Title: A perfect storm: El Niño and sewage spill cause unprecedented bleaching and disease in *Acropora palmata* in the Florida Keys

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POSTER / Abstract

Coral reefs are frequently exposed to thermal and other anthropogenic stressors which threaten their health and survival. The Florida Keys saw unprecedented warming last summer when anthropogenic climate change was exacerbated by an exceptionally strong El Niño. Prior to the summer heat, there was also a major leak of raw sewage from a newly installed centralized wastewater treatment plant in Key Largo. Effluent from the spill included *Serratia marcescens* (a known coral pathogen) as well as additional human enteric fecal coliform bacteria. We are investigating how the combined stressors of warming temperatures and sewage discharge affect the health and survival of *A. palmata* at Horseshoe Reef, in the Florida Keys National Marine Sanctuary. With complete image libraries from eight reefs in 2022 and also with a time series of these same reefs in 2023, we have captured not just "before-and-after' information, but 'before-during-and-after" conditions of this extraordinary bleaching event. Our imagery included both natural and out-planted colonies, both with and without disease. Preliminary analysis shows a strong significant effect of time period on bleaching. By late July, none of the surveyed *A. palmata* remained unbleached, while only about 5% remained at the lowest bleaching intensity level of slightly pale. These results suggest that under severe thermal stress, all *A. palmata* experiences at least some level of bleaching, with nearly 50% turning white. Future research in 2024 will explore whether or not *A. palmata* is recolonized by *Symbiodinium*, regaining its color after this extreme heat event and the influence of pre-existing disease in affecting post-bleaching mortality.

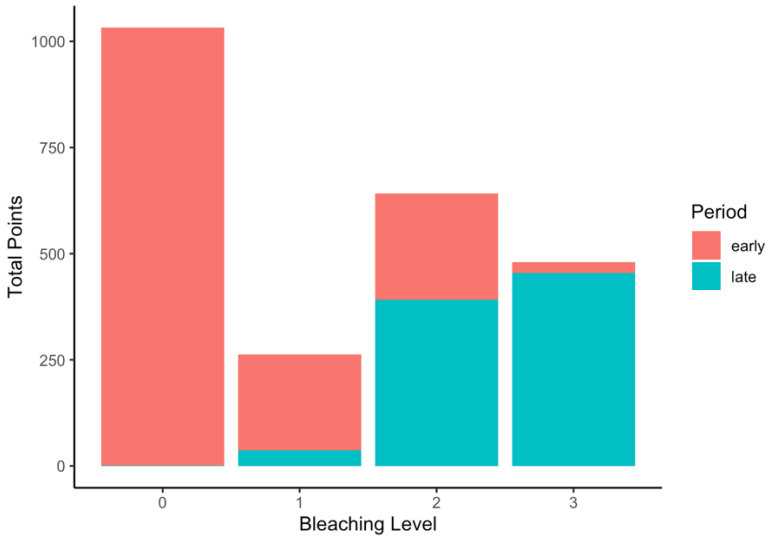

Figure 1. Categorical bleaching level of *A. palmata* across seven sites, including all points on all photos. Bleaching categories are: 0= not bleached, 1= slight pale, 2= very pale, 3= white. Time period is early July (7/11-7/14) and late July (7/22-7/25) 2023.