

## MESOPHOTIC CORAL COMMUNITY VARIATION AND CONNECTIVITY IN CUBA, THE GULF OF MEXICO, AND BELIZE

Authors: Joshua D. Voss<sup>1\*</sup>, Silvia Patricia González Díaz<sup>2</sup>, Julieta González Méndez<sup>3</sup>, Alexis B. Sturm<sup>1</sup>, Ryan J. Eckert<sup>1</sup>, Michael S. Studivan<sup>1</sup>, John K. Reed<sup>1</sup>

Affiliations: <sup>1</sup>Harbor Branch Oceanographic Institute, Florida Atlantic University, Fort Pierce, FL, USA; <sup>2</sup>Centro de Investigaciones Marinas, Universidad de la Habana, Cuba; <sup>3</sup>Centro Nacional de Áreas Protegidas, Cuba

\*Institutional Address: 5600 N US Highway 1, Fort Pierce, FL 34946

\*Email: [jvoss2@fau.edu](mailto:jvoss2@fau.edu)

Mesophotic coral ecosystems (MCEs) at 30-150m depths are believed to be extensive in the Tropical Western Atlantic, but relatively few community characterizations or connectivity assessments have been conducted on MCEs as compared to shallow coral reefs. Through collaborative research projects in Cuba, the Gulf of Mexico (GOM), and Belize, we evaluated 1) the extent and composition of mesophotic coral communities, 2) genomic evidence of coral connectivity across depths and distance, 3) spatial and temporal variation in corals' algal endosymbiont assemblages, and 4) models of larval connectivity dynamics among shallow and mesophotic coral reef populations. On a broad scale, populations of the depth-generalist coral *Montastraea cavernosa* demonstrate evidence of genetic connectivity across the entire GOM and NW Caribbean. However, Pulley Ridge appears to harbor relatively isolated coral populations that have experienced major declines in the past two decades. Evidence of vertical connectivity among *M. cavernosa* populations was regionally variable; shallow and mesophotic populations in the NW GOM were panmictic, while population from different depths zone demonstrated significant structure in Belize. The results of this study and others indicate that mesophotic coral habitats in the Cuba and GOM are more extensive, connected, and ecologically important than previously known, particularly with respect to supporting biologically diverse faunal assemblages. Through ongoing collaborative partnerships, including two extended expeditions in Cuba, the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute has contributed to proposed and recommended expansions of multiple marine protected areas that may improve metapopulation resilience among MCEs.