**PCMHAB: Expanding Harmful Algal Bloom Mitigation in the Gulf of Mexico with Operational Support and Training for the Imaging FlowCytobot Network.**

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**Total Project cost: $899,322 (without ship time); no ship time is requested**
**Budget period: September 1, 2015- August 31, 2018**

**Summary:**

The frequency of harmful algal blooms (HABs) is increasing worldwide. In the Gulf of Mexico, concern focuses on not only the nearly annual blooms of *Karenia brevis*, but also emerging HAB species such as *Dinophysis* and *Pseudo-nitzschia*. Early warning, provided by monitoring combined with rapid response, has been identified as one of the most effective ways to mitigate the impact of HABs; however, obtaining species-specific results with sufficient temporal resolution to provide early warning is challenging. Monitoring programs for HABs typically rely on toxin analysis of seafood samples or time-consuming manual enumeration of phytoplankton, which limit the frequency of observations and the potential for early warning. Automated submersible microscopes such as Imaging FlowCytobot (IFCB) have changed this situation. Using a combination of flow cytometric and video technology to capture high resolution images of suspended particles and machine learning technology to classify the images, the IFCB can identify potentially toxic species within hours. Long term continuous plankton imaging by the IFCB deployed at Port Aransas, TX has provided early warnings of six HAB events since 2007. We now propose to expand the early warning capabilities in the Gulf of Mexico by advancing an IFCB network to increase the spatial coverage of HAB detection, training additional end-users, and developing an information support system to improve management applications of this technology.

The goals of this project are to increase the number of end-users and extend a network of IFCBs in the Gulf of Mexico along the Texas coast for improved detection and management of HAB events that threaten human and ecosystem health. The transfer of this mature technology will provide a model for scaling up the network and expanding it to other regions. One commercial IFCB will be purchased and added to the network of existing IFCBs in Port Aransas and Galveston. Through development of generalized training sets and improved automated classification to target a variety of HAB species, an outcome of this project will be a tool that is more useful to a wider scope of end-users. To facilitate use of the IFCB by managers and researchers outside of our laboratories, the project will include a number of partners from Texas A&M University at Galveston (TAMU-G), Texas Parks and Wildlife Department (TPWD), Department of State Health Services, University of California Santa Cruz, and Woods Hole Oceanographic Institution. Participation by potential users (Mission-Aransas National Estuarine Research Reserve, US Geological Survey, Texas Coastal Ocean Observing Network (TCOON) and members of the Interstate Shellfish Sanitation Conference (ISSC) and current IFCB owners will be welcomed. A Transition Advisory Committee (TAC), including Yuki Honjo, McLane Research Laboratories, Inc. (MRL), the commercial manufacturer of IFCB; Jonathon Deeds, Food and Drug Administration (FDA); Rebecca Hensley (TPWD), Kendra Daly, University of South Florida and Ocean Observing Initiative PI; and Matthew Howard, Gulf of Mexico Coastal Ocean Observing System (GCOOS), will provide feedback throughout the project, with the goal of improving the transfer of technology and knowledge to the state and federal managers who require early warning of HABs for effective mitigation. Outcomes include training additional end-users, which will facilitate a broader scale implementation of IFCB technology for mitigation of HABs, and production of a user manual for field deployment and analysis.