

## **Eighth Regional MPAConnect Peer-to-Peer Learning Exchange: Stony Coral Tissue Loss Disease for Caribbean Marine Natural Resource Managers**

**AUGUST 1 – 2, 2019  
KEY WEST, FLORIDA**



Photo: K. Neely

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## TABLE OF CONTENTS

Executive Summary.....	2
Introduction .....	3
Objective .....	4
Peer-to-peer sharing.....	4
Field experience .....	11
Next steps .....	13
Follow-up actions.....	17
Post-learning exchange updates from participants.....	19
Participant evaluation of peer-to-peer learning exchange.....	21
Appendix I .....	22
Appendix II .....	24
Appendix III .....	26

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## Executive Summary

1. Stony coral tissue loss disease (SCTLD) is no longer just a Florida problem. Unfortunately, other locations in the Caribbean have started to see similar disease signs and, as of August 1, 2019, the disease is confirmed in the Caribbean countries and territories of Jamaica, Mexico, Sint Maarten, the Dominican Republic, the U.S. Virgin Islands (St. Thomas), the Turks and Caicos Islands and Belize. A regional peer-to-peer learning exchange on SCTLD was hosted in Key West on August 1-2, 2019 by the MPACConnect Network, a partnership between the Gulf and Caribbean Fisheries Institute and the US National Oceanic and Atmospheric Administration's Coral Reef Conservation Program, with funding from NOAA CRCP and the NFWF Coral Reef Conservation Fund.
2. The Key West learning exchange provided capacity-building support to Caribbean countries and territories currently affected by SCTLD and susceptible to the disease. The involvement of marine natural resource managers from across the Caribbean allowed for the wide dissemination of information about the disease and also served to establish an inclusive pan-Caribbean network of managers, mentors and experts to help monitor, detect and respond to SCTLD in the region. Already the network is playing a role in assisting members with technical assistance for coral disease identification, the interpretation of monitoring results, sharing advice and contacts on treatment protocols and guiding outreach to decision makers.
3. SCTLD is contagious between individual corals and between coral species. It does not affect humans. It is water-borne and can also spread through contact. Work is ongoing to determine the pathogen(s) involved and although it has not yet been determined, antibiotics have arrested disease progression in both laboratory and field experiments, so a bacterial component is highly likely.
4. The correct identification of SCTLD depends on multi-factor field diagnosis based on the characteristics described on the MPACConnect poster guide to SCTLD.
5. The learning exchange participants recommended that a multi-step SCTLD monitoring approach be adopted at the regional scale by existing programs such as the Global Coral Reef Monitoring Network (GCRMN) and Reef Check. See the findings below of the working group on monitoring for more details about step-wise implementation of manta tows-roving diving surveys-AGRRA-type monitoring-repeat surveys-treatment monitoring.
6. An online platform for reporting and verification of suspected cases of SCTLD can be found at <http://www.agrra.org/coral-disease-outbreak/>. Caribbean marine natural resource managers and their partners are encouraged to use this platform for shared reporting of SCTLD. Participants recommended the development of a dashboard on the AGRRA site to indicate the regional status of SCTLD and the progression of the disease.
7. In order to prevent the spread of SCTLD, no-cost best practices such as diving healthy reefs before diving infected reefs are recommended. Local rental of dive and snorkel gear is recommended. Decontamination of gear involves soaking for 10 mins in 1% bleach solution, rinse in fresh water, air dry. The wash solution should be left out in the sun for 1 day to break down the bleach and it can then be disposed of without causing pollution.
8. Spread of SCTLD by water also raises links with the shipping industry, including tankers and cruise ships, with the exchange of ballast and other water away from coral reefs likely to help prevent the spread of SCTLD. There is an opportunity for Caribbean marine natural resource managers to raise the issue of SCTLD with their colleagues in shipping/ports at the March 2020 meeting of Regional Maritime Administrators and with the Florida-Caribbean Cruise Association.
9. The recommendation from SCTLD experts in Florida is to treat the disease as quickly and as aggressively as possible once identified in new locations. Large-scale field trials indicate that the best practice is currently the application of amoxicillin powder with CoreRx Base2B in a 1:8 ratio. Participants noted possible regulatory obstacles to the use of antibiotics on corals in their countries,

with a need to get agencies on board to grant necessary approvals. Securing an affordable supply of CoreRx Base2B material has been the focus of efforts by NOAA, GCFI and AGRRRA with free samples now shipped to some of the affected locations.

10. Selection criteria must guide the prioritization of SCTLD-affected coral reef sites and coral colonies for treatment - large coral colonies close to others of the same species are priorities for treatment, and colonies with a large amount of remaining tissue and a small number of active lesions are considered more treatable. Site selection criteria relate to the regulatory framework, for example, sites within an MPA may respond more positively to treatment since they may not be affected by additional stressors such as fishing pressure.
11. Crisis communications measures are justified by managers in the face of the threat posed by SCTLD to coral reefs and associated economies with unified messaging by agencies and careful choice of language.
12. SCTLD has implications for many aspects of MPA management. A key recommendation for managers in affected and susceptible countries/territories/MPAs is to treat this disease outbreak seriously and to put an intervention action plan in place.
13. The learning exchange working group on restoration suggested that Caribbean marine natural resource managers consider exploring bio-banking local corals in order to save genetic diversity, and to consider incorporating stony corals in coral restoration efforts, but with caution about local capacity and caveats about feasibility as detailed in this report.
14. Next steps are to develop communications materials desired by participants including: outreach materials to encourage decontamination of dive gear and to encourage detection of SCTLD by divers; communications to promote regional uptake of recommended monitoring protocols and a reporting platform; documentation for use in discussions with maritime administrators; a presentation to justify the recommended treatment protocol; a template intervention action plan. Establish a regional SCTLD monitoring dashboard. Consider proposed small support for practical local action by some of the learning exchange participants.

## Introduction

First reported in Florida in 2014 stony coral tissue loss disease (SCTLD) has since been confirmed in Jamaica, Mexico, Sint Maarten, the Dominican Republic, the U.S. Virgin Islands, the Turks and Caicos Islands and Belize. This regional peer-to-peer learning exchange was an initiative of the MPACoast Network which comprises marine protected area managers in 11 Caribbean countries and territories working in partnership with the Gulf and Caribbean Fisheries Institute and the US National Oceanic and Atmospheric Administration's Coral Reef Conservation Program, with funding from NOAA CRCP and the NFWF Coral Reef Conservation Fund. Additional support was provided by the Turks & Caicos Reef Fund, the Association of Reef Keepers of the British Virgin Islands, Healthy Reefs for Healthy Peoples Initiative, Sociedad Ambiente Marino and TNC. The meeting provided capacity-building support to six Caribbean countries and territories currently affected by SCTLD and a further ten Caribbean countries and territories that are susceptible to the disease, as well as to the regional International Maritime Organization (IMO) coordinator. A full list of participants, facilitators and contributing experts can be found in the participant list in Appendix I. Efforts were made to include Cuba in this exchange and although necessary approval was granted, travel funding through other organizations was not ultimately available.

The meeting was held at the Eco-Discovery Center in Key West, Florida on August 1-2, 2019 with 34 participants including 22 marine natural resource managers and partners from 17 countries and territories (Figure 1). Experts from the NOAA Coral Reef Conservation Program, Florida Keys National Marine Sanctuary, Nova Southeastern University, the Atlantic and Gulf Rapid Reef Assessment (AGRRRA) Program, Florida Sea Grant and the International Maritime Organization contributed to the meeting. Two MPA

management mentors contributed to the learning exchange – Roberto Ibarra, Biologist from CONANP Cancun and Sarah Fangman, Superintendent of the Florida Keys National Marine Sanctuary. This regional peer-to-peer learning exchange is the eighth in a series since 2012 by the MPAConnect learning network among Caribbean marine natural resource managers. A summary press note is provided in Appendix II.



Figure 1: Participants in the regional learning exchange on stony coral tissue loss disease for Caribbean marine natural resource managers, Key West 2019 (Photo: C. O’Sullivan)

## Objective

The objective of the meeting was to share information about SCTLD with Caribbean marine natural resource managers so that they can:

1. Communicate effectively with stakeholders to enhance management actions for SCTLD and build coral reef resilience; and
2. Share accurate information about the spread of the disease with GCFI, NOAA, peers and experts.

## Peer-to-peer sharing

The learning exchange provided an opportunity for participants to update their knowledge about coral diseases in the Caribbean. They learned how to identify SCTLD, and discussed monitoring for SCTLD, prevention and possible interventions and treatments. The participants shared detailed information on the progression of the disease thus far, and the different courses of action being taken by experts both in Florida to address its effects and in other parts of the Caribbean. The agenda for the learning exchange is included as Appendix III. Key points included the following:

1. As of August 1, 2019, SCTLD is confirmed in the following Caribbean countries and territories (in addition to Florida) listed from earliest to latest date of outbreak as shown in Figure 2.
  - Jamaica
  - Mexico (detected by dive guides, online reporting format established, seemed to coincide with upwelling)
  - Sint Maarten (follows impacts of Hurricane Irma on reef health, managers are monitoring SCTLD incidence in MPA and outside MPA)
  - US Virgin Islands (St. Thomas)
  - Dominican Republic (reefs in all types of health/condition are affected)

- Turks and Caicos Islands (occurring at otherwise healthy reef sites)
- Belize (affected reef has otherwise good reef health and includes DCYL sentinel sites)

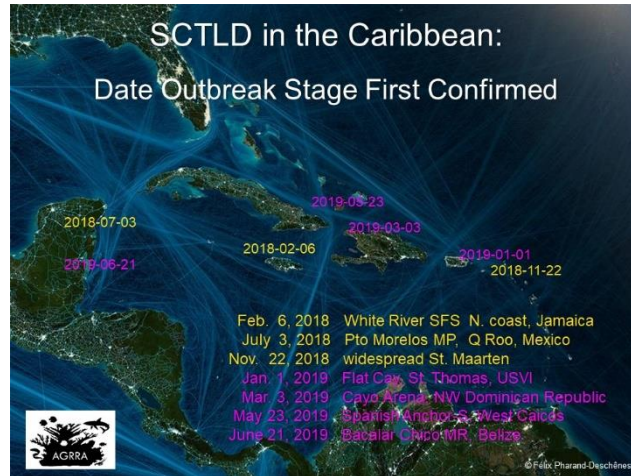


Figure 2: Dates of SCTL D outbreaks in the Caribbean (Source: AGRA)

2. Management capacity for response to disturbances such as SCTL D in the Caribbean is not strong. Approximately half of the MPAConnect sites report having little or no consideration of response to disturbances, either natural or human-caused, in the management of their MPA (Figure 3). This underlines the importance of sharing experiences about SCTL D from mentor sites Florida Keys National Marine Sanctuary and Parque Nacional Costa Occidental de Isla Mujeres, Punta Cancun y Punta Nizuc.

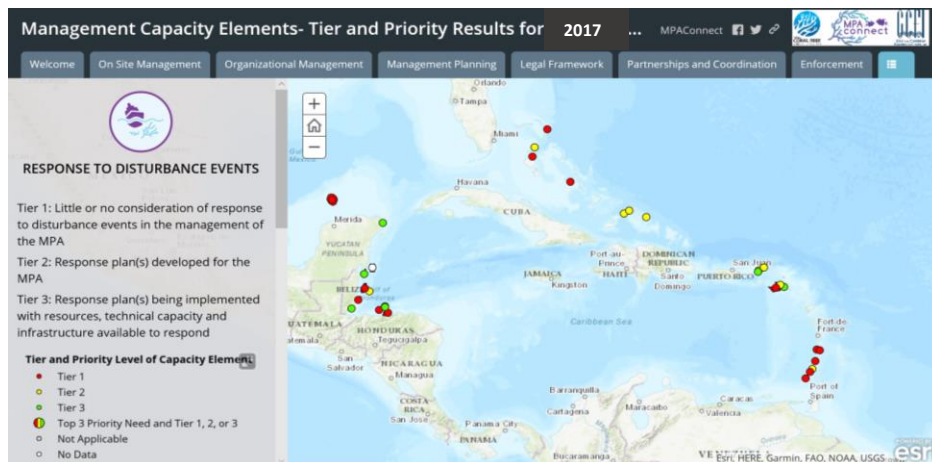


Figure 3: Findings from MPAConnect management capacity assessment, 2017 – capacity for response to disturbance

3. A number of coral diseases are known to affect stony corals in the Caribbean including white plague, black-band disease, yellow-band disease, Caribbean ciliate infection, dark spots disease, and possibly Siderastrea white-blotch syndrome (which might, however, be a form of SCTL D). Stony coral tissue loss disease can appear similar to some of these diseases, and the October 2018 case definition for SCTL D provides notes on comparative gross morphology. Additionally, some coral diseases affect only acroporids including white band disease, white patch disease and rapid tissue loss.
4. SCTL D was first recorded near Miami in 2014 and since then it has spread south at a rate of approximately 2.5km per month reaching Key West by August 2019. All evidence suggests that the disease is contagious between individual corals and between coral species. It does not affect humans. Experiments have shown that colonies can become infected by conspecifics as well as other species. SCTL D is water-borne and can also spread through contact. Work is ongoing to determine the

pathogen(s) involved and although it has not yet been determined, antibiotics have arrested disease progression in both laboratory and field experiments, so a bacterial component is highly likely.

5. The correct identification of SCTL D depends on multi-factor field diagnosis. Note that it can be difficult to distinguish between lesions on stony corals caused by disease, predation, overgrowth, competition or physical damage, and this makes it difficult to diagnose SCTL D based on single observations or photos alone. Key steps in the identification of SCTL D are as follows:

- If multiple lesions are observed, check whether there’s total loss of tissue/denuded skeleton and no bleached tissue remaining, and whether tissue is visibly sloughing off.
- Check affected coral species – SCTL D has a distinct pattern of spread among susceptible species.
- Check for higher than normal prevalence of disease on the stony corals that are known to be most susceptible to SCTL D, which can be 66-100% versus a “normal” background coral disease level of 2-3%.
- Check for a rapid rate of disease spread on the affected coral colonies and between corals on the reef. Check for rapid and high mortality of affected corals (within a week or up to 2 months).
- The disease will remain active throughout the year and over multiple years.

The MPAConnect poster for managers provides guidance to help identify SCTL D and copies were distributed to participants (Figure 4). Underwater ID cards to help with correct disease identification were distributed to participants (Figure 5). Participants also received GCFI thumb drives/memory sticks loaded with all of the workshop materials, which included the presentations and supporting materials relating to disease identification and monitoring.

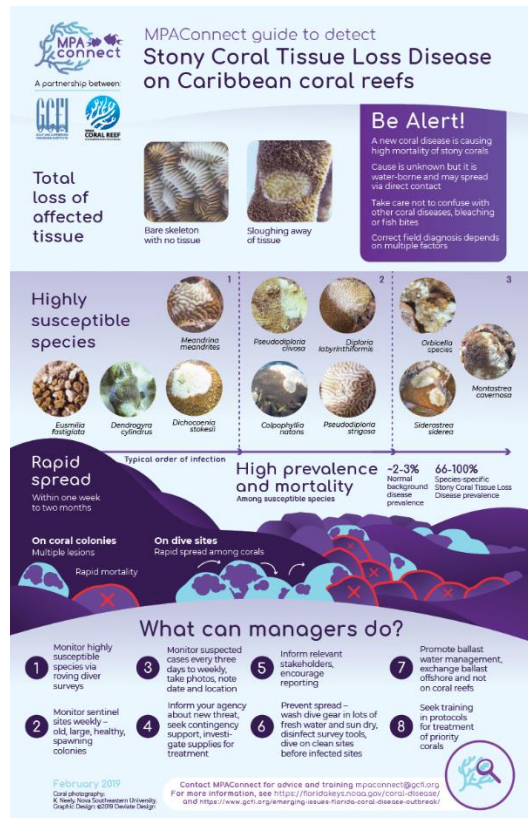


Figure 4: MPAConnect guide to detect and identify SCTL D



Figure 5: Underwater cards for identification of SCTLD distributed to participants

6. There are a number of different protocols that can be used for monitoring coral disease (AGRRA Coral+, AGRRA Coral-, MESB [abbreviated from Spanish Monitoreo Enfermedades de Síndrome Blanco], Modified AGRRA, AGRRA-Adapted Bar Drop, SCTLD Roving Diver, Tagged Corals). The selection of the appropriate protocol depends on the manager's objective. Among participants at the learning exchange the objective is generally to detect earliest signs of SCTLD, for which roving diver surveys are recommended. The description of this methodology and data sheets are provided in Appendix IV. Sites can also be repetitively surveyed for trend analyses using AGRRA.
7. A new online platform for reporting and verification of suspected cases of SCTLD can be found at <http://www.agrra.org/coral-disease-outbreak/>. Caribbean marine natural resource managers and their partners are encouraged to use this platform for shared reporting of SCTLD in order to allow for tracking of the status and progression of the disease. More information on SCTLD, resources, training materials and latest science are being shared at <https://www.agrra.org/coral-disease-resources/>.
8. In order to prevent the spread of SCTLD, no-cost best practices such as diving healthy reefs before those that are infected, when on multiple dives, are recommended. Decontamination protocols for dive, snorkel and monitoring gear have also been developed. Wetsuits, booties, gloves, and the internal bladder of BCDs can harbor and proliferate pathogenic bacteria. Pathogens can adhere to other dive and snorkel gear when a diver contacts the bottom and touches corals. Pathogens on dive gear may survive for extended periods and can be transferred among reefs. To decontaminate, soak gear for 10 mins in 1% bleach solution, rinse in fresh water, air dry. The wash solution should be left out in the sun for 1 day to break down the bleach and it can then be disposed of without causing pollution. The participants noted possible resistance to the use of bleach based on cost, perceived contradiction with eco-friendly trends, and limited space and facilities on liveaboards. Florida experts advised managers to focus their messaging about decontamination on areas with new outbreaks. Assistance from MPACConnect was sought to develop template communications materials for use with dive shops/divers to prevent spread of SCTLD. In order to prevent the spread of the disease while avoiding damage to visitors' gear, the participants also discussed promoting the rental of gear locally, with the possible added benefit of local dive business profitability in some areas.
9. Spread of SCTLD by water also raises links with the shipping industry, including tankers and cruise ships, with the exchange of water away from coral reefs likely to help prevent the spread of SCTLD. The International Maritime Organization oversees the Ballast Water Management Convention and biofouling guidelines (not mandatory) which seek to prevent the spread of invasive aquatic species. However, requirements for exchange of ballast water between sub-regions of the Caribbean potentially heighten the risk of SCTLD spread and there are exemptions permitted under the



convention that can undermine the application of best practices. Concern was raised by participants about whether bio-fouling on cruise ship hulls is a vector for the spread of SCTLD, especially considering the use of ablative anti-fouling paints which may not be effective at low cruising speeds, and whether waste-water discharges from onboard sewage systems, bilge and engine cooling water could be implicated in SCTLD. There is an opportunity for Caribbean marine natural resource managers to raise the issue of SCTLD with their colleagues in shipping/ports and with the Florida-Caribbean Cruise Association (FCCA), possibly drawing parallels with efforts related to zika in the Caribbean. The EPA and CONANP Mexico are in touch with the FCCA. It was noted that discharge from passenger vessels under 5m and pleasure craft are not regulated by the IMO. MPA managers can play a role in promoting best waste-water management practices by such vessels visiting their parks.

10. The recommendation from SCTLD experts in Florida is to treat the disease as quickly and as aggressively as possible once identified in new locations. Mechanical, chemical and biological treatment protocols have been tested in Florida and the lowest failure rates have been achieved by treating SCTLD-affected corals with antibiotics directly applied to lesions. Large-scale field trials indicate that the best practice to date is application of amoxicillin trihydrate powder with CoreRx Base2B. Note that amoxicillin belongs to the Beta-Lactams class of antibiotic to which some people are allergic, so it is imperative to verify that no one on dive teams that may be applying this treatment is allergic to Beta-Lactams. Securing a supply of CoreRx Base2B to the Caribbean will be explored in follow-up to the meeting and, in the meantime, it can be substituted by shea butter.
11. The treatment recipe is amoxicillin powder mixed into a paste with CoreRx Base2B or shea butter in a 1:8 ratio, prepared in syringes and kept cool for underwater application. If CoreRx Base2B is being used then mix with amoxicillin powder just prior to application, otherwise the antibiotic will become ineffective after a few days. Dr. Andy Bruckner from FKNMS recommends that actual disease margins (where the coral tissue is already dying) should be covered with clay, putty or cement to contain the pathogen, then the treatment (CoreRx Base2B or shea butter with antibiotics) should be applied several inches back over the live tissue (which already probably is internally infected with the pathogen). He suggested that in the absence of CoreRx Base2B, managers apply whatever locally available, cheaper material they may have from the lesion interface over the live tissues as well, in anticipation that this measure will kill the pathogen(s). Although chlorinated epoxy with firebreak treatments have also been used in Florida, all species have lower failure rates with amoxicillin than chlorinated epoxy and teams north of Florida recommend switching from chlorinated epoxy to amoxicillin. The Mexican Protected Areas Commission (CONANP) tested a number of treatments using medicinal plants and organic compounds but with 100% failure rate in treating SCTLD. Participants noted regulatory obstacles to the use of antibiotics on corals in their countries, with a need to get agencies on board to grant necessary approvals. Managers in Sint Maarten are already seeking such approval. In Belize, the use of antibiotics has been denied, although discussions are ongoing.
12. Example points made in Florida to help justify the small-scale, topical use of amoxicillin for *in situ* disease mitigation on coral species that are highly susceptible to rapidly spreading SCTLD include:
  - The success of the amoxicillin on rescued *D. cylindrus* fragments in controlled laboratory settings, combined with the rapid and catastrophic loss of the species in the wild, has prompted the proposed tests on the effectiveness of antibiotic disease treatments in the field.
  - In order to address concerns of antibiotics in the environment, we estimated and compared the maximum concentration in the area from this treatment to other environmental concentrations. The maximum possible concentration at the reef was calculated based on the volume of seawater in the Coffins Patch pillar coral area assuming stagnant water (3 million liters) and the maximum potential application (50 colonies \* 5 grams = 250 grams). The resulting 82,000 ng/L estimate is 50 times greater than the concentrations measured in sewage and 30 times less than the

concentrations measured consistently in some aquaculture shrimp ponds. As another comparison of scale, this maximum single application is 60 times less than the amount of antibiotic released daily by wastewater treatment plants into Hong Kong's Victoria Harbour.

13. Selection criteria (ecological, regulatory and treatability) can guide the prioritization of SCTLD-affected coral reef sites and coral colonies for treatment. Large coral colonies close to others of the same species are priorities for treatment, and colonies with a large amount of remaining tissue and a small number of active lesions are considered more treatable.
14. As baseline for later follow-up monitoring, Florida experts recommended tagging treated corals, collecting data on location, treatment applied and taking photos. They also suggest hammering a small round nail into the coral just behind the treatment (dead side) as a reference point for future monitoring. Re-treatment may be needed to treat reinfections, based on findings from monitoring and according to usual effectiveness of any particular type of treatment.
15. Other interventions that are being implemented in Florida include bio-banking coral samples to store genetic diversity, restoration via sexual fertilization in laboratories with propagation, preferably of microfragments, in land-based nurseries and eventual out-planting on reefs. Discussion of feasibility for the Caribbean is presented later in this report.
16. Crisis communications measures are justified by managers in the face of the threat posed by SCTLD to coral reefs and associated economies. The lesson learned in Florida has been to ensure unified messaging by all partners involved in the disease, with careful use of appropriate language, minimum use of abbreviations, acronyms and technical jargon. Suggested language for use by managers in describing coral disease was summarized for participants by the National Marine Sanctuary Foundation's Communications and Outreach Manager and the list is being further developed by GCFI. Recommended messages about SCTLD are as follows:
  - Since 2014, the Florida Reef Tract has been experiencing an historic outbreak of coral disease. Scientists are calling this "stony coral tissue loss disease" because it only affects stony corals. [\_\_\_\_] is one of several government agencies, academic institutions, and conservation organizations responding to the outbreak.
  - This disease outbreak is unprecedented due to its large geographic range, extended duration, high rates of mortality and the number of coral species affected. Nearly half of the stony coral species found on the Florida Reef Tract have been affected, including the primary reef-building species.
  - This outbreak, and response, is ongoing. [\_\_\_\_] scientists and partners are working to document the outbreak, identify likely causes and contributing factors, and to identify and develop innovative, advanced treatments and interventions including coral rescue for preservation of genetic diversity.
  - While the situation is urgent, it is not too late to save this incredibly important ecosystem. Corals are resilient if given the chance and the enabling conditions for their growth and survival. The key is reducing local stressors to support reproduction, growth, and survival.
17. Stakeholder participation in monitoring for SCTLD has been encouraged in Florida with outreach to dive operators, divers and the general public. Florida Sea Grant shared training materials with the participants. An online reporting platform was established where divers can upload photos of tagged corals. The involvement of trained teams in treatment efforts has also been achieved in Florida. Assistance from participants was sought to develop template communications materials for use with dive shops/divers to help with SCTLD outreach.
18. Lessons have been learned by Florida Keys National Marine Sanctuary (FKNMS) about SCTLD and MPA management. Key lessons shared with Caribbean marine natural managers included:

- Sustainable financing - new funding was not immediately available for management of SCTLD so existing funding was reprogrammed from other activities. This is also likely to be a reality for Caribbean managers. There is scope for a high level SCTLD management team to consider and address resource gaps, funding opportunities and allocations.
- Enforcement - consultation efforts regarding MPA zoning in Florida Keys National Marine Sanctuary now incorporate SCTLD. This serves to emphasize the importance of coral reef resilience in general. Closure of affected areas has not been practical in Florida given the widespread occurrence of SCTLD. In Mexico, however, changed zoning and closures are being implemented by CONANP in response to the SCTLD outbreak.
- Bio-physical monitoring – there is an increased need for monitoring and SCTLD has been added to the FKNMS MPA monitoring program. Long-term monitoring sites remain important for observing trends, randomized/representative monitoring is a challenge to achieve. Increased funding is needed to make additional monitoring activity possible and where this is not available then cost efficiencies in monitoring are sought eg. several researchers work on the same corals. Monitoring and reconnaissance teams in Florida work to identify where the disease is and is not occurring. This is essential for identifying the locations for in-water activities such as intervention and coral rescue.
- Fisheries management – no impact has been noted by the Sanctuary. Participants questioned whether there is any impact on reef fish from ingestion of the antibiotic mix – no information is available to address this question.
- Communications – Sanctuary managers noted that every disaster also brings an opportunity, and SCTLD has provided new visibility for managers to feature the actions they are taking and to highlight the importance of effective MPA management. One of the major communication tools is a public website on the FKNMS page. This has general, audience-friendly information about the disease and response, about ways to get involved, images and videos, and news updates.
- Partnerships and coordination– SCTLD highlights the importance of partnerships for MPA management. Academia, citizen participation, budget and policy makers are critical stakeholders with respect to SCTLD. Treating individual lesions on corals affected by SCTLD is both time and resource intensive, and Florida has a dedicated intervention team that includes multiple agencies, universities and ex-military that are going out into the water to implement coral disease treatments. Partners in research and ex-situ bio-banking/coral rescue efforts are critical, and they are largely new partners to the MPA that are located far-afield from the affected reefs, eg. via the Association of Zoos and Aquaria nationally in the US.
- SCTLD interventions – best management of SCTLD is constantly evolving and is being undertaken with the mentality ‘take quick decisions and fail fast’. Recommendation to Caribbean managers is to rapidly and aggressively treat outbreaks of SCTLD with antibiotics – whilst acknowledging concerns about use of antibiotics in the environment. The application is direct and targeted, and the alternative that managers face is certain loss of 66-100% of affected species of stony corals. Culling of affected corals is not seen to be a viable strategy given the many susceptible species and the widespread nature of SCTLD in the Sanctuary.
- Coral restoration - Due to the longevity of the disease in endemic areas, we need to figure out how to do restoration in the context of this disease. We want to make sure that we are not putting out corals just to die, and also that we are not negatively influencing disease dynamics by introducing new susceptible materials onto the reefs. In other words, managers in Florida have been mindful of not adding fuel to the SCTLD fire by growing and outplanting corals while a disease outbreak is active. A change in restoration objective is noted. Previously, the objective was to grow coral in order to increase live coral cover. In the face of SCTLD, the objective is to maintain or increase genetic diversity of affected stony corals. Latest directions involve the capture of gametes from spawning corals, assisted fertilization in laboratories, propagation in

land-based nurseries and outplanting once the disease is under control. Bio-banking of corals is being employed in Florida to save genetic material, this is being referred to as 'coral rescue' and means collecting colonies of susceptible species in advance of the disease margin (identified through monitoring efforts), taking corals out of the reef and keeping them in land-based facilities for future propagation and restoration efforts with the idea of returning them to the marine environment once the disease has passed. However, even with as many genotypes as possible, thermal warming, food availability, water quality, pollution, sedimentation and other stressors will influence the success of coral outplanting and outcomes are uncertain. This webinar, <http://reefresilience.org/restoration-in-the-age-of-disease/>, provides more insight into restoration, coral disease and future directions. AGRRA staff mentioned the Ocean Genome Legacy project and potential challenges associated with the Nagoya Protocol related to possible collaborative research and bio-banking in the US.

19. A key recommendation for management in affected and susceptible countries, territories and MPAs is to treat this disease outbreak seriously and to put an intervention action plan in place. Such a plan can identify key reefs and significant coral colonies for monitoring, guide how to respond to reports of disease, how to try to minimize spread, how to prioritize reefs and corals for possible treatment, communications, stakeholder participation and funding needs. Example plans from Florida, Mexico and Belize were shared.

## Field experience

In order to allow the participants to see SCTL and its impacts first-hand, as well as to practice monitoring and treatment protocols, a field trip to Looe Key and Newfound Harbour Key Sanctuary Preservation Area was made during the learning exchange. The field trip was facilitated by Karen Neely, with assistance from Andy Bruckner and Brian Walker. The participants were divided into two groups with one group practicing the application of Core Rx's Base2B and antibiotics to affected corals (Figure 6) while the second group practiced monitoring protocols (Figure 7). While two dives were originally planned, one at Looe Key and the other at Newfound Harbour, rough weather prevented the second dive and the participants only visited Looe Key. In order to allow all the participants an opportunity to apply the treatment, members of the second group applied the material to limestone rocks in tanks at the dive shop to give them practical experience in treatment handling and application.

The owner of Looe Key Dive Resort (Figure 8) spoke with participants about his perspective on SCTL and advice for Caribbean managers in addressing their local dive industries. Participants had the opportunity to ask questions and see first-hand how local stakeholders are reacting to the threat posed by SCTL.



Figure 6: Participants Tazio Bervoets, Sint Maarten Nature Foundation, and Ruben Torres, Reef Check Dominican Republic, applying SCTLD treatment to infected corals. Photo: K.Neely



Figure 7: Participant Andres Morales, INAPESCA Mexico, monitoring and identifying affected corals. Photo: S. Frew



Figure 8: Q&A session for participants with the owner of the Looe Key Dive Resort about stakeholder consultation and engagement regarding SCTLD. Photo: S. Frew

## Next steps

To summarize lessons learned, to explore next steps and agree on desired follow-up arising from the peer-to-peer learning exchange, the participants divided into five working groups together with relevant experts and mentors on the following topics:

### 1. Recommended approach to monitoring for SCTLD

- Caribbean marine natural resource managers need to know the spatial extent of SCTLD in order to plan for response, and this in turn requires monitoring for the disease. We can seek input and assistance in this from stakeholders such as the dive industry and fishers.
- The first recommended approach to monitoring (which is especially pertinent where we are going in cold and have little idea of what reefs and types of corals exist, for example in large areas like in the Turks & Caicos Islands) is **manta tows** to look for susceptible corals and signs of SCTLD, and to seek reports from stakeholders in dive and fishing industries. This will enable us to define the broad spatial limits of the disease.
- The second recommended approach is in areas where the most susceptible corals are found, and/or possible signs of SCTLD are observed during manta tows, that **roving diver surveys** are undertaken to check prevalence of disease among the susceptible species (depending on the stony coral species composition on local reefs), take photos and note affected locations. Surveyors, including MPA staff and dive masters can be trained on SCTLD identification.
- Managers will need to provide guidance for input of data from roving diver surveys, and the working group recommends use of the **reporting** platform at [www.agrra.org/coral-disease-outbreak](http://www.agrra.org/coral-disease-outbreak)
- In areas where SCTLD is known to be present and any response/interventions are being implemented, especially if in MPAs, then **AGRRA-type surveys** should be used so that the spatial extent of the disease can be quantified in defined transects. These should be repeated at 6 monthly intervals to provide periodic assessment of the interventions.
- In areas with SCTLD, and where **other standard national monitoring protocols** are in use, eg. MBRS in Belize, these should be applied and data on disease prevalence converted to averages.

- Managers **need SCTL D monitoring outreach materials** to help them engage the dive industry, hoteliers and other stakeholders in order to promote collaborations and the sharing of resources in order to expand monitoring efforts.
- The working group recommends presenting regional SCTL D data in a **dashboard** format which could perhaps be built into the AGRRA platform pending project funding. An example is provided by the coral rescue dashboard in Figure 9.



Figure 9: Sample coral monitoring dashboard

- The working group and learning exchange participants **recommended that this multi-step SCTL D monitoring approach be adopted at the regional scale** by existing programs such as the Global Coral Reef Monitoring Network (GCRMN) and Reef Check. These are summarized in Table 1.

Table 1: SCTL D Monitoring Needs and MPAConnect Working Group Recommendations

Monitoring Need	Recommended Protocol
Define broad spatial limits of disease	Manta tows, stakeholder reporting
Approximate prevalence of SCTL D	Roving diver surveys
Monitor progression of SCTL D	Marked colony sites, establish sentinel reef sites, photo series
Quantify spatial extent of SCTL D	AGRRA-type surveys (or standard national protocol)
Assessment of SCTL D interventions	Visual inspection of treated lesions, photo series
Assessment of coral treatment success	Tag, photograph and take repeat photos of treated corals
Determine impacts on coral reef ecosystems including fish	6-monthly repeat of AGRRA-type surveys at long-term monitoring sites affected and unaffected by SCTL D
Supporting Need	Recommended Approach
Outreach materials	SCTL D monitoring poster for dive industry
Data input/reporting platform	<a href="http://www.agrra.org/coral-disease-outbreak/">http://www.agrra.org/coral-disease-outbreak/</a>
SCTL D monitoring results dashboard	To be considered by AGRRA, possible follow-up funding
Regional adoption of SCTL D multi-step monitoring protocol	Sharing of meeting recommendations with GCRMN, Reef Check

## 2. Considerations to move forward in the Caribbean with recommended treatment protocol for SCTL D

- Availability of the recommended materials for treatment is needed. In particular, a supply of the recommended CoreRx Base2B material. We hope that a supply of this material can be made

available for treatment of SCTLD in the Caribbean in future, and that the cost for this will reduce to an affordable level. As a follow-up to this learning exchange, NOAA will assist in discussions about supplying participants with CoreRx Base2 material, or its replacement formulation.

- Approval from, or acceptance by, authorities to implement the recommended treatment protocol using antibiotic mix applied directly to coral lesions. A first step is to understand stakeholder perceptions of antibiotics, their impacts and obstacles to their use in the case of SCTLD. This will enable us to better address concerns and share relevant supporting information. The working group requested access to results about treatment that were shared at the peer-to-peer learning exchange by K. Neely and B. Walker. These have now been shared. The experts and facilitators at the peer-to-peer learning exchange expressed a willingness to provide further input as helpful to address concerns. A possible strategy is to start by applying SCTLD treatment in a small area and monitor results and any broader impacts.
- Prioritization of SCTLD ahead of other diseases or threats to coral reefs. Justification is needed for investment in SCTLD monitoring, treatment and prevention.
- We need to seek funding for response to SCTLD. K. Neely could calculate an average cost per coral or per area of reef to treat SCTLD to provide guidance. MAR countries could explore funding via reef insurance payouts associated with the new parametric insurance scheme, and whether this can be applied or adapted for sites that might suffer from SCTLD.
- We need to communicate about available resources to other managers. The intervention action plans already prepared by Florida and Mexico can provide guidance to Caribbean managers. A decision tree for use in the field could help to guide decisions about whether or not to treat particular corals and help teams to move faster in the field. We need to prepare to respond to questions and interest from the press. It is recommended to have these resources available in one spot eg. [www.agrra.org/coral-disease-resources](http://www.agrra.org/coral-disease-resources).

### 3. SCTLD outreach material for dive industry

- Given concerns about the possible spread of SCTLD by dive and snorkel gear, there is a need for outreach materials to inform the dive industry.
- The suggested format is a poster similar to the MPACoast SCTLD poster. The desired messaging is prevention through application of best practices for decontamination, and by promoting local rental of dive and snorkel gear which is also seen as positive for local dive businesses' profitability. The target audience is divers.
- Such material can be used in existing outreach/training/consultation activities by MPAs with their local dive shops. The poster could include links to more information and to local marine managers.
- A list of suggested language for describing coral disease with divers and the media was shared during the learning exchange and is being further developed by GCFI as Caribbean managers gain experience in speaking with stakeholders and the media.

### 4. Communications for Caribbean maritime administrators

- Figure 10 shows a message box for desired messaging to target Caribbean maritime administrators (ministers and maritime transport officials in government and port authorities) in support of enhanced measures by the shipping industry to prevent the spread of SCTLD.
- A meeting of Senior Maritime Administrators will be held in March 2020 in Saint Lucia and SCTLD is on the agenda. Supporting documentation is desired to help convey messaging about the importance of preventing the spread of SCTLD.
- Draft materials could be developed with further input from Colin Young, Regional Maritime Coordinator, IMO, representatives from Statia Marine Park, Statia Shipping Inspector L. van Osch and P. Hoetjes, BES government.



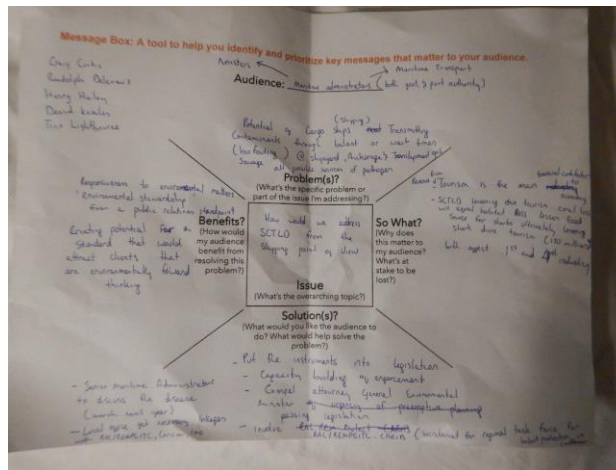


Figure 10: SCTLD message box for communications with maritime administrators

## 5. Considerations for coral rescue and restoration in the Caribbean in the face of SCTLD

- The feasibility of bio-banking of corals in the Caribbean is limited by the lack of suitable storage facilities in which to house corals, the costs to establish and operate such facilities, and by the survival rates for corals kept in such facilities. The strategy of coral rescue being implemented in Florida is to save as many as 50 genotypes of each of the approximately 25 species of stony coral that are susceptible to SCTLD. This scale of bio-banking is prohibitive for Caribbean nations and territories. Mexico is known to have a suitable facility with space in which to house corals. Iberostar is maintaining some corals of SCTLD-susceptible species at one of its resorts in the Dominican Republic. These might be explored as possible banks for corals from other areas in the region, pending feasibility of transport and survival of transported corals.
- The working group suggests that a short-term solution to make coral rescue more feasible is for individual Caribbean countries and territories to rescue small pieces of genetic material from their reefs, only for the up to 25 different species that are susceptible to SCTLD. With smaller pieces taken and with a smaller quantity of material involved in total, this genetic banking will require less space while still presenting an opportunity for further fragmentation of the corals at a later date. Smaller pieces also translate to greater ease of movement of corals.
- The working group suggested that cryo-preservation of some specimens could be helpful. Mexico is exploring this direction, however it is noted that this works only for the preservation of sperm and not eggs.
- Coral restoration efforts are ongoing in the Caribbean but are largely focused on acroporids with a small number of people working with massive corals. Mexico has so far included 13 species of corals in its restoration efforts and has started microfragmenting and outplanting these species. The microfragmented outplants are smaller than in Florida and are planted in the reef using attachments. There is a risk that outplanted corals can be affected by SCTLD should there be a disease outbreak, leading to mortality and also potentially increasing SCTLD prevalence among other species. A move away from coral restoration based on fragments of opportunity towards purposeful growing of more resistant genotypes was suggested. In Florida, a Restoration Trials Team composed of local restoration practitioners is identifying key knowledge gaps, seeking to address questions about restoration and helping to determine where to invest effort and resources in building restoration infrastructure.
- The tentative recommendation is to start considering bio-banking and more focused restoration, but with caution about local capacity and caveats about feasibility.


## Follow-up actions

- After the learning exchange, GCFI and AGRRA worked with the participants in affected countries and territories and with those seeking contingency supplies for SCTLTD treatment to estimate quantities of base material needed to apply best practice treatment protocols. K. Neely advised that estimations could be based on the Florida Force Blue experience that three divers require about 1 kg/day of the base to treat two shallow spurs like those the participants dived at Looe Key. An estimation was made about quantities of CoreRx Base2B needed by Caribbean participants. In total, 72kg of CoreRx Base2B is estimated as needed by the countries and territories in Table 2. The initial cost quoted by the manufacturers for supply of this quantity was US\$15,000-\$20,000 annually. Following discussions with the manufacturers Ocean Alchemists by NOAA, Nova Southeastern University, AGRRA Program and GCFI, the likely cost is now US\$8,500 for the total desired amount (US\$50 per 400g). We have secured donations of at least 400g of CoreRx Base2B and shipping for each of the six affected countries (product value US\$300 for each location plus sponsorship of shipping by Ocean Alchemists). This will enable participants to do local field trials and also test shipping and customs procedures.

Table 2: Estimated Requirements for CoreRx Base2B Material for Treatment of SCTLTD



Interested Countries/Territories	Amount Requested (kg)	Notes
Mexico	-	Refer to Melina Soto, HRI
Belize	10	HRI - 8-10kg feasible luggage
Dominican Republic	6	starter for La Caleta (one MPA)
Jamaica	10	8-10kg per starter
Turks & Caicos Islands	10	8-10kg per month
British Virgin Islands	10	contingency
Sint Maarten	10	starter
Sint Eustatius	10	contingency
Grenada	6	contingency
Total	72	

- GCFI has worked with a subset of participants to develop communications materials desired by participants including: outreach materials to encourage decontamination of dive gear and to encourage detection of SCTLTD by divers.
- GCFI is leading communications to promote regional uptake of recommended monitoring protocols and reporting platform, including with communications to GCRMN.
- GCFI developed and distributed a summary sheet to guide managers about appropriate language for science communications in relation to the disease (Figure 11).



MPA connect

A partnership between:





## Stony Coral Tissue Loss Disease












terminology for clear science communications

✘ MISLEADING LANGUAGE	MORE ACCURATE TO SAY ✔
White disease	Tissue loss disease
SCTLD acronym	Coral disease affecting hard corals
Mysterious	Emerging, newly occurring disease
Unidentified	Named by scientists as stony coral tissue loss disease
Confused with other diseases	Shares similarities with other coral diseases
Contagious	Spreads rapidly among stony corals but does not affect humans
Unknown disease	Scientists are working to document the outbreak and develop advanced treatments
Cause unknown	Partners regionally are researching the disease; Scientists are working to identify pathogen(s) responsible (nb. common cold analogy)
Unmanageable	Targeted, strategic efforts
Closure of reef	Quarantine
Culling	Strategic removal or rescue
Antibiotics	Strategic, small-scale application
Uncertain about plans	Range of approaches needed



### Highly susceptible species

 *Meandrina meandrites*  
 *Eusmilia fastigiata*  
 *Dendrogyra cylindrus*  
 *Dichocoenia stokesii*  
 *Pseudodiploria clivosa*  
 *Diploria labyrinthiformis*  
 *Colpophyllia natans*  
 *Pseudodiploria strigosa*  
 *Orbicella species*  
 *Siderastrea siderea*  
 *Montastrea cavernosa*

### What's at stake?

Our highly diverse and economically valuable coral reef ecosystem

### What can we do?

While the situation is urgent, it is not too late to save this incredibly important ecosystem. Corals are resilient if given the chance and the enabling conditions for their growth and survival.

The key is reducing local stressors to support reproduction, growth, and survival.

**Figure 11:** Suggested language for use by managers in describing coral disease

- GCFI developed a presentation for decision makers in the Caribbean about intervention planning and the recommended treatment protocol using antibiotics to treat SCTLD. The MPACoordinator will present this at a meeting of the Belize National Coral Monitoring Network on September 11, 2019 in Belize.
- GCFI has drafted a template SCTLD intervention action plan based on existing models from Florida, Mexico and Belize. This will be shared with participants for them to consider, tailor to their local settings and adopt as recommended by mentors at the learning exchange.
- GCFI and AGRRA are exploring the establishment of a regional SCTLD monitoring dashboard as part of the AGRRA coral disease platform.
- NOAA, AGRRA and Nova Southeastern University have provided technical support to network members and will continue to do so after the closure of the project.
- GCFI is overseeing the implementation of two immediate follow-up projects with participants from the learning exchange – ‘Partner Collaboration in Support of Stony Coral Tissue Loss Disease Monitoring in The Turks & Caicos Islands’ and ‘Building Capacity for the Management of the Stony Coral Tissue Loss Disease Threat in the British Virgin Islands’. These have leveraged non-federal co-funding from the private sector (local dive operators) and in the case of the latter project from the British Foreign and Commonwealth Office. Further co-funding is being applied to implement the follow-up project ‘Improving Stakeholder Support to Ensure Successful Stony Coral Tissue Loss Disease Monitoring in Roatan, Honduras’. The small project support was proposed by the learning exchange participants and is permitting immediate, practical local action in follow-up to the learning exchange.

## Post-learning exchange updates from participants

Table 2 presents the status of in-country activities and identifies further follow-up support desired by participants at the learning exchange. Countries and territories that are currently affected by SCTL D are listed first and marked with an asterisk\*.

Table 2: Post-learning exchange status and desired follow-up support

Country/Territory	Organization	Update	Proposed Activities
Jamaica*	National Environment and Planning Agency		Host a two-day workshop on SCTL D identification, prevention and treatment for MPA Managers and Scientific Officers
Mexico*	CONANP	CONANP is collaborating with the National Autonomous University of Mexico (UNAM) to implement a monitoring project in Quintana Roo. The project will be led by Dr. Lorenzo Alvarez Filip from UNAM and 4 sites have already been selected within Cancun National Park. The project is slated to start on September 15, 2019	
Dominican Republic*	Reef Check DR	<ul style="list-style-type: none"> <li>• Exploring the possibility of creating a base material for the application of an antibiotic cream to the reef</li> <li>• Testing the application of an antibiotic cream (without a base compound)</li> <li>• Bi-weekly monitoring of affected reefs in La Caleta and other parts of the Dominican Republic</li> </ul>	<ul style="list-style-type: none"> <li>• SCTL D identification workshop for stakeholders (government representatives, dive industry, NGOs)</li> <li>• Re-check the status of the disease in the six affected locations to confirm SCTL D presence</li> <li>• Assess treatment feasibility</li> </ul>
Turks and Caicos Islands*	Turks and Caicos Reef Fund Department of Environment and Coastal Resources	Approval was granted to start monitoring and treatment in Providenciales and South Caicos but antibiotic approval is currently on hold pending ministerial review	<ul style="list-style-type: none"> <li>• Begin data collection to compare transmission conditions and the species affected between Florida and the Turks and Caicos Islands.</li> <li>• Status: Completed.</li> </ul>
Belize*	Healthy Reefs for Healthy People Initiative TIDE Department of Fisheries	SCTL D is on the agenda of the next meeting of the National Coral Monitoring Network, MPACoordinator invited to present about intervention planning	<ul style="list-style-type: none"> <li>• Field visit to affected areas to consider treatment options and trial possible treatments</li> <li>• Creation of a 'treatment toolbox' for use in the field. This will include cameras, syringe, treatment materials, etc.</li> <li>• Implementation of an outreach campaign, including printing of flyers and ID cards</li> </ul>

Country/Territory	Organization	Update	Proposed Activities
			<ul style="list-style-type: none"> <li>• Implement antibiotic treatment protocol within a selected site and determine efficacy</li> </ul>
Sint Maarten			Workshop for MPA personnel from Sint Maarten, Saba and Statia to learn how to professionally collect and preserve coral tissue samples for histopathological, microbiological and genomic research on the causes of SCTLD
Honduras	Roatan Marine Park	SCTLD not (yet) confirmed in Honduras	<ul style="list-style-type: none"> <li>• SCTLD information meetings with dive shops</li> <li>• Workshop with divers and volunteers on coral ID and coral disease, a second workshop on SCTLD ID, monitoring and prevention</li> <li>• Collaborate with AGRRA and Healthy Reefs Initiative to establish SCTLD monitoring sites</li> <li>• Rapid evaluation of SCTLD using the roving diver protocol to determine SCTLD presence in Roatan</li> <li>• Development of an informational video on SCTLD threat response in Roatan</li> <li>• Status: underway</li> </ul>
The Bahamas	Department of Marine Resources	<ul style="list-style-type: none"> <li>• Ongoing reef assessments to determine disease presence.</li> <li>• Development of a presentation for dissemination to counterparts</li> </ul>	
British Virgin Islands	Association of Reef Keepers		<ul style="list-style-type: none"> <li>• Organise a group of volunteer divers to look for suspected SCTLD transmission. Costs associated with this would include dive boat charter and gear rental and the hosting of a training session</li> <li>• Status: underway</li> </ul>
Sint Eustatius	Sint Eustatius National Parks Foundation		<ul style="list-style-type: none"> <li>• Outreach and awareness workshops</li> <li>• Additional reef assessment practice</li> </ul>
Grenada	St. George's University	Meeting with SCUBA operators and fishers to brief them on SCTLD so they can help with reef monitoring	

## Participant evaluation of peer-to-peer learning exchange

At the closing of the peer-to-peer workshop on Stony Coral Tissue Loss Disease, the participants were asked to complete an evaluation form. This contained a mixture of open and closed-ended questions intended to evaluate the perceived usefulness, impact and quality of the workshop. A total of 21 questionnaires were completed by the participants.

Key findings from the evaluation were:

1. This peer-to-peer learning exchange (P2P) received the highest rating so far for the facilitators of the exchange (90% vs 77% average excellent rating over six MPACoast P2Ps).
2. Handouts shared at the learning exchange were the highest rated so far among handouts provided at other learning exchanges (100% vs 78% average excellent/very good). They included MPACoast Stony Coral Tissue Loss Disease posters and NOAA underwater ID cards.
3. Practically all participants (95%) reported that the workshop contributed a lot to their knowledge of Stony Coral Tissue Loss Disease. This is the highest rating to date for knowledge acquired among six MPACoast P2Ps (just ahead of 94% for P2PVII financing with Wolfs Company) and likely reflects the technical nature of the content and the technical expertise of the facilitators.
4. All of the participants reported that they learned something that they will apply in their work. The most important things they reported learning were about the possible interventions to address the disease (11 mentions) and communications/stakeholder engagement (6 mentions).
5. All participants reported that they now have more confidence in their ability to address Stony Coral Tissue Loss Disease. In particular, to intervene, treat and manage the disease (7 mentions), understanding the urgency of responding (5 mentions) and to communicate about the disease (4 mentions).
6. In addressing the disease, 57% of participants reported that they anticipate facing obstacles in applying what they learned. Although this is lower than the average of 65% obstacles across six P2Ps, there was also a higher level of uncertainty than usual with 24% unsure whether they will face obstacles. Among the obstacles anticipated were approval/permits to treat corals (4 mentions), political will to address the disease (4 mentions) and reluctance specifically to use antibiotics (3 mentions).
7. A lower than average proportion of participants desired further training or follow-up on the coral disease (85% vs 95% average across six P2Ps). This suggests good uptake of useful information that can be ready to be applied. Topics suggested for further training and follow-up include: interventions (9 mentions); communications/stakeholder engagement (8 mentions); and monitoring (6 mentions).
8. All of the participants would recommend the workshop to other MPAs.

## LIST OF PARTICIPANTS

Country	Participant	Title	Affiliation
Mexico	Esteban Roberto Ibarra Navarro	Biologist	CONANP/Parque Nacional Costa Occidental de Isla Mujeres Punta Cancún y Punta Nizuc
	Adrian Andrés Morales	Technician	Centro Regional de Investigación Acuícola y Pesquera
Belize	Henry Brown Jr.	Biologist	Department of Fisheries/ Bacalar Chico Marine Reserve
	Kevin Novelo	Marine Biologist	Toledo Institute for Development and Environment
	Nicole Craig	Belize Coordinator	Healthy Reefs for Healthy People Initiative
Honduras	Gabriela Ochoa	Program Officer	Roatan Marine Park
The Bahamas	Bradley Rutherford	Assistant Fisheries Superintendent III	Department of Marine Resources
Turks and Caicos Islands	Alexander McLeod	Environmental Officer	Department of Environment and Coastal Resources
	Alizee Zimmermann	Project Manager	Turks and Caicos Reef Fund
Jamaica	Tamarah Myles	Environmental Officer	National Environment and Planning Agency
Cayman Islands	Cody Panton	Research Officer	Department of Environment
Dominican Republic	Ruben Torres	President	Reef Check DR
Puerto Rico	Alex Mercado-Molina	Vice President	Sociedad Ambiente Marino (SAM)
British Virgin Islands	Argel Horton	Marine Biologist	Conservation and Fisheries Department
	Shannon Gore	Managing Director	Association of Reef Keepers
Sint Maarten	Tadzio Bervoets	Managing Director	Sint Maarten Conservation Foundation
Saba	Jelle van der Velde	Marine Park Ranger	Saba Conservation Foundation
Sint Eustatius	Marit Pistor	Marine Park Ranger	Sint Eustatius National Parks Foundation
Saint Lucia	Donovan Brown	Board Member and Representative	Soufriere Marine Managed Area/ Department of Fisheries
Saint Vincent and the Grenadines	Shamal Connell	Fisheries Officer	Fisheries Division
Grenada	Stephen Nimrod	Assistant Professor	St. George's University

Country	Participant	Title	Affiliation
USA	Andy Bruckner	Research Coordinator	Florida Keys National Marine Sanctuary
	Brian Walker	Research Scientist	Nova Southeastern University
	Gena Parsons	Communications and Outreach Manager	National Marine Sanctuary Foundation <i>in support of</i> Florida Keys National Marine Sanctuary
	Judith Lang	Scientific Coordinator	Atlantic and Gulf Rapid Reef Assessment Program
	Karen Neely	Coral Reef Ecologist	Nova Southeastern University
	Sarah Fangman	Superintendent	Florida Keys National Marine Sanctuary
	Shelly Krueger	Monroe County Extension Agent	Florida Sea Grant
	Victoria Barker	Coral Reef Fellow	National Oceanic and Atmospheric Administration
Trinidad and Tobago	Colin Young	Regional Maritime Advisor (Caribbean)	International Maritime Organization
	<b>MPAConnect</b>	<b>Title</b>	<b>Affiliation</b>
	Dana Wusinich-Mendez	Atlantic and Caribbean Team Lead	NOAA Coral Reef Conservation Program
	Scot Frew		NOAA Coral Reef Conservation Program
	Emma Doyle	MPAConnect Coordinator	Gulf and Caribbean Fisheries Institute
	Christine O'Sullivan	MPAConnect Project Assistant	Gulf and Caribbean Fisheries Institute





## Sharing Knowledge to Tackle Stony Coral Tissue Loss Disease

**Key West, August 1, 2019 – Experts from around the Caribbean region are meeting at the Eco-Discovery Centre in Key West to share information on an emerging and unprecedented threat to Caribbean coral reefs posed by a coral disease first documented in Florida and now being reported at sites across the region.**

Since 2014, the Florida Reef Tract has been severely impacted by a newly documented coral disease which scientists are calling “Stony Coral Tissue Loss Disease” (SCTLD) because it affects only hard stony corals and is characterized by the rapid loss of live coral tissue. The disease has rapidly spread across coral reefs from Palm Beach to the lower Florida Keys and in the last year has been reported elsewhere in the Caribbean, including in Mexico, Jamaica, Sint Maarten, the Dominican Republic, the U.S. Virgin Islands, the Turks and Caicos Islands and Belize.

“Stony Coral Tissue Loss Disease affects some of the slowest-growing and longest-lived reef-building corals, including the iconic brain corals, star corals and pillar corals,” explained Dr. Andy Bruckner, Research Coordinator at the Florida Keys National Marine Sanctuary, where the meeting is taking place.

“Scientists from NOAA and the state of Florida, sanctuary managers and academic partners have been working to document the outbreak, identify causes and contributing factors, and develop treatments and interventions,” he added.

As the disease has begun to be reported in other parts of the Caribbean, experts from Florida are sharing their valuable knowledge with counterparts around the region to help them identify the disease and learn how to respond once it has been documented. The learning exchange includes 22 participants from 17 countries and territories of the Caribbean.

“The visitors will see first-hand how this disease has impacted Florida’s coral reefs. With local experts, they’ll learn about monitoring for and treating the disease and about local efforts to save this incredibly important ecosystem,” explained Dana Wusinich-Mendez from the NOAA Coral Reef Conservation Program.

“The visitors are not only learning from Florida’s experience but are also sharing with their hosts and with each other. The gathering is an important opportunity to exchange information and experiences about the disease progression and status of response efforts in other affected countries.”

Ms. Argel Horton from the Conservation and Fisheries Department of British Virgin Islands commented: “Given the significance of coral reef ecosystems to our islands, it’s imperative that we join forces with scientists, communities and the authorities to find possible solutions to this issue. By exchanging ideas and sharing expertise with other countries we hope to keep pace with advances in managing the disease. We are learning from our Florida hosts that once the disease has been reported it is essential to respond rapidly to prevent it from spreading to a wider area. What we learn at this meeting is giving us a head start to face this disease.”

Superintendent of Florida Keys National Marine Sanctuary, Sarah Fangman, welcomed the visitors and commented: “Everyone here is aware of the vital role corals play in our region. In the Florida Keys, coral reefs help to support some 33,600 jobs and bring over \$2.1 billion to the local economy. While the situation is

urgent, it is not too late to save this incredibly important ecosystem. Corals are resilient if given the chance and the enabling conditions for their growth and survival.”

The meeting is an initiative of the MPACConnect Network which comprises marine protected area managers in 10 Caribbean countries and territories, working in partnership with the Gulf and Caribbean Fisheries Institute and the US National Oceanic and Atmospheric Administration’s Coral Reef Conservation Program, with funding from NOAA CRCP and the NFWF Coral Reef Conservation Fund.

For more information please contact Emma Doyle at [emma.doyle@gcfi.org](mailto:emma.doyle@gcfi.org).



Caribbean marine natural resource managers and coral disease experts at Florida Keys National Marine Sanctuary (Photo: C. O’Sullivan)

## Appendix III

### AGENDA

Thursday, August 1 2019		
Time	Activity	Presenter
8:30 – 8:45	Welcome	Sarah Fangman, Florida Keys National Marine Sanctuary (FKNMS)
8:45 – 9:00	Introduction of Participants	Emma Doyle, MPACConnect
9:00 – 9:15	Introduction to MPACConnect and Overview of Stony Coral Tissue Loss Disease Observations in the Caribbean Region	Dana Wusinich-Mendez, NOAA Coral Reef Conservation Program (NOAA CRCP)
9:15 – 9:45	History of Coral Diseases in the Caribbean Region Questions and Answers	Dr. Judith Lang, Atlantic and Gulf Rapid Reef Assessment Program (AGRRA)
9:45 – 10:15	Introduction and Background to Stony Coral Tissue Loss Disease	Dr. Karen Neely, Nova South-Eastern University
10:15 - 10:30	<b>COFFEE BREAK</b>	
10:30 – 11:00	Identification of Stony Coral Tissue Loss Disease	Dr. Andy Bruckner, FKNMS
11:00 – 11:30	Exchange by Affected Countries	Tadzio Bervoets – Sint Maarten Roddy McLeod - Turks and Caicos Islands Ruben Torres – Dominican Republic Henry Brown Jr. - Belize
11:30 – 12:00	Monitoring Protocols for Stony Coral Tissue Loss Disease	Dr. Karen Neely, Nova Southeastern University
12:00 - 12:30	Online Reporting Mechanisms for Stony Coral Tissue Loss Disease	Dr. Judith Lang, AGRRA
12:30 – 1:30	<b>LUNCH</b>	
1:30 – 2:00	Disease Prevention Strategies for Stony Coral Tissue Loss Disease - Decontamination of dive gear	Dr. Andy Bruckner, FKNMS
2:00 – 2:30	Disease Prevention Strategies for Stony Coral Tissue Loss Disease - Minimizing the Transfer of Invasive Aquatic Species by Ship	Colin Young, International Maritime Organization

<b>Time</b>	<b>Activity</b>	<b>Presenter</b>
2:30 – 3:30	Treatment Protocols for Stony Coral Tissue Loss Disease - Evolution of Treatments in Florida - Trials and Results by CONANP Cancun - Treatment Methods on Florida’s Northern Reef Tracts - Current Treatment Methods and Future Directions	Dr. Karen Neely, Nova Southeastern University Mr. Roberto Ibarra Navarro, CONANP Dr. Brian Walker, Nova Southeastern University Dr. Karen Neely, Nova Southeastern University
3:30 – 3:45	<b>COFFEE BREAK</b>	
3:45 – 4:15	Communications and Outreach on Stony Coral Tissue Loss Disease in Florida	Gena Parsons, FKNMS
4:15 – 4:45	Citizen Engagement in Stony Coral Tissue Loss Disease in Florida	Shelly Krueger, Florida Sea Grant
4:45	Closing Day 1	Emma Doyle, GCFI
<b>Friday, August 2 2019</b>		
<b>Time</b>	<b>Activity</b>	<b>Presenter</b>
8:00 – 2:00	Field Visit - Looe Key - Newfound Harbor Key Sanctuary Preservation Area	Dr. Karen Neely, Nova Southeastern University Dr. Andy Bruckner, FKNMS Dr. Brian Walker, Nova Southeastern University
3:00 – 3:15	Organizational Structure and Teamwork for Stony Coral Tissue Loss Disease Response Efforts in Florida	Dana Wusinich-Mendez, NOAA CRCP
3:15 – 4:00	Management Considerations for Caribbean Marine Natural Resource Managers in Addressing Stony Coral Tissue Loss Disease	Sarah Fangman, FKNMS
4:00-5:00	Working session: Strategic Communications Planning for Stony Coral Tissue Loss Disease in Affected and Susceptible Countries	Emma Doyle, MPACoconnect with all participants
5:00	Workshop Closing	Dana Wusinich-Mendez, NOAA CRCP