

# HARBOR BRANCH

FLORIDA ATLANTIC UNIVERSITY\*

Ocean Science for a Better World®

## ***The Florida Center for Coastal and Human Health: Addressing the Health of Florida Coastal Ecosystems and Communities.***

*This Center is made possible by an initial grant of \$650K from the Harbor Branch Oceanographic Institute Foundation and officially started research operations August 1, 2018*

### **Executive Summary**

The effects of both environmental and anthropogenic change are evident in Florida coastal waters, where warming temperatures, nutrient eutrophication, sea level rise, changing precipitation patterns and so called “tropicalization” are creating documented ecological shifts. The Florida coastal region that is the focus of the proposed Center’s research is the Indian River Lagoon (IRL) ecosystem and associated watersheds (including Lake Okeechobee), where ecological shifts have already begun to negatively affect the ecosystem, communities and human health through exposure to an increasing number of harmful algal bloom (HAB) events and suites of toxins. The IRL ecosystem is likely one of the most HAB impacted estuaries in the United States in terms of diversity of HAB species, number and extent of blooms, and resultant range of toxins that may ultimately affect the humans that live and work in the region. Understanding the connections between a changing environment and HABs, and resultant human health issues is the central mission of the proposed Center.

#### **The specific aims of the Center during its first year of funding are:**

1. Assess HAB dynamics in the IRL ecosystem and associated environmental drivers using direct sampling and remote sensing.
2. Develop advanced genomics methods to define the drivers of HAB community dynamics and toxin production.
3. Use sentinel species and human epidemiology studies (and hospitalization data) to define mechanisms and the extent of trophic uptake of HAB toxins in both wildlife and humans.
4. Identify metabolites/toxicity in samples collected by the research projects that may represent a threat to human health or that are predictive of HAB community structure and toxin production.
5. Disseminate the results of the Center through both stakeholder meetings and the creation of a display at the HBOI Ocean Discovery Visitor Center that conveys to the public the mission and results of the Center.

**Center Summary:** The proposed, highly integrated Center will fill a critical need for understanding the significant health threats associated with environmental changes in the IRL ecosystem, and how these threats will be affected by climate change and anthropogenic changes

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(e.g. nutrient pollution) in the system. A primary focus will be on HABs, but other factors (viruses, pathogenic bacteria, influx of deleterious chemicals) will be incorporated into the Center's mission over time. The major products of the Center will include an in-depth characterization of HAB ecology in the IRL system (e.g. distributions, physiology, environmental drivers, taxonomy with metagenomics, toxicity), the refinement of an ecosystem level model to predict the effects of environmental change on the occurrence, distributions and transport of HABs in the IRL ecosystem, a better understanding of the functional microbial landscape of the IRL, and how this landscape changes in relation to HAB ecological dynamics, as well as a better understanding of functional genetic components responsible for toxin regulation and biosynthesis, a new understanding of HAB toxin trophic transfer in important components of the IRL aquatic food web (i.e. indicator species) and lastly, epidemiological studies on the direct exposure of regional human populations to HAB toxins. The Center will actively seek to educate and engage the public on Center results and work with numerous state and local stakeholders to fill a major scientific need required to protect the health and safety of the region's population.

For more information please contact:

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