MITRE's Response to the Ocean Policy Committee's RFI on a National Strategy for a Sustainable Ocean Economy

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For additional information about this response, please contact:

Duane Blackburn
Center for Data-Driven Policy
The MITRE Corporation
7596 Colshire Drive
McLean, VA 22102-7539

policy@mitre.org
(434) 964-5023

About MITRE

MITRE is a not-for-profit company that works in the public interest to tackle difficult problems that challenge the safety, stability, security, and well-being of our nation. We operate multiple federally funded research and development centers (FFRDCs), participate in public-private partnerships across national security and civilian agency missions, and maintain an independent technology research program in areas such as artificial intelligence, intuitive data science, quantum information science, health informatics, policy and economic expertise, trustworthy autonomy, cyber threat sharing, and cyber resilience. MITRE's 10,000-plus employees work in the public interest to solve problems for a safer world, with scientific integrity being fundamental to our existence. We are prohibited from lobbying, do not develop or sell products, have no owners or shareholders, and do not compete with industry. Our multidisciplinary teams (including engineers, scientists, data analysts, organizational change specialists, policy professionals, economists, and more) are thus free to dig into problems from all angles, with no political or commercial pressures to influence our decision making, technical findings, or policy recommendations.

MITRE's BlueTech (Bluetech.mitre.org) work program supports the Departments of Commerce, Defense, and Homeland Security and consists of multi-disciplined engineers and scientists focused on developing solutions for the world's oceans at the intersection of national, economic, and climate security. MITRE BlueTech works across industry, academia, and government accelerating outcomes, connecting the ecosystem, and moving technology from the lab bench to the ocean.

Introduction and Overarching Recommendations

Our national economy has long depended on the ocean as an engine of innovation and economic growth, and a vital resource to our entire global ecosystem. However, as climate change forces communities to adapt, and new offshore industries emerge, economic uncertainties in coastal regions are intensifying. Coastal regions face increased demands on finite ocean resources, workforce shortages and modern skills gaps, insufficient infrastructure to meet evolving needs, scarcity of new investment capital, and diversity and accessibility challenges. These challenges are being intensified by climate-induced changes in maritime habitats and species behaviors as changing ocean chemistry and temperatures are impacting ocean life and distributions. If current trajectories continue without adaptation, the entire marine ecosystem is at risk and all communities—not just coastal—will face a major threat to their livelihoods.
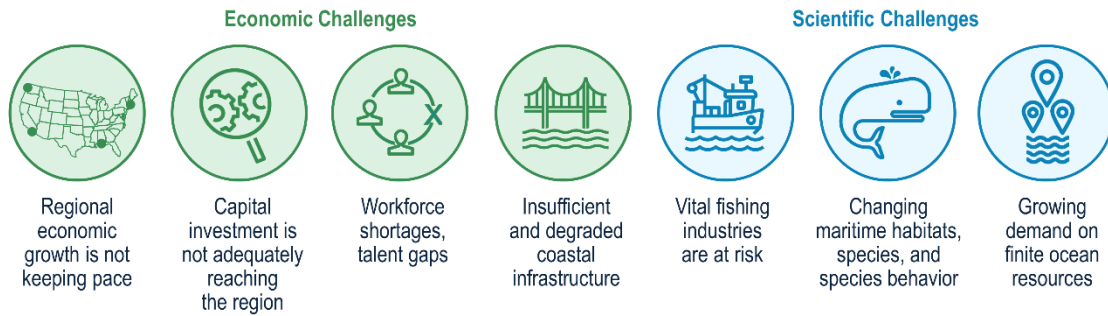
To stimulate responsible growth of offshore industries, stakeholders need a shared understanding of the complex natural and human system interactions among new or existing industries and infrastructure, the fragile coastal environment, and marine habitats and species behaviors.

The **new blue economy** as defined by the National Oceanic and Atmospheric Administration (NOAA) is founded on improved collection, analysis, and dissemination of ocean and coastal-derived data to support economic growth, protect the ocean's health, and address societal challenges and inspire their solutions. To achieve leadership in this realm, there is an imperative to accelerate innovation, improve access and equitable utilization of maritime data, and accelerate the development of a world-class "blue technology" (BlueTech) workforce.

Coastal regions need regional programs that enable use-inspired research—both from science discovery to technical innovation and from technical innovation to economic development and sustainment. Creating innovative solutions to support the new blue economy will be the key to a sustainable ocean economy for all Americans.

Questions Posed in the RFI

1. *Sustainable Ocean Economy.* What should the national vision and high-level goals be for a sustainable ocean economy? Are there successful regional or local efforts that could be applied nation-wide?

National Vision and High-Level Goals:

A national vision should include building and implementing a new blue economy ecosystem focused on innovative technology and services to promote resilient and sustainable usage of ocean and freshwater resources.

Goals that support this vision should include:

- Improve access and usability of "blue" data and testing infrastructure.
- Grow research capacity focused on coastal and offshore industry and community challenges.
- Build a network of new and sustainable blue economy companies with robust revenue growth, generating more products and companies that support the health of the American economy.

- Grow a diverse and inclusive workforce equipped to meet the needs of the new blue economy.

Successful Regional or Local Efforts That Could Be Applied Nation-Wide:

One of the regional areas that stand out for a steady and sustainable growth in ocean economy is the Northeast region. Emerging technologies and the growing need for climate resiliency solutions and sustainable resource management are generating industries such as aquaculture and offshore renewable energy. According to NOAA's 2022 Marine Economy Report, the Northeast region's marine businesses, employees, average wages, and GDP all increased over the past decade. The number of marine businesses increased by 17% and the value of the Northeast region's marine economy, or the GDP, had an increase of 43% in that time.[1]

Within the Northeast region, there are multiple initiatives for sustainable growth in ocean economy, such as Gulf of Maine's effort to develop a Blue Economy Innovation Corridor and Advancing the North Shore Blue Economy initiative. The goal of Gulf of Maine's Blue Economy Innovation Corridor initiative from Maine to Boston is to harness the Gulf of Maine's potential through "…combining the technical expertise of Gulf of Maine Research Institute (GMRI) with business formation and support services to forge a pathway for blue economy entrepreneurs and start-ups… ."[2] The Advancing the North Shore Blue Economy initiative aims to increase financial investment in coastal resilience, evolve a living resources sector, and develop marine and science tech clusters and the potential for offshore wind in the Gulf of Maine.[3] These types of scalable efforts can be applied across U.S. coastal areas and nation-wide.

A core strength and differentiator for this region's success in sustainable growth in ocean economy is the presence of a robust network of coastal research organizations: University of New Hampshire, University of Maine, Maine Maritime Academy, Northeastern University's Roux Institute, GMRI, Bigelow Laboratory for Ocean Sciences, Downeast Institute, Island Institute, Mount Desert Island Biological Laboratory, Woods Hole Oceanographic Institute, University of Massachusetts–Dartmouth, University of Rhode Island, and more. The region is home to an enviable network of maritime-focused labs and onshore, coastal, and offshore testing environments. Similar clusters of regional networks exist in other coastal areas: around San Diego, off the coast of Oregon/Washington, along the northern Gulf coast, and in Southern Florida, to name a few.

As an example, TMA BlueTech (tmabluetech.org) is an incubator set up in the Port of San Diego that brings together innovation in the public sector with government and academia. MITRE has a unique ability to act as both the linkage between the government interests in each region and a bridge between these regional efforts.

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[1] 2022 Marine Economy Report: Great Lakes Region. 2022. National Oceanic and Atmospheric Administration (NOAA), https://coast.noaa.gov/data/digitalcoast/pdf/econ-report-regional-state.pdf.

[2] Blue Economy Innovation Corridor. 2023. Gulf of Maine Research Institute, https://gmri.org/projects/blue-economy-innovation-corridor/. Last accessed: September 11, 2023.

[3] Advancing the North Shore Blue Economy. 2022. North Shore Technology Council, https://nstc.org/resources/Documents/Advancing%20the%20North%20Shore%20Blue%20Economy_KKahl_060822.pdf.

2. *Ocean, Coasts, and Great Lakes Priorities*. What are your priorities for sustainable management of the ocean, coasts, and Great Lakes at a local, state, Tribal, territorial, regional, and/or national scale? What key challenges do you face in achieving them? Are your priorities for ocean, coastal, and Great Lakes management reflected in existing workplans, strategy documents, or other materials? What practices/tactics are you employing or would you need to employ to meet those priorities?

Insight into investments from across the federal, state, and local government related to the sustainable ocean economy is essential in informing strategic, data-driven decision making. MITRE's priority for sustainable management of the ocean, coasts, etc. currently in practice is applying advanced thinking in analysis and benchmarking of federal budgets and associated spending, allowing future situational awareness into current priorities and related programs, such as NSF Regional Economic Engines, NOAA, DoD Climate Resilience, etc.

Ensuring regional and national prosperity from coastal resources requires use-inspired, focused discovery and a systems-level understanding of the challenges, opportunities, and evidence-based approaches to nurture and sustain both the resources and the industries and communities they support.

MITRE will build and enhance observation and modeling systems for the coastal and undersea environments, striving for fidelity and accuracy like that of onshore and atmospheric monitoring. With these and other information systems, MITRE's BlueTech[4] will deliver reliable access to trusted data and unbiased analytics to address critical research questions and support informed policymaking that encourages cooperative development and adoption of sustainable solutions.

Lastly, MITRE will integrate existing assets and investments, both intellectual and financial, to drive outcomes for equitable growth and sustainable uses of maritime resources that are defined by the northeast region's diverse coastal communities. MITRE will leverage current relationships with our partners and stakeholders, who are already working on aspects of this topic area, funded by government programs, foundations, and private equity. These efforts will bring in investment to catalyze research that will remove barriers to equitable growth of the blue economy, close knowledge gaps and integrate technologies into regional curricula, and attract and retain a larger, more diverse maritime workforce.

3. *An Informed and Responsive National Strategy.* Are there gaps in our knowledge of the ocean, coasts, and Great Lakes that need to be addressed to support sustainable ocean management? Are there opportunities to improve how we manage the use of marine ecosystems to maximize their benefits while minimizing human impacts on them? For example, and as relevant only to the U.S. Exclusive Economic Zone, how can the United States advance its commitment to a precautionary approach to seabed mining and other emerging ocean industries? What co-management and co-stewardship practices are needed to meet ocean, coasts, and Great Lakes sustainability?

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[4] BlueTech. 2023. MITRE, https://bluetech.mitre.org/. Last accessed: September 11, 2023.

There are various gaps in our knowledge of the oceans, coasts, and Great Lakes that need to be filled to support sustainable ocean management. The primary gap is the lack of mapping data for significant areas within these respective water bodies. In response to a Presidential Memorandum on November 19, 2019,[5] the 2020 National Strategy for Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone (NOMEC) has made comprehensive mapping a priority for the current decade.[6] This includes knowledge of the depth, shape, and composition of the seafloor.[7]

As identified by the federal Interagency Working Group on Ocean and Coastal Mapping (2023), approximately 50% of the U.S. coastal, ocean, and Great Lakes waters are unmapped. Many of these areas fall within the U.S. Exclusive Economic Zone, are experiencing rapid effects from climate change, and represent geostrategic areas of interest to the U.S. and its allies across the Pacific Ocean, Caribbean Sea, Aleutian Island Chain, Bering Sea, and Gulf of Alaska.[8] While progress is being made in these geographic areas, detailed ocean floor geodetic mapping should be accelerated, and the data products made available in an accessible, usable, and affordable format. This geospatial oceanographic survey advances safe navigation, supports national security, informs hazard mitigation of coastal resilience, and facilitates preservation and restoration of marine habitats and heritage. Further, understanding the ocean floor surface is essential for sustainable ocean economies.

A high-resolution, accurate, and accessible mapping of ocean, coastal, and lake seabed layers are essential to drive sustainable management of critical ocean, coastal, and Great Lakes habitat. Acceleration of this mapping effort, combined simultaneously with authoritative data product release, is critical to address key scientific questions more rapidly, support innovation in the new blue economy, and inform critical coastal adaptation and resilience engineering strategies.[9] Shared ocean, coast, and lake bottom structural layers are also essential for the development and fostering of co-management and co-stewardship practices. Finally, without a high-resolution mapping of the ocean floor morphology, any significant advances in seabed mining should proceed with extreme caution as these areas provide critical habitat to many species and processes vital to ecosystem function and health.[10]

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[5] Memorandum on Ocean Mapping of the United States Exclusive Economic Zone and the Shoreline and Nearshore of Alaska. 2019. The White House, https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-ocean-mapping-united-states-exclusive-economic-zone-shoreline-nearshore-alaska/. Last accessed: September 11, 2023.

[6] National Strategy for Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone. The White House, https://iocm.noaa.gov/about/documents/strategic-plans/20200611-FINAL-STRATEGY-NOMEC-Sec.-2.pdf.

[7] The Interagency Working Group on Ocean and Coastal Mapping announces progress report on mapping U.S. ocean, coastal, and Great Lakes waters. 2023. NOAA, https://nauticalcharts.noaa.gov/updates/the-interagency-working-group-on-ocean-and-coastal-mapping-announces-progress-report-on-mapping-u-s-ocean-coastal-and-great-lakes-waters-2/. Last accessed: September 11, 2023.

[8] Status of Seafloor Mapping Within U.S. Waters. 2023. NOAA, https://iocm.noaa.gov/seabed-2030-status.html. Last accessed: September 11, 2023.

[9] Ocean Floor Features. 2020. NOAA, https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-floor-features. Last accessed: September 11, 2023.

[10] Mapping the Seafloor. 2023. United States Geological Survey, httpss://www.usgs.gov/science/science-explorer/ocean/mapping-the-seafloor. Last accessed: September 11, 2023.