



# Florida Reef Resilience Program



## Coral Bleaching Monitoring

# What is the FRRP?

The Florida Reef Resilience Program (FRRP) began in 2004, to develop a resilience-based reef management concept and create a unified monitoring program for the entire Florida Reef Tract.

## Goals

- Identify reefs that are likely to resist or recover from bleaching or other disturbances
- Guide the protection and management of coral reefs



Australian Government  
Great Barrier Reef  
Marine Park Authority



The Nature  
Conservancy   
Protecting nature. Preserving life.™

# FRRP Partnership

The Nature Conservancy



Protecting nature. Preserving life.™



Institute for  
Marine Remote Sensing



Southeast  
Florida  
Coral Reef  
Initiative

*Acting above to protect what's below.*



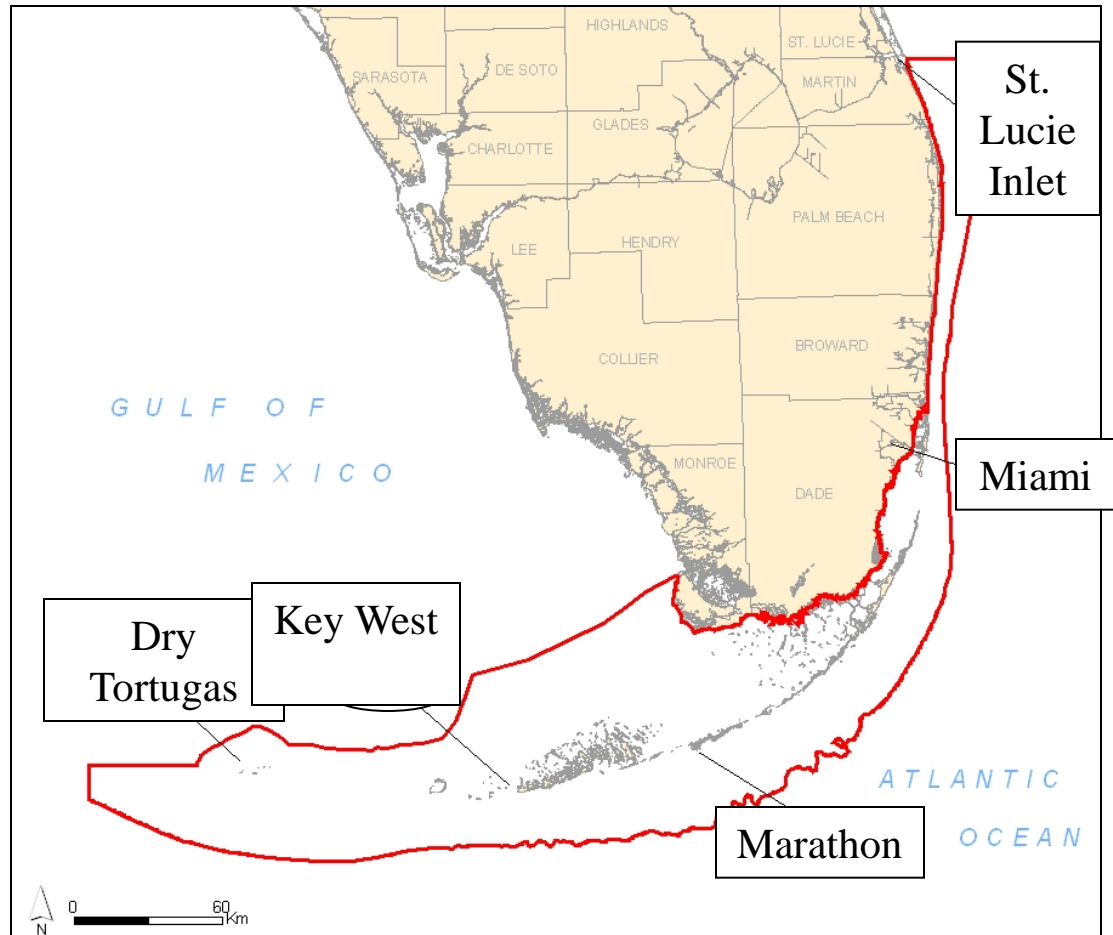
UNIVERSITY OF  
SOUTH FLORIDA  
COLLEGE OF MARINE SCIENCE



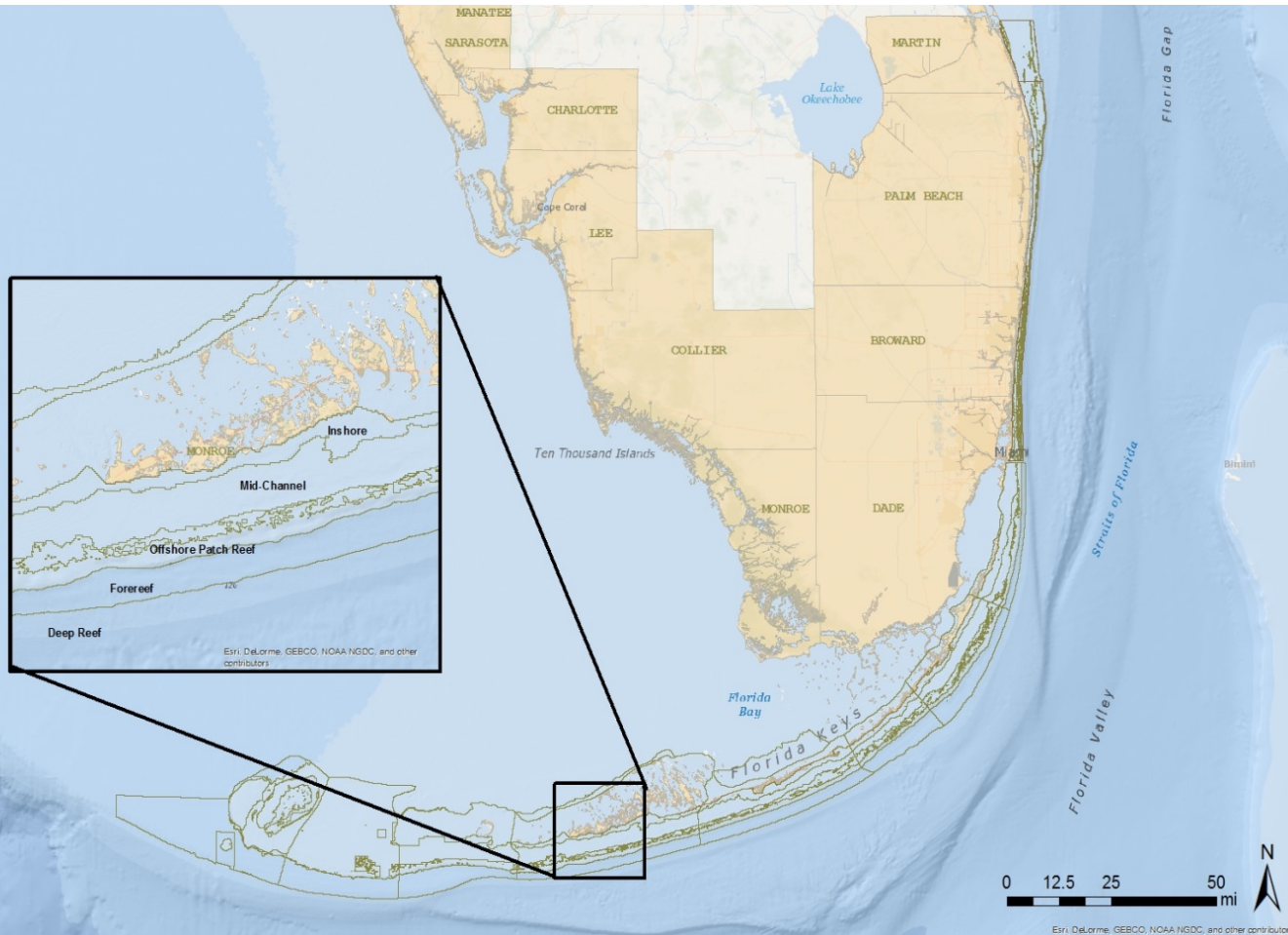


# FRRP Region

The FRRP spans the reefs from St. Lucie Inlet to the Dry Tortugas



# Spatial Framework



- Provides a unified method of dividing up and looking at the reef tract
- There are 16 sub-regions (e.g. Upper Keys, Broward) and 156 bio-zones (e.g. inshore, middle reef)
- The spatial framework and sampling grid were revised in Spring 2014 using new spatial and benthic data.

# Disturbance Response Monitoring

- Surveys designed to monitor coral reef condition during and after disturbance
- 2005-2014 focused on coral bleaching and 2010 focused on the cold event
- Trained experts survey corals during peak annual temperatures (typically mid-August through mid-October)
- Follow-up surveys are completed after moderate/severe bleaching years. This is determined by FRRP Coral Bleaching Response Plan.





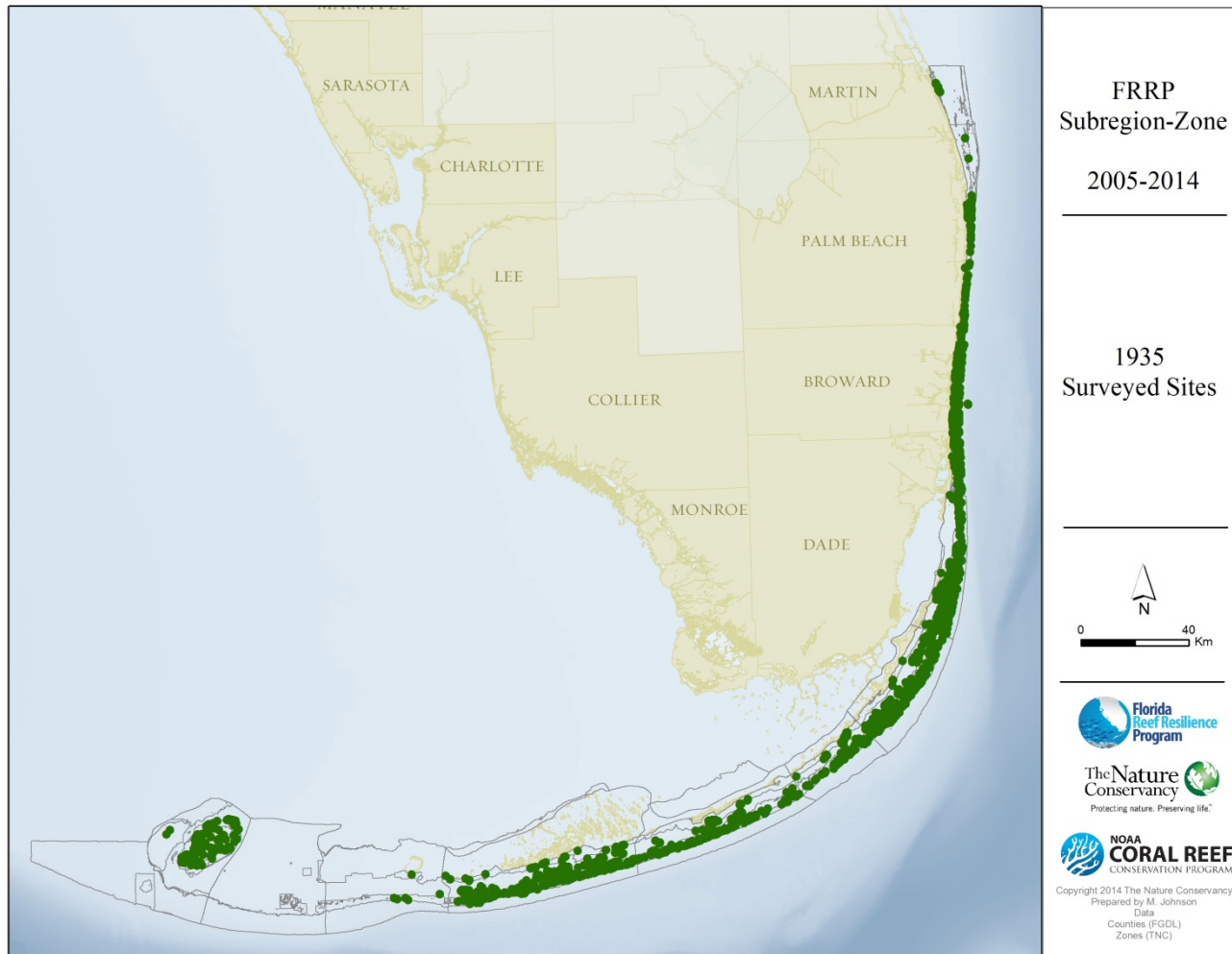
# DRM Field Methodology

- Random sites generated and assigned to teams
- 1 x 10m belt transects (2/site)
- Measure/assess all corals ( $\geq 4$  cm); # of tissue isolates
- Species level identification
- Degree of paling/bleaching, % mortality, disease presence
- Data entered online
- Database queried for results



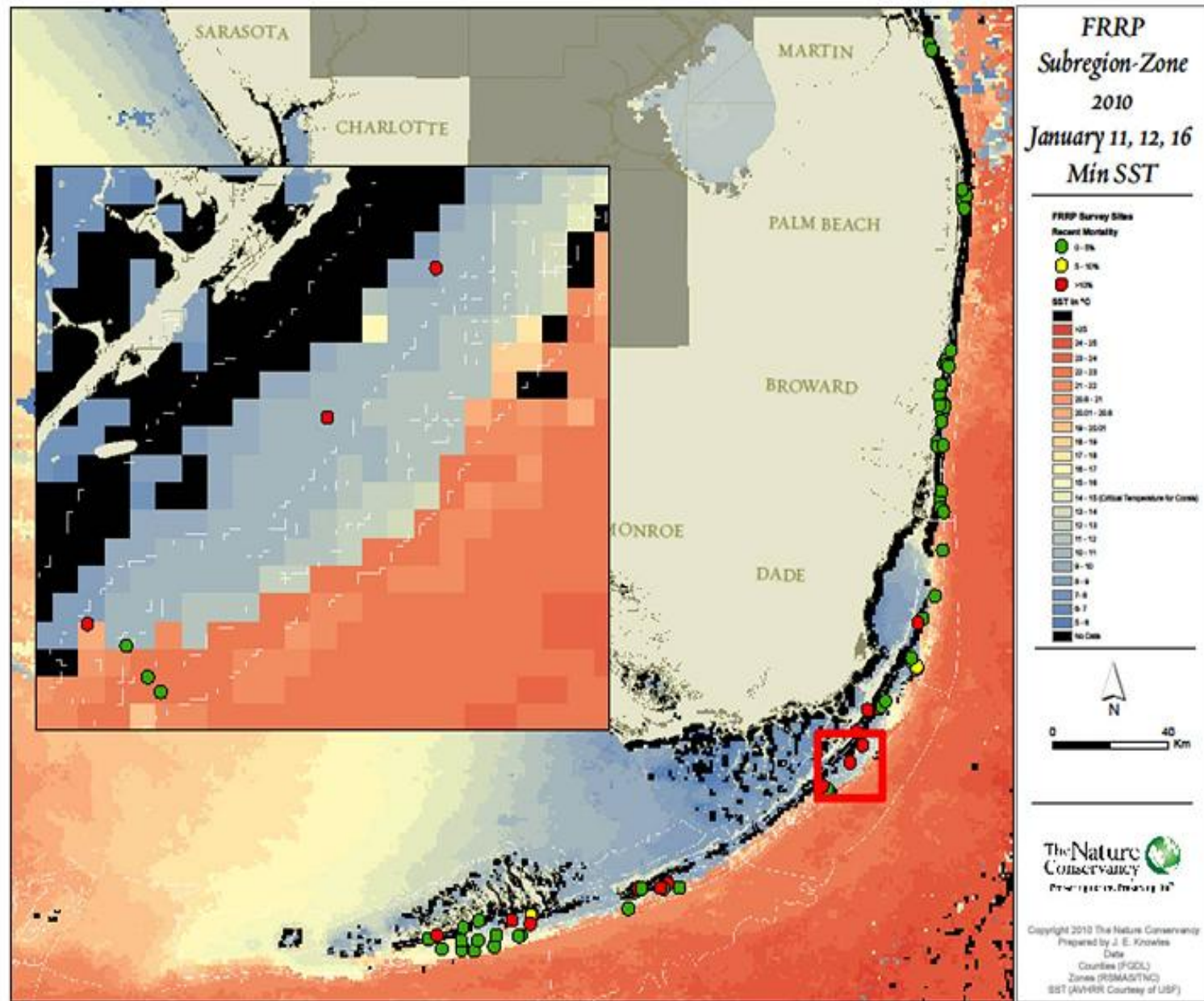
# DRM Survey Sites

From 2005-2014, **1935** surveys were completed

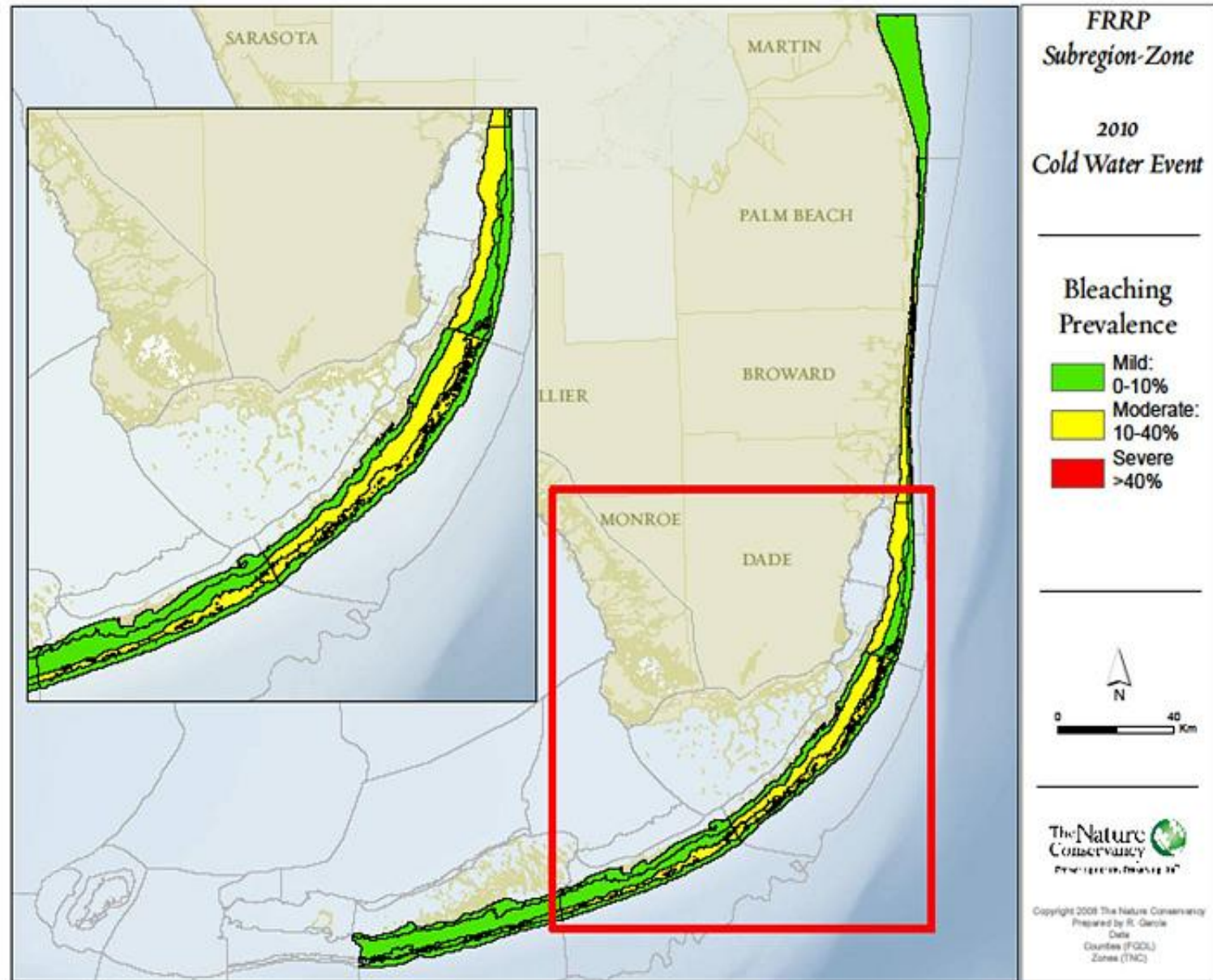




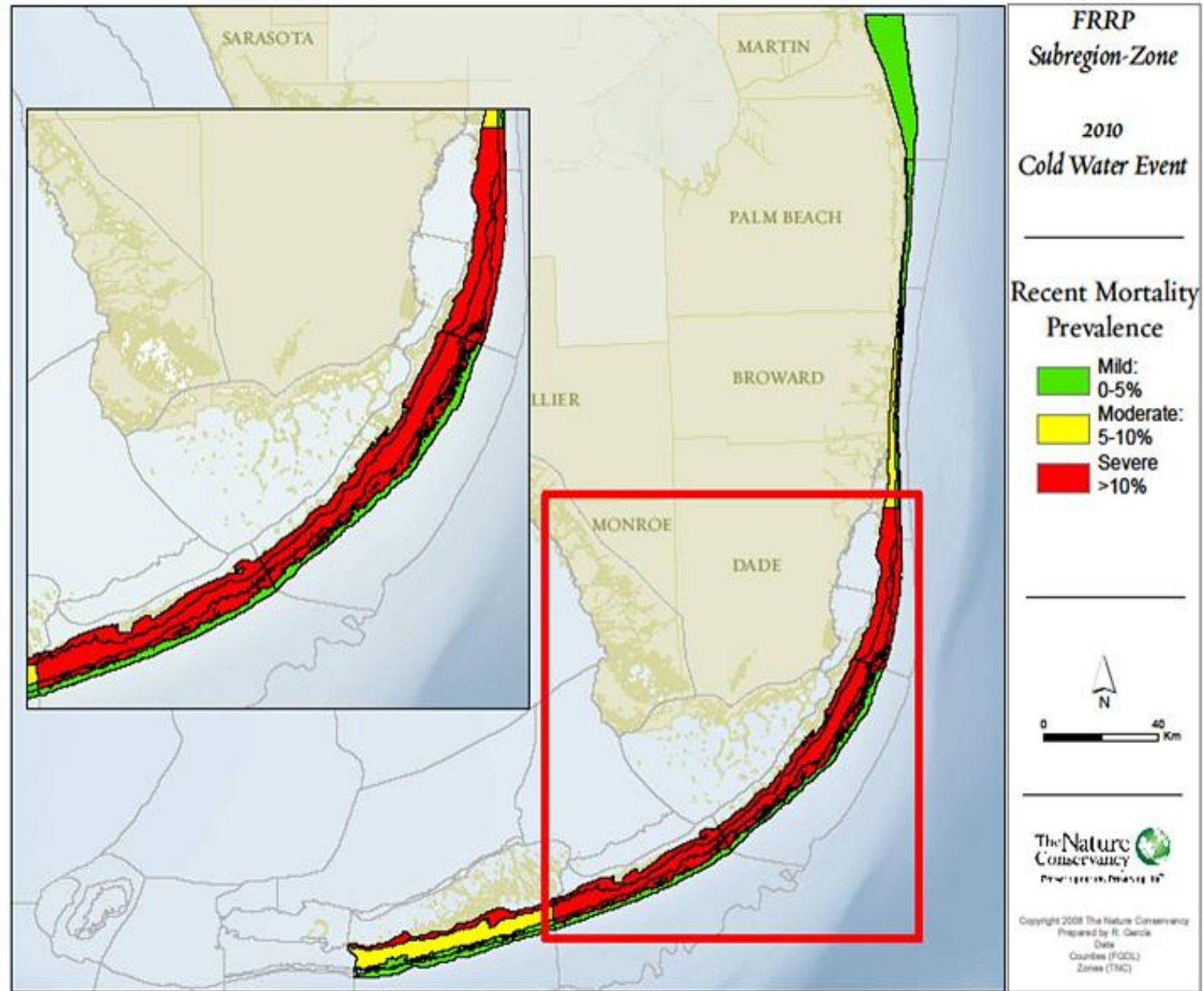
# 2010 Winter DRM Temperatures and Sites



# 2010 winter DRM bleaching prevalence map



# 2010 Winter DRM recent mortality prevalence map

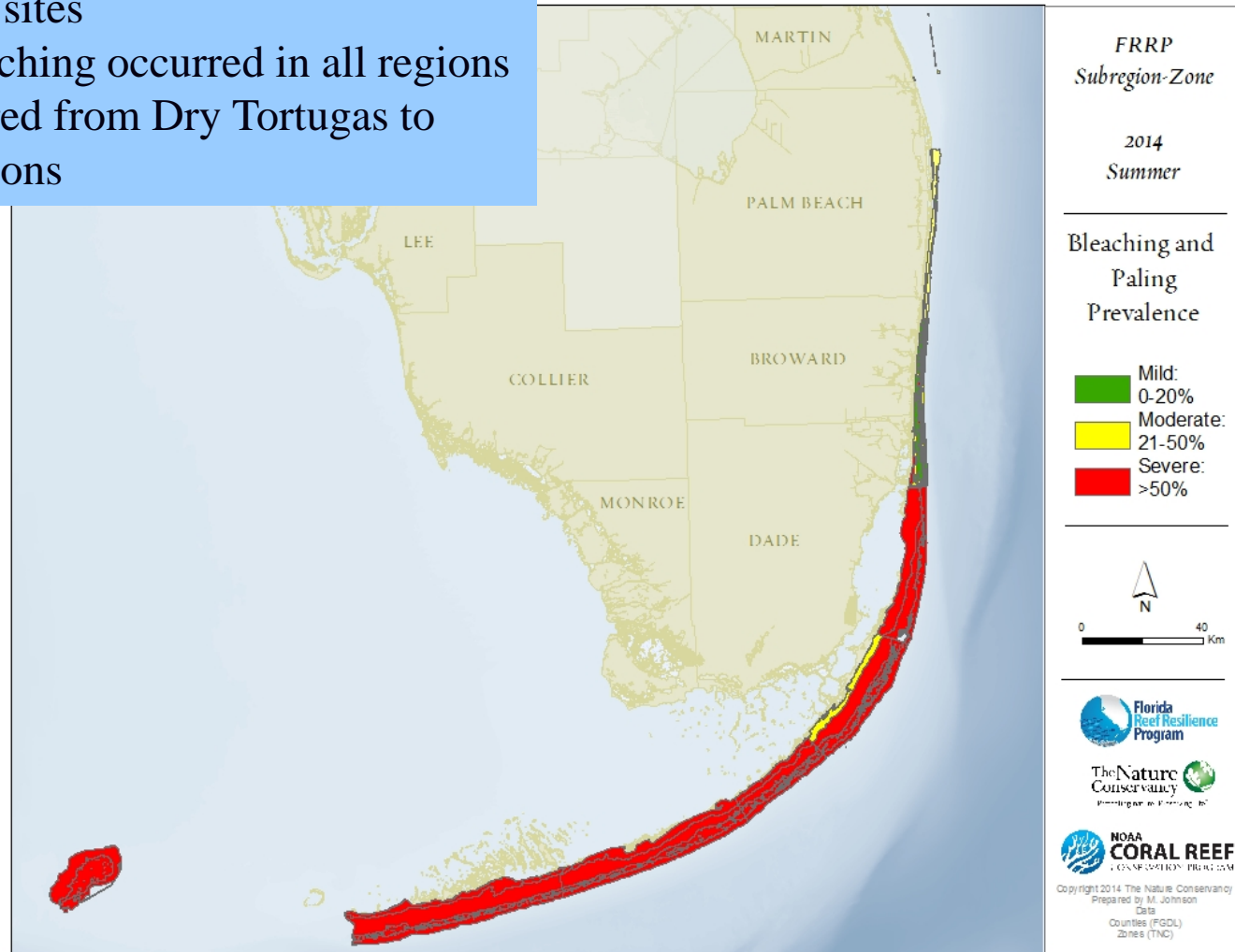




# 2014 Summer Bleaching Results

- For 2014, 172 surveyed sites
- Moderate to severe bleaching occurred in all regions
- Severe bleaching occurred from Dry Tortugas to Broward-Miami sub-regions

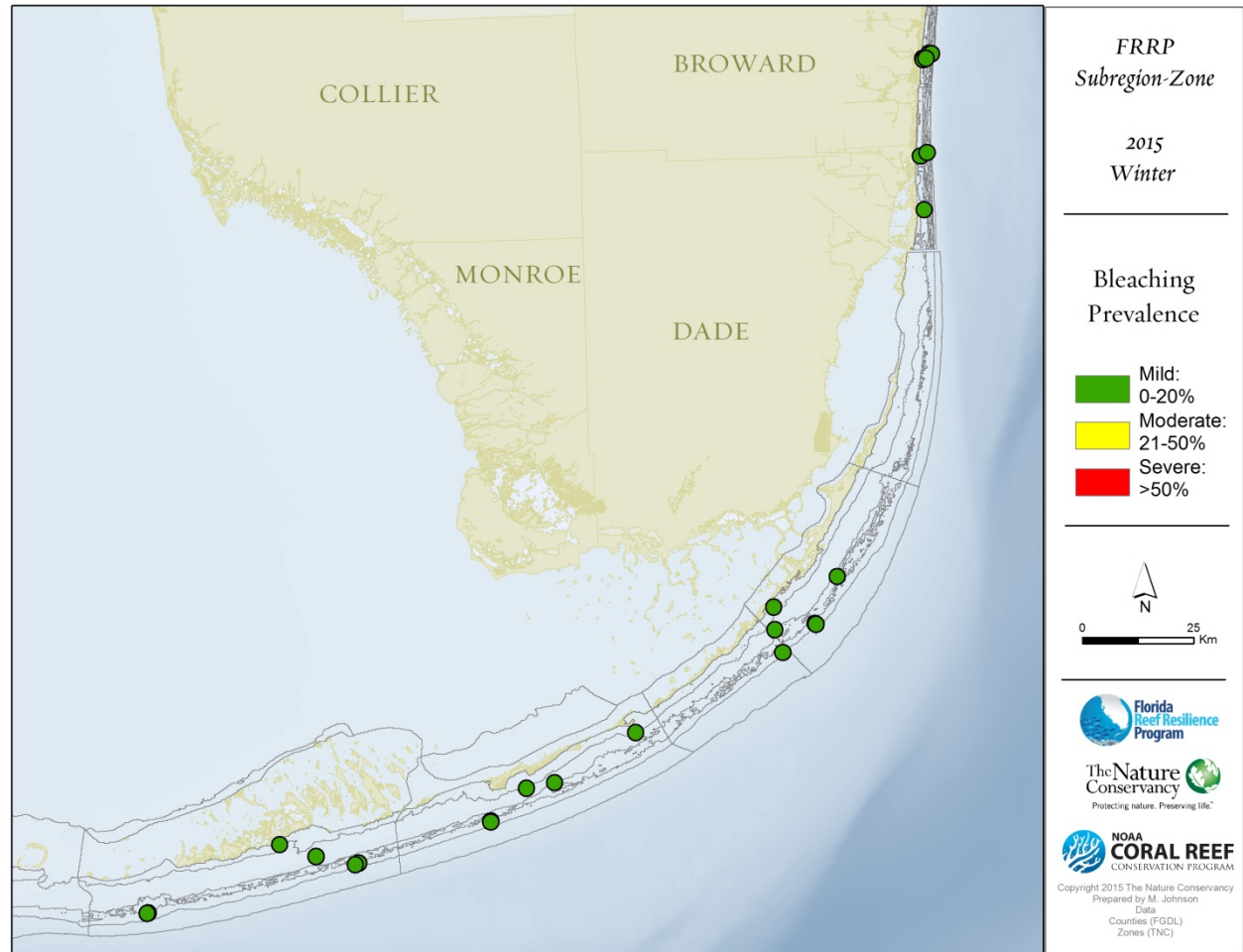
Each year, a Quick-Look Report is produced based on the survey results. This can be found online at [www.frrp.org](http://www.frrp.org).



Sub-Region	Zone	% Paling Prevalence	% Bleaching and Paling Prevalence	# of Sites
Dry Tortugas	Lagoon	19.55	70.20	11
Dry Tortugas	Forereef	20.41	55.38	17
Lower Keys	Inshore	33.52	77.18	3
Lower Keys	Mid-Channel	6.09	71.42	6
Lower Keys	Offshore Patch	15.86	80.22	9
Lower Keys	Forereef	18.98	79.83	24
Middle Keys	Inshore	32.65	52.42	2
Middle Keys	Mid-Channel	18.73	68.86	2
Middle Keys	Offshore Patch	24.73	77.66	5
Middle Keys	Forereef	29.79	59.06	8
Upper Keys	Inshore	16.67	50.00	2
Upper Keys	Mid-Channel	54.04	72.78	9
Upper Keys	Offshore Patch	12.66	90.37	2
Upper Keys	Forereef	17.18	77.98	11
Biscayne	Inshore	27.05	89.26	3
Biscayne	Mid-Channel	4.35	65.22	1
Biscayne	Forereef	10.75	61.38	15
Broward- Miami	Undetermined	11.54	42.31	1
Broward-Miami	Inshore	16.16	61.56	10
Broward-Miami	Deepwater	7.84	15.69	1
Broward-Miami	Inner Reef	18.95	54.41	8
Broward-Miami	Middle Reef	7.22	28.20	8
Broward-Miami	Outer Reef	13.75	29.90	5
Deerfield	Inshore	5.56	22.22	1
South Palm Beach	Inshore	9.38	25.00	2
South Palm Beach	Outer Reef	1.96	5.88	2
North Palm Beach	Inshore	28.57	28.57	2
Martin	Inshore	1.91	29.39	2

# 2015 Post-Event Surveys - Bleaching

- Surveys completed at 25 CREMP and SECREMP sites
- Surveys took place from January-February 2015
- Mild bleaching occurred at all sites.
- This data shows bleaching only, NO paling

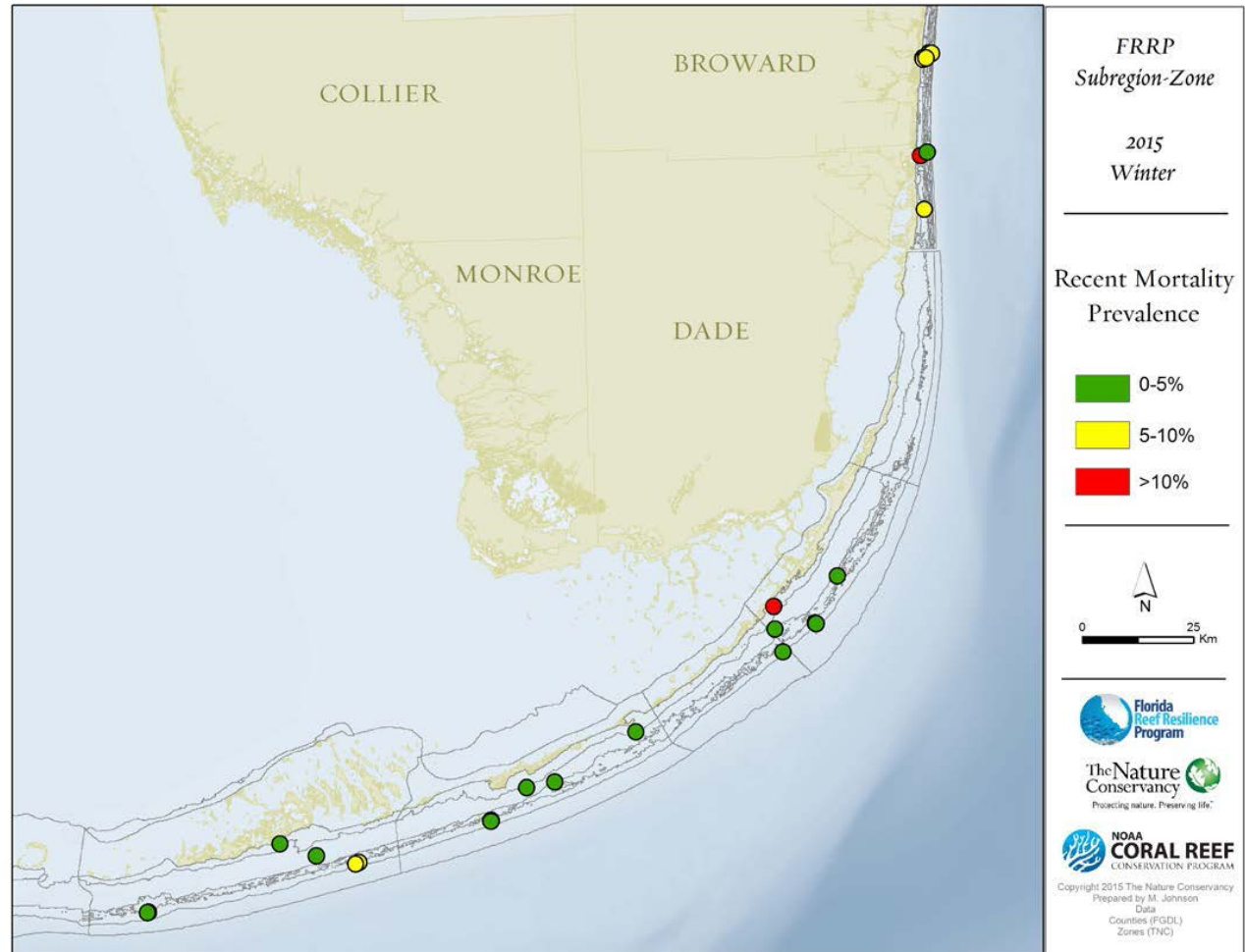




Site	Sub-Region	Zone	% Bleaching Prevalence	% Bleaching and Paling Prevalence
N1001	Lower Keys	Inshore	0.00	0.00
N1002	Lower Keys	Mid-Channel	0.86	11.11
N1003	Lower Keys	Forereef	6.09	20.87
N1004	Lower Keys	Forereef	8.38	22.16
N1005	Lower Keys	Forereef	1.82	1.82
N2003	Lower Keys	Forereef	0.00	0.00
N1006	Middle Keys	Mid-Channel	2.44	3.05
N1007	Middle Keys	Mid-Channel	1.21	5.46
N1008	Middle Keys	Offshore Patch	1.47	17.65
N1009	Middle Keys	Forereef	3.85	9.23
N1010	Middle Keys	Forereef	0.00	33.33
N1016	Mid-Upper Keys Transition	Forereef	4.83	26.21
N1011	Upper Keys	Inshore	1.55	33.33
N1012	Upper Keys	Mid-Channel	5.10	18.88
N1013	Upper Keys	Forereef	4.94	14.07
N1014	Upper Keys	Forereef	8.21	22.02
N1015	Upper Keys	Forereef	3.33	4.44
N2023	Broward-Miami	Inner Reef	3.20	5.60
N2028	Broward-Miami	Inshore	0.99	3.96
N2029	Broward-Miami	Undetermined	0.00	2.86
N2031	Broward-Miami	Inshore	0.00	5.88
N2032	Broward-Miami	Inshore	0.00	2.38
N2033	Broward-Miami	Middle Reef	0.00	11.11
N2034	Broward-Miami	Outer Reef	2.04	2.04
N2035	Broward-Miami	Inner Reef	1.09	5.98

# 2015 Post-Event Surveys - Mortality

- Moderate to severe recent mortality occurred in the Lower Keys, Upper Keys and Broward-Miami sites
- Severe recent mortality occurred **ONLY** in the inshore zones of both the Upper Keys and Broward-Miami sub-regions
- Disease occurrence was very low



Site	Sub-Region	Zone	% Recent Mortality Prevalence
N1001	Lower Keys	Inshore	0.00
N1002	Lower Keys	Mid-Channel	2.56
N1003	Lower Keys	Forereef	7.83
N1004	Lower Keys	Forereef	9.58
N1005	Lower Keys	Forereef	0.00
N2003	Lower Keys	Forereef	1.11
N1006	Middle Keys	Mid-Channel	0.00
N1007	Middle Keys	Mid-Channel	1.83
N1008	Middle Keys	Offshore Patch	3.33
N1009	Middle Keys	Forereef	5.88
N1010	Middle Keys	Forereef	3.08
N1016	Mid-Upper Keys Transition	Forereef	1.49
N1011	Upper Keys	Inshore	33.33
N1012	Upper Keys	Mid-Channel	2.07
N1013	Upper Keys	Forereef	3.10
N1014	Upper Keys	Forereef	5.10
N1015	Upper Keys	Forereef	5.32
N2023	Broward-Miami	Inner Reef	10.40
N2028	Broward-Miami	Inshore	13.86
N2029	Broward-Miami	Undetermined	2.86
N2031	Broward-Miami	Inshore	17.65
N2032	Broward-Miami	Inshore	5.56
N2033	Broward-Miami	Middle Reef	1.85
N2034	Broward-Miami	Outer Reef	8.16
N2035	Broward-Miami	Inner Reef	9.78



# Bleaching Response Plan

Chapter 1: Early Warning System

Chapter 2: Impact Assessment (DRM)

Chapter 3: Communications

Chapter 4: Management Actions



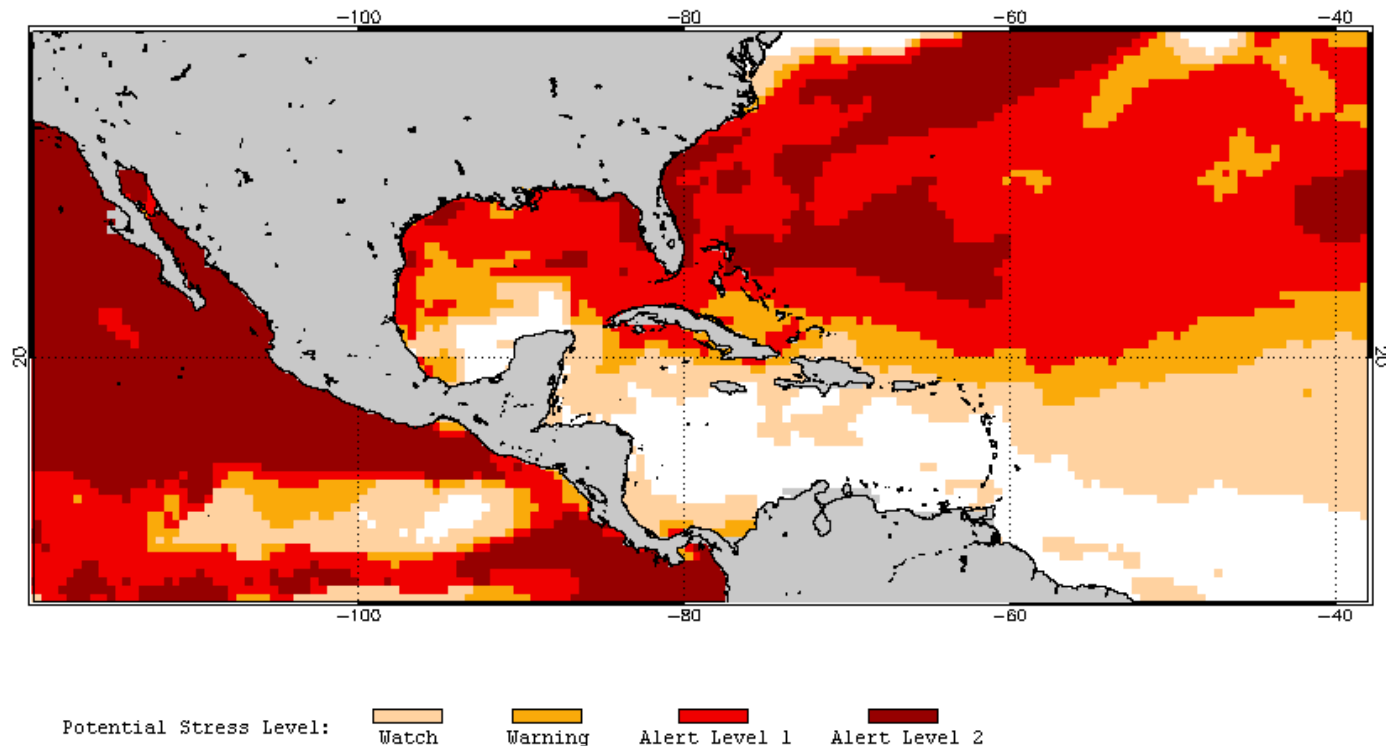
Photo by Mito Martin Laboratory

**Florida Reef Tract**  
Coral Bleaching Response Plan



# 2015 Summer Bleaching Outlook

2015 Jun 9 NOAA 60% Probability Coral Bleaching Thermal Stress for Jun–Sep 2015  
Experimental, v3.0, CFSv2–based, 28–member Ensemble Forecast



According to newly released NOAA Coral Reef Watch (CRW) experimental data, there is potential for coral bleaching throughout the FL Reef Tract in the coming months (June–September).

# Report Coral Bleaching at [www.mote.org/bleachwatch](http://www.mote.org/bleachwatch)

Mote Marine Laboratory / Florida Keys National Marine Sanctuary

## Coral Bleaching Early Warning Network

Current Conditions Report #20150602

Updated June 2, 2015



**Summary:** Based on climate predictions, current conditions, and field observations, the threat for mass coral bleaching within the FKNMS is currently **LOW**.

### NOAA Coral Reef Watch 60% Probability Coral Bleaching Thermal Stress Outlook June 2015-Sept. 2015 (experimental)

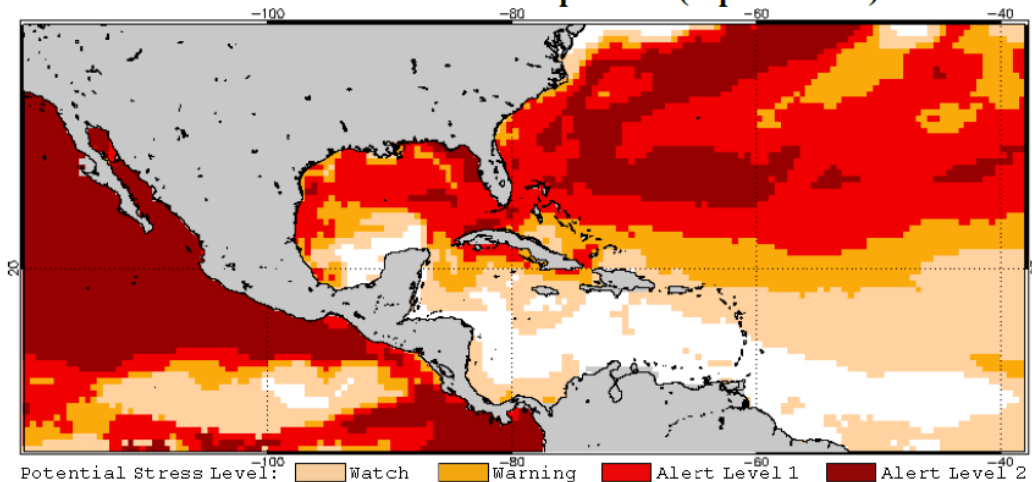


Figure 1. NOAA's Experimental Coral Bleaching Thermal Stress Outlook for June 2015– Sept. 2015

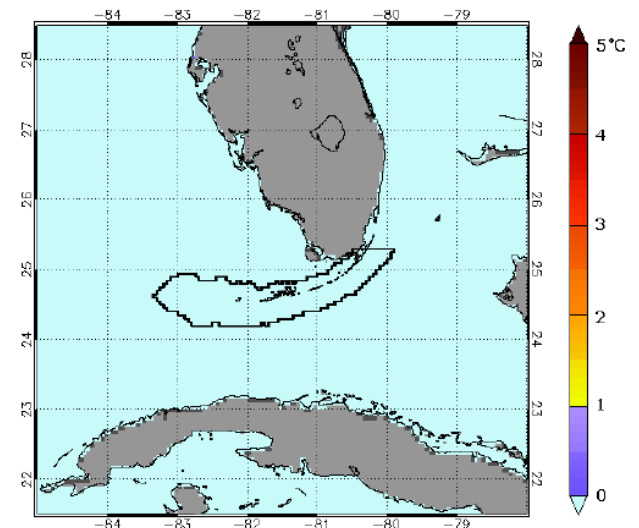


Figure 2. NOAA's Experimental 5km Coral Bleaching HotSpot Map for Florida May 31, 2015.

<http://coralreefwatch.noaa.gov/regions/florida.php>



# Next Steps

- 1) Revise Bleaching Response Plan to include CREMP/SECREMP post-bleaching surveys
- 2) Compare CREMP/SECREMP 2014 spring data to the DRM 2015 post-bleaching data to determine individual coral impacts
- 3) Prepare for 2015 DRM summer surveys and incorporate CREMP/SECREMP sites into survey site list

# Questions?

*[www.frrp.org](http://www.frrp.org)*

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