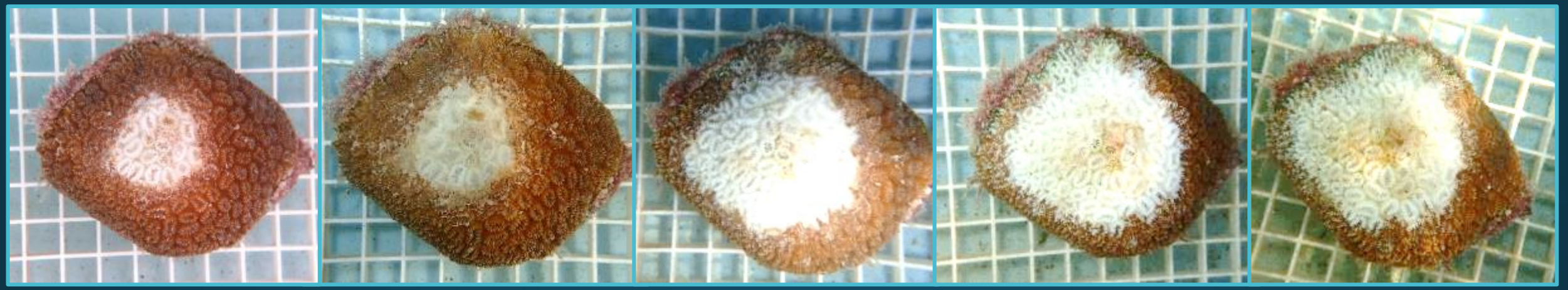
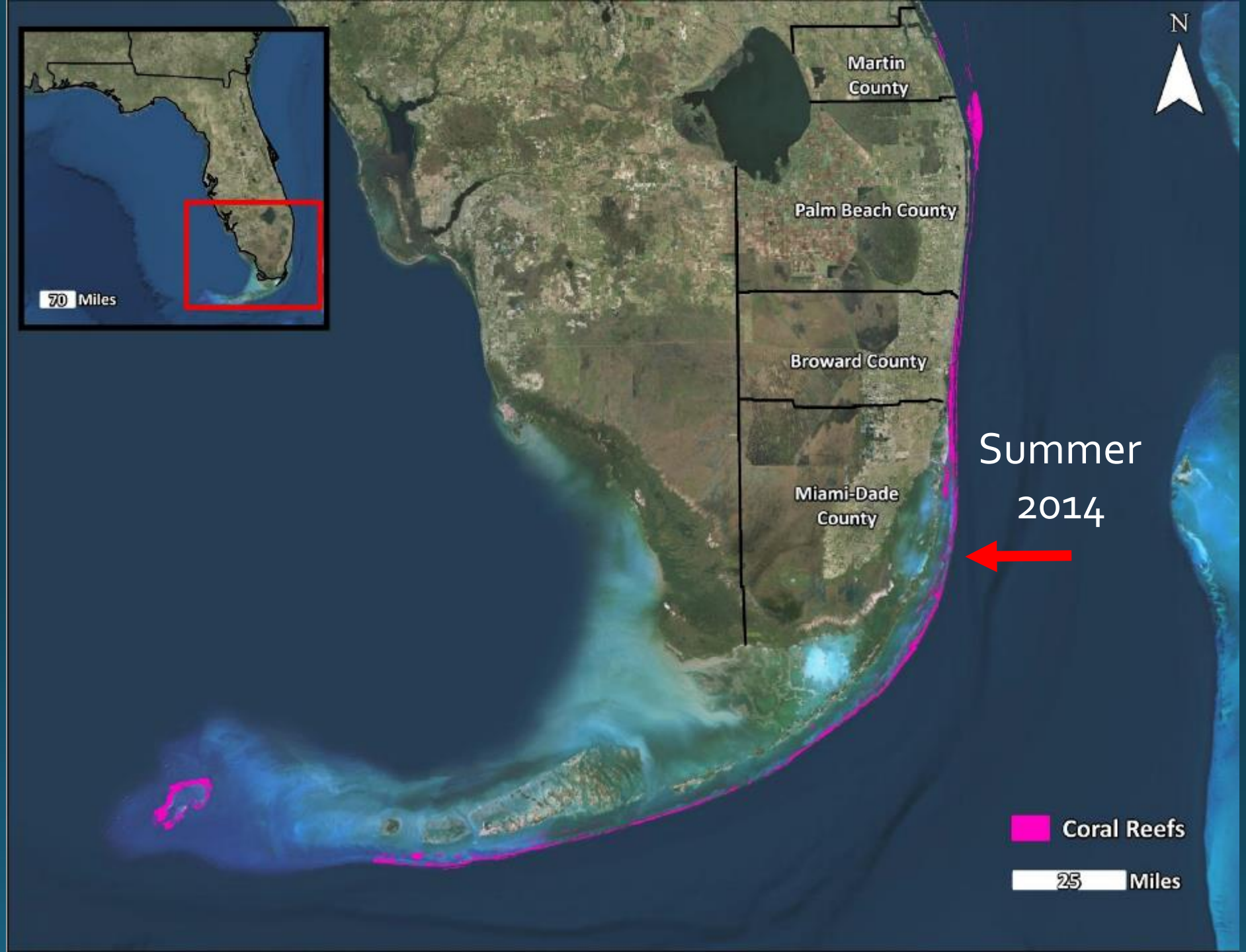
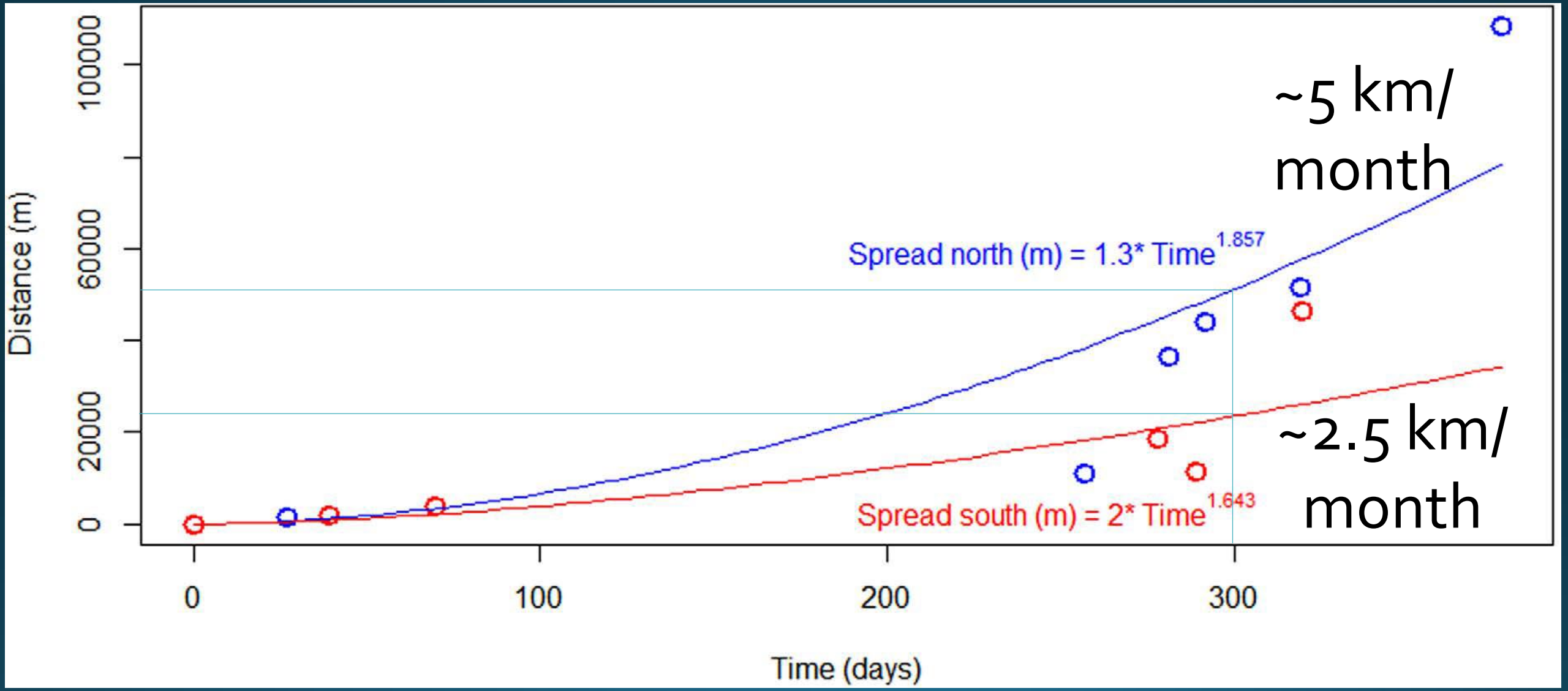


# Stony Coral Tissue Loss Disease

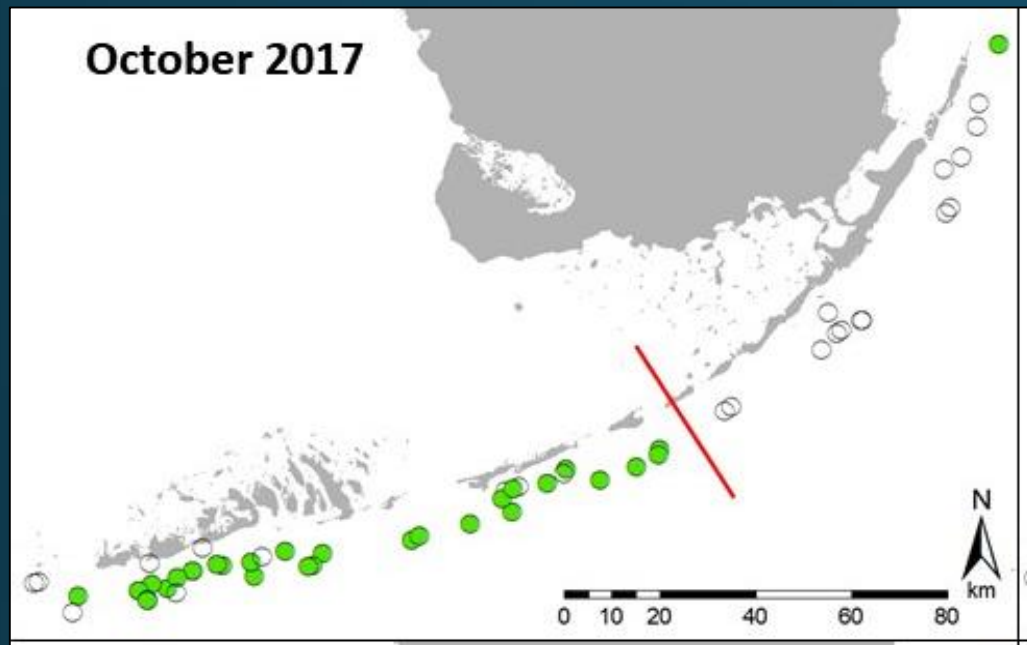
Karen Neely, Ph.D.

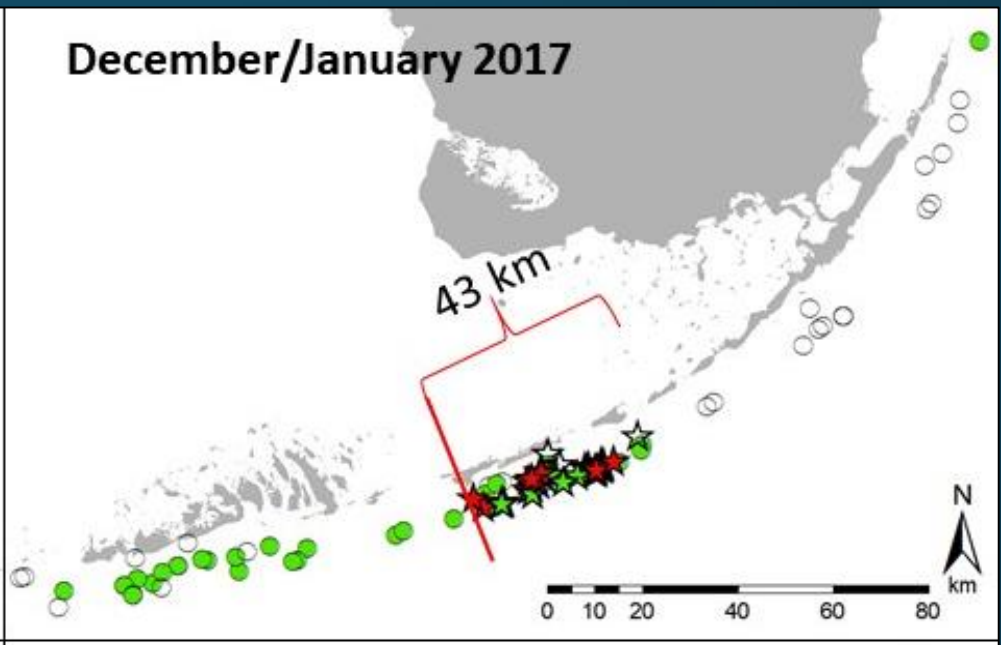
# ORIGIN

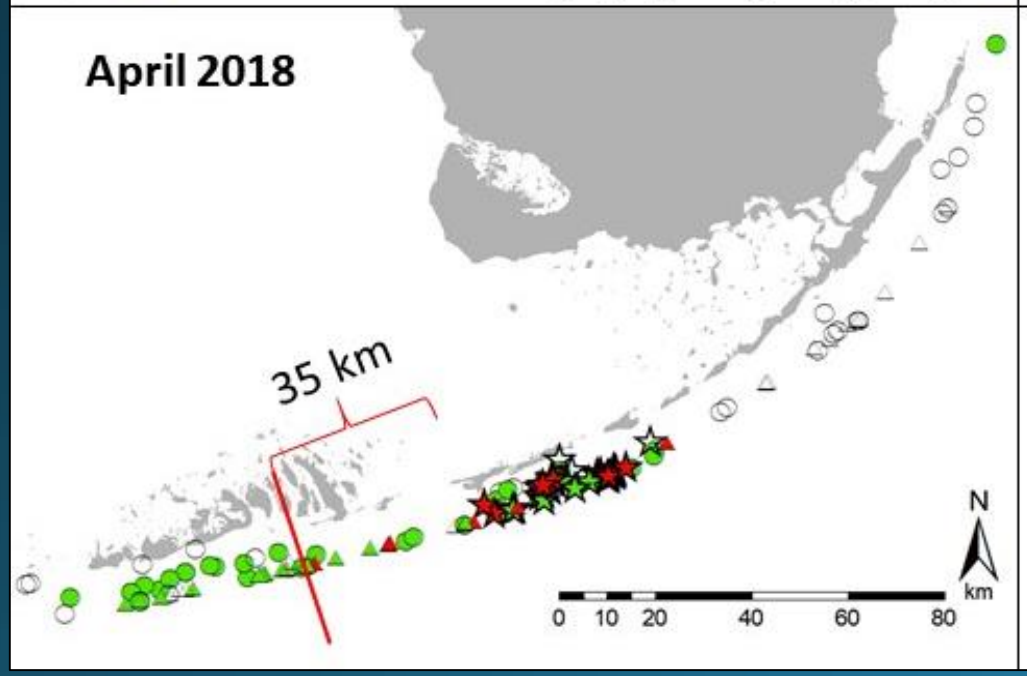

Martin County
Palm Beach County
Broward County
Miami-Dade County
70 Miles
N
Summer 2014
Coral Reefs
25 Miles




Precht et al, 2016



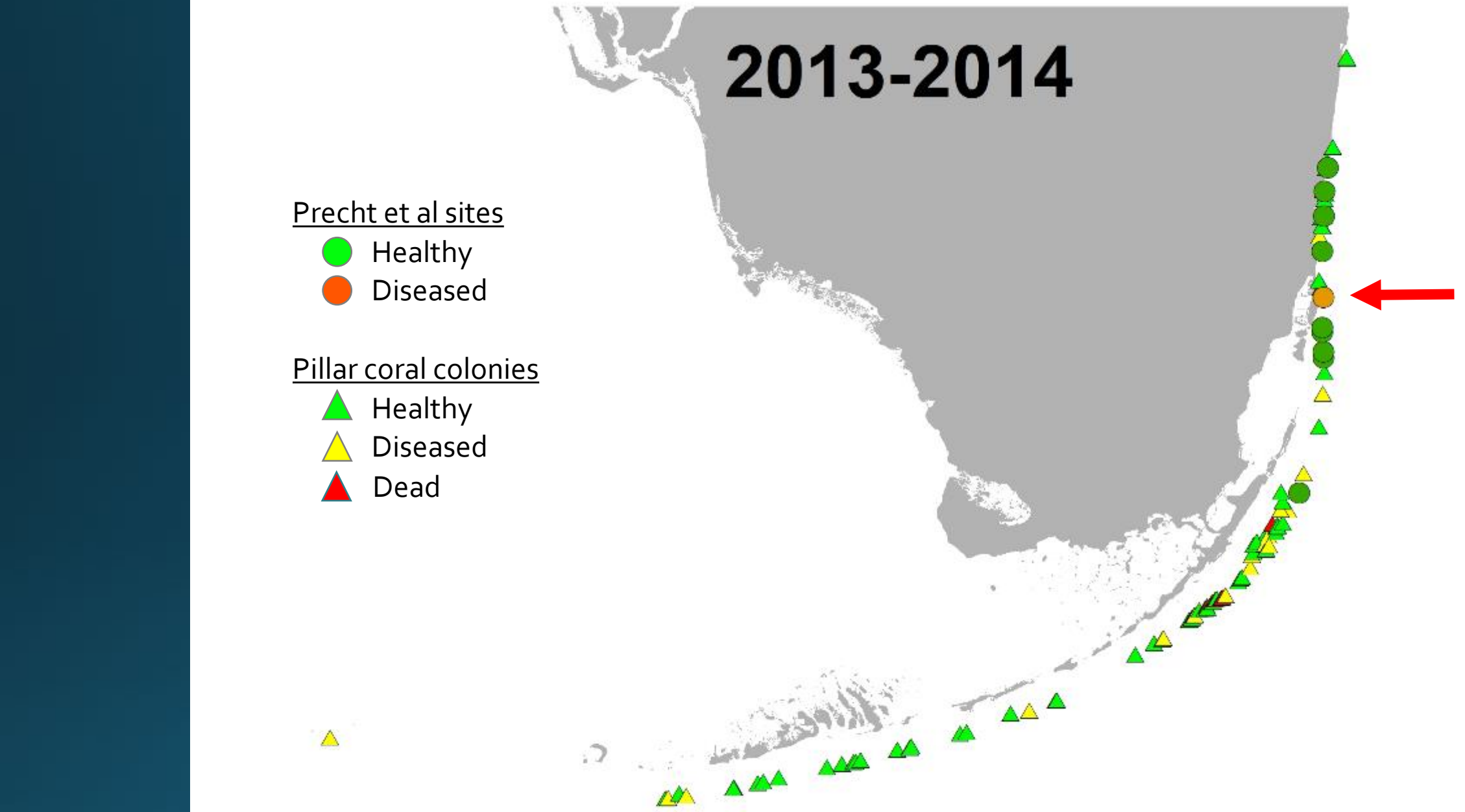



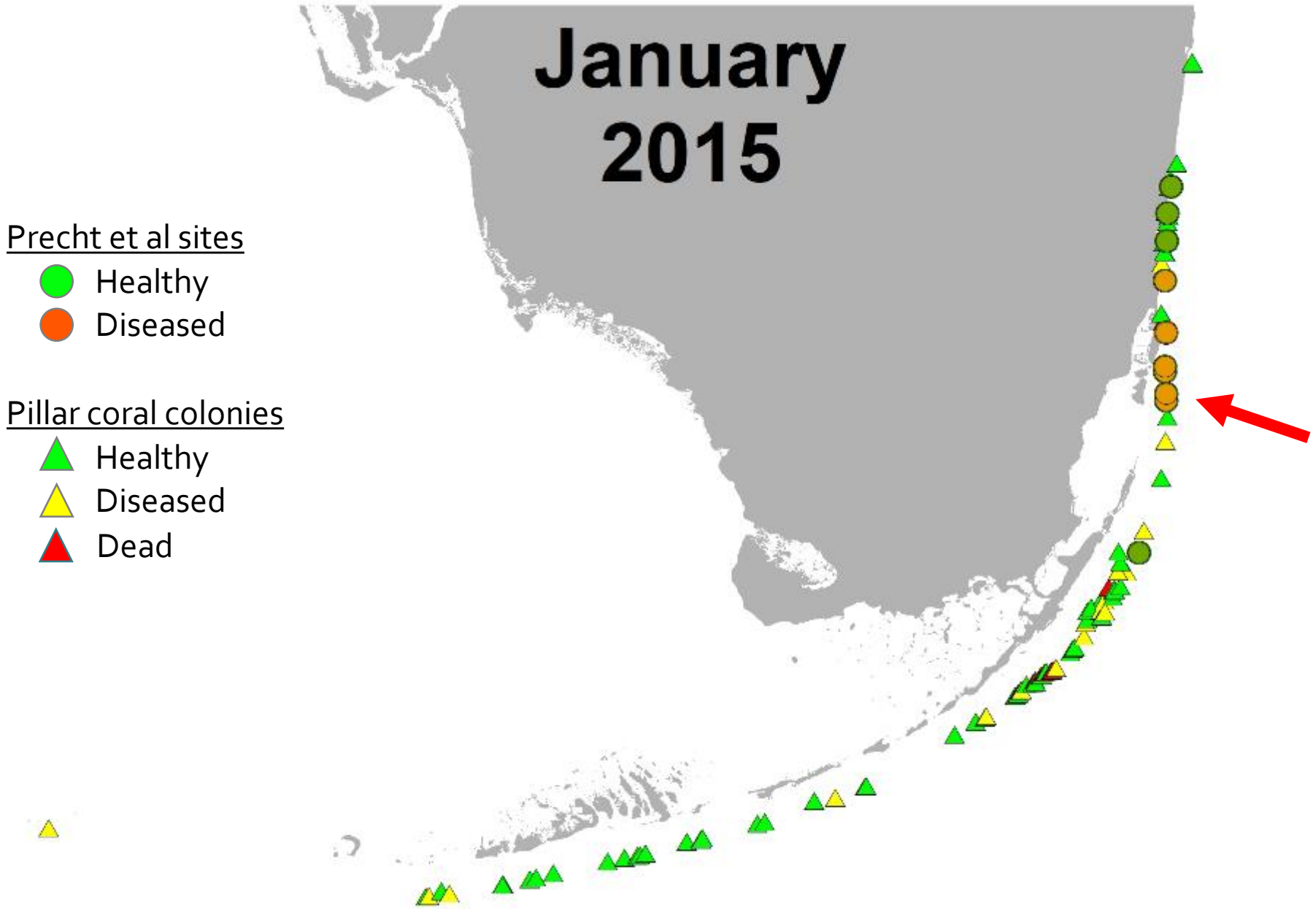



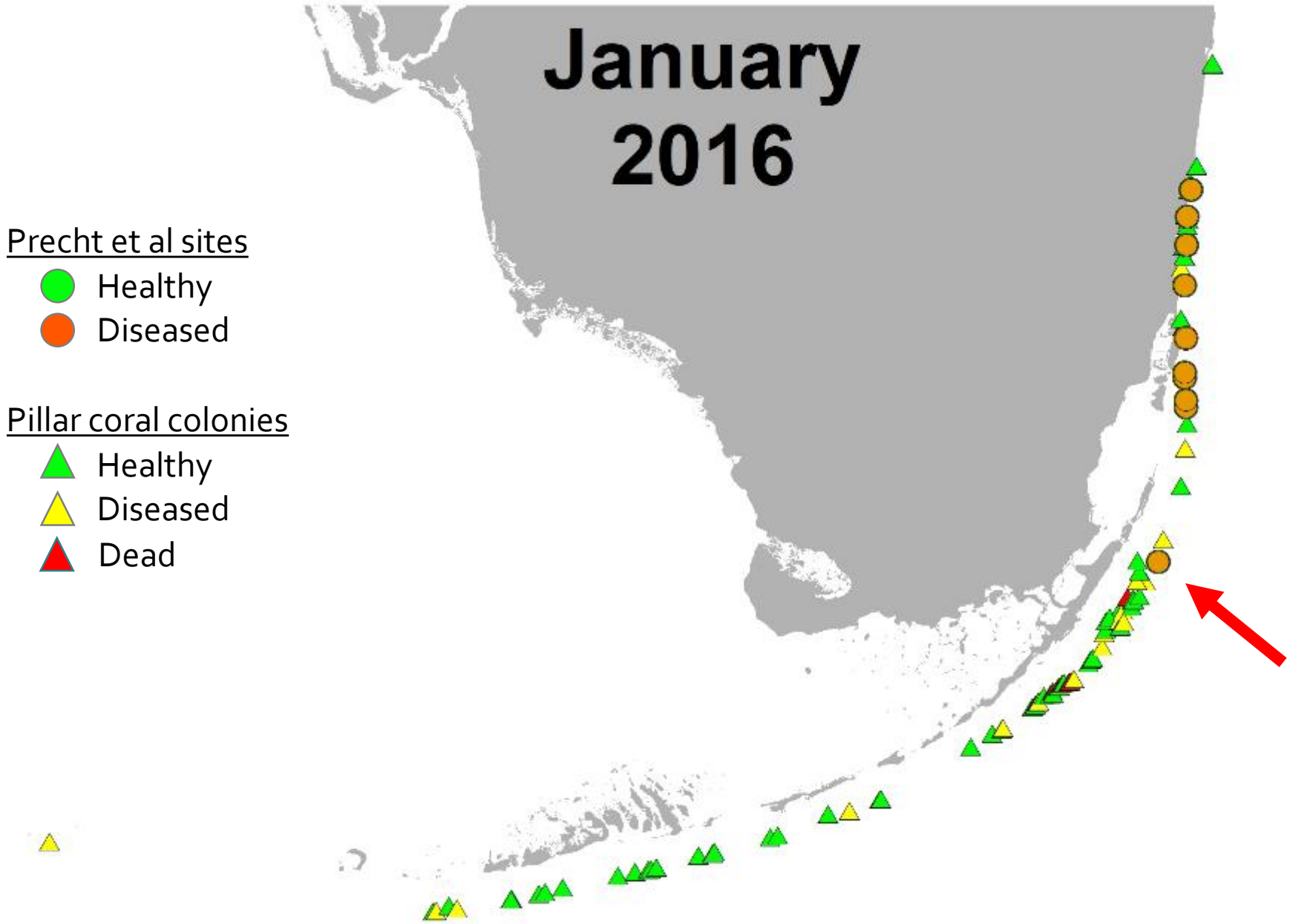

**MMEA disease present/absent**

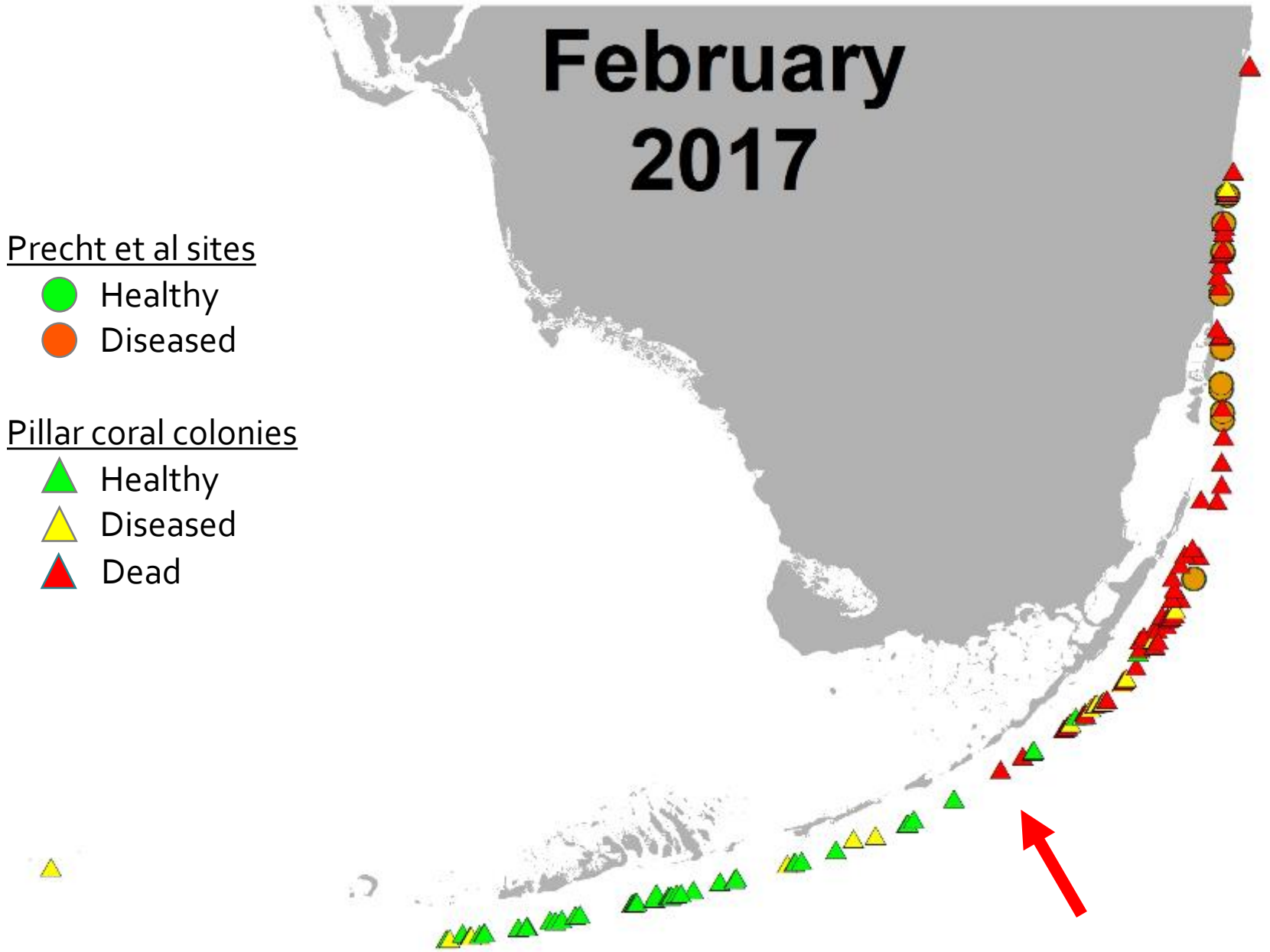
~15 km/ month

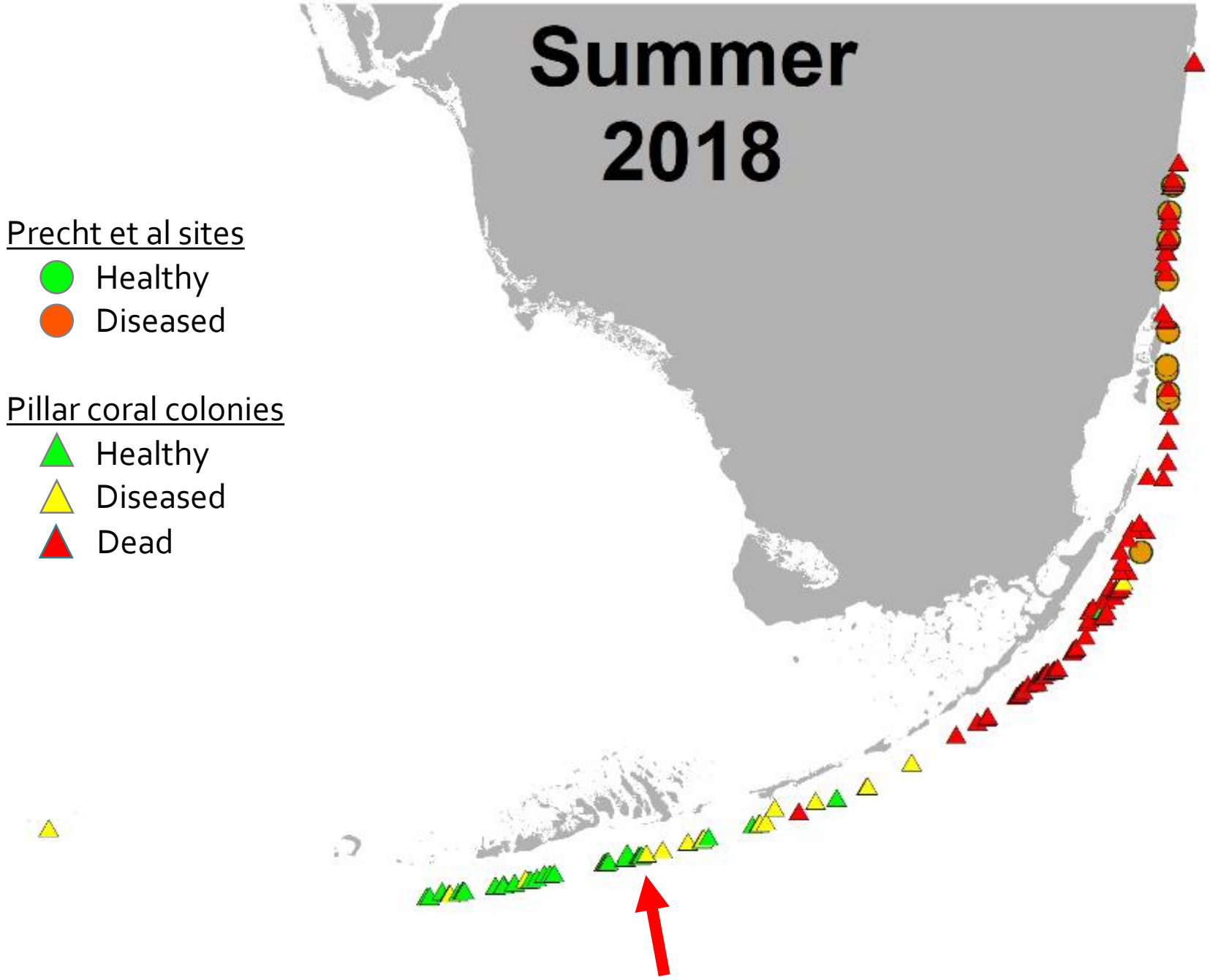
Karen Neely - NSU

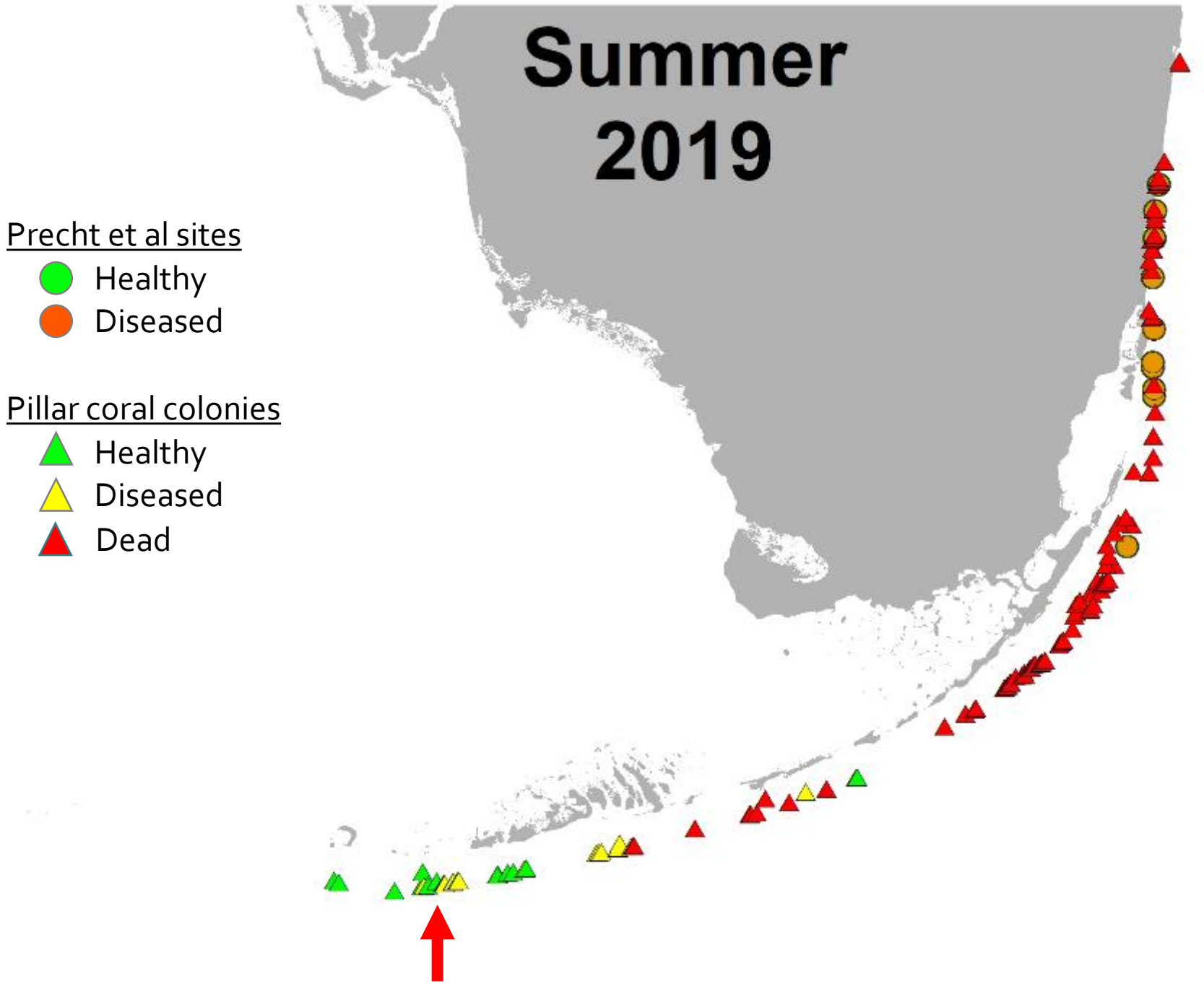

2013-2014
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead


January
2015
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead


January
2016
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead


February
2017
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead


Summer
2018
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead


Summer
2019
Precht et al sites
Healthy
Diseased
Pillar coral colonies
Healthy
Diseased
Dead

# Transmission

| | Touching | Not Touching |
|---|---|---|
| MCAV to MCAV | 45%, ~4 days | 10%, ~9 days |
| MCAV to OFAV | 100%, ~5 days | 40%, ~10 days |
| SSID to SSID | 30%, ~14 days | 10%, ~8 days |
| SSID to OFAV | 60%, ~8 days | 20%, ~8 days |

Data: Paul, Ushijima, Aeby

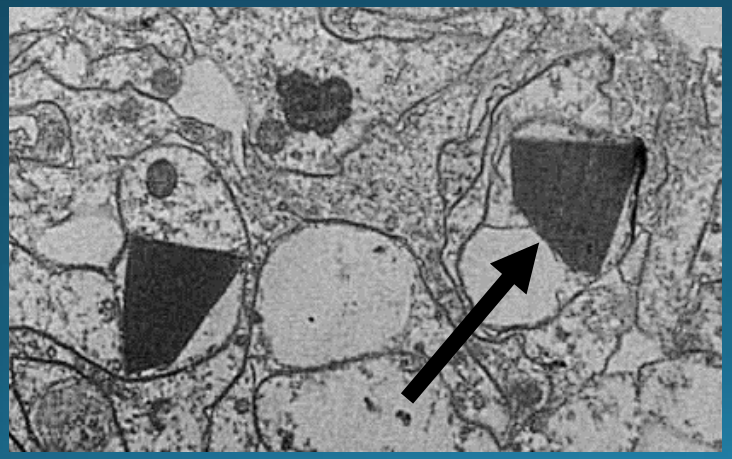
# Pathogen: Histology

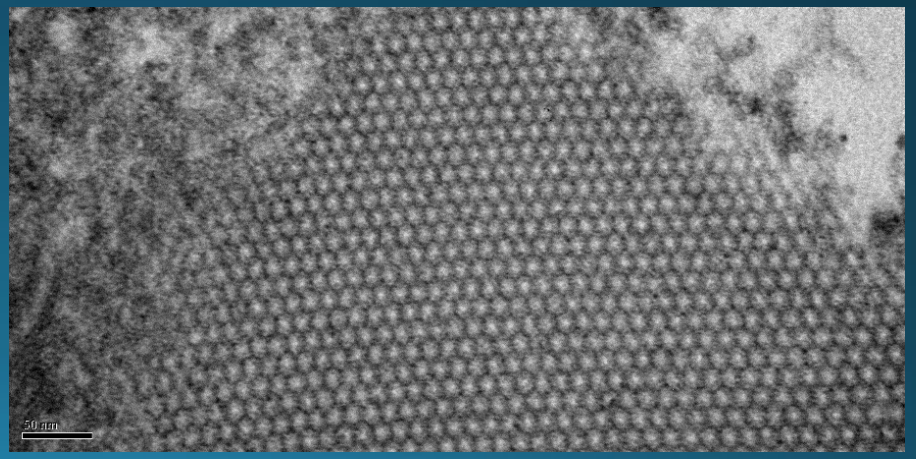
Jan Landsberg - FWC

- Degradation begins in gastrodermis



- Crystalline inclusion bodies





# Pathogen: Treatment Response

- Symptoms halted with antibiotics (bacterial component suggested)

Woodley et al. 2018. NOAA report

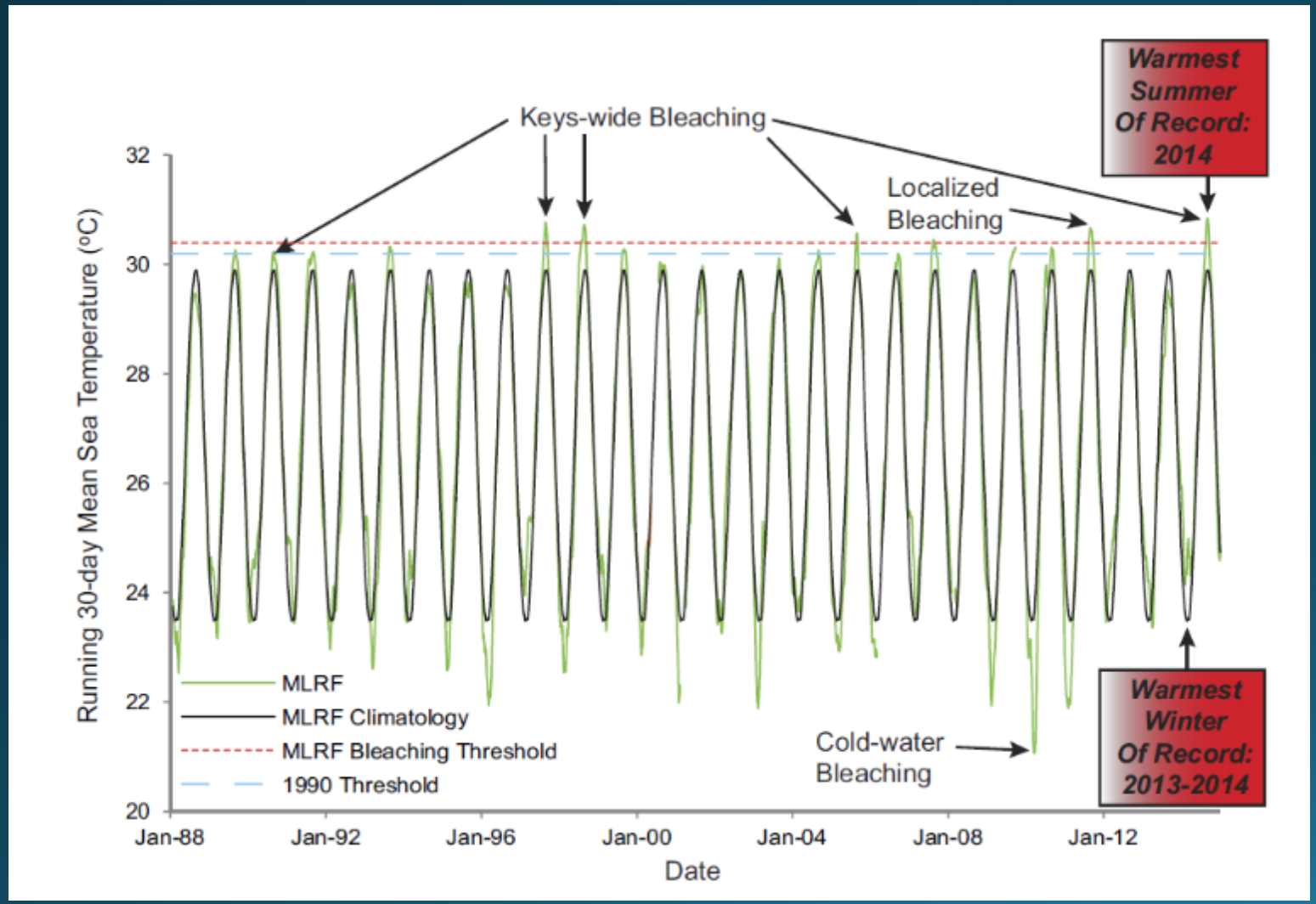


Karen Neely - NSU

# Pathogen: Culture and Sequencing

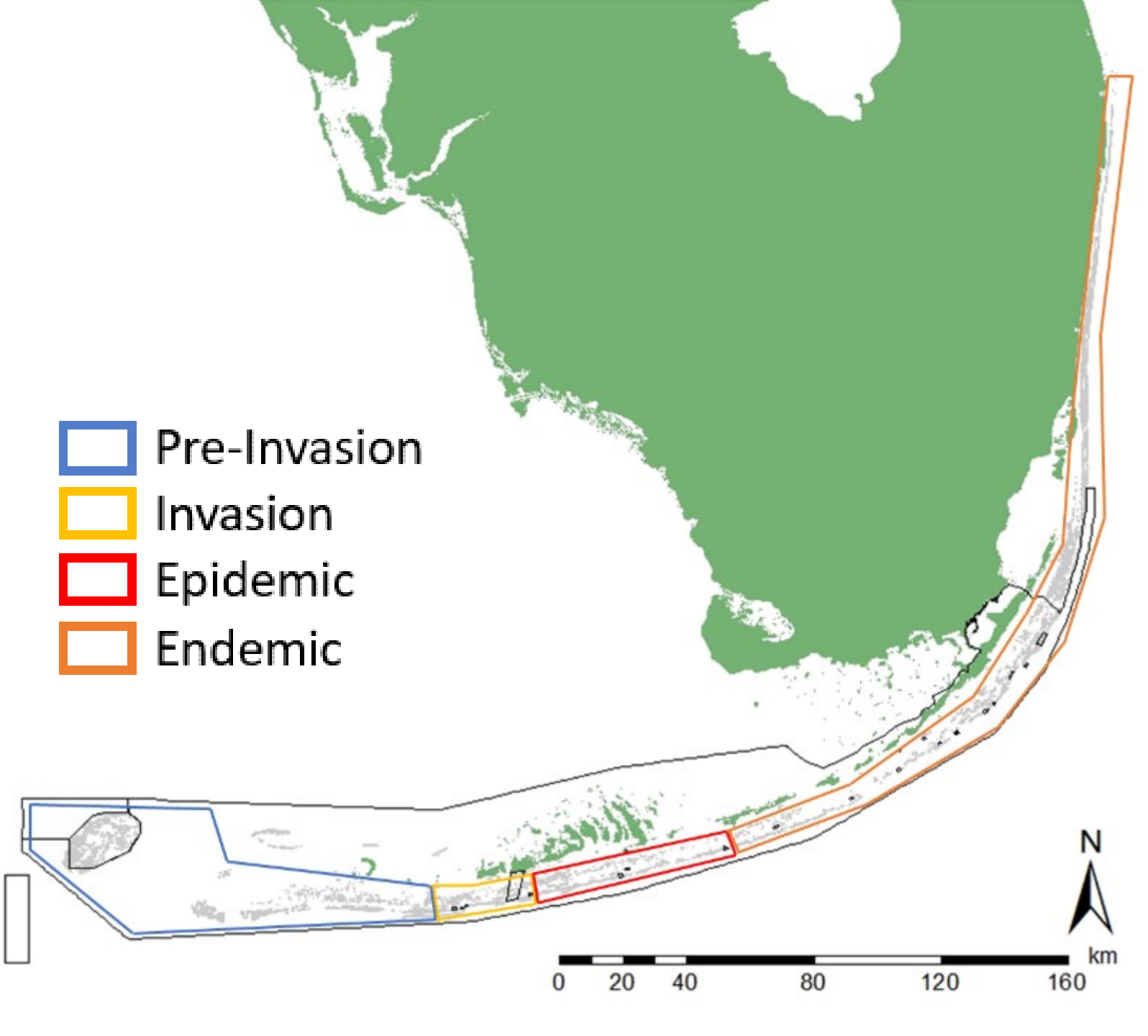
| Tissue Sequencing (Meyer) | Tissue Sequencing (Rosales) | Sediment Sequencing (Rosales) | Water Sequencing (Rosales) | Tissue Culture (Ushijima) | Tissue Culture (Briggs) | Amoeba Culture (Briggs) | Grass Culture (Nowicki) |
|---|---|---|---|---|---|---|---|
| Rhodobacteracaea (Gen: Planktotalea) 6/19 samples. | Rhodobacteracaea | Rhodobacteracaea | Rhodobacterales | Rhodobacteraceae | Rhodobacteraceae (Gen: Shimia and Synechococcus) | | |
| Vibrionacaea (Gen: Vibrio) 7/19 samples | | | | Vibrionacaea (Sp: V. coralliilyticus) | Vibrio | | Vibrio |
| Alteromonadaceae (Gen: Algicola) 4/19 samples | | | | Alteromonadaceae | | | |
| Clostridiodies (Gen: Fusibacter) 4/19 samples | | | | | Clostridiodies | | |
| Flavobacteriales (Fam: Cryomorphaceae). 10/19 samples | | | Flavobacteriales | | | Flavobacteriales (Gen: Flavobacterium) | |
| | Rhizobiales | | | | | | |
| | | Nitrosopumilus | | | | | |
| | | | | | Prosthecochloris | | |
| | | | | | Arcobacter | | |
| | | | | | Achromobacter | Achromobacter | |
| | | | | | Teoidicaulis | | |
| | | | | | | Methylobacterium | |
| | | | | | | Staphylococcus | |
| | | | | | | Delftoa | |
| | | | | | | Massilia | |

# Environmental Factors?




Manzello et al. 2015

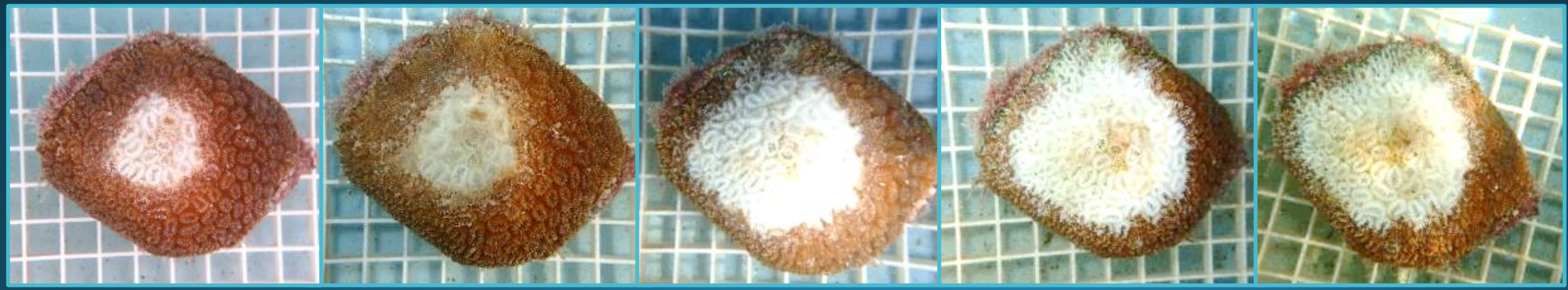
# Disease Zones



# Ecosystem Effects: Rapid Mortality

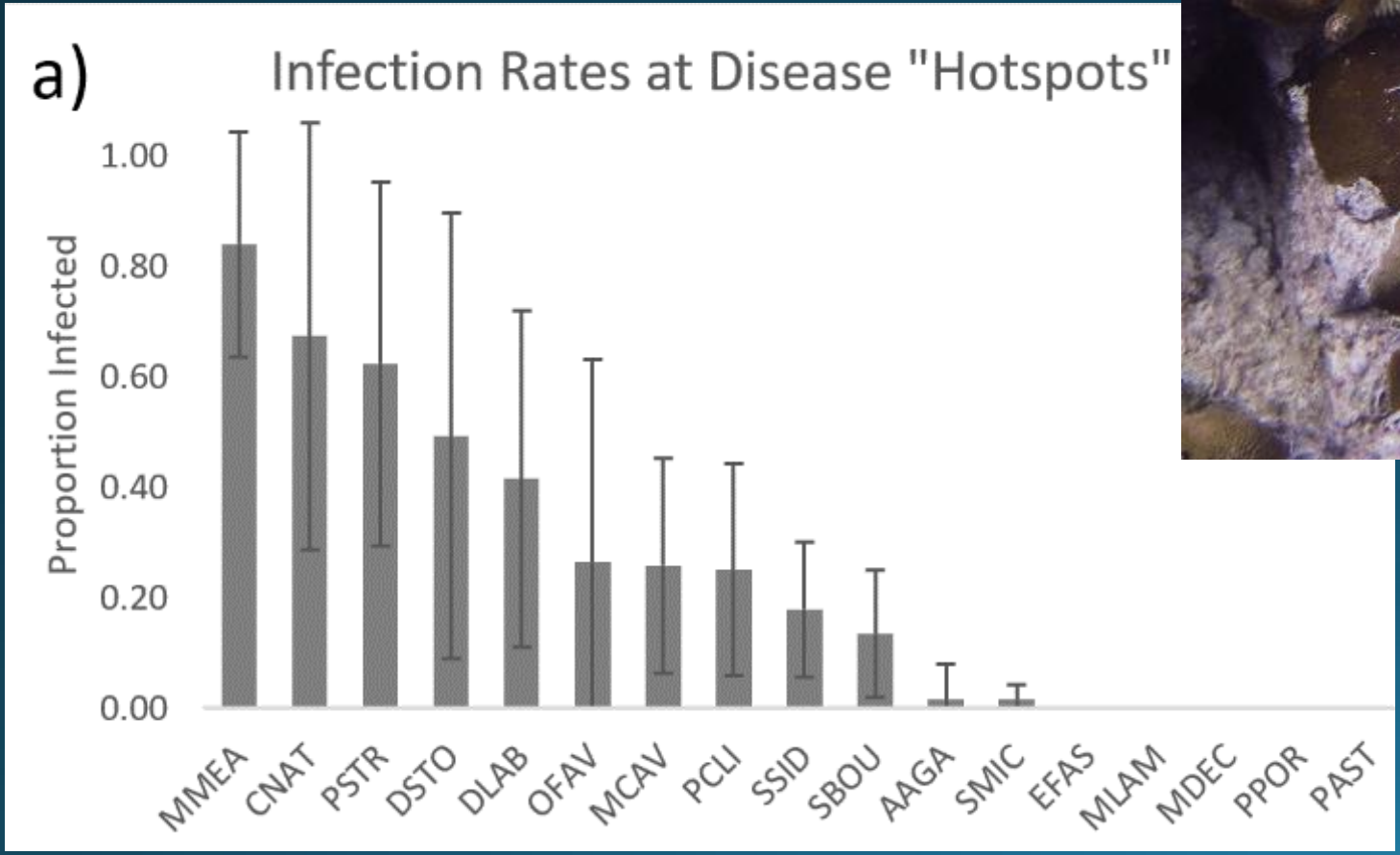

Brian Reckenbeil
FWC

Karen Neely - NSU



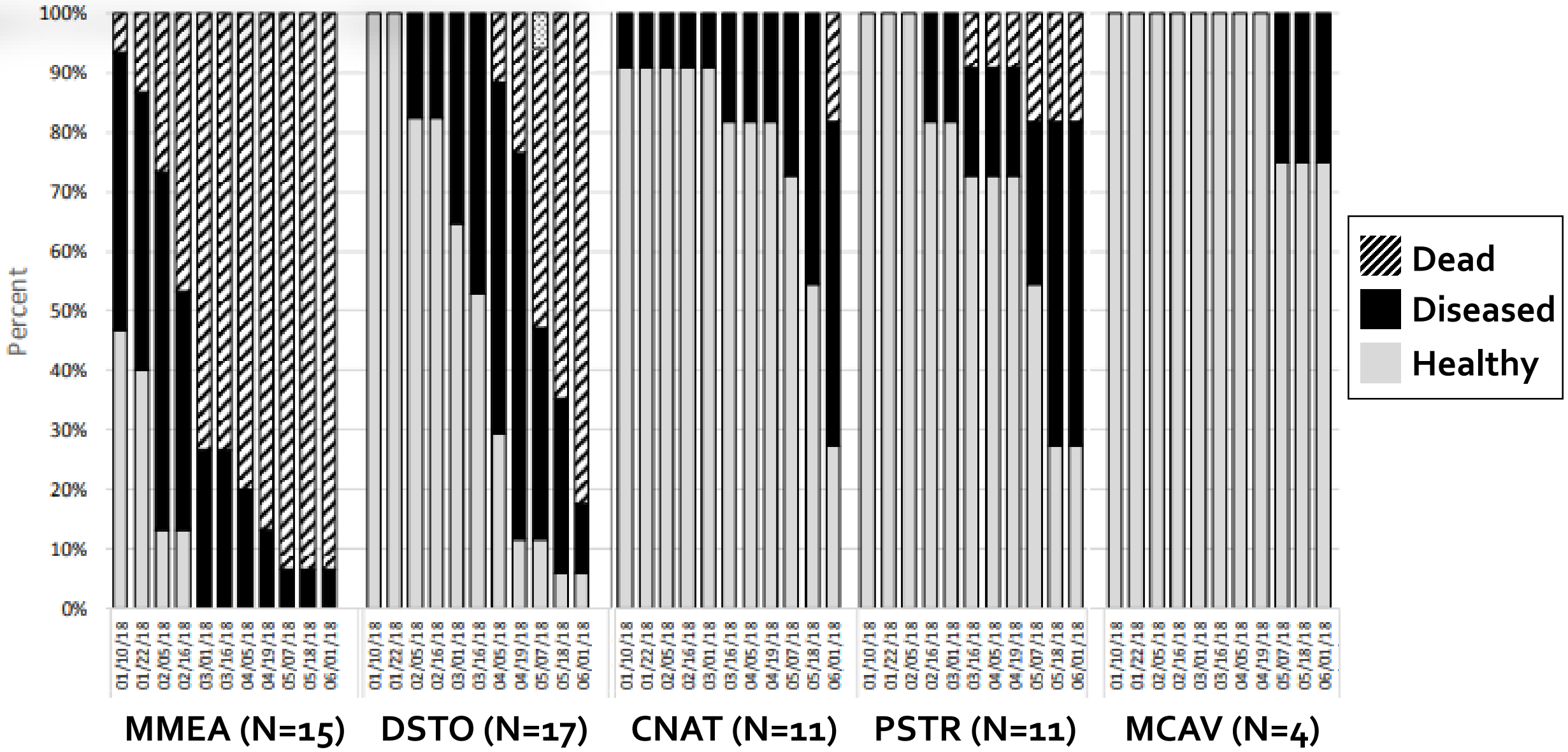
# Ecosystem Effects

## > 20 Species Affected

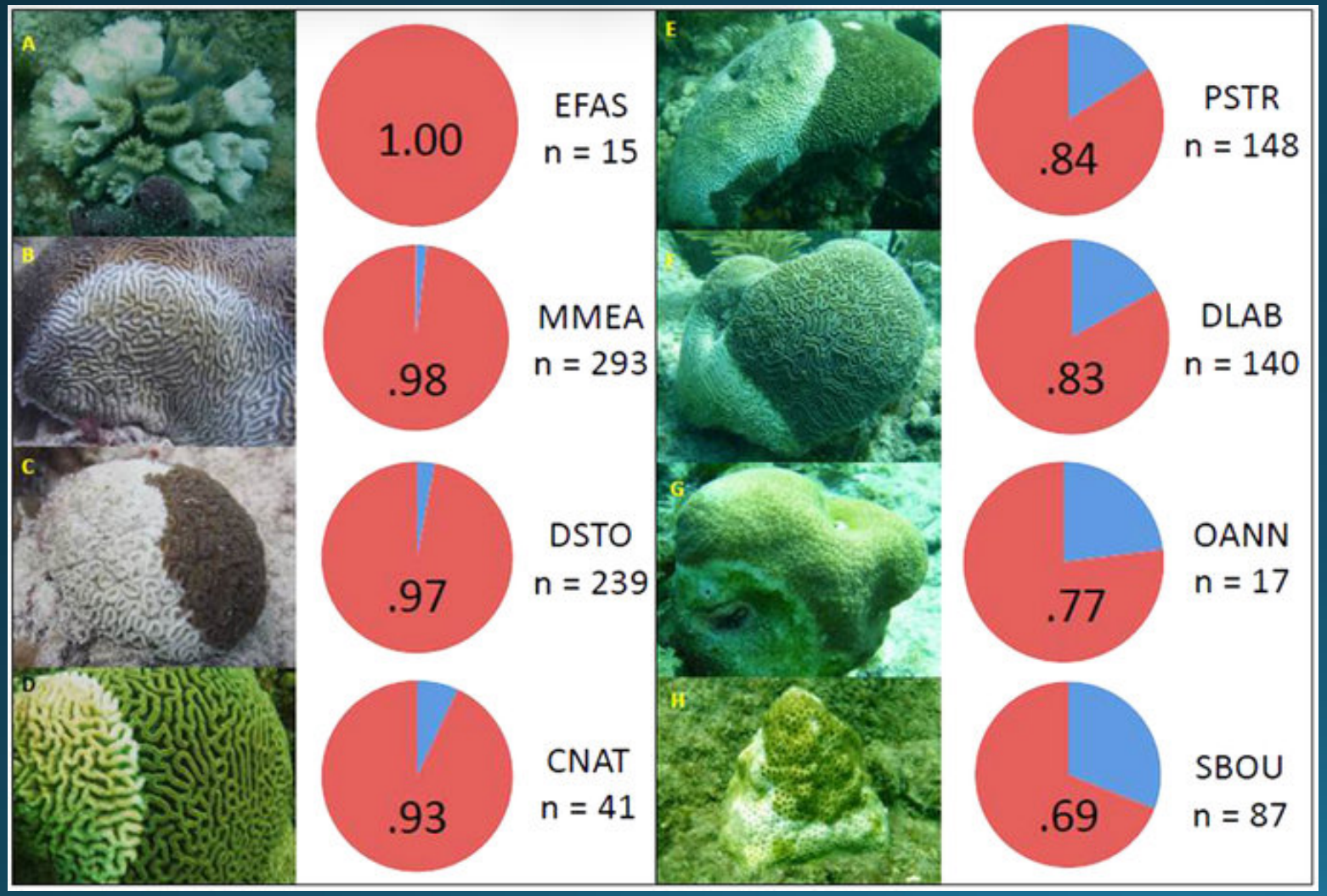


# Ecosystem Effects

Sharp et al, FWC



# Ecosystem Effects




Mortality Rates by Species

Precht et al. 2016


# Ecosystem Effects

Walton et al. 2018