

Ocean Exploration Advisory Board *Handbook*

November 2014, Version 1

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Ocean Exploration
and Research

Ocean Exploration Advisory Board

Handbook, November 2014, Version 1

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Ocean Exploration Advisory Board Key Documents

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Ocean Exploration
and Research

TITLE XII—OCEANS

Subtitle A—Ocean Exploration

PART I—EXPLORATION

SEC. 12001. PURPOSE.

33 USC 3401.

The purpose of this part is to establish the national ocean exploration program and the national undersea research program within the National Oceanic and Atmospheric Administration.

SEC. 12002. PROGRAM ESTABLISHED.

33 USC 3402.

The Administrator of the National Oceanic and Atmospheric Administration shall, in consultation with the National Science Foundation and other appropriate Federal agencies, establish a coordinated national ocean exploration program within the National Oceanic and Atmospheric Administration that promotes collaboration with other Federal ocean and undersea research and exploration programs. To the extent appropriate, the Administrator shall seek to facilitate coordination of data and information management systems, outreach and education programs to improve public understanding of ocean and coastal resources, and development and transfer of technologies to facilitate ocean and undersea research and exploration.

SEC. 12003. POWERS AND DUTIES OF THE ADMINISTRATOR.

33 USC 3403.

(a) IN GENERAL.—In carrying out the program authorized by section 12002, the Administrator of the National Oceanic and Atmospheric Administration shall—

(1) conduct interdisciplinary voyages or other scientific activities in conjunction with other Federal agencies or academic or educational institutions, to explore and survey little known areas of the marine environment, inventory, observe, and assess living and nonliving marine resources, and report such findings;

(2) give priority attention to deep ocean regions, with a focus on deep water marine systems that hold potential for important scientific discoveries, such as hydrothermal vent communities and seamounts;

(3) conduct scientific voyages to locate, define, and document historic shipwrecks, submerged sites, and other ocean exploration activities that combine archaeology and oceanographic sciences;

(4) develop and implement, in consultation with the National Science Foundation, a transparent, competitive process for merit-based peer-review and approval of proposals for activities to be conducted under this program, taking into consideration advice of the Board established under section 12005;

(5) enhance the technical capability of the United States marine science community by promoting the development of improved oceanographic research, communication, navigation, and data collection systems, as well as underwater platforms and sensor and autonomous vehicles; and

(6) establish an ocean exploration forum to encourage partnerships and promote communication among experts and other

stakeholders in order to enhance the scientific and technical expertise and relevance of the national program.

(b) DONATIONS.—The Administrator may accept donations of property, data, and equipment to be applied for the purpose of exploring the oceans or increasing knowledge of the oceans.

33 USC 3404.

SEC. 12004. OCEAN EXPLORATION AND UNDERSEA RESEARCH TECHNOLOGY AND INFRASTRUCTURE TASK FORCE.

Establishment.
Strategic plan.

(a) IN GENERAL.—The Administrator of the National Oceanic and Atmospheric Administration, in coordination with the National Science Foundation, the National Aeronautics and Space Administration, the United States Geological Survey, the Department of the Navy, the Mineral Management Service, and relevant governmental, non-governmental, academic, industry, and other experts, shall convene an ocean exploration and undersea research technology and infrastructure task force to develop and implement a strategy—

(1) to facilitate transfer of new exploration and undersea research technology to the programs authorized under this part and part II of this subtitle;

(2) to improve availability of communications infrastructure, including satellite capabilities, to such programs;

(3) to develop an integrated, workable, and comprehensive data management information processing system that will make information on unique and significant features obtained by such programs available for research and management purposes;

(4) to conduct public outreach activities that improve the public understanding of ocean science, resources, and processes, in conjunction with relevant programs of the National Oceanic and Atmospheric Administration, the National Science Foundation, and other agencies; and

(5) to encourage cost-sharing partnerships with governmental and nongovernmental entities that will assist in transferring exploration and undersea research technology and technical expertise to the programs.

(b) BUDGET COORDINATION.—The task force shall coordinate the development of agency budgets and identify the items in their annual budget that support the activities identified in the strategy developed under subsection (a).

33 USC 3405.

SEC. 12005. OCEAN EXPLORATION ADVISORY BOARD.

(a) ESTABLISHMENT.—The Administrator of the National Oceanic and Atmospheric Administration shall appoint an Ocean Exploration Advisory Board composed of experts in relevant fields—

(1) to advise the Administrator on priority areas for survey and discovery;

(2) to assist the program in the development of a 5-year strategic plan for the fields of ocean, marine, and Great Lakes science, exploration, and discovery;

(3) to annually review the quality and effectiveness of the proposal review process established under section 12003(a)(4); and

(4) to provide other assistance and advice as requested by the Administrator.

(b) FEDERAL ADVISORY COMMITTEE ACT.—Section 14 of the Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Board appointed under subsection (a).

(c) APPLICATION WITH OUTER CONTINENTAL SHELF LANDS ACT.—Nothing in part supersedes, or limits the authority of the Secretary of the Interior under the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.).

SEC. 12006. AUTHORIZATION OF APPROPRIATIONS.

33 USC 3406.

There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this part—

- (1) \$33,550,000 for fiscal year 2009;
- (2) \$36,905,000 for fiscal year 2010;
- (3) \$40,596,000 for fiscal year 2011;
- (4) \$44,655,000 for fiscal year 2012;
- (5) \$49,121,000 for fiscal year 2013;
- (6) \$54,033,000 for fiscal year 2014; and
- (7) \$59,436,000 for fiscal year 2015.

**~~PART II NOAA UNDERSEA RESEARCH
PROGRAM ACT OF 2009~~**

NOAA Undersea
Research
Program Act
of 2009.
33 USC 3401
note.

~~SEC. 12101. SHORT TITLE.~~

~~This part may be cited as the “NOAA Undersea Research Program Act of 2009”.~~

~~SEC. 12102. PROGRAM ESTABLISHED.~~

33 USC 3421.

~~(a) IN GENERAL. The Administrator of the National Oceanic and Atmospheric Administration shall establish and maintain an undersea research program and shall designate a Director of that program.~~

~~(b) PURPOSE. The purpose of the program is to increase scientific knowledge essential for the informed management, use, and preservation of oceanic, marine, and coastal areas and the Great Lakes.~~

~~SEC. 12103. POWERS OF PROGRAM DIRECTOR.~~

33 USC 3422.

~~The Director of the program, in carrying out the program, shall—~~

~~(1) cooperate with institutions of higher education and other educational marine and ocean science organizations, and shall make available undersea research facilities, equipment, technologies, information, and expertise to support undersea research efforts by these organizations;~~

~~(2) enter into partnerships, as appropriate and using existing authorities, with the private sector to achieve the goals of the program and to promote technological advancement of the marine industry; and~~

~~(3) coordinate the development of agency budgets and identify the items in their annual budget that support the activities described in paragraphs (1) and (2).~~

~~SEC. 12104. ADMINISTRATIVE STRUCTURE.~~

33 USC 3423.

~~(a) IN GENERAL. The program shall be conducted through a national headquarters, a network of extramural regional undersea research centers that represent all relevant National Oceanic and Atmospheric Administration regions, and the National Institute for Undersea Science and Technology.~~

~~(b) DIRECTION. The Director shall develop the overall direction of the program in coordination with a Council of Center Directors comprised of the directors of the extramural regional centers and~~

Deadlines.
Federal Register,
publication.
Public comment.

**UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
CHARTER OF THE
OCEAN EXPLORATION ADVISORY BOARD**

- 1. Committee Official Designation:** Ocean Exploration Advisory Board
- 2. Authority:** The Ocean Exploration Advisory Board (the Board) is established by the Under Secretary of Commerce for Oceans and Atmosphere (Under Secretary) who is also the Administrator of the National Oceanic and Atmospheric Administration, as directed by the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.) and by 33 U.S.C. § 3405. The Board shall function solely as an advisory body in accordance with the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. App.
- 3. Objectives and Scope of Activity:** The purpose of the Board is to advise the Under Secretary on matters pertaining to ocean exploration including the identification of priority areas that warrant exploration; and the development and enhancement of technologies for exploring the oceans, managing the data and information, and disseminating the results. The Board will also provide advice on the relevance of the program with regard to the NOAA Next Generation Strategic Plan, and other guiding documents.
- 4. Description of Duties:**

The Board, per 33 U.S.C. § 3405, shall:

 - a. advise the Under Secretary on priority areas for survey and discovery;
 - b. assist the program in the development of a 5-year strategic plan for the fields of ocean, marine, and Great Lakes science, exploration, and discovery;
 - c. annually review the quality and effectiveness of the proposal review process established under 33 U.S.C. § 3403(a)(4); and
 - d. provide other assistance and advice as requested by the Under Secretary.
- 5. Authority to Which the Committee Reports:** The Board will report to the Under Secretary.
- 6. Support:** NOAA's Office of Ocean Exploration and Research will provide support for the Board.
- 7. Estimated Annual Operating Costs and Staff Years:** The annual cost of operating the Board is estimated to be \$117,000, which includes 0.8 FTE staff support. Members of the Board will not be compensated for their services, but will upon request be allowed travel and per diem expenses as authorized by 5 U.S.C. § 5701 et seq.
- 8. Designated Federal Officer:** The Designated Federal Officer (DFO) will be a full time or permanent part-time employee from the Office of Ocean Exploration and Research. The DFO will approve or call all of the Board's meetings, prepare and approve all meeting

agendas, attend all Board meetings, adjourn any meeting when the DFO determines adjournment to be in the public interest, and chair meetings when directed to do so by the Under Secretary.

9. Estimated Number and Frequency of Meetings: The Board will meet approximately twice per year. The DFO will have discretion to request additional meetings as necessary

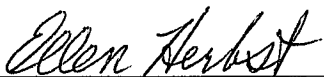
10. Membership and Designation: The Board will consist of approximately ten members. Consideration will be given to candidates who are experts in fields relevant to ocean exploration, including ocean scientists, engineers and technical experts, and experts in education and communications. Membership will be open to individuals from academia, government, industry, non-governmental not-for-profit organizations, and other ocean-related institutions. Consideration will also be given to candidates who have national and international reputations, or have degrees or professional qualifications in: physical, chemical, or biological oceanography, social sciences, or ocean engineering, technology, operations, education, and/or communications. Members will be appointed as "special government employees" (SGEs) and will be subject to the ethical standards applicable to SGEs.

Members will be appointed by, and serve at the discretion of, the Under Secretary for three-year terms, renewable once. The Chair and Vice Chair will be designated from the members by the Under Secretary and will serve three-year terms, renewable once. Initial appointments will include: four members serving three-year terms, three members serving four-year terms and three members serving five-year terms. All renewals will be three-year terms. Vacancy appointments shall be for the remainder of the unexpired term of the vacancy, and shall be renewable twice if the unexpired term is less than one year.

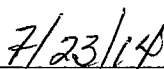
11. Subcommittees: As necessary, the Under Secretary may establish subcommittees, task forces, and working groups consisting of Board members and/or outside experts, subject to the provisions of FACA, the FACA implementing regulations, and applicable Department of Commerce guidance. Subcommittees report only to the main committee and do not provide advice directly to NOAA.

12. Recordkeeping: Records of the Board, formally and informally established subcommittees, and other subgroups of the Board shall be handled in accordance with General Records Schedule 26, item 2, or other approved agency records disposition schedule. These records shall be available for public inspection and copying, subject to the Freedom of Information Act, 5 U.S.C. 552.

13. Duration/Termination: This charter will terminate two years from the date of its filing with the appropriate U.S. Senate and House of Representatives oversight committees unless earlier terminated or renewed by proper authority.



Chief Financial Officer and
Assistant Secretary for Administration



Filing Date

Membership Balance Plan
Ocean Exploration Advisory Board

1. **FEDERAL ADVISORY COMMITTEE NAME:** Ocean Exploration Advisory Board (Board)
2. **AUTHORITY:** The Board is established by the Under Secretary of Commerce for Oceans and Atmosphere (Under Secretary) who is also the Administrator of the National Oceanic and Atmospheric Administration as directed by Section 12005 of the Outer Continental Shelf Lands Act. (43 U.S.C. 1331 et seq.) The Board shall function solely as an advisory body in accordance with the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. App.
3. **MISSION/FUNCTION:** The purpose of the Board is to advise the Under Secretary on matters pertaining to ocean exploration including the identification of priority areas that warrant exploration; and the development and enhancement of technologies for exploring the oceans, managing the data and information, and disseminating the results. The Board will also provide advice on the relevance of the program with regard to the NOAA Next Generation Strategic Plan and other guidance documents.
4. **POINTS OF VIEW:** The Board will consist of approximately ten members including a Chair and Co-chair, designated by the Under Secretary in accordance with FACA requirements. Consideration will be given to members that are experts in fields relevant to ocean exploration, including ocean scientists, engineers and technical experts, and experts in education and communications. Membership will be open to individuals from academia, government, industry, non-governmental not-for-profit organizations, and other ocean-related institutions. Consideration will also be given to members that have national and international reputations, or have degrees or professional qualifications in: physical, chemical, or biological oceanography, social sciences, or ocean engineering, technology, operations, education, and/or communications. Members will have scientific credentials and/or relevant experience that will enable them to provide expert advice concerning Ocean Exploration Research roles within the context of NOAA's ocean missions and policies. Members will be appointed as "special government employees" (SGEs) and will be subject to the ethical standards applicable to SGEs.
5. **OTHER BALANCE FACTORS:** The categories of professional sector, geographic, gender and ethnic diversity are considered in the selection of Board members but are secondary to the scientific and technical expertise required.
6. **CANDIDATE IDENTIFICATION PROCESS:** NOAA solicits candidates for the Board as requests to appropriate organizations, including the Consortium for Ocean leadership, National Academy of Sciences, professional societies, university consortia, NOAA line and program offices, and existing and former Board members. These solicitations will ensure that candidates are identified in areas of relevant scientific, technical, and other areas of expertise and consideration is given to members from sectors such as academic, industry, and not-for-profit. The list of candidates is evaluated by the DFO and individuals who have

not met the criteria of the requests to organizations are removed. Existing vacancies on the Board are reviewed and candidates who provide expertise in the vacant topics are put on a short list. The short list is reviewed by the Ocean Exploration Senior Science Advisor, the Deputy Director of Ocean Exploration and Research, and the Director of Ocean Exploration and Research. A revised short list plus the full list of candidates are provided to the Under Secretary for consideration along with all supporting materials (statement of interest, 2-page CV or resume). Vacancies are filled, to the extent possible and desirable, by individuals with similar expertise.

7. **SUBCOMMITTEE BALANCE:** The process for determining balance on Board Subcommittees is the same as that used for the Board.
8. **OTHER:** N/A
9. **DATE PREPARED/UPDATED:** May 12, 2014

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Ocean Exploration Advisory Board Member Biographies

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Ocean Exploration
and Research

Vice Admiral Paul G. Gaffney II, U.S. Navy (Ret.)
President Emeritus Monmouth University and
Fellow, Monmouth University Urban Coast
Institute

Vice Admiral Paul G. Gaffney II, U.S. Navy (Ret.) served as the seventh president of Monmouth University from 2003 to 2013; he is President *Emeritus* and currently part of Monmouth's Urban Coast Institute as its first Fellow. He was president of the National Defense University from 2000 to 2003. Prior to that, he was the Chief of Naval Research with responsibility for Department of the Navy science and technology investment. He was appointed to the statutory U.S. Ocean Policy Commission and served during its full tenure from 2001 to 2004.



In his military career, he headed the Navy's worldwide operational meteorology and oceanography program and he commanded the Naval Research Laboratory. He is a Member of the National Academy of Engineering and is a fellow of the American Meteorological Society. He was a member of the National Research Council's Ocean Studies Board and chaired the Federal Ocean Research Advisory Panel. He co-chaired the NOAA Decadal Ocean Exploration Study in 2013. He is a director of Diamond Offshore Drilling, Inc.

He is a graduate of the U.S. Naval Academy and holds an M.S. in Ocean Engineering from Catholic University. He graduated from the Naval War College with Highest Distinction. He earned an M.B.A. from Jacksonville University. The University of South Carolina, Jacksonville University, and Catholic University have awarded him honorary doctorates.

VADM Gaffney will serve an initial three-year term.

Dr. James (Jamie) Austin

Senior Research Scientist

University of Texas Institute for Geophysics

Dr. James (Jamie) Austin is a senior researcher at the Institute for Geophysics, part of the University of Texas/Austin Jackson School of Geosciences. He also serves as the Associate Director for International Relations.

Dr. Austin uses a variety of geophysical tools to examine the stratigraphic and structural evolution of a wide range of continental margin and lake environments around the world. He has worked on many continental margins, from the Arctic to the Antarctic.



Recent international collaborative efforts include:

- A high-resolution seismic profiling and coring investigation of Lago Fagnano, Tierra del Fuego (Argentina) in association with colleagues from Stanford University, the University of Geneva, and ETH/Zurich. The primary objective was to decipher the geologic record of the lake's basins and to understand the pristine climate record contained in the lake's sediments.
- A seismic expedition on the French vessel *Alis* to Sabine Bank west of the New Hebrides in the western Pacific in a search for ancient reefs.
- A deep-crustal seismic investigation of part of the Sumatra accretionary prism, with investigators from the U.K. National Oceanography Center. The target was the rupture zone of the tremendously destructive 2004 tsunamigenic earthquake.
- A high-resolution seismic and coring investigation of the Israeli shelf offshore the ancient Roman city of Caesarea.

Dr. Austin has also led ocean exploration expeditions aboard the Ocean Exploration Trust Research Vessel *Nautilus* offshore of Israel (2010, 2011) and Spain (2011), and in the Gulf of Mexico (2012, 2014) and off the east coast of the U.S. (2014) aboard NOAA Ship *Okeanos Explorer*.

Dr. Austin holds a B.A. (1973) in geology from Amherst College and a Ph.D. in oceanography (1979) from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Applied Ocean Sciences and Engineering.

Dr. Austin will serve an initial five-year term.

Dr. Amanda W.J. Demopoulos
Research Ecologist

Dr. Amanda W.J. Demopoulos received a B.S. in Oceanography from the University of Washington (1996) and M.S. (2000) and Ph.D. (2004) in Biological Oceanography from the University of Hawaii at Manoa.

After completing a post-doctoral position at Scripps Institution of Oceanography, in 2007, she joined the U.S. Geological Survey in her current position as a Research Benthic

Ecologist at the Southeast Ecological Science Center in Gainesville, Florida.



Her research examines the community structure and function of benthic organisms found in coastal wetlands, seagrasses, mangroves, shallow and deep-sea coral habitats, and chemosynthetic environments.

In addition to serving as member of the OEAB, she is also a member of the Deep Submergence Science Committee (DESSC).

Dr. Demopoulos will serve an initial four-year term.

Dr. Jacqueline Dixon

*Dean, College of Marine Science
University of South Florida*

Dr. Jacqueline Dixon is Dean of the College of Marine Science at the University of South Florida. She received her bachelor's and master's degrees in geology from Stanford University and a Ph.D. in geochemistry from the California Institute of Technology.

From 1992 through 2010, Dr. Dixon was at the University of Miami, where she served as Director of the Abess Center for Ecosystem Science and Policy's Undergraduate Program, Senior Associate Dean for the Life and Physical Sciences, and Interim Dean of the College of Arts and Sciences.

She received an Early Career Development award from the National Science Foundation for excellence in research and education and is internationally recognized for her research on submarine volcanoes and the role of volatiles in magmatic processes.

Dr. Dixon will serve an initial three-year term.



Dr. Chris German

Senior Scientist

Geology and Geophysics

Woods Hole Oceanographic Institution



Dr. Chris German is a United Kingdom native who grew up in Rochester, England. After receiving a bachelor's degree in Chemistry and Geology and a Ph.D. in Marine Geochemistry (both at the University of Cambridge, UK), Dr. German first moved to the U.S. as a NATO Post-Doctoral Fellow studying hydrothermal vent systems with Professor John Edmond at the Massachusetts Institute of Technology.

From 1990 to 2000, Dr. German helped pioneer the field of systematic exploration of ridge-crests for hydrothermal activity while working in the UK. Between 2000 and 2005, he served as co-PI for the proposal that acquired the UK's first deep-diving remotely operated vehicle (ROV), *Isis*. He also began to pursue new directions, both in astrobiology and in the use of autonomous vehicles equipped with *in situ* sensors and artificial intelligence for ocean exploration. In 2005, Dr. German returned to the Woods Hole Oceanographic Institution (WHOI) as a Senior Scientist in the Geology and Geophysics Department. He also served as WHOI's Chief Scientist for Deep Submergence from 2006 to 2014, culminating in the re-launch of the newly upgraded *Alvin*.

A veteran of more than 50 research expeditions comprising more than three years at sea, Chris has also served as Chair or Co-Chair for major international programs ranging from InterRidge to the Census of Marine Life, as well as advising on issues concerning seafloor mining at the International Seabed Authority. Past awards include the MBE Medal "for services to Marine Science" by Queen Elizabeth II; a Doctor of Science (Sc.D.) degree from the University of Cambridge, UK; and an Alexander von Humboldt research award from the German government.

While recent events have seen Chris turn his skills to help with responses to the Deepwater Horizon oil spill and the Fukushima Nuclear Power Plant accident, his first love remains the exploration for and investigation of deep-sea chemosynthetic ecosystems. His most recent cruises have taken him from the Caribbean, south to the southernmost tip of Chile, and north to the ice-covered Arctic. Most recently, Chris co-led an expedition spanning the South Pacific from Peru to Tahiti; pioneered use of a new under-ice ROV in the Arctic Ocean; and developed a new methods for using telepresence more effectively for ocean exploration, research, and education.

Dr. German will serve an initial five-year term.

Cameron R. Hume
Business Consultant

Cameron R. Hume was U.S. Ambassador to Indonesia from 2007 to 2010. He retired from the Foreign Service with a rank of Career Minister. His earlier assignments included Italy, Tunisia, Syria, Lebanon, the United Nations, and the Holy See. More recently, he served as Ambassador to Algeria and to South Africa, and as Charge d’Affaires to Sudan. While Ambassador to Indonesia, he focused on oceans, climate change, and education as elements of “soft power” diplomacy.



He has published three books and numerous articles on foreign policy and has been a fellow or guest scholar at the Council on Foreign Relations, Harvard University’s Center for International Affairs, and the United States Institute for Peace. He is a lawyer and admitted to practice in New York and the District of Columbia. His foreign languages include Arabic, French, and Italian.

Ambassador Hume led the effort to bring the NOAA Ship *Okeanos Explorer* to Indonesia for the Indonesia-U.S. ocean exploration partnership expedition—the first ever such joint expedition in Indonesia. He considers the U.S. Indonesia ocean exploration partnership and the *Okeanos Explorer* visit to Indonesia as a defining event of his tenure there.

Since leaving the Foreign Service, Ambassador Hume has served as a consultant to various interests based in Indonesia. He brokered a settlement between Greenpeace and Sinar Mas, one of the world’s largest palm oil producers, which committed the company to less-disruptive forestry practices. He also served as a panelist on the Decadal Independent Review of the NOAA ocean exploration program.

Ambassador Hume will serve an initial five-year term.

John R. Kreider

*Senior Vice President, Advanced Technology
Oceaneering International, Inc.*

John R. Kreider has nearly 40 years of experience as an Ocean Engineer and Manager developing and operating unique ocean systems and performing projects in harsh environments for commercial and government customers.



In 2002, Mr. Kreider became Senior Vice-President of Oceaneering Advanced Technologies (ADTECH), one of five business segments of Oceaneering International, Inc., a \$3-billion company. In this position, he has broad responsibility for all non-oilfield business, including manned and unmanned projects in space and undersea. Since 2002, ADTECH has grown at a compounded rate of more than 15 percent per year, with annual revenues of more than \$300 million and 1,300 employees.

Prior to his current position, Mr. Kreider held several other positions at Oceaneering. Prior to Oceaneering, he was a Vice-President at Eastport International (1987-1992) responsible for unmanned subsea and land-based robotic systems; a Vice-President at Arctec Incorporated (1982-1987) responsible for offshore data acquisition and design projects in the Arctic; and at Shell Oil/Shell Development Company (1975 – 1982) managing design and data acquisition programs in frontier offshore areas.

Prior to management positions, he managed more than 50 projects, including two new ROV systems; 15 major field programs; six offshore instrumentation systems; and numerous design and analysis studies for underwater vehicles, offshore structures, and ships.

Mr. Kreider has a B.S. in Chemical Engineering from Lehigh University and M.S. and Engineer's Degrees in Ocean Engineering from Massachusetts Institute of Technology and Woods Hole Oceanographic Institution. He currently holds a Top Secret SBI/SCI clearance.

Mr. Kreider has authored more than 60 publications and technical reports and served on numerous technical committees. One of his papers has been recognized by the American Society of Civil Engineers for a Hall of Fame Award for "Pioneering Innovation and Lasting Impact."

Mr. Kreider will serve an initial four-year term.

David Lang
Co-Founder
OpenROV

David Lang is the Co-Founder and President of OpenROV, makers of low-cost underwater robots, and OpenExplorer, a platform for collaborative exploration.

He is the author of the book *Zero to Maker* and writes frequently on the role of technology in empowering amateurs to contribute to science and discovery.

He was named a TED Fellow in 2013.

Mr. Lang will serve an initial three-year term.



Dr. Darlene Lim
Research Scientist
NASA Ames Research Center

Dr. Darlene Lim is a geobiologist based at the NASA Ames Research Center and is a leader in the development of operational concepts for human-robotic scientific exploration.



Dr. Lim is currently the Principal Investigator (PI) of the NASA-funded Pavilion Lake Research Project (PLRP) and the Deputy PI of the NASA "Field Investigations to Enable Solar System Science and Exploration" (FINESSE) research program. Both programs are focused on real (non-simulated) science and exploration activities that seamlessly blend field science research with the development of human exploration tools, technologies and concepts. Under her leadership and guidance, the PLRP has become one of NASA's premier analog programs. PLRP has produced numerous peer-reviewed publications and also garnered an international reputation for producing innovative concepts and capabilities that support human scientific exploration.

Dr. Lim has spent over 20 years conducting field research around the world and has worked in both the Arctic and Antarctic, as well as in underwater environments where she has spent hours piloting submersibles as a scientist and explorer. She has participated in numerous NASA field programs in various extreme environments and serves as the NASA MEPAG (Mars Exploration Program Analysis Group) Goal IV (Prepare for Human Exploration) Co-Chair.

Dr. Lim will serve an initial four-year term.

Nicolette Nye

Vice President for Communications and External Relations

National Ocean Industries Association

Nicolette Nye is the Vice President Communications and External Relations for the National Ocean Industries Association (NOIA) in Washington, DC. She staffs NOIA's Health, Safety, Security and Environment Committee as well as the Offshore Renewables Committee.



Before joining NOIA in 2008, Nicolette worked for nearly a decade at the Department of the Interior's Minerals Management Service where she held various public affairs positions, including acting Chief of Public Affairs and National Offshore Public Affairs Lead. She began her federal government career as a public affairs specialist at the Consumer Product Safety Commission in Bethesda, Maryland.

Ms. Nye is also a retired Navy Chief Journalist, who did print, broadcasting, and public affairs tours in Virginia, Japan, and Hawaii.

Born in England, Ms. Nye is a naturalized U.S. citizen who enjoys the outdoors and athletics. She recently completed her first sprint triathlon, is a certified SCUBA diver, has gone sky diving, and enjoys skiing and hiking.

Ms. Nye will serve an initial three-year term.

Dr. Richard Rikoski
CEO/Chief Scientist
Hadal, Inc.

Dr. Richard Rikoski is the CEO and Chief Scientist of a stealth mode start-up anchoring the Marine Technology Cluster in Oakland, California. Prior to that, he was a researcher at the Naval Surface Warfare Center in Panama City, Florida, where he received 10 patents for various marine robotic systems.



He holds a bachelor's degree in mechanical engineering and economics from Carnegie Mellon University, a master's degree in ocean engineering from MIT, and received the first doctorate in marine robotics from MIT. As a member of the OEAB, he intends to focus on partnerships, data, technology, and budget.

In his view, priorities for a national ocean exploration program include mapping the U.S. Exclusive Economic Zone, rapidly assessing the water column on basin scales, and global genome mapping. Dr. Rikoski believes there is a need for paths that lead to goal achievement, development of enabling technologies, appropriate partnerships, and allocation of sufficient budgets. He describes the need this way: "It is very difficult to explore a 12 million square kilometer Exclusive Economic Zone, and another 5.5 million square kilometers of treaty obligations; this is simply too much territory to adequately explore with so little. As the nation with the largest Exclusive Economic Zone, the U.S. must make ocean exploration a responsibility and a priority."

Dr. Rikoski believes international partnerships are critical to advance global exploration priorities and notes that technology will drive the ability to pursue such goals. He encourages use of public and private sector partners, the identification of global partners who can exchange data to prevent duplications of effort, and data partners who can ensure data is properly documented and distributed.

Dr. Rikoski will serve an initial three-year term.

Dr. Dominique Rissolo

*Executive Director
Waitt Institute*

Dr. Dominique Rissolo is the director of small grants programs and the senior program officer for the Waitt Foundation and is involved in developing field research initiatives across a broad range of disciplines for the Waitt Foundation and for National Geographic.



Dr. Rissolo oversaw the acquisition and management of a deep submergence capability for the Waitt Institute, in partnership with Woods Hole Oceanographic Institution, and worked closely with agencies and universities to plan and execute oceanographic survey and research projects using AUV, ROV, HOV, and vessel platforms.

As an archaeologist, Dr. Rissolo's research interests also include the development of ancient maritime trade networks along the Yucatan coast. His work on the Yucatan Peninsula has also focused on ancient Maya and Paleoamerican cave and cenote use as well as coastal and near-coastal settlement patterns and ecosystems. Throughout his fieldwork, Dr. Rissolo has been active in local indigenous issues and the development of sustainable cultural heritage preservation strategies.

Dr. Rissolo is a visiting scholar at the University of California, San Diego, and a research associate at Scripps Institution of Oceanography.

Dr. Rissolo will serve an initial four-year term.

Lance Towers

*Director, Advanced Technology Programs
The Boeing Company*



Lance Towers is the director of Advanced Technology Programs (ATP) for Electronic and Information Solutions, a division within Boeing Network and Space Systems. In this role, Towers oversees the Advanced Technology Programs business, which is headquartered in Huntington Beach, California. ATP has approximately 500 employees throughout the United States who specialize in small, lightweight, low-power electronics; remote unattended sensors; network communications solutions; mission planning and field support; operations support and sustainment; unmanned underwater systems; and acoustics solutions.

Mr. Towers has more than 28 years of engineering and management experience. He holds a Bachelor of Science degree in electrical engineering and a Master of Science degree in communication theory from California State Polytechnic University of Pomona. He is also a registered professional electrical engineer with the State of California.

Mr. Towers will serve an initial three-year term.

Ocean Exploration Advisory Board

Handbook, November 2014, Version 1

NOAA Biographies

oeab.noaa.gov



**Ocean Exploration
and Research**

Dr. Kathryn D. Sullivan

*NOAA Administrator and Under Secretary of
Commerce for Oceans and Atmosphere.*

Dr. Kathryn Sullivan was confirmed by the Senate as the Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator on March 6, 2014, having served as Acting NOAA Administrator since February 28, 2013.

She is a distinguished scientist, renowned astronaut and intrepid explorer.

Prior to her appointment as Acting Administrator, Dr. Sullivan held the position of Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator, and also performed the duties of NOAA's Chief Scientist, a vacant position.



As Assistant Secretary, Dr. Sullivan played a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She also provided agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. As Deputy Administrator, she oversaw the smooth operation of the agency.

Dr. Sullivan is the United States Co-chair of the Group on Earth Observations (GEO), an intergovernmental body that is building a Global Earth Observation System of Systems (GEOSS) to provide environmental intelligence relevant to societal needs.

Dr. Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, she was appointed NOAA's Chief Scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity.

She was the inaugural Director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, she served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science museums. Dr. Sullivan joined COSI after three years of service as Chief Scientist.

Dr. Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope. Dr. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006). She holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

Dr. Richard Spinrad
NOAA Chief Scientist

On May 9, 2014, Dr. Richard W. (Rick) Spinrad was named by the Obama Administration as NOAA's Chief Scientist.

An internationally recognized scientist and executive with more than 30 years of experience, Dr. Spinrad is the senior scientist for the agency, driving policy and program direction for science and technology priorities. Until this appointment, Dr. Spinrad served as vice president for research at Oregon State University (OSU) in Corvallis, Oregon, and from 2003 until 2010, was the head of NOAA's Office of Oceanic and Atmospheric Research and the head of the National Ocean Service.



As Assistant Administrator for research for NOAA, Dr. Spinrad directed the agency's programs in oceanography, atmospheric science, and climate. He directly supervised several of NOAA's high-profile research efforts, including ocean exploration, the National Sea Grant College Program, and the Climate Program Office, as well as seven NOAA laboratories around the United States.

Among his accomplishments, Dr. Spinrad led the White House Committee that developed the nation's first set of ocean research priorities and oversaw the revamping of NOAA's research enterprise. He also served as the Department of Commerce representative to the Office of Science and Technology Policy committee addressing scientific integrity.

He spent two years as NOAA's Assistant Administrator for Oceanic Services and Coastal Zone Management, directing the agency's navigation and coastal services, including the National Geodetic Survey, the Office of National Marine Sanctuaries, and the Office of Coastal Resource Management. As part of his duties, he represented U.S. interests in the establishment of a global tsunami warning system.

Prior to joining NOAA, Dr. Spinrad served as a research director with the U.S. Navy (Office of Naval Research and Oceanographer of the Navy), taught at two universities, directed a major national non-profit organization, presided over a private company, and worked as a research scientist. He also developed the National Ocean Sciences Bowl for high school students.

Dr. Spinrad served as the U.S. Permanent Representative to the United Nations' Intergovernmental Oceanographic Commission. He is the recipient of Presidential Rank Awards from Presidents George W. Bush and Barack H. Obama. Dr. Spinrad is the past-President of the Oceanography Society and President-Elect of the Marine Technology Society. He is also a Fellow of the American Meteorological Society, the

Marine Technology Society and the Institute of Marine Engineering, Science and Technology.

Dr. Spinrad received his B.A. in earth and planetary sciences from The Johns Hopkins University in Baltimore, Maryland. He received his M.S. and Ph.D. both in oceanography from Oregon State University.

Craig McLean

*Acting Assistant Administrator and Deputy Assistant Administrator for Programs and Administration
NOAA Office of Oceanic and Atmospheric Research*

As Acting Assistant Administrator, Craig McLean is responsible for daily operations and administration of NOAA's research enterprise including a network of research laboratories and the execution of NOAA programs including the Climate program, National Sea Grant, and Ocean Exploration.



He has previously served in NOAA as Executive Officer of the National Ocean Service, and was the founding Director of NOAA's Office of Ocean Exploration. McLean served in uniform for nearly 25 years, retiring from NOAA's Commissioned Corps in the grade of Captain after service at sea, underwater, and in operational, legal, and marine resource management positions. McLean served aboard hydrographic, oceanographic, and fisheries research ships and was the first commanding officer of NOAA's largest fisheries research vessel, the 224-foot Gordon Gunter. He led NOAA's innovation and planning for the Smithsonian Institution's Ocean Hall, and achieved a National Ocean Action Plan goal of securing a permanent, dedicated ship for the national ocean exploration program, the NOAA Ship Okeanos Explorer.

A life long diver, he began exploring deep shipwrecks through decompression diving while in junior high school. These experiences have taken him to the Amazon River searching for freshwater dolphins, and to the USS MONITOR and RMS TITANIC searching for solutions in historic shipwreck management.

Craig McLean is also an attorney and has practiced marine resource law for NOAA. He has been awarded the Departmental Silver and Bronze Medals, the NOAA Corps Commendation Medal, and Special Achievement Medal. He is a frequent speaker on ocean related subjects, rooted in his diverse NOAA career experience in fisheries, coastal and marine area management, directing research, law, and both surface and submerged marine operations. He is a Fellow of the Explorers Club, and of the Marine Technology Society, and a Past-President and Chairman of the Sea-Space Symposium.

Alan P. Leonardi, Ph.D.

Director

NOAA's Office of Ocean Exploration and Research

As Director of NOAA's Office of Ocean Exploration and Research (OER), Dr. Leonardi leads a team responsible for providing direction to NOAA and the U.S. Department of Commerce (DOC) in the field of ocean exploration, research and advanced technology development. A key element of OER's portfolio is the expeditionary exploration activities which combines the NOAA Ship *Okeanos Explorer*, with shore-based high-speed networks and infrastructure for live communications, including HD video of the seafloor, to scientists and other audiences ashore. It is the only federal program dedicated to systematic telepresence-enabled exploration of the world ocean.



A meteorologist and oceanographer, Leonardi has been with NOAA since 2003. He began his career as the first Program Coordinator for NOAA's Environmental Modeling Program and subsequently also served as an advocate and coordinator of a broad spectrum of oceanic and atmospheric research across OAR. He eventually assumed the role of Environmental Modeling Program Manager and served as the Deputy Director of Policy, Planning, and Evaluation within OAR Headquarters prior to moving to Miami in 2010 to become Deputy Director of NOAA's Atlantic Oceanographic and Meteorological Laboratory. He assumed his current role as director of OER in October 2014.

He earned his undergraduate degree in meteorology from the University of Wisconsin, and his master's and doctorate degrees in physical oceanography from the Florida State University (FSU). While at FSU, he served as a Naval Research Laboratory graduate research fellow and received a NASA Mission to Planet Earth fellowship. During his academic and government tenures he has served as guest speaker and lecturer in national and international scientific meetings, symposia, and academic programs; has held adjunct faculty positions with James Madison University, Miami Dade College, and Broward College; and been awarded the DOC Silver Medal for his leadership efforts fostering a partnership with Google, Inc. on the development and deployment of NOAA data and information in Google's popular Google Earth platform.

David McKinnie

*Designated Federal Official, OEAB
NOAA Office of Ocean Exploration and Research*

David McKinnie is senior advisor for the National Oceanic and Atmospheric Administration's Office of Ocean Exploration and Research (OER) and the Designated Federal Official for the Ocean Exploration Advisory Board (OEAB). His expertise includes development of domestic and international external partnerships, moving concepts to operations, and translating science for decision makers.



McKinnie was the OER lead for initiating the OEAB. He led OER's involvement in Ocean Exploration 2020, a national forum held with the Aquarium of the Pacific to lay the groundwork for a national ocean exploration program. He has initiated and developed a series of private sector and foundation partnerships to advance OER's mission.

Before joining OER in 2011, he led coordination of the Indonesia-U.S. Ocean Exploration Partnership. He was technical manager for the NOAA component of the U.S. Indian Ocean Tsunami Warning System Program. He worked with counterparts in Thailand, Sri Lanka, India, the Maldives, Indonesia, and Australia to design and implement the first phases of the Indian Ocean system and global tsunami warning system framework while serving as U.S. representative to the Intergovernmental Oceanographic Commission on tsunami issues. He has been awarded four NOAA Bronze Medals and two State Department Meritorious Honor awards.

McKinnie earned a MS in Natural Resources from the University of Michigan and BA in History from Colorado College.

Ocean Exploration Advisory Board

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NOAA Organizational Charts

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**Ocean Exploration
and Research**

NOAA Headquarters

Corporate Functions

Senior Advisor

Deputy Assistant Secretary for
International Fisheries

Federal Coordinator for
Meteorology

Under Secretary of Commerce for Oceans & Atmosphere & Administration
Dr. Kathryn D. Sullivan

Assistant Secretary
Conservation &
Management/Deputy
Administrator
Dr. Holly A. Bamford

Assistant Secretary
Environmental Observation
& Prediction/Deputy
Administrator
Vacant

Chief Scientist
Dr. Richard Spinrad

Deputy Undersecretary for Operations
VADM Michael S. Devany

Chief of Staff

Deputy Chief of Staff
Decision Coordination &
Executive Secretariat

Legislative &
Intergovernmental Affairs
Communications

Senior Advisor for
Internal Affairs
Education

Military Affairs

External Affairs

General Counsel

Office of Marine & Aviation
Operations

Acquisition & Grants

Chief Administration Officer

Chief Information Office/HP
Computing & Communications

Workforce Management

Line Offices

Assistant Administrator
National Marine Fisheries
Service

Deputy Assistant
Administrator for
Operations

Deputy Assistant
Administrator for
Regulatory Programs

Director of Scientific
Programs & Chief Science
Advisor

Assistant Administrator
National Ocean Service

Deputy Assistant
Administrator

Assistant Administrator
National Environmental
Satellite, Data &
Information Service

Deputy Assistant
Administrator

Assistant Administrator
Oceanic & Atmospheric
Research

Deputy Assistant
Administrator for
Laboratories & Cooperative
Institutes

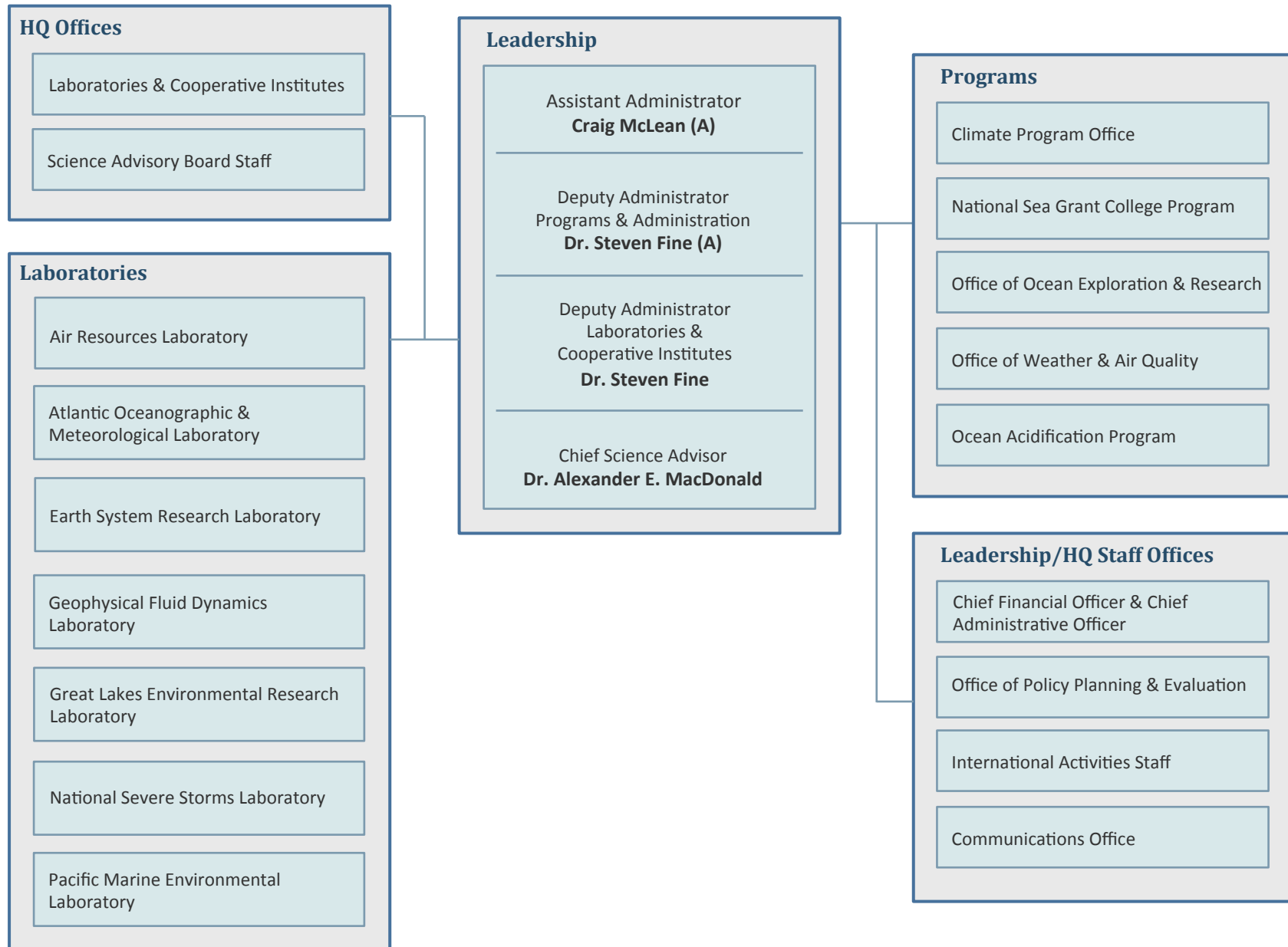
Deputy Assistant
Administrator for Programs
& Administration

Assistant Administrator
National Weather Service

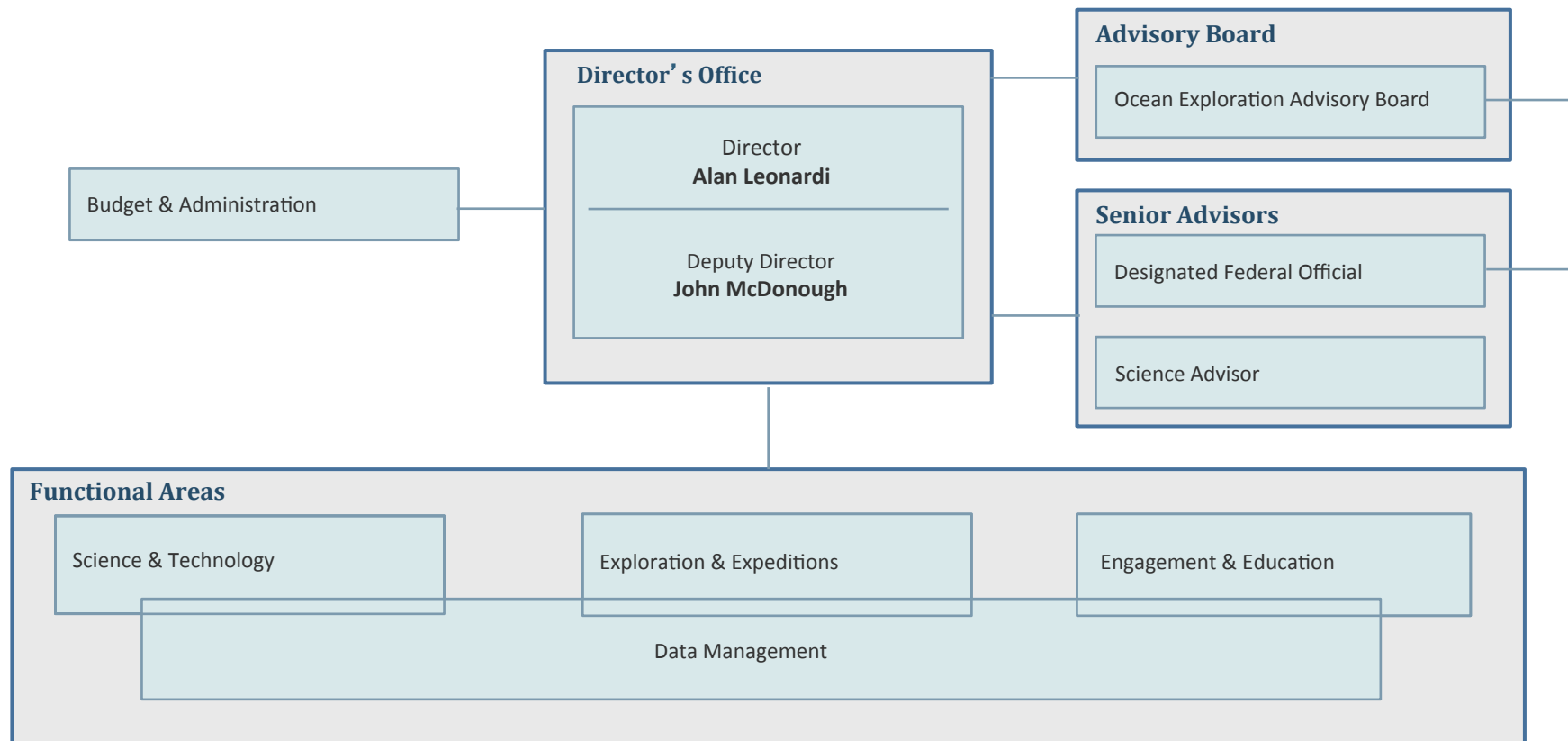
Deputy Assistant
Administrator

Assistant Administrator
Program Planning &
Integration

Oceanic & Atmospheric Research



Office of Ocean Exploration & Research



Ocean Exploration Studies Overview

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Ocean Exploration
and Research



Ocean Exploration
Advisory Board

Ocean Exploration Studies Overview

“President’s Panel” Report

- *Earth’s Final Frontier: A U.S. Strategy for Ocean Exploration* (2000)—the report of the President’s Panel on Ocean Exploration—is a comprehensive look at the importance of a national program of ocean exploration
- Fifteen years on, it remains a useful framework of concepts and principles
- Recommends a national program of ocean exploration that incorporates “discovery and the spirit of challenge” and funded at \$75 million/year (excluding capitalization costs)

“President’ s Panel” Report

- Recommendations:
 - “The U.S. should undertake a national program in ocean exploration in which discovery and the spirit of discovery are cornerstones”
 - Ocean exploration should be multidisciplinary
 - Global in scope, with an initial focus on the U.S. EEZ
 - Results should be documented carefully and widely disseminated
 - The program must be “innovative and bold”

“President’s Panel” Report

- National Program Objectives:
 - map all aspects of the ocean to inform policy makers, regulators, commercial ventures, researchers, educators
 - explore dynamics at new scales to understand complexity in the living ocean for stewardship
 - develop new sensors and systems for ocean exploration
 - reach out in new ways to stakeholders for literacy with respect to ocean issues
- NOAA embraced these objectives as the foundation for the Office of Ocean Exploration and Research

National Academy of Sciences

- Congress requested the National Academy to consider an international ocean exploration program. *Exploration of the Seas: Voyage into the Unknown* (2003) affirmed the importance of ocean exploration and the President's Panel recommendations and offered detailed program structure and investment advice . It found that:
 - exploration and research programs housed in one agency may have difficulty reaching across government;
 - clear priorities and competitive funding can be a successful model
 - a long view (longer than decades) is important
 - bilateral international efforts are more likely to be successful than multilateral initiatives
 - data standards and integration are critical

U.S. Commission on Ocean Policy

- *An Ocean Blueprint for the 21st Century* (2004) described NOAA and NSF as well positioned to lead a “global U.S. ocean exploration effort” and recommended that:
 - NOAA and NSF lead an expanded national ocean exploration program with the involvement of the U.S. Geological Survey and the Office of Naval Research
 - Public outreach and education should be integral components of the program

Ocean Exploration Advisory Working Group

- The NOAA Science Advisory Board established the Ocean Exploration Advisory Working Group (OEAWG) in 2006 to “provide NOAA with timely and expert guidance and oversight” with respect to:
 - general priorities for ocean exploration
 - advice about emerging ocean exploration technologies
- The OEAWG played a critical role in the evolution of the NOAA ocean exploration program, and ocean exploration in general
- The precursor to the OEAB, the OEAWG sunsets with this first OEAB meeting

Ocean Exploration Advisory Working Group

- Key contributions and recommendations include:
 - Early concern about long lag times in awarding competitive grants and highly variable annual funding that compromised planning for large, complex seagoing programs
 - Definition of “systematic telepresence-enabled ocean exploration” concept
 - Concepts of operation for the then-new *Okeanos Explorer* and advice for converting the platform
 - Advice on technology development, particularly with respect to *Okeanos Explorer* exploration systems (telepresence, ROV, AUV, multibeam mapping, etc.)
 - Advice on sampling and data management and distribution models
 - Recommendations to engage across NOAA programs
 - Ongoing consultation and advice for NOAA and program leadership
 - Consultation and advice for Ocean Exploration 2020

Decadal Review

NOAA requested the SAB to conduct an independent review of the ocean exploration program. *Ocean Exploration's Second Decade* (2012) found “undiminished motivation for ocean exploration” and offered ten recommendations for NOAA’s ocean exploration program:

1. Set strategic goals and priorities to define program boundaries and metrics
2. NOAA leadership support is required for success
3. Hold a National Forum on Ocean Exploration
4. Consider radical new management models to maximize value and impact of a limited budget
5. Restore the “targeted expeditions” (competitive awards) program to at least \$10 million each year and derive targets from a strategic plan
6. Consider diverting all Okeanos Explorer funds for targeted exploration and confirm real costs
7. Partner with others to stay abreast of new technologies
8. Accelerate work to complete the Extended Continental Shelf
9. Develop new icons and cultivate new champions
10. Establish the Ocean Exploration Advisory Board

NOAA Response to the Decadal Review

- NOAA agreed with all recommendations except the first part of the recommendation on the *Okeanos Explorer*. In its response (see OEAB website under “reports”) NOAA detailed its actions in response to each recommendation.
- For recommendation 6, on the *Okeanos Explorer*, NOAA provided a rationale for its disagreement and complete cost information.

Ocean Exploration 2020

- Ocean Exploration 2020: A National Forum (2013) was the first-ever national forum. NOAA and the Aquarium of the Pacific co-hosted 110 ocean explorers and stakeholders to identify elements and attributes of a national program of ocean exploration
- Significantly, this was the first time the community itself engaged to describe a national program, rather than a panel of experts

Ocean Exploration 2020

The OE 2020 report identifies seven major attributes a national program of ocean exploration should exhibit in 2020:

- Clear ocean exploration priorities that are revisited regularly
- An “extensive and dynamic” network of partnerships that links government, private, NGO, and academic institutions
- More and more capable platforms (ships, submersibles, etc.)
- Significant private sector investment in technology, and a significant federal role in testing and refining new technologies
- Citizen science and exploration emerges as an important contributors to the ocean exploration endeavor
- Data are widely and freely available in formats that allow integration
- There is a coordinated network to promote public engagement

Ocean Exploration 2020

NOAA and the National Aquarium in Baltimore held a second, smaller National Forum in September 2014. Its recommendations to the OEAB for the next National Forum are:

- *Build the value proposition for ocean exploration:* national program stakeholders should use case studies to demonstrate the value of ocean exploration to decision makers
- *Focus on and prioritize targets for ocean exploration:* the community should prioritize the U.S. EEZ, the Arctic, newly protected areas, and the Pacific Territorial Trust Areas
- *Execute expeditions with attention to visibility and engagement:* expeditions should include an “Architecture of Participation” to ensure the public is engaged
- *Exploit existing partnerships and programs to build a national program:* use what works or has worked to build the program
- *Use the next National Forum as a lens to focus ocean exploration:* the OEAB should use its discussions and other events to build a roadmap to National Forum 2015

The National Aquarium will host the next National Forum in the fall of 2015

Ocean Exploration Advisory Board

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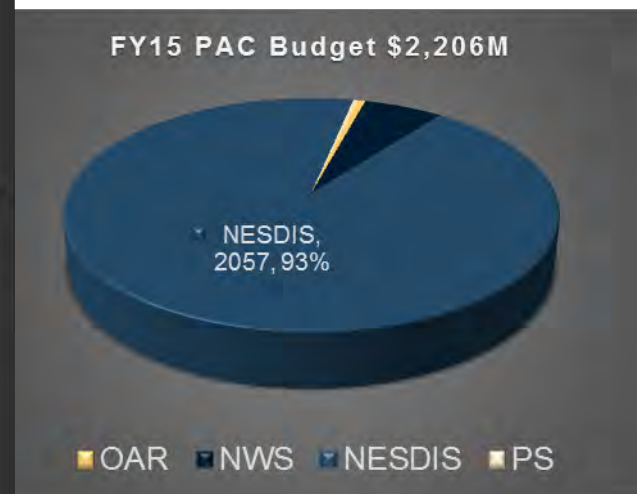
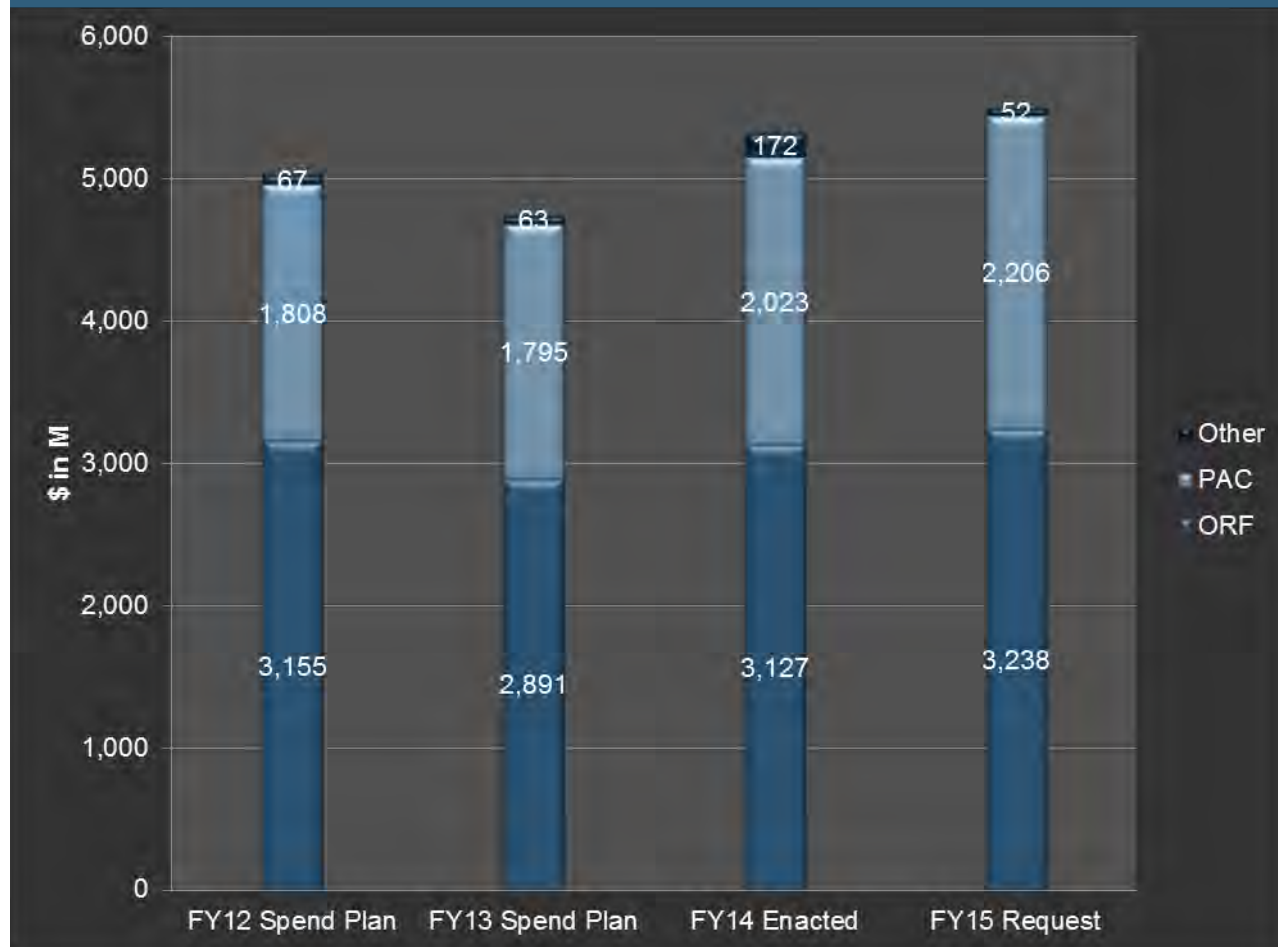
NOAA Financial Summaries

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**Ocean Exploration
and Research**

NOAA Total Budget FY12-15

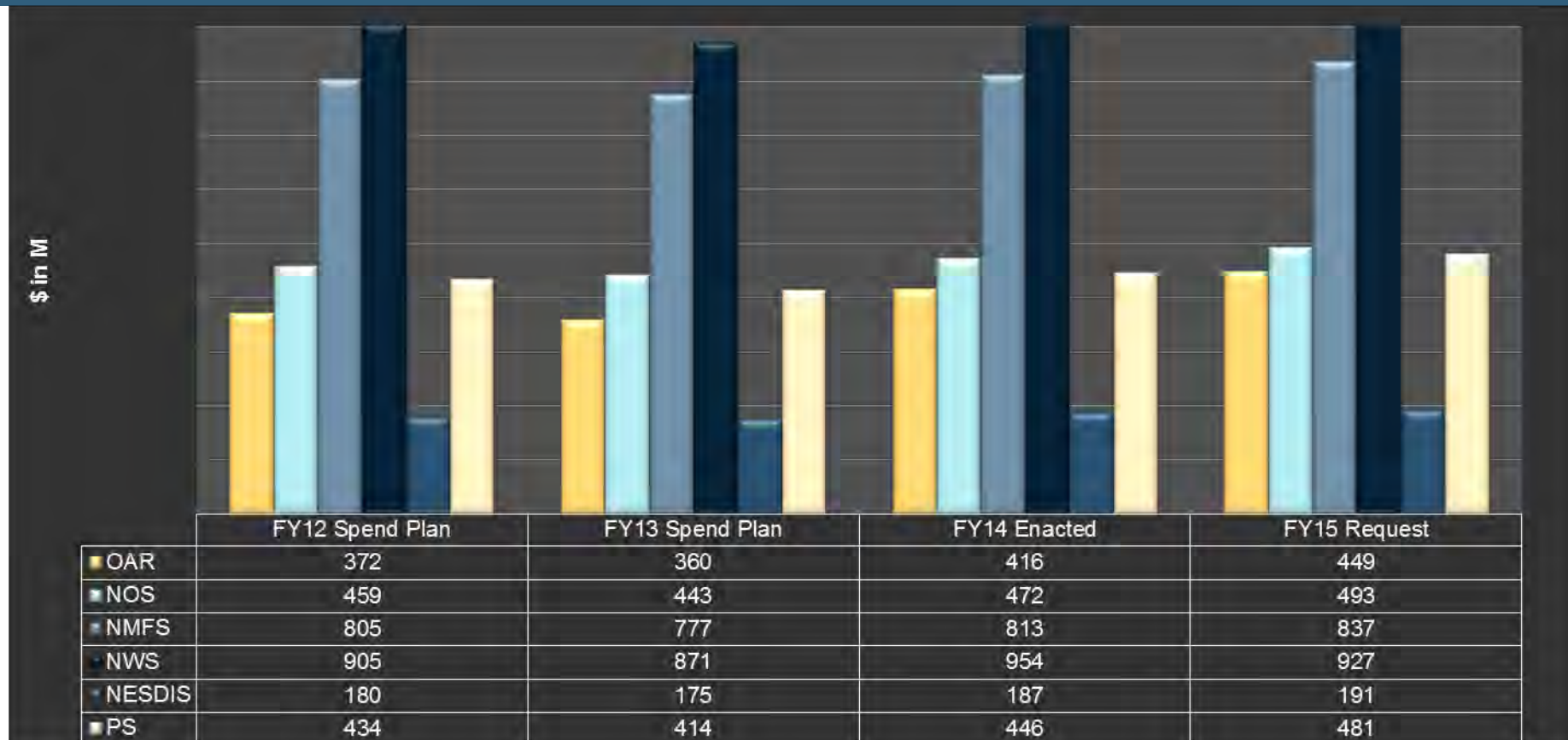


ORF: Operations, Research, and Facilities
PAC: Procurement, Acquisition, Construction
Other: Fisherman's Contingency Fund, Pacific Coastal Salmon Recovery Act, etc.



Ocean Exploration
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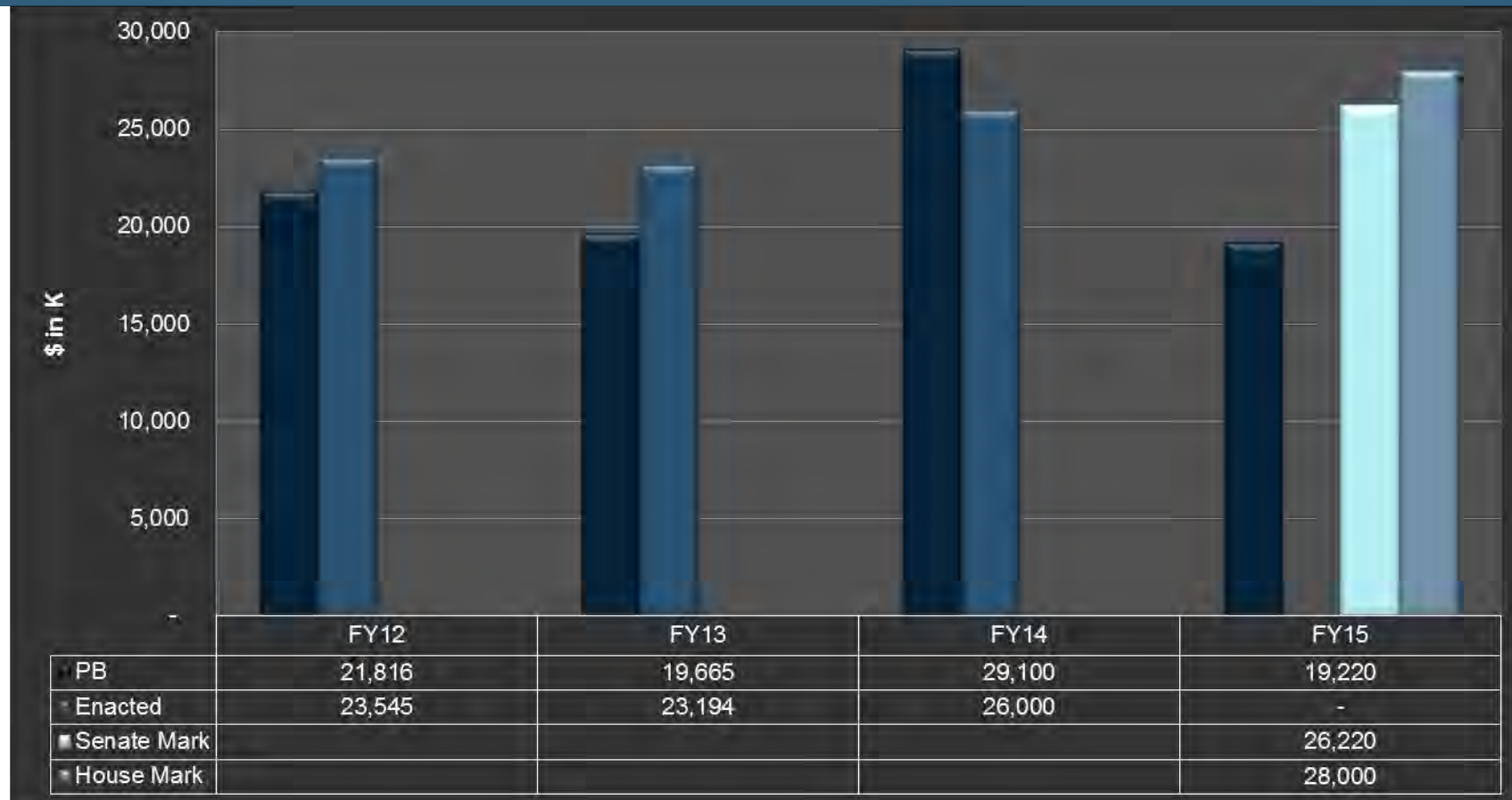
NOAA ORF FY12-15



OAR ORF FY12-15

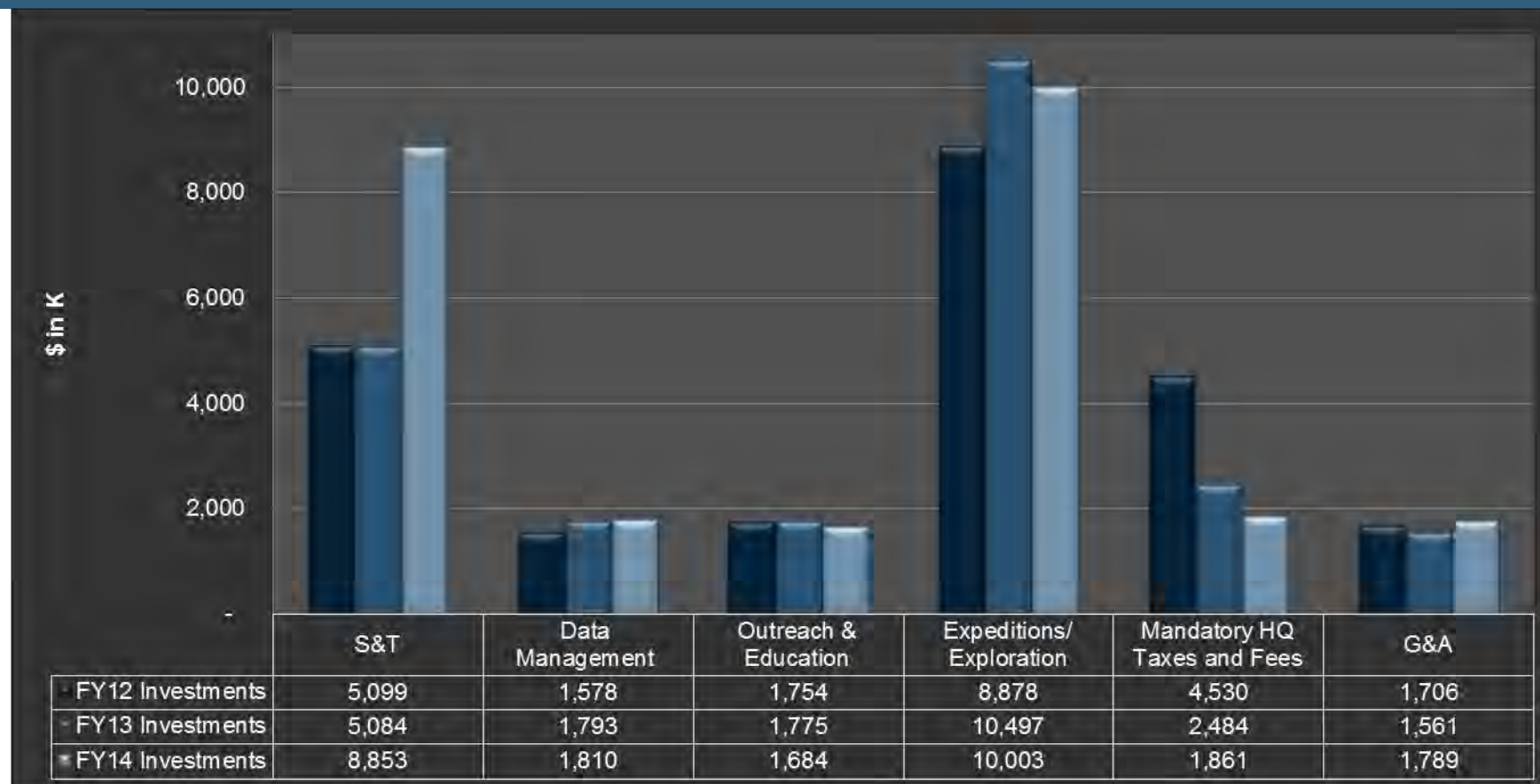


OER FY12-15



OER by Investment Categories

FY12-14



*Amounts Based on Enacted Budget



Ocean Exploration
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Ocean Exploration Advisory Board

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Multi-year Investments Financial Summary

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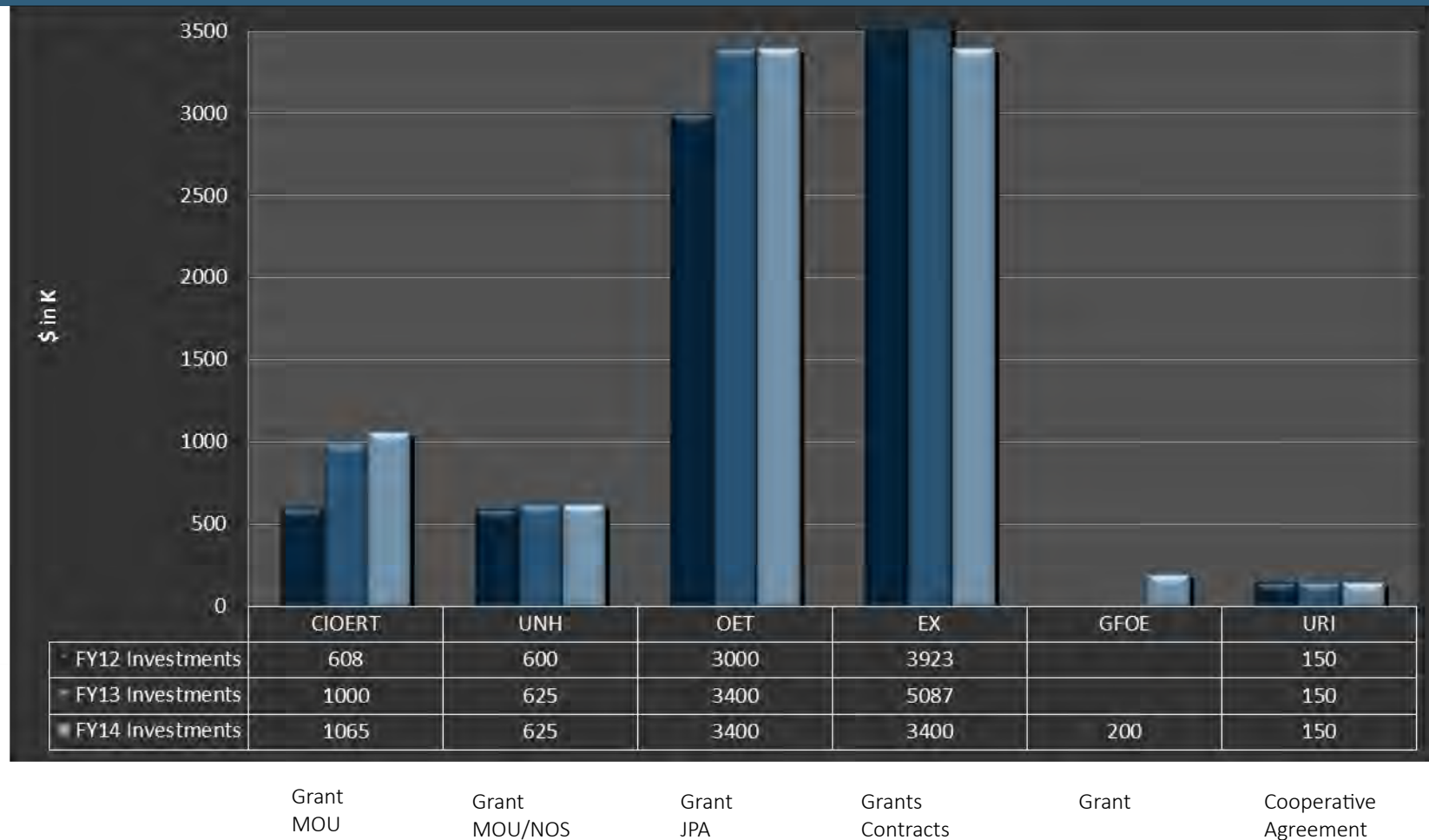


Ocean Exploration
and Research

OER Multi-year Investments

- OER does not have fixed costs, except for federal labor
- Investments are adjusted in Ocean Exploration Trust and other long-term partnerships based on appropriations and NOAA mission priorities, plus opportunities to collaborate with external partners
- OER depends on these partnerships to conduct its activities. As a practical matter, the office cannot readily terminate these arrangements on short notice

OER Multi-year Investments



*Amounts based on enacted budget

Ocean Exploration Advisory Board

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Summary of NOAA and OER Programmatic Priorities

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**Ocean Exploration
and Research**

NOAA

America's Environmental Intelligence Agency

*Putting environmental information into
the hands of people who need it.*



ENVIRONMENTAL INTELLIGENCE



Observations

Monitoring

Assessment

Modeling

Forecasts and
Products

TOP PRIORITIES FOR 2014-2018

1

Make
communities
more resilient

2

Evolve the
Weather
Service

3

Invest in
observational
Infrastructure

4

Achieve Organizational Excellence



Table of Programmatic Priority Investments for FY 14 and FY 15

| | FY 14 | FY 15 ¹ |
|--|----------------|--------------------|
| Exploration and Expeditions | | |
| Okeanos Explorer | \$3.4 M | \$3.6 M |
| Ocean Exploration Trust | \$3.4 M | \$3.4 M |
| OMAO-Funded Days at Sea | 0 | \$0.5 M |
| Extended Continental Shelf | \$2.4 M | \$2.6 M |
| Interagency Expeditions ² | 0 | 0 |
| <i>Total, Expeditions</i> | <i>\$9.2 M</i> | <i>\$10.10 M</i> |
| Science and Technology | | |
| Competitive grants (FFO) | \$4.2 M | \$3.8 M |
| Pulley Ridge (CIOERT) | \$1.0 M | \$1.0 M |
| Other Technology (non-FFO/non-Okeanos) | \$0.8 M | \$0.55 M |
| <i>Total, Science and Technology</i> | <i>\$6.0 M</i> | <i>\$5.35 M</i> |

Summary of Programmatic Priorities

Overview

To best meet NOAA and national ocean exploration priorities OER is focusing on the following priorities for Exploration and Expeditions and Science and Technology in FY 14 and FY 15. These reflect significant input from the science and marine resource management communities, and give due consideration to estimated budgets:

Expeditions

- Continue to expand upon the telepresence-enabled expedition model using NOAA Ship *Okeanos Explorer* and through the partnership agreement with the Ocean Exploration Trust for expeditions using their Exploration Vessel (EV) *Nautilus*;
- Continue to collect, process, and analyze sonar data in support of the interagency Extended Continental Shelf (ECS) Mapping initiative, including the development of expansion scenarios for U.S. ECS regions;

¹ Assumes year-long Continuing Resolution

² FY 14 focused on data management and analysis at no cost to OER. Activities for FY 15 and beyond are in planning stages (see below)

- Initiate and engage in interagency partnership expeditions and projects, building on the successful exploration model developed in conjunction with the Bureau of Ocean Energy Management (BOEM)

Science and Technology

- Initiate exploration of unknown areas and phenomena in the Arctic Ocean through the annual federal funding opportunity process, challenging the science community to use and build on the wealth of information collected in this region in support of ECS;
- Build on the success of the multi-partner investigation of the Pulley Ridge mesophotic coral reef complex in the Gulf of Mexico, expanding this model of exploration into new areas harboring similar habitats;
- In addition to the advancements in undersea technologies and techniques inherent in the above, continue to initiate partnership “wet test-bed” pilot projects in partnership with other NOAA Line and program offices and industry partners.

The following sections provide additional detail on each priority.

Exploration and Expeditions

1. Telepresence-enabled Exploration

What We Do

Based on the success of the Atlantic Canyons Undersea Mapping Expeditions (ACUMEN) and the follow-on exploration of the canyons, shelf-edge, and seamounts, OER is launching a the “Campaign to Address Pacific monument Science, Technology, and Ocean NEeds (CAPSTONE). This multiyear (2015 – 2017) campaign will focus on systematically collecting baseline information using NOAA Ship *Okeanos Explorer* to support science and management needs within and around the U.S. Marine National Monuments and other protected places in the Pacific. It also serves as an opportunity for NOAA and the nation to highlight the uniqueness and importance of these national symbols of ocean conservation.

OER is also working with the Ocean Exploration Trust (OET) to identify targets for telepresence-enabled expeditions to be conducted with their EV *Nautilus* in the eastern Pacific starting in 2015. The mission areas and expeditions selected will be conducted under the Joint Project Agreement (JPA) between OER and OET, whereby each party contributes an equal amount of funding.

Why We Do It

Unlike traditional ocean exploration and research missions conducted through the OER competitive peer-review proposal process, telepresence-enabled expeditions are built on collaboration, allowing communities of scientists, marine resource managers, educators, students and others to participate in and make observations from shore-based Exploration Command Centers, as well as through standard internet connected devices. Furthermore, data and information is streamed in near real-time for immediate archive, and processed data sets are made publicly available within months as opposed to years under the traditional model. OER has invested in and developed the telepresence-enabled model to exponentially expand the pool of participants and to provide critical information to marine resource decision makers as soon as possible.

What We Achieve

The telepresence-enabled model has established a framework and foundation of information including GIS data and products, high-definition video and still image libraries, databases containing atmospheric and oceanographic environmental data, and logs of observations made by professional scientists representing multiple scientific disciplines, in each region the ships have operated. This includes baseline characterizations of previously unknown habitats and species, as well as phenomena such as the sources and plumes of gas from seeps in the Gulf of Mexico

and off the US east coast, thus increasing our knowledge of the flux of gas in the world's ocean

The results have been and will continue to be used to stimulate further exploration, catalyze new lines of scientific inquiry, inform marine resource management planning and decision making, and to help train the next generation of scientists, engineers, technicians and people engaged in other fields such as documentary filmmaking.

What are the Challenges?

The telepresence-enabled exploration model is rapidly being accepted and is increasingly in demand. Therefore, some of the most significant challenges and opportunities include:

- sustaining and evolving the current assets engaged in this activity;
- transitioning the telepresence-enabled model to other platforms – from global and ocean class vessels to small coastal platforms;
- developing and implementing procedures to seamlessly integrate the observations made by these vessels with data sets being collected through other in-situ and transient observing systems;
- stabilizing and expanding the shore-based network and capitalizing on the most up-to-date advanced communications technologies; and
- developing formal accredited programs for training future ocean explorers.

What's Next?

Upon the conclusion of CAPSTONE, OER and NOAA have been considering an expedition track that will take NOAA Ship *Okeanos Explorer* through the Indian Ocean, around the Cape of Good Hope, and into the Atlantic basin to engage in a yet-to-be-defined exploratory campaign in partnership with the European Union.

2. Extended Continental Shelf Mapping

What We Do

OER has functioned as the NOAA lead on the interagency Extended Continental Shelf (ECS) Mapping initiative, supporting expeditions to collect bathymetric data describing the depth, shape and geophysical characteristics of the seabed following the criteria contained in Article 76 of the United Nations Convention of the Law of the Sea (UNCLOS). As part of this initiative OER has also facilitated the design, development, and utilization of a custom GIS to allow scientists and cartographers to develop and analyze different extension scenarios for each region.

Why We Do It

The ECS initiative may be the largest and potentially most significant high-resolution civil bathymetric mapping project ever undertaken. The data collected will help the US determine policies with respect to the marine resources contained within this area, estimated to be worth at least \$1 trillion in a 2001 report of the International Seabed Authority.

Mapping represents one of the most fundamental activities of the exploration process, and the resulting data and products serve as a foundation upon which to guide further exploration, research, and inform marine policy and resource management strategies – in essence enabling NOAA and the nation to establish exploration priorities within this region.

What We Achieve

As of 2014 over 2.5 million square kilometers of seafloor has been mapped around the US and its territories, collecting data including multibeam bathymetry and backscatter, seismic reflection, seafloor samples, gravity, and magnetic information. Proving the value of the initiative beyond delimiting an extension, these data have been used to plan ocean drilling projects, have yielded new insights into submarine landslides and tsunami risks for the US East Coast, and to identify new gas seeps, including what is believed to be a large methane plume emanating from the ocean floor off the coast of California. Over 70 scientific papers, conference proceedings and cruise reports, based on new ECS bathymetry and backscatter data, have been produced, including papers describing two new seamounts, one rising 3,000 meters, in the Arctic Ocean and another in the western Pacific.

With regard to data management and analysis, scientists and data experts from several US federal agencies and academic institutions have developed new and improved existing common metadata standards for marine seismic reflection data, multibeam sonar data, seafloor bottom geologic samples, gravity and magnetic data, and cruise level data. This will ensure the utility of data and products at all stages of the ECS initiative – from “ship to submission”. Not only does metadata provide the

formal descriptions of data and products, it captures the decision-making process and supports the analysis, eventual determination of the limits, and long-term archive.

What are the Challenges?

The ECS Mapping initiative has been highly successful and the data acquisition phase is near completion. The primary challenge is ensuring funding is sustained to conclude this phase (estimated 2017). A more significant challenge – and opportunity – is developing the justification for funding a national strategy to implement the next phase of exploration, focusing on identifying and characterizing vulnerable marine ecosystems and habitats, as well as significant marine resources within this area. This would follow the example of other coastal states such as Australia, which in 2012 launched its Super Science Initiative investing in marine and climate science, which will include science conducted in their extended continental shelf.

What's Next?

In 2015 OER will support an expedition to complete the multibeam surveys required for the western Atlantic. Expeditions to targeted areas in 2016 and 2017 will complete the mapping requirements to define potential extensions surrounding US territories in the Pacific.

3. Interagency Partnerships

What We Do

Since 2004 OER has collaborated with BOEM on multiyear expeditions to explore deep-water areas in the Gulf of Mexico and Mid-Atlantic Bight. Through this partnership, BOEM conducts a peer-review process to select and fund scientists under their Environmental Studies Program, while OER provides the ships and submersibles to conduct the work.

Why We Do It

The objective of this partnership is to leverage scarce federal funding to meet the complementary mission objectives of two federal agencies. The expeditions provide BOEM with critical information to manage oil and gas activities, as well as to provide information to NOAA to meet ecosystem-based management responsibilities.

What We Achieve

In the Gulf of Mexico the expeditions resulted in the first comprehensive characterizations of deep-water chemosynthetic and coral communities within the study area. This information gained additional importance in the advent of the Deepwater Horizon oil spill, providing a baseline upon which to determine the impacts of this unprecedented event.

The Mid-Atlantic Bight expeditions focused on submarine canyons that intersect the continental shelf. These canyons were suspected to function as hotspots for biodiversity and productivity, including deep-water coral and sponge communities. The baseline characterizations established for these canyons are currently being used as the nation considers opening deep water lease blocks for hydrocarbon exploration and development, as well as for informing fishery management decisions.

What are the Challenges?

BOEM and OER have developed a very successful model and a highly leveraged partnership, which has won several Excellence in Partnership awards. The challenges are minimal and relate to the availability of funds to expand this model into new areas where each agency has complementary objectives.

What's Next?

OER has engaged in preliminary discussions with BOEM concerning: (1) return investigation of some of the key deep water sites in the Gulf of Mexico to determine how conditions have changed, as well as to install in-situ monitoring instruments to explore change over time in a more systematic manner; (2) implementing the model in the Arctic Ocean in key areas such as the Chuckchi Plateau; and (3) exploring and characterizing more canyons off the US east coast that are being considered for hydrocarbon exploration and development.

Science and Technology

4. Arctic Ocean Extramural Program

What We Do

OER was founded upon an extramural grant program modeled on the National Science Foundation (NSF). Through an annual announcement of opportunity, OER encourages applicants to submit proposals related to exploring poorly known ocean areas and phenomena, including new and innovative use of undersea technologies. Prior to 2015, announcements of opportunity were very broad, stating that proposals should be bold, innovative and interdisciplinary in their approach, and to be consistent with NOAA's mission and the Next Generation Strategic Plan.

Based on feedback and advice from the science community and in support of NOAA priority mission requirements, the 2015 announcement of opportunity challenges applicants to develop interdisciplinary proposals to explore the Arctic Ocean.

The full announcement can be found at:

<http://www.grants.gov/view-opportunity.html?oppId=269435>

Why We Do It

The Arctic Ocean is one of the most poorly explored ocean areas on the planet and a region, which is undergoing very rapid change. To meet the growing need to identify and characterize marine habitats, resources, and phenomena in the Arctic, and to capitalize on OER investments in ECS, applicants are requested to use the wealth of information as a springboard to identify areas that warrant further exploration and to provide better scientific understanding of the processes on our continental margins, and new insights are expected in such areas as climate variability, marine ecosystems, undiscovered or unconventional energy, mineral resources, and hazards resulting from extreme events, such as earthquakes and tsunamis.

What We Achieve

As with past strategic investments in extramural grants, OER anticipates proposals selected through peer-review, once completed, will add significantly to the body of knowledge concerning the Arctic, as well as identify new questions requiring further investigation through research, monitoring, and other techniques. It is also anticipated successful proposals will provide information critical for informing marine policy and resource management decisions.

What are the Challenges?

The budget available for this effort is anticipated to be small – an estimated \$3M – and given how difficult it can be to work in this extreme environment, it may be difficult to award more than a handful of proposals. However, as with past announcement of opportunity, applicants are strongly encouraged to develop proposals that leverage other funding sources.

In the long-term, there is an opportunity to integrate the results achieved through this announcement with other NOAA and non-NOAA investments in Arctic science, research, and management, such as the Bureau of Ocean Energy Management (BOEM) Marine Arctic Ecosystem Study (MARES), which will help the nation justify the need for increased investments in Arctic exploration and research.

What's Next?

Full proposals in response to this announcement are due on January 29, 2015, and OER is in the process of identifying reviewers for the peer-review process, which will be scheduled for spring 2015.

5. Gulf of Mexico and Caribbean Mesophotic Coral Reef Systems:

What We Do

In 2013 and 2014, OER joined forces with NOAA's National Centers for Coastal Ocean Science (NCCOS) in an interdisciplinary study directed at determining the connectivity of mesophotic coral reef species living in Pulley Ridge, the deepest known photosynthetic coral reef off the continental US, to those in the Florida Keys, as well as describing the structure and determining the economic value of Pulley Ridge's mesophotic communities. This effort includes collaboration between two NOAA Cooperative Institutes: the Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT); and the Cooperative Institute for Marine and Atmospheric Studies (CIMAS).

Why We Do It

Mesophotic coral reefs are some of the most poorly understood habitats in the Gulf of Mexico. Results from this study will then be packaged into a format that can be used by resource managers to manage and protect shallow and mesophotic coral ecosystems.

What We Achieve

Results include individual reports focused on physical oceanography, biological-physical modeling, population genetics, population dynamics, community structure, and bio-economics, as well as reports integrating the findings. The project will also include decision support tools, including GIS, tailored to meet the needs of marine resource managers.

What are the Challenges?

Despite austere budgets over the past few years, the Pulley Ridge project has been gaining support within NOAA, but additional funds will be required to complete the development of the decision support tools.

What's Next?

The Pulley Ridge project in many ways complements the systematic deep-water habitat characterization approach OER has developed with BOEM. Given the success of this effort and the continued need to develop detailed baselines for mesophotic coral reefs in the region, the Pulley Ridge project could be considered a "pilot" for expanding to new areas in the Gulf of Mexico and Caribbean. OER has engaged in preliminary discussions with NOAA partners concerning this.

6. Advanced Technology

What We Do – (A Focus On FY14 Investments)

NOAA Ship *Okeanos Explorer* (\$763K)

Camera Systems – Investments include upgrading existing and installing new state-of-the-art high-resolution video cameras on the ROV system. This included new strobes for preparing high-resolution photo mosaics and new miniature high-definition cameras to be installed on the manipulators this winter. These investments ensure OER will continue to maintain the cutting edge with regard to high-definition video and still images, providing scientists the best visual images possible for analysis.

Data Transmission – Investments include upgrading existing and installing new state-of-the-art hardware to ensure data, including high-definition video, are appropriately encoded, transmitted, and decoded for display over Internet2 at Exploration Command Centers in the US and overseas, as well as made available to the general public over Internet1. This included upgrades to the fiber optic multiplexer, new more efficient video encoders onboard the ship, new video decoders on shore, and a new video recording system. Investments also included significant upgrades to the onboard and shore-based data storage arrays. These investments increase our ability to ensure high quality data transmission to shore-based users, as well as to increase our data storage and archive capability.

The most significant investment involves an overhaul of the existing VSAT system, which was purchased and installed in 2008 by OMAO using OER funds. This has been a high-risk, high-fail system since initial installation. Using FY14 funds, OER through GFOE is having a smaller, more powerful and robust system designed and constructed.

Sampling – OER invested in new manipulators that will be installed this winter, providing the ability to collect voucher specimens when appropriate, to deploy new sensors, and to capture high-definition close up video and still images of very small organisms and features. An initial investment was made in designing a sample ‘post-recovery’ processing telepresence van, which will provide shore-based scientists the ability to analyze samples via telepresence.

Data Management (\$931K)

OER FY14 efforts to improve our ability to acquire, manage, and disseminate information include investments in state-of-the-art hardware and software, as well as in customized solutions for data management. Specific investments include a pilot project for developing new video data management solutions within a Cloud environment; the development of customized software solutions for the development of geospatial data products; and the continued build-out and testing of the Integrated Management System (IMS) for the Extended Continental Shelf (ECS)

Mapping Initiative, which will enable experts to develop defensible scenarios for potential extensions using the criteria in Article 76, UN Convention on the Law of the Sea.

Example Investments to Advance Technology (\$2.34 M³)

OER advances technology through direct investments, through the competitive grants process, and by leveraging others investments. Significant advances in technology also occur through the competitive grant process (see below). Examples of OER investments in expeditions and field exercises to design, develop, deploy and test new technology in FY14 include the following:

Nereid Under Ice – OER provided funding to the Woods Hole Oceanographic Institution (WHOI) to deploy and test their new hybrid ROV designed specifically for work under the ice. On August 3, 2014 WHOI provided a detailed report of the accomplishments. (\$650K – direct investment to leverage substantial NSF funding)

Boeing Echo Ranger – OER staff coordinated an expedition between the NOAA Southwest Fisheries Science Center and Boeing under a Cooperative Research and Development Agreement (CRADA) to explore the potential applicability of the large autonomous underwater vehicle (AUV) Echo Ranger for rockfish surveys in untrawlable habitats. From May 17-22 the team deployed and tested the AUV off Catalina Island. The information collected during these tests is still being evaluated, and plans are underway for a second deployment with the Office of National Marine Sanctuaries in 2015. (\$45K – direct investment)

Remotely Conducting in situ Chemical and Isotopic Exploration of Deep Sea Environments –WHOI was funded to conduct the first-ever in situ, real-time chemical and stable isotopic exploration of two unique seafloor sites in the Caribbean using a newly designed sensor package for measuring chemicals expelled by hydrothermal vents. OER worked with the Ocean Exploration Trust (OET) to eliminate operational costs as the package was deployed by E/V *Nautilus* during one of the joint OER/OET expeditions conducted under our Joint Project Agreement (JPA). (\$390K-competitive grant award)

Exploration of the Muertos Trough and Puerto Rico Trench via Un-tethered Free Vehicles – The University of Puerto Rico, Mayaguez was funded to systematically test, improve, and enhance the relatively low-cost AUVs of their design in shallow to abyssal depths (Muertos Trough), and to employ the improved techniques in an exploratory study of Puerto Rico Trench hadal waters. The vehicles are being designed to deploy and retrieve Niskin bottles, take CTD measurements, conduct ADCP, and collect small invertebrate and sediment samples. (\$349K – competitive grant award)

³ Includes \$800K direct investment and competitive grants focused on technology

Ambient Sound at Full Ocean Depth – PMEL was funded to design, build and deploy a specialized deep-ocean hydrophone and mooring system to make the first recordings of ambient sound at the deepest point in the global ocean, Challenger Deep in the Mariana Trench. (\$77K – competitive grant award)

Exploring the CO₂ Output from Erupting Submarine Volcanoes into the Ocean – PMEL was funded to test new and recently developed technologies for remotely calculating volcanic CO₂ input to the oceans. (\$300K – competitive grant award)

High Resolution Visual 3D Reconstructions for Rapid Archeological Characterization – The University of Michigan Department of Naval Architecture and Marine Engineering was funded to develop new open-source user-friendly tools to allow non-engineers to gather and process data quickly into high-resolution 3D models of archeological sites. Central to this goal is a significant reduction in the costs associated with high-resolution (<1m) mapping expeditions. (\$340K – competitive grant award)

Ecosystem and Carbon Wave Glider Surveys in the Arctic Ocean – PMEL was funded to develop and test innovative technology – a new state-of-the-art radiometer package – using wave gliders in 2014, and deploy a mooring and survey the Chukchi Sea for ~60 days in 2015. (\$190K – competitive grant award)

Why We Do It

Supporting the design, development, testing and evaluation, and deployment of advanced undersea technologies has been a cornerstone of OER since its inception. Given the magnitude of the ocean exploration challenge, supporting advancements in tools and techniques is critical for increasing the scope, scale, and efficiency of ocean exploration.

What We Achieve

The above describes the individual results achieved through OER investments. However, it is critical to note that through the telepresence-enabled model of ocean exploration, OER and partners have been able to establish technological advancements in a strategic manner, enabling the science community to design and develop an efficient, effective method for locating, characterizing, and communicating information in a timely manner.

What are the Challenges?

The most significant challenge is associated with the limited budget available for running an advanced undersea technology and innovation program. However, OER has recognized that exploration often functions as a technology attractor, and as described above engages in highly leveraged activities, as well as the development of new models for exploring, which engages partners willing to share the costs.

What's Next?

Each of the priority areas described represents opportunities to advance undersea technologies. From expanding the telepresence-enabled model of ocean exploration, to completing and building upon ECS data, to further application of systematic approaches such as the Pulley Ridge pilot project and the BOEM partnership expeditions – each represents both challenges and opportunities for building a dedicated, robust advanced technology capability.

Ocean Exploration Advisory Board

Handbook, November 2014, Version 1

OER Strategic Plan Status

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**Ocean Exploration
and Research**

OER Strategic Plan Status

PART I – The Current Strategic Plan

Official Status

In November 2011 then-NOAA Administrator Dr. Jane Lubchenco approved the NOAA Office of Ocean Exploration and Research (OER) Strategic Plan FY 2011 – FY 2015, which was transmitted to Congress at their request. OER has been functioning under this strategic plan ever since.

The plan built upon and referenced several key documents that outlined the need for ocean exploration, and which reflected NOAA and national priorities:

- President's Panel on Ocean Exploration - 2000 - Discovering the Earth's Final Frontier: A U.S. Strategy for Ocean Exploration, p. 1-61.
- National Research Council of the National Academies - 2003 - Exploration of the Seas: Voyage into the Unknown, p. 1-228.
- NOAA - 2005 - Understanding Global Ecosystems to Support Informed Decision-Making: A 20-Year Research Vision, p. 1-16.
- NOAA - 2005 - Research in NOAA: Toward Understanding and Predicting Earth's Environment, NOAA Research Council, p. 1-60.
- National Science and Technology Council, Joint Subcommittee on Ocean Science and Technology - 2007- Charting the Course for Ocean Science in the United States for the Next Decade. An ocean research priorities plan and implementation strategy, p. 1-85.
- Van Atta, Richard - 2008 - Fifty Years of Innovation and Discovery, in DARPA: 50 Years of Bridging the Gap, Arlington, VA: Defense Advanced Research Projects Agency, p. 20-29.
- NOAA - 2010 - Chart the Future. NOAA Next Generation Strategic Plan, p. 1-31.
- Magurran, A.E. and Dornelas, M. - 2010 - Biological diversity in a changing world, Philosophical Transactions of the Royal Society, B: Biological Sciences, vol. 365, no. 1558, pp. 3593-3597.

OER has benefited from and capitalized on the ongoing advice and council of NOAA leadership and external expertise in formulating and executing the strategic plan. On an annual basis OER undertakes activities that: increase our knowledge of unfamiliar marine areas and processes; generate information that stimulates marine research; can be readily applied to supporting marine resource policies and strategies; push the envelope on advancing undersea technologies; and disseminate the results as broadly as possible to increase ocean literacy and awareness.

Vision, Mission, and Priority Goals in the Existing Strategic Plan:

Vision – A society that understands the importance of a healthy ocean to all life on Earth and is informed and inspired by discoveries that reveal the wonders, mysteries, and workings of the ocean.

Mission – Develop and use state-of-the-art technology to increase our scientific knowledge of the Earth’s largely unknown ocean, in all its dimensions, to support NOAA and national objectives

Priority Strategic Goals:

- GOAL 1: Conduct scientific baseline characterizations of unknown or poorly-known ocean basin boundaries, processes, and resources
- GOAL 2: Transition ocean exploration discoveries to new research areas and research results to new applications to benefit society
- GOAL 3: Increase the pace, scope, and efficiency of exploration and research through advancement of underwater technologies
- GOAL 4: Engage audiences through innovative means by integrating science, education, and outreach

These goals and the objectives outlined for each have driven OER investments in cornerstone activities: developing and implementing a telepresence-enabled exploration model using NOAA Ship Okeanos Explorer and the Ocean Exploration Trust (OET) vessel Nautilus; targeted exploration to conduct more in-depth investigations through a peer-review proposal process; engaging in the interagency Extended Continental Shelf (ECS) Mapping Initiative and conducting the first-ever surveys of expansive marine regions; and engaging in interagency partnerships that significantly leverage other agency funds to explore unknown areas to mutual benefit.

These goals and objectives have also motivated investments in creating new tools and procedures for managing, archiving, and disseminating the information and results of exploratory expeditions, as well as engaging in formal and informal education and outreach activities that use the excitement associated with exploration and discovery to stimulate interest in the marine environment and the need for and value of ocean exploration, research, and marine resource management.

PART II – Critical Context

In developing and executing the strategic plan, OER has engaged in the development of the President’s National Ocean Policy Implementation Plan, the Department of Commerce Strategic Plan, and the NOAA Next Generation Strategic Plan. This ensures the activities and investments undertaken by OER meet NOAA mission and national priorities related to ocean science, technology development, information management and dissemination, and education.

Connections to Higher-level Strategic Plans:

National Ocean Policy Implementation Plan – Most of OER activities can be accounted for within Section VI of the plan under “Science and Information.” This section is designed to increase knowledge of the marine environment through sound science, enabling the nation to improve our response to new challenges, as well as to take advantage of new opportunities. Specific activities called for in the plan include: advancing fundamental scientific knowledge through exploration and research; advancing technologies; increasing ocean and coastal literacy; advancing and sustaining observing systems; and improving the framework for science-based decision-making.

Department of Commerce Strategic Plan 2014-2018 – The Department of Commerce Strategic Plan contains three goals that relate well to OER activities: fostering innovation; preparing for a changing environment; and improving data capabilities. Specifically, OER expeditions directly support the objective of advancing the understanding and prediction of changes in the environment through world-class science and observations. OER efforts also intersect well with the objectives to creating opportunities and partnerships to accelerate technology development and commercialization; and to enhance the value of and accessibility to data products and services.

NOAA Next Generation Strategic Plan – The enterprise-wide NOAA objective focused on science and technology calls for the development and application of integrated earth system approaches to understand processes underpinning the earth environment and driving changes in ecosystems at multiple scales. NOAA recognizes efforts to meet this objective provide the foundation that supports the primary mission goals related to climate adaptation and mitigation, creating a weather-ready nation, creating resilient coastal communities and economies, and ensuring healthy oceans. Therefore, as part of NOAA’s science enterprise, OER activities play a critical role in providing environmental intelligence for areas and phenomena we know the least about, and positioning NOAA to make progress on all the mission goals.

In Summary – The goals and objectives described in the preceding documents can be distilled into four discrete categories – (1) advance scientific knowledge; (2) improve our ability to observe, record, and report; (3) enhance our ability to manage, archive, and disseminate data and information products; and (4) apply the results for the betterment of society.

PART III – OER Programmatic Priorities In Terms Of Strategy

What follows is a simple matrix demonstrating the connection between the current OER programmatic priorities as described in Section 8 of this handbook and the four strategic categories described above:

| OER Programmatic Priority | Strategic Category | | | |
|----------------------------|------------------------------|------------------------------------|--------------------------------|----------------------------|
| | Advance Scientific Knowledge | Improve Observational Capabilities | Improve Information Management | Engagement and Application |
| Expand Telepresence | ✓ | ✓ | ✓ | ✓ |
| ECS Initiative | ✓ | | | ✓ |
| Arctic FFO | ✓ | | | ✓ |
| Mesophotic Communities | ✓ | | | ✓ |
| BOEM Partnership | ✓ | | | |
| Technological Advancements | | | | |
| Platforms | ✓ | ✓ | | |
| Sampling | ✓ | ✓ | | |
| Sensors | ✓ | ✓ | | |
| Data Visualization | | | ✓ | ✓ |
| Communications | | | ✓ | ✓ |

This table represents the potential strength of the priority with the strategic category and is meant to stimulate discussion.

PART IV – Next Steps

The Charter for the NOAA Ocean Exploration Advisory Board (OEAB) quotes 33 U.S.C §3405, specifying the Board will, “assist the program in the development of a 5-year strategic plan for the fields of ocean, marine, and Great Lakes science, exploration, and discovery.” Given the higher-level strategic plans are in place and the current OER programmatic priorities are well connected, OER proposes to use this information as the foundation to revise the current OER Strategic Plan, which

expires this year. OER also proposes to use this as an opportunity to craft a plan that will enable the program and NOAA to work in conjunction with other federal agencies, academic institutions, and private organizations to strategically and seamlessly plan, execute, and evaluate ocean exploration activities, thus creating a true National Ocean Exploration Program as envisioned by the President's Panel in 2000.

Competitive Grants Process Overview

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Ocean Exploration
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Summary of OER's Competitive Grants Process—Then and Now

Since its inception in 2001, the office of Ocean Exploration and Research (OER) has used a Federal Funding Opportunity (FFO) competitive grants process to solicit ocean exploration proposals from the at-large marine sciences community (national as well as international). From 2001 through FY 2014, OER has awarded \$45,370,000 in competitive grants for ocean exploration.

Consistent with OER's mission, the FFO called for proposals that were distinct from traditional research proposals meaning that they would not be focused on resolving narrowly defined hypotheses but instead be relatively high-risk endeavors that would make fundamental discoveries (to be then followed by research). The mantra was, and remains, "Exploration results in discoveries; research results in knowledge".

The FFO called for proposals that could be focused on any aspect of ocean exploration science, i.e., physical, chemical, geological, or geophysical. The FFO also encouraged submission of proposals focused on aspects of marine cultural heritage, including shipwrecks.

Beginning in 2003, OER formalized a proposal evaluation process that functionally emulates that used by the National Science Foundation. Essential elements of the process include solicitation of at least three peer reviews of each proposal. Following this, the proposals, along with the peer reviews, are evaluated by a panel of scientists selected to include expertise that spans the subject matter of the proposals being evaluated.

The panel review results in a discrete recommendation for each proposal; the panel does not rank the proposals. The OER program Director, in consultation with the program's science team, then decides which proposals to support. Funding support depends on an individual proposal's panel scores and evaluations as well as limiting considerations that include the available budget and essential factors and resources that include availability of ship time and other seagoing assets.

Successful proposals are frequently interdisciplinary and often engage partnerships that leverage OER's support with other financial, technical, or human resources.

Hallmarks of OER proposals include the absence of proprietary holds on any data or information collected (with the single exception of specific shipwreck locations) and a strong commitment for engagement by Principal Investigators in OER's education and outreach activities.

FY 2014 and FY 2015

Beginning in FY 14, and henceforth, the FFO will call for proposal focused on specific NOAA priorities (subjects and/or geographic regions) or expeditions or projects that exploit the program's important ocean exploration discoveries. For example, the FY 14 FFO called for proposals focused on the Caribbean, the Gulf of Mexico, and the Arctic. The FY 15 FFO narrows the focus to the Arctic, given the region's priority for NOAA, and the opportunities to develop new technologies there.

Measures of Success

The number of peer-reviewed journal articles is one measure of the competitive grants program's success. The table that follows shows a very good return on investment using this metric.¹ A summary funding table showing only OER's investments in competitive grants (and excluding the value of ship time and other technological resources contribution—worth over \$25 million since 2002) is below.

SUMMARY METRICS

| Bibliometric Indicator | Value |
|---|---------|
| Number of Publications (p) | 574 |
| Total Number of Citations Received (c) | 8,479 |
| Average Number of Citations per Paper (c/p) | 14.77 |
| H- Index | 42 |
| Percentage of Publications in the Top 10% for Citation Counts | ≈21.43% |

Table 1: Common bibliometric indicators calculated for publications supported by OER. An H-Index of 42 indicates that this group of 574 publications includes 42 articles that have each received 42 or more citations.

OER Competitive Funding by Fiscal Year

| | | | |
|------|-------------|-------|-------------|
| 2002 | \$6,300,000 | 2009 | \$1,800,000 |
| 2003 | \$5,500,000 | 2010 | \$2,650,000 |
| 2004 | \$5,100,000 | 2011 | \$400,000 |
| 2005 | \$6,670,000 | 2012 | \$0 |
| 2006 | \$3,200,000 | 2013 | \$0 |
| 2007 | \$2,500,000 | 2014 | \$4,200,000 |
| 2008 | \$4,050,000 | 2015* | \$3,000,000 |

* planned

¹ The full OER October 2014 bibliographic citation report is available at <http://oceanexplorer.noaa.gov/about/what-we-do/publications/oer-citation-report-oct-2014.pdf>

Definition of “Ocean Exploration”

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Ocean Exploration
and Research

Definitions of Ocean Exploration

The on-line Oxford Dictionaries define Exploration as: (1) The action of traveling in or through an unfamiliar area in order to learn more about it; (2) thorough analysis of a subject or theme.

OER and its partners use the following definitions of ocean exploration most often:

Functional definitions:

- Ocean exploration involves the deliberate systematic investigation of unfamiliar ocean regions and phenomena for the purpose of discovery and the advancement of knowledge.
- Ocean exploration is a process requiring diverse observations, accurate recording of the findings, and the integration of results into a suite of products that provide a baseline characterization of the region or phenomena.
- Ocean exploration provides baseline information needed to reduce unknowns and deliver high-value environmental intelligence critical to understanding environmental change, addressing current and emerging science and resource management needs, and enhancing community resilience.

Applied definitions:

- Ocean exploration catalyzes new lines of scientific inquiry, research, and informs marine policy.
- Ocean exploration stimulates education and motivates the next generation of explorers – scientists, engineers, technicians, artists, and others.
- A successful explorer leaves a legacy of new knowledge that can be used by those not born to answer questions not yet posed at the time of the exploration.
(Quote from the Report of the President's Panel on Ocean Exploration 2000)

A statement about the fluid nature of the unfamiliar:

The unfamiliar manifests itself at multiple spatial and temporal scales – from the global ocean to the microbial communities associated with the smallest of features – from eons to picoseconds – yet the process of exploration to make the unfamiliar known still applies.

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