

A Cross- Sectional Approach in the Monitoring and Treatment Efforts of Stony Coral Tissue Loss Disease (SCTLD) in the British Virgin Islands

Un enfoque intersectorial en los esfuerzos de seguimiento y tratamiento de SCTLD en las Islas Vírgenes Británicas

Une approche intersectorielle dans les efforts de surveillance et de traitement des SCTLD dans les Îles Vierges britanniques

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ABSTRACT

Stony Coral Tissue Loss Disease (SCTLD) was first sighted in the BVI in May 2020 at the RMS Rhone, the only marine park in the BVI and three other popular dive sights. By August 2020, SCTLD was confirmed at eleven (11) reefs which were fisheries protected areas and popular dive sites. A Coral Reef Strike Team (CRST) was formed to combat SCTLD, bringing together Government, Statutory Bodies, non-profit organizations, the Virgin Islands Dive Cooperation and volunteers to track, tackle and slow the progression of the disease. The collaborative efforts produced over 30 volunteers, trained based on the guidelines directed by NOAA/MPA Connect. Verified volunteers were grouped into zones to effectively manage the disease within the respective space. Within nine months of establishing the CRST, the team completed > 600 surveys and treated over 7000+ individual coral colonies across 45 dive sites with the Base2B antibiotic paste with amoxicillin. A summary of the monitoring and treatment efforts and an update of our findings and progress from the cross sectional partnership was compiled.

KEYWORDS: Stony Coral Tissue Loss Disease (SCTLD)

INTRODUCTION

Stony Coral Tissue Loss Disease (SCTLD), a lethal bacterial disease that started along the Florida Reef track in November 2014 spread rapidly across the Caribbean region. SCTLD is known to have affected more than 20 species of stony or hard corals (i.e., Scleractinia corals). These types of corals are critical to reefs as they provide them with their three dimensional structure, which offers shelter and hiding places for numerous reef organisms. In addition, some of the ecosystem services that coral reefs in general provide to small island developing states (SIDs) such as the British Virgin Islands (BVI) including the provision of nutrients for nearby ecosystems such as seagrass beds and mangroves along the shoreline, reefs buffer the coast from wave energy, a source of sand for beaches, and recreational activities. Coral reefs in the BVI are very important to the economy as they contribute immensely to the Territory's tourism sector. In 2014, The Nature Conservancy estimated that the value of coral reefs to the BVI at USD \$194,691,000.00. Of this amount, 68% was attributed to "On Reef Tourism" (e.g., diving, snorkeling, glass bottom boat etc.), while the remaining 32% was attributed to "Adjacent Reef Tourism" (e.g., beaches, calm seas, views, seafood etc.)

SCTLD was discovered in the neighbouring United States Virgin Islands (USVI) January 2019, and progressed eastwardly towards the BVI. One year later, March/April 2020, SCTLD's initial discovery in the BVI was noted during field investigations from a local non-governmental organization (NGO), Association of Reek Keepers, who reported susceptible corals displaying potential signs of SCTLD at the Indians, a popular dive site in the BVI. In addition, SCTLD was also observed at the only marine park in the Territory, the Royal Mail Ship Rhone (RMS Rhone), commonly referred to as the Wreck of the Rhone. By late May to early June of 2020, SCTLD was also reported in other locations in the BVI including Ring Dove Rock, Angelfish Reef, and Santa Monica and has continued to spread, infecting nearby reefs across the Territory until there were no reef left untouched. Currently, the only reef that is not impacted by SCTLD was Anegada, which is the most Northern Island in the Territory and is surrounded by the Horseshoe Reef, the largest barrier reef within the Territory.

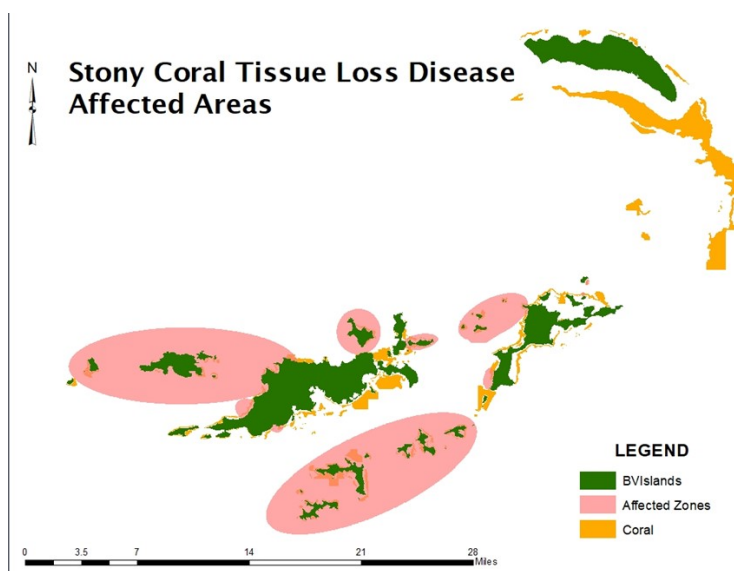


Figure 1. Spread of SCTLD across the British Virgin Islands

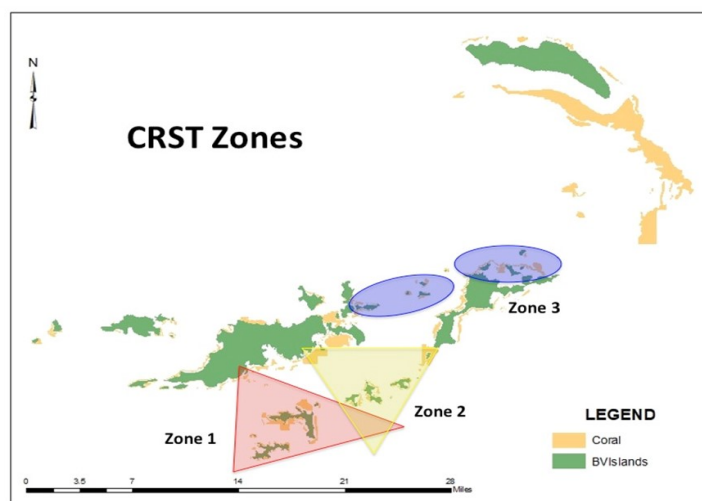


Figure 2. Geographic region designated into Zone managed by the BVI Coral

METHODS

Treatments administered to affected corals are in alignment with guidelines established by NOAA and MPA Connect. The treatment is applied using a catheter tip syringe that expands into the healthy tissue at the edge of the disease lesion(s). As part of the best practices based on the work completed in Florida, ocean managers are advised to revisit sites after two (2) weeks to determine the efficacy of the coral treatment and application, and retreat where necessary. Roving Diver Surveys (RDS) were used to assess the extent of SCTLD and its impact at various locations throughout the Territory. RDS were completed whereby a diver swam alongside a reef for roughly 20 to

40 minutes, recording all affected species in a zig-zag swimming path in a forward direction.

Field Exercises

Participants who were interested in combating SCTLD derived from the Dive Association. Volunteers were briefed on what SCTLD was, how it has impacted Florida, lessons learned, how to identify SCTLD from other diseases or predator marks, established monitoring protocols, treatment applications and storage. At the end of each training session, a quiz was distributed to participants, which covered the lesson taught. Over 30 volunteers were trained and were grouped into designated zones to effectively manage SCTLD within their respective space. A standardize data sheet was distributed to all volunteers

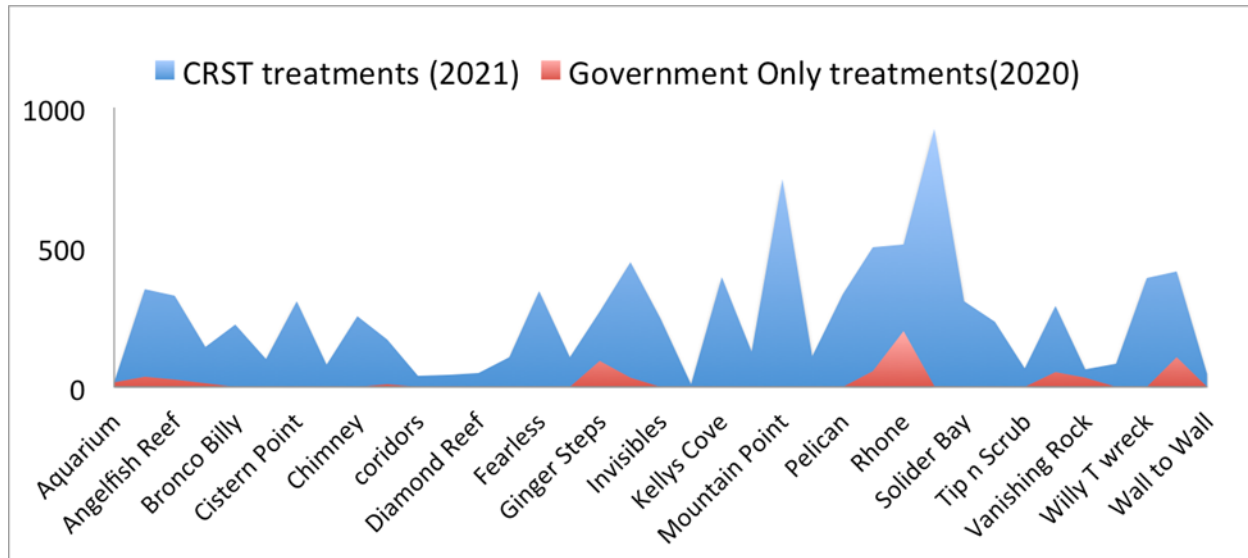


Figure 3. Government of the Virgin Islands SCTLD treatment efforts versus the combine treatment efforts from the CRST

which included coral size, number of lesions, quantity of antibiotic paste used, water depth and site locations were recorded. Treated corals were tagged using farm animal tags, which were utilized to determine the effectiveness of the antibiotic treatments. Completed data were uploaded via Dropbox for secondary verifications before its final approval. Prevalence of SCTLD spread was plotted using ArcGIS.

Educational Outreach

An extensive education outreach program was conducted to educate the general public about SCTLD, which consisted of:

Billboards erected on Virgin Gorda and Tortola (funded by Unite BVI)

The billboards showcased a staff from the NPTVI treating a coral affected with SCTLD. At the bottom of the billboards, the various logos of dive operators who formed part of the CST are included.

Animated cartoons on SCTLD (funded by Unite BVI and the Governor's Office)

Waterproof advisories imploring boaters to discharge away from land (funded by the Governor's Office).

Meet Stony

In the first episode of the cartoon series, "Meet Stony – Part 1", viewers are provided with background information about what corals are, their anatomy, some of their economic and ecological benefits, and human impacts. The education lesson is portrayed between a sassy coral and a diver who thinks the coral is a rock. Part 1 ends with a cliff hanger so viewers knew that something ominous was going to happen as a dark cloud lurked over the coral reef.

In the second episode, "Saving Stony – Part 2", which was released on March 3rd, 2021, viewers were brought up to speed on the dark cloud that was passing over the reef.

The ever vibrant and sassy coral was not as chipper as she was in Part 1. Her health was compromised and multiple lesions appeared along the body. The second animation introduced viewers to what SCTLD was, where it was showing up in the Gulf and Caribbean region, some of the players treating SCTLD in the BVI, and the importance of treating affected snorkeling and diving gear. In the third and final episode, "Thanks from Stony and Company. Part 3 highlighted the funders that assisted with the treatment measures and the education programme that the National Parks Trust of the Virgin Islands was able to facilitate based on the funding it received from the donors and thanking the Coral Strike Team.

RESULTS

Local efforts to mitigate the spread of infectious disease during Covid-19 proved to be very challenging and strenuous as it's a race against the clock. When SCTLD was first discovered in the Territory in May 2020, it was in its early stages of establishing itself within the BVI. However, like most countries, The Government of the Virgin Islands response to address and manage SCTLD was slow as the Government of the Virgin Islands utilized their resources in addressing and managing the spread of COVID-19 from impacting communities. Officers within the MNRLI who were competent to address the impacts of SCTLD were transferred to the Ministry of Health to assist with COVID-19 protocols, site inspections, and assisting with the reopening of businesses so that the Ministry of Health's new health guidelines could be satisfied.

Assessing and treating infected corals requires significant financial investment. At the time, of the National Parks Trust of the Virgin Islands (NPTVI) utilized their own funds in gathering the resources needed to tackle the disease by purchasing antibiotic treatment and fuel to carry out the divers. As finances were running thin, the Trust sought funding from the non-profit organization, UNITE

BVI, to request funds to continue their efforts. Volunteers were introduced to assist in SCTLD December 2020 and have proven to be an effective tool to monitor and cover all 60 islands within the Territory. The team completed over 600+ surveys, and treated over 7000+ corals across 45 dive sites.

The species that was most affected and treated for SCTLD were *Meandrina meandrites*, *Dendrogyra cylindrus*, *Eusmilia fastigiata* and *Montastrea cavernosa*. The use of antibiotic treatment has been an ineffective tool in halting the spread of stony coral tissue loss disease with corals that has long/deep corallites and grooves. Currently, the Government of the Virgin Islands are seeking alternative treatment measures such as antiseptic and chlorine treatment options as new outbreaks are emerging after a year of its initial presence within the Virgin Islands.

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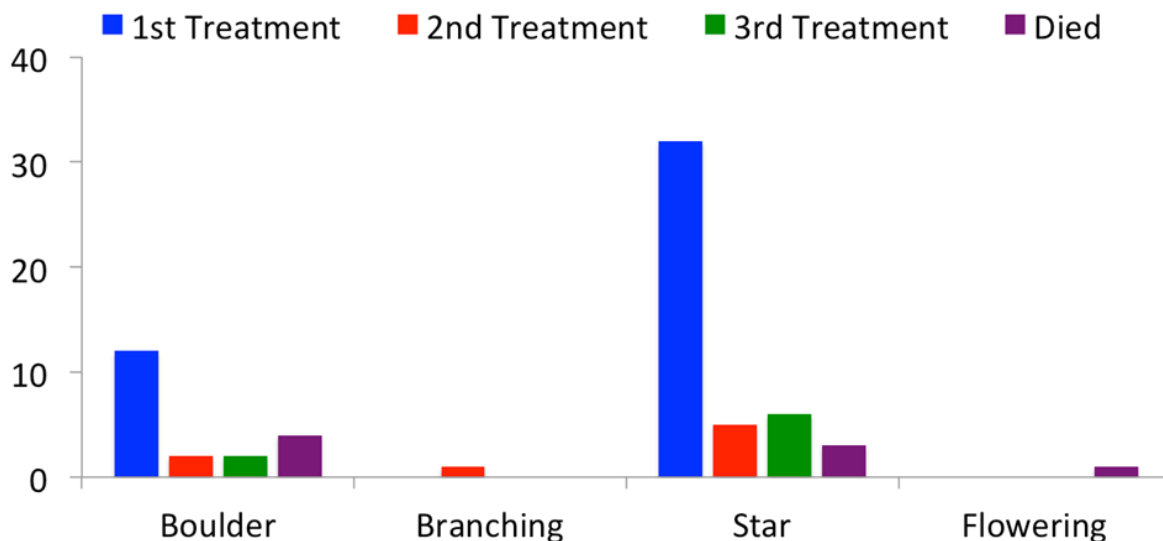


Figure 4. The effectiveness of applying antibiotic treatment on different coral species that were tagged. The asterisks indicate the data is incomplete.