

undercurrent

The Private, Exclusive Guide for Serious Divers

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Special Report

Dear Fellow Divers,

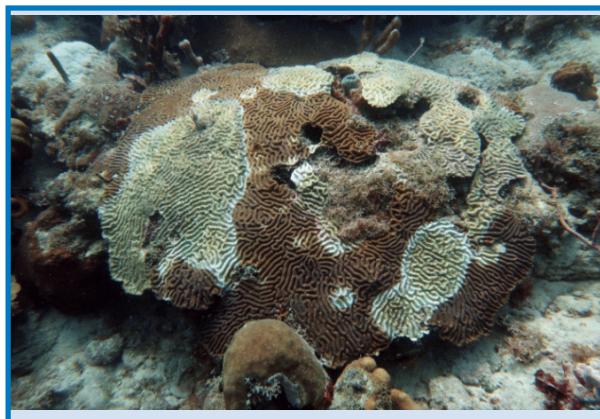
First discovered seven years ago, Stony Coral Tissue Loss Disease has been spreading through the Caribbean, affecting our favorite reefs from the Bahamas to Grand Cayman to Cozumel. The there is no cure in sight.

We've prepared this special report to help you understand the full impact. There is no direct evidence that divers spread the disease, however it is conceivable and cannot be discounted. We divers and dive operators should take a few simple steps to ensure we're not part of the problem.

— John Bantin and Ben Davison

New Thoughts on Stony Coral Tissue Loss Disease *and a role for divers to play*

In recent years, we have reported on Stony Coral Tissue Loss Disease, which is mysteriously spreading and rapidly decimating hard corals throughout the Caribbean and Atlantic. In 2019, diving was restricted along sections of Cozumel's reefs to research the disease and perhaps stop the spread. In June, the Grand Cayman Department of Environment suggested that it is a "bacterial pathogen that is transmitted by touch and water circulation." The disease was not spreading in a continuous line, but popping up at significant distances from diseased commonly-dived reefs, suggesting that divers may be spreading this destructive disease. The Cayman government has now exhorted divers to avoid diving in more than one location on the same day and disinfect their equipment between dives.



Brain coral affected by SCTLD

The Depressing Facts

First identified in Florida in 2014, SCTLD has become the scourge of hard corals throughout much of the Caribbean, from Florida as far south as St. Lucia, and westward to Mexico, Belize and Honduras. While the cause is still unclear, Dr. Lorenzo Alvarez Phillip, a researcher from the

University of Mexico, told *Undercurrent* that scientists are now hypothesizing that it's a "consortium of bacteria (supported by the response to antibiotics and genetic analysis), but it is also likely that the initial damage is caused by a viral infection and that bacteria attacks later when the coral is weakened." In Florida, it's spreading at the rate of 300 feet each day. And, the only means to fight it is for divers to apply an antibiotic

paste directly to affected corals, an arduous and time-consuming process.

One oddity is that it appears to have trouble moving across substantial stretches of water without assistance. The Bahamas has the closest reefs to Florida, yet there were no reports of SCTLD in the Bahamas until 2019, despite rising local sea temperatures and the hurricanes moving water. Within a few months, it became widespread, affecting popular Nassau diving and fishing reefs close to major shipping ports.

In Mexico, more than 40 percent of the reefs in one scientific study have suffered, with at least 10 percent of its hard corals infected. In Florida, regional decline in coral density is approaching 30 percent, with live tissue loss of more than 60 percent. It's serious.

Ship Ballast and Bilge Water the Major Culprit?

It may be that the ballast and bilge water from commercial and cruise ships play a significant role in transmitting the disease, a theory supported by a recent peer-reviewed study published in *Frontiers in Marine Science*. Scientists from the Perry Institute for Marine Science found the disease more prevalent on Bahamas' reefs close to the main ports of Nassau and Grand Bahama, pointing an accusing finger at visiting ships.

In 2017, the spread of other deadly pathogens from discharged ship's ballast water, which is collected from the ocean wherever they travel, prompted the International Maritime Organization to implement the Ballast Water Management Convention. It requires that ships discharging ballast water do so 200 miles from shore and in water at least 660 feet deep before entering port.

Ships are notorious for not following discharge rules. Their captains are reluctant to dump ballast water so far from their destination, especially when the weather is anything less than flat calm. Thousands of gallons are taken onboard or released when a vessel needs to be stabilized, for example, to prevent the loss of deck cargo such as containers. Ballast water allows a ship to float at the correct depth to stay level and stable when cargo is loaded or unloaded at ports or during bad weather. Ballast water has been identified as one of the major pathways for the introduction of non-indigenous marine species. A ship's ballast water will inevitably contain a mixture of water from multiple ports and a mix of pathogens within it.

Even with such distant discharge in the Atlantic, the prevailing currents and the westward winds

in the Caribbean will push ballast water toward Florida and the Bahamas, carrying the pathogens with it.

As for Grand Cayman, the latest map shows that the windward side, the entire north and east coasts, has been infected, with the disease now creeping around the west end to the shipping ports. But, perhaps it's north and east of Grand Cayman where ballast water is released on a ship's journey.

Did Divers Usher Along the Disease in the Caymans?

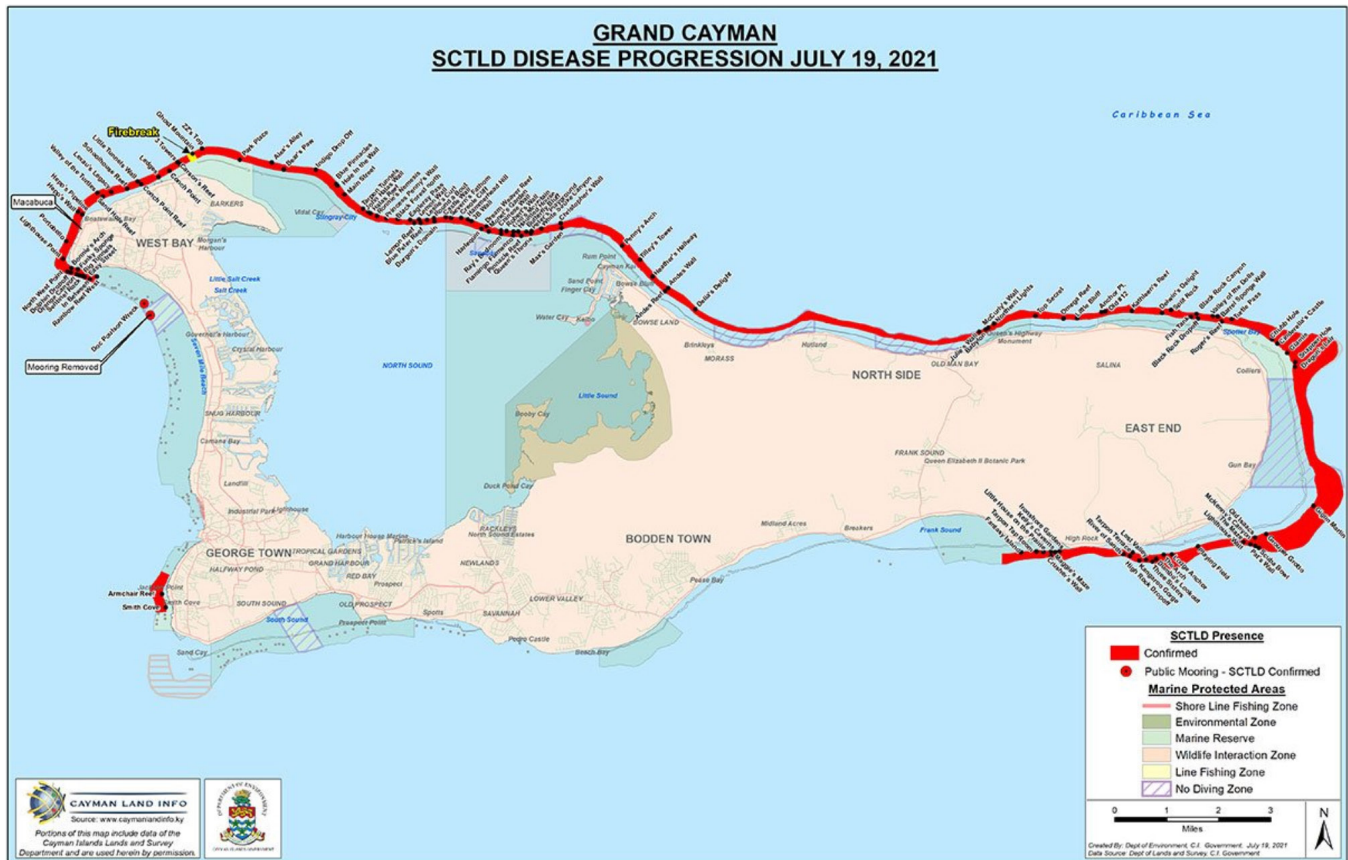
Because major reefs infected in Cayman are where most dive boats go and were affected randomly, not systematically, Cayman scientists have speculated that divers pick up the bacteria and transmit it to other reefs. Dr. Erinn Muller of the Mote Marine Laboratory told *Undercurrent* that she doesn't dismiss out of hand that divers can spread the disease, but "It would be really difficult to conclusively say that divers are causing 'jumps' at the small spatial scale (<1 to 10 or so km) because near-shore/small-scale currents are not well known, seasonal, and ephemeral. Also, certain reef characteristics (physical structure, species composition, etc.) may result in the acquisition of more disease agents over time compared with others, which may result in different disease onsets for reefs . . . I believe most studies indicate the oceanographic characteristics (temporal eddies, countercurrents, etc.) can explain those small-scale jumps."

That said, she's not dismissing a diver impact: "We don't know what is causing this disease, so appropriate sterilization of gear between dive sites and trying to dive in healthy sites prior to visiting disease sites (rather than the opposite) are great biosecurity measures to prevent the spread of a disease that we know is waterborne and transmissible."

Still, she says that she doesn't believe there is any evidence showing a direct influence of diver spread; however, "a lot of evidence suggests that some type of human activities (boating, divers, etc.) is needed to explain the large geographic jumps that SCTLD has displayed (i.e., from Florida to the USVI or Florida to the Caymans)."

What's Happening in Cozumel?

Dr. Alvarez-Filip, who is studying the disease on Cozumel's reefs, told *Undercurrent* that he knows of no "solid scientific evidence in favor of or against the possibility that divers contribute to the spread of the SCTLD. That said, I do believe that the hypothesis of divers serving as vectors of the disease is logical, and, in some places, like Cozumel that



has thousands of visitors, is a very likely explanation.”

A peer-reviewed paper, of which he was one of five authors, reported that “The means by which SCTL DISEASE arrived in SW Cozumel remains uncertain, particularly because Cozumel is separated from the mainland by a deep-water channel in which the strong northward Yucatan Current passes, acting as a barrier to biological connections. However, we can speculate on three possible causes of the outbreak that are not mutually exclusive. First it is possible that the outbreak circled the island, aided by the predominant currents that run from south to north. Another potential source for the outbreak may be that recreational divers or dive-masters brought the disease to SW Cozumel from the mainland. It is common for divers to travel among multiple locations within a single trip. As such, divers could have brought the disease with them via their diving gear. Lastly, it is feasible that the high influx of ships arriving in Cozumel served as a vector for the disease . . . [one thousand cruise ships a year, commercial ships, and daily ferries] . . . Ballast water from commercial ships has been linked to the transmission of SCTL DISEASE across the Caribbean region.” (For the complete study on Cozumel, view this link <https://www.frontiersin.org/articles/10.3389/fmars.2021.632777/full>)

Dr. Alvarez-Filip says, “given the magnitude of the threat that the SCTL DISEASE represents, we need to consider all the possibilities and take the precautionary approach – even if we are not sure that it might serve as a vector of the disease. I would recommend taking all the possible measures, that include dive gear decontamination or even the closure of some areas where the disease is known to be present, to help to slow down or even halt the spread of this deadly disease.”

What Should Dive Operators Do?

So, while there is no evidence that divers transport the disease, there is equally no evidence that they don’t or can’t. So while the jury is out on the role of a diver, a responsible dive operator should engage in at least two activities.

- Wash down all dive gear between trips; disinfect if possible.
- If you must dive an infected reef, make it your last dive so you don’t carry the infection to your next stop.

Since good reefs are the underpinning of a dive operator’s business, these are two small steps that just might help preserve that business.

– John Bantin and Ben Davison