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

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

Coral reef communities within Virgin Islands National Park (VIIS) consist of stony corals, octocorals, sponges, algae, and gorgonians (e.g., sea fans). Reefs support incredible marine biodiversity including a multitude of fish species, as well as lobsters, sea turtles, and other creatures. Reefs play a vital role for humans by supporting fisheries, fishery nursery areas, tourism, sand creation for beaches, pharmaceutical bio-prospecting, and shoreline protection to name a few. Monitoring coral reefs was identified as a national priority in President Clinton's Executive Order 13089, establishing the Coral Reef Initiative. These coral reefs are negatively impacted by events such as extreme water temperatures that cause "bleaching", vessel scarring, and major storms, as well as long-term stressors such as coral disease, over-fishing, damaging fishing methods, sediment runoff, nutrient enrichment, contaminants, ocean acidification, and abrasion of the reef by debris or careless snorkelers and divers.

2012

Tektite Reef in Virgin Islands National Park.

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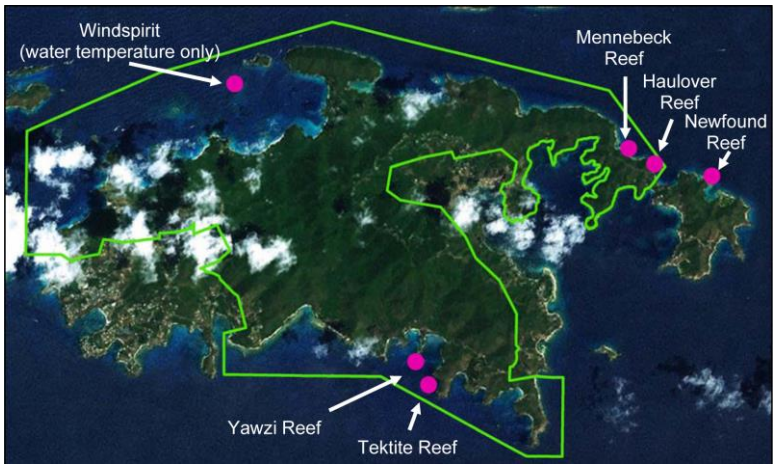
Long-term Monitoring: *Five coral monitoring sites*

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



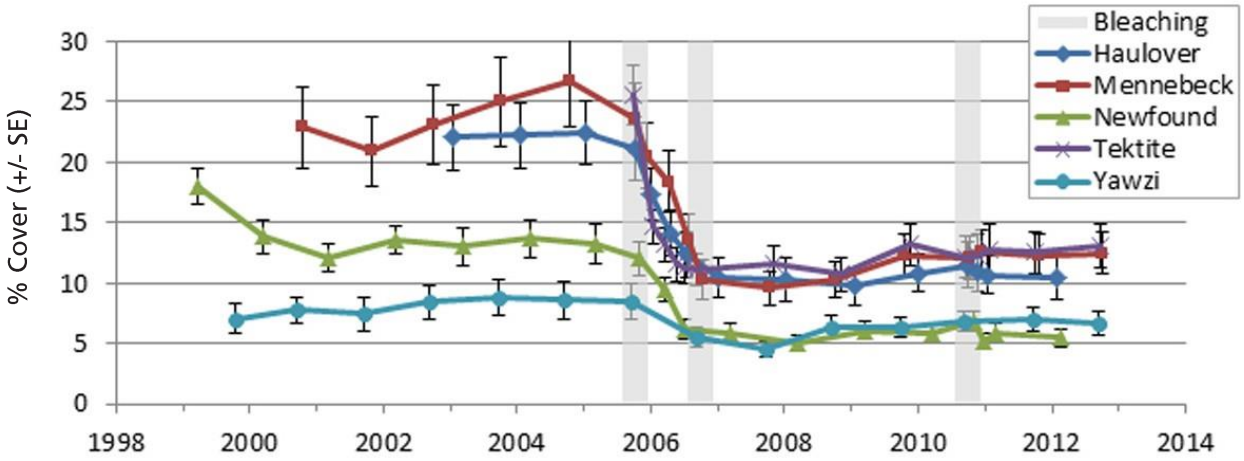
The five reefs monitored by SFCN are: Yawzi Reef (7,125 m^2), Newfound Reef (13,768 m^2), Mennebeck Reef (12,495 m^2), Haulover Reef (13,568 m^2), and Tektite Reef (18,711 m^2).

All are forereef features between 2-20m depth. The most common stony coral present is Boulder Star Coral (*Montastraea annularis complex*) although Yawzi Reef also has appreciable Mustard Hill Coral (*Porites astreoides*), Finger Coral (*Porites porites*), and Massive Starlet Coral (*Siderastrea siderea*).
Water temperature is also monitored at a sixth site called Windspirit.

Status and Trends: *Small upward trend in stony corals post 2005-2006 bleaching/mortality event*

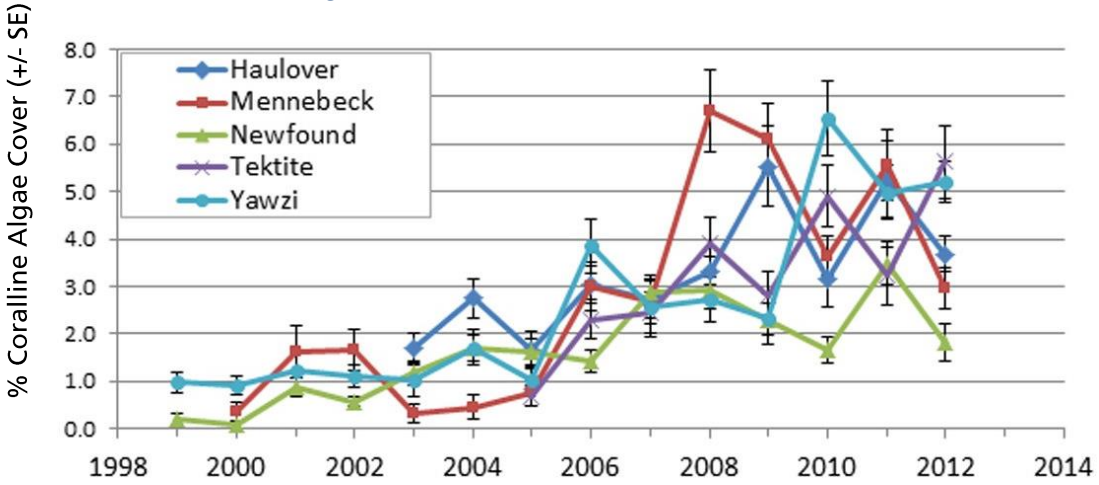
In 2005-2006, soaring water temperatures were associated with a coral bleaching/disease outbreak followed by catastrophic stony coral mortality. In 2012, stony coral cover remains 22-58% below pre-event levels. However, since 2007, a small but statistically significant increase in stony coral cover has occurred at Mennebeck, Tektite, and Yawzi sites. In addition, crustose coralline algae, thought to be a critical substrate for coral recruitment, has increased at all sites. And while coral bleaching occurred in 2010, temperatures peaked below 2005 levels and widespread coral disease outbreaks did not occur.

Average Stony Coral Cover (%)



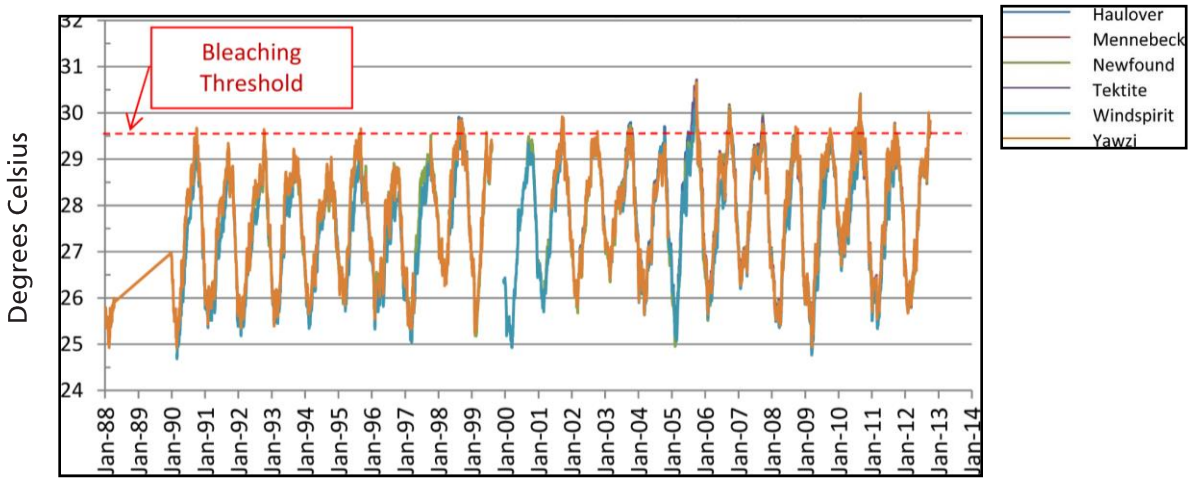
Trends in live stony coral cover at index sites throughout VIIS. Grey bars indicate coral bleaching/ disease event of 2005 that continued into 2006 and the coral bleaching event in 2010.

Percent (%) Coralline Algae Cover



Trends in coralline algae cover at 5 reef monitoring sites in VIIS. Crustose corraline algae has been found to be a critical substrate for coral recruitment, so this is assumed to be a beneficial trend for reef health.

Water Temperature at Reef Depths



VIIS water temperature data from six sites at reef depth using underwater data loggers. Monitoring at Yawzi and Windspirit were initiated in 1990, Newfound in 1991, Haulover in 1998, and Mennebeck and Tektite in 2005. The bleaching stress threshold of 29.5°C for the Virgin Islands parks is shown. Note: The Windspirit site does not have concurrent coral monitoring.