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Ciguatera fish poisoning (CFP) is the most common form of phycotoxin-borne seafood illness across the globe, with an estimated 50,000 - 500,000 poisonings per year. The average annual economic impact of ciguatera in the United States has been estimated to be \$21 million, far surpassing public health impacts from other illnesses associated with toxic algae. CFP is caused by the consumption of seafood (primarily reef fish) contaminated with ciguatoxins. Gambiertoxins, the precursors of ciguatoxins produced by the (sub)tropical benthic dinoflagellate genus, *Gambierdiscus*, enter coral reef food webs when herbivores and detritivores consume *Gambierdiscus* during grazing on substrate macroalgae. These precursors are transferred to higher trophic levels by bioaccumulation, bioconversion and biomagnification until they reach predatory finfish species that are targeted in many fisheries. People are exposed to the toxins when they consume the fish, thereby experiencing CFP.

The Greater Caribbean Region (GCR) is a region with a large and expanding problem of CFP. Consistent with the underlying philosophy of the ECOHAB program, this research project is a multi-investigator regional study designed to increase understanding of the ecology and oceanography of *Gambierdiscus* populations, leading to a predictive capability for CFP in the region. In addition to Dr. Parsons, the research team is composed of Dr. Don Anderson (Woods Hole Oceanographic Institution), Dr. Deana Erdner (University of Texas Marine Science Institute), Dr. Ron Kiene (University of South Alabama), Dr. Yuri Okolodkov (University of Veracruz, Mexico), Dr. Mindy Richlen (Woods Hole Oceanographic Institution), Dr. Alison Robertson (FDA Gulf Coast Seafood Laboratory), and Dr. Tyler Smith (University of the Virgin Islands).

The GCR study area covers a range of environments and habitats, some pristine and others with clear anthropogenic impacts. A suite of new genetic tools and ecological methods are now available to examine *Gambierdiscus* populations and their environments in detail, and this information can be used to parameterize a population dynamics model of *Gambierdiscus* in the GCR that will have predictive value. The objectives of CiguaHAB are to: 1) Characterize *Gambierdiscus* population diversity and connectivity on regional and local scales; 2) Determine effects of environmental factors on the growth and toxicity of representative strains of *Gambierdiscus*; 3) Investigate *Gambierdiscus* population dynamics and the environmental conditions that contribute to blooms in several representative locations for the study region; 4) Investigate the fate of ciguatera precursors, toxins and metabolites in the reef food web; 5) Model the population dynamics and toxin production of *Gambierdiscus* under different environmental forcings, including those associated with natural and human-induced perturbations such as pollution, reef destruction, and climate change; and 6) Communicate project results and discuss applications to resource management with stakeholders in the GCR, including medical personnel, natural resources officials, fisherman, and others, and develop a website to serve as an information clearinghouse for information on CFP. CiguaHAB will result in a comprehensive understanding of the diversity, physiology and ecology of *Gambierdiscus* in the GCR, will increase our knowledge and educate

managers and the public about the risks of CFP, and will develop a model of bloom dynamics and toxin production which will provide information of clear management value and lead towards a predictive capability and an opportunity to estimate effects of global warming and other climatic or environmental perturbations on this important public health issue.