



Ocean-Shot Submission

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Title of Ocean-Shot Concept:

Forecasting Changes to Ocean Biodiversity to Inform Decision-Making: A Critical Role for the Marine Biodiversity Observation Network (MBON)¹

¹ <http://marinebon.org>

Relevant Ocean Decade Challenge(s):

Challenge 2 (Understand the effects of multiple stressors on ocean ecosystems; solutions to monitor, protect, manage and restore ecosystems and their biodiversity under changing environmental, social and climate conditions)

Challenge 9 (Ensure comprehensive capacity development; equitable access to data, information, knowledge, and technology across all aspects of ocean science and for all stakeholders).

Also: Challenges 4 (knowledge and solutions for sustainable development of a changing ocean, climate, and society), 5 (quantify long-term impacts related to climate change) and 6, 7, and 8 (integration of infrastructure to deliver data and information to all users).

These challenges are the foundation of sustainable development (UN SDG targets 14.1, 14.2, 14a) and conservation (UN SDG target 14.5).

Vision and potential transformative impact (200 word limit):

The diversity of marine habitats and species is a fundamental characteristic of marine ecosystems. Particular groups of species can maintain ecosystem functions like the cycling of nutrients including carbon and nitrogen, provide opportunities for multiple fisheries, support the tourism industry, and harbor medicines and materials. Yet, a change to unwanted groups of species can harm services that sustain human well-being, create jobs, and grow economies. Understanding the composition and distribution of life in the sea is a requirement of managing for conservation and development.

To address these needs, the Marine Biodiversity Observation Network (MBON) seeks to 1) measure, monitor, and forecast changes in marine biodiversity, 2) understand natural and human-related causes including effects due to climate change, and 3) assess and predict how those changes affect ecosystem function and services over various spatial and temporal scales. Given the challenges in applying marine biodiversity observations to inform conservation and management decisions, MBON will leverage its trans-disciplinary, inclusive framework to build stronger connections with stakeholders involved in “on-the-water” decision-making so that observations of marine biodiversity are directly integrated into decision-making. This framework is necessary to address all of the Ocean Decade Challenges and achieve the ambitious goals traced for the decade.

Realizable, with connections to existing U.S. scientific infrastructure, technology development, and public-private partnerships (150 word limit):

US agencies, the private sector, and academia developed MBON through the National Oceanographic Partnership Program (NOPP), building on the legacy of the Census of Marine Life. MBON provides a framework for best practices and interoperability, and coordinates among national and international groups to integrate critical biological observations into ocean observing, mapping, exploration, and characterization strategies and programs. This framework

is fundamental to meet the U.S. vision for the ocean and for executing Ocean Decade Actions including:

- Assessing biodiversity value for societal benefit.
- Advancing ecological forecasting and applications.
- Innovating eDNA, imaging, acoustics, animal movement, machine learning/artificial intelligence, remote sensing and other emerging approaches for biodiversity assessments to address research and applications needs.
- Mapping ecosystems and life in 4 dimensions, across disciplines, from seabed to surface, from the watershed to the ocean interior over time.
- Expanding capacity, literacy, participant diversity, and use of traditional knowledge for inclusion and representativeness.

Scientific/technological sectors engaged outside of traditional ocean sciences (100 word limit):

Adaptive management strategies and monitoring requirements for public and industry sectors depend on information on status and trends of marine biological resources. This information is not yet consistently available at regional or global scales. Biodiversity indicators for advancing overlapping ocean uses and conservation need a foundation of standardized approaches and interoperable data. MBON enables user-accessible products based on novel technologies and their integration, including environmental DNA, remote sensing, imaging, acoustics, and citizen science. This informs national to international stakeholders and indicators of the UN Sustainable Development Goals, Ramsar Convention, global biodiversity assessments (IPBES), and fisheries treaties.

Opportunities for international participation and collaboration (100 word limit):

MBON fosters collaborations to coordinate collection, sharing, and application of biodiversity information. It contributes to international Research Coordination Networks, Scientific Committee on Oceanic Research (SCOR) Working Groups, Global Ocean Observing System (GOOS), Ocean Best Practices System, Ocean Biodiversity Information System (OBIS), Ocean Teacher Global Academy, Group on Earth Observations (GEO BON, Blue Planet), the Global Ocean Acidification Observation Network (GOA-ON), MarineGEO, academia, and organizations (e.g., UNEP WCMC) to inform research and policy. An MBON Ocean Decade Program will expand present Actions for capacity exchange with small island developing states and developing nations through training workshops, webinars, publications, and fundraising.

Builds global capacity and encourages the development of the next generation of ocean scientists (100 word limit):

MBON is a network of people that leverages the expertise, interests, and focus of groups across national and international networks to engage students and early-career professionals of diverse ethnic and national groups, backgrounds, and gender. A goal is to share standards, best

practices and approaches for interoperability and knowledge management and exchange. This includes advancing ethics, diversity, and inclusion among stakeholders. MBON has been holding workshops on new tools for data sharing weekly to monthly for US participants and for collaborators in Mexico, Brazil, Argentina, Colombia, Ecuador and Chile, and seeks Ocean Decade Actions to expand work in other regions.