A Washington, DC-based non-profit organization that represents the leading public and private ocean research and education institutions, aquaria, and industry; working to advance research, education, and sound ocean policy.

The U.S. is an ocean nation, with more than 95% of the nation’s commerce traveling through American ports, more than $100 billion in annual seafood sales, and 1.7 million jobs in coastal tourism and recreation. Furthermore, over $8 trillion worth of oil and gas reserves lie below the oceans and above them are terawatts of untapped wind resources. Current and anticipated changes in ocean chemistry, productivity and sea level will have tremendous regional and national economic impacts. The academic research community is equipped to inform efficient and effective solutions to help America manage our resources and adapt to our changing planet, thus enhancing our economy and maintaining our status as the world’s leader in research and innovation.
America: An Ocean Nation

- The ocean covers 71% of the Earth’s surface.
- The ocean contains 97% of the planet’s water.
- The ocean provides 99% of the Earth’s habitat.
- More than 50% of the U.S. population lives in coastal counties, making up less than 10% of the total land area (minus Alaska).
- The U.S. has more than 95,000 miles of shoreline, which supports a $60 billion recreation and tourism economy.
- The international trade in coastal and marine fisheries contributes more than $100 billion annually to our nation’s economy.
- 95% of the nation’s commerce travels through U.S. ports.
- The ocean contains approximately $8 trillion in oil and gas reserves.
- The Great Lakes are the largest sources of freshwater in the world.
- The ocean drives our weather and climate through the global transfer of heat and water.
- Ocean organisms generate the oxygen we breathe every day.
- The ocean contains the sedimentary archive of past planetary change.
Protecting Lives and Property

The ocean covers 71% of the Earth’s surface and transfers enormous amounts of heat, energy, and carbon to and from the atmosphere, which drives weather patterns and influences extreme events such as droughts, floods, hurricanes, tropical storms and El Niño events as well as changes in ocean productivity. In 2012 alone, the Federal Emergency Management Agency declared a record 99 disasters, nearly all of them caused by extreme weather, including flooding, wind damage, drought and wildfires. Hurricane Sandy was the 11th billion-dollar weather-related disaster in the U.S. in 2012. While Sandy took more than 100 lives and is estimated to have created more than $50 billion in damage to property, infrastructure and lost business, its impacts on the local environment and communities will be felt for many years. Since 1990, total government exposure to losses in hurricane-ravaged states has grown more than fifteen-fold to $885 billion in 2011. Sustaining and improving our prediction capabilities to prepare for the impacts of extreme events will enable resource managers, emergency personnel and ocean/coastal industries to adapt and mitigate short and long-term damages. We recommend the following actions:

- Improve accuracy of sea-level projections through research on glacial/ice sheet melt and ice/sea dynamics to guide responsible coastal development and formulate effective adaptation plans;
- Assess physical and socioeconomic vulnerabilities to sea level rise, saltwater intrusion, and extreme events and develop resilient and sustainable infrastructure systems;
- Support research to enhance the observation and monitoring of extreme events to better inform prediction and modeling capabilities; and
- Understand the role of the oceans in climate variability across time and spatial scales.
The offshore environment will likely be at the forefront of America’s attempt to achieve energy independence. The economic and job creation impacts of this new frontier of development are enormous as are the potential environmental benefits achieved through renewable ocean energy sources. Nationwide installation of offshore wind farms could create more than 43,000 permanent operations and maintenance jobs, by 2025 ocean wave energy could provide at least 10% of the U.S. electric supply, and algae may prove to be a future viable alternative fuel source. Yet each of these options requires additional research and development to make them commercially viable. The expansion of oil and gas drilling to full capacity in our EEZ and OCS zones would provide 190,000 new jobs and contribute $45 billion to the U.S. economy. Of course, energy extraction needs to be balanced with potential negative consequences of developing offshore oil and gas, including the impact of potential spills on natural ecosystems, tourism and fishing industries. To ensure that science is at the forefront of developing new technologies and ensuring safe and reliable delivery of energy, we recommend the following actions:

- Reinvest a fraction of royalties from offshore energy exploration and development into an ocean trust fund to support renewable energy research and development, and scientific observations and monitoring, as well as prepare to mitigate problems such as potential spills;
- Promote revenue sharing from a carbon tax to support clean energy technology research, development and deployment as well as federal, state and industry-related ocean acidification research, monitoring, mitigation and adaptation strategies;
- Foster academic-industry partnerships to promote research, development and application of safe ocean energy development extraction practices; and
- Expand and integrate oceanographic and meteorological data collected by offshore energy production to improve spill response and greater understanding of the surrounding ocean ecosystem.
Rapidly changing climate, weather, water and disease patterns will likely exacerbate regional and local tensions, thus increasing international instability involving water scarcity, food shortages, natural resource competition and overpopulation. An increasing depletion of Arctic ice will lead to competition over resources, and militarization may intensify sovereignty conflicts. Sea-level rise, altered weather patterns and extreme events will threaten America’s infrastructure, economy, food-security and citizenry. America’s military bases are also particularly vulnerable and the National Intelligence Council has judged that more than 30 military installations are already facing elevated levels of risk from rising sea levels.

Resiliency, or the ability to adapt and mitigate to a changing climate, is essential for America at home and abroad and will shape DoD missions and impact military facilities and capabilities. Consequently, we recommend the following actions to help our nation prevail in current conflicts and prepare for future engagements:

- Develop climate science models, tools and new technologies and improve extreme forecasting ability to meet DoD operational needs, including adapting coastal installations to sea level rise;
- Advance understanding of abrupt climate change scenarios and likelihood;
- Improve mapping, monitoring and physical models of ocean-ice-atmosphere interactions as well as currents, sea-ice, storm frequency and intensity, permafrost and coastal zone bathymetry; and
- Develop the next generation of earth observing satellites to sustain critical climate and weather data.
The Arctic Ocean is of great strategic importance to the nation as it contains tremendous natural resources, is a future trade route and is a critical driver of the global climate. The offshore Arctic holds 30% of the world’s undiscovered natural gas and 13% of its oil reserves. Furthermore, the Arctic supports large commercial fish populations that contribute to Alaska’s $1.5 billion fishing industry. The loss of Arctic sea ice will dramatically impact commerce and the national economy through increased access to the Arctic’s valuable living and nonliving resources as well as the opening of the Northwest Passage for shipping. Loss of shorefast ice and thawing of permafrost is also threatening a number of coastal Native American communities. The following science priorities will improve our understanding of the air-sea-ice relationship to facilitate our ability to forecast the changing Arctic and enhance safe access to – and conservation of – the sea and its resources. In order to accomplish these objectives, we recommend:

- An enduring integrated Arctic observing system to monitor air-sea-ice interactions and changing ecosystems and their impacts on marine life and human livelihoods, utilizing new, autonomous systems and platforms capable of working in harsh environments;
- Research and modeling of oil in and under ice-covered waters as well as evaluating dispersants in Arctic conditions;
- Research to better forecast future rates of sea ice melting, including research to understand and measure sea ice thickness and the ocean’s role in the formation and melting of sea ice; and
- Monitor the extent of freshwater exiting the Arctic and decipher its impact on regional and global ocean circulation and changing climatic patterns.
Sustaining Ocean Productivity

Ocean ecosystems have been subjected to decades of intense fishing, urban and agricultural runoff, and the loss and degradation of estuaries and wetlands. Furthermore, changes in ocean temperatures, salinity, currents and acidity are having significant impacts on marine living resources. The incidence of hypoxia (dead zones) has increased almost 30-fold in the U.S. since 1960, with more than 300 systems recently experiencing hypoxia. The Washington State shellfish industry, which is worth over $270 million to the U.S. economy, suffered an 80% loss in productivity due to elevated ocean acidity in 2008. U.S. commercial and saltwater recreational fisheries support almost two million jobs and generate more than $160 billion in sales. Yet, $31 billion in sales and as many as 500,000 jobs are lost because our fisheries are not performing as well as they would if all stocks were rebuilt. To help ensure that we have access to sustainable marine living resources we recommend the following actions:

- Support funding for agriculture conservation programs and services to reduce runoff of nitrogen, phosphorus, and sediment from agricultural activities, which is causing harmful algal blooms and dead zones;

- Advance basic and applied research of planktonic food web dynamics and fisheries to support integrated management of marine living resources; and

- Develop a national ocean acidification observing network to better understand and predict the impact of ocean acidification on ecosystems and marine industries.
Educating students, teachers, families and the general public about the ocean is essential for developing the next generation of scientists, resource managers and industry leaders.

The ocean is an exciting and unique interdisciplinary teaching tool for science, technology, education, and mathematics (STEM) that puts study in a real world context. Working in the ocean environment poses challenges that push the innovation, engineering and technology development needed in our workforce. A well-educated public with a solid foundation in ocean, climate and atmospheric literacy is a national asset with immeasurable strategic and long-term value. To support this goal, we recommend the following actions:

- Advance understanding of ocean literacy principles across all student levels and through professional development opportunities for educators;
- Promote opportunities and serve as a clearinghouse and organizer for existing and new national-scale ocean education initiatives at member institutions and beyond;
- Support national initiatives for improving and enhancing STEM education and the career pipeline, with particular emphasis on enhancing diversity and broadening participation in a wide variety of ocean-related fields of study and careers.
Federal Ocean Science Agencies

There are several federal agencies that dedicate significant resources towards monitoring, studying and forecasting ocean conditions and marine life. Below is a brief synopsis of the agencies roles in supporting oceanography and academic research.

National Science Foundation (NSF)
- NSF is the nation’s premier science agency and accordingly the largest source of federal funding for oceanography, supporting a wide-array of biological, chemical, physical and geological research.
- Oceanography requires significant infrastructure to provide access to the sea. NSF supports several infrastructure projects that are essential for a variety of interdisciplinary programs including the Ocean Observatories Initiative, the International Ocean Discovery Program, and the academic research fleet.

National Oceanic and Atmospheric Administration (NOAA)
- As a mission agency driven to understand, predict, manage and protect ocean and coastal resources, NOAA requires the best information available and therefore supports a wide range of intramural and extramural applied research programs.
- Extramural Research Programs include: Sea Grant, Ocean Acidification, Ocean Exploration, Competitive Climate Research, Cooperative Institutes, National Centers for Coastal and Ocean Science and the Integrated Ocean Observing System.

Office of Naval Research (ONR)
- Navy Basic (6.1) research supports science and technology superiority for our naval forces and has developed and supported much of the nation’s science and engineering workforce.
- The Navy has been a leader in building and providing large research ships for the nation’s academic research fleet since WWII.

National Aeronautics and Space Administration (NASA)
- NASA supports a wide array of ocean observations and research initiatives to understand how our oceans play a major role in influencing changes in the world’s climate and weather.
- Essential ocean missions include: ocean temperature, color, salinity, topography and sea-surface winds, currents and ice.

Department of the Interior (DOI)
- USGS – supports science-based resource management, ecosystem restoration and invasive species control.
- BOEM – funds renewable energy research (including wave and current) as well as development and essential environmental studies, baseline characterization and monitoring capabilities to support conventional and renewable energy development.
- BSEE – sponsors oil spill research to improve the methods and technologies used for oil spill detection, containment, treatment, recovery and cleanup.

Department of Energy (DOE)
- Supports the development of marine and hydrokinetic technologies and devices, which capture energy from waves, tides, ocean currents, the natural flow of water in rivers, and marine thermal gradients.

Environmental Protection Agency (EPA)
- EPA supports Great Lakes, estuarine and coral reef monitoring, research and development programs.

National Institute for Environmental Health Sciences (NIEHS)
- NIEHS supports research to better understand and detect marine pathogens as well as discover therapeutic marine organisms.
MEMBER INSTITUTIONS

ALABAMA
Dauphin Island Sea Lab

ALASKA
Alaska Ocean Observing System
North Pacific Research Board
University of Alaska Fairbanks

CALIFORNIA
Aquarium of the Pacific
Bodega Marine Laboratory
Esri
Hubbs SeaWorld Research Institute
L-3 MariPro, Inc.
Liquid Robotics, Inc.
Monterey Bay Aquarium Research Institute (MBARI)
Moss Landing Marine Laboratories (MLML)
Romberg Tiburon Research Laboratory
Stanford University
Teledyne RD Instruments
U.S. Naval Postgraduate School (NPS)
University of California, San Diego (Scripps)
University of California, Santa Barbara
University of California, Santa Cruz
University of Southern California

COLORADO
Cooperative Institute for Research in Environmental Sciences (CIRES)

CONNECTICUT
University of Connecticut

DELAWARE
MARACOOS
University of Delaware

FLORIDA
Earth2Ocean
Florida Institute of Oceanography (FIO)
FAU Harbor Branch Oceanographic Institute
Mote Marine Laboratory
Nova Southeastern University
University of Florida
University of Miami
University of South Florida

GEORGIA
Savannah State University
Skidaway Institute of Oceanography of the University of Georgia

HAWAII
University of Hawaii

ILLINOIS
John G. Shedd Aquarium

LOUISIANA
Louisiana State University
Louisiana Universities Marine Consortium (LUMCON)

MAINE
Bigelow Laboratory for Ocean Sciences
IOOS Association
University of Maine

MARYLAND
Johns Hopkins University Applied Physics Lab
National Aquarium
University of Maryland Center for Environmental Science

MASSACHUSETTS
Massachusetts Institute of Technology
University of Massachusetts, Dartmouth
University of Massachusetts, Lowell
Woods Hole Oceanographic Institution

MICHIGAN
University of Michigan

MISSISSIPPI
University of Mississippi
University of Southern Mississippi

NEW HAMPSHIRE
University of New Hampshire

NEW JERSEY
Monmouth University Urban Coast Institute (UCI)
Rutgers University

NEW YORK
Columbia University (LDEO)
Stony Brook University

NORTH CAROLINA
Duke University
East Carolina University
North Carolina State University
University of North Carolina at Chapel Hill
University of North Carolina at Wilmington

OREGON
Oregon State University

PENNSYLVANIA
Pennsylvania State University

RHODE ISLAND
University of Rhode Island

SOUTH CAROLINA
Belle W. Baruch Institute for Marine & Coastal Sciences
South Carolina Sea Grant Consortium

TEXAS
Fugro
Harte Research Institute
Sonardyne, Inc.
Texas A&M University
University of Texas at Austin

VIRGINIA
CARIS, USA
CNA
College of William & Mary (VIMS)
Institute for Global Environmental Strategies (IGES)
Old Dominion University
U.S. Arctic Research Commission

WASHINGTON
Sea-Bird Scientific
University of Washington

WASHINGTON, DC
Marine Technology Society (MTS)
National Ocean Industries Association (NOIA)
SURA

WISCONSIN
University of Wisconsin, Milwaukee School of Freshwater Sciences

AUSTRALIA
Institute for Marine and Antarctic Studies (IMAS)

BERMUDA
Bermuda Institute of Ocean Sciences

CANADA
Dalhousie University
University of Victoria