

Recent Changes to Habitats and Resources within FKNMS

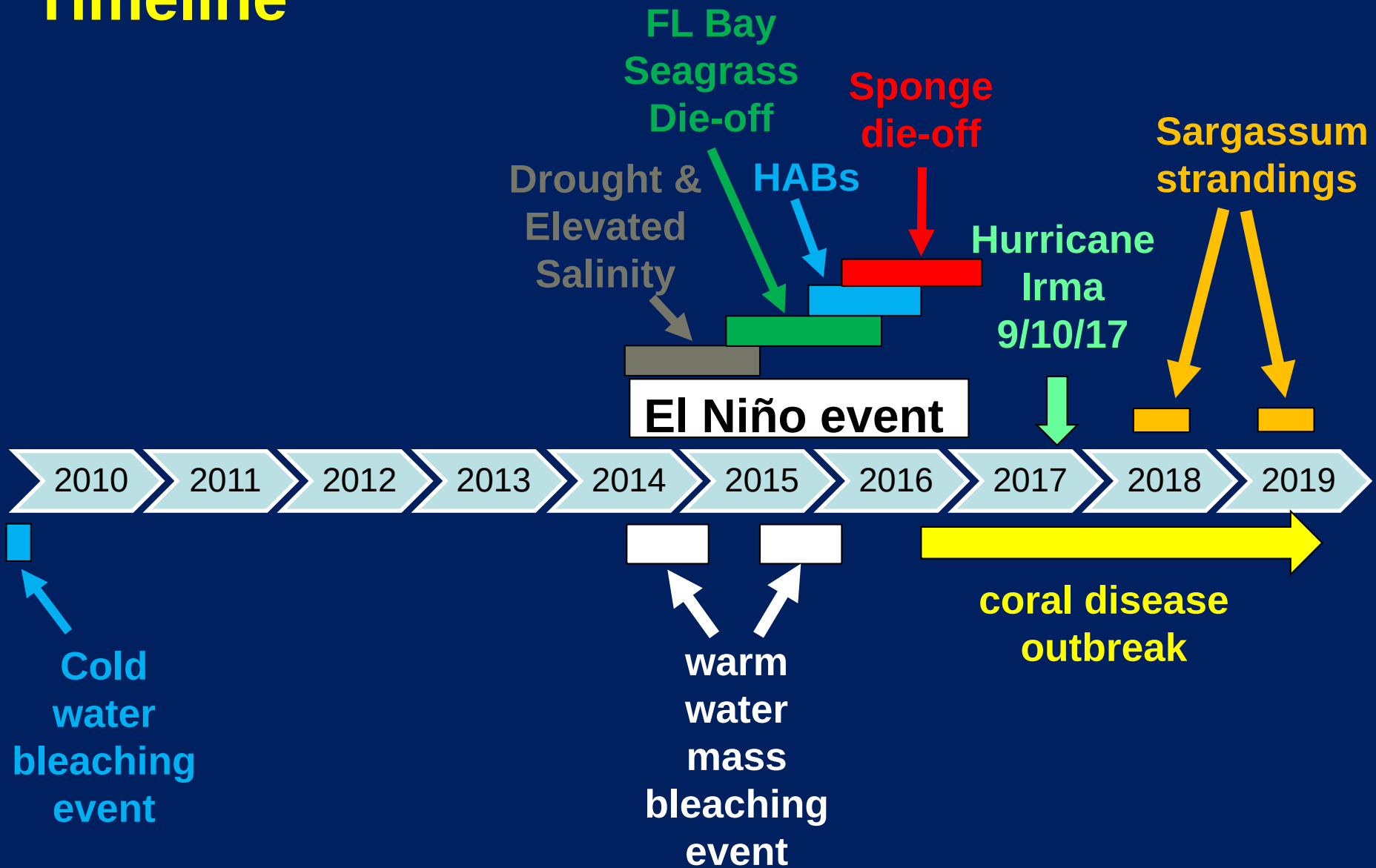
Sand Key 2019

Andy Bruckner
Research Coordinator, FKNMS

An aerial photograph showing a wide, sandy beach crowded with hundreds of people and numerous small, white motorboats. The water is a vibrant turquoise color, with many more boats scattered throughout. The coastline is irregular, with some rocky areas visible. The overall scene suggests a large-scale public gathering or festival.

**Islamorada
Memorial Day, 2019**

Timeline

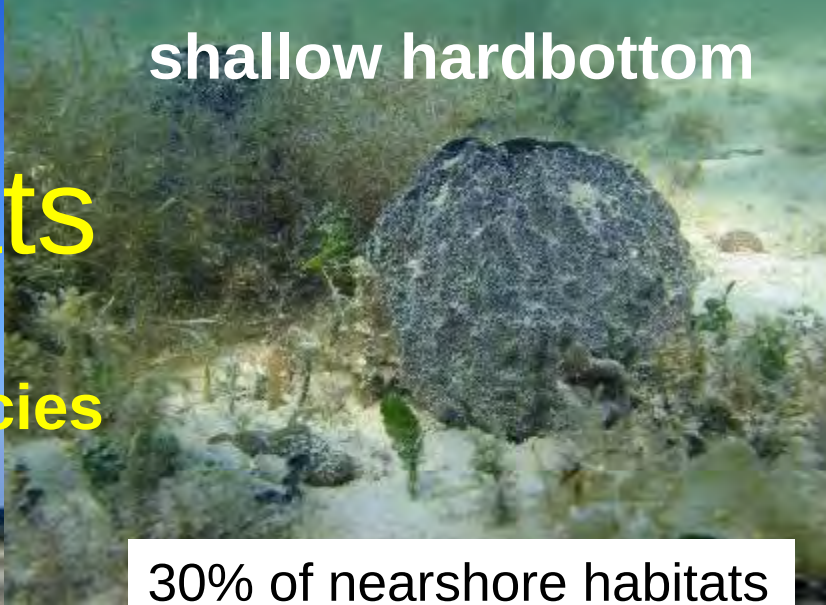


A photograph of a mangrove forest with dense green foliage and visible roots in the water.

mangroves

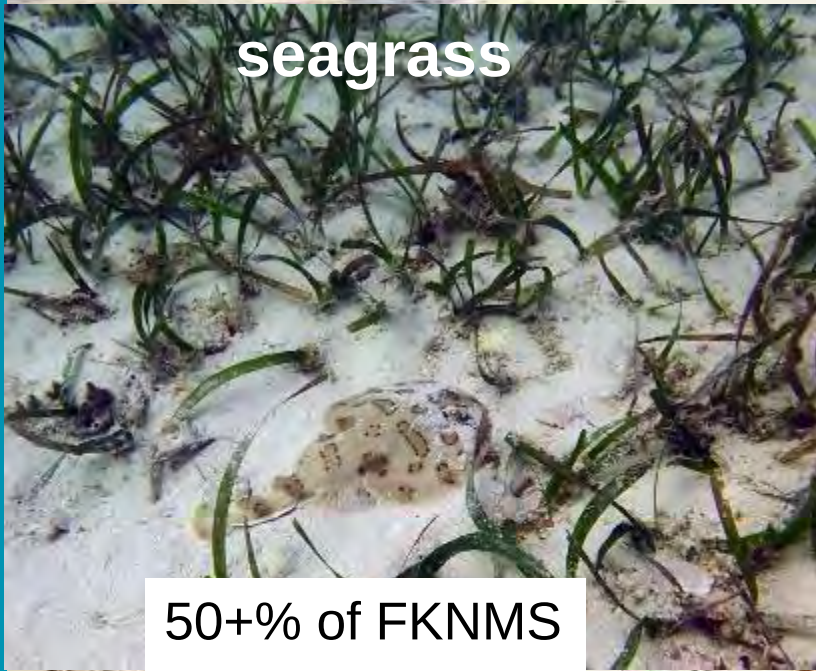
1800 miles of mangroves

Habitats
support
>6000 species

An underwater photograph showing a large, dark, rounded rock covered in green algae on a sandy seabed.

shallow hardbottom

30% of nearshore habitats
204,000 acres

An underwater photograph of green seagrass blades growing from a sandy bottom.

seagrass

50+% of FKNMS
1.5 million acres

A photograph of a wide, flat expanse of light-colored sand.

sand flats

An underwater photograph of a coral reef with various types of coral and some fish.

coral reefs

200 mile bank barrier reef
>6000 patch reefs; 59,500 acres

A Sargassum is snowballing, scientists say

By Kevin Wadlow Free Press Staff

June 5, 2019



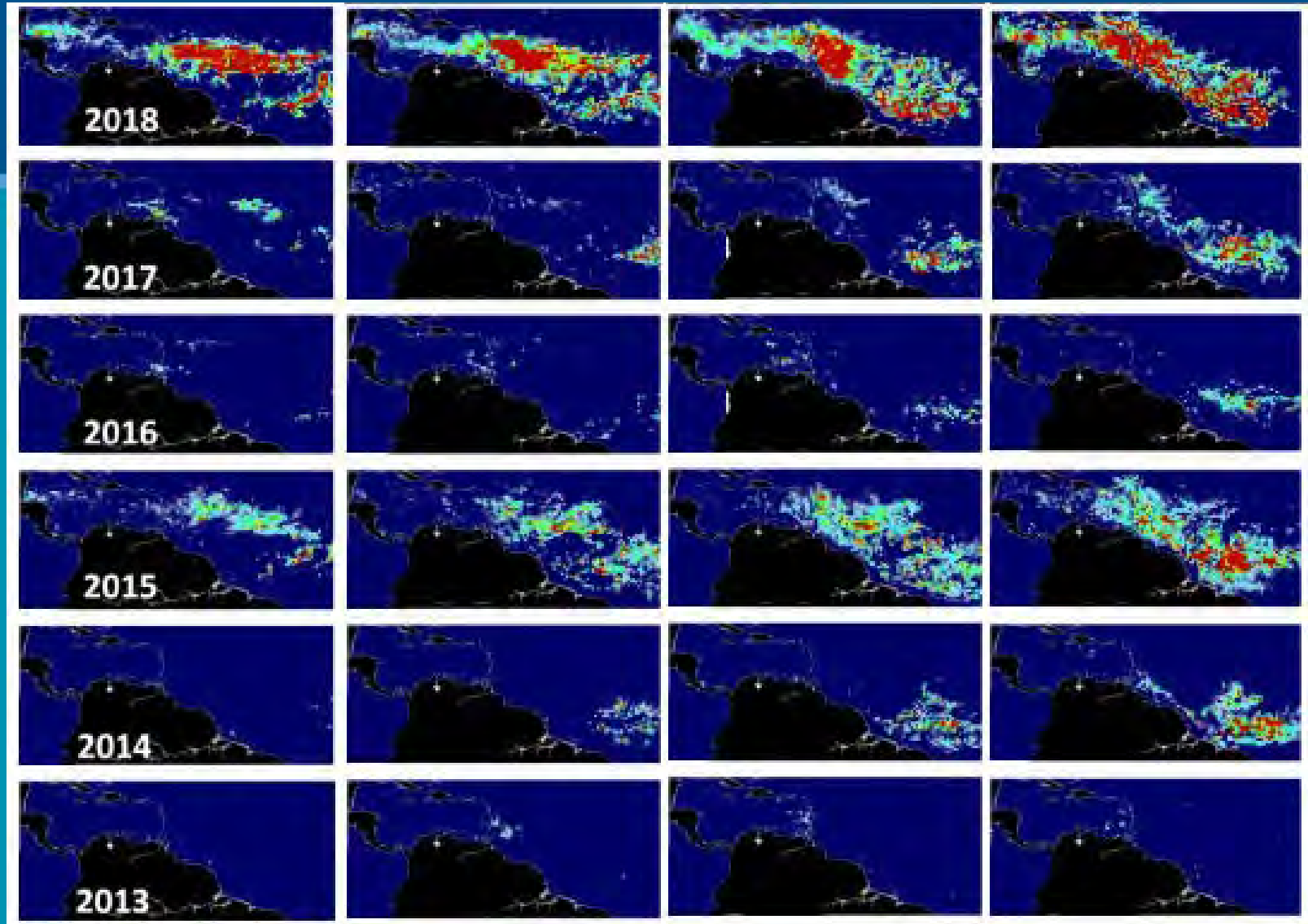
Right Photos: Ken Nedimeyer



- Large Sargassum bloom off South America
- Strong S/SE winds push Sargassum into the Caribbean
- Sargassum flows into Gulf of Mexico, and to the Florida Keys via the Loop Current and Florida Current

Sargassum abundance

Satellite-based Sargassum Watch System (SaWS)



February

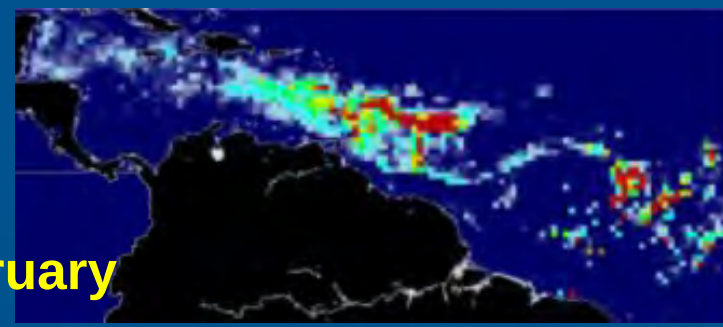
March

April

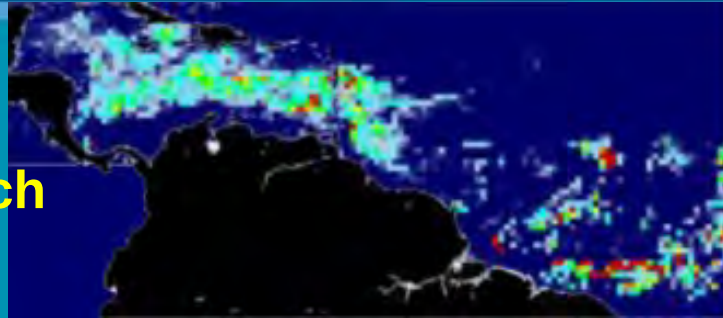
May



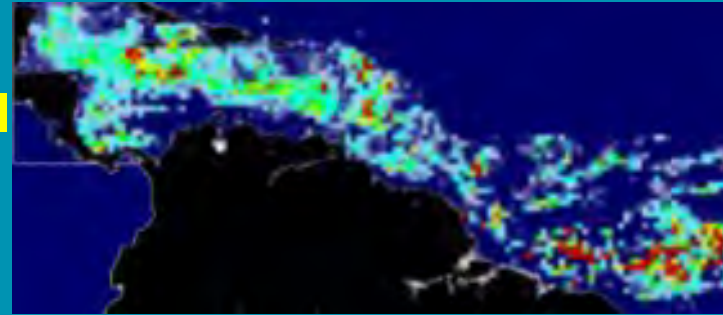
February



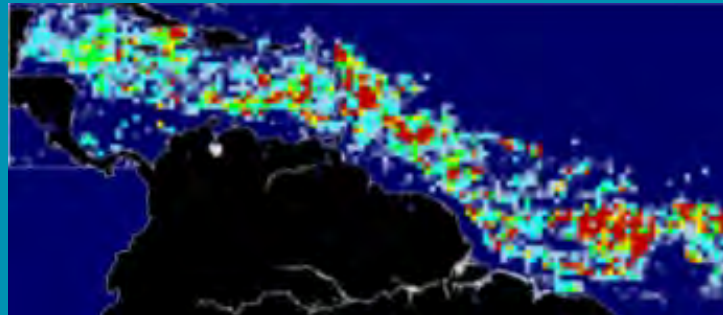
March



April



May



2019

Florida Bay Impacts to shallow hardbottom communities



Dead seagrass

- Historic drought – 2015
- Seagrass die-off - June 2015
- Elevated nutrients - 2015-2016
- Harmful algal blooms affected Middle Keys in 2016

Shallow hard bottom habitats

2014



2018



Cyanobacteria blooms in 1991, 2007, 2013, 2016 caused sponge die-offs

Photos: FWC

2016 affected
500 km²

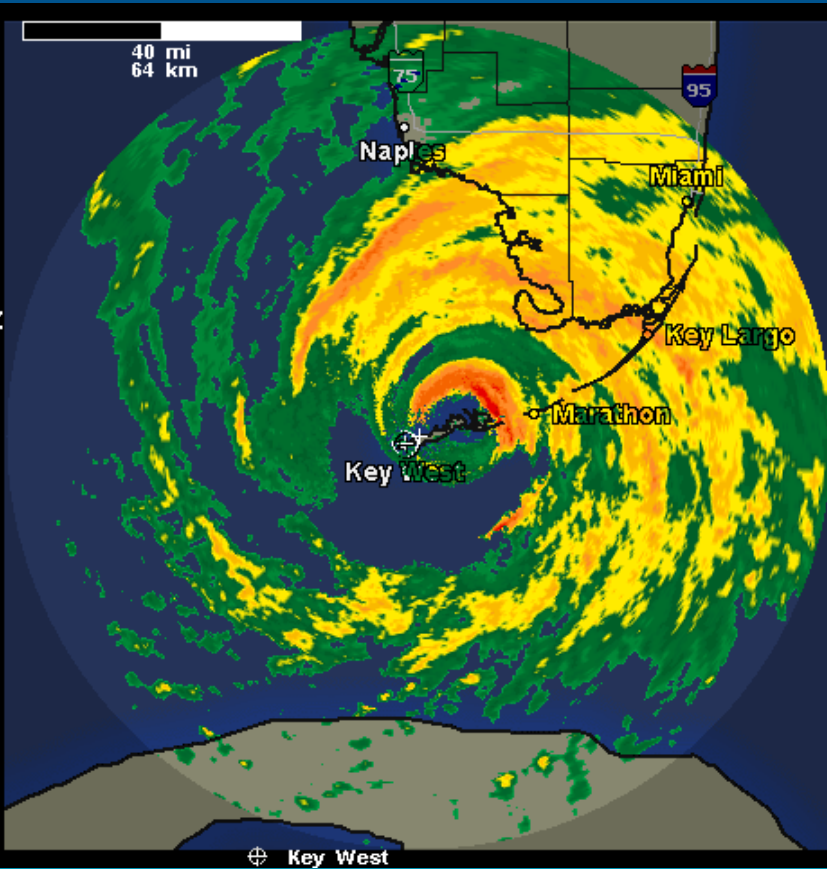
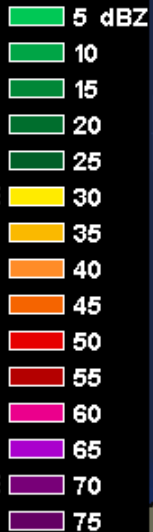


13:10 UTC
09/10/17

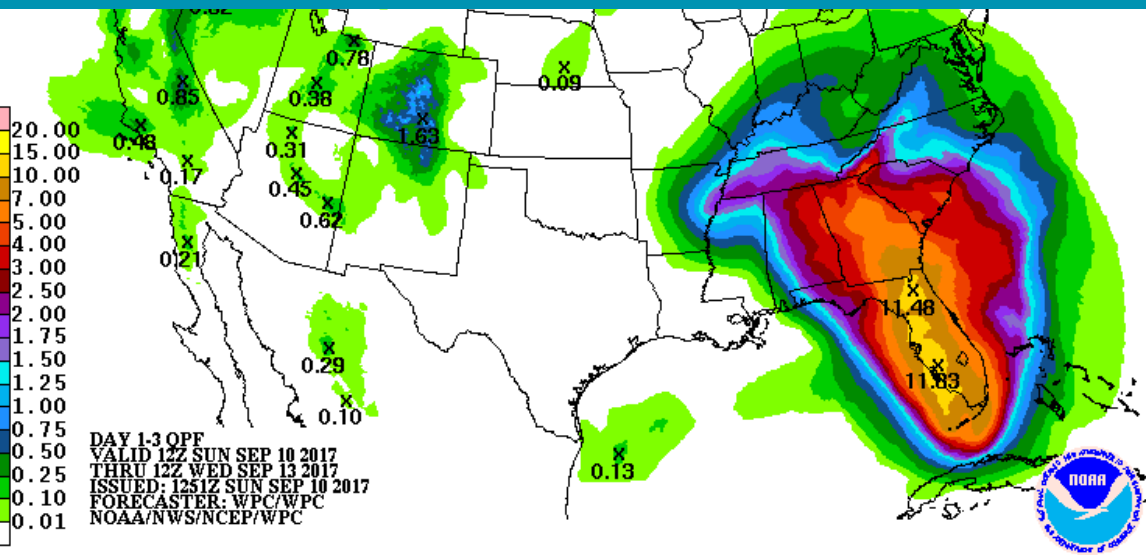
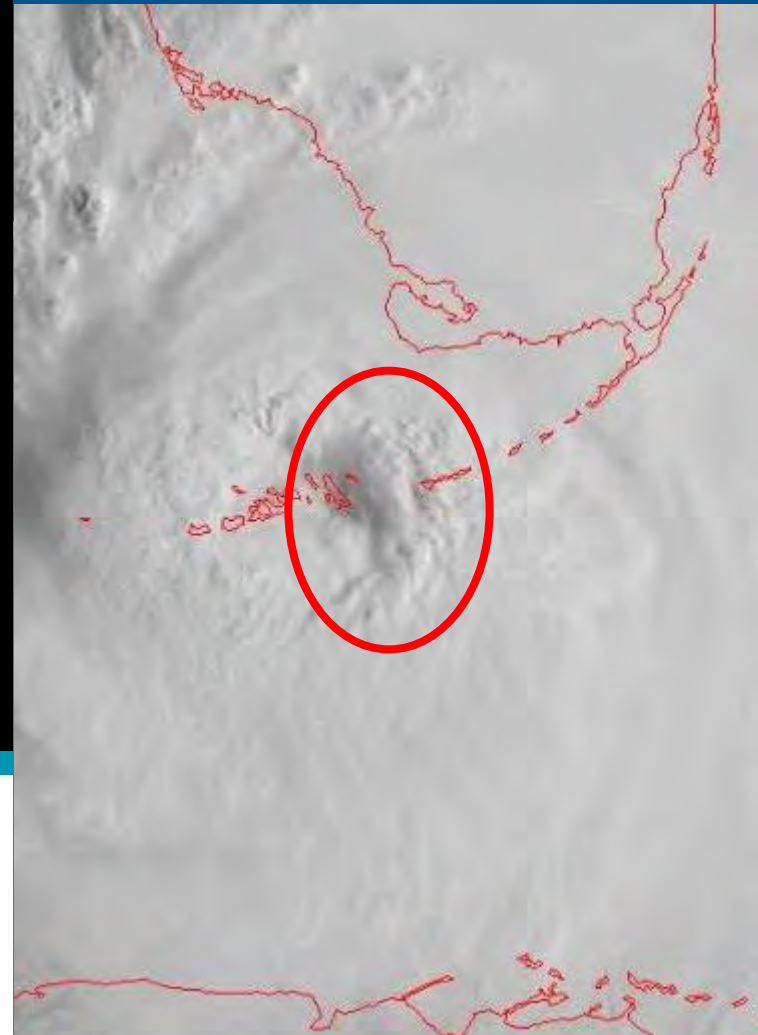


13:10 UTC
09/10/17

Max reflectivity 58 dbZ
Vol. cov. pattern 212

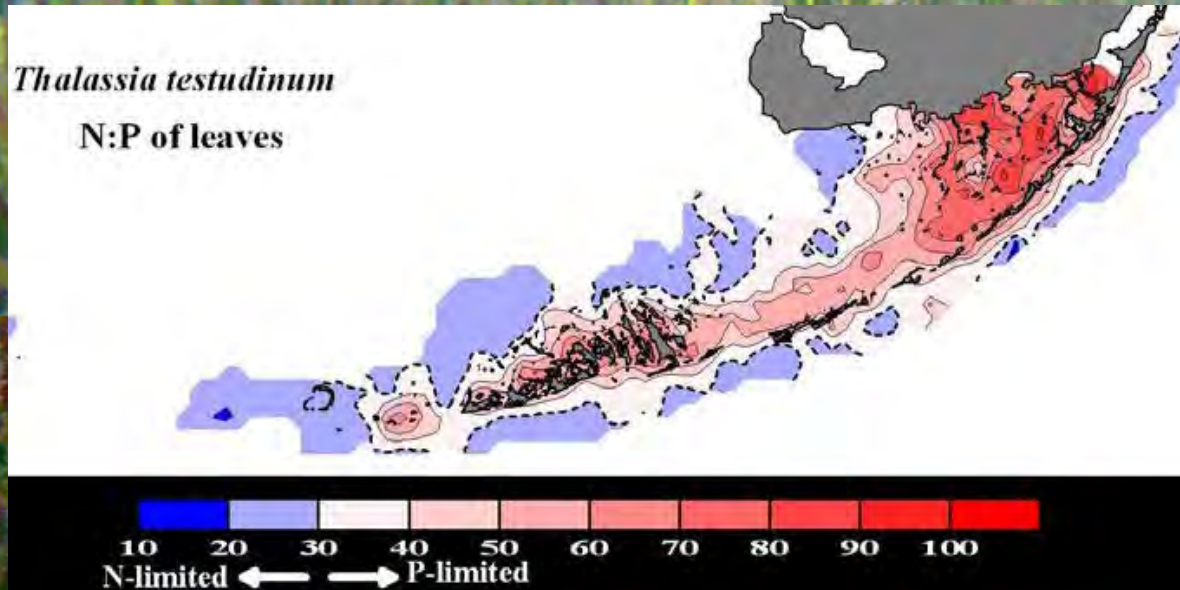


Hurricane Irma



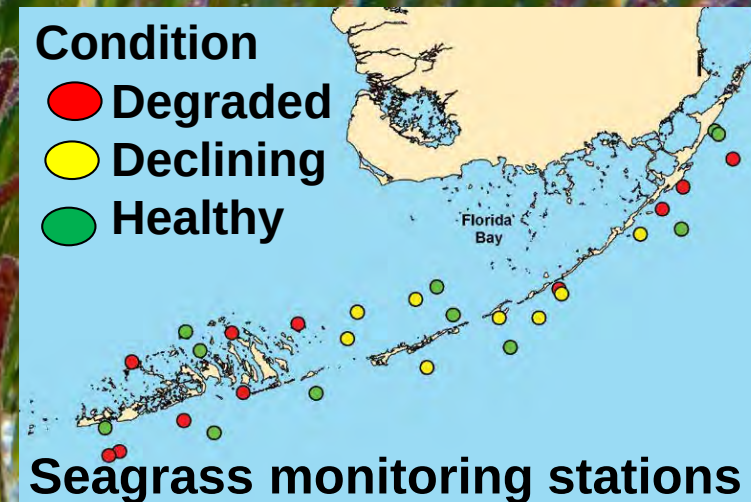
- First category 4 storm since Donna in 1960
- Wind gusts of 120 mph on Big Pine Key

Seagrass communities

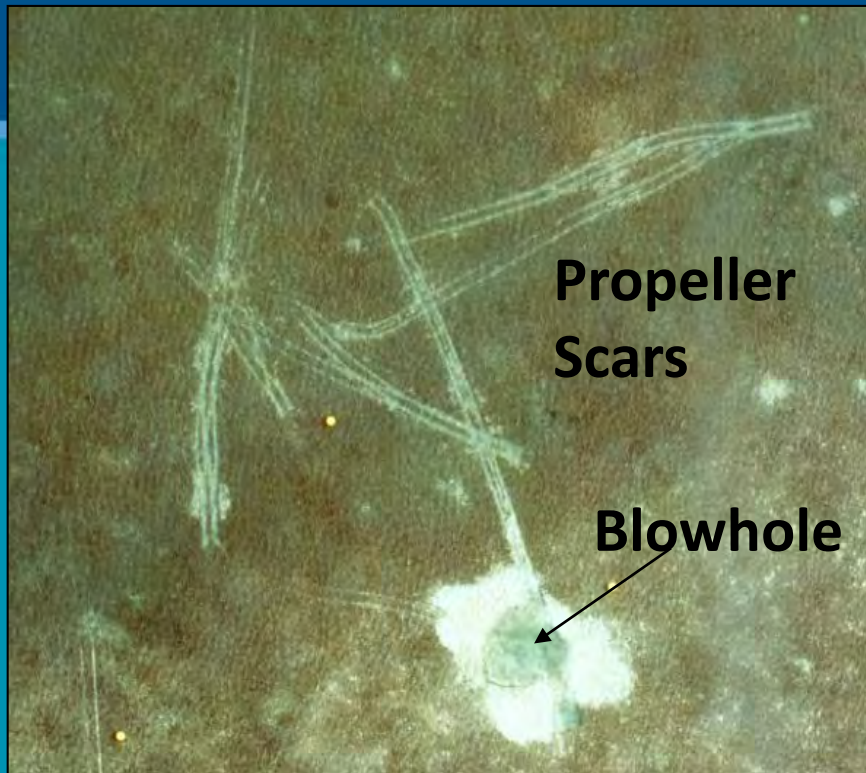


- Changes in seagrass density associated with nitrogen input
- Species shifts (*Thalassia*-*Macroalgae*) at N:P ratio of 30:1

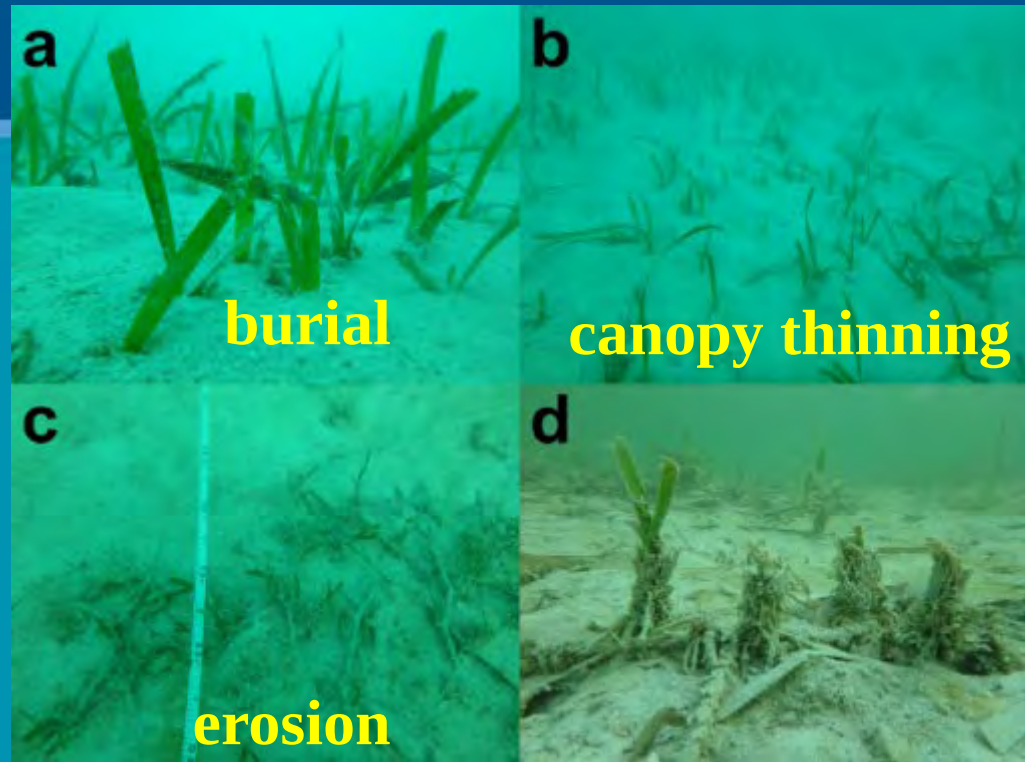
Healthy seagrass bed



Physical impacts to seagrass beds



Boat impacts



Hurricane Irma

prop scars		Acreage of Mapped Impact			
Year	Light	Moderate	Severe	Moderate + Severe	Total
1995	14,560	10,430	5,060	15,490	30,050
2015	26,007	11,481	19,462	30,943	56,950

Mangroves



1955



2013

Expanding!!!

Impacts from Hurricane Irma



Wind damage to canopy
Storm surge deposits
Erosion
Altered hydrology





February 2017



December 2017

Sugarloaf Key

Long Key



February 2017



December 2017



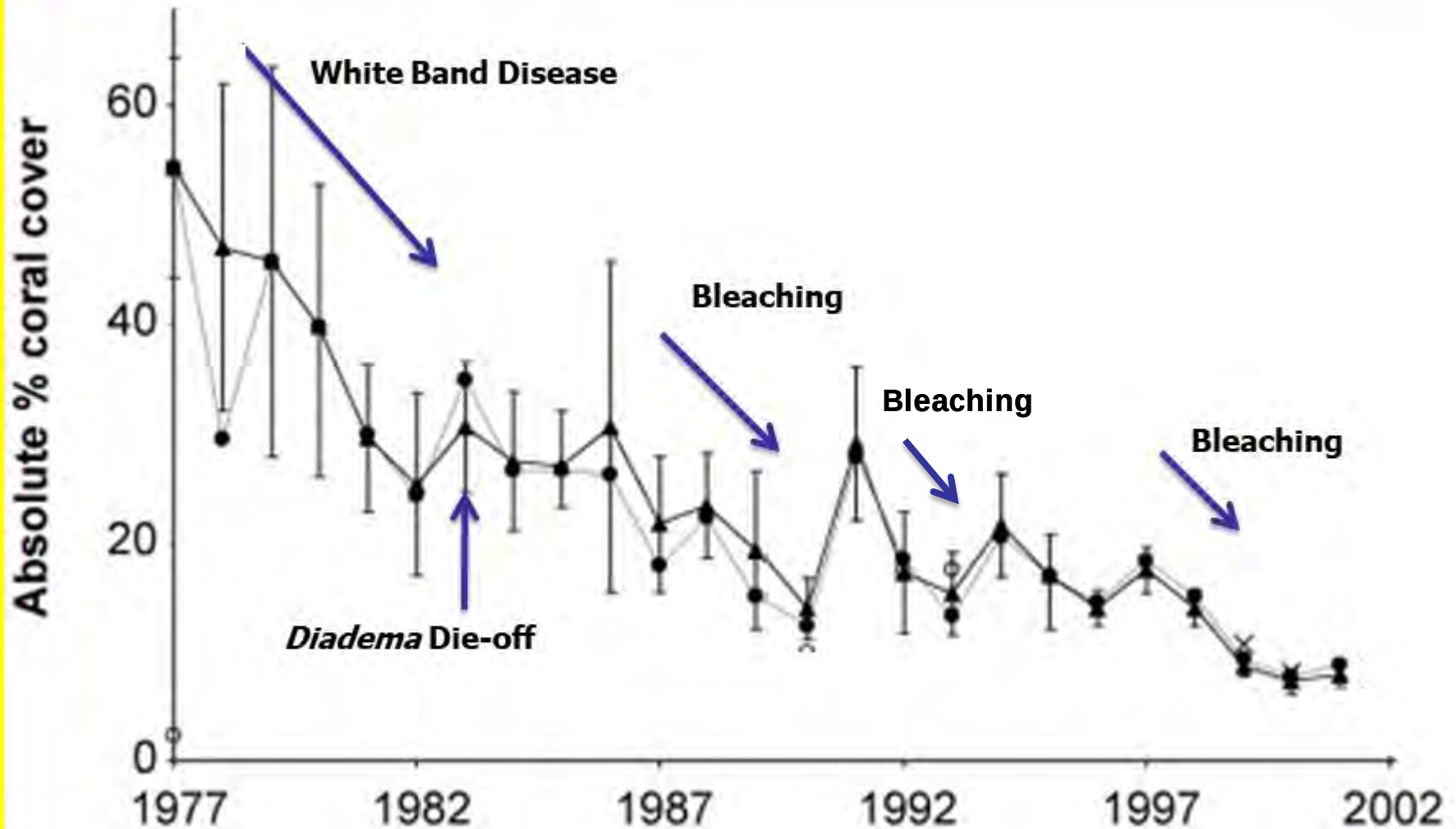
February 2017



December 2017

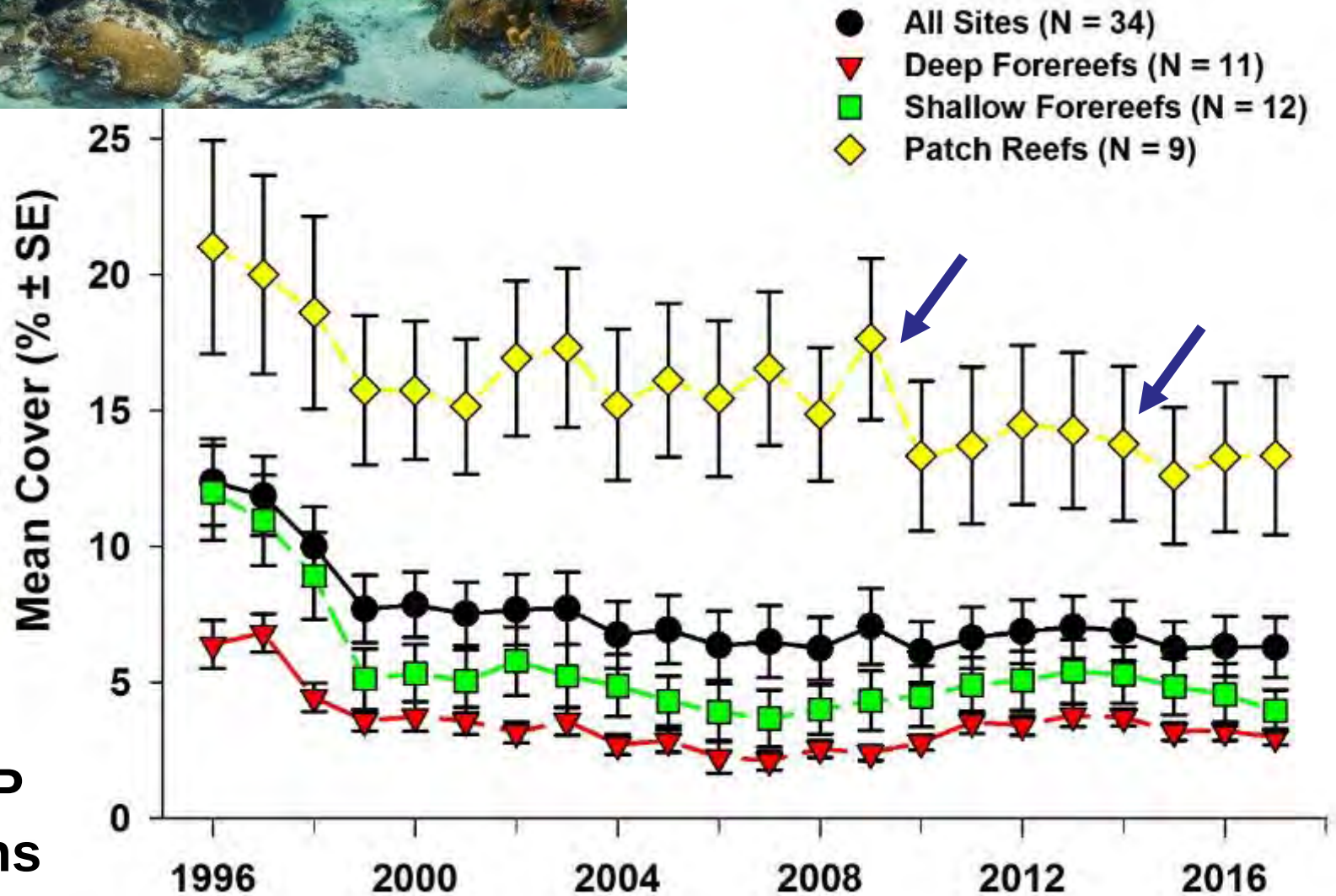
Grassy Key

Caribbean-wide Coral Decline





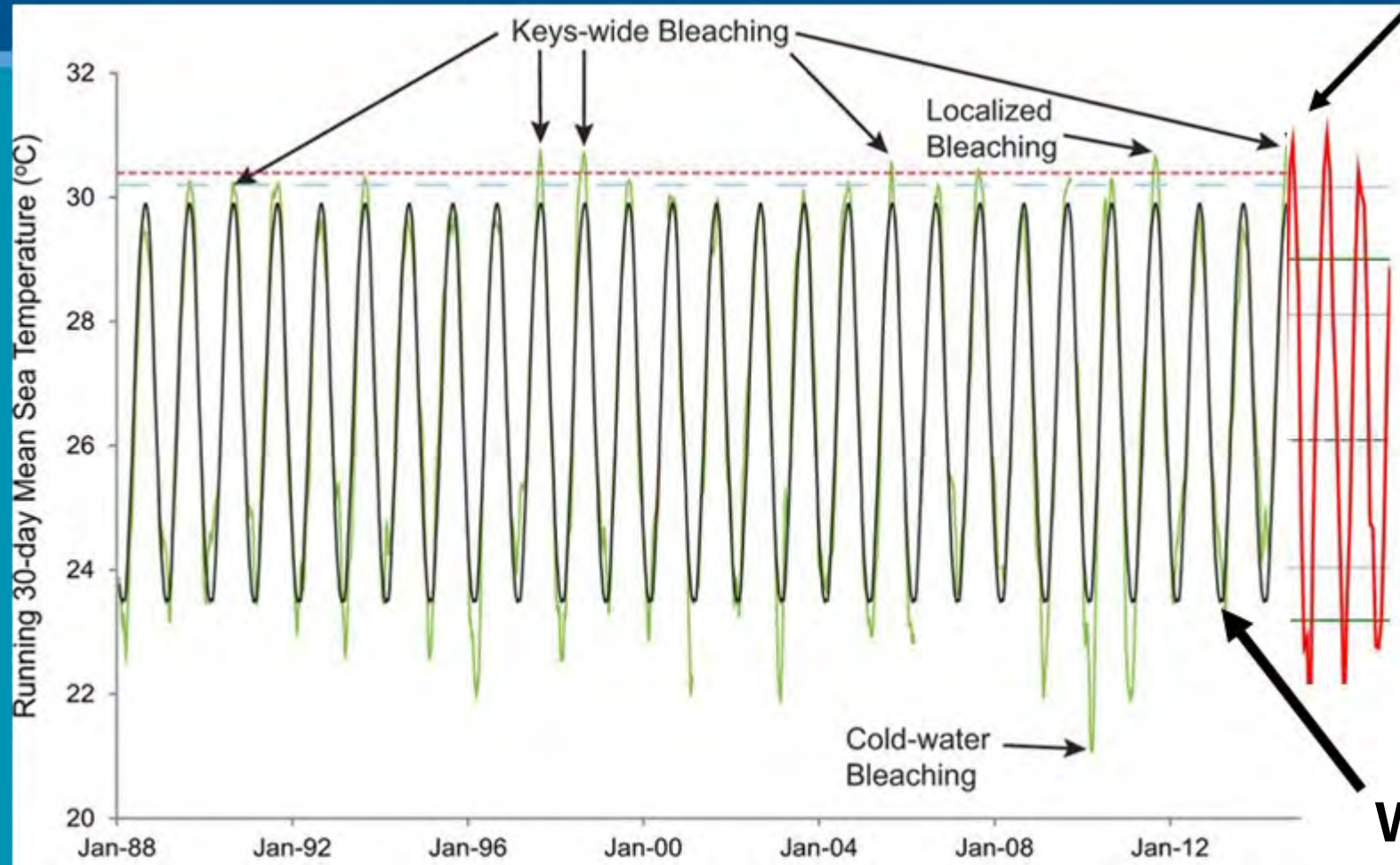
Recent trends



CREMP
Stations

Temperature Stressors

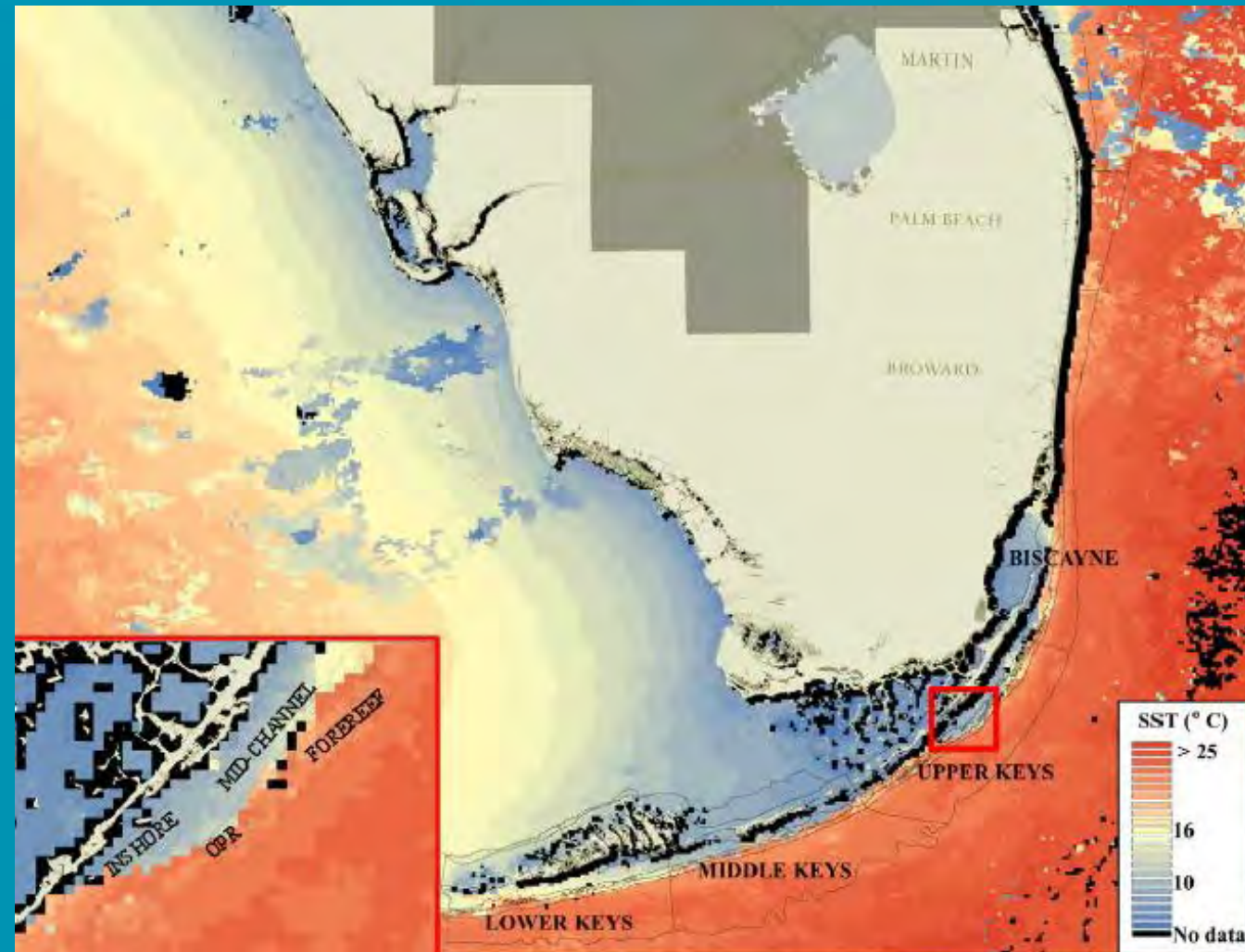
2014-2016
El Niño



**Warmest
winter on
record**

Molasses Reef

Cold water event: January, 2010

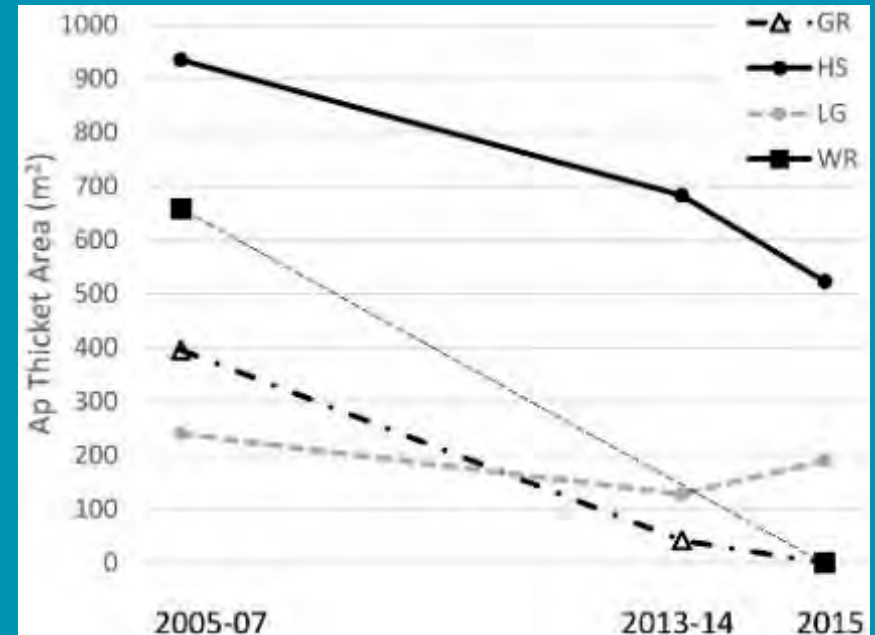


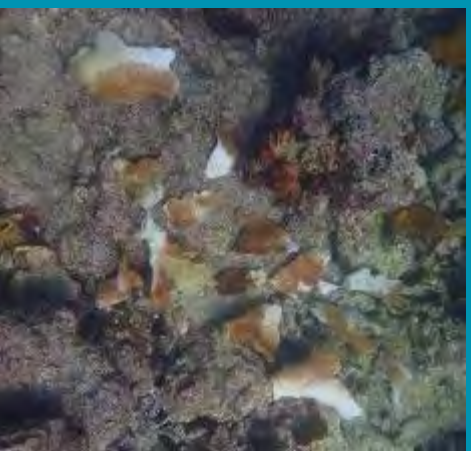
Lirman et al. 2011

2014-2015 Coral bleaching

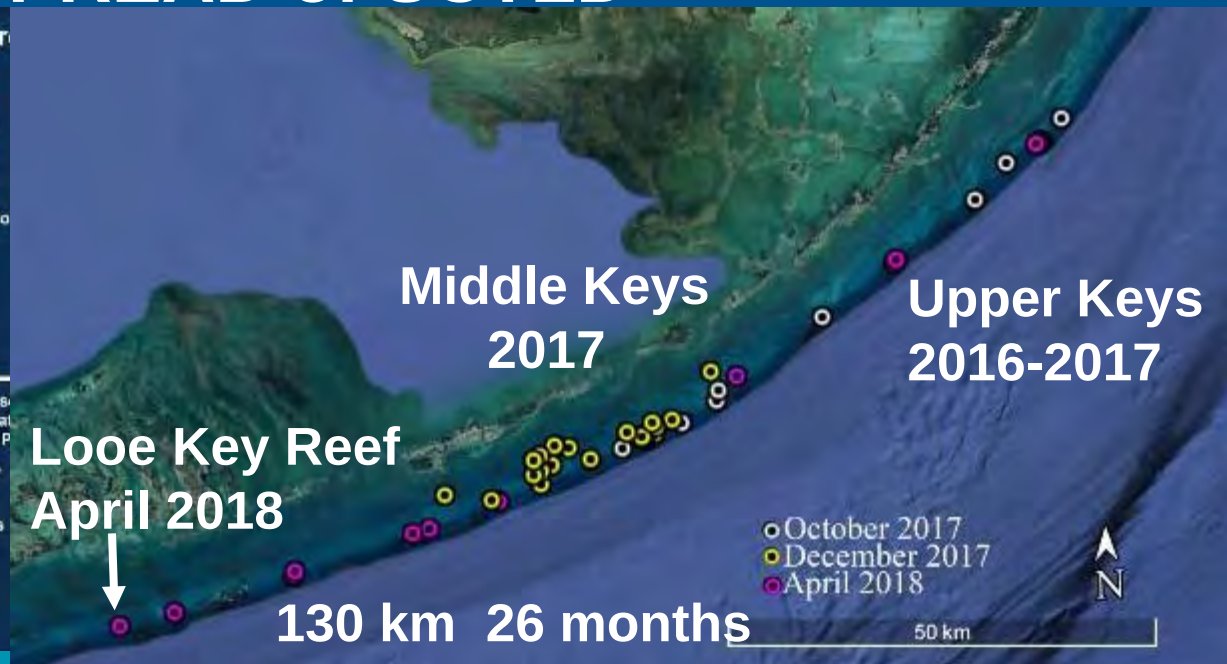


33% of elkhorn coral killed at 7 monitoring sites in upper keys



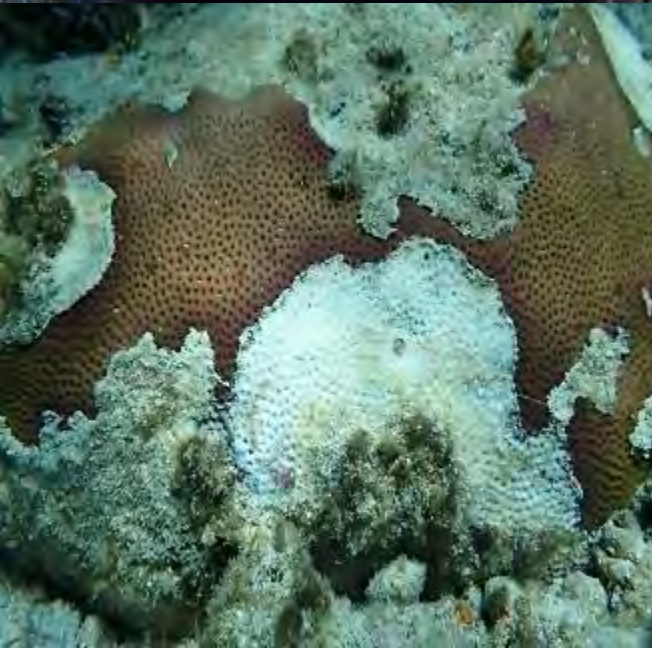


SPREAD of SCTLD

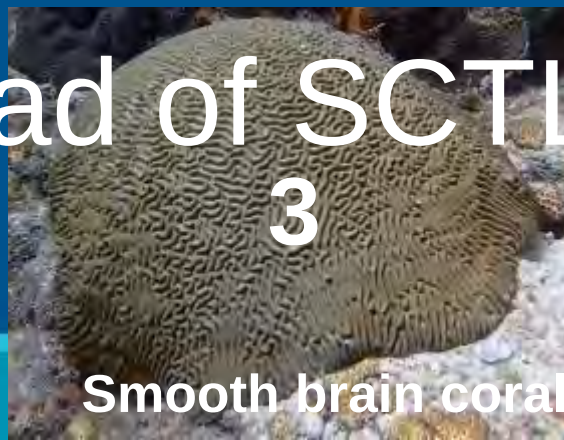




22+ susceptible species

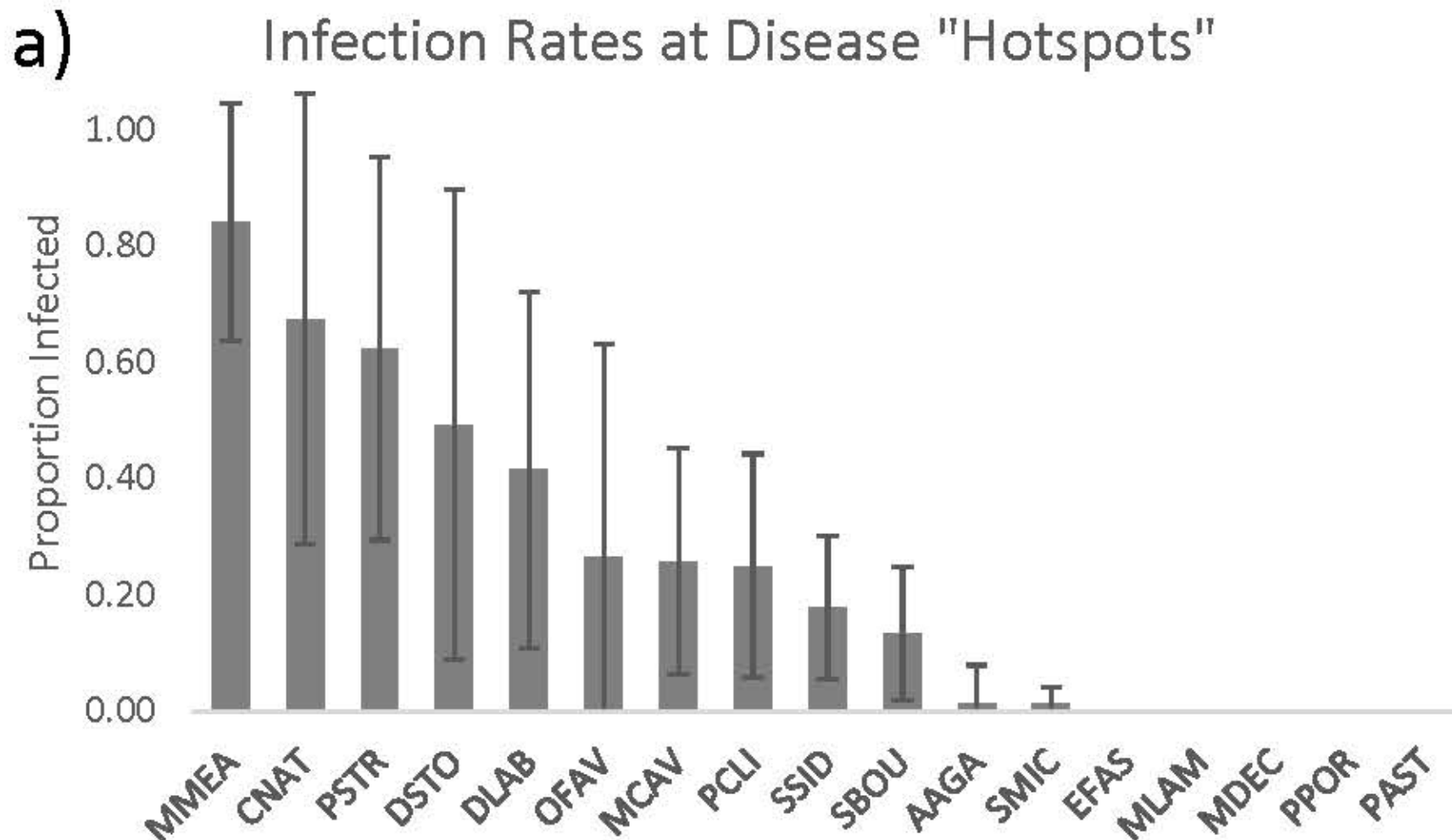


Spread of SCTLD



Mountainous star coral

Disease prevalence



Rates of tissue loss

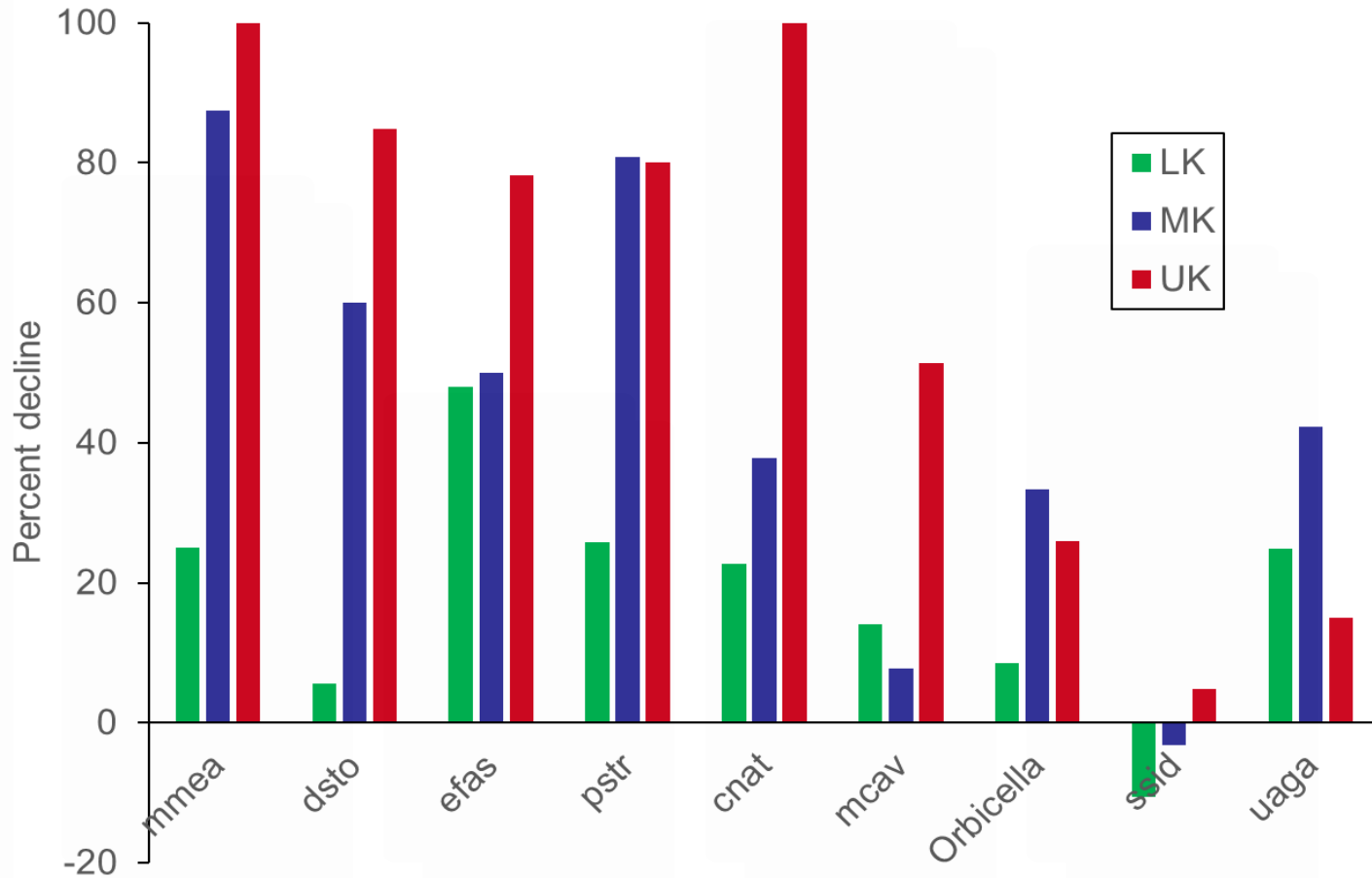


3-4 cm/day linear spread

CREMP 40 sites



Coral Losses 2015-2018



Species shifts



1997

Molasses, Upper Keys



2019

An underwater photograph of a coral reef. In the center, there are several tall, purple sea fans (gorgonians) growing from a rocky substrate. The surrounding reef is covered with various types of coral, including branching yellow and orange corals. Numerous small, yellow tang-like fish are swimming throughout the scene. The water is clear and blue.

Hope Spots

Turtle Reef, 6/9/2019

Image: Brenda Altmeier



Horseshoe Reef, 6/9/2019

Cheeca Rocks

6/10/2019





Image: Steve Gittings



Image: CRF



Entering a new era





Questions?

3 year old nursery-reared coral

08/201