

United States' Contribution to the Office of Legal Affairs of the United Nations regarding Ocean Science and the United Nations Decade of Ocean Science for Sustainable Development

This submission is in response to LOS/SGR/2019/1/ST, which provides Member States the opportunity to submit a contribution outlining their views on “Ocean Science and the United Nations Decade of Ocean Science for Sustainable Development”.

The United States welcomes the United Nations Decade of Ocean Science for Sustainable Development (hereafter referred to as “the Decade”) as the theme of the twentieth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea. The United States supports the emerging themes of the Decade and its mission to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide in support of a common framework that will bring together policy makers, the scientific community, and society to create a healthier ocean for the benefit of all.

The United Nations General Assembly mandated the Intergovernmental Oceanographic Commission (IOC) of UNESCO to coordinate the Decade’s preparatory process from 2018 - 2020 leading up to the launch of the Decade in 2021. The United States is supportive of this coordination, and is well-aligned to work with the IOC throughout the preparatory process and during the Decade (2021-2030): the United States has been a leading member of the IOC for 59 years and spends approximately \$80 to \$100 Million USD per year on programs that support the IOC’s mission worldwide. U.S. national programs in global ocean science and coordination with complementary global efforts stimulate an international ocean research enterprise in support of the IOC.

U.S. activities align well with the emerging priorities of the Decade, as evident in the United States’ “Science and Technology for America’s Oceans: A Decadal Vision” strategy published by the Subcommittee on Ocean Science and Technology of the Office of Science and Technology Policy in November 2018. These endeavors include ocean observing, ocean acidification programs, seabed mapping, tsunami warning systems, ocean literacy initiatives, and other activities, many of which are reflected in the identified themes of the Decade.

Seabed mapping and exploration initiatives directly support Objective 1 of the Decade, “To generate knowledge of the ocean system, its role in the earth and climate system, including the human component, its biodiversity and the seabed, to support sustainable management” and Research and Development Priority Area 1, “Comprehensive map (digital atlas) of the ocean”. The United States is a global leader in seabed mapping and deep-sea exploration through both national programs and engagements in international campaigns such as the Nippon Foundation-GEBCO Seabed 2030 Project (Seabed 2030), the Atlantic Seabed Mapping International Working Group of the Atlantic Ocean Research Alliance (ASMIWG), and the International Hydrographic Organization (IHO). For example, the National Oceanic and Atmospheric Administration (NOAA) works with international partners to map and explore the ocean to make discoveries of scientific, economic, and cultural value; supports innovations in exploration tools and capabilities; and encourages the next generation of ocean explorers, scientists, and engineers to pursue careers in ocean exploration and related fields. The data and information collected

during expeditions are publicly available, giving resource managers, the academic community, and the private sector the information they need to identify, understand, and manage ocean resources.

U.S. mapping initiatives benefit both the citizens of the United States and global partners. From 2014 - 2017, NOAA conducted a three-year Pacific Ocean exploration and research program, CAPSTONE, that provided Samoa, the Republic of Kiribati, Tokelau and Cook Islands with maps of key areas of their exclusive economic zones. In May 2017, NOAA mapped 4000 km within and conducted two telepresence-enabled dives on features north of Cook Islands' Marae Moana marine park, which revealed a large scale, high-density coral community.

The United States is also an active partner and current Chair of the Atlantic Seabed Mapping International Working Group, which is part of the Atlantic Ocean Research Alliance launched by the Galway Statement on Atlantic Ocean Cooperation, a trilateral partnership between the United States, Canada, and the European Union. This partnership is focused on the sustainability of our shared sea, the North Atlantic Ocean, and has already resulted in a trilateral, 24-day exploratory mapping expedition of a high priority, biologically rich, sensitive marine area from Norfolk, VA to St. Georges, Bermuda.

Significant progress has also been made on the International Hydrographic Organization Data Centre for Digital Bathymetry's (IHO DCDB) infrastructure and data viewer, which is hosted by NOAA's National Centers for Environmental Information (NCEI). This infrastructure allows for the contribution of various bathymetric data (e.g., multibeam, crowdsourced bathymetry, and bathymetric products) collected worldwide, while the data viewer allows for the discovery and access of those data using a single web portal.

Such regional, multilateral seabed mapping approaches to achieve a common goal for the benefit of all align well with the Decade, and could serve as models to build upon or replicate.

In addition to seabed mapping efforts, space-based observations will be critical to the Decade's success. Basic research funded by the U.S. National Aeronautics and Space Administration (NASA) addresses the goal of further understanding the ocean system and its relationship to the earth's climate. For example, the NASA EXPORTS (Export Processes in the Ocean from Remote Sensing) project seeks to develop a predictive understanding of the export and fate of global ocean primary production from remote sensing and its implications for the Earth's carbon cycle in the present and future. Additionally, a joint NASA/NOAA investment called the Marine Biodiversity Observation network (MBON) seeks to establish a process for sustained, standardized, and operational measurements of biodiversity around the ocean in order to understand how biodiversity is changing and to develop better management policies relevant to the conservation and sustainable use of marine biodiversity. Basic research programs like these can help advance multiple Decade Objectives.

Proper stewardship of the world's oceans is critical to sustaining ecosystem services, including food from global fisheries, agricultural feed, industrial compounds, medicines, coastal tourism and protection, and the associated jobs such industries provide. The goal is to maintain ecosystems in a healthy, productive, and resilient condition so they can provide the services

humans around the world want and need. The United States is a leader in using adaptive resource management (ARM) and ecosystem-based fisheries management (EBFM), which balance short-term gains and long-term objectives. Instead of managing species in isolation, these strategies utilize multiple sources of information, such as linkages between species, relationships between the physical environment and biological responses, socio-economic data, and stakeholder knowledge. For example, the NOAA National Marine Fisheries Service (NMFS) uses these strategies to manage living marine resources across 11 large marine ecosystems, including approximately 450 regulated fishery stocks/stock complexes, 150 threatened or endangered species, and 100 marine mammal species.

The demand for integrated marine assessment drives a global need for efficient and economical monitoring methods, and molecular biological approaches are being used to meet that demand. For example, scientists in the United States and abroad are pursuing the integration of environmental DNA (eDNA) into ecosystem observing programs and fisheries management. By using genetic material obtained directly from habitat samples such as seawater and sediment, eDNA provides a non-invasive alternative to net and biopsy sampling. NOAA scientists and partners are exploring eDNA as a way to quickly and cost-effectively assess biodiversity, and to track invasive species, harmful algal blooms, aquaculture pathogens, migratory species, larval dispersal, and endangered populations.

The issue of marine litter and microplastics has risen to the forefront of global ocean conservation in recent years. To adequately address this serious and growing problem, sound science, data, and monitoring are required to better understand the pathways, distribution, and fate of litter and microplastics in the marine environment, as well as the resulting ecological and human health impacts. NOAA's Marine Debris Program is providing critical resources to researching this topic as well as funding efforts aimed at prevention of litter from entering watercourses and the marine environment as well as removal of litter from coastal areas.

Ecosystem and fisheries management tools like these support Objective 2 of the Decade, "To develop and provide access to a comprehensive evidence base and capacities for ecosystem-based management that will improve ocean health and support a blue economy", and Research and Development Priority Area 3, "A quantitative understanding of ocean ecosystems and their functioning as the basis for their management and adaptation".

The Decade also aims to save lives and reduce risks through enhancing integrated multi-hazard warning systems. Tsunamis are extremely fast onset events. Coastal communities can be better prepared through planning, education, awareness and enhancing local emergency action capabilities. The United States Tsunami Program is part of a cooperative effort to save lives and protect property through hazard assessment, warning guidance, mitigation, research capabilities, and international coordination. This program includes a coordinated U.S. national effort to mitigate the impact of tsunamis through public education, community response planning, hazard assessment, and warning coordination. Additionally, the United States National Science Foundation's ongoing PREEVENTS initiative focuses research on understanding hazards such as tsunamis and cyclones, and NASA's Disasters Program promotes the use of Earth observations to improve prediction of, preparation for, response to, and recovery from natural and technological disasters.

Under the IOC, Tsunami Ready (TR) is an international performance-based community recognition pilot program modeled after the U.S. TsunamiReady® Program. To date, the Office of Foreign Disaster Assistance at the United States Agency for International Development has provided US\$ 1 Million for the Tsunami Evacuation Mapping and Planning Project (TEMPP) and TR pilots in Belize, El Salvador, Haiti, Honduras, Grenada, Jamaica, Saint Kitts and Nevis and Saint Vincent and the Grenadines. Integrated multi-hazard warning systems like these will be critical to the Decade's success. The United States is working to improve tsunami warning systems both nationally and internationally in direct support of Objective 3 and Research and Development Priority Areas 5 and 7 on integrated multihazard warning systems and capacity building, respectively.

The United States is the leading contributor to the development of the knowledge, tools, and capabilities to observe the global ocean. The United States provides its global ocean data to all, free of charge, and works with partners through various national, regional, and global programs, including the IOC Global Ocean Observing System (GOOS). Real-time data from ocean observing activities such as the Tropical Atmosphere Ocean (TAO) Array, the Argo Program, and the global drifter network enable skillful weather and climate forecasts. Other observation programs targeting carbon, ocean acidification, and nutrients provide actionable information on the ocean environment and inform policy and management decisions. Multiple geostationary and polar orbiting satellite systems provide routine nearly-global coverage of critical ocean characteristics for global forecasting and warning systems.

The Decade will provide an opportunity to expand and mature these existing ocean observing efforts to address emerging needs in remote locations (e.g., deep ocean and polar seas), new knowledge gaps (e.g., oxygen, nutrients and ecosystem health), and improve our foundational capabilities in the critical regions.

In addition to the scientific research programs outlined above, ocean literacy and capacity development are key for all nations to benefit from developments in research and technology and are a major focus of the Decade's Objectives and emerging priorities. The transfer of knowledge and information through capacity building is not only an essential pursuit for the benefits that it brings to the constituency, but also important for connecting those that commit resources to, for example, ocean observing systems to local decision makers.

The United States is the global leader in ocean literacy with efforts beginning over 30 years ago, supported by government agencies, academia, business and industry, NGOs, and professional education and scientific societies. Close collaboration among Member States who are leaders in ocean literacy is integral in the early planning phases of the Decade. Recent U.S. capacity development efforts throughout the Indo-Pacific have focused on training the next generation of researchers and technicians to promote the sustainability of regional observing systems and the local utilization of available data for their social and economic benefits. To date, the United States has held approximately twenty such capacity development workshops under the auspices of the Indian Ocean Observing System (IndOOS). Another example of an established capacity development program to which NOAA contributes is the *Partnerships for New GEOSS Applications* (PANGEA). PANGEA provides for in-country practical applications

training of ocean data to large and diverse groups of regional participants and fosters resource-sharing partnerships between developed and developing countries to realize the social-economic benefits of ocean observing systems. Efforts like these will be critical to the success of the Decade.

The United States encourages members to begin coordinating at a national level, and looks forward to working with all UN members during the preparatory process to explore how all of the Decade's Objectives and priorities can be met.