

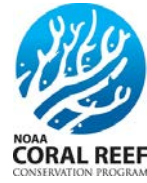
Florida Reef Resilience Program

Disturbance Response Monitoring



Quick Look Report:

Summer 2015



Introduction

The summer of 2015 was a moderate to severe bleaching year for Florida's coral reefs. Severe bleaching occurred in some areas of the Upper, Middle and Lower Keys, and Dry Tortugas sub-regions. High disease prevalence and recent mortality were recorded at sites throughout the Florida Reef Tract. Compared to the summer of 2014, bleaching, disease and recent mortality were lower, but still significant in certain sub-regions.

The Florida Reef Resilience Program (FRRP) is a collaborative effort among managers, scientists, conservation organizations and reef users, to develop resilience-based management strategies for coping with climate change and other stresses on Florida's coral reefs. With projected increases in coral bleaching due to climate change, the FRRP Disturbance Response Monitoring (DRM) was developed for monitoring shallow coral reefs from the Dry Tortugas to Martin County. The DRM consists of a probabilistic sampling design and a stony coral condition monitoring protocol implemented during the annual period of peak thermal stress. Each year, survey teams from federal, state, and local government agencies, universities and non-governmental organizations cooperate to complete surveys across the south Florida Reef Tract within a six to eight week period. In 2015, surveyors included: The Nature Conservancy, Mote Marine Laboratory, University of Miami, Nova Southeastern University, Miami-Dade County, Broward County, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, National Oceanic and Atmospheric Administration and National Park Service.

Methodology

The DRM consists of a probabilistic sampling design that focuses on sampling the coral population based on how corals are distributed spatially within and across different sub-regions and zones of the overall reef tract. For the 2015 DRM season, 322 potential sample sites were allocated across 28 discrete reef zones in 10 sub-regions. Twelve survey teams of scientific divers conducted the monitoring in 2015. In addition to these sites, surveys were completed at 25 fixed CREMP/SECREMP sites.

For random sites, two independent 1x10m belt transects were randomly placed within each 100x100m sampling site. At fixed sites, a 1x10m belt transect was completed at plots 1 and 2. Transect tapes were run from the offshore to inshore stake within each plot, and chain was laid beneath the tape. Surveyors then completed the 1x10m belt transect starting from the offshore stake, working inshore. At all sites, indicators were then recorded for all stony corals greater than 4cm including: 1) hard coral size and 2) hard coral condition as determined by the presence of bleaching and paling, the precursor to bleaching, presence of disease, and percent mortality.

Results

A total of 250 DRM surveys were completed from August 17th - October 16th, 2015. The prevalence of bleaching and paling in each zone was determined and broken into three categories: mild (0-20%), moderate (21-50%) and severe (>50%) (Figure 1; Table 1).

Severe bleaching and paling, which is defined as >50% of all hard corals over 4cm surveyed showing signs of bleaching or paling, occurred in the forereef and offshore zones of the Middle and Lower Keys, and in all zones of the Upper Keys and Dry Tortugas sub-regions. Moderate bleaching (21-50%) occurred in at least one zone within the Martin, South Palm Beach, Deerfield, Broward-Miami, Biscayne, Middle and Lower Keys sub-regions. Mild bleaching (0-20%) occurred in at least one zone in the Broward-Miami, South Palm Beach and Martin sub-regions. Current Conditions reports for the Florida Keys and southeast Florida, between Miami-Dade and Martin County, reported “High” threats of mass bleaching from mid-August through late September and DRM monitoring results suggest that this threat level was warranted.

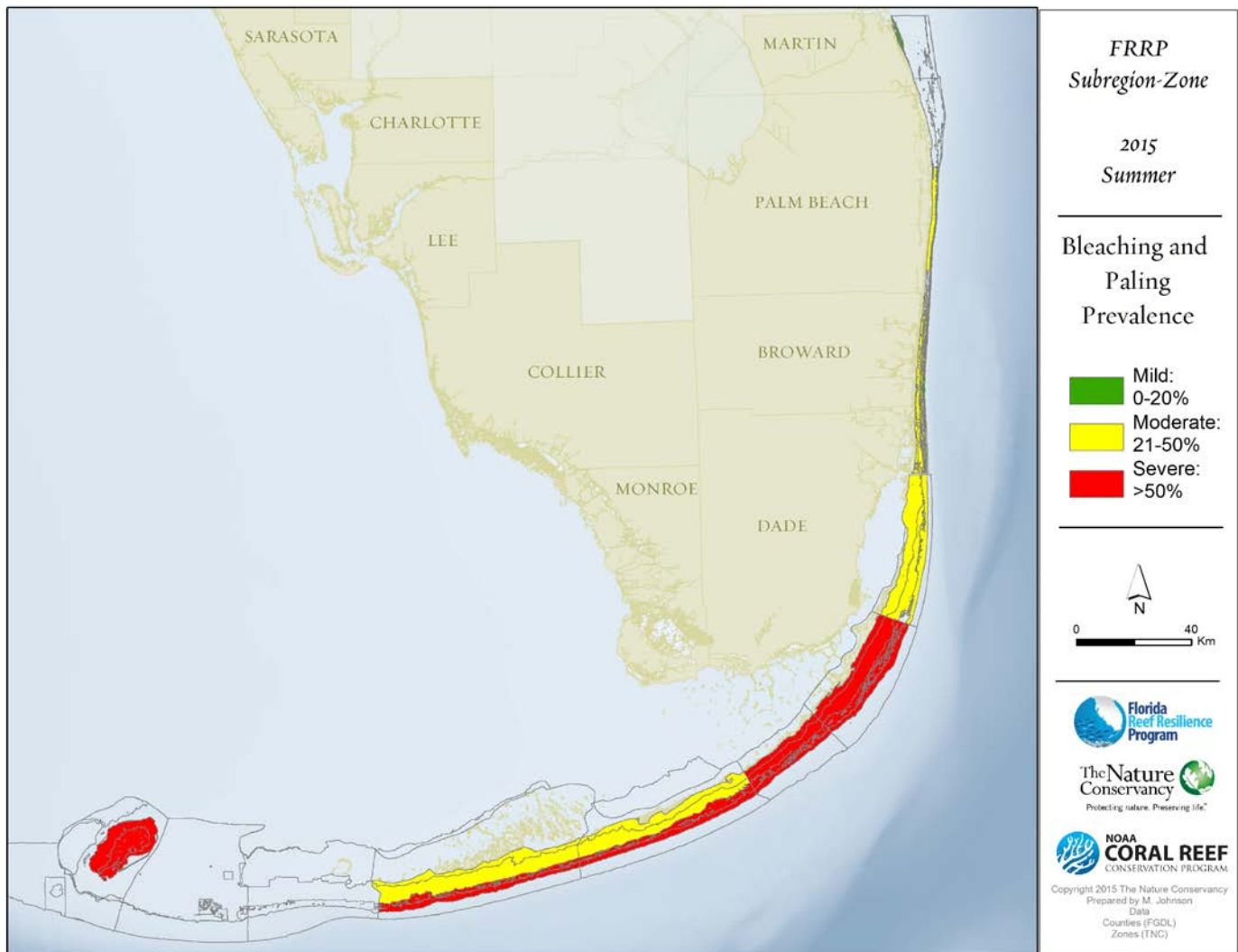


Figure 1: Percent bleaching and paling prevalence of surveyed hard coral colonies.

Table 1: Bleaching and paling prevalence of hard coral colonies surveyed by sub-region and zone. Red indicates severe (>50%), yellow indicates moderate (21-50%) and green indicates mild (0-20%) bleaching and paling prevalence.

Sub-Region	Zone	% Paling Prevalence	% Bleaching and Paling	# of Sites
Dry Tortugas	Lagoon	17.26	68.93	6
Dry Tortugas	Forereef	17.37	68.95	14
Lower Keys	Inshore	25.96	39.60	10
Lower Keys	Mid-Channel	27.09	46.57	10
Lower Keys	Offshore Patch	27.66	68.85	7
Lower Keys	Forereef	25.39	72.98	35
Middle Keys	Inshore	15.00	30.00	2
Middle Keys	Mid-Channel	29.95	42.05	4
Middle Keys	Offshore Patch	37.69	79.51	4
Middle Keys	Forereef	24.96	80.20	12
Upper Keys	Inshore	64.29	75.00	3
Upper Keys	Mid-Channel	30.53	61.30	4
Upper Keys	Offshore Patch	21.53	58.59	5
Upper Keys	Forereef	22.48	59.62	12
Biscayne	Inshore	7.42	42.69	3
Biscayne	Mid-Channel	16.55	49.89	4
Biscayne	Forereef	10.32	36.64	21
Broward- Miami	Undetermined	8.90	32.80	5
Broward-Miami	Inshore	19.59	48.23	27
Broward-Miami	Inner Reef	13.63	38.50	17
Broward-Miami	Middle Reef	10.41	24.43	15
Broward-Miami	Outer Reef	6.45	19.60	8
Deerfield	Inshore	35.38	39.56	3
Deerfield	Middle Reef	12.94	26.06	5
Deerfield	Outer Reef	14.29	33.33	1
South Palm Beach	Inshore	0	8.33	1
South Palm Beach	Outer Reef	6.24	9.04	4
Martin	Inshore	0.64	9.51	6

The disease prevalence at each site was determined and broken into three categories: (0-5%), (5-10%) and (>10%) (Figure 2). High disease prevalence (>10%) occurred at sites within the Broward-Miami, Biscayne, Upper and Lower Keys sub-regions (Table 2). Fifty percent of the high disease prevalence (>10%) sites are within the Broward-Miami sub-region (Table 2).

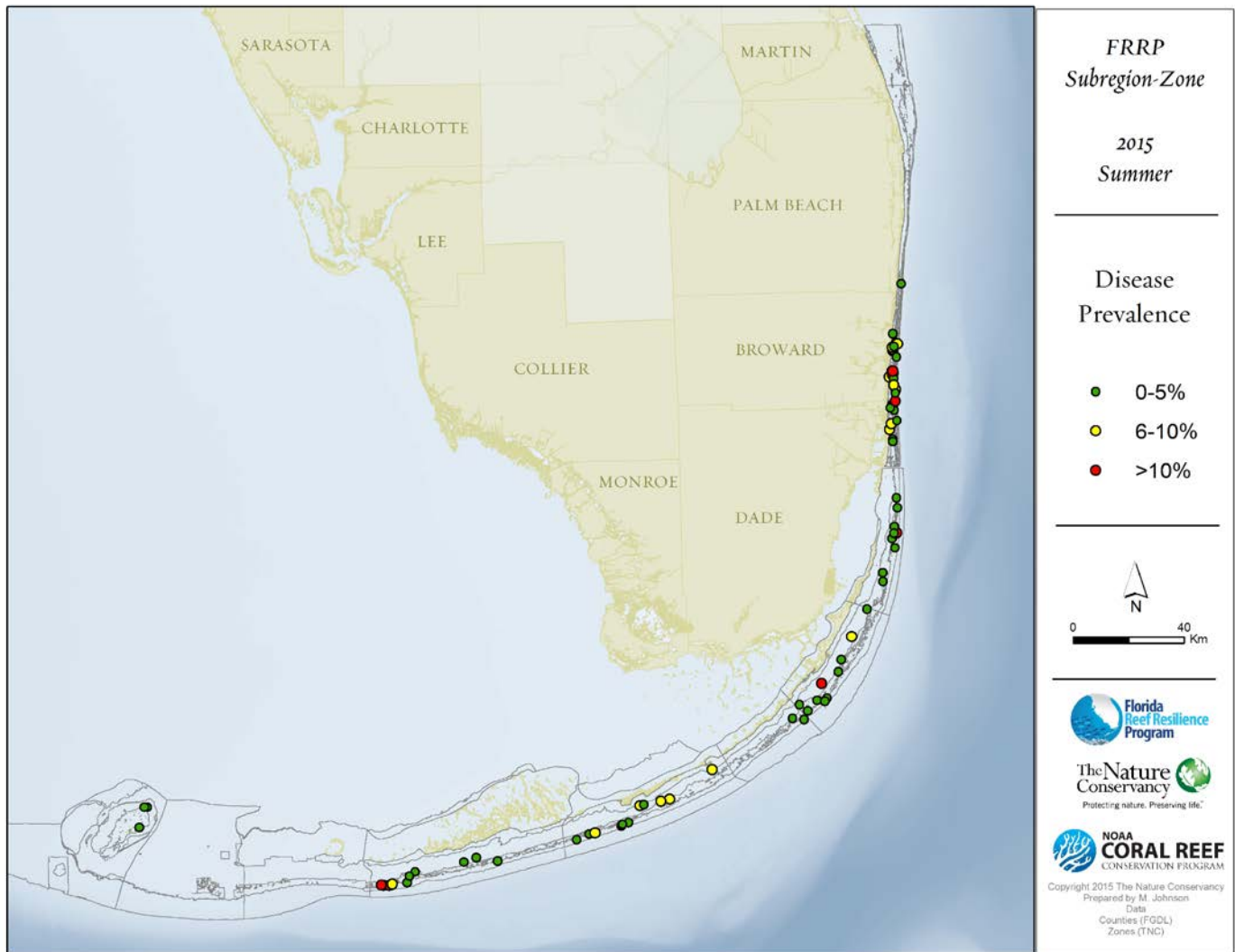


Figure 2: Percent disease prevalence of surveyed hard coral colonies.

Table 2: High disease prevalence (>10%) of hard coral colonies surveyed by site.

Site	Sub-Region	Zone	% Disease Prevalence
3101	Broward-Miami	Inner Reef	10.26
1133	Biscayne	Forereef	10.42
1085	Broward-Miami	Inner Reef	11.11
1079	Broward-Miami	Inner Reef	12.50
3139	Broward-Miami	Undetermined	17.24
1165	Upper Keys	Mid-Channel	17.95
3075	Lower Keys	Forereef	22.22
1285	Lower Keys	Forereef	22.41

The prevalence of recent mortality at each site was determined and broken into three categories: (0-5%), (5-10%) and (>10%) (Figure 3). High recent mortality prevalence (>10%) occurred at sites within the South Palm Beach, Deerfield, Broward-Miami, Biscayne, Upper and Middle Keys, and Dry Tortugas sub-regions (Table 3). Sixty-five percent of those high recent mortality prevalence (>10%) sites are within the Broward-Miami sub-region (Table 3).

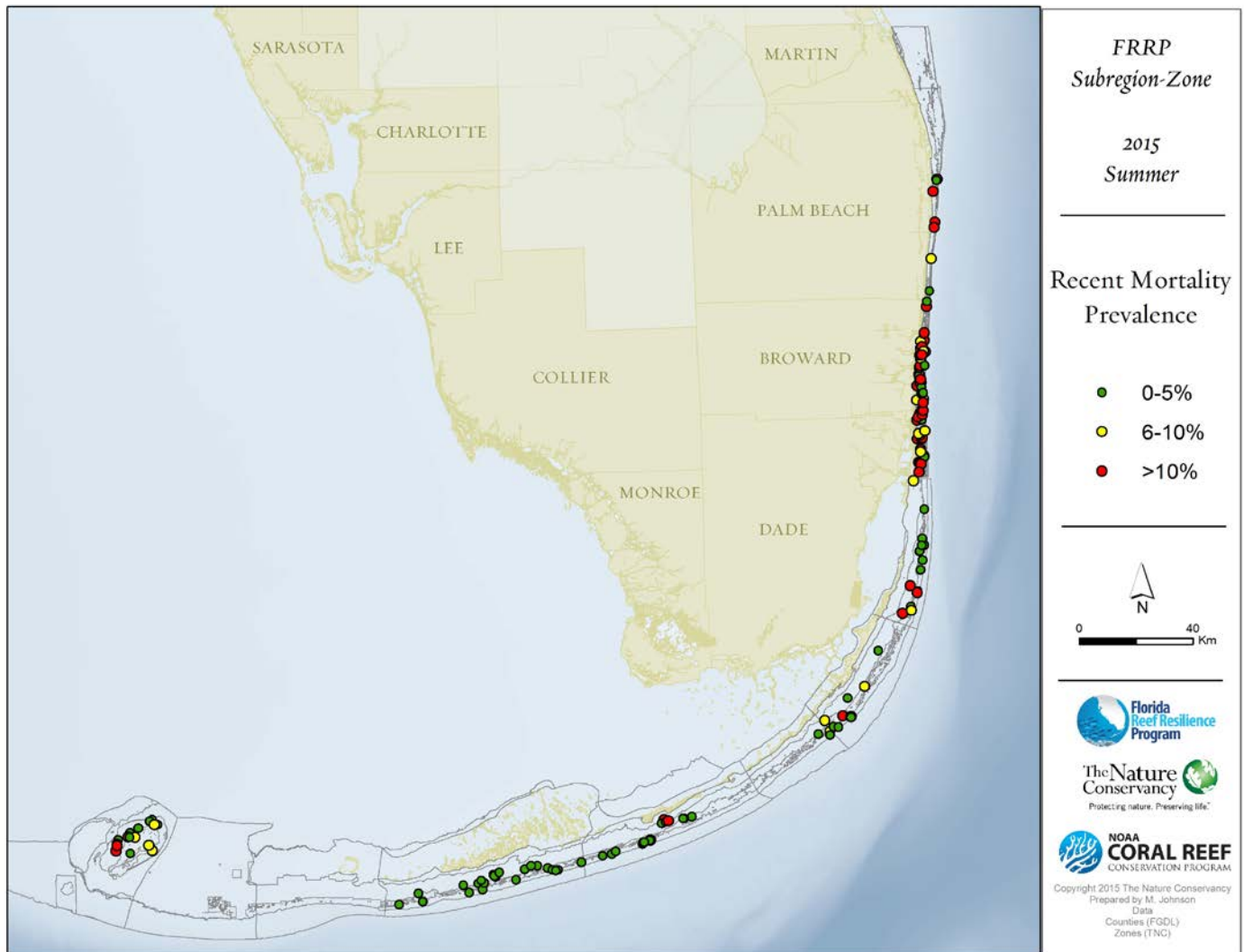


Figure 3: Percent recent mortality prevalence of surveyed hard coral colonies.

Table 3: Recent mortality prevalence (>10%) of hard coral colonies surveyed by site.

Site	Sub-region	Zone	% Recent Mortality Prevalence
1169	Upper Keys	Offshore Patch	10.23
3108	Broward-Miami	Inshore	10.42
1105	Broward-Miami	Middle Reef	10.53
2042	Broward-Miami	Inner Reef	10.53
3102	Broward-Miami	Inshore	10.53
1057	Broward-Miami	Inshore	10.81
3103	South Palm Beach	Inshore	11.11
3106	Broward-Miami	Outer Reef	11.11
2061	Broward-Miami	Middle Reef	11.54
3099	Middle Keys	Mid Channel	11.70
1088	Broward-Miami	Inner Reef	12.28
3137	Biscayne	Mid Channel	12.38
1079	Broward-Miami	Inner Reef	12.50
1151	Biscayne	Forereef	12.90
1072	Broward-Miami	Inshore	13.04
3139	Broward-Miami	Undetermined	13.79
1219	Middle Keys	Inshore	14.29
2025	Broward-Miami	Inshore	14.29
1085	Broward-Miami	Inner Reef	14.81
3140	Broward-Miami	Outer Reef	15.00
3116	Broward-Miami	Inner Reef	15.07
1080	Broward-Miami	Inner Reef	15.38
3101	Broward-Miami	Inner Reef	15.38
3109	Broward-Miami	Undetermined	15.38
3040	Broward-Miami	Inshore	16.00
1061	Broward-Miami	Inshore	16.67
1130	Biscayne	Forereef	16.95
1302	Tortugas--Dry	Forereef	17.46
1042	Broward-Miami	Inshore	17.65
1015	South Palm Beach	Undetermined	18.18
1090	Broward-Miami	Undetermined	18.18
1313	Tortugas--Dry	Forereef	19.51
1101	Broward-Miami	Middle Reef	21.43
1017	South Palm Beach	Outer Reef	22.22
3043	Broward-Miami	Inshore	22.22
1026	Deerfield	Middle Reef	24.00
1016	South Palm Beach	Undetermined	25.00
1100	Broward-Miami	Middle Reef	25.00
2267	Tortugas--Dry	Forereef	25.93
2023	Broward-Miami	Inshore	26.67

Comparing the 2014 and 2015 datasets, the % bleaching, bleaching and paling, recent mortality and disease prevalence for the entire Florida Reef Tract were all lower in 2015 (Table 4). Compared to 2013, both 2014 and 2015 were significantly higher bleaching years.

Table 4: Percent paling, bleaching, combined bleaching and paling, recent mortality and disease prevalence for the Florida Reef Tract in 2013, 2014 and 2015.

Year	% Paling Prevalence	% Bleaching Prevalence	% Bleaching and Paling Prevalence	% Recent Mortality Prevalence	% Disease Prevalence
2013	6.43	1.47	7.90	1.03	1.35
2014	18.19	51.78	69.97	3.19	1.42
2015	23.34	28.41	51.75	2.64	1.35

For more information about the Florida Reef Resilience Program and its Disturbance Response Monitoring effort see the website www.frrp.org. For more information about the 2015 Disturbance Response Monitoring results contact The Nature Conservancy at (305) 872- 7071 or email Meaghan Johnson, Marine Science Coordinator, at meaghan_johnson@tnc.org.