



Marine Benthic Communities: Coral Reef Monitoring in Virgin Islands National Park

2021

Importance: *A critical resource for fisheries, tourism and marine biodiversity*

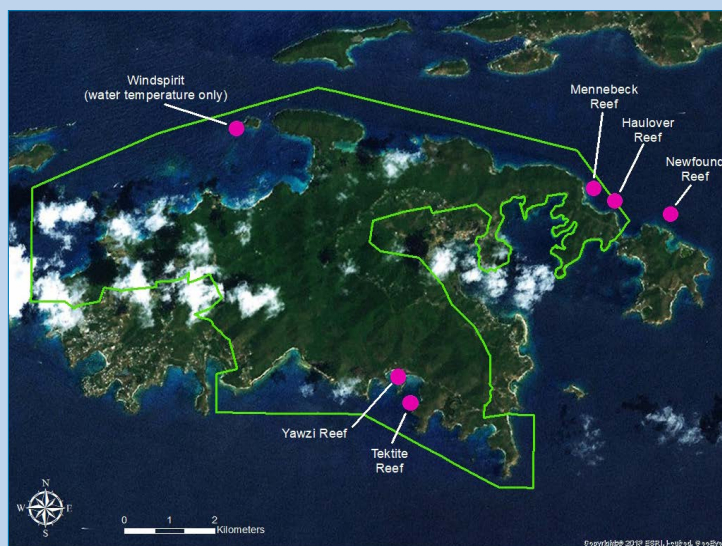
Coral reef communities within Virgin Islands National Park (VIIS) consist of stony corals, octocorals (i.e., gorgonians, sea fans) sponges, and algae. Reefs support incredible marine biodiversity including hundreds of coral and fish species, as well as sea turtles, lobsters and other marine invertebrates. Reefs play a vital role for humans by providing juvenile fish habitats, protecting shorelines from erosion, creating sand for beaches, supporting tourism and as a source for pharmaceuticals. Monitoring coral reefs was identified as a national priority in President Clinton's Executive Order 13089, establishing the Coral Reef Initiative. Coral reefs are negatively affected by rising seawater temperatures that cause "bleaching," coral diseases, storms, and ocean acidification. Local stressors include vessel groundings, over-fishing, damaging fishing methods (e.g., fish traps), sediment runoff, nutrient enrichment, contaminants, and abrasion and fracturing of corals reef by debris or careless snorkelers and divers.

Long-term Monitoring: *Five coral monitoring sites*

The South Florida/Caribbean Network (SFCN) annually monitors five coral reef sites: Newfound Reef (established 1999); Yawzi Reef (established 1999); Mennebeck Reef (established 2000); Haulover Reef (established 2003); and Tektite Reef (established 2005). Sites were selected based on several criteria including management recommendation, high initial coral cover, comparability with historic work, and levels of stressors in different watersheds. Each site consists of 20 permanent, randomly selected 10-meter (32.8-foot) transects which are monitored using underwater video. Percent cover of living coral by species, macroalgae, turf algae, crustose coralline algae, octocorals, and sponges is calculated. Data on coral disease, bleaching, water temperature, and long-spined sea urchins are also collected.



Above: Star coral community, *Orbicella annularis*, one of the most abundant corals on Virgin Islands National Park reefs.



Above: The five reefs monitored by South Florida/Caribbean Network are: Yawzi Reef (7,125 square meters [76,693 square feet]), Newfound Reef (13,768 square meters [148,198 square feet]), Mennebeck Reef (12,495 square meters [134,495 square feet]), Haulover Reef (13,568 square meters [146,045 square feet]), and Tektite Reef (18,711 square meters [201,404 square feet]). All are forereef features between 2–20 meters (6.6–65.6 feet depth). Water temperature is also monitored at all sites.



Status and Trends: Thermal stress and Stony Coral Tissue Loss Disease (SCTLD) cause substantial mortality and reduce coral recovery three years after direct hits by two major hurricanes (2017)

Despite two major Hurricanes (Irma and Maria) striking St. John in 2017, the most significant impact on coral cover recently is coral disease. In 2005–2007, coral bleaching and disease led to a loss of more than 60% of the average coral cover at the five monitoring sites. Currently, the extremely virulent coral disease, Stony Coral Tissue Loss Disease (SCTLD), is killing coral throughout Virgin Islands National Park. Monitoring revealed average coral cover declined at four of the five monitoring sites (average decline = 15.3%) with each of those sites recording the lowest coral cover values ever in their monitoring

history (Figure 1). Haulover and Mennebeck Reefs had historically high values for area killed by disease in 2021. All the common reef-building coral species are affected by SCTLD: the three *Orbicella* spp. and *Montastraea cavernosa*, *Siderastrea siderea*, *Pseudotrigona diploia*, *P. clivosa*, *Colpophyllia natans*, and *Dendrogyra cylindrus*. Several species considered highly or moderately vulnerable to SCTLD (including the last four species listed), while not historically present in high abundance, are nearly undetectable at the monitoring sites. Only the branching corals (*Acropora palmata* and *A. cervicornis*) weren't affected by SCTLD. Additionally, reef-depth water temperatures were again above the bleaching threshold (Figures 2 and 3) causing coral bleaching and thermal stress on coral communities. Despite another active hurricane season only tropical storms winds were experienced locally during storms in 2021.

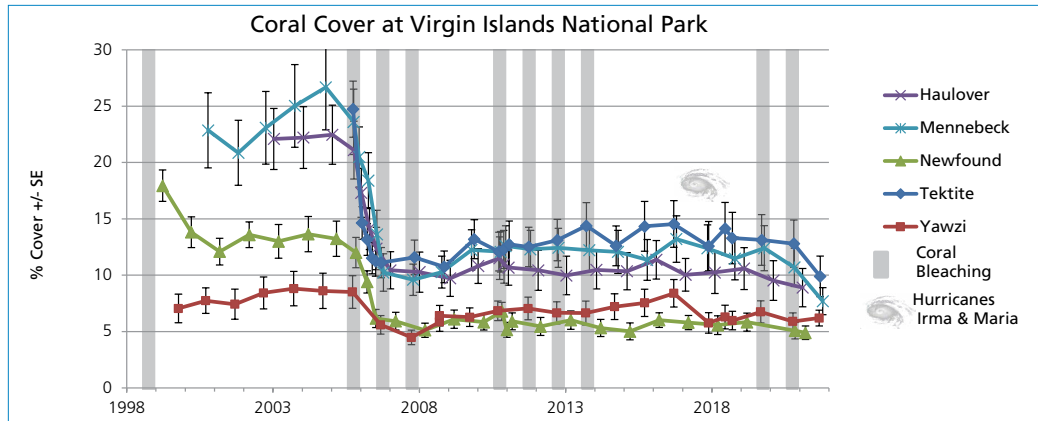


Figure 1. Trends in average ($\pm$ SE) stony coral cover and notable events at index sites throughout Virgin Islands National Park. (Note: coral bleaching occurs when corals under stress lose their symbiotic algae and look white or “bleached.”) The most common stony coral present is Boulder Star Coral (*Orbicella* spp. complex) although Yawzi Reef also has relatively high amounts of appreciable Mustard Hill Coral (*Porites astreoides*), Finger Coral (*P. porites*), and Massive Starlet Coral (*Siderastrea siderea*).

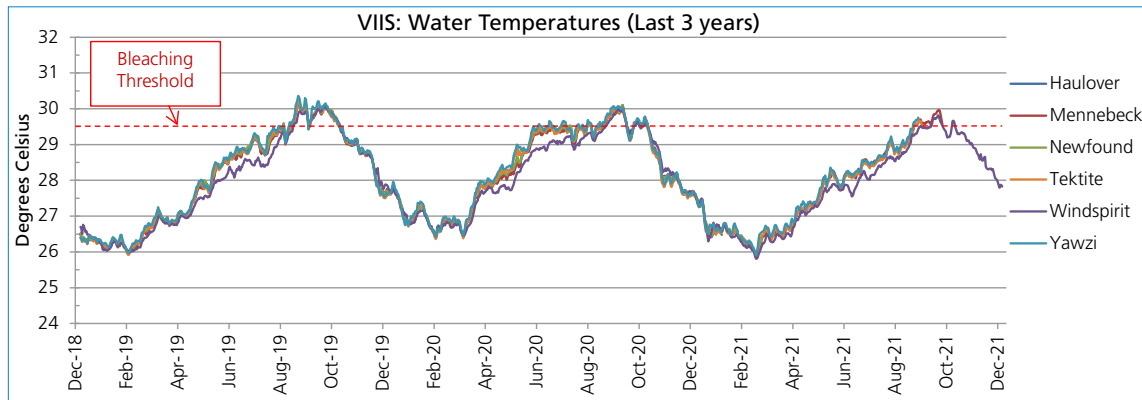


Figure 2. Virgin Islands National Park water temperature data from six sites at reef depth using underwater data loggers. Monitoring of water temperature at Yawzi and Windspirit was initiated in 1990, Newfound in 1991, Haulover in 1998, and Mennebeck and Tektite in 2005.

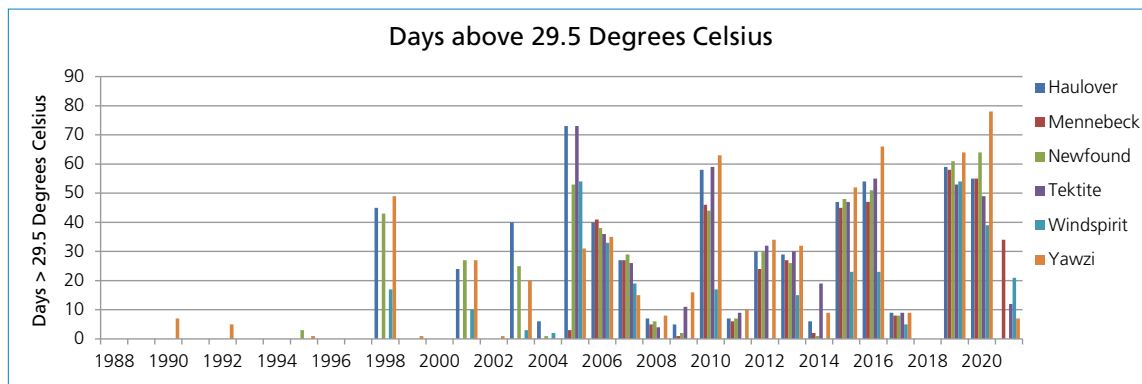


Figure 3. Although 2018 was the first year since 2000 with no days above the bleaching threshold (29.5°C [85.1°F]), 20 of the past 24 years have had multiple days of thermal stress above this threshold.

