

Summary of 2016-2020 Disturbance Response Monitoring Efforts in the Florida Reef Tract



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Introduction

The Disturbance Response Monitoring (DRM) program was developed and first implemented in 2005 to monitor shallow coral reefs from Martin County to the Dry Tortugas. The Disturbance Response Monitoring consists of a probabilistic sampling design and a stony coral condition monitoring protocol during the annual period of peak thermal stress. From 2005 through 2018, The Nature Conservancy coordinated survey teams from federal, state, and local government agencies, nonprofit organizations, and universities to complete surveys across the Florida Reef Tract within a six to eight-week period of peak heat stress each year, before passing operational management to the Fish and Wildlife Research Institute (FWRI). Information is gathered on the coral population's size frequency, size structure, bleaching prevalence, and coral condition, including disease and percent mortality.

The goals of the impact assessment are to determine the extent, severity, and impacts of individual disturbance events, such as coral bleaching, to support communication and management efforts during these events. The impact assessment also aims to collect information that will help identify trends in coral bleaching patterns, and support understanding of management for long-term ecosystem resilience. In order to meet these goals, the monitoring is structured to answer management questions about the impacts of coral bleaching events across varying temporal and spatial scales.

The Disturbance Response Monitoring program surveys coral populations using a probabilistic sampling design based on how corals are distributed spatially within and across different subregions and zones of Florida's coral reef. New sites are selected randomly each year. Sites were defined by 100m by 100m grid cells until 2020 when the grid cell size was modified to 50m by 50m in an effort to use more accurate benthic mapping data to avoid mis-identified sites (i.e. reduce the number of sites classified as coral habitat that are actually seagrass or sand). The sites also now match those selected for the National Coral Reef Monitoring Program to more closely align the two programs.

Although additions have been made to the methodology over the years to better characterize other impacts, namely stony coral tissue loss disease (SCTLD), the basic methods have remained the same. At each site, two independent 1x10m belt transects are randomly placed within each sampling site. In some years, fixed sites were also completed using existing Coral Reef Evaluation and Monitoring (CREMP) and Southeast Florida Coral Reef Evaluation and Monitoring Program (SECREMP) sites. At the fixed sites, a 1x10m belt transect was completed at CREMP/SECREMP plots 1 and 2. Transect tapes were run from the offshore to inshore stake within each plot. Surveyors then completed the 1x10m belt transect starting from the offshore stake, working inshore. At all sites (randomly-selected and fixed), indicators are recorded for all stony corals greater than 4cm, including: 1) coral size (maximum width and height) and 2) coral condition as determined by the presence of bleaching and paling (a precursor to bleaching),

presence of disease, and percent mortality. Any additional changes to the survey methodology are discussed by year of implementation below.

A training workshop is held each year to ensure consistency across surveyors. At least one team lead from each survey team and all new surveyors participate in one of the annual Florida Reef Resilience Program Disturbance Response Monitoring training workshops. Surveyors that have participated in previous years can complete these trainings online, except when methods change substantially. The team lead must also participate in an in-water consistency training offered after each new surveyor training during the training workshops. Subsequently, each team lead conducts a consistency training with their team.

Major Modifications

Over the course of this project, changes were made to the program to adapt to unanticipated threats to the reef. These are noted here and more detail is included in the report for each year.

2017 – Added roving diver surveys

2018 – Added collection of tissue loss disease patterns (% recent mortality caused by disease, fast or slow progression, pattern on coral, disease condition (if known)); Operational management of Disturbance Response Monitoring was transferred from The Nature Conservancy to the Fish and Wildlife Research Institute

2019 – Added stony coral tissue loss disease (SCTLD) as option for disease condition (previously listed as unknown, ‘UNK’)

2020 – Roving diver surveys were replaced by two additional transects focusing on Stony Coral Tissue Loss Disease-susceptible species; juveniles from three families/subfamilies were tracked on all 4 transects; this decision was made in consultation with the Florida Reef Resilience Program Benthic Working Group

Year 1 (2016)

Training

Two training sessions were held to accommodate surveyors located both in the Keys (Mote) and in Southeast Florida (Nova), and a total of 25 people attended the two trainings.

The training consisted of the following modules:

1. Introduction to Florida Reef Resilience Program
2. Disturbance Response Monitoring Sampling Design
3. Disturbance Response Monitoring Methodology
4. Coral Identification
5. Estimating Coral Bleaching

Bleaching Outlook

Current Conditions reports for southeast Florida, between Miami-Dade and Martin County, reported “Moderate” threats of mass bleaching through the month of August but then decreased to a “Low” level threat in September. Current Conditions reports for the Florida Keys reported “Moderate” threats of mass bleaching in mid-July but the threat level decreased to “Low” in August.

Results

The summer of 2016 was a mild to moderate bleaching year for Florida’s coral reefs. Moderate bleaching occurred in some areas of the South Palm County, Broward-Miami, Upper Keys, Lower Keys and Dry Tortugas sub-regions while severe bleaching only occurred in the Upper Keys. Compared to the summer of 2014, which was the worst bleaching year since the Disturbance Response Monitoring surveys began in 2005, and the summer of 2015, bleaching was substantially lower in 2016. Despite less prevalence of bleaching, however, high disease prevalence and recent mortality were recorded at numerous sites throughout the Florida Reef Tract.

For more details on the methodology and results, see the 2016 Quick Look Report at <https://ocean.floridamarine.org/FRRP/TrainingDocs/2016%20Summer%20DRM%20Quick%20Look%20Report.pdf>.

Year 2 (2017)

Training

In 2017, three trainings were held to accommodate surveyors in the Keys, Southeast Florida and the Dry Tortugas. A total of 35 surveyors attended in-person trainings.

Mote Marine Lab – July 17 – 3 new surveyors, 3 returning surveyors, and 7 team leaders
Nova Southeastern University – August 4 – 9 new surveyors, 6 returning surveyors, and 6 team leaders
Dry Tortugas National Park – August 29 – 1 team leader

The training consisted of the following modules:

1. Introduction to Florida Reef Resilience Program
2. Disturbance Response Monitoring Sampling Design
3. Disturbance Response Monitoring Methodology
4. Coral Identification
5. Estimating Coral Bleaching
6. Coral Disease Identification and Nomenclature (New due to increased prevalence of disease across the reef tract; presented by Greta Aeby)

Bleaching Outlook

In late July, the National Oceanic and Atmospheric Administration Coral Reef Watch Bleaching Alert System reported both the southeast Florida mainland reefs and the Florida Keys under a low-level bleaching ‘*watch*’. Southeast Florida reefs were upgraded to a coral bleaching ‘*warning*’ in early September while the Florida Keys were upgraded to an Alert Level 1. When Hurricane Irma made landfall in the Florida Keys on September 10th both sections of the reef tract were reduced back down to a low-level ‘*watch*’ only days after the storm.

Results

Hurricane Irma hit in September and surveys were conducted both in the traditional format and during a research cruise aimed at understanding the impacts of Irma. Overall, it was a mild to moderate bleaching year, with severe bleaching observed at 6 of the 75 sites, concentrated in the Broward-Miami subregion. Moderate bleaching was observed in the same subregion and also in some zones in the Lower Keys. Hurricane impacts were most pronounced in the Lower Keys where the eye of the storm passed through. Full results related to bleaching, disease and the hurricane are summarized in detail in the Quick Look report.

For more details on the methodology and results, see the 2017 Quick Look Report at <https://ocean.floridamarine.org/FRRP/TrainingDocs/2017%20Summer%20DRM%20Quick%20Look%20Report.pdf>.

Year 3 (2018)

Training

Due to the modifications to the Disturbance Response Monitoring methodology implemented in 2018, partner organizations were encouraged to have all surveyors within their organization attend the in-person trainings. Two full day trainings were performed at two locations (NOVA Southeastern University and Mote Marine Laboratory) on July 31st and August 3rd. The training modules were revised to include the modifications to the Disturbance Response Monitoring methodologies and expanded to contain more images and information related to the ongoing coral disease outbreak along the Florida Reef Tract. In addition to the training modules used during the Disturbance Response Monitoring trainings, a coral disease review and training was added so that surveyors could recognize the lesions associated with the current disease outbreak in Florida, and how to record the signs of the disease using the new disease descriptors. The additional coral disease review also offered an opportunity for new surveyors to ask questions specific to the coral disease outbreak and allowed other surveyors to share information and knowledge about what they have learned and observed in the field.

Thirty-four surveyors from nine different organizations attended the Disturbance Response Monitoring training at NOVA Southeastern University and 24 surveyors from seven different

organizations attended the training at Mote Marine Lab. Following the morning classroom session at the NOVA Southeastern University Disturbance Response Monitoring training, six team leaders participated in the in-water consistency dive that was performed. Due to adverse weather conditions no in-water consistency dive was performed during the MOTE training.

The training consisted of the following modules:

Lesson 1. Introduction to Florida Reef Resilience Program and Disturbance Response Monitoring

Lesson 2. Disturbance Response Monitoring Sampling Design

Lesson 3. Disturbance Response Monitoring In-Water Methodology

Lesson 4. Coral Demographic Data

Lesson 5. Coral Bleaching and Coral Disease Data

Lesson 6. Disturbance Response Monitoring Website and Data Entry System

Lesson 7. Coral Identification Review

Lesson 8. Coral Disease Review

Bleaching Outlook

In late June and early July of 2018, the National Oceanic and Atmospheric Administration Coral Reef Watch Bleaching Alert System reported both the southeast Florida mainland reefs and the Florida Keys reefs under a low-level bleaching ‘*watch*’. By late July, temperatures began to quickly increase, and Southeast Florida reefs were upgraded to a coral bleaching ‘*warning*’ and the Florida Keys were upgraded to an Alert Level 1. However, in August frequent storms throughout the month reduced the sea surface temperatures in both southeast Florida and the Florida Keys and subsequently returned the region to a ‘*watch*’ level although Alert Level 1-temperatures remained in some portions of the upper Keys. Both regions were downgraded to low heading into the first week of October.

Results

Results from the 2018 surveys showed a mild to moderate bleaching year for Florida’s coral reefs. Moderate bleaching occurred in the outer reefs of the Upper Keys and in the southern reefs of Palm Beach County. A high prevalence of coral diseases was recorded in the Upper Key Mid Channel reefs and a medium disease prevalence was observed throughout the Middle Keys zones, similar to the conditions recorded in 2017.

For more details on the methodology and results, see the full QuickLook Report at:

<https://ocean.floridamarine.org/FRRP/TrainingDocs/2018%20DRM%20Summer%20Quick%20Look%20Report.pdf>.

Year 4 (2019)

Training

Trainings were offered at Nova and Mote to accommodate surveyors in both the Keys and Southeast Florida, and a total of 42 surveyors completed in-person training.

Nova Southeastern University – July 29 – 22 surveyors

Mote Marine Lab – July 31 – 20 surveyors

Training modules included:

- Introduction to Florida Reef Resilience Program and Disturbance Response Monitoring
- Disturbance Response Monitoring Sampling Design
- Disturbance Response Monitoring In-Water Methodology
- Coral Demographic Data
- Coral Condition Data
- Disturbance Response Monitoring Website Navigation and Data Entry Portal Training
- Coral Identification Refresher
- Coral Data Collection Practice Session

Bleaching/Disease Outlook

In July of 2019, the National Oceanic and Atmospheric Administration Coral Reef Watch Bleaching Alert System reported a bleaching ‘*Watch*’ for Southeast Florida mainland reefs and a ‘*Warning*’ for Florida Keys reefs, due to rapidly increasing sea surface temperatures. While temperatures in Southeast Florida had increased enough to put the area under a bleaching ‘*Warning*’ by mid-August, those temperatures leveled out and decreased by the end of September. In contrast, temperatures in the Florida Keys experienced a sharp increase through the month of August, putting the region under a bleaching ‘*Alert Level I*’ and eventually ‘*Alert Level II*’ by the end of the month.

Prior to the start of the 2019 Disturbance Response Monitoring survey season, stony coral tissue loss disease had been reported spreading west in the Lower Keys (Florida Fish and Wildlife Conservation Commission & Florida Keys National Marine Sanctuary divers, pers. comm.), but there were no reports of it in the Marquesas. However, this may have been due to underreporting because of the difficulty in accessing that region, and only a few reconnaissance surveys had been completed there. To determine the potential spread of stony coral tissue loss disease into the Marquesas, the Disturbance Response Monitoring program organized a research cruise targeting areas of known hardbottom and reef habitat. The 2019 Disturbance Response Monitoring season marked the first year that the Marquesas subregion had been included in the effort since 2007, when only six sites were surveyed.

Results

Overall, the results indicate that 2019 was a mild bleaching year. Compared with 2018, bleaching prevalence was lower in 2019 but when you add in paling, the numbers are very similar. Disease prevalence was also low in 2019; overall prevalence values of stony coral tissue loss disease was less than 3% in every subregion-zone. Results also indicate that the leading edge of the disease is advancing towards the Marquesas subregion.

For more details on the methodology and results, see the full QuickLook Report at: <https://ocean.floridamarine.org/FRRP/TrainingDocs/2019%20Summer%20DRM%20Quick%20Look%20Report.pdf>.

Year 5 (2020)

Training

Due to Covid-19 restrictions, three trainings were held virtually on July 9, July 27 and August 4, and a total of 80 surveyors attended the sessions.

The modules offered included:

Lesson 1: Introduction to Florida Reef Resilience Program and Disturbance Response Monitoring

Lesson 2: Disturbance Response Monitoring Sampling Design

Lesson 3: Disturbance Response Monitoring In-Water Methodology

Lesson 4: Coral Demographics

Lesson 5: Coral Condition

Lesson 6: Disturbance Response Monitoring Website and Data Entry System

Lesson 7: Coral Species

Lesson 8: Juvenile Coral Identification

Lesson 9: Practice Session

Summary of Transition of Disturbance Response Monitoring Coordination

In 2017, The Nature Conservancy began discussing with the Fish and Wildlife Research Institute Coral Program the possibility of transferring the operational management of Disturbance Response Monitoring to them. This transfer made sense because long-term programs are better housed and funded through state and federal agencies, Fish and Wildlife Research Institute already manages another long-term monitoring program, and Fish and Wildlife Research Institute has the in-house expertise to handle adjacent work like database management and complex data analyses. The TNC CRCP cooperative agreement was modified to include a contract with Fish and Wildlife Research Institute (FWC) to cover two years of the transition while they built the capacity to continue to manage the program (2018-2020). During this time

TNC staff continued to advise FWC staff as needed. As of 2020 the operational leadership for Disturbance Response Monitoring (DRM) efforts have fully transitioned from The Nature Conservancy to Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute.