Research Project Summary: Addressing the Threat of SCTLD in the Cayman Islands

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The project aims to detect and document the arrival of Stony Coral Tissue Loss Disease (SCTLD) and monitor the spread of the disease across the Cayman Islands. SCTLD was first observed in Grand Cayman at Penny’s Arch dive site, north side of Grand Cayman (19° 22' 35.8" N 81° 15' 56.7" W), June 2020 (Figure 1). A site visit was made on June 26th 2020, by members of the Department of Environment (DoE), Cayman Islands Government, in response to a disease report from Tom Byrnes, Cayman Marine Lab. A 15-minute opportunistic, dive survey was conducted to observe what species of corals were infected by the disease at approximately 8 - 15m depth. Colonies of Siderastrea siderea, Colpophyllia natans, Dichocoenia stokesii, Agaricia spp., Montastraea cavernosa, Pseudodiploria strigosa, Diploria labyrinthiformis, Meandrina meandrites, Orbicella spp., and Eusmilia fastigiata were highly compromised by the disease over a substantial distance. The disease outbreak resembles that described by Precht et al. 2016; affected species, susceptibility patterns, outward disease signs, rapid mortality rates, and similar overall community-scale impacts. The reefs being impacted in Grand Cayman have much higher coral cover and colony densities than those described in Florida (Precht et al., 2016); therefore, an immediate and rapid response effort was warranted. A coral disease response strike team was established by the Cayman Islands DoE to treat and monitor diseased corals, including a rapid response strategy to the outbreak.

Figure 1: Position of Penny’s Arch and Max’s Garden dive sites, north side of Grand Cayman.
Current Monitoring and Intervention Protocols

Rapid Disease Assessment
After the discovery of a potential SCTLD outbreak, a coral disease response team within the DoE, Marine Resources Unit, was established. Within days of the citizen science report, the DoE response team conducted two 60-minute roving diver coral surveys of the reported area (Penny’s Arch, north side Grand Cayman). During these surveys, the presence or absence of potential SCTLD in the area was noted across a variety of hermatypic coral species, finding overwhelming evidence that this was indeed an SCTLD outbreak (Figure 2).

![Graph showing coral species affected by SCTLD](image)

*Figure 2: Results from a 60-minute roving diver, coral disease survey at Penny’s Arch dive site, north of Grand Cayman, 29/JUNE/2020.*

A manta-tow was then conducted on the same day East and West of the outbreak site to establish the spread of area impacted by the disease outbreak. After estimating these boundaries, a “control” site was established approximately 2 km (one nautical mile) to the West of Penny’s Arch at Max’s Garden (Figure 1.). The control site, Max’s Garden appeared to be unaffected by SCTLD at that time, so the response team replicated two 60-minute roving diver coral surveys for the presence or absence of SCTLD (Figure 3).
Figure 3: Results from a 60-minute roving diver, coral disease survey at Max’s Garden dive site, north of Grand Cayman, 30/JUNE/2020.

To monitor SCTLD progression across a variety of species over time, a structure-from-motion (SfM) photogrammetry technique was established to quantify the prevalence and virulence of the disease at each site. This was done by tagging hermatypic corals of interest at each location and re-photographing every 3-7 days over the coming weeks-months of this project’s implementation (Figure 4). In total, at Penny’s Arch (Diseased Site) 57 colonies were tagged, and at Max’s Garden (Control Site) 126 coral colonies were tagged.

Figure 4: Repeted measures survey of a SCTLD infected Dichocoenia stokesii at Penny’s Arch, 8th – 21st July 2020.

An island-wide search for SCTLD using manta-tows was initiated by the DoE to establish whether there were other SCTLD infected areas around Grand Cayman. Over one month, approximately 75% of the island’s shallow reef terrace has been monitored for SCTLD (Figure 5). Results demonstrate that approximately seven (7) km (four statute miles) of the north coast of Grand Cayman has been infected by SCTLD. Additional strike teams have been established to do replicate surveys in the sister islands: Little Cayman and Cayman Brac. Additionally, the DoE is working with local dive companies and NGOs to meet the objectives of this project.
Future Monitoring and Intervention Protocols

Pending approval from the National Conservation Council of the Cayman Islands, a variety of intervention techniques previously used in Florida and other Caribbean countries to mitigate the spread of SCTLD will be implemented. Proposed methods include the use of amputation experiments, removal of diseased colonies, antibiotic treatments (Neely et al., 2020), double-banded chlorinated epoxy (Aeby et al., 2015) trenching and probiotic treatments (pending verification from recent experiments by the Smithsonian Institution). Consideration will be given to establishing in-situ and ex-situ coral refuge sites, which will be used to store genetic material from infected sites and highly susceptible species such as *Dendrogyra cylindrus* (Neely and Lewis, 2020).

The work conducted thus far and proposed work outlined will address the necessary rapid response needed to confront the SCTLD outbreak that is currently underway in the Cayman Islands. Through collaboration with reputable international scientists and institutions to tackle this new disease and find viable solutions, the DoE not only galvanizes its commitment to protecting the Cayman Islands coral reefs but coral reefs regionally. The potential of this disease to reduce and diminish coral reefs functionally in the Caribbean region is colossal. It necessitates countries and coral reef scientists in the Caribbean region working together to find actionable solutions.
References


