NCCOS NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

NOAA'S NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE FY22 HARMFUL ALGAL BLOOM PROGRAM AWARDS

United States Harmful Algal Bloom Control Technologies Incubator

- **Institutions:** University of Maryland Center of Environmental Sciences/Institute of Marine and Environmental Technology and Mote Marine Laboratory
- **Project Period:** September 2022 - August 2027 (with potential for a one time 5-year renewal)
- **Location:** National
- **FY22 Funding:** $1,643,762
- **Total Anticipated Funding:** $7,500,000
- **Project Summary:** The development of scale appropriate technologies that can be used to control the growth and spread of harmful algal blooms (HAB) has lagged the advances in understanding the factors that lead to their formation and spread. The HAB Control Technologies Incubator (HAB-CTI) is a partnership between NOAA and academia to streamline the vetting process of novel control ideas so that the research community and funding agencies can focus on those that promise to be both effective at controlling the further spread of blooms and scalable to the scales at which HABs often occur. The funded institutions will implement the HAB-CTI and develop the framework to conduct the assessment of new ideas. In addition, the HAB-CTI will create and maintain a clearinghouse that will provide information on all permitting and environmental impact assessment requirements that regulate the development and use of HAB control methodologies. Learn more.

Climate Change and Acidification Impacts on Cyanobacterial Harmful Algal Blooms in the Great Lakes

- **Institutions:** University of Michigan, University of Minnesota Duluth, Oberlin College, University of Kentucky, and University of Toledo
- **Project Period:** September 2022 - August 2025
- **Location:** Great Lakes (Michigan, Ohio, Wisconsin)
- **FY22 Funding:** $281,975
- **Total Anticipated Funding:** $1,196,437
- **Project Summary:** The Great Lakes experience recurrent toxin-producing cyanobacterial harmful algal blooms (cHABs). While cHAB events have been well-studied in recent years, little attention has been given to acidification in the Great Lakes. Using a combination of laboratory and field studies, 'Omics techniques, and sedimentary analysis, this project aims to advance a holistic understanding of the combined impacts of acidification, temperature, alkalinity, and nutrients on toxic cHAB formation and progression to understand past trends and better predict and respond to future events. Project results will aid the development and validation of biogeochemical models which are lacking essential carbon data in the Great Lakes, models of potential phytoplankton assemblage shifts occurring with acidification, and cHAB toxin forecasts. Learn more. Learn more.

Do Harmful Algal Bloom Migrations Across Carbonate System Gradients Confer a Competitive Advantage?

- **Institutions:** Woods Hole Oceanographic Institute, Bowdoin College, and NERACOOS
- **Project Period:** September 2022 - August 2025
- **Location:** Massachusetts, Maine
- **FY22 Funding:** $499,999
- **Total Anticipated Funding:** $1,046,428
- **Project Summary:** This project will evaluate whether harmful algal bloom (HAB) species may have a competitive advantage over other phytoplankton in response to coastal acidification and climate change. Some phytoplankton move up and down in the water column and exploit vertical gradients of light and nutrients. Cells travel down to absorb nutrients at depth and move up to absorb light closer

to the surface. Thus, they are well adapted to increasingly stratified coastal habitats. During their vertical migrations, the cells encounter carbonate system gradients in the water column that may influence or be exploited by different species in different ways. This project is the first study of the behavior and response of co-occurring HAB and non-HAB phytoplankton over a broad range of environmental conditions. This information will be used to improve HAB model predictions, early warnings, and forecasts in the northeast US. Learn more.

Coastal Acidification and Harmful Algal Blooms in New York Coastal Waters: Interactions and Implications for Marine Ecosystems and Organisms

- **Institutions:** Stony Brook University, Adelphi University, and St. Joseph's College
- **Project Period:** September 2022 - August 2025
- **Location:** New York
- **FY22 Funding:** $364,265
- **Total Anticipated Funding:** $1,000,184
- **Project Summary:** This project aims to determine how harmful algal blooms (HABs) in New York waters respond to coastal acidification, how current and future climate change conditions will affect these HABs, and how the co-occurrence of these HABs with acidification will impact economically and ecologically important fish and shellfish. The project team will identify stressor “hot spots” with co-occurring HABs and acidification that can directly impact shellfish resources and determine fish and shellfish that are most and least vulnerable to HABs and acidification to inform practical decisions on aquaculture site locations and cultivated species. Learn more.

Harmful Algal Blooms, Acidification and Climate Change in the Salish Sea

- **Institutions:** Northwest Indian College, San Francisco State University, and University of Washington
- **Project Period:** September 2022 - August 2025
- **Location:** Washington
- **FY22 Funding:** $355,281

- **Total Anticipated Funding:** $1,355,349
- **Project Summary:** This project investigates the interactive effects of acidification, warming, and nutrients on three economically important harmful algal bloom (HAB) species in the Salish Sea. Spanning the western US-Canada border, the Salish Sea is one of the most productive estuaries in the US. HABs that occur regularly along the US west coast are responsible for frequent closures of Dungeness crab and shellfish harvests and cause massive mortalities of wild and aquacultured shellfish. This work will expand Salish Sea HAB monitoring to include measurements of acidification, assess the effects of changing environmental conditions on HABs in the Salish Sea, and provide early warning of potential impacts to commercial, recreational, and subsistence seafood resources. Learn more.

Integrated Multi-stressor Observations, Modeling, and Experiments to Inform Management in the Northern California Current

- **Institutions:** Oregon State University, University of Washington, University of Connecticut, University of California Santa Barbara, and NOAA's Pacific Marine Environmental Laboratory, Olympic Coast National Marine Sanctuary, and Northwest Fisheries Science Center
- **Project Period:** September 2022 - August 2026
- **Location:** California, Oregon, Washington
- **FY22 Funding:** $167,505
- **Total Anticipated Funding:** $2,000,000
- **Project Summary:** This project will help resource managers and tribes prepare for the anticipated impacts of climate change by increasing their understanding as to how multiple stressors (ocean acidification, hypoxia, harmful algal blooms, and increasing ocean temperatures) are likely to interact and affect marine ecosystems in the future. The research project will occur off the coasts of northern California, Oregon, and Washington, including NOAA's Olympic Coast National Marine Sanctuary, and will focus on climate impacts to Dungeness crab, an iconic and valuable fishery resource that is culturally and economically important to the region's coastal communities. Learn more.