On behalf of the Consortium for Ocean Leadership (COL), which represents the leading ocean science, research, and technology organizations from academia, industry, and philanthropy (to include aquariums), I appreciate the opportunity to submit for the record our fiscal year (FY) 2020 funding priorities for the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA). As a maritime nation, our national, homeland, energy, food, water, and economic securities, as well as our public health and safety, depend on a healthy ocean – which in turn depends on ocean science and technology – a concept I refer to as “ocean security.” This understanding enables us to have advance notice of oncoming hurricanes, to sustainably manage fish populations, to let boat operators know when there’s rough weather ahead, to allow for the safety of maritime commerce, to forecast harmful algal blooms, and so much more that helps protect our nation, its infrastructure, and its prosperity. I hope that as the subcommittee makes funding decisions for FY 2020, you will provide the needed support for programs, many of which are outlined below, that advance our nation’s ocean security, ensuring we remain an economically competitive, scientifically literate nation secure in our access to food, water, and energy.

Many of the issues addressed in this testimony are cross-cutting. The importance of observing our ocean doesn’t exist in a vacuum but instead includes NOAA’s Integrated Ocean Observing System (IOOS), NSF’s Ocean Observatories Initiative, and NASA’s Plankton, Aerosol, Cloud, ocean Ecosystem mission (to name just a few). Advancing science, technology, engineering, and math (STEM) education falls to, among others, NOAA’s Office of Education, NASA’s Office of STEM Engagement, and NSF’s Education and Human Resources. But it’s not just the federal ocean science community investing in these and other similar enterprises; there are more than 600 businesses engaged in ocean observation and forecasting; over 400 postsecondary institutions that provide ocean-related certificates or degrees; and in excess of 45,000 nonprofits focused on ocean and coastal activities. To share information, observations, technology, and best practices, cross-sector and interagency collaboration are necessary. To this end, the National Oceanographic Partnership Program (NOPP), a congressionally mandated program established in 1997, is an ideal vehicle to advance collaborative efforts and already has been involved with funding projects such as IOOS, the Argo Project, and the JASON project. To fully utilize NOPP and facilitate the success of projects promoting national goals (national security, economic prosperity, quality of life) related to ocean knowledge, I respectfully request the subcommittee provide $16 million in NOPP funding – $8 million to NOAA and $8 million to NASA. I thank the subcommittee for their support of the program throughout the FY 2019 appropriations process.

National Oceanic and Atmospheric Administration

For NOAA to fully execute its mission of service and science, I respectfully request $6.5 billion for the agency, in addition to support to other programs highlighted below.

Ocean observations are a requisite first step when it comes to understanding the ocean. Without temperature data, we can’t know who needs to evacuate from a hurricane’s path; without depth data, we can’t tell if the shipping channel is deep enough for a vessel to pass through safely; without
chemical analysis, we can’t get notice that changing pH will wipe out a shellfish farm; without knowing the biodiversity of an area, we can’t tell if it should be a marine sanctuary or a potential site for offshore wind development. The U.S Integrated Ocean Observing System (IOOS) is a coordinated network of technologies (such as gliders, satellites, buoys, underwater vehicles, and tide gauges) that generate continuous data on our coasts, ocean, and Great Lakes. Building and leveraging local and regional partnerships ensures IOOS’ efficiency and provides the infrastructure needed to support jobs, the economy, maritime safety, and environmental health. **To ensure we continue to collect data and increase our ocean observations, I respectfully request $50.5 million for U.S. IOOS in FY 2020. This includes $3.2 million to install high-frequency radar systems to close gaps in surface current mapping; $3.5 million for underwater gliders to detect harmful algal blooms, ensure safe navigation, and improve hurricane warnings; $4.3 million for research and development; and funding to integrate federal and non-federal data and coordinate across NOAA and the 17 federal IOOS agencies.**

Hand-in-hand with ocean observations is ocean exploration. NOAA’s Office of Ocean Exploration and Research (OER), the only federal organization dedicated to ocean exploration, has not only made significant discoveries but has captured public imagination about our blue planet. Exploring the more than 1.3 billion cubic kilometers of water that makes up our global ocean involves more than just OER but other federal and state agencies, nonprofits, private industry, and academic institutions. **I respectfully request the subcommittee fund OER at $50 million and that report language address the importance of collaboration and coordination among federal and state agencies, academic institutions, industry, and other oceanographic partners to maximize return on investment and advance shared data, science and public engagement, and innovative technology.**

I thank the subcommittee for continuing to recognize the importance of STEM education and extension programs, despite repeated attempts by the administration to eliminate many of them. **I respectfully request $12 million for NOAA’s Bay-Watershed Education and Training and $8 million for NOAA’s Environmental Literacy Program.** The two goals of NOAA’s agency-wide education strategic plan required by the **America COMPETES Act** are workforce development and environmental literacy, where formal and informal education and outreach create an environmentally literate society. Sustained and adequate funding for these programs not only advances NOAA’s mission but grows the STEM workforce, strengthens our economy, and ensures our national security. As the longest-standing and most comprehensive national grants program with a focus on environmental literacy, ELP grants have and will continue to keep our coastal communities – and our nation as a whole – safe, secure, and prosperous. Adequately funding ELP will allow programs such as the National Ocean Sciences Bowl (NOSB), a quiz-bowl style ocean science competition for high schoolers that has received ELP funding during its 22-year history, to flourish. The NOSB alone has graduated tens of thousands of students from high school with a solid ocean science foundation who go on to careers that advance our nation and keep it secure.

For more than 50 years, the National Sea Grant College Program (Sea Grant) has supported coastal and Great Lakes communities, improving community and economic resiliency, ensuring the health of coastal ecosystems, and advancing environmental literacy and workforce education. Between February 2016 and January 2017, Sea Grant’s research, extension, and education resulted in 1.4 million acres of restored or protected habitat, 494 communities with improved resilience, and 2,002 seafood HAACP safety certifications. The $74 million in federal investments in 2016 resulted in a
$611 million economic benefit. I respectfully request $93.5 million for the National Sea Grant College Program in FY 2020.

The importance of programs that address emerging issues cannot be understated. One of these, NOAA's Marine Debris Program, has grown in importance and visibility as scientists and the public better understand the widespread impact of the ocean plastic problem. I respectfully request $10 million for this program to evaluate, track, and clean up debris that threatens ocean health.

National Science Foundation

As the only federal agency tasked with supporting all fields of fundamental science and engineering (except medical sciences), NSF is vital to our nation’s scientific enterprise, today and tomorrow. I respectfully request $9 billion for NSF "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense" in FY 2020.

I want to thank the subcommittee for providing $127 million in FY 2019 to finish out the final year of a three-year funding profile to complete construction of all three Regional Class Research Vessels (RCRVs). With more modern technology and abilities than previous generations, these long-awaited RCRVs will provide even more access to the marine realm, and I respectfully request the subcommittee maintain full support for these critical research vessels.

As with NOAA, STEM education at NSF plays a vital role in securing our national, homeland, economic, energy, food, and water securities. Broadening the backgrounds of scientists to represent all people across our nation, better reflecting our diversity of gender, race, class, and perspective, is a critical for all STEM fields — not just ocean science. A diverse, STEM-literate workforce strengthens our nation's economy and is vital to maintaining the nation's leadership in science and technology innovation. It’s imperative to reinforce the importance of funding federal programs that empower underrepresented groups to become the next generation of ocean-STEM leaders at every educational and technical level. The NSF INCLUDES (Inclusion across the Nation of Communities and Learners of Underrepresented Discoverers in Engineering and Science) program aims to increase access to and participation in STEM learning by demographic groups with historically low participation in these fields. Programs such as this – that support a more diversified academic core in the science and technology workforce – are key to growing our blue economy.

National Aeronautics and Space Administration

While images of faraway galaxies lead to a desire for space exploration, equally memorable are photos of our planet as seen from space. While the administration’s desire for space exploration is exciting, it should not come at the expense of understanding our own home. I respectfully request $7.25 billion for the Science Mission Directorate and $2.5 billion for NASA Earth Science. This should include support for the agency’s Earth-facing missions, including those proposed for elimination in the president’s budget request, specifically the Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission and the Climate Absolute Radiance and Refractivity Observatory (CLARREO) Pathfinder instrument. Both of these were recommendations from the 2007 Earth Science decadal survey. As support is thrown behind the space-based efforts at NASA, let’s not forget how space-based ocean science can inform research related to ocean work on other moons and planets.

In closing, it is clear that ocean science and technology strengthen our national and homeland security; underpin our economy; ensure food, water, and energy security; and provide for safety and
efficiency in marine transportation. To ensure this ocean security upon which we all depend, our federal ocean science agencies and programs must be adequately and consistently funded. While the Cold War may remain a distant memory today, the late Admiral James D. Watkins, chief of naval operations from 1982-1986, used to state, “Oceanography won the Cold War.” Our knowledge of the undersea domain gave the United States a competitive advantage over our enemies. That advantage is in jeopardy today – not just in comparison to federal ocean science investments by our competitors but in comparison to oceanographic threats. In 30 years, will we say oceanography helped us win the “cold war” against harmful algal blooms, ocean plastic, changing climate and ocean conditions, and illegal fishing? Only if we have a prosperous, sustainable, well-understood ocean, and we will only achieve that with federal investments.

As you work to provide funding for these critical programs, COL and our member institutions are doing all we can to give you the subcommittee allocations necessary to fully fund these programs as we continue to encourage the creation of a bipartisan budget agreement that raises the discretionary spending caps. I know you face difficult decisions that involve offsets and divestments to achieve a balanced budget. COL and our members stand ready to engage in discussion to help establish priorities around the ocean security framework to support these difficult decisions. Thank you for your exemplary leadership and dedicated work and for the opportunity to provide input into FY 2020 appropriations.

COL Members: Bermuda Institute of Ocean Sciences*Bigelow Laboratory for Ocean Sciences*College of William & Mary*Columbia University(LDEO)*Dauphin Island Sea Lab*Duke University*FAU Harbor Branch Oceanographic Institute*Harte Research Institute*Louisiana State University*Massachusetts Institute of Technology*Monterey Bay Aquarium Research Institute*Moss Landing Marine Laboratories*Mote Marine Laboratory*Old Dominion University*Oregon State University*Pennsylvania State University*Rutgers University*Skidaway Institute of Oceanography(UGA)*Stanford University*Stony Brook University*Texas A&M University*US Naval Postgraduate School*University of Alaska Fairbanks*University of California(UC) Davis*UC San Diego(Scripps)*UC Santa Barbara*UC Santa Cruz*University of Delaware*University of Florida*University of Hawaii*Center for Environmental Science(UMD)*University of Massachusetts Dartmouth*University of Miami*University of New Hampshire*University of North Carolina(UNC) Chapel Hill*UNC Wilmington*University of Rhode Island*University of South Carolina*University of South Florida*University of Southern California*University of Southern Mississippi*University of Texas Austin*University of Washington*Woods Hole Oceanographic Institution*AOOS*Alaska SeaLife Center*Aquarium of the Pacific*Arctic Research Consortium of the US*Consumer Energy Alliance*Cooperative Institute for Research in Environmental Sciences*Dalhousie University*Earth2Ocean*East Carolina University*Estuary & Ocean Science Center, SFUS*Florida Institute of Oceanography*Moore Foundation*Hubbs SeaWorld Research Institute*IEEE Oceanic Engineering Society*Institute for Global Environmental Strategies*Institute for Marine and Antarctic Studies*IOOS Association*Johns Hopkins University APL*Marine Technology Society*MARACOOS*Monmouth University Urban Coast Institute*Mystic Aquarium*National Aquarium*NOAA*NERACOOS*North Carolina State University*North Pacific Research Board*Nova Southeastern University*Savannah State University*South Carolina Sea Grant Consortium*Southeastern Universities Research Association*US Arctic Research Commission*University of Maine*Ocean Networks Canada*University of Wisconsin Milwaukee School of Freshwater Sciences*ASV Global LLC*Chevron USA*Eastman Chemical Company*Esri*Exocetus Autonomous Systems*L-3 MariPro Inc*Liquid Robotics Inc*Sea-Bird Scientific*Severn Marine Technologies LLC*Shell Exploration and Production Company*Sonardyne, Inc*Teledyne CARIS*Teledyne RD Instruments*Vulcan Inc