Coral Recruitment, thermal stress and coral reef community structure in St. John, US Virgin Islands
P.I.: Peter Edmunds, PhD

Censuses of juvenile corals in St. John demonstrate that their distribution is not related statistically to that of the contemporaneous adult corals and that their density, growth and mortality are related to varying aspects of seawater temperature. A decade of analysis of the dynamics of juvenile corals in St. John reveals that they die at rates that are unusually high compared to other Caribbean locations. This has demographic implications for the local populations and moreover, suggests that there are hidden sources of coral mortality in this relatively pristine location.

The pervasive and profound effects of temperature on all biological processes has been recognized for centuries, but surprisingly little attention was accorded to the effects on scleractinian corals until the first large scale bleaching episodes of the 1980s were associated with seawater temperature. While it seems certain that thermally tolerant corals will increase in abundance while thermally susceptible species will decline in abundance, evidence to this effect is rare, and therefore it is challenging to project how coral reefs will change as temperatures increase.

Successful coral reef ecosystem conservation requires adaptive management that responds rapidly to changing environmental conditions. Marine protected areas (MPAs) have proliferated with the objective of protecting marine resources through the management of human activities based in the quantification of coral cover. Typically, declining coral cover is construed as “bad” and increases as “good.” However, the critical factor here is that changes in reef community structure, as assessed from percentage cover data, has limited capacity to illuminate the mechanistic basis of the changes. Without such information, it is impossible to design effective management strategies, or to project how the reef might change in the future.

Through this study, Peter J. Edmunds from the Department of Biology of California State University (CSNU), will address the recruitment of reef corals and the role of thermal stress in mediating post-settlement success of juvenile corals. The study quantifies the settlement rates of corals and seawater temperature over a kilometer-wide scale in order to explore the relationship between temperature and recruitment and the role of larval supply versus post settlement mortality in determining coral distribution. Additionally, in situ physiological analyses will be used to determine the “health” of juvenile corals in the summer and winter, in order to test the role of thermal stress in determining

mortality patterns of early life stages.

This project will contribute to contemporary and important scientific questions, and it addresses several key areas of the UPRSG Strategic Plan including: 1) maintenance of local fish habitats and the regional economy; 2) the promotion of coral reef monitoring programs; and indirectly, 3) promoting habitat mapping.