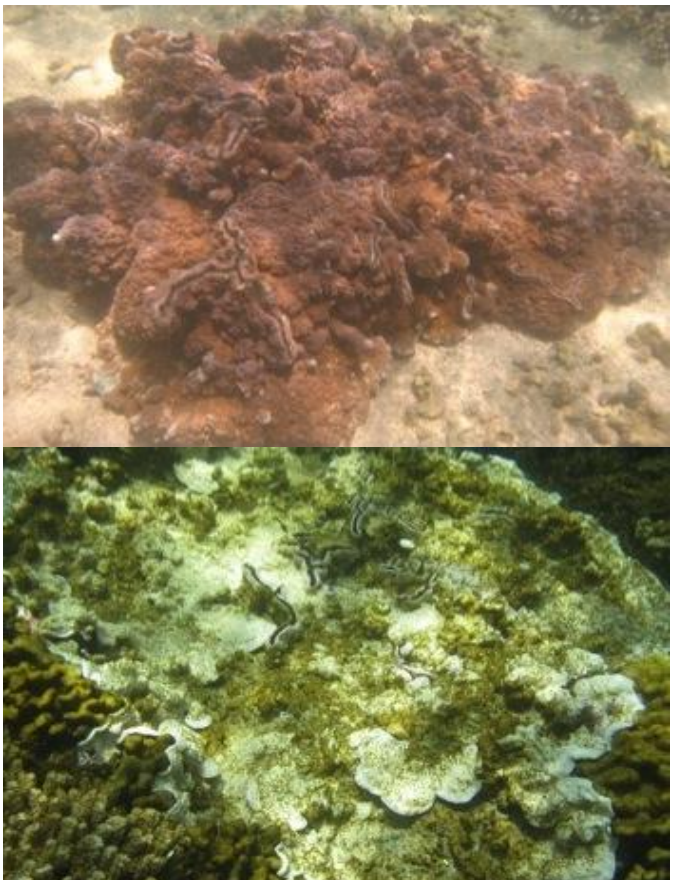

Figure 1. Above, a large bleached colony of the coral *Montipora patula,* with dead tissue sloughing (brownish green), compared to a similar healthy coral (below), located outside of the area of damage during the 19-20 July, 2014 storm event.

before the storm. Temperatures before the storm ranged from 27.4 - 29.2°C on the patch reefs with gauges (Fig. 2: reefs 44, 46, 47). The input of freshwater caused temperatures on the adjacent reef flat to decrease by 1°C and average irradiance levels to decrease by 55%; this compares with reports on the flood of 1988 that caused a temperature drop of 1 - 3°C and reduction of solar irradiance levels by 10-20% (Jokiel et al. 1993).

Acknowledgments
We would like to acknowledge the University of Hawai'i Field Problems in Marine Biology students for helping document and obtain data during this storm event.

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Dimming sand halos in Dominica and the expansion of the invasive seagrass *Halophila stipulacea*.

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Coral reefs of Dominica are restricted to the island's narrow shelf. Most of its 31 reefs and reef complexes are clustered in two areas, one in the North and one in the West (Fig. 1). Together they comprise 77 % of the total coral reef area of only 80.5 ha (Steiner 2015) and are exposed to chronic stressors such as storm-induced breakage, sediment resuspension and terrestrial run off due to their proximity to shore (Steiner 2003). Despite Dominica's comparatively modest infrastructural development and a low human population (slowly declining from a peak of close to 74,000 in the 1950s), deforestation, the use of coral lime in construction, and fishing pressure since the 18th century, are among the principal direct anthropogenic forces that have shaped the deterioration of coral reefs throughout the island (Steiner 2015). In addition, the four most recent coral bleaching episodes between 2003 and 2010 led to further substantial loss of live coral cover (Steiner 2015).

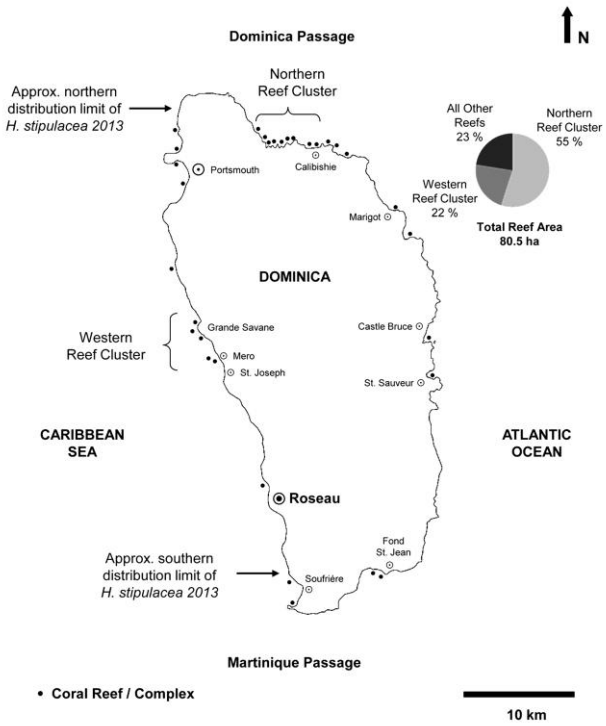

Figure 1. Distribution of coral reefs around Dominica and the distribution limit of *H. stipulacea* on the west coast of the island as of 2013

It has been long known that in many regions where coral reefs and seagrass beds co-occur, the former are commonly surrounded by an unvegetated band of bare sand. This sand "halo" is maintained in part by reef-associated fishes and invertebrates that graze on seagrasses and their epiphytes (Randall 1965; Ogden et al. 1973; Valentine and Heck 2005) or feed on infauna within the sediments (e.g. Mullidae). We have observed that around shallow reefs the erosional effects of current eddies also play a role in maintaining these halos.

In March 2013 we observed the uncharacteristic absence of such sand halos around coral reefs in Dominica, during surveys of the invasive seagrass *Halophila stipulacea*. This native Indian Ocean seagrass was first reported in the Caribbean in 2002 by Ruiz and Ballentine (2004), and has since been identified on at least eighteen islands (Willette et al. 2014). Its second reported observation from the region came from Dominica in 2007 (Willette and Ambrose 2009), since when its distribution has expanded dramatically from isolated patches in 2008 (Steiner et al. 2010) to a 55 km swath along the west coast in 2013 (Steiner and Willette 2015). In this way *H. stipulacea* has profoundly affected the native seagrasses and meadows by replacing many of them. Notably *H. stipulacea* has also, within its current distribution on

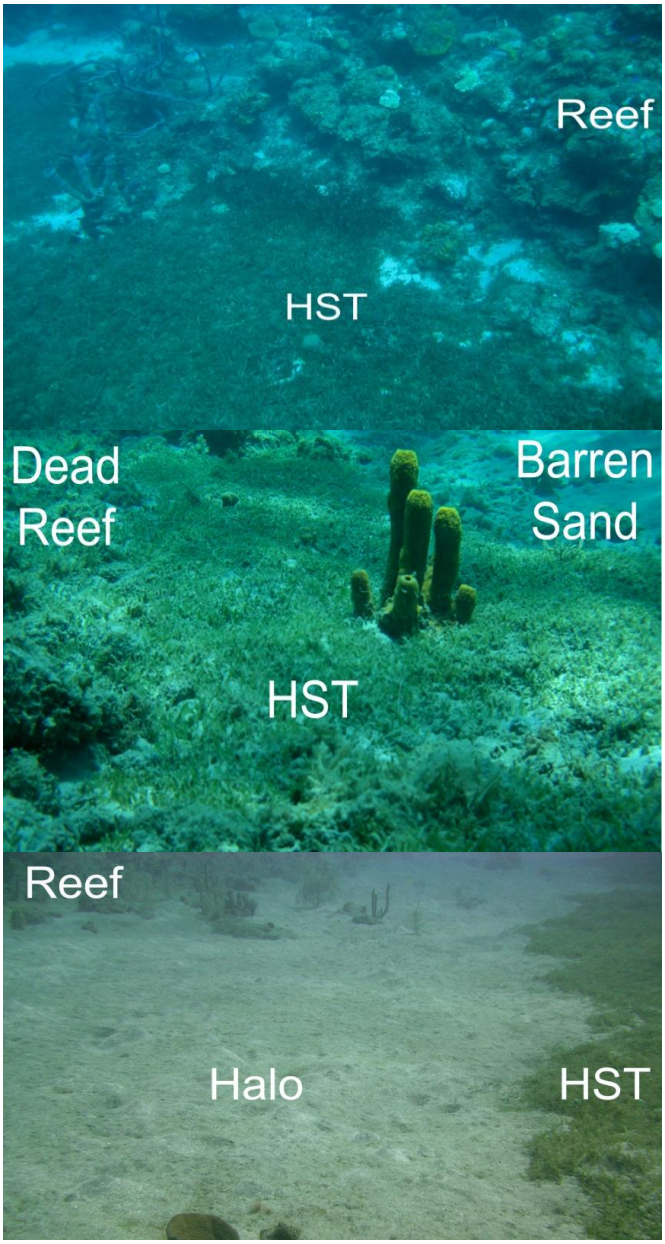

Figure 2 (top). *Halophila stipulacea* meadow (HST) growing up to the moribund Douglas Bay Reef in 2013. **Figure 3** (middle). Margin of dead reef in Scott's Head serving as expansion corridor for *H. stipulacea* (HST). **Figure 4** (bottom). Bioturbated halo separating reef and the invasive *H. stipulacea* (HST) near Mero in 2013.

the island, which is restricted to the western sublittoral, overgrown most sand halos that used to exist around reefs (Figs. 2 and 3). Further, sand and rubble-laden depressions within affected reefs are no longer seagrass-free. In shallow turbulent waters (1-5 m depth), *Halophila stipulacea* has also spread along the semi-consolidated coral rubble that fringes dead reefs (Fig. 3); the rubble thus provided expansion corridors across the highly disturbed sandy surroundings that continue to be unsuitable for seagrasses.

We did find a few locations at depths of 10 to 30 m on particular sections of the largest west coast reefs between Grande Savane and Mero (Fig. 1 and 4) that were exceptions to this pattern. With a live coral cover rarely exceeding 10 % and few living coral frameworks (Steiner 2015) these reefs are nonetheless currently the "healthiest" in Dominica. It remains to be determined whether the native reef-associated fauna or other factors will maintain the last seagrass-free halo fragments vis-à-vis the encroaching *H. stipulacea*. If herbivores are playing a role, it raises the question of whether there are species present at these locations with feeding preferences different to the other native herbivores.

The disappearance of sand halos illustrates one facet of rapidly changing Caribbean coral reef - seagrass seascapes. In the case of Dominica, the invasive seagrass *H. stipulacea* drastically altered native seagrass meadows in four and half years (Steiner and Willette 2015), and colonized sand halos around, and sandy patches within, coral reefs. The paucity of conspicuous reef-dwelling grazers and bioturbators on the island's moribund reefs possibly contributed to expansion of the dense seagrass carpets (Figs. 5 and 6) all the way into reefs. This recent marine angiosperm invasion also shows that future attempts in conserving the remaining coral communities will have to jointly address the conservation of native seagrasses. Unfortunately, the structural and ecological alterations in Dominica's benthic habitats are presently occurring faster than the formation of mitigation initiatives.

Acknowledgments *Seagrass and reef surveys in 2013 were executed under the Fisheries Research License RP-03/063S-2, Fisheries Division, Government of Dominica. Funding and logistic support was provided by the Institute for Tropical Marine Ecology, J. Esprit, and private research supporters.*

Figure 5 (above). Traditional fish pot in typical Dominican *S. filiform*e bed in 2008, with 20 cm tall canopy and open spaces at Bioche. **Figure 6** (below). Traditional fish pot in former *S. filiforme* bed that was replaced by *H. stipulacea*'s dense mat with a 5 cm tall canopy, in 2013 at Mero.

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