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Unprecedented densities of *Gorgonia* sea fans on coral reefs in St. John, US Virgin Islands?

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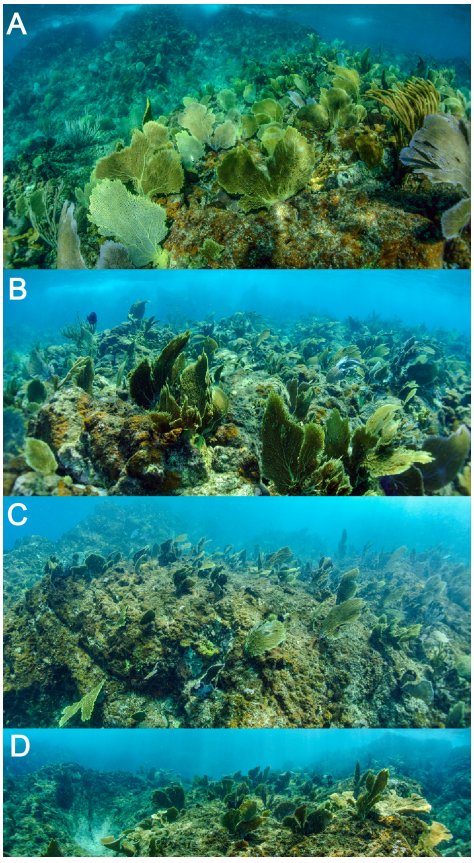

Arborescent octocorals on Caribbean reefs have not experienced the long-term declines in population size that have affected scleractinians over the last few decades (Jackson et al. 2014). Although they have been impacted by diseases and mass mortality events (Weil et al. 2017), octocoral abundances have been increasing recently in at least three locations (Ruzicka et al. 2013, Lenz et al. 2015, Sánchez et al. 2019), and perhaps over a wider geographic area (Lenz et al. 2015). Interpreting these trends requires knowledge of the responses of octocorals to disturbances, notably to discriminate between whether they are resilient to disturbances vs ephemeral placeholders marking the transition to another community state. Monitoring of coral reefs around St. John, US Virgin Islands has revealed rising abundances of octocorals (Lenz et al. 2015) that have persisted through hurricanes in 2017 (Lasker et al. 2020). *Gorgonia ventalina* Linnaeus, 1758 is an iconic member of this fauna, and here we report unusually high population densities at two sites on the south shore of St. John, 35 mo after being hit by two hurricanes (Edmunds 2019).

In August 2020, dense aggregations of *G. ventalina* were found at ≤2 m depth off Yawzi Point (18.3155°N, 64.7261°W; Panels A and B) and White Point (18.3148°N, 64.7317°W; Panels C and D). These aggregations spread along approximately 50–100 m of shore and were characterized by a mean density of 12.8 (SE 1.5) colonies m^{-2} at Yawzi Point and 10.8 (SE 0.9) colonies m^{-2} at White Point (n = 15 quadrats $site^{-1}$); densities were <1.5 colonies m^{-2} in adjacent areas at 9 and 14 m depth (Edmunds 2020). In the aggregates in shallow water, many colonies touched one another while swaying, and virtually all were free of damage from physical disturbances or the disease aspergillosis (sensu Smith et al. 1996). Colony heights were positively skewed ($P < 0.001$), and mean (SE) heights were greater at White Point [24.8 (1.0) cm, n = 173] than Yawzi Point [19.2 (0.8) cm, n = 187; $U = 20.470$, df = 1, $P < 0.001$].

Previously published records of *G. ventalina* abundances show that the current densities are unprecedented in the scientific literature. Over the last six decades, studies have typically reported densities as a range for each site, and the high ends of these ranges extend from about 0.2 to 5.9 colonies m^{-2} (Kinzie 1973, Opresko 1973, Lasker and Coffroth 1983, Yoshioka and Yoshioka 1989, Kim and Harvell 2004, Lasker 2019, Edmunds 2020, Rey-Villiers et al. 2020). To our knowledge, the highest reported densities come from Panama, where Birkeland (1974) found 6.2 colonies m^{-2} in 1971. Relative to these data, the present densities of *G. ventalina* are unprecedented.

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High densities of *G. ventalina* in St. John are remarkable considering the impacts of two category 5 hurricanes in September 2017 (Edmunds 2019). Both locations where *G. ventalina* were abundant in August 2020 probably were exposed to very large waves for lengthy periods given that significant wave heights just 8 km away were 5.6 and 7.9 m during these storms (Edmunds 2019). Following these effects, few *G. ventalina* at ≤2 m depth survived (PJ Edmunds, California State University, pers observ), while most survived at 9 and 14 m depth (Edmunds 2020). Since the present study sites have not been monitored, we cannot be certain that the high densities of *G. ventalina* detected in August 2020 had recruited following 2017, but this possibility is supported by rarity of damage on colonies that might be attributed to storms, as well as the concordance of colony heights with likely growth rates of 2.8–4.9 cm yr^{-1} in St. John (i.e., at 9 and 14 m depth; Edmunds 2020), and 3.6 cm yr^{-1} in Puerto Rico (Borgstein et al. 2020). These growth rates suggest the present colonies could have recruited and grown to their present heights in the 35 mo since the recent hurricanes. Together, our observations underscore the capacity for rapid population growth of select octocorals following severe storms, and the high likelihood that *G. ventalina* will continue to support the rising abundances of octocorals in the region (Lenz et al. 2015).

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