

Report to the U.S. Congress on the
National Oceanographic Partnership Program

Fiscal Year 2009

March 2010

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I. Executive Summary

The National Oceanographic Partnership Program (NOPP) marked its 12th year in 2009. Since its inception, NOPP has forged interagency and intersector cooperation through a multitude of cross-cutting research and education projects supported by the federal government. In accordance with its enabling legislation, NOPP promotes the objectives of assuring national security, advancing economic development, protecting quality of life, and strengthening science education and communication through improved knowledge of the ocean. As demonstrated by its achievements, NOPP is an effective forum for development of new interagency initiatives and priorities that transcend single agency agendas.

NOPP has grown and transitioned over time in regards to the ocean governance structure within which it operates. During fiscal year (FY) 2009, the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI), – which incorporated the mandate of the National Ocean Research Leadership Council (NORLC), the NOPP governing body – served as an interagency body dedicated to supporting the ocean sciences community in support of national objectives. The ICOSRMI was established in 2004 as an Under/Assistant Secretary-level body in response to the U.S. Commission on Ocean Policy report, with representation from 28 federal agencies. The Joint Subcommittee on Ocean Science and Technology’s (JSOST) Interagency Working Group on Ocean Partnerships (IWG-OP, formerly the NOPP Interagency Working Group) serves as an oversight and guidance body to NOPP. Under the guidance of the IWG-OP, NOPP will continue to make progress on these four strategic goals:

1. Continue and expand ocean partnership dialogues;
2. Sponsor ocean partnership activities;
3. Identify and remove obstacles and disincentives to ocean partnerships; and
4. Facilitate opportunities for dialogue with the nation’s leadership.

As the Ocean Policy Task Force makes its final recommendations on a national ocean policy and new ocean governance structure, NOPP will continue to serve as a well-practiced mechanism for implementing ocean partnerships among federal agencies. The priority objectives outlined in the interim report of the Ocean Policy Task Force align with the current and historical activities and objectives of NOPP. New interagency ocean initiatives can be safely implemented through the NOPP model, which has twelve years of experience and lessons learned from which to draw.

Overall fiscal investment in NOPP has increased significantly since the program’s inception to a total of more than \$325 million; the FY 2009 contribution totaled \$29.5 million. By issuing proposal solicitations from FY 1997 to FY 2009, NOPP has funded 151 projects, including 21 renewal projects. Nineteen new projects were funded in FY 2009 focusing on:

- A) *Improving Wind Wave Predictions: Global to Regional Scales;*
- B) *Sensors for Measurement of Biological, Bio-Optical, Optical or Chemical Properties of the Ocean;* and
- C) *Improving Tropical Cyclone Intensity Forecasting.*

A central tenet of NOPP is interagency partnerships, as seen in the many activities of the IWG-OP and its interaction with other interagency entities. For example, the IWG-OP is pursuing interagency dialogues with the JSOST IWG on Facilities and Infrastructure¹ (IWG-FI) and other interagency committees regarding marine biodiversity and Arctic research as integrative programmatic issues among agencies’ exploration, research, and monitoring projects.

The Ocean Research and Resources Advisory Panel (ORRAP) serves as the primary ocean-focused federal advisory panel and provides additional guidance to NOPP. The ORRAP recently highlighted ocean-related challenges, opportunities, and critical actions vital to U.S. interests in a transition document for the current Administration.

¹ The Interagency Working Group on Facilities and Infrastructure (IWG-FI) was formerly known as the Interagency Working Group on Facilities (IWG-F). A charter indicating this name change was signed by the JSOST Co-Chairs on January 26, 2010. For the purposes of this report, the committee will be referred to as the IWG-FI.

NOPP will continue to complement and support the implementation of national ocean research objectives and anticipates playing an important role in the policy proposed by the Ocean Policy Task Force. The program will maintain its pursuit of exciting and novel areas of ocean research, with an emphasis on partnerships.

II. Introduction

The 1997 Defense Authorization Act (Public Law (P.L.) 104-201) directed the Secretary of the Navy to establish the National Oceanographic Partnership Program (NOPP, www.nopp.org). Supplemental legislation for appointments to the NOPP oversight body, the National Ocean Research Leadership Council (NORLC), and to the Ocean Research Advisory Panel (ORAP, now ORRAP), is contained in P.L. 105-85, the fiscal year (FY) 1998 Defense Authorization Act.

Throughout the history of the program, NOPP has transitioned through several governance frameworks. In response to the release of the report by the U.S. Commission on Ocean Policy (USCOP) in September 2004, a governance structure was developed which linked existing groups with new entities by building on the existing NOPP legislation, emphasized federal coordination in the execution of ocean research to better understand the ocean, coasts, and the Great Lakes, and provided an improved scientific basis for resource management. The structure utilized during FY 2009 is described more fully in a notice posted in the Federal Register on 29 June, 2007 (Volume 72, Number 125, p. 35708-35709)². During FY 2009, the Ocean Research and Resources Advisory Panel (ORRAP) maintained marine resources under its purview to better reflect the connectivity between ocean research, decision-making, and societal benefits. The working groups of the Joint Subcommittee on Ocean Science and Technology (JSOST), a subcommittee under the National Science and Technology Council structure which also reports to the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI – Under/Assistant Secretary-level body established in response to the U.S. Commission on Ocean Policy report and functionally serving as the NORLC), continue to reflect the main activities of the historical NOPP committees.

An Ocean Policy Task Force was convened by President Obama in June 2009. The Interim Report of this group, released in September 2009, proposes a policy coordination framework which modifies and builds on the existing structure. The proposed framework includes a stronger mandate and direction, as well as sustained high-level engagement. Also included in the proposed governance structure is continued guidance from the ORRAP to the highest level of the proposed structure, the National Ocean Council (NOC). As the Ocean Policy Task Force prepares to make its final recommendations on a national ocean policy, NOPP will continue to serve as an existing mechanism for implementing ocean partnerships between and among federal agencies.

NOPP is also well positioned to help implement the policy should the President accept the recommendations. As illustrated in Figure 1, the past and current activities of NOPP and the priority objectives outlined in the interim report of the Interagency Ocean Policy Task Force overlap, making NOPP a highly effective and appropriate tool for implementing the priorities identified.

² The ocean governance structure utilized during FY 2009 is reflected in the headings of this report to Congress. The NOPP committees and their functions completely transitioned to this structure during FY 2007 to provide a consistent, interagency approach to ocean science and resource management.

Priority Objectives of the Ocean Policy Task Force									
Historic and Current NOPP Activities	Ecosystem-Based Management	Regional Ecosystem Protection and Restoration	Water Quality and Sustainable Practices on Land	Inform Decisions and Improve Understanding	Coordinate and Support	Resiliency and Adaptation to Climate Change and Ocean Acidification	Coastal and Marine Spatial Planning	Changing Conditions in the Arctic	Ocean, Coastal, and Great Lakes Observations and Infrastructure
Achieve and sustain an Integrated Ocean Observing System (IOOS)				Design studies for the Ocean Observatories Initiative					
				Argo Float Array					
	Establishment of IOOS Regional Associations								
Promote lifelong ocean education	National Ocean Sciences Bowl (NOSB)								
		COAST Internship		Ocean Science, Technology and Operations Workforce Study					
Modernize ocean infrastructure and enhance technology development	Sensor development and commercialization			IWG-FI Federal Oceanographic Fleet Status Report				Joint Workshop on Interagency Ocean and Coastal Interests in the Arctic	
Foster interagency partnerships to increase and apply scientific knowledge	LOPHELIA I and II: Deep water coral research			Four FY 2008 multi-institution projects on Atlantic Meridional Overturning Circulation		Ocean modeling from the Global Ocean Data Assimilation Experiment (GODAE)		Four FY 2007 multi-institution projects on Coastal Effects of a Diminished-ice Arctic Ocean	
	IWG-OP Biodiversity Ad Hoc group activities			Six FY 2009 multi-institution projects on Improving Tropical Cyclone Intensity Forecasting			FY 2010 funding opportunity on Ocean Renewable Energy and Stewardship		
	Multi-disciplinary and multi-sector partnerships between basic and applied researchers								

Figure 1. Examples of NOPP investments and projects in ocean science, technology and education that intersect with the priority objectives described in the *Interim Report of the Interagency Ocean Policy Task Force*.

NOPP will continue to develop and coordinate its activities within the evolving ocean governance structure. The NOPP model of interagency collaboration has proven to be an effective and efficient method of maximizing and enhancing federal investments in ocean science, technology and education. The outlook for the future is promising, as NOPP continues to further the national agenda for ocean research, education and interagency cooperation.

This FY 2009 Report to Congress reflects the central role NOPP is playing in the implementation of the objectives of its enabling legislation and the ocean research priorities identified in *Charting the Course for Ocean Science in the United States for the Next Decade: An Ocean Research Priorities Plan and Implementation Strategy (Charting the Course)*. Prepared by the JSOST as a national plan with significant input and review by the ocean community as a whole, *Charting the Course* is the first report to prioritize national ocean research by focusing on key interactions between society and the oceans. The remainder of this report summarizes the NOPP Investment Strategy, the NOPP committees' activities and investments for FY 2009, and ongoing NOPP plans and activities for FY 2010.

III. Partnership Lessons Learned

Since the implementation of NOPP in 1997, the program has strengthened the incentives for interagency partnerships. In some cases, the federal agency participants in NOPP have made significant progress; in others, there is still room for improvement. However, several lessons have been learned during the twelve-year journey.

The organization of the program has proved to be an effective model for facilitating interagency partnerships. A central program office, which could be expanded to support additional entities if needed, provides infrastructure and support to associated interagency activities. As increasing interagency attention is paid to a broad range of ocean-related subject matter, coordination and communication amongst the various interagency committees will be vital. The program also receives high-level independent guidance from the ORRAP, which is directed by P.L. 105-85 to advise on policies and procedures to implement NOPP. Most recently, the ORRAP expressed great confidence in NOPP and its operating procedures at the ORRAP's November 2009 meeting.

The collaborative approach to NOPP allows federal agencies to work on large, cross-cutting issues with varying levels of contributions; over the history of the program, 18 agencies have participated. This model provides a structure within which agencies can implement new initiatives while at the same time minimizing the risk of a single agency starting an initiative in isolation. The construct provides a support group of agencies whose missions are mostly or wholly ocean-related and allows for the inclusion of agencies whose mandates are typically terrestrial.

One area that continues to hinder progress is the interagency transfer of resources under the authority of the Economy Act, requiring agencies to devote considerable time and energy to find solutions to this obstacle. Within several partner agencies, effective communication strategies have been identified between program managers and legal departments. The establishment of interagency agreements has been eased through the development of realistic timelines and tactics for easing future amendments to the agreement. To continue to strengthen and improve NOPP, the fiscal concerns of agencies must be addressed. As suggested by P.L. 111-11, Subtitle C – Integrated Coastal and Ocean Observation System Act of 2009 Sec. 12305, member departments

and agencies should have the authority to ‘enter into and perform such contracts, leases, grants and cooperative agreements as may be necessary to carry out’ interagency activities. This freedom was intended in the original NOPP legislation but not explicitly stated. The difficulties caused by its absence resulted in the explicit language in P.L. 111-11.

One of the most successful lessons of NOPP is that strategic vision can create action. Agencies active in NOPP during the early years of the program identified critical needs for the ocean and developed them into the backbone of a strategic plan. The four goals outlined under the 2004 NOPP Strategic Plan, listed in Figure 2 below, have grown into mature efforts. Currently, each goal has transitioned into a specific interagency effort. For example, the NOPP strategic goal to *achieve and sustain an Integrated Ocean Observing System (IOOS)*[®] is now spearheaded by the JSOST’s Interagency Working Group on Ocean Observations (IWGOO). Funding opportunities, such as Broad Agency Announcements (BAA) and Requests for Proposals (RFP), serve as a day-to-day expression of interagency collaboration and effort toward these strategic goals and other issues. The evolving areas of investment by NOPP, as seen in BAAs and RFPs, may well grow into specific, interagency efforts as well.

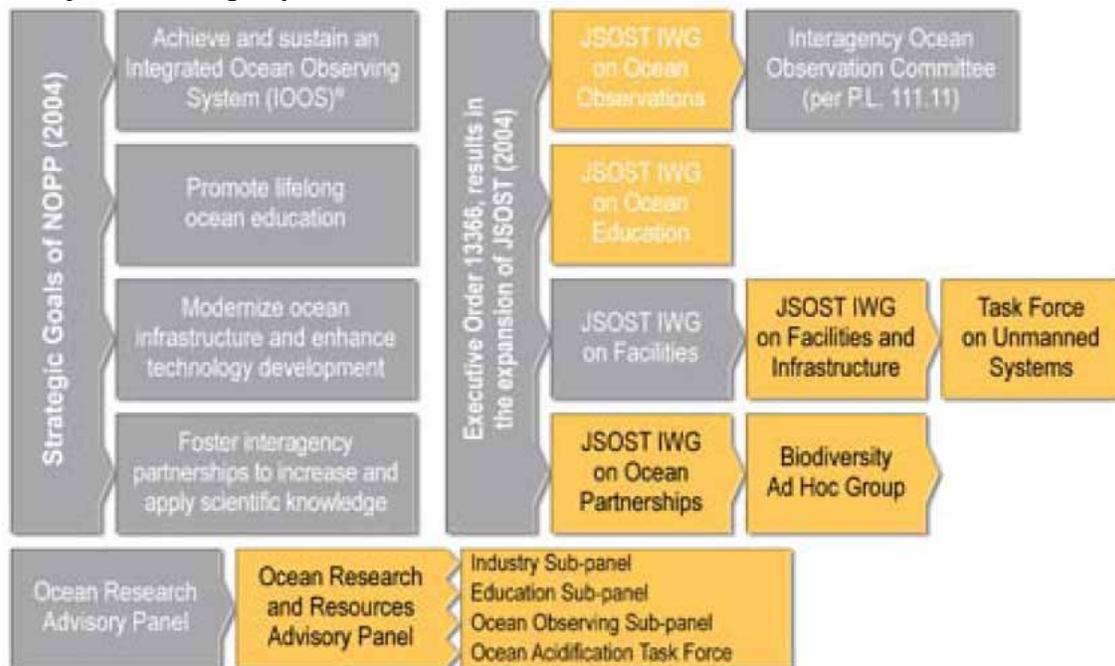


Figure 2. Descendants of the NOPP. A yellow box indicates current operation. The NOPP Office currently supports any committee written in black.

IV. Strategies for the Future

The JSOST’s Interagency Working Group on Ocean Partnerships (IWG-OP) has taken over the role of the NOPP IWG in providing the interagency forum for implementing and advancing NOPP. In FY 2009, the IWG-OP continued to follow its Strategic Plan, which outlines the IWG-OP evolution from the NOPP IWG and lays out a path toward implementing Strategic Goals for ocean partnerships. NOPP, working through the IWG-OP, will continue to pursue new strategic goals, which align with the Strategic Goals described below. The IWG-OP is currently exploring marine biodiversity, Arctic research, ocean acidification and marine renewable energy as areas of research for future consideration.

Each of the four Strategic Goals discussed below identifies three or more actions as specific targets for which partnerships may be necessary. These actions represent measures of sufficient progress for the Strategic Plan. The challenge for NOPP is to facilitate efforts through interagency and intersector partnerships to execute the listed actions.

New actions may be added, implementation plans prepared, and metrics developed and tracked as appropriate. The Strategic Plan will be updated periodically as needed, particularly so as to reflect adjustments in the priorities and implementation strategies of *Charting the Course for Ocean Science* and the final national ocean policy issued by the Ocean Policy Task Force. Plans to address actions, and any associated metrics, will be documented separately and are intended for annual assessment and update.

The following is an excerpt from the IWG-OP Strategic Plan with accompanying examples of the accomplishments toward each goal that the IWG-OP and NOPP has made:

GOALS

Goal I – Continue and expand ocean partnership dialogues

Actions...

- 1** Build on the partnership successes of the National Oceanographic Partnership Program.
- 2** Serve as a point for dialogue on those tasks requiring interagency or intersector partnerships in order to realize success.
- 3** Form or foster partnerships necessary to support *Charting the Course for Ocean Science*, in particular its four near-term priorities.
- 4** Working with the other interagency bodies as needed, form long-term strategic partnerships on emerging science and technology needs and opportunities (for example, the issue of anthropogenic sound in the marine environment and the scientific and mapping efforts necessary to address the interagency Extended Continental Shelf initiative).
- 5** Facilitate and participate in forums on ocean research and development priorities.

Accomplishments...

During FY 2009, the IWG-OP met with several agencies within the Washington, DC, area to raise awareness of the IWG-OP and NOPP by presenting on the history of NOPP and the accomplishments and opportunities available through participation. The objectives of the outreach were dual-purpose; the IWG-OP hoped to 1) excite new agency participants about partnering activities through the IWG-OP and NOPP, and 2) solicit feedback and information from agency program managers regarding ocean issues that require a partnership approach. Through outreach to the Department of Energy (DOE), the IWG-OP was able to build a partnership between DOE, the Minerals Management Service (MMS) and the National Oceanic and Atmospheric Administration (NOAA) which resulted in a FY 2010 funding opportunity for *Developing Environmental Protocols and Monitoring to Support Ocean Renewable Energy and Stewardship*.

Goal II – Sponsor ocean partnership activities

Actions...

- 1** Invest in critical topics (e.g., Broad Agency Announcements and Requests for Proposals in support of *Charting the Course for Ocean Science* and other interagency activities).
- 2** Present awards for Excellence in Partnering to recognize the best examples of projects involving multiple sectors.

- 3 Support forums and reports on emerging ocean topics and develop priorities.

Accomplishments...

The IWG-OP continues to develop annual extramural funding opportunities through NOPP and fund selected ocean research projects. The FY 2009 funding opportunities and funded research are discussed in depth in Chapter V of this report; notably, the FY 2009 funding opportunity resulted in 19 funded research projects, the highest number of project awards in one year to date. During FY 2009, a NOPP Excellence in Partnering Award was presented to the *Multi-sensor Improved Sea Surface Temperature (MISST) for the Global Ocean Data Assimilation Experiment (GODAE)* project, led by Dr. Chelle Gentemann of Remote Sensing Systems, Inc., in collaboration with 23 other academic and government organizations.

Goal III – Identify and remove obstacles and disincentives to ocean partnerships

Actions...

- 1 Improve partnership flexibility among federal agencies (financial and staffing resources) by:
 - encouraging interagency personnel rotations
 - enabling interagency transfer of resources
 - developing shared interagency objectives for complementary missions
- 2 Develop mechanisms to link federal and non-federal resources especially in the context of regional alliances, consortia and other regional partnerships.
- 3 Raise awareness of obstacles and disincentives external and internal to the federal government.

Accomplishments...

During FY 2009, the IWG-OP, NOAA, and the Office of Management and Budget (OMB) worked to include language in the FY 2010 NOAA Budget to facilitate NOAA's ability to conduct funds transfers with other federal agencies. The language is designed to meet the requirements of NOPP and other executing needs for NOAA's work. The work of the participating NOPP agencies, OMB, and the support of the Congress to enact this provision has already expedited the formation of several interagency partnerships that advance the goals of the NOPP.

Goal IV – Facilitate opportunities for dialogue with the nation's leadership

Actions...

- 1 Achieve recognition as the leading resource on ocean partnership activities.
- 2 Facilitate/host educational forums or updates to members of Congress and their staff on ocean partnership matters, (e.g., *Charting the Course for Ocean Science* and its four near-term priorities).
- 3 Sponsor forums on emerging ocean science and technologies for government leaders specifically regarding needs, opportunities, and benefits of multi-agency and multi-sector relationships.
- 4 Report annually to Congress on partnership activities.

Accomplishments...

During FY 2009, the IWG-OP hosted a workshop on the *Consideration of a National Implementation Plan on Gliders, Autonomous Underwater Vehicles (AUV) and Unmanned Aerial Systems (UAS)* with representatives of eight federal agencies. Discussion at the

workshop centered on common lifecycle infrastructure, development of new capabilities, governance and policy, and workshops or demonstration projects. The workshop recommended that the JSOST IWG on Facilities and Infrastructure (IWG-FI) – a group that works closely with the IWG-OP – take formal responsibility for the coordination of AUV and UAS issues. This was accepted by the IWG-FI, and a Task Force on Unmanned Systems has been established to advise, assist, and make recommendations to the IWG-FI on policies, procedures, and plans related to unmanned systems uses, upgrades, and investments.

In order to ensure wise use of the oceans and maintenance of their health, individual agencies pursue scientific and technical information on which to base management decisions. Advancement toward appropriate stewardship of the oceans, and associated societal gains, can be more rapidly and efficiently realized through collaborative partnerships. The IWG-OP, through NOPP, will continue to focus on ocean research objectives which are too large for single agencies to undertake but satisfy multiple agency missions and would benefit from partnerships between government, private industry, and academia.

V. NOPP Investment Profile

NOPP-Funded Activities are those that are either solicited or managed by NOPP and involve support *from two or more agencies*. NOPP-Related Activities are those that are funded primarily *by a single agency* in response to plans produced by NOPP entities. Both types of activities have grown since the inception of NOPP.

NOPP-FUNDED ACTIVITIES

The growth of NOPP-Funded Activities from FY 1997-2009 is shown in Figure 3, which also includes the breakdown by subcategories for Solicited Projects and Managed Activities. In FY 2009, total funding reached \$29.5M.

NOPP-Solicited Projects

NOPP-Solicited Projects are the direct result of a formal NOPP BAA or RFP. The process of developing these funding opportunities is fully described in Appendix 1. The funding level for solicited projects has grown from \$10.8M in FY 1997 to \$27.1M in FY 2009 (does not account for inflation, Figure 2). The cumulative investment from FY 1997-2009 is \$292.8M. Through FY 2009, there have been 151 funded projects, including 21 renewal projects. On average, 11 new projects are initiated each year, with a typical duration of between three and five years.

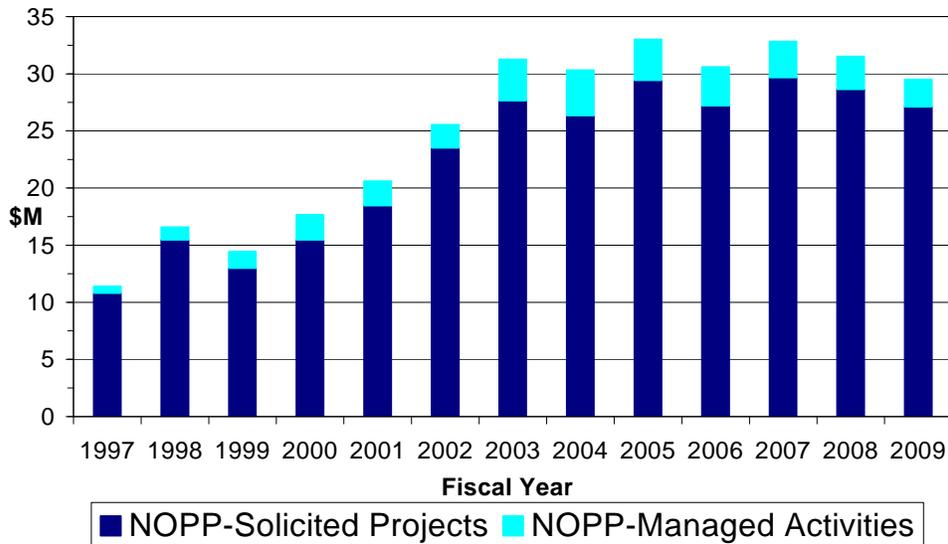


Figure 3. FY 1997-2009 investment in NOPP-Funded Activities, including both NOPP-Solicited Projects and NOPP-Managed Activities. Note that the dollar amounts shown are those spent each year; out-year commitments are not shown.

One of the primary functions of NOPP is to promote partnerships within the federal government and between the federal government and other members of the ocean sciences community, including academia, industry, and non-governmental organizations (NGOs). Figure 4 shows the annual distribution of funding for new awards across sectors within the ocean sciences community. When averaged over NOPP’s thirteen-year history, approximately 59 percent, 24 percent, and 17 percent of the funds have been awarded to academic, government, and industry partners (including NGOs), respectively.

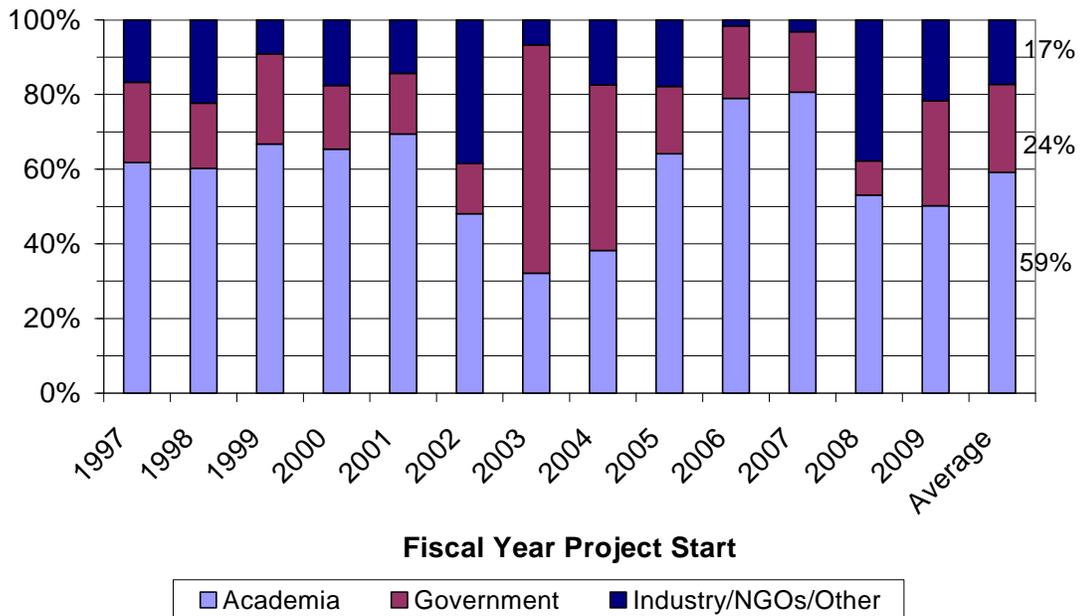


Figure 4. The distribution of annual NOPP funding for new solicited project awards by sector from FY 1997-2009 for academia, government, and industry (includes NGOs/others). The bar on the far right indicates the thirteen-year sector averages.

NOPP-Managed Activities

FY 2009 NOPP-Managed Activities include single agency expenditures for the NOPP Office and the National Ocean Sciences Bowl (NOSB). Funding for managed activities has grown from \$0.6M in FY 1997 to \$2.4M in FY 2009 (Figure 3). The cumulative expenditure for these activities is \$32.6M over the history of the program.

NOPP-RELATED ACTIVITIES

NOPP-Related Activities include new investments in activities overseen by NOPP entities. These investments fulfill the broad cross-cutting oceanographic goals and partnerships embraced by NOPP, but they are primarily single-agency expenditures.

VI. Fiscal Year 2009 Activities

Overall fiscal investment in NOPP has increased since its inception in 1997 and can best be described in terms of NOPP-Funded Activities and NOPP-Related Activities.

NOPP-FUNDED ACTIVITIES

NOPP-Solicited Projects

NOPP agencies invested approximately \$20.8M in new NOPP-Solicited projects in FY 2009 in response to one solicitation, issued in January 2009 through the Office of Naval Research (ONR) on behalf of NOPP and the ICOSRMI. A BAA called for proposals on the topics of: 1) *Improving Wind Wave Predictions: Global to Regional Scales*, 2) *Sensors for Measurement of Biological, Bio-Optical, Optical or Chemical Properties of the Ocean* and 3) *Improving Tropical Cyclone Intensity Forecasting*. Topic two is one of the Near-Term Priorities from *Charting the Course* and represents continued efforts by NOPP to help implement that national ocean research

priorities plan. In response to the solicitations, 91 proposals were received that included collaborations among approximately 260 institutions (academia, industry, and government). The proposals underwent a peer review process in June 2009 to determine which would be funded; overall, 19 projects were approved for funding by the IWG-OP on behalf of the ICOSRMI. Detailed information on these solicitations is included in Appendix 2, and summaries of the funded projects are provided in Appendix 3.

BAA Topic (Issuing NOPP Agency; Release Date)	Funding Available	Number of Awards Issued
<i>Improving Wind Wave Predictions: Global to Regional Scales</i> (ONR; January 2009)	\$8M over four years	Six
<i>Sensors for Measurement of Biological, Bio-Optical or Chemical Properties of the Ocean</i> (ONR; January 2009)	\$7.5M over three years	Six
<i>Improving Tropical Cyclone Intensity Forecasting</i> (ONR; January 2009)	\$6M over three years	Seven

Table 1. Summary of NOPP BAA issuance and results for FY 2009.

NOPP-Managed Activities

National Ocean Sciences Bowl

The NOSB[®] was created in 1998 through NOPP. The NOPP agencies, committed to increasing ocean literacy, continue to sponsor the program. FY 2009 proved to be an exciting year for the NOSB, as the theme of the 2009 competition was biodiversity. The NOSB worked closely with the Census of Marine Life (www.coml.org) to develop biodiversity-related questions for the competition. The 2009 NOSB Finals Competition was held in Washington, DC, on 26-27 April 2009 at the Sant Ocean Hall in the Smithsonian’s National Museum of Natural History.

In FY 2009, the NOSB hosted the *Living on the Ocean Planet* Video Contest to engage additional students in NOSB opportunities. The video competition is designed to reach beyond established NOSB teams to those students who are interested in oceans, but may not be interested in participating in a structured academic competition. This innovative and creative challenge is a way to allow these individuals the opportunity to showcase their passion for oceans. For this inaugural competition, students highlighted marine biodiversity in a short video using one or more of the Ocean Literacy Principles, knowledge required to be ocean literate in accordance with the National Science Education Standards. The winning video was posted on the NOSB and the Census of Marine Life web sites and was presented by the team at the 2009 NOSB Finals Competition.

The NOSB presented at the National Council for Science and the Environment’s 9th National Conference on Science Policy and the Environment: *Biodiversity in a Rapidly Changing World*, and at the National Marine Educators Association conference in FY 2009.

For additional information on NOSB, please visit www.nosb.org.

NOPP Office

The NOPP Office, sponsored through a contract from ONR to the Consortium for Ocean Leadership, supported many interagency activities during FY 2009. All meetings and intercessional activities of the IWG-OP, the IWG-OP’s Biodiversity Ad Hoc Group, the IWG-FI, and the ORRAP were supported by NOPP Office staff. The NOPP Office coordinated the peer

review of 88 proposals, resulting in 19 funded research projects. Outreach efforts undertaken in FY 2009 include: hosting an exhibit booth at the American Geophysical Union's 2008 Fall Meeting, assisting in the production of a special issue of *Oceanography* magazine, coordinating outreach from the IWG-OP to additional agencies, and developing a suite of new outreach materials. The NOPP Office staff members also serve as liaisons to other Interagency Working Groups and committees of the ocean governance structure.

NOPP INTERAGENCY INTERACTIONS

A central tenet of NOPP is interagency partnership. The most recent activities are described in the following two sections of this report.

Interagency Working Group on Ocean Partnerships

The IWG-OP met 11 times in FY 2009 in support of partnership efforts across the ocean community. The IWG-OP made progress on the goals and actions of their Strategic Plan, designed to complement the NOPP Strategic Plan, in order to achieve significant integrative value for the ocean science and resource management missions of the member agencies and partners.

The group developed solicitations on three topics: 1) *Improving Wind Wave Predictions: Global to Regional Scales*; 2) *Sensors for Measurement of Biological, Bio-Optical, Optical or Chemical Properties of the Ocean*; and 3) *Improving Tropical Cyclone Intensity Forecasting*. Nineteen multi-year proposals were funded totaling \$20.8M in contributions from partner agencies.

The IWG-OP was instrumental in the production of a special issue of *Oceanography* magazine to highlight ocean research conducted through NOPP and the downstream impacts of ocean partnerships in the field of oceanography (Volume 22:2, June 2009). The articles included in the special issue demonstrate the range of work funded by NOPP with the aim of bringing together cutting edge science, ocean information, and broad partnerships to better serve society and the ocean research community. The NOPP volume of *Oceanography* is available for viewing at www.tos.org/oceanography/.

The IWG-OP presented the annual NOPP Excellence in Partnering Award to *Multi-sensor Improved Sea Surface Temperature (MISST) for the Global Ocean Data Assimilation Experiment (GODAE)* in May 2009. Over five years, the MISST partnership included 23 researchers from academic institutions and federal agencies to produce improved, high-resolution, global, near-real-time, sea surface temperature analyses. The impacts of these improved sea surface temperatures have been demonstrated on operational ocean models, weather prediction and tropical cyclone intensity forecasting. This project provides a direct U.S. contribution to the GODAE, which aims to develop operational ocean state observations and models, through the GODAE High-Resolution Sea Surface Temperature Pilot Project. MISST also provides critical data to the National Hurricane Center, the U.S. Navy and NOAA.

The IWG-OP Biodiversity Ad Hoc met four times during FY 2009. The intent of the group is to develop actions and activities, including but not limited to NOPP BAAs and RFPs, starting with four categories: 1) biodiversity science and technology; 2) biodiversity metrics, indices and proxies; 3) applications and data sharing; and 4) international conventions and frameworks. The group increased information exchange between the agencies, encouraged participating agencies to increase data deposition into Ocean Biogeographic Information System (OBIS)-USA, and began planning a workshop on operational marine biodiversity observations to be held in May 2010.

The IWG-OP hosted a workshop on *Consideration of a National Implementation Plan on*

Gliders, Autonomous Underwater Vehicles (AUV) and Unmanned Aerial Systems (UAS) in April 2009. Representatives from eight agencies participated and summarized recent and upcoming AUV and UAS activities. Potential interagency activities were identified in five categories: 1) common lifecycle infrastructure; 2) development of new capabilities; 3) governance / policy; 4) community workshops; and 5) field program / demonstrations. The group felt that significant partnership opportunities exist as new technologies and infrastructure are utilized and recommended that the JSOST IWG on Facilities and Infrastructure formally take responsibility for coordination of AUV and UAS issues.

Interagency Working Group on Facilities and Infrastructure

The IWG-FI³ met three times during FY 2009. It continued to consider a long-term vision for the federal oceanographic research and operational facilities in the U.S. and focused on future interagency ocean facility, technology, and infrastructure priorities. Continuing from FY 2007 and FY 2008 activities, the IWG-FI concluded their assessment of the inventory of current and planned federal facility retirements, closures, or gaps and incoming federal infrastructure available to accomplish Near-Term Priorities of *Charting the Course for Ocean Science*.

The IWG-FI received a recommendation from an IWG-OP led workshop on the *Consideration of a National Implementation Plan on Gliders, Autonomous Underwater Vehicles (AUV) and Unmanned Aerial Systems (UAS)* to formally coordinate AUV and UAS issues. The workshop participants felt that significant partnership opportunities exist as these new technologies and infrastructure are increasingly utilized. At their September 2009 meeting, the IWG-FI decided to form a sub-group to focus on coordination of autonomous systems, including AUV and UAS, between agencies. The scope of the Task Force includes AUVs, gliders, UASs, unmanned surface vessels and Lagrangian platforms⁴.

Ocean Research and Resources Advisory Panel

The ORRAP, a formal Federal Advisory Committee Act (FACA) committee, continued its trend of meeting three times annually, addressing research, education and resource management issues in order to provide advice and guidance on NOPP and other matters to the NORLC/ICOSRMI. The FY 2009 ORRAP meetings took place in Washington, DC, on 4-5 December 2008, 6-7 April 2009, and 11-12 August 2009. During FY 2009, the terms for five ORRAP members expired, and one new member was welcomed, bringing ORRAP membership to 13.

Recognizing its mandate and the opportunity to advise the incoming Obama administration on ways to maximize the benefits of ocean research and resources, the ORRAP released a strategic transition document in December 2008. The report, emphasizing eight themes vital to U.S. interests, presents the Administration with critical actions that can reap meaningful and immediate rewards for the nation. The document highlights the most pressing ocean-related challenges and promising opportunities for the new Administration. The transition document can be accessed via the NOPP web page (www.nopp.org). The ORRAP conducted two conference

³ During FY 2009, the IWG-FI was known as the Interagency Working Group on Facilities. A charter incorporating the name change was signed on January 26, 2010. The membership of the committee has not been altered due to the change in committee name. For consistency in this report, the current committee name is used.

⁴ The Task Force was formed and met in January 2010.

calls, one on 6 October 2008 and another on 6 November 2008, to finalize the content of this document.

The December 2008 meeting featured a review of and strategy session on increasing the prominence and impact of various ocean-related transition documents for the incoming Obama administration. The ORRAP discussed strategies for increasing the chance for adoption of the recommendations contained within these documents, including those by ORRAP, the Consortium for Ocean Leadership, the Joint Ocean Commission Initiative, the University Corporation for Atmospheric Research, and jointly by JSOST and its sister group the Subcommittee on Integrated Management of Ocean Resources (SIMOR). Additional discussion at the meeting focused preparing recommendations on future directions and prospects for the Census of Marine Life program in the U.S. Finally, the ORRAP examined and offered suggestions for enhancing the implementation of the national research plan *Charting the Course*.

Notable areas of ORRAP focus in 2009 included increasing the presence of renewable ocean energy on the national stage; providing input to the JSOST revision process for *Charting the Course*; integrating ecosystem assessments into governance; ocean observing requirements in the Arctic; revising its Education Strategy; and environmentally responsible energy development on the U.S. Outer Continental Shelf.

The ORRAP currently operates four sub-groups to address four priority areas: 1) education; 2) industry; 3) ocean observing; and 4) ocean acidification (through a Task Force created in early 2010). The Education Sub-panel focused on three areas of interest: 1) ways to collaborate on ocean education initiatives; 2) how to encourage more participation by the Department of Education; and 3) a better means to set priorities in the ocean education community. As a result of these thrusts, the Sub-panel held a workshop to revise the ORRAP's Education Strategy, written in 2002. See Section VII for more details.

Notable Ocean Observing Sub-panel activities included conducting a joint meeting with the Interagency Working Group on Ocean Observations (IWGOO) to discuss IOOS[®] development, legislative priorities regarding ocean observing, and collaborative efforts between IOOS[®] and the Ocean Observatories Initiative. Subsequent recommendations were passed to the parent ORRAP and later used to inform two letters submitted by ORRAP to the federal agencies.

The Industry Sub-panel presented at the 11-12 August 2009 ORRAP meeting on environmentally responsible offshore energy development. This effort will be continued in FY 2010, as the Sub-panel plans to develop the framework for a case study on improving the permitting process for ocean renewable energy projects.

All ORRAP recommendations, meeting materials, and information on ORRAP sub-groups are accessible via the ORRAP website: www.nopp.org/site/ORRAP.

VII. Fiscal Year 2010 Activities and Plans

Interagency science and technology priorities for FY 2010 have been articulated via an interagency priorities memo prepared by JSOST and sent from the ICOSRMI co-chairs to the Director of the Office of Science and Technology Policy; NOPP agencies may use the NOPP BAA process to implement corresponding collaborative research activities in response to these guidance memos. NOPP, working through the IWG-OP, plans to investigate innovative research areas to help inform future implementation of national ocean research priorities set by the JSOST. It is also prepared to assist in implementing the ocean policy priority areas articulated by the Ocean Policy Task Force should the President accept the Task Force recommendations.

NOPP-FUNDED ACTIVITIES

FY 2010 anticipated agency contributions for NOPP-Funded Activities are indicated in Table 2.

	NOPP–Solicited Projects	NOPP–Managed Activities	FY 2010 Anticipated Expenditure (\$M)
DOE	X		1.0
MMS	X	X	4.6
NASA	X	X	2.1
NAVY	X	X	8.0
NOAA	X	X	13.4
NSF	X	X	2.0
USGS	X		0.1
			Total: ~31.2

Table 2. Anticipated FY 2009 Agency Contributions to NOPP-Funded Activities by Investment Area. This includes solicited projects (projects solicited through NOPP RFPs and BAAs) and managed activities.

NOPP-Solicited Projects

A BAA was issued in August 2009 for funding in FY 2010. Up to \$8M is expected to be available over four years for projects addressing two topics: *Improving Attachments of Electronic Data Loggers to Cetaceans* and *Improvements in High-Resolution, Tide-Resolving Global Ocean Predictions*. The proposal reviews took place in February 2010 and funding announcements are anticipated in spring 2010. More information regarding the solicitation is included in Appendix 2.

NOPP-Managed Activities

National Ocean Sciences Bowl

Technology is the focus for NOSB in 2010. Marine technology was selected as the official theme for the competitions and is the driving force behind many of the questions, prize field trip destinations, and keynote speakers. In addition, technology is also taking a more prominent role in the actual program. This year NOSB is field-testing a new software program that will replace the traditional paper-filled notebooks of questions. This new software, called the electronic Ocean Sciences Bowl (eOSB), allows the moderators to read the questions directly from a computer monitor, saving each regional site hours of man-time collating the notebooks, as well as resources spent on reams of paper and copies.

NOSB held web-based professional development training for coaches in October 2009. A live and asynchronous training on the latest advances in marine technology was developed for use by all NOSB coaches to assist them in preparation of their students in this subject area. A partnership between NOSB and Deep Earth Academy, the educational component of the U.S. Integrated Ocean Drilling Program (IODP), drew on the technical expertise of many IODP scientists to implement this very successful initiative.

In addition, the second annual NOSB *Living on the Ocean Planet* video contest was launched in FY 2010. In order to promote the video contest to a larger audience and to provide the students with additional resources, NOSB partnered with the Census of Marine Life, Encyclopedia of Life and National Marine Educators Association. With the help of these organizations, the *Living on the Ocean Planet* program was expanded to include a national winner, as well as 1st – 3rd place awards in three regions across the country.

Outreach opportunities for NOSB in FY 2010 included a presentation at Oceans '09 in Biloxi, MS and a poster presentation at the 2010 Ocean Sciences Meeting in Portland, OR.

NOPP Office

In FY 2010, the NOPP Office plans to continue and expand their support of its interagency committees, including the IWG-OP, the IWG-OP Biodiversity Ad Hoc Group, the IWG-FI, the IWG-FI Task Force on Unmanned Systems, and the ORRAP. The NOPP Office hosted an exhibit booth at the Oceans '09 Marine Technology Society/Institute of Electrical and Electronics Engineers Biloxi Conference, *Marine Technology for our Future: Global and Local Challenges*, in October 2009. At the conference, NOPP also hosted a roundtable discussion to solicit feedback from the scientific community on future directions of NOPP. In December 2009, NOPP hosted a workshop on interagency ocean and coastal interests in the Arctic. More information on this activity is available on page 20. The NOPP Office coordinated a town hall session at Ocean Sciences 2010, entitled *Ocean Partnerships: Collaborative Oceanographic Research of the Future*. NOPP Office staff members are involved with the planning of a workshop on operational marine biodiversity observations, an activity of the IWG-OP Biodiversity Ad Hoc Group, to be held in May 2010. Additional plans for FY 2010 include the re-design of the NOPP website, coordination of the peer review process for all FY 2010 NOPP funding solicitations, and positioning NOPP to offer support in implementing the Ocean Policy Task Force recommendations should the President accept the recommendations.

NOPP-RELATED ACTIVITIES

Individual agencies will continue to invest in NOPP-Related Activities in FY 2010. For example, various agencies of the IWG-OP will continue to support infrastructure activities for biological data, such as the U.S. Geological Survey's (USGS) continued role in the development of the Ocean Biogeographic Information System-USA (OBIS-USA). OBIS-USA is meant to fill the role of a national open data-sharing-portal, providing comprehensive data coverage for U.S. and global marine biodiversity information needs. The USGS has declared that OBIS-USA is the marine component of its National Biological Information Facility, and is the U.S. marine contribution to the Global Biodiversity Information Infrastructure. The IWG-OP has become more active in biological data issues through the Biodiversity Ad Hoc Group, where synergies between OBIS-USA and the IWG-OP can be explored. As partnership opportunities focused on biological data infrastructure arise, the IWG-OP will support and coordinate as appropriate through the Biodiversity Ad Hoc group.

NOPP INTERAGENCY INTERACTIONS

In FY 2010, NOPP will continue to work with and through the appropriate ocean governance channels. Below are the specific plans for three bodies that are intimately involved with NOPP.

Interagency Working Group on Ocean Partnerships

The IWG-OP will continue to meet monthly in FY 2010. Efforts will continue along its strategic planning and implementation process, specifically in support of *Charting the Course*. The IWG-OP will also continue working toward improved interagency partnership flexibility, specifically in the area of transferring funds between agencies through the authority of the Economy Act. The following forums allow the IWG-OP to explore innovative areas of ocean research and develop new partnership opportunities.

The IWG-OP plans to continue and expand its outreach efforts to potential industry partners, so that members of industry are more involved in the NOPP program and process. In October 2009, representatives from the IWG-OP hosted a Visioning Round Table at the Oceans '09 Marine Technology Society / Institute of Electrical and Electronics Engineers Conference in Biloxi, MS. The round table discussion focused on furthering industry-government cooperation in ocean

related research, specifically through NOPP. The session was an opportunity to identify and understand areas of common interest among a variety of sectors. In particular, the discussion centered on increased participation by small businesses, building of educational partnerships, and critical areas of ocean research. Representatives of the offshore energy and technology industries, academia, research institutions, and U.S., Canadian and Japanese governments participated.

In early FY 2010, the IWG-OP and the IWG-FI conducted a workshop based on the committees' interest in pursuing topics related to the Arctic region. Discussions focused on operations, research, infrastructure, partnerships, and policy. The goal of the workshop was to identify areas where federal agencies might collaborate and coordinate resources. More information on the structure and outcomes of the workshop is available on page 20.

The IWG-OP began an initiative in February 2010 to increase communication amongst the various JSOST IWGs. Although each IWG has a distinct charter, there are shared interests, such as coastal and marine spatial planning, climate change and ocean education. Throughout FY 2010, NOPP and the IWG-OP will facilitate information exchanges designed to identify connections, overlapping issues, and challenges which create opportunities for interaction and collaboration amongst the IWGs.

The IWG-OP has developed and announced two FY 2010 funding opportunities to date. A BAA addressing two topics, *Improving Attachments of Electronic Data Loggers to Cetaceans* and *Improvements in High-Resolution, Tide-Resolving Global Ocean Predictions*, received 14 submissions. Funding announcements for these topics are expected in spring 2010. An additional BAA on *Developing Environmental Protocols and Monitoring to Support Ocean Renewable Energy and Stewardship* contains eight subtopics and the deadline for submission is 22 February 2010. Approximately \$6.5M over three to five years may be available for projects selected for funding under this BAA. Additional funding solicitations are being developed for FY 2010, with research topics such as: exploration of deepwater Atlantic canyons, sea level rise inundation for coastal communities, ocean acidification, and marine mammals.

The IWG-OP Biodiversity Ad Hoc Group has met twice in FY 2010 and will continue to meet quarterly. The IWG-OP Biodiversity Ad Hoc Group will continue working to increase the effectiveness of federal biodiversity data management to enable better tracking of biodiversity status and trends. At the request by the Ad Hoc Group, the National Oceanographic Data Center is in the process of developing standardized grant and contract language for potential adoption by agencies in upcoming awards. Using the available channels of the current ocean governance structure, the Ad Hoc Group and the IWG-OP have sent two letters of support to the JSOST and SIMOR, one expressing the need for increasing the U.S. data-support infrastructure for biological resource data and one urging a coordinated U.S. response to the 2010 International Year of Biodiversity, as declared by the United Nations General Assembly. The group will host a workshop on operational marine biodiversity observations in May 2010; the goal of the workshop is to determine the status of current marine biodiversity observational capabilities and scope future solutions to operationally monitor the status and trends of biodiversity. The Biodiversity Ad Hoc Group hopes to have the workshop listed as one of the celebration activities for the 2010 International Year of Biodiversity.

Interagency Working Group on Facilities and Infrastructure

During FY 2010, the IWG-FI drafted a revised charter to include a broader definition of infrastructure based on communication with the JSOST; an update to the group's name was a component of the new charter. The IWG-FI has met once in FY 2010 and will continue to meet as necessary.

In December 2009, the IWG-FI co-hosted a joint workshop with the IWG-OP, *Interagency Ocean and Coastal Interests in the Arctic*, to explore the capability and capacity of federal agencies in the Arctic. As the Arctic is increasingly open to research, tourism, and resource extraction, it is critical that federal agencies coordinate their activities in a cost effective manner, particularly considering the harsh environment (i.e. safety) and the environmental changes being observed. Beginning in FY 2010, the IWG-OP and the IWG-FI intend to pursue three steps:

- a gap analysis of Arctic activities and investments by agency/department;
- an identification and prioritization of a concise list of interagency priorities, both short-term and long-term; and
- an assessment of current and future infrastructure requirements needed to achieve these priorities.

The above actions will address at least two of the priority objectives identified by the interim report of the Interagency Ocean Policy Task Force: the need for improved coordination / integration across the federal government and the need to address changing conditions in the Arctic. The IWG-OP and the IWG-FI are hoping to facilitate these collaborations by assisting in the assessment of capability and capacity, minimizing duplication, and maximizing joint, collaborative endeavors.

A terms of reference for the IWG-FI Task Force on Unmanned Systems was created and a kick-off meeting was held in January 2010. A request for data is currently being developed to gather information on agency inventories, activities, topical interest, requirements, current gaps and future needs. The results from the data call will provide starting points for discussion and actions during FY 2010. The Task Force plans to communicate with existing coordination bodies to gain knowledge about their activities and reduce duplication of effort.

Ocean Research and Resources Advisory Panel

The ORRAP has met twice in FY 2010 and, to date, has made progress on the following: revising its Education Strategy document; developing strategy to implement the Ocean Policy Task Force's framework for Coastal and Marine Spatial Planning, should it be enacted; initiating the work of the ORRAP Ocean Acidification Task Force; reviewing Arctic observing needs for the nation; providing input on the JSOST's refresh of *Charting the Course*; and continuing to promote the recommendations within its transition document to the Obama administration.

Prominent items for the ORRAP's FY 2010 work load and meeting agendas will likely include:

- a. Reviewing NOPP-funded projects and their selection process.
- b. Revising the ORRAP Education Strategy.
- c. Assessing federal progress and opportunities regarding the establishment of IOOS®.
- d. Developing the framework for a case study on improving the permitting process for ocean renewable energy projects.
- e. Reviewing federal progress on ocean acidification.
- f. Assessing priorities and opportunities for research and resource management in the Arctic.

The Education Sub-panel convened a workshop on 16 November 2009, in conjunction with the leadership of the JSOST/SIMOR Interagency Working Group on Ocean Education (IWG-OE), to develop revisions to the ORRAP's Education Strategy. The Sub-panel will continue to interact with the IWG-OE and meet as necessary in FY 2010.

Recognizing the increasing relevance of ocean acidification to the health of the oceanic system and increasing efforts among federal agencies to address this issue, the ORRAP formed an Ocean Acidification Task Force (OATF) to provide expert advice and recommendations to the federal government. Working with other allied groups and individuals, the OATF will work to enhance the coordination and implementation of ocean acidification efforts among academic, state, private, federal, and other stakeholders.

The ORRAP stands ready to return to briefing the highest levels of the ocean governance structure, offering advice and recommendations as required by legislative mandate and needed by the nation.

VIII. Fiscal Year 2011 Plans

Agency-specific budget requests for the FY 2011 Administration's Budget have recently been announced; therefore, precise funding levels and associated programmatic issues are not yet firmly established. The IWG-OP agencies anticipate contributions to NOPP to be comparable to those of both FY 2009 and FY 2010 and anticipate supporting interagency collaborations and extramural research partnerships.

IX. Conclusion

In the past, NOPP has contributed to the implementation of national ocean research priorities, such as the Near-Term Priorities of *Charting the Course* and the annual funding memos to OSTP. NOPP will continue to complement and support such efforts in the future and anticipates taking a strong role in the national ocean policy proposed by the Ocean Policy Task Force should the President take action on the recommendations. NOPP will continue to pursue novel areas of research by cultivating an increased emphasis on partnership solicitations that facilitate the integration of science and technology with resource management.

Appendix 1. Development and Process for NOPP-Funded Research

Two or more agencies must collaborate on funding NOPP research. Funded NOPP projects require multi-sector partnerships between academia, industry (including non-government organizations), and government (including state and local).

Research topics funded through NOPP are typically initiated via interactions among agency program managers, often at IWG-OP meetings. The partner agencies then informally propose the research topic to the IWG-OP for approval to proceed. At this point, interagency partnerships are formed, tentative levels of support are pledged on an as available basis, and draft solicitation (BAA or RFP) language is developed. The IWG-OP then approves the funding announcement language, which is then announced by a lead agency as a BAA or RFP on behalf of NOPP.

Once a funding opportunity is announced, all submitted proposals undergo a peer review process similar to that of the National Science Foundation (NSF). Proposals are reviewed based on:

- Relevance of the proposed research to NOPP objectives;
- Overall scientific and technical merits of the proposal;
- Level of support of critical research objectives or operational goals;
- Quality of proposed partnerships;
- The offeror's capabilities, related experience, and facilities that are critical to the proposal objectives;
- The long-commitment of the partners to the proposed objectives;
- The qualifications and experience of the proposed PI and key personnel; and
- Reasonableness of cost.

The rankings of the peer review panel are made available to and reviewed by the agency program managers, who make a recommendation for funding to the IWG-OP. After receiving IWG-OP approval, the funded research projects are announced.

Appendix 2. NOPP Solicitations

FY 2009 ONR BROAD AGENCY ANNOUNCEMENT #ONR-BAA-09-12

Topics:

- Improving Wind Wave Predictions: Global to Regional Scales
- Sensors for Measurement of Biological, Bio-Optical, Optical, or Chemical Properties of the Ocean
- Improving Tropical Cyclone Intensity Forecasting

FY 2010 ONR BROAD AGENCY ANNOUNCEMENT #ONR-BAA-09-037

Topics:

- Improving Attachments of Electronic Data Loggers to Cetaceans
- Improvements in High-Resolution, Tide-Resolving Global Ocean Predictions

FY 2010 MMS BROAD AGENCY ANNOUNCEMENT #M10PS00152

Topics:

- Developing Environmental Protocols and Monitoring to Support Ocean Renewable Energy and Stewardship

Appendix 3. NOPP-Funded Projects Initiated in Fiscal Year 2009

IMPROVING WIND WAVE PREDICTIONS: GLOBAL TO REGIONAL SCALES

"Ocean Wave Dissipation and Energy Balance (WAVE-DB): Toward Reliable Spectra and First Breaking Waves"

Lead Principle Investigator (PI): Dr. Fabrice Arduin, Service Hydrographique et Oceanographique de la Marine

Funding Requested: \$996,853

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#fabrice-arduin>

"Observation-based Dissipation and Input Terms for Spectral Wave Models, with End-user Testing"

Lead Principle Investigator (PI): Dr. Alexander Babanin, Swinburne University of Technology

Funding Requested: \$740,600

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#alexander-babanin>

"Refined Source Terms in WAVEWATCH III with Wave Breaking and Sea Spray Forecasts"

Lead PI: Dr. Michael Banner, The University of New South Wales.

Funding Requested: \$979,904

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#michael-banner>

"Modeling Wind Wave Evolution from Deep to Shallow Water: Nonlinearity and Dissipation"

Lead PI: Dr. Tim Janssen, San Francisco State University

Funding Requested: \$947,561

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#tim-janssen>

"Nonlinear and Dissipation Characteristics of Ocean Surface Waves in Estuarine Environments"

Lead PI: Dr. James Kaihutu, Texas Engineering Experiment

Funding Requested: \$635,426

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#james-kaihutu>

"TSA- A Two Scale Approximation for Wind-generated Ocean Surface Waves"

Lead PI: Dr. William Perrie, Bedford Institute of Oceanography

Funding Requested: \$1,137,140

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-1-improving-wind-wave-predictions-global-to-regional-scales/#william-perrie>

SENSORS FOR MEASUREMENT OF BIOLOGICAL, BIO-OPTICAL, OPTICAL, OR CHEMICAL PROPERTIES OF THE OCEAN

"Development of an Integrated ISFET pH Sensor for High Pressure Applications in the Deep-Sea"

Lead PI: Dr. Kenneth Johnson, Monterey Bay Aquarium Research Institute

Funding Requested: \$1,781,992

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#kenneth-johnson>

["Next Generation of Advanced Laser Fluorescence Technology for Characterization of Natural Aquatic Environments"](#)

Lead PI: Dr. Alex Chekalyuk, Columbia University

Funding Requested: \$1,499,636

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#alex-chekalyuk>

["A Submersible Holographic Camera for the Undisturbed Characterization of Optically Relevant Particles in Water \(HOLOCAM\)"](#)

Lead PI: Dr. James Sullivan, WETLabs

Funding Requested: \$1,566,361

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#james-sullivan>

["Integration of an Emerging Highly Sensitive Optical CO2 Sensor for Ocean Monitoring on an Existing Data Acquisition System, SeaKeeper 1000TM"](#)

Lead PI: Dr. Govind Rao, University of Maryland-Baltimore County

Funding Requested: \$1,180,828

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#govind-rao>

["Development of Autonomous Ammonium Fluorescence Sensor \(AAFS\) with a View Toward In Situ Application"](#)

Lead PI: Dr. Peter Ortner, University of Miami, RSMAS

Funding Requested: \$660,857

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#peter-ortner>

["Development, Assessment and Commercialization of a Biogeochemical Profiling Float for Calibration and Validation of Ocean Color and Ocean Carbon Studies"](#)

Lead PI: Dr. Emmanuel Boss, University of Maine

Funding Requested: \$1,503,146

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-2-sensors-for-measurement-of-biological-bio-optical-optical-or-chemical-properties-of-the-ocean/#emmanuel-boss>

IMPROVING TROPICAL CYCLONE INTENSITY FORECASTING

["Improving Tropical Cyclone Intensity Forecasting with Theoretically-Based Statistical Models"](#)

Lead PI: Dr. Wayne Schubert, Colorado State University

Funding Requested: \$718,525

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#wayne-schubert>

["Achieving Superior Tropical Cyclone Intensity Forecasts by Improving the Assimilation of High-Resolution Satellite Data into Mesoscale Prediction Models"](#)

Lead PI: Dr. Chris Velden, University of Wisconsin-Madison

Funding Requested: \$1,288,279

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#chris-velden>

"Augmentation of Early Intensity Forecasting in Tropical Cyclones"

Lead PI: Dr. J. Scott Tyo, University of Arizona

Funding Requested: \$786,551

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#scott-tyo>

"Data Assimilation and Predictability Studies for Improving Tropical Cyclone Intensity Forecasts"

Lead PI: Dr. Takemasa Miyoshi, University of Maryland

Funding Requested: \$618,202

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#takemasa-miyoshi>

"Impacts of Turbulence on Hurricane Intensity"

Lead PI: Dr. Yongsheng Chen, York University

Funding Requested: \$363,568

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#yongsheng-chen>

"Initialization, Prediction, and Diagnosis of the Rapid Intensification of Tropical Cyclones using the Australian Community Climate and Earth System Simulator, ACCESS"

Lead PI: Dr. Michael Reeder, Monash University

Funding Requested: \$1,248,800

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#michael-reeder>

"A Unified Air-Sea Interface for Fully Coupled Atmospheric-Wave-Ocean Models for Improving Intensity Prediction of Tropical Cyclones"

Lead PI: Dr. Shuyi S. Chen, University of Miami, and Dr. Isaac Ginish, University of Rhode Island

Funding Requested: \$2,111,753

A project summary can be found at: <http://www.nopp.org/funded-projects/fy2009-projects-funded-under-nopp/topic-3-improving-tropical-cyclone-intensity-forecasting/#shuyi-chen>

Acronyms and Abbreviations

AUV	Autonomous underwater vehicle
BAA	Broad Agency Announcement
DOE	Department of Energy
eOSB	Electronic Ocean Sciences Bowl
FACA	Federal Advisory Committee Act
FY	Fiscal Year
GODAE	Global Ocean Data Assimilation Experiment
ICOSRMI	Interagency Committee on Ocean Science and Resource Management Integration
IODP	Integrated Ocean Drilling Program
IOOS	Integrated Ocean Observing System
IWG	Interagency Working Group
IWG-F	Interagency Working Group on Facilities
IWG-FI	Interagency Working Group on Facilities and Infrastructure
IWG-OE	Interagency Working Group on Ocean Education
IWGOO	Interagency Working Group on Ocean Observations
IWG-OP	Interagency Working Group on Ocean Partnerships
JSOST	Joint Subcommittee on Ocean Science and Technology
MISST	Multi-sensor Improved Sea Surface Temperature
MMS	Minerals Management Service
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NOC	National Ocean Council
NOPP	National Oceanographic Partnership Program
NORLC	National Ocean Research Leadership Council
NOSB	National Ocean Sciences Bowl
OBIS	Ocean Biogeographic Information System
OMB	Office of Management and Budget
ONR	Office of Naval Research

ORRAP	Ocean Research and Resources Advisory Panel
OSTP	Office of Science and Technology Policy
PL	Public Law
RFP	Request for Proposals
SIMOR	Subcommittee on Integrated Management of Ocean Resources
UAS	Unmanned Aerial Systems
USGS	United States Geological Survey