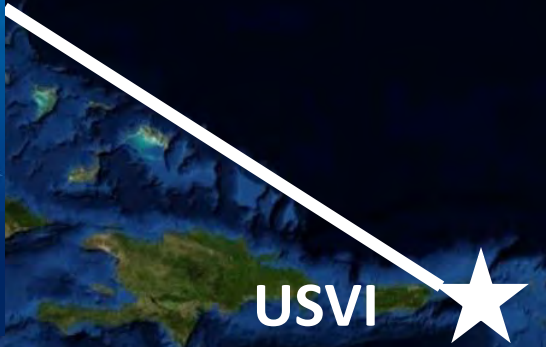


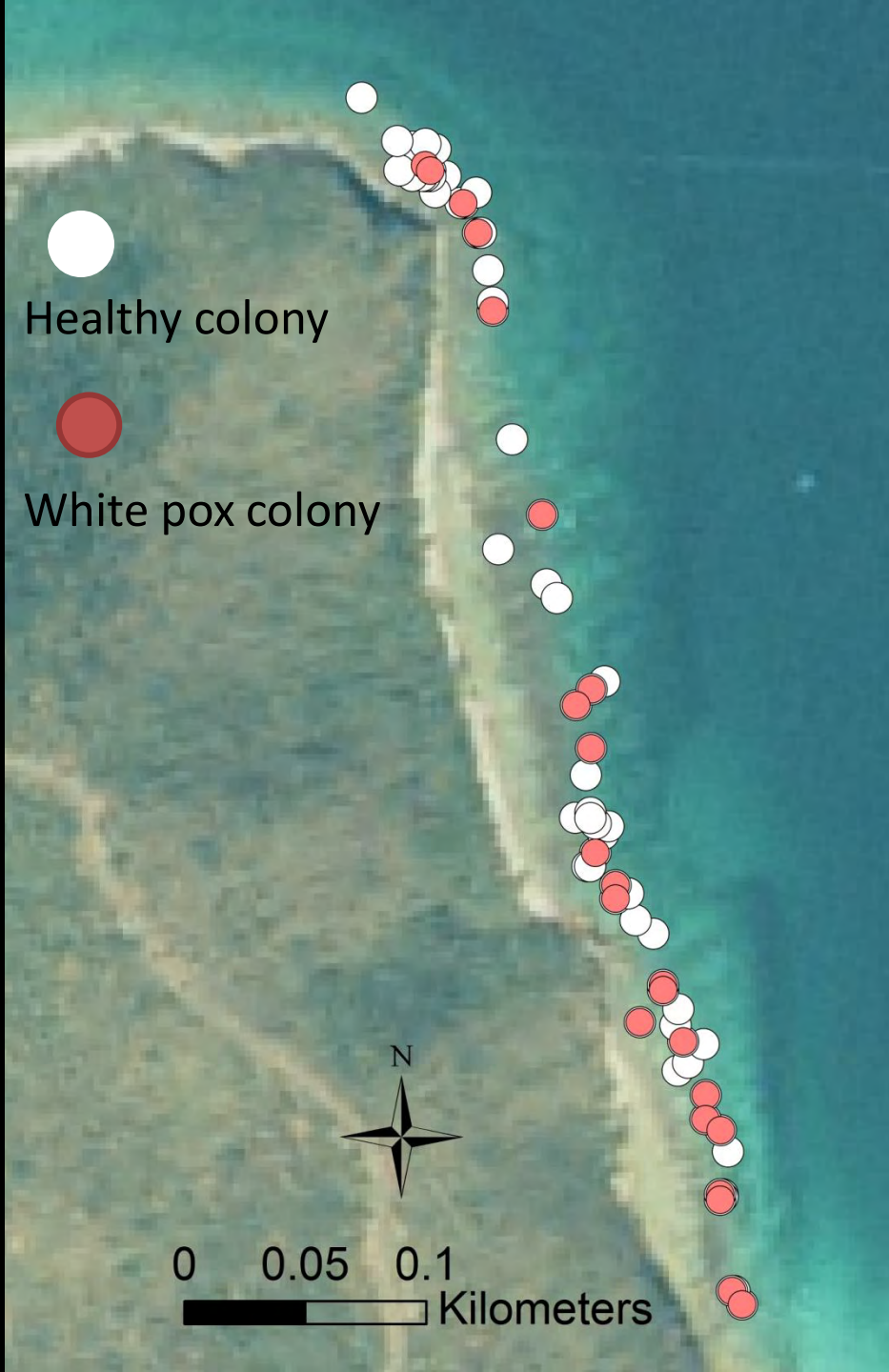
**YELLOW BAND**



# Study coral diseases

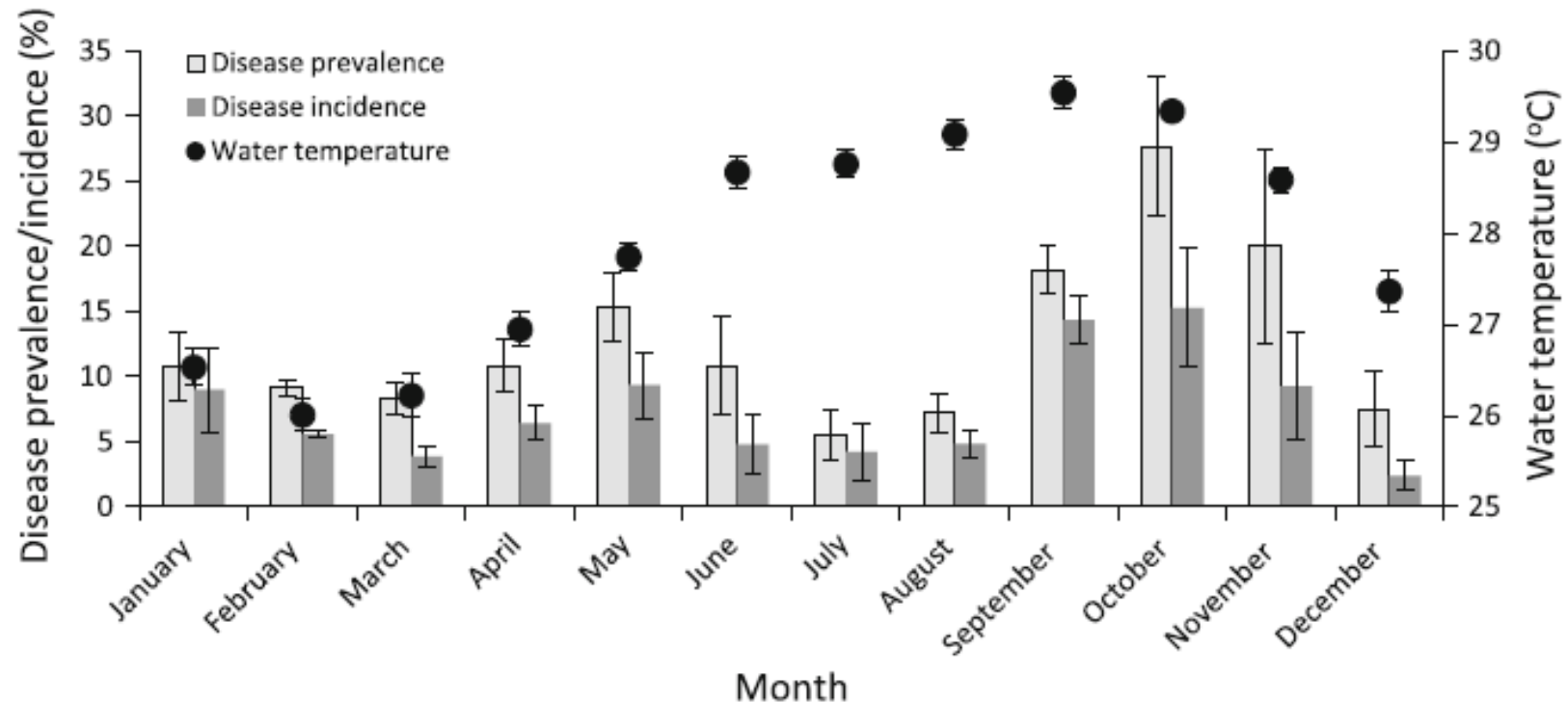




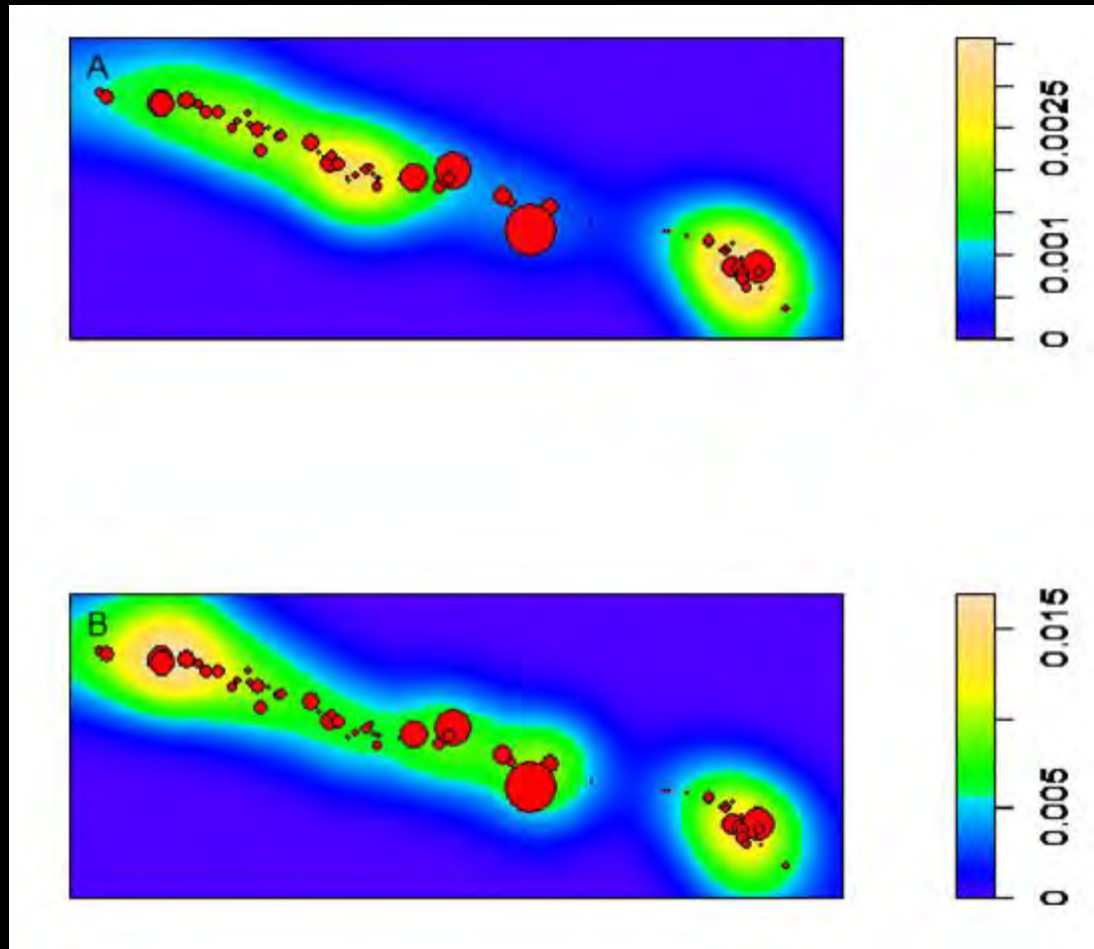




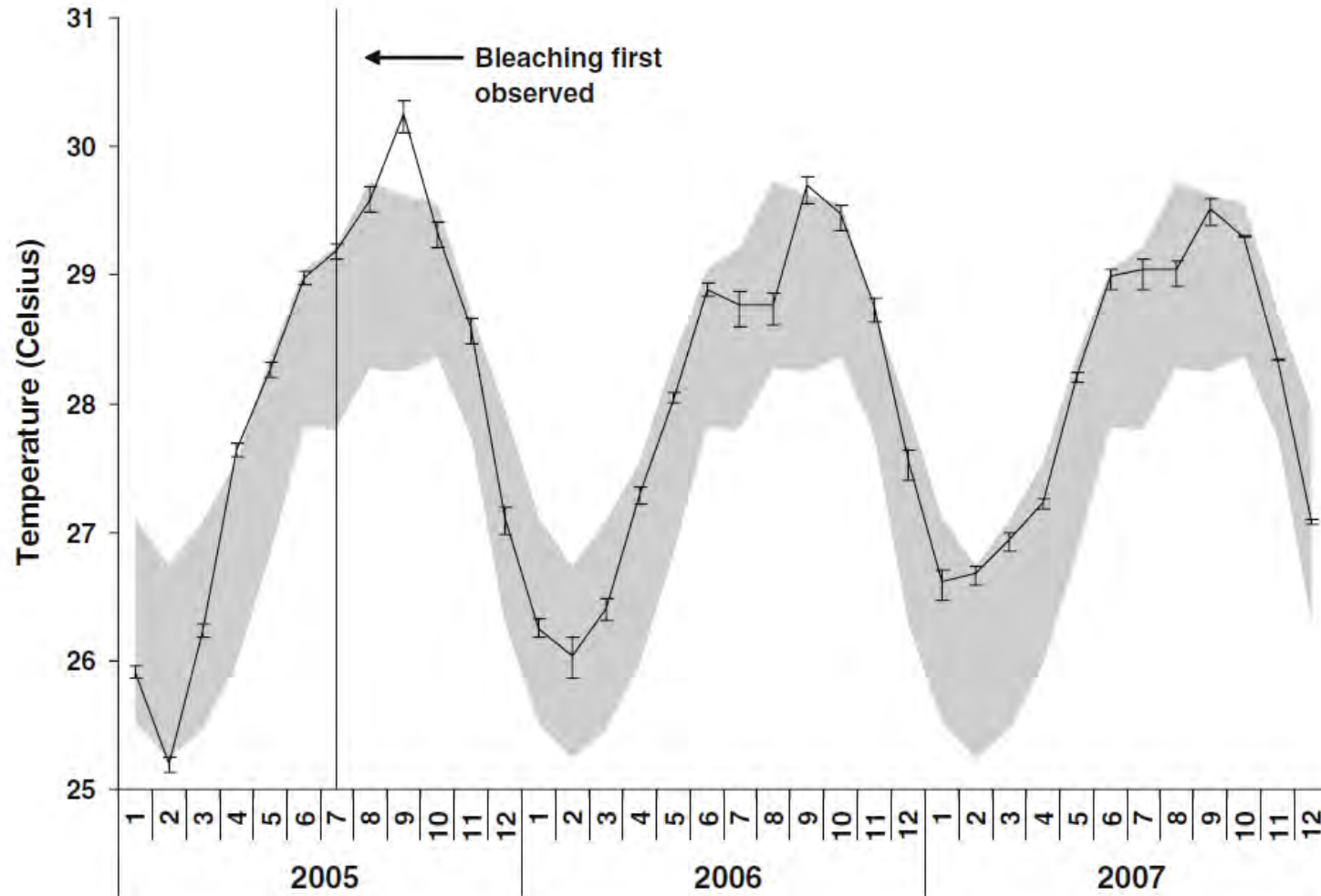
# Disease prevalence increased with water temperatures



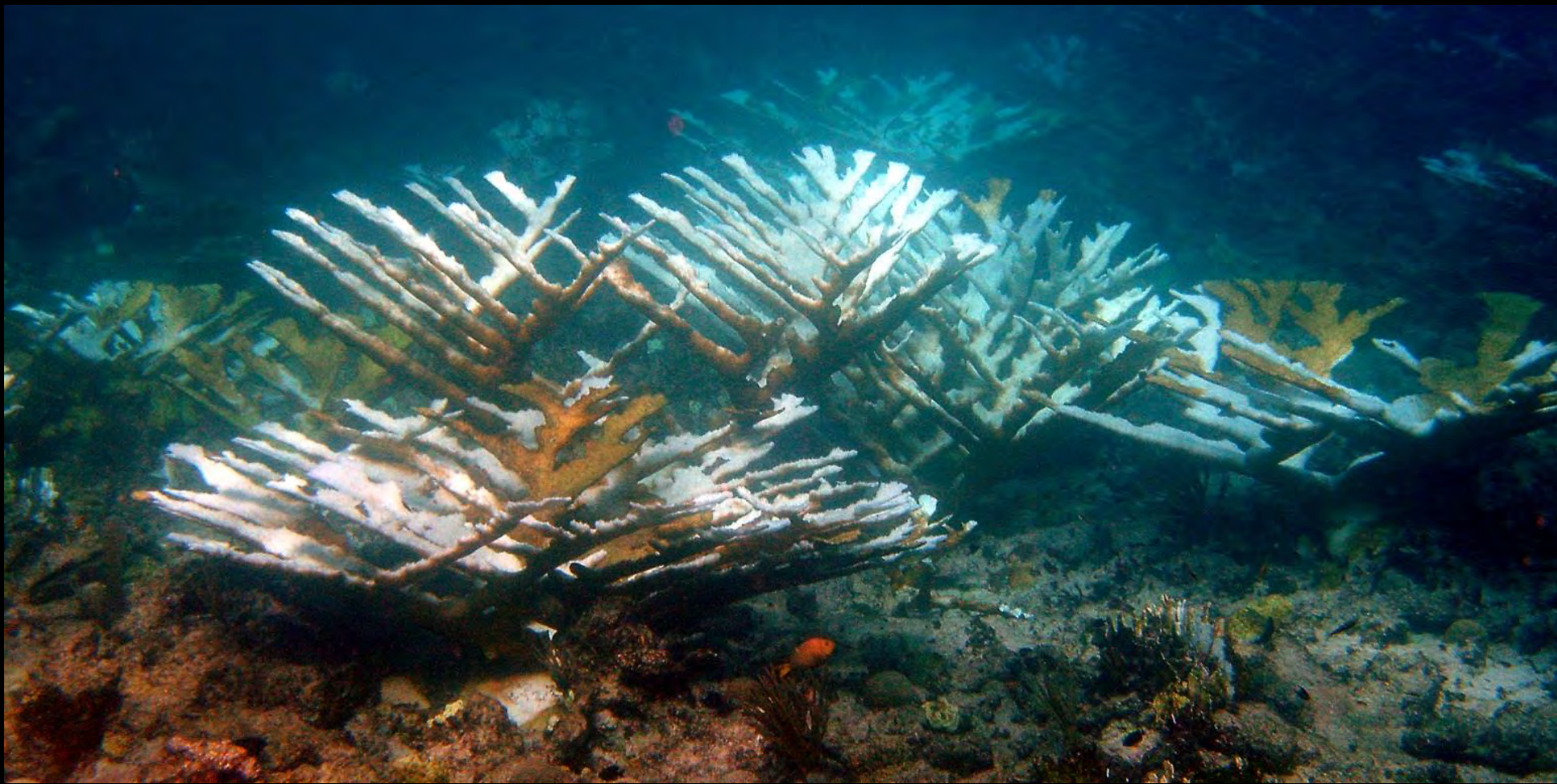
# White pox did not follow a contagious disease model



# 2005: warmest year on record



2005

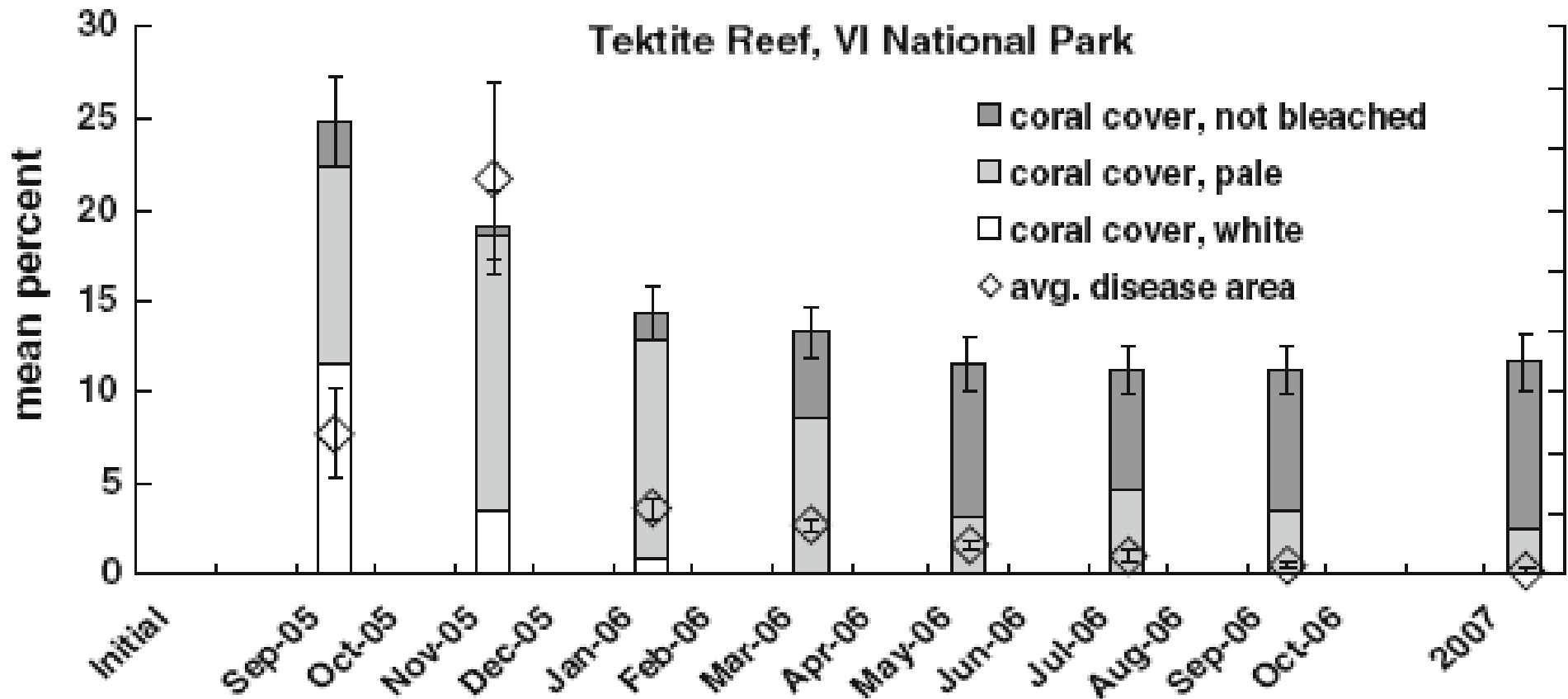


2005

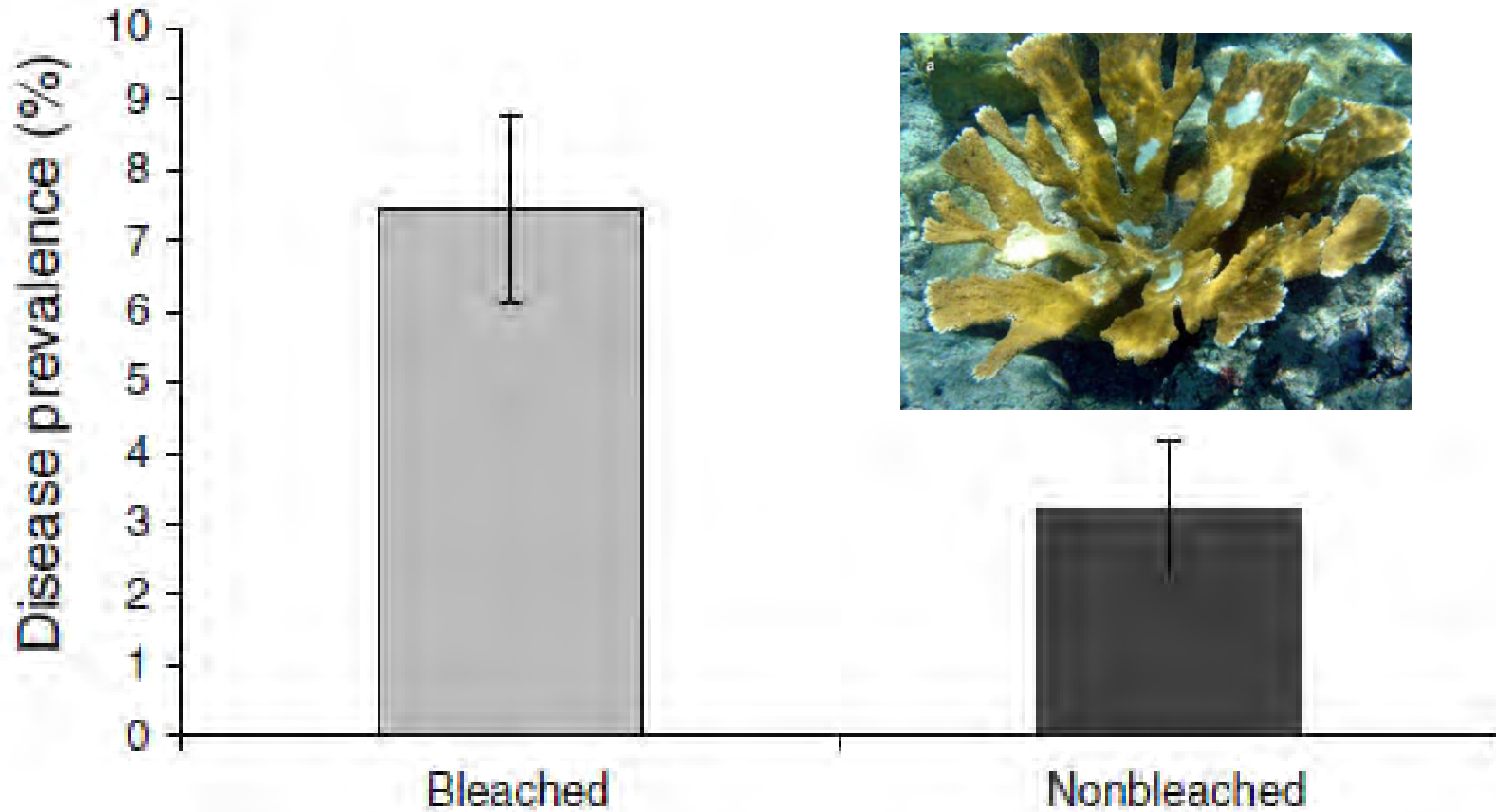




# >60% loss in coral cover



# Disease prevalence was higher on bleached corals





# Environmental stress

Coral bleaching

Stress  
response



Host-susceptibility

Coral disease

# Stress



# Sickness



# Caribbean yellow band disease



Diseased tissue

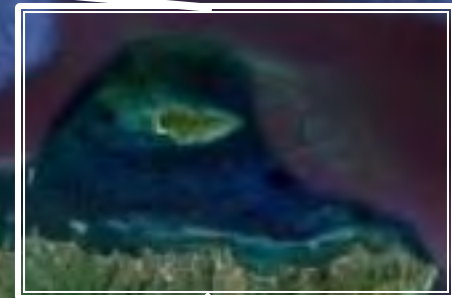
Apparently healthy  
tissue

# Caribbean yellow band disease

- Typically on *Orbicella* spp.
- May be associated with *Vibrio* spp. (bacteria)
- Associated with warm water temperatures
- Progresses ~3 cm a year, but often completely kills colony
- Increased in VI after 2005 bleaching event



# Study yellow band within BIRNM

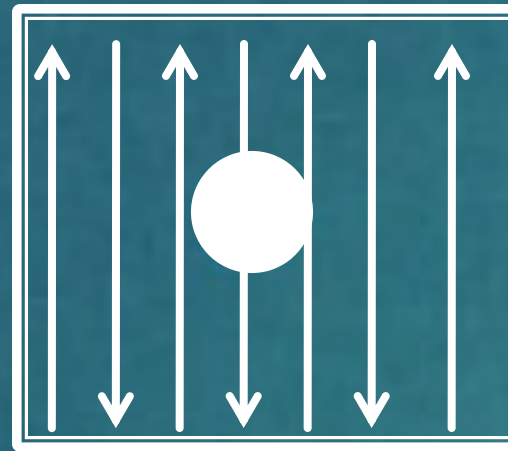


# Information gathered within sites



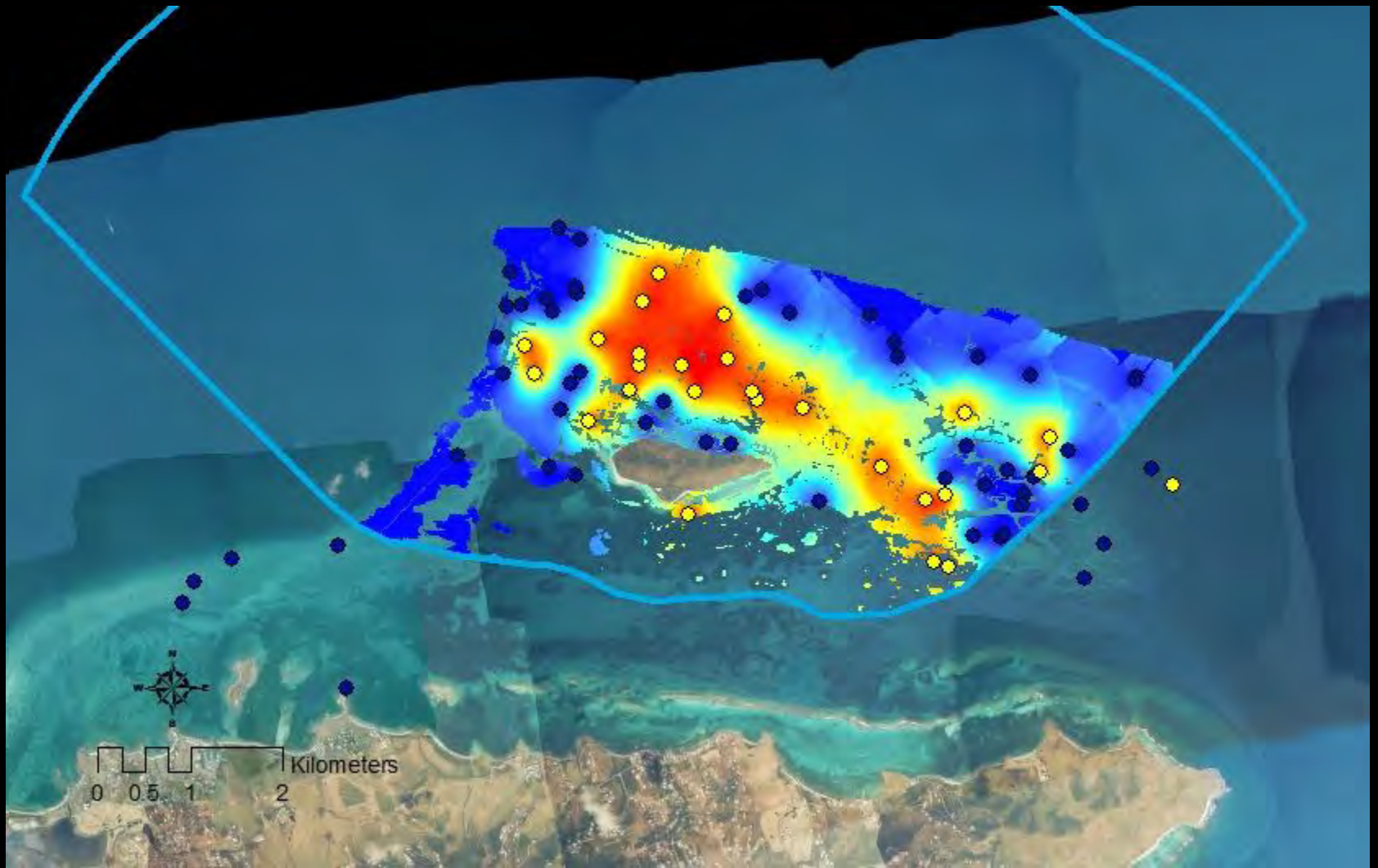
**Identify diseased corals**

10 x 10 m quadrat



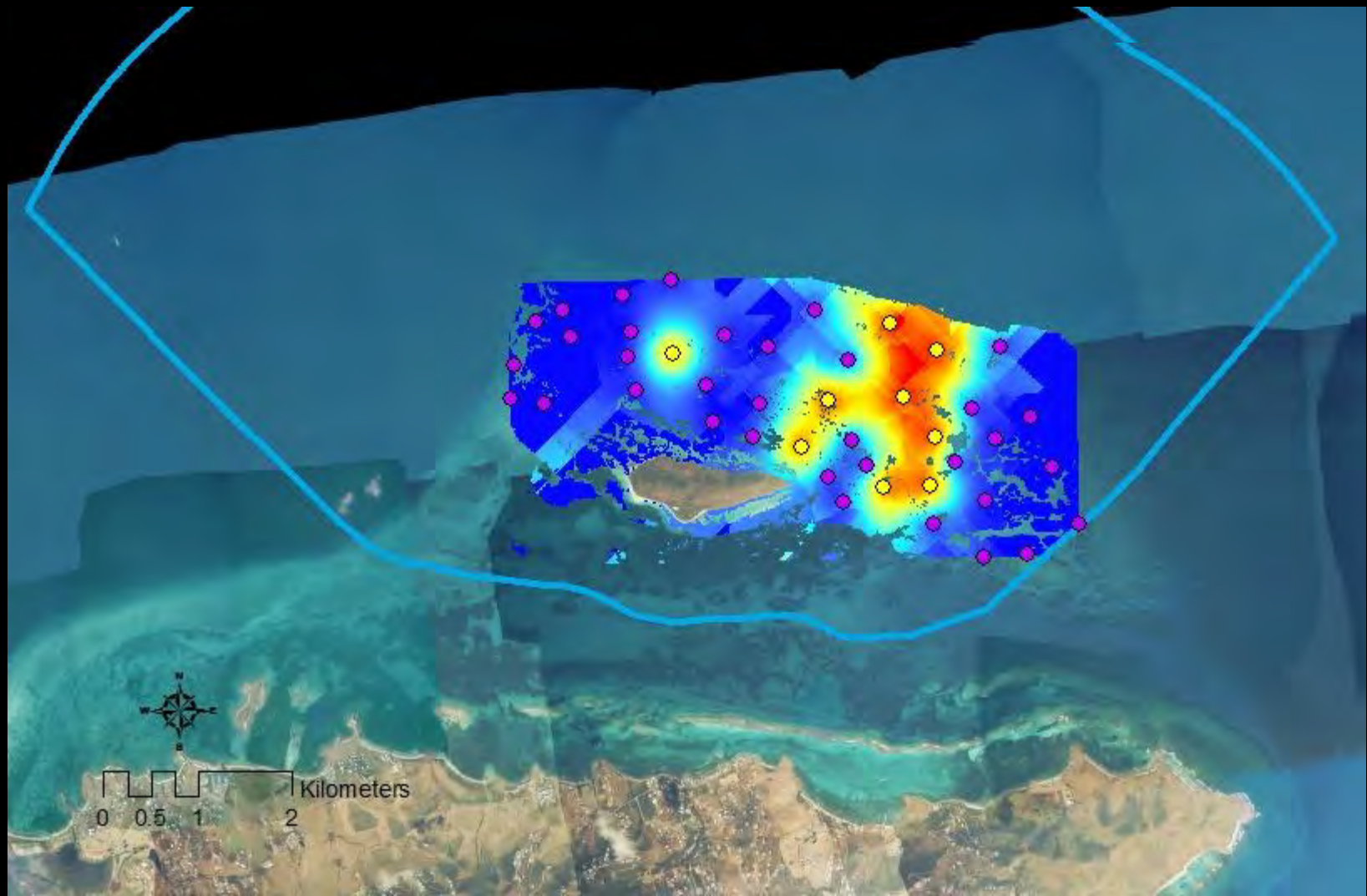


# 2009 data

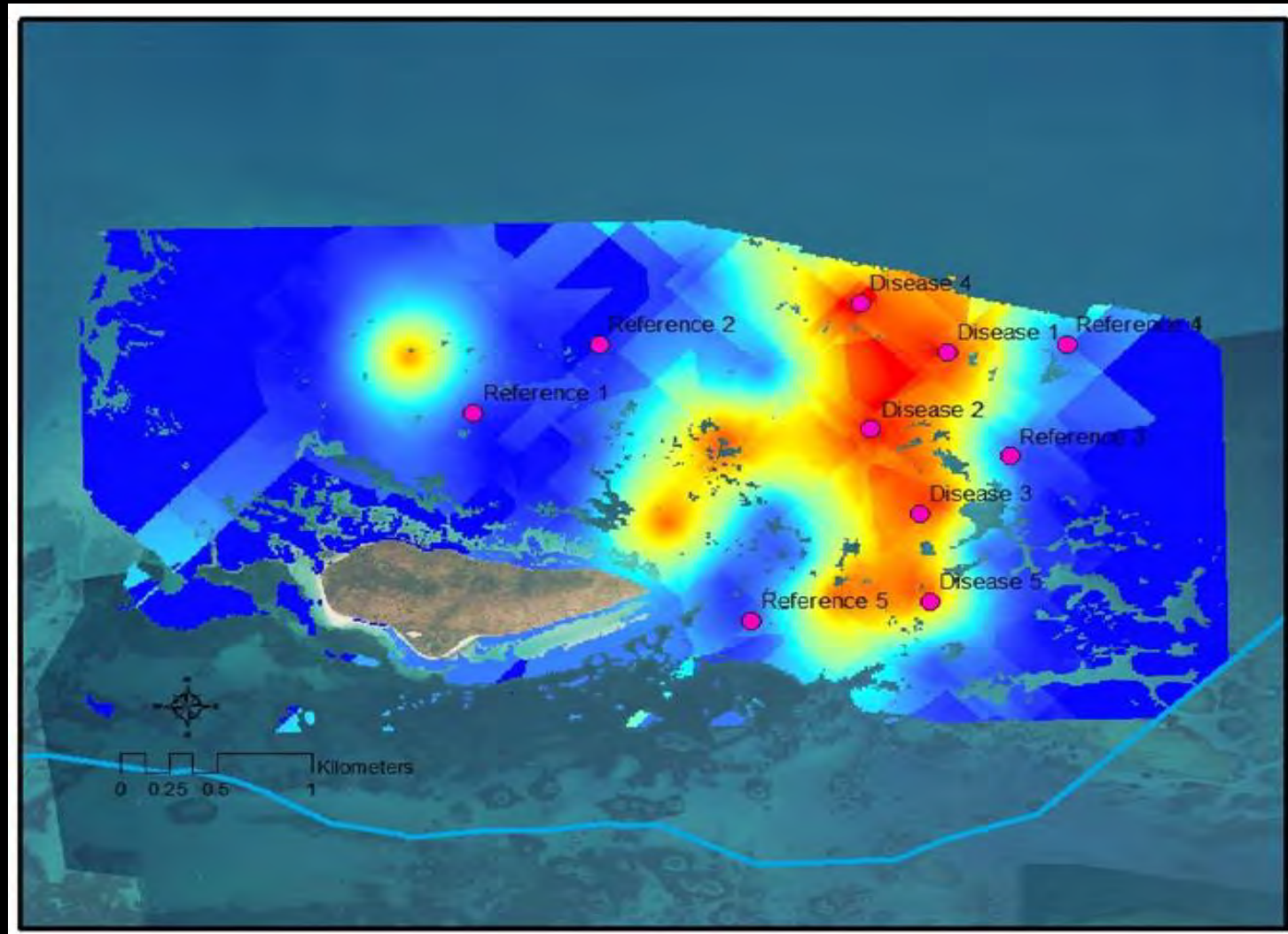




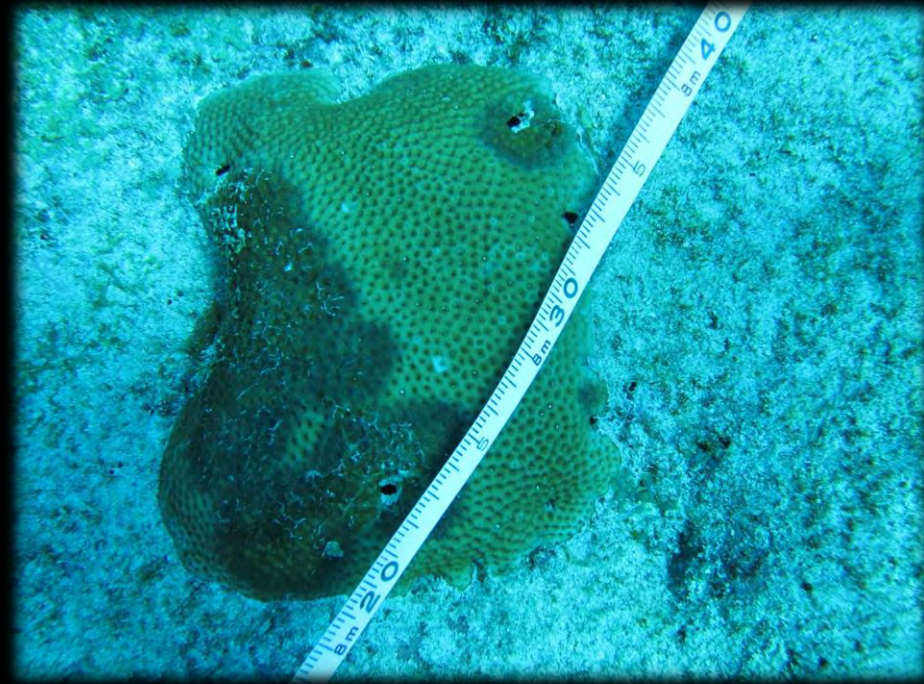
# 2014 data



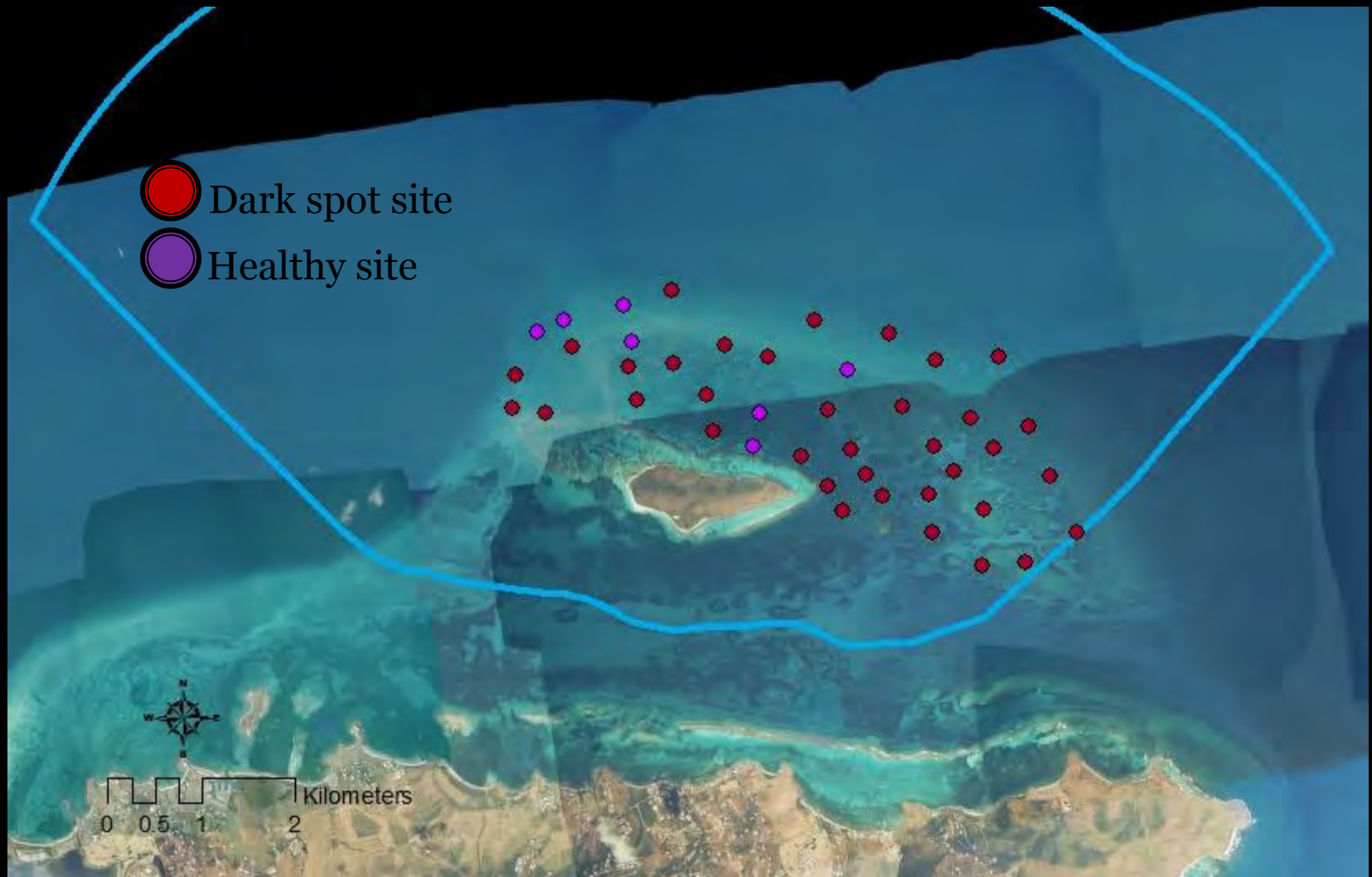
# Permanent Sites



# Dark spot syndrome



# Dark spot syndrome



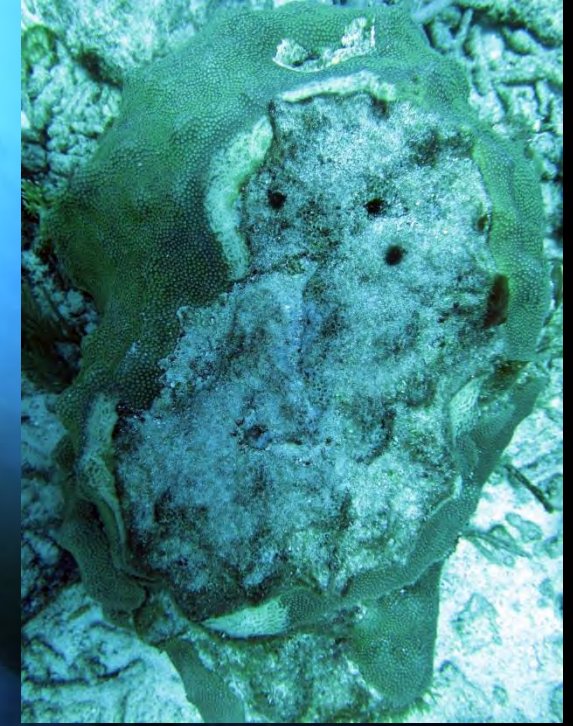
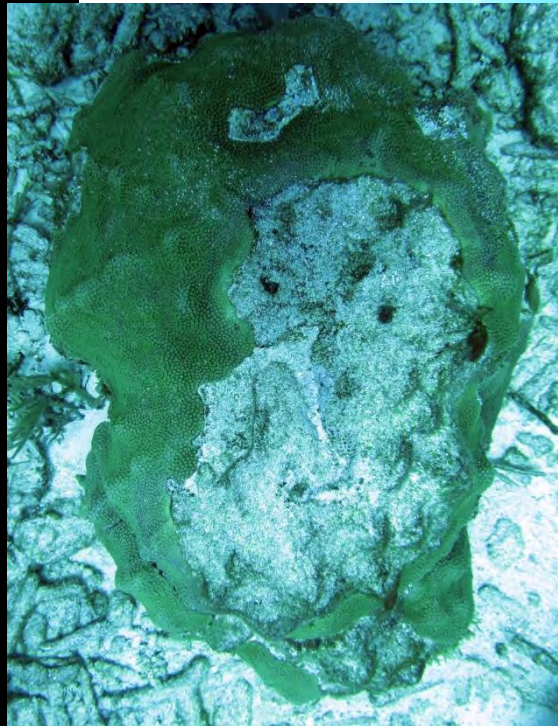
# What are we doing?

- Set up permanent sites to determine how yellow band is changing over time
  - Are new colonies infected?
  - Is it spreading to sites that appear healthy today?
  - Are some corals getting healthy, or all dying?
- Determine what makes survivors resilient
- Identify differences in microbial communities between healthy and diseased colonies
- Test methods to mechanically remove disease from corals

# Mechanically stopping disease progression

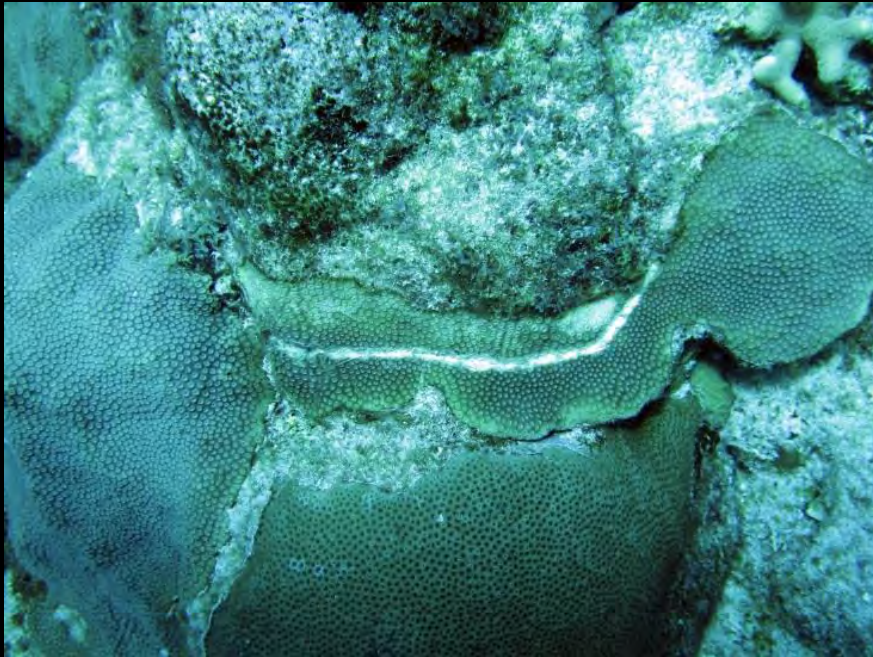
Before

After

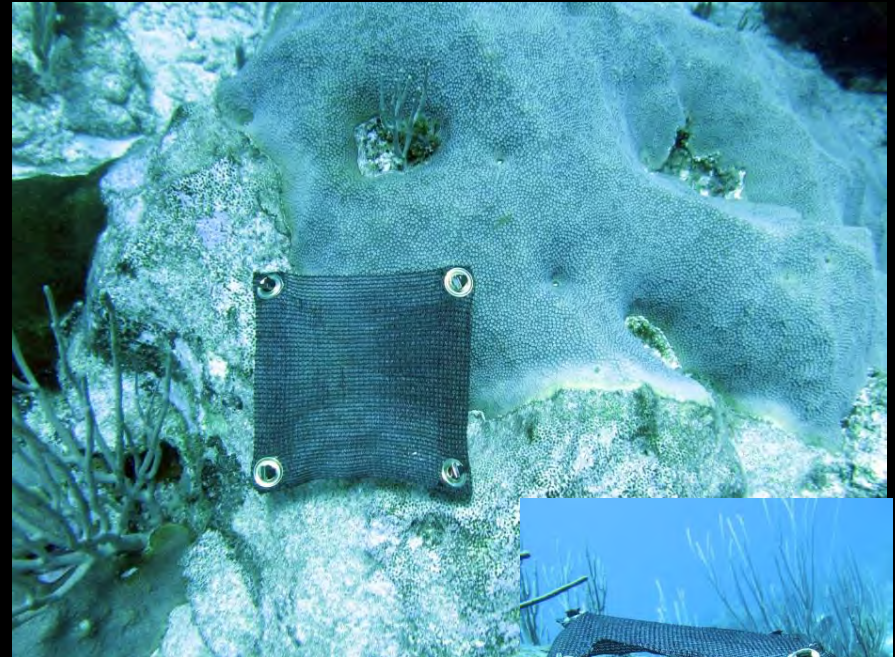


# Mechanically stopping disease progression

Chisel barrier



Shading





There is hope!

Mar Biol (2014) 161:359–365  
DOI 10.1007/s00227-013-2341-2

ORIGINAL PAPER

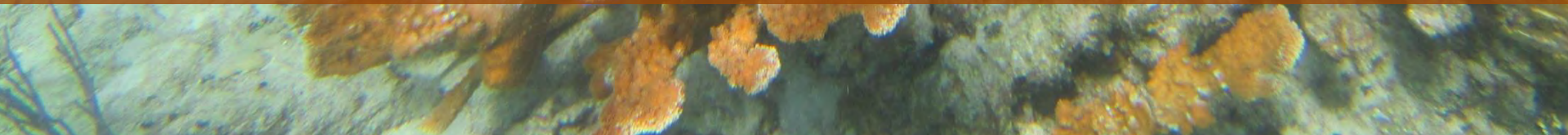
## **Early signs of recovery of *Acropora palmata* in St. John, US Virgin Islands**

E. M. Muller · C. S. Rogers · R. van Woesik





**Identify resilient elkhorn corals**



# Find resilience within Mote's coral nursery





Test different genotypes for resilience

Ocean acidification

High water temperature

Disease

# Future research: find resilience within *Acropora* nurseries of the Virgin Islands



EARTHANGLE



The Nature  
Conservancy



# Thank you!

Caroline Rogers  
Robert van Woesik  
Zandy Hillis Starr  
Ian Lundgren  
Clayton Pollock  
Tessa Code  
Jeff Miller  
Rob Waara  
Carly Randall

Liz Whitcher  
Sara Williams  
Michael Crosby  
Kim Ritchie  
Erich Bartels  
Laura Mydlarz  
Monty Joe Clark  
Anthony Spitzack  
and many more...

