The following supplement accompanies the article

Decadal-scale changes in the community structure of coral reefs of St. John, US Virgin Islands

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SUPPLEMENTAL MATERIAL

Text S1. Measurement of seawater temperature

Methods

Seawater temperature was recorded every 15-30 min using a Ryan Industries thermistor (± 0.3°C accuracy) at 11-m depth from January 1989 to April 1997, and from November 1997 to August 1999; an Optic Stowaway logger (± 0.2°C accuracy) at 9-m depth from May 1997 to October 1997, and from August 1999 to August 2001; and a Hobo Aquapro logger (± 0.2°C accuracy) at 9-m depth from August 2001 to August 2011. Temperatures were averaged by day and month and used to calculate annual mean and range using monthly mean temperatures. Daily temperatures were used to categorize days as hot (> 29.3°C) or cold (≤ 26.0°C), with hot days exceeding the coral bleaching threshold for St. John (http://coralreefwatch.noaa.gov/satellite), and 'cold days' less than or equal to the lower 12th percentile of daily seawater temperatures in Great Lameshur Bay between 1989-2005 (Edmunds 2006).

Results

In 1989, mean annual seawater temperature was 27.0 ± 0.4°C (± SE, n = 12 months), there were 94 d with temperatures ≤ 26.0°C, and none ≥ 29.3°C. Twenty-three years later, the mean annual temperature was 27.7 ± 0.4°C (± SE, n = 12 months), there were 38 d colder than 26.0°C, and 26 d ≥ 29.3°C; 2010 was the hottest year, with a mean annual temperature of 28.3 ± 0.3°C (± SE, n = 12 months), and 81 hot days (second only to 2005 with 112 hot days) (Fig. S1). Between 1989 and 2011, mean seawater temperature increased significantly (F = 13.129, df = 1,21, p = 0.002) at 0.030°C yr^{-1}, as did the maximum daily seawater temperature (F = 7.798, df = 1,21, p = 0.011), which increased at 0.034°C yr^{-1}; minimum daily seawater temperature remained unchanged (F = 1.511, df = 1,21, p = 0.233). Additionally, the number of thermally extreme days changed, with many cold days in the first portion of the study, and many hot days in the latter portion of the study. When considered in 3 periods (1989–1995, 1996–2003, and 2004–2011) the number of hot and cold days was dependent on the time period (χ^2 = 292, df = 2, p < 0.001), with disproportionately more hot days in the more recent periods.

LITERATURE CITED

Edmunds PJ (2006) Temperature-mediated transitions between isometry and allometry in a colonial modular invertebrate. Proc R Soc Lond B Biol Sci 273:2275–2281

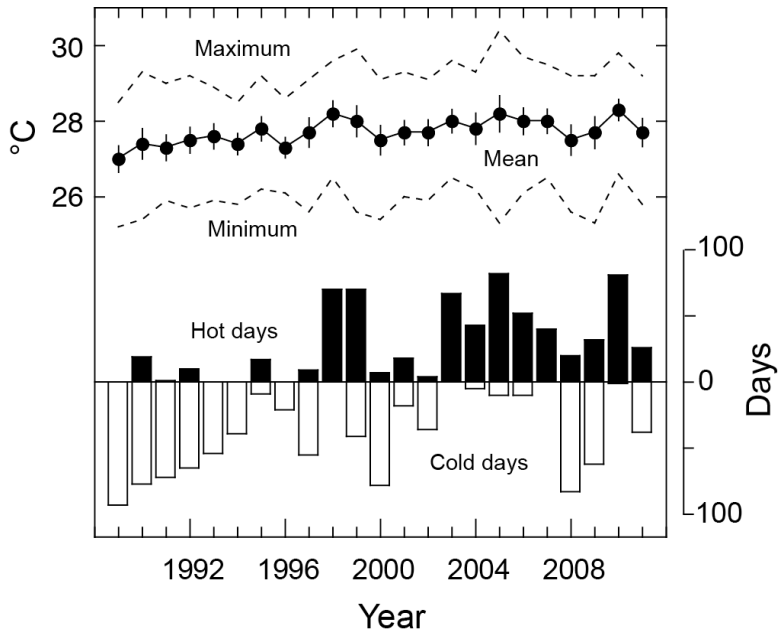

Fig. S1. Seawater temperature in Great Lameshur Bay (9-m depth) over 23 y (1989–2011). Upper plot (left ordinate) displays mean monthly temperatures (± SE, n = 12 months) with maximum and minimum monthly temperature shown as dashed line. Lower plot (right ordinate) displays the number of days each year that were categorized as hot (> 29.3°C) or cold (≤ 26.0°C).

Taxonomic composition of small corals

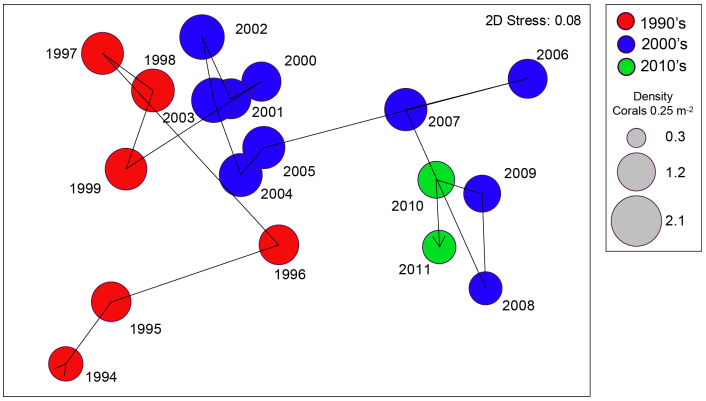

Fig. S2. Multidimensional scaling (MDS) plot displaying relative taxonomic composition of small corals on shallow substrata in St. John based on the density of *Porites, Favia fragum, Siderastrea radians, S. siderea, Diploria, Agaricia,* and *Montastraea*. Vector links points by chronology, the sizes of bubbles are scaled to the abundance of *Porites*, and colors reflect sampling decades