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**Fig. 1** Living *Diploria strigosa* colony covered by a seasonal bloom of *Cladophora* sp. during the 1988 summer wet season



**Fig. 2** *Diploria strigosa* colony overgrown by the boring sponge *Cliona lampa* (orange color) in 1997



**Fig. 3** *Cladophora vagabunda* forming thick mats covering most of the *Diploria strigosa* skeletons in 2004

## Shifts in coral overgrowth by sponges and algae

The “Rock Pile” is a shallow-water (6 m) patch reef in southern Florida Bay, approximately 1 km north of the Content Keys in the lower Florida Keys. The reef is comprised of numerous hemispherical *Diploria strigosa* coral colonies  $\leq 2$  m in height that, historically, supported substantial fish and lobster populations. During the late 1980s these corals were healthy but were seasonally affected by summertime (wet season) *Cladophora* sp. blooms (Fig. 1). Beginning in 1991 and peaking in 1995, water managers increased freshwater inputs to the bay from the Everglades in an effort to reduce the bay’s salinity. This resulted in significant increases in nitrogen loading, phytoplankton blooms, turbidity, and sedimentation, until flows were diverted elsewhere (Lapointe et al. 2001). Scientists with the Florida Keys Coral Reef Monitoring Project observed high *D. strigosa* mortality between 1995 and 1996 at the Rock Pile (J. Porter, personal communication). Benthic surveys in 1997 confirmed extensive *D. strigosa* mortality and overgrowth by the boring sponge *Cliona lampa* (Fig. 2); a phenomenon known to be associated with regional nutrient enrichment in the Florida Keys (Ward-Paige et al. 2005). Surveys conducted in 2004, after several years of decreased Everglades runoff and turbidity, revealed that *Cladophora vagabunda* had replaced much of the *C. lampa* (Fig. 3). However, following increased turbidity from Hurricane Wilma in October 2006, *C. lampa* again became highly abundant. These observations suggest that overgrowth of *D. strigosa* skeletons by *C. lampa* versus macroalgae may be mediated by turbidity, which varies seasonally and yearly as a function of watershed drainage patterns and tropical storm activity.

### References

- Lapointe BE, Matzie WR, Barile PJ (2001) Biotic phase-shifts in Florida Bay and fore reef communities in the Florida Keys: linkages with historical freshwater flows and nitrogen loading from Everglades runoff. In: Porter J, Porter K (eds) The Everglades, Florida Bay, and coral reefs of the Florida Keys: an ecosystem sourcebook, CRC Press, Boca Raton, pp 629–648
- Ward-Paige CA, Risk MJ, Sherwood OA 2005. Clionid sponge surveys on the Florida Reef Tract suggest land-based nutrient inputs. *Mar Pollut Bull* 51:570–579

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