

UNCLASSIFIED

FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2007

BUDGET ACTIVITY: 02
PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH

COST: (Dollars in Thousands)

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH	59,921	53,515	49,869	48,430	51,860	52,429	52,975	53,530

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element (PE) provides the unique, fundamental programmatic instrument by which basic research on the natural environment is transformed into technological developments that provide new or enhanced warfare capabilities for the Battlespace Environment (BSE). The objectives of this program are met through measuring, analyzing, modeling and simulating, and applying environmental factors affecting naval material and operations in the BSE. This program provides for BSE technological developments that contribute to meeting top joint warfare capabilities established by the Joint Chiefs of Staff, with primary emphasis on Joint Littoral Warfare and Joint Strike Warfare.

This PE fully supports the Director of Defense Research and Engineering's Science and Technology Strategy and is coordinated with other DoD Components through the Defense Science and Technology Reliance process. Work in this program is related to and fully coordinated with efforts in accordance with the on-going Reliance joint planning process. There is close coordination with the US Air Force and US Army under the Reliance program in the BSE categories of Lower Atmosphere, Ocean Environments, Space & Upper Atmosphere, and Terrestrial Environments. Within the Naval Transformation Roadmap, the investment will contribute toward achieving each of the "key transformational capabilities" required by Sea Strike, Sea Shield, and Sea Basing. Moreover, environmental information, environmental models, and environmental tactical decision aids that emerge from this investment will form one of the essential components of FORCEnet (which is the architecture for a highly adaptive, human-centric, comprehensive maritime system that operates from seabed to space). The Navy program includes efforts that focus on, or have attributes that enhance, the affordability of warfighting systems.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

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B. PROGRAM CHANGE SUMMARY:

	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
FY 2007 President's Budget Submission	62,470	48,718	50,243	50,809
Congressional Action	0	5,000	0	0
Congressional Realignment	2,000	0	0	0
Congressional Undistributed Reductions/Rescissions	-183	-203	0	0
Execution Adjustments	-3,355	0	0	0
Non-Pay Inflation Adjustments	0	0	-351	236
Program Adjustments	0	0	610	-2,624
Program Realignment	0	0	-757	-250
Rate Adjustments	0	0	124	259
SBIR Assessment	-1,011	0	0	0
FY 2008/FY 2009 President's Budget Submission	59,921	53,515	49,869	48,430

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

E. PERFORMANCE METRICS:

All Science and Technology model improvements undergo a rigorous validation, verification and evaluation against quantifiable metrics before being accepted for transition into operations. In Marine Meteorology, for example, typical improvements over the past decade have amounted to a gain in skill of one forecast-day (i.e.,

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the 4-day forecast is now as skillful as the 3-day forecast of a decade ago), and tropical cyclone forecast track error has been reduced by 50%. It is expected that future increases in skill will continue at or above this pace.

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OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH	59,921	53,515	49,869	48,430	51,860	52,429	52,975	53,530

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides technologies that form the natural environment technical base on which all systems development and advanced technology depend. Furthermore, this technical base provides developments that may be utilized in the Future Naval Capabilities programs: Organic Mine Countermeasures (MCM) and Autonomous Operations. This project contains the National Oceanographic Partnership Program (NOPP) (Title II, subtitle E, of Public Law 104-201) and efforts aimed at understanding and predicting the impacts of underwater sound on marine mammals.

Major efforts of this project are devoted to: gaining real-time knowledge of the BSE, determining the natural environment needs of regional warfare, providing the on-scene commander with the capability to exploit the environment to tactical advantage and, developing atmospheric research related to detection of sea-skimming missiles and strike warfare. This project provides natural environment applied research for all fleet operations and for current or emerging systems. Major developments are routinely transitioned to the Fleet Numerical Meteorology and Oceanography Center and to the Naval Oceanographic Office where they are used to provide timely information about the natural environment for all fleet operations.

Joint Littoral Warfare efforts address issues in undersea, surface, and air battlespace. Efforts include ocean and atmospheric analysis and prediction for real-time description of the operational environment, shallow water acoustics, multiple-influence sensors for undersea surveillance and weapon systems, and influences of the natural environment on MCM and Anti-Submarine Warfare (ASW) systems. Joint Strike Warfare efforts address issues in air battlespace dominance. Efforts include influences of the natural environment on air operations, electromagnetic (EM)/electro-optic (EO) systems used in intelligence, surveillance, reconnaissance, targeting, bomb damage assessment, and detection of missile weapon systems. They also include improvements in tactical information management about the BSE.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
MARINE METEOROLOGY	8,995	9,962	10,394	10,063

The marine atmosphere affects most aspects of naval operations. This activity develops observing technologies, models, Numerical Weather Prediction (NWP) systems and Tactical Decision Aids (TDA) that describe the atmospheric environment and its impacts on naval sensors and operations. This activity focuses on uniquely marine aspects of atmospheric science such as air-sea interaction, coupled ocean-atmosphere modeling, EM and EO propagation, coastal meteorology, Tropical Cyclone (TC) prediction, and the use of remote sensing to obtain quantitative observations of atmospheric properties. Aspects of the atmospheric environment of particular interest include near-surface phenomena that affect refractivity, marine boundary layer dynamics that affect clouds, rain, visibility and fog, and processes that control TC structure, track, and intensity. Objectives of this activity are improved NWP systems and TDAs that provide nowcast and forecast skill at global, regional, and tactical scales for operational support, sensor and system development, and performance prediction.

FY 2006 Accomplishments:

ONR

- Continued developments in atmospheric effects on EMs and EOs because of the central importance of EM and EO propagation to many modern warfare systems.
- Continued development of an EO propagation model that accounts for the atmospheric effects of near-surface refraction, scintillation, aerosol extinction, illumination and target, background and sensor characteristics for incorporation into EO tactical decision aids and for supporting warfare systems development.
- Completed development of methods for determination of refractivity from clutter as an inverse method of obtaining the critical refractivity properties of the atmosphere that affect EM/EO propagation.

NRL

- Completed development of techniques for analysis and exploitation of through-the-sensor technology for rapid environmental assessment in support of Sea Strike. (NRL)
- Completed development of a technique for improving high-resolution environmental fields required for chemical/biological warfare defense. (NRL)
- Initiated application of predictability concepts to optimize use of new-generation satellite data to target

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observation selection for maximum forecast impact in military areas of interest. (NRL)

- Initiated exploitation of optimal methods for capturing uncertainty of environmental predictions on regional and local scales for reliability estimates of tactical parameters. (NRL)

- Initiated program to develop the ability to assimilate data from the next generation of operational weather satellites to benefit real-time analysis of the battlespace environment as well as improving the global forecasting skill. (NRL)

ONR and NRL

- Initiated effort to optimize rapid environmental assessment using coupled air-sea systems to support multiple warfare and mission areas, with a particular emphasis on Special Warfare. (ONR and NRL)

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

ONR

- Initiate development and validation of the Advanced Propagation Model to account for atmospheric effects on EM radiation, in particular, by the addition of the capability to describe high frequency radio frequencies.

- Initiate development of new methods that account for a wider range of atmospheric conditions, for determination of refractivity from clutter as an inverse method of obtaining the critical refractivity properties of the atmosphere that affect EM propagation.

ONR and NRL

- Initiate the development of a real-time meteorological and oceanographic battlespace characterization capability (NOWCAST) that collects, processes and exploits on-scene environmental data for rapid environmental assessment. The system will combine high-resolution atmospheric forecast information with 4-D data assimilation of on-scene observations (radar, satellite, conventional observations, etc) for customized display at time and space scales relevant for tactical operation support (ONR & NRL).

- Initiate the development of global and mesoscale aerosol/radiation models that account for the major sources (desert dust, sea spray, biomass burning, industrial pollution) of visibility degradation in the atmosphere and integrate with numerical weather prediction systems for an aerosol predictive capability than can support militarily relevant time and space scales (ONR & NRL).

- Initiate the development and validation of a next-generation TC model that can analyze, initialize, and predict TC position, structure and intensity, using a high-resolution (< 3 km) mesoscale model. The

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development will leverage emerging data assimilation and modeling techniques as well as observational results from the scientific community to build upon existing modeling capabilities. (ONR & NRL).

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

ONR and NRL

- Initiate development of methods to retrieve and assimilate remotely-sensed aerosol data into aerosol prediction models. (ONR & NRL)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

ONR and NRL

- Complete the development and validation of a next-generation TC model that can analyze, initialize, and predict TC position, structure and intensity, using a high-resolution (< 3 km) mesoscale model. The development will leverage emerging data assimilation and modeling techniques as well as observational results from the scientific community to build upon existing modeling capabilities. (ONR & NRL)

	FY 2006	FY 2007	FY 2008	FY 2009
PHYSICAL OCEANOGRAPHY	11,248	12,941	13,442	12,969

The goal of this activity is to develop naval tactical uses of knowledge of the physics of the ocean within the BSE. This is achieved through the development of predictive models of the water mass structure, waves, currents, and air-sea interactions and developing measurement/observation technology. Other applications utilize knowledge of the interaction of the water column hydrodynamics and the acoustics to predict the undersea transmission characteristics and sources of uncertainty in these statistics. Utilizing knowledge of the ocean surface physics, the physical oceanography program seeks to exploit the combination of remotely sensed data, in-situ data, and adaptively sampled data to optimize predictions of ocean currents and water column structure. These predictions, custom databases, adaptive sampling schemes and data programs serve ASW, Naval Special Warfare (NSW), Sea-Basing, and mine warfare needs.

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FY 2006 Accomplishments:

ONR

- Continued undersea persistent surveillance effort with field experimentation using ocean gliders to provide water column structure influencing acoustic propagation and allowing adaptation in sampling locations for optimal inputs to ocean predictive models; major in-water experiment in summer 2006 in Monterey Bay, CA. (ONR)
- Continued to employ ocean models to complete 3-D acoustic simulations of space-time coherence of the acoustic field, which is a primary characteristic related to detection performance of acoustic systems. (ONR)

NRL

- Continued development of mass conserving baroclinic finite element models using discontinuous Galerkin methods. (NRL)
- Continued to extend current theory dealing with tidal variations in sound-speed to sound-speed events with strong range-dependence. (NRL)
- Completed the development of techniques, software and testing of a global relocation capability for ocean circulation models with a focus on the littoral ocean. (NRL)
- Completed study of coastally buoyant jets using a combination of observations and numerical models. (NRL)
- Completed the study of the effect of shoaling waves on ocean wave prediction. (NRL)
- Initiated the development of next-generation methods to estimate subsurface temperature and salinity from remotely-sensed surface and sparse in-situ observations. (NRL)
- Initiated the development of a data assimilative nearshore modeling capability using measurements to guide hydrodynamic forecasts including data sampling strategies and model sensitivity to data. (NRL)
- Initiated the integration of hyperspectral imagery into underwater autonomous vehicles and derive river environmental properties through a combination of models and observations. (NRL)

ONR and NRL

- Continued studies of the monitoring and evaluation of ocean currents and water mass properties near topographic control points in marginal seas. (ONR and NRL)
- Continued to develop improved ocean wave prediction, especially shoaling waves, based on the extensive basic research measurement programs in this area over the past decade. (ONR and NRL)
- Continued developments in atmospheric and ocean model nowcast/forecast systems at a variety of scales (global, regional, semi-enclosed seas, local) including relocateable and nested models dependent on other priorities in this area. (ONR and NRL)
- Continued development of predictive capability of internal wave affects on the battlespace, including

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affects on acoustic transmission. (ONR and NRL)

- Completed developing environmentally sensitive, physics-based decision tools and measures of effectiveness in predictive systems. (ONR and NRL)
- Completed development in advanced on-board ocean models to maximize the on-board forecast capabilities available to the on-scene commander. (ONR and NRL)
- Completed efforts in nested models to allow for a larger domain ocean model to set boundary conditions for a smaller domain model. Incorporate high-resolution nests into the Navy Coastal Ocean Model. (ONR and NRL)

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

ONR

- Initiate the development and implementation of new techniques for parameterizing fluxes of mass and energy across the air-sea interface in coupled ocean-atmosphere models, to improve operational predictions of the BSE. (ONR)
- Initiate development and testing of acoustic communications, disposable environmental instruments, and Unmanned Undersea Vehicles (UUV) and gliders for NSW mission support.
- Initiate developing Delft3-D-Coupled Ocean Atmosphere Mesoscale Prediction System (COAMPS) to include new options for riverine input and transport and behavior of contaminants in support of NSW mission planning.
- Initiate development of the knowledge layer of the internal wave tactical decision aid.
- Initiate development and testing of optimizing remote environmental monitoring units and other autonomous devices for NSW-Meteorological and Oceanographic Command (METOC) uses in assessing METOC conditions and providing data for assimilation.
- Initiate development and testing of glider uses in ASW METOC, adaptive sampling, and NSW support.
- Initiate the development of synthetic aperture radar and hyperspectral imagery exploitation for NSW and Marine Expeditionary Forces as well as the support of new riverine units.

ONR and NRL

- Initiate the development of the coupled Delft3d-COAMPS model within the larger Naval forecast system for use in NSW mission planning
- Initiate the development of adaptive sampling algorithms for minimizing acoustic uncertainty using persistent, reconfigurable sampling by UUVs.

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FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

ONR

- Complete the development and implementation of new techniques for parameterizing fluxes of mass and energy across the air-sea interface in coupled ocean-atmosphere models, to improve operational predictions of the battle space environment. (ONR)

- Initiate on-board processing of METOC data on gliders/UUV for exfiltration consistent with operational concept of operations. (ONR)

ONR and NRL

- Complete Phase 1 of the development of adaptive sampling algorithms for minimizing acoustic uncertainty using persistent, reconfigurable sampling by UUVs. (ONR and NRL)

- Initiate the custom installation of adaptive sampling algorithms for minimizing acoustic uncertainty using persistent, reconfigurable sampling by UUVs using Naval Oceanographic (NAVO) modeling systems. (ONR and NRL)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

ONR

- Complete development and testing of glider uses in ASW METOC, adaptive sampling, and NSW support. (ONR)

	FY 2006	FY 2007	FY 2008	FY 2009
COASTAL GEOSCIENCES/OPTICS/BIOLOGY	10,416	10,988	11,134	10,763

The goal of this activity is to determine the sources, distribution, and natural variability (concentration and properties) of optically important matters in the coastal ocean in support of Naval Mine, Undersea, and Special Warfare. Research investments in this activity support the development and testing of expendable and autonomous bioluminescence sensors, the continued development of extended range underwater imaging technologies, and algorithm development and testing for application to ocean color remote sensing from aircraft and space in order to characterize key features of the coastal battle space such as bathymetry, shallow-water bottom types, and the distribution of ocean water optical properties.

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FY 2006 Accomplishments:

ONR

- Continued bioluminescence sensor effort with emphasis on needs of the Special Warfare (SPECWAR) forces and Naval Oceanographic Office survey capabilities, and use of the bioluminescence sensors in joint field measurements with ocean sensors to determine persistence of the bioluminescence signal and the ocean factors controlling the persistence. (ONR)
- Continued efforts to use space-based optical sensors as input for both active and passive optical MCM sensor performance prediction models. (ONR)
- Continued development of innovative naval biosensors, biomaterials, and bioprocess technology. (ONR)
- Completed model development for diver visibility prediction in support of Explosive Ordnance Disposal (EOD) and SPECWAR operations. (ONR)
- Completed development of sensors to characterize diver visibility in support of EOD and SPECWAR operations. (ONR)
- Completed programs in detection of fish by acoustic methods. (ONR)
- Completed analysis of physics-based models for hyperspectral imaging of the ocean surface/near-surface to establish what information can be deduced about the optical properties of the ocean's upper layers. (ONR)
- Completed programs for promising new biological and chemical sensors. (ONR)
- Initiated engineering development and optimization of sea-floor sediment energy harvesting system for sustainable and autonomous powering of underwater sensor networks (coordinated with NRL Benthic Unattended Generator effort in this area). (ONR)

NRL

- Continued design of human subject experiments to test user performance as a function of clutter in various displays (e.g., nautical, meteorological, aeronautical). (NRL)
- Continued development and testing of an underwater geo-magnetic noise model. (NRL)
- Continued development of adaptive algorithms to improve MCM EO sensor performance. (NRL)
- Continued to refine algorithms that fuse sediment information extracted from operational sonar with historical sediment databases. (NRL)
- Continued development of gravity-based navigation by deploying a conventional gravimeter on a submarine. (NRL)
- Continued development of a Benthic Unattended Generator to power an autonomous ocean environmental profiler and provide demonstration. (NRL)
- Continued development of Web Services registry search algorithms. (NRL)

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- Continued innovative translator methods to apply mappings to xml request/response objects. (NRL)
- Continued process to refine Naval Postgraduate School's (NPS) METOC ontology. (NRL)
- Continued investigation into appropriate measures of reliability of data and data sources discovered by Advanced METOC Broker (AMB). (NRL)
- Completed studies of ionospheric scintillation phenomena using satellite-satellite measurements providing near global coverage using the Scintillation and Tomography Receiver in Space (CITRIS) instrument to the Space Test Program Satellite (STPSAT1) mission. (NRL)
- Completed work on Advanced Techniques for Net-Centric Warfare to create a Naval Advanced METOC Broker to reliably find and broker data from new and ad-hoc METOC data providers to the warfighter in an automated manner. (NRL)
- Completed algorithm developments for novel navigation and communications among multiple UUVs. (NRL)
- Completed a technique using hyperspectral and motion imagery in the Littoral Zone (LZ) which offer new possibilities for exploitation based on previous investigation. (NRL)
- Completed field test of a shipborne Light Detection And Ranging (LIDAR) system for near surface environmental characterization. (NRL)
- Completed AMB system architectural design and complete development of functions to parse xml and to map AMB schema to Web Services schema. (NRL)
- Completed enhancement to clustering algorithm to cluster features in 3D and determine clutter density. (NRL)
- Initiated experiments (and data collection) to test user performance as a function of display clutter. (NRL)
- Initiated development of small satellite calibration targets to determine atmospheric drag due to neutral density via LIDAR remote sensing. (NRL)

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

ONR

- Continue development of bio-sensors, -materials, and -process technology, with a focus on development of marine mammal pathogen diagnostics (for bacteria, viruses and fungal infections) to support Navy's Fleet Marine Mammal Systems. (Transfers to 0602236N in FY08)
- Continue engineering development and optimization of sea-floor sediment energy harvesting system for sustainable and autonomous powering of underwater sensor networks (coordinated with NRL Benthic Unattended Generator effort in this area). (Transfers to 0602236N in FY08)

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NRL

- Complete development and testing of undersea noise models to improve sensor prediction performance in the LZ. (NRL)
- Complete development of adaptive algorithms to improve MCM EO sensor and system performance and provide a demonstration. (NRL)
- Complete development of gravity-based navigation by deploying a conventional gravimeter on a submarine. (NRL)
- Complete development of web services registry search algorithms (NRL).
- Complete innovative translator methods to apply mappings to XML request/response objects (NRL).
- Complete process to refine NPS's METOC ontology (NRL).
- Complete investigation into appropriate measures of reliability of data and data sources discovered by AMB (NRL).
- Complete experiments (and data collection) to test user performance as a function of display clutter. (NRL)

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

NRL

- Complete refining algorithms that fuse sediment information extracted from operational sonars with historical sediment databases. (NRL)
- Complete development of a Benthic Unattended Generator to power an autonomous ocean environmental profiler and provide demonstration. (NRL)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

NRL

- Complete tracking analysis of small satellite calibration targets to determine atmospheric drag due to neutral density via LIDAR remote sensing. (NRL)

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	FY 2006	FY 2007	FY 2008	FY 2009
OCEAN ACOUSTICS	4,900	4,952	4,899	4,635

This activity is dedicated to the determination of the impact of the natural ocean environment on acoustic wave phenomena in support of Naval undersea warfare and underwater force protection operations. This activity studies underwater acoustic propagation, scattering from ocean boundaries, and ambient noise issues that impact the development and employment of acoustic systems. The LZ has been the ocean environment of greatest interest. Aspects of this environment, that greatly impact underwater acoustic systems, are the shallow water included in the LZ, the consequent closeness and physical significance of the ocean bottom, and the complexities inherent to rapid changes of the ocean structure. The objectives of this program are met through measuring, analyzing, modeling and simulating, and exploiting ocean acoustic factors to gain advantage over potential adversaries using undersea acoustic systems. Results of this activity support acoustic sensor and system development, performance prediction, and tactical decision aids.

FY 2006 Accomplishments:

NRL

- Continued to develop a method to optimize 3-D sonar search path by incorporating environmental uncertainty into the acoustic propagation estimates. (NRL)
- Continued development of an integrated hydrodynamic/acoustic propagation modeling capability for littoral regions to predict acoustic ASW system performance in dynamic environments. (NRL)
- Completed analysis of experimental data sets to quantify the impact of dynamic oceanography on acoustic ASW system performance. (NRL)
- Initiated development of a TDA that can predict the dynamic oceanographic characteristics of shallow-water internal waves and their effects on underwater acoustic signals. (NRL)

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

NRL

- Complete development of a method to optimize 3-D sonar search path by incorporating environmental uncertainty into the acoustic propagation estimates. (NRL)

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- Initiate development of a validated, physics-based processing algorithm that diagnoses acoustic performance directly from oceanographic data. (NRL)
- Initiate development of a set of physics-based environmental acoustic metrics to evaluate the predictions of TDAs that are used in planning asset allocation and placement of distributed AUVs in a time evolving scenario. (NRL)
- Initiate development of improved performance predictions for sonar surveillance systems that utilize horizontal line arrays operating in shelf-break environments and relate horizontal-array signal gain and coherence length to the statistics and scale lengths of transverse environmental inhomogeneities. (NRL)

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

NRL

- Complete development of an integrated hydrodynamic/acoustic propagation modeling capability for littoral regions to predict acoustic ASW system performance in dynamic environments. (NRL)
- Complete development of a TDA that can predict the dynamic oceanographic characteristics of shallow-water internal waves and their effects on underwater acoustic signals. (NRL)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

	FY 2006	FY 2007	FY 2008	FY 2009
NATIONAL OCEANOGRAPHIC PARTNERSHIP PROGRAM (NOPP)	9,586	9,691	10,000	10,000

This activity focuses on U.S. Navy investments in the National Oceanographic Partnership Program (NOPP). NOPP, established by the U.S. Congress (Public Law 104-201) in Fiscal Year 1997, is a unique collaboration among 15 federal agencies involved in conducting, funding, or utilizing results of ocean research. NOPP's value to the Navy derives from the capacity of the partnership to enable and ensure multi-agency efforts where such collaboration enhances efficiency or effectiveness, and/or reduces costs. Major areas of investment by NOPP include: development of an integrated coastal ocean observation system and development of sensors, communications and data acquisition, storage and processing tools required to effect it, modernization of ocean research and observation infrastructure, and marine mammal-related research.

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FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2007

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602435N PROGRAM ELEMENT TITLE: OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH

PROJECT TITLE: OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH

FY 2006 Accomplishments:

ONR

- Continued marine mammal program on noise mitigation.
- Continued real-time forecasting system of winds, waves and surge in TCs.
- Continued The Partnership for Advancing Interdisciplinary Global Modeling.
- Continued Global Ocean Data Assimilation Experiment (GODAE) including assessment of GODAE boundary conditions for use in coastal ocean predictions.
- Continued Hybrid Coordinate Ocean Model (HYCOM).
- Completed the Multi-Disciplinary Ocean Sensors for Environmental Analyses and Networks.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

ONR

- Complete real-time forecasting system of winds, waves and surge in TCs.
- Initiate new methods for detection of fish, fish populations and mapping of fish habitat.
- Initiate development of sensors for sustained, autonomous measurement of chemical or biological parameters in the ocean.
- Initiate marine mammal program on methods for detection and tracking of marine mammals and mapping their habitat.
- Initiate and complete wireless communications for the coastal ocean.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

ONR

- Complete HYCOM. (ONR)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

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CONGRESSIONAL PLUS-UPS:

	FY 2006	FY 2007
AUTONOMOUS MARINE SENSORS AND NETWORKS FOR RAPID LITTORAL ASSESSMENT	0	3,985

This effort funds research into the development of small, low-power sensors to use on small autonomous underwater vehicles designed for clandestine rapid environmental assessment.

	FY 2006	FY 2007
BIOLUMINESCENCE TRUTH DATA MEASUREMENT AND SIGNATURE DETECTION	958	0

This effort supported research into the development of affordable, compact, efficient sensors that allow ease of deployment and permit the rapid measurement of bioluminescence in the world's oceans in order to create a database for future research. Advances in basic research on bioluminescence in the ocean have enabled the development of a fundamental understanding of the phenomena and the Navy operations that may be affected.

	FY 2006	FY 2007
COASTAL MASINT	4,023	0

This effort supported the next generation of technical capabilities to detect, acquire and analyze contaminants in the coastal environment.

	FY 2006	FY 2007
CONTINUATION OF RESEARCH IN OCEAN TECHNOLOGY AND AUTONOMOUS MARINE SENSORS	4,597	0

This effort supported research into the development of small, low-power sensors to be used on small autonomous underwater vehicles designed for covert characterization of denied areas, thereby giving the Navy a new capability in MCM operations.

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	FY 2006	FY 2007
EXTENDED CAPABILITY UNDERWATER OPTICS	958	996

FY 2006: This effort supported research into development of smaller, more energy efficient sensors for autonomous underwater vehicles with an enhanced ability to detect and identify man-made objects in support of mine and undersea warfare.

FY 2007: Laboratory tank experiments will be conducted to optimize the architecture of compact underwater imaging sensors. The work will result in a prototype engineering sensor that can be applied in controlled laboratory imaging scenarios and that will serve as the foundation of future autonomous sensor systems.

	FY 2006	FY 2007
INTEGRATED LITTORAL SENSOR NETWORK	1,724	0

The central goal of the Integrated Littoral Sensor Network was to integrate scientific resources and understanding to enable rapid and effective response to potential terrorist threats as well as episodic natural or accidental hazards, such as severe storms, harmful algae blooms or toxic spills. Deliverables to the Navy included a portable suite of sensors, models and informatics techniques for detection, diagnosis, and predictions of man-made and natural water-borne pathogens and toxins in ports, bays and littoral waters.

	FY 2006	FY 2007
NEW JERSEY COASTAL OBSERVING SYSTEM	958	0

The connected and expanded New Jersey Coastal Observing System provided improved environmental situational awareness helpful to homeland defense.

	FY 2006	FY 2007
SOUTHEAST COASTAL OCEAN OBSERVING SYSTEM (SEACOOS)	1,558	0

This effort supported additional data collection and modeling by the SEACOOS consortium and continued analysis and provision of the information to the public.

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DATE: February 2007

BUDGET ACTIVITY: 02

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C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0601153N (Defense Research Sciences)
PE 0602114N (Power Projection Applied Research)
PE 0602123N (Force Protection Applied Research)
PE 0602235N (Common Picture Applied Research)
PE 0602271N (RF Systems Applied Research)
PE 0602747N (Undersea Warfare Applied Research)
PE 0602782N (Mine and Expeditionary Warfare Applied Research)
PE 0603207N (Air/Ocean Tactical Applications)
PE 0603271N (RF Systems Advanced Technology)
PE 0603747N (Undersea Warfare Advanced Technology)
PE 0603782N (Mine & Expeditionary Warfare Advanced Technology)
PE 0604218N (Air/Ocean Equipment Engineering)

NON-NAVY RELATED RDT&E:

PE 0602601F (Space Technology)
PE 0602784A (Military Engineering Technology)
PE 0603401F (Advanced Spacecraft Technology)

D. ACQUISITION STRATEGY:

Not applicable.