U.S. IOOS FY24

Ocean Technology Transition & Marine Life Awards recommended for funding under the Inflation Reduction Act

Delaware

MARACOOS/University of Delaware and Smithsonian Environmental Research Center
PIs: Gerhard F. Kuska, Matthew B. Ogburn
IRA Funded Marine Life award: $1,750,000

Mid-Atlantic MBON: Dynamic Biodiversity and Telemetry Data for a Changing Coast

Understanding the health and status of ecosystems is essential for coastal management, conservation, and alternative energy planning. This project will establish and develop a Marine Biodiversity Observing Network for the Mid-Atlantic coast. It will include work to transition intermittent observations and sampling to monthly and daily scales, and demonstration of an integrated biodiversity and telemetry observation program in the location of the Maryland Wind Energy Area, leveraging an ongoing monitoring program supported by U.S. Wind, Inc. The project will integrate meteorological-oceanographic data, satellite observations, animal telemetry, soundscapes, and environmental DNA. It will create open access to biodiversity data and information, develop species distribution models that will scale to the Mid-Atlantic region, and engage stakeholders in the development and design of data and information delivery tools.

Massachusetts

Woods Hole Oceanographic Institution
PI: Michael Brosnahan
IRA Funded Ocean Technology Transition award: $1,197,911

Optimization of PhytO-ARM harmful algal bloom sensing for low-bandwidth, satellite-based telemetry

This project will develop and implement robust real-time monitoring of harmful algal blooms via satellite-based telemetry. Monitoring phytoplankton communities offshore presents a challenge in terms of power and connectivity. With these funds, the team will implement a new data management model, as well as operationalize the pairing of a sampling bot (IFCB) with an autonomous surface vehicle that provides both power and connectivity within the Northeast HAB Observing Network.

Great Lakes Observing System
PI: Shelby Brunner
IRA Funded Ocean Technology Transition award: $1,199,426

Building Capacity to Measure and Assess Offshore, Full-frequency Water Level Fluctuations to Support Coastal Hazard Observation and Prediction

This project will deploy low-cost, in-lake observing platforms capable of capturing the full wave spectrum in real-time. Deployments will initially focus on the Great Lakes, but are ultimately scalable to any coastline. These platforms will: address the high frequency water level fluctuations gap and the evaluate their coastal impacts; collect year-round, in-lake data, providing timely information related to coastal hazards; and offer interested communities low-cost, easy-to-use monitoring platforms to enhance the spatial resolution of the observing network.

University of Michigan
PI: Casey Godwin
IRA Funded Marine Life award: $1,750,000

Dynamics of Biodiversity Across Lakescapes in North America's Inland Seas

The Great Lakes are seeing dramatic shifts and losses in biodiversity that threaten ecosystem services in these inland seas of North America, which are under pressure from invasive species, climate change, nutrient pollution, hypoxia, and harmful algal blooms. The Great Lakes Marine Biodiversity Observation Network (GL-MBON) will assess biodiversity, habitat, and key ecosystem functions in the region to meet stakeholders' information needs. The University of Michigan is partnering with NOAA's Great Lakes Environmental Research Laboratory, Oregon State University, and the Great Lakes Fisheries Commission to assess habitat and biodiversity across a range of spatial and temporal scales. A key innovation of the GL-MBON will be integration across multiple technological approaches, from high-throughput sequencing and bioinformatics to telemetry for fish populations to mapping large-scale biogeographic patterns measured by satellites. Working closely with the Great Lakes Observing System (GLOS), data from those approaches will be integrated to maximize interoperability of information, links with existing repositories, and access to the information.

Montana

University of Montana
PI: Mike DeGrandpre
IRA Funded Ocean Technology Transition award: $935,976

An in situ system for combined pH and alkalinity measurements

Increased carbon dioxide in the ocean, ocean acidification, has a stark impact on shell growing organisms, as well as impacting the health of fish, sea grasses, and whole ecosystems. This project will develop technology that can be used to improve our understanding of ocean acidification, both its magnitude and effect on marine organisms, through a two-prong approach. First, the project will combine two proven carbon measurement systems (SAMI-pH and SAMI-alk) into a single device capable of quantifying the inorganic carbon parameters. Second, the team will work with the Hawaii-based PacIOOS to test prototype instruments on the CRIMP2 MapCO2 buoy in Kaneohe Bay, Hawaii.

New Hampshire

NERACOOS
PI: Jake Kritzer
IRA Funded Marine Life award: $1,900,000

Multi-Trophic Level Expansion of the Gulf of Maine Marine Biodiversity Observation Network: Meeting Management Challenges in a Rapidly Changing Ecosystem

The project will continue and expand the Gulf of Maine Marine Biodiversity Observing Network by supporting continued biodiversity and oceanographic sampling at established locations along the Maine Coastal Current and in the deep Wilkinson Basin. In addition, it will develop a detailed ecosystem framework, a seascape, for lower trophic levels to observe change in ecosystem conditions. Finally, the project will develop a holistic view of the water column to increase our explanatory and predictive capabilities, as well as the utility of information to support gulf area management and decision-making.

NERACOOS
PI: Jake Kritzer
IRA Funded Ocean Technology Transition award: $1,198,592

NOAA build-a-buoy: meeting the operational and scientific needs in Stellwagen Bank National Marine Sanctuary through innovation and collaboration

This project will transition an existing National Data Buoy Center meteorological buoy into a multi-purpose ecosystem monitoring buoy that will provide in situ real-time data and information on ocean conditions and the acoustic environment. Ultimately the developed platform will create efficiencies that support NOAA's ability to monitor the ocean holistically. The new platform will be suitable to deploy nationwide to meet the rising need to monitor a changing marine environment. These observations inform weather forecasting, safe commercial and recreational navigation, state and federal environmental and water quality management, offshore wind development, as well as oceanographic, chemical, biological and climate research.

NERACOOS
PI: Thomas Shyka
IRA Funded Ocean Technology Transition award: $1,189,353

Streamlining Integration and Distribution of Metocean Data from Offshore Wind Operations for Marine Stakeholders

This project will transition the data ingestion and management pipelines used by the U.S. IOOS Regional Associations NERACOOS and MARACOOS, and the IOOS GliderDAC into a common cyberinfrastructure. This new framework leverages a best-of-breed approach for acquisition, processing, integration, and dissemination of metocean data. Private and public data providers will benefit from this effort because there will be a documented, standards based, scalable cyberinfrastructure for them to efficiently deliver data through. Data end users will also benefit by new access to the growing volume of data though standard services and existing products.

Oregon

Oregon State University
PI: Maria Kavanaugh
IRA Funded Marine Life award: $1,750,000

Marine Biodiversity Observation Network in the Northern California Current: Dynamic, multiscale assessment of biodiversity and ecosystem function to support emerging science and management needs

Biodiversity is a sentinel of ocean health and an increasingly crucial component of ocean observing. Marine Biodiversity Observing Networks, part of a global effort to understand changes and connections between biodiversity and ecosystem function, are an important partner in understanding and managing marine ecosystems. This project will continue development of the Northern California Current Marine Biodiversity Observing Network with an established community of resource managers, tribal partners, and stakeholders. This award will support the creation of a regional MBON hub, advance remote sensing, contribute to the development of best practices of image classification and FAIR practices for image data archiving and sharing. In addition, the team will work with the California Current Integrated Ecosystem Assessment and National Marine Sanctuaries to develop ecosystem indicators derived from observations and new information products.

Rhode Island

Ocean Discovery League
PI: Katherine Bell
IRA Funded Ocean Technology Transition award: $1,199,918

Development & Implementation of a Low-cost Deep Ocean Research & Imaging System

The Ocean Discovery League will develop a deep-diving, low-cost Deep Ocean Research & Imaging System (DORIS) to lower the financial and technical barriers to deep-sea exploration and research. DORIS is a novel, customizable tool consisting of interchangeable sensing and operational modules that can be configured to meet the mission of individual projects. The high degree of flexibility and ease of use gives users the freedom to create a technological solution that meets their unique needs. DORIS can also integrate with artificial intelligence-driven data processing tools for video and sensor data aggregation, analysis, and archiving to accelerate the pace of discovery for users.

Washington, D.C.

The Ocean Foundation
PI: Alexis Valauri-Orton
IRA Funded Ocean Technology Transition award: $924,644

Assessing the emerging threat of sargassum inundation on coastal carbonate chemistry in the U.S. Caribbean by streamlining and operationalizing observing technologies

Large "brown tide" events, where large mats of sargassum inundate coastal areas, are increasing in frequency and extent in the U.S. Caribbean. Preliminary data collected by CARICOOS suggests that these events may cause dramatic changes in carbonate chemistry significant enough to affect reef and ecosystem health. However, monitoring the small-scale changes in carbonate chemistry to inform management decisions remains difficult and costly.

This project will enable The Ocean Foundation, together with its partners Dakunalytics, The University of Hawai'i, and CARICOOS, to pilot, improve, and bring to market a new surface dissolved carbon dioxide sensor — the pCO2 to Go — capable of making rapid, in-field measurements during sargassum inundation events. Additionally, the project will streamline elements of the Global Ocean Acidification Observing Network (GOA-ON) in a Box Kit, a suite of equipment designed by The Ocean Foundation that enables weather-quality carbon chemistry measurements, to make this system more easily accessed and maintained by researchers. Monitoring partners in the CARICOOS region will receive equipment and funding and will assist with the iterative design of training materials in English and Spanish.

Shark Research Foundation
PI: Neil Hammerschlag
IRA Funded Marine Life award: $1,750,000

An Operational BioTrack: Monitoring At-Risk Marine Species Biodiversity Hotspot Interactions with Management and Resource Use Areas to Support Stakeholder Needs in the Face of Global Change

This project will expand [BioTrack](), a collaborative network established in partnership with MBON and ATN to identify and characterize critical biodiversity hotspots along the U.S. eastern seaboard where threatened marine species converge. By integrating satellite and acoustic tracking of marine animals with remotely sensed environmental data, and modeling techniques, the project will map these biodiversity hotspots of at-risk species and their intersections with areas of human use and interest, such as marine sanctuaries and wind energy leasing blocks. Additionally, the project will examine the impact of future climate change on these at-risk hotspots and these spatial intersections of human use. Emphasizing stakeholder engagement from the start, the project is designed to produce practical, accessible data products to aid in informed decision-making and support conservation and management efforts.