The United States Virgin Islands

TERRITORIAL CORAL REEF MONITORING PROGRAM

ANNUAL REPORT

2017

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MISSION

Mission

OUR VISION

To provide critical information on the status and threats to all Virgin Islands coral reef ecosystems, increasing management effectiveness and improving basic and applied coral reef research

OBJECTIVES

- **Monitor the status and trajectories of coral reefs across a majority of habitats and threats, including land-based sources of pollution & thermal stress**
- **Link changes in coral reef health with specific stressors, indicating specific management interventions most effective for preserving reefs**
- **Integrate assessments of understudied mesophotic coral reef ecosystems and threatened species in the USVI**
- **Provide data, outputs, and advice to stakeholders and create a nexus of information for reef research**

EXECUTIVE SUMMARY

Executive Summary

Coral reefs in the Caribbean are facing a dramatic decline and are at a crossroads. Management decisions made today will affect the goods and services that reefs provide for decades to come. The government of the United States Virgin Islands (USVI), in coordination with the NOAA Coral Reef Conservation Program and the University of the Virgin Islands, implemented the **Territorial Coral Reef Monitoring Program** (TCRMP). The TCRMP has established baseline conditions and temporal trends of coral reefs and fish populations and has identified threats that will influence the future reef health and development.

A major focus of the TCRMP is to provide information that can lead to more effective management strategies that balance the immediate needs of the Virgin Island's population with preservation and sustainability of coral reefs and the renewable goods and services they provide.

The intent of this report is to distill monitoring data into actionable information that can guide management decisions and inform the public and policy-makers about areas that need further effort. This executive summary presents information on threats to USVI reefs that require management intervention/action as well as positive signs that can inform our understanding of sustainability.

CORAL REEFS OF THE VIRGIN ISLANDS: MANGEMENT ACTIONS NEEDED

The TCRMP data has identified threats to USVI coral reef ecosystems that need increased management attention if reef corals are to persist in a condition that is equal to or better than current conditions.

Coral Reef Bleaching. High thermal stress caused by climate change is currently the greatest threat to USVI coral reef ecosystems. The 2005 coral bleaching event caused the largest loss of coral in the documented history of the USVI, with a 50% decline in coral cover in shallow waters less than 25m/85' deep (Smith et al. 2013b; Smith et al. 2016a). This event surpassed all known modern impacts from physical damage (storms and anchoring), ecosystem changes (fishing and disease), and pollution (terrestrial sediments and toxins). These events are predicted to increase with a warming planet, troubling news for the USVI.

While local management actions cannot remove impacts to reefs from global warming, reefs that are otherwise less stressed by land-based sources of pollution, fishing, and/or physical damage are known to recover more quickly from bleaching. Hence, local management actions that promote seascape-wide coral reef health offer the best strategy for sustainable reefs. We can also identify areas that are naturally more resistant to thermal stress and offer these areas further protection, since they offer insurance against the worst possible future outcomes for USVI reefs.

Figure 1. Partially bleached and recovering colony of *Siderastrea siderea* at Flat Cay, St. Thomas (Nov. 12, 2005).

Overfishing. There are clear indications that reefs of the USVI are suffering the effects of overexploitation of reef resources, although there are also positive signs. The entire district of St. Croix has an extremely low abundance of commercially important grouper species, including the threatened Nassau grouper (Kadison et al. 2017). In St. John and St. Thomas, many common species have completely or nearly disappeared from nearshore waters in the last 30 years. For example, a study conducted by Rogers et al. (1982) on the southwest coast of St. Thomas during the airport runway expansion (1979-1981) found a variety of species that are no longer encountered or are rare, including the black, Nassau, tiger, and yellowfin groupers, as well as the federally protected parrotfish species blue, midnight, and rainbow. A study by Randall (1963) also found high relative abundances of groupers and threatened parrotfish on the south coast of St. John. Rebuilding these fish stocks will require comprehensive life-history information for target species, a willingness to find strategies to rebuild stocks, and partnerships between commercial and recreational fishers, community stakeholders and managers.

Land-Based Source of Pollution. The steep hillsides of the USVI are natural conduits for run-off during heavy rain events and in many instances there is little interception of materials before they reach the sea and impact coral reefs. When tropical soils are naturally disturbed or altered through human activity, they can erode and release fine-grained silt and clay particles. In the USVI, these fine-grained particles are quickly transported to coral reefs where they can block sunlight, directly smother corals, or increase the growth of organisms that compete with corals for space. There is evidence from the TCRMP that terrestrial sediments are having large negative impacts on nearshore coral reefs by increasing mortality of ecologically important corals (Henderson et al. in press).

EXECUTIVE SUMMARY

CORAL REEFS OF THE VIRGIN ISLANDS: POSITIVE SIGNS

Despite the incredible declines in reef health witnessed since the inception of the TCRMP in 2001, there are many positive signs for the USVI that should be highlighted. These successes offer lessons that can be applied to troubled reefs and may indicate refuge areas where we might "double-down" on current management strategies.

Reef Refuges. The USVI is blessed, perhaps uniquely for the Caribbean, with extensive areas of deep bank and slope reefs that may be buffered from the direct impacts of local pressures (Smith et al. 2019a,b). The mesophotic (pronounced: me-zo-photik; meaning; "middle-light") reefs of the USVI are the best developed in the Caribbean from what is currently known. Mesophotic Coral Ecosystem (MCE) bank reefs with high populations of star corals (*Orbicella* spp.), which have recently been listed as threatened on the United States Endangered Species List (NOAA 2014), form extensive tracts on the south shelf of St. John and St. Thomas, from the British Virgin Islands to Vieques, Puerto Rico. Well-formed, but patchier mesophotic boulder coral reefs also form on the Lang Bank, St. Croix and the northern Puerto Rican Shelf. The lower MCE consists mostly of lettuce corals (primarily *Agaricia undata*) and form a semi-continuous ring on steep slopes and walls at depths between 50-70m. These reef are isolated from some local impacts, but may be susceptible to global climate change (see below).

In federal waters some of these areas are wholly or partly protected from fishing of ecologically important species that help maintain reef health. These include the Red Hind Marine Conservation District (est. 1999), the Grammanik Bank Seasonally Closed Area (est. 2005), and the Lang Bank Red Hind Seasonally Closed Area (est. 1993). However, extensively developed mesophotic reef in unprotected territorial waters also exist near the island of French Cap and Sail Rock, St. Thomas District. It is important that these areas are identified, their threats assessed, and they are incorporated into the territorial and federal management planning process.

Rebounding Fisheries Species. There are positive signs of recovery for certain fish species in some areas. At the Grammanik Bank grouper spawning aggregation site there have been increasing numbers of Nassau grouper present for annual spawning (Kadison et al. 2010; Jackson et al. 2014) and a red hind aggregation in the Red Hind Marine Conservation District (MCD) has dramatically rebounded (Nemeth 2005). Red hind caught in the fishery on the south side of St. Thomas are more numerous and larger (D. Olsen, pers. comm.). In 2015 there was a recruitment pulse of juvenile Nassau grouper to shallow nearshore environments of St. Thomas and St. John in 2015. In Brewers Bay, St. Thomas over 70 juvenile Nassau grouper were recorded (R. Nemeth, unpub. data), increasing evidence that the reproductive population is contributing to the recovery of the species. It is also the impression of the authors that stocks of grouper and snapper are increasing in the MCD, although TCRMP measurements are confounded to some degree by the rotating array of aggregating fishes. Other territorial and federal closed areas in St. Croix, St. John, and St. Thomas are more recently established and may not show effects for several years. Although uncommon, Nassau grouper have been seen around St. Croix since 2011, a positive sign. For species that are completely protected from fishing (Nassau grouper and blue, midnight, and rainbow parrotfish), educational campaigns for recreational and commercial fisherman are critical, as awareness of regulations appears to be lacking (Authors, unpub. obs.).

Land-based source of pollution. While development of steep island slopes has continued despite current regulations intended to prevent sediments from entering nearshore waters, research has identified key targets for restoration and some effective habitat restoration best-management practices. Results from TCRMP research suggest that there are certain levels of silt-laden terrestrial run-off that are damaging to corals, providing a target for reductions of sediment in the marine environment (Henderson et al. 2019). Unpaved road segments have been implicated as the worst culprits in the production of sediment-laden run-off (Ramos-Scharrón and MacDonald 2007b) and this provides a clear target for where management can be most effectively applied. Restoration of watersheds has shown that implementation of best-management practices and control structures can be effective in reducing sedimentation. For example, the American Recovery and Reinvestment Act project “USVI Coastal Habitat Restoration Through Watershed Stabilization” showed promising results (Virgin Islands Resource Conservation and Development Council; P.I. M. Taylor).

This report presents results of the 17th year of monitoring on reefs surrounding St. Croix, St. John, and St. Thomas (years 2001-2018). *This year of monitoring was impacted by the passage of Hurricane Irma and Hurricane Maria in September 2017, before the initiation of monitoring. Due to heavy damage to the territory and to the UVI marine science facilities, in particular, monitoring scheduled for October – December 2017 was not completed until the spring of 2018.*

Monitoring sites were distributed across the insular platform in depths from 5 to 63 m (16 – 220’) in an effort to capture the diversity of reef types present in the Virgin Islands. Long-term data is presented from 33 sites. While not exhaustive, the TCRMP is generally representative of the geographic areas and variety of reef types in the USVI. Digital video and diver surveys were used to quantify benthic cover and coral health at 14 permanent sites surrounding the island of St. Croix and 19 permanent sites on the Puerto Rican Shelf surrounding the island of St. John and St. Thomas. In addition, at 32 of these sites sea urchin density and fish community structure were evaluated.

All data is now available at the TCRMP website and updated annually after quality control:

https://sites.google.com/site/usvitcrmp/home