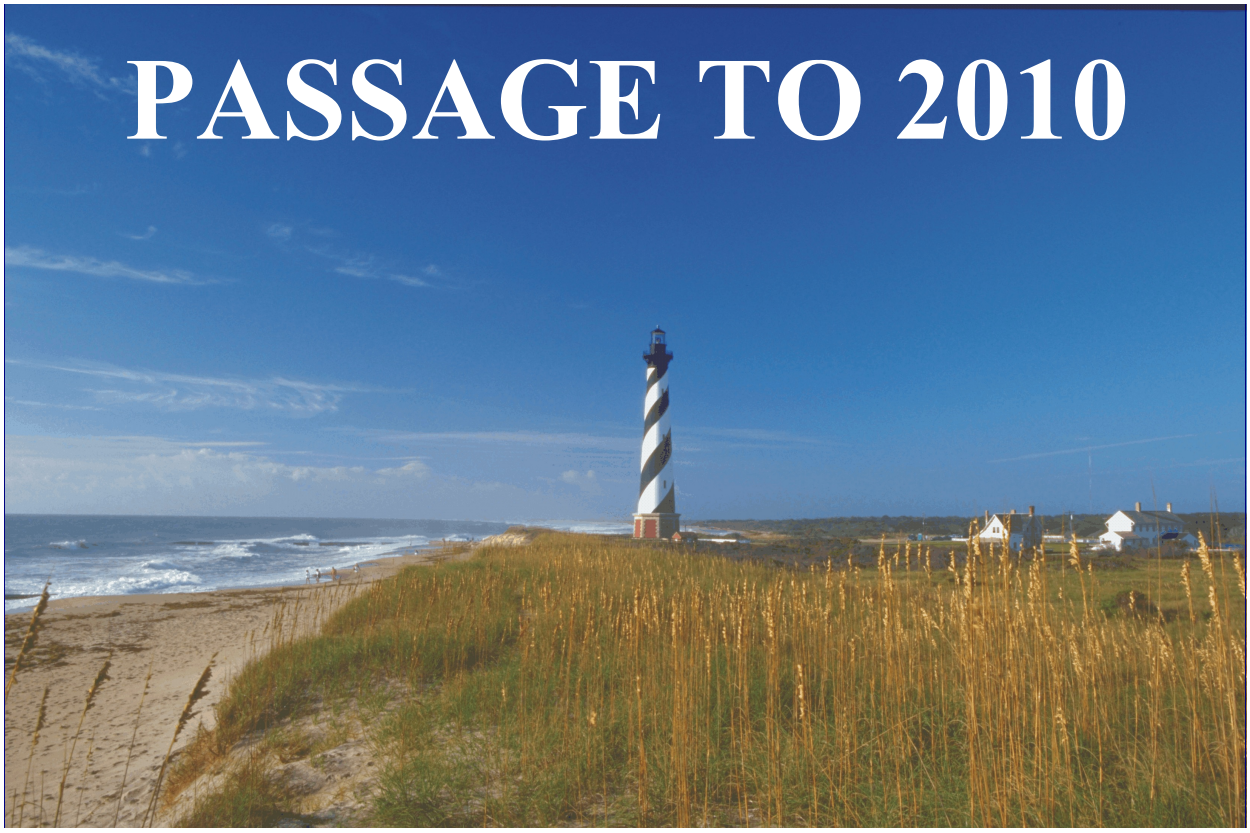
PASSAGE TO 2010



THE STRATEGIC PLAN FOR THE

CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES

National Oceanic and Atmospheric Administration
U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

PASSAGE TO 2010

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CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES

PREFACE

Passage to 2010, the Strategic Plan for the Center for Operational Oceanographic Products and Services (CO-OPS), provides the overall vision for CO-OPS for 2010. The Plan provides the broad context for all CO-OPS activities and resources in support of NOAA's vision, missions, strategic goals, and objectives. The Plan encompasses the National Ocean Service (NOS) Global Leadership in Integrated Management of the Ocean (GLIMO) vision. The Plan addresses cross-cutting strategies. The Plan is a working document that CO-OPS will use to guide development and operations planning. As a working document, the Plan is never final; CO-OPS anticipates routine adjustments to this Plan in response to changing customer and stakeholder requirements, scientific and technical developments, or changes in other external factors that could affect how CO-OPS can best support NOAA's mission goals and meet the requirements of the global community.

Michael Szabados
Director
Center for Operational Oceanographic Products and Services

July 13, 2004

CO-OPS Employees and Contractors,

This document, *Passage to 2010*, provides the vision for CO-OPS in 2010, and our goals and priority areas in support of the NOAA strategic plan and the NOS vision for being the Global Leader for Integrated Management of the Ocean (GLIMO). The GLIMO themes include observations, modeling, watersheds, partnerships, and technology. CO-OPS integrates each of these theme areas into our programs and business practices. The Plan provides some detail regarding how we will achieve our goals. On a yearly basis, our divisions and matrix teams will use this document to help develop annual work plans. We will also use this document to inform and educate NOS and NOAA management about our plans and goals so that they are aware of the critical and important work that we are doing. In addition, I see this as your guide to how we support and enhance the NOS and NOAA missions and goals, and to some level of detail, how we contribute to these goals. The Plan will be modified as needed to reflect changes in mission, goals, technology, or other factors that we deem necessary.

I want to share with you what I see as priorities for our growth as an organization and as a leader in the Nation and the world.

National Center for Water Levels and Currents - We will continue our leadership and expert role as the National Center for Water Levels and Currents. As such, through the use of innovative partnerships, technology transfer, use of contracts for standard processing, development and growth of skilled personnel, and continued technology infusion in instrumentation, processing and dissemination, we will expand and improve the NWLON to support navigation and non-navigation applications. Including in this area are our COASTAL, currents, and PORTS® programs, and new efforts such as incorporation of HF Radar (CODAR) into the National currents and PORTS® programs, and partnering with regional associations as part of the Integrated Ocean Observing System (IOOS), etc. Other actions include clear and concise documentation and communication of standards and protocols we have (or need to be) developed, and utilizing the marketing, education and outreach capabilities in Sea Grant, Coastal Services Center, NOAA and NOS Public Affairs, and Special Projects Office as critical elements to achieving this goal.

Global Leader in Sea Level Variability - We are in the best position with the database, products and expertise required to assume a global leadership role in sea level variability. At one time, we were heavily involved in this arena, and it is time we begin the process of making the necessary connections and providing the guidance and expertise for this critical area of climate change. This will require an assessment of where our leadership and expertise are most critically needed, an identification of all the critical players, and a plan on how to proceed.

Operational Oceanographic Modeling - Through support and coordination from other offices in NOS and NOAA, we will become the NOAA leader in operational oceanographic modeling in support of navigation, emergency response, and coastal resource management, among other NOAA priorities. We have begun this effort by creating a strategic plan and procedures for transitioning models from development to operations. Our plan is to implement operational hydrodynamic nowcast/forecast models for all critical port areas, and ecological nowcast/forecast models for coastal areas at risk from harmful algal blooms, hypoxia and other coastal environmental phenomena. Supporting this goal requires utilization of NOAA corporate computing resources and expertise, expansion of CO-OPS modeling knowledge and expertise, and a dedicated effort to ingest and quality control input data streams and output products for/of the models.

Earth Observing System (EOS)/IOOS and Data Management - An emerging area that has local, regional, national, and international attention is EOS/IOOS. EOS has been endorsed by the White House science advisor, and involves cabinet level participation from the Bush administration. This system is a global-to-local environmental observations and data management system for comprehensive and continuous monitoring of coupled ocean/atmosphere/land systems. IOOS is a National component of EOS; therefore, CO-OPS is a National contributor to IOOS, and a global contributor to EOS. To support IOOS/EOS, CO-OPS has begun and will continue to participate in planning and implementation efforts involving partnerships, technology transfer, increased outreach and education. One area in particular I expect to see more emphasis and leadership in NOS is the area of coastal data management. We have a long and successful history of managing water level and current data that can be applied to other IOOS data sets. Working with NESDIS data centers and IOOS data management experts, a plan is needed to define our roles and responsibilities in this arena.

Although achieving even a small step toward these goals may seem like an enormous task, we must continue to evolve and "morph" as our customers and circumstances dictate to remain competitive and relevant. In this rapidly changing world, I realize it will be a challenge to move forward and continue to improve our products and services, as well as develop new growth areas, but this we must do to serve our ever expanding customer base. Your continued dedication to excellence, willingness to get the job done, and creative and innovative energy are CO-OPS' most important assets, without which, we have no hope of moving forward to meet this challenge. CO-OPS leadership and management would like to express our gratitude for your hard work and thank you for your help and support.

Sincerely,

Mike Szabados
Director, CO-OPS

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INTRODUCTION

Center for Operational Oceanographic Products and Services
National Ocean Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

The National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) collects and distributes observations and predictions of water levels and currents to ensure safe, efficient and environmentally sound maritime commerce. The Center provides the set of water level and coastal current products required to support NOAA's Strategic Plan mission requirements, assist in providing operational oceanographic data/products required by NOAA's missions, and support the NOS vision of being the Global Leader in Integrated Management of the Ocean (GLIMO). For example, CO-OPS provides data and products required by the National Weather Service to meet its flood and tsunami warning responsibilities. The Center manages the National Water Level Observation Network (NWLON) and a national network of Physical Oceanographic Real-Time Systems (PORTS®) in major U.S. harbors. The Center establishes standards for the collection and processing of water level and current data; collects and documents user requirements which serve as the foundation for all resulting program activities; designs new and/or improved oceanographic observing systems; designs software to improve CO-OPS' data processing capabilities; maintains and operates oceanographic observing systems; performs operational data analysis/quality control; and produces/disseminates oceanographic products.

All Center activities are consistent with the challenging NOS GLIMO vision. NOS works to balance the use of the coast with conservation of the Nation's coastal and ocean resources. NOS and NOAA place a high emphasis on enhancing public understanding of the Nation's oceans and coasts. CO-OPS is committed to ensuring a skilled and able workforce remains in place that will support NOS in providing National and global leadership and understanding.

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The primary purpose of the *Passage to 2010* is to communicate and clarify organizational goals to CO-OPS' personnel. A strategic plan provides overall vision and the broad context for all activities. The CO-OPS Strategic Plan provides an outlook of how CO-OPS will look in 2010. The Plan includes CO-OPS activities for each of the four NOAA strategic goals as defined for FY04. The Plan shows how CO-OPS will contribute to NOAA's strategic vision for 2010. Annual Operating Plans (AOPs) will provide the details for execution of the CO-OPS Strategic Plan. AOPs describe the work that CO-OPS will do each year to support NOAA's four strategic goals.

CO-OPS contributes to the National backbone and supports NOAA's coastal observing system and coastal monitoring programs. CO-OPS provides operationally sound observation and monitoring capability coupled with operational nowcast/forecast modeling and the quality data and information

needed to support NOAA's strategic goals. CO-OPS' vision is *a Nation where everyone has ready access to tide, current, water level, and other coastal oceanographic products and services required for informed decision-making*. CO-OPS' mission is to *provide the National infrastructure, science, and technical expertise to monitor, assess, and distribute tide, current, water level, and other coastal oceanographic products and services necessary to support NOAA's mission*. CO-OPS' guiding principles and core values (Appendix A) provide the foundation that has guided organizational decision making for well over 100 years.

New Priorities for the 21st Century is NOAA's strategic vision. The next step for NOAA is to align every NOAA project and program to this new corporate framework. NOAA strategic planning will be a coordinated ongoing process. Each NOS program office has, in turn, developed a strategic planning process to support the NOAA priorities.

The CO-OPS Cross-Cutting Priorities identify our strategic direction for the next decade. These capabilities provide the critical support we need to achieve our goals. The cross-cuts represent the managerial and programmatic foundation that facilitate the timely delivery of products and services to our global customers.

The CO-OPS 100% Requirement was developed as part of the FY 2006 budget process. 100% requirement is forward looking and represents the NOAA view of how programs will need to look in 2010 to satisfy NOAA priorities. The CO-OPS Strategic Plan is consistent with the NOAA 100% requirement.

CO-OPS is organized functionally across six programs as follows, (1) National Water Level Program (NWLP), (2) National Physical Oceanographic Real-Time System (PORTS®) Program, (3) Ocean Systems Test and Evaluation Program, (4) National Current Observation Program (NCOP), (5) National Operational Coastal Modeling Program (NOCMP), and (6) National Coastal Oceanographic Applications and Services of Tides and Lakes (COASTAL) Program. In general, these programs are matrix managed.

Next steps include developing stepping stones (AOP projections) that incrementally evolve CO-OPS from today to 2010, under various budget options.

NEW PRIORITIES FOR THE 21ST CENTURY

What follows is the CO-OPS Strategic Plan mapped into NOAA's strategic vision, developed under Conrad C. Lautenbacher, Jr., Vice Admiral, U.S. Navy (Ret.), Under Secretary for Oceans and Atmosphere. The NOAA mission goals are as follows:

NOAA Priorities (mission goals)

Mission Goal 1: (Ecosystems)	Protect, restore, and manage the use of coastal and ocean resources through ecosystem based management.
Mission Goal 2: (Climate)	Understand climate variability and change to enhance society's ability to plan and respond.
Mission Goal 3: (Weather and Water)	Serve society's needs for weather and water information.
Mission Goal 4: (Commerce and Transportation)	Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation

In addition, the NOAA priorities include outcomes (benefits) as derived through specified strategies. The strategies and some interpretation of how the strategies apply to outcomes in the CO-OPS Strategic Plan area are as follows:

Monitor and Observe - Acquiring, processing, and disseminating environmental measurements.

Understand and Describe - Conducting research and development for new technologies and products/services. Increasing understanding of environmental dynamics.

Assess and Predict - Conducting environmental assessments. Provision of predictions. Modeling activities resulting in nowcasts/forecasts.

Engage, Advise, and Inform - Provision of specific products and services. Provision of tools and technical assistance. Provision of customer support, education, and outreach.

CO-OPS STRATEGIC PLAN

Mission Goal 1: ECOSYSTEMS

Protect, restore, and manage the use of coastal and ocean resources through ecosystem based management.
Coastal areas are among the most developed in the Nation. Our coastal counties are growing three times faster than other U.S. counties, adding more than 3,600 people a day to their populations. During the first decade of the 21st Century, the greatest challenge will be to implement a truly integrated ecosystem management approach to all of NOAA's living resource responsibilities by all NOAA components.

We are improving our science, management, and regulatory processes to support comprehensive, integrated ecosystem-based management of our coastal, ocean, and Great Lakes resources. We will invest in improved understanding of ecosystems, identification of regional ecosystems, development of ecosystem health indicators, and new methods of governance to establish the necessary knowledge, tools, and capabilities to fully implement ecosystem-based management.

OUTCOMES (BENEFITS)

CO-OPS, using V-datum tools in partnership with NGS, OCS, OCRM, and local/regional communities, will support wise land use, sustainable local planning infrastructure, and protection of coastal resources.

CO-OPS will integrate water quality sensors (DO, nutrients, etc.) into the CO-OPS monitoring infrastructure resulting in multi-parameter observing systems to monitor ecosystem variability. This same technology will provide environmental measurements to support fisheries planning and management.

The NOAA/OAR CREWS network will be transitioned to operational status; CO-OPS is a candidate to become the operational home. CREWS provides real-time measurements, and when coupled with decision-making technology, the system provides coral bleaching warnings/reports. Solar radiation integrated into the present CO-OPS real-time monitoring infrastructure at sites near coral reefs will provide comparable measurements.

Transition the NOS/NCCOS HAB forecasting activity to operational status; once again, CO-OPS is a candidate to become the operational home. When coupled with decision making technology, model results will provide guidance for decisions on closing fisheries.

The implementation of a quick response measurements capability will provide HAZMAT responders with more reliable data for trajectory model applications.

An expanded monitoring capacity (climate quality measurements) will result in improved flood warnings and ENSO predictions that will, in turn, allow better information for coastal community planning.

Water quality models linked with CO-OPS operational models (circulation) will result in the ability to predict water quality characteristics of ecosystems when rates and sources of inputs are known, which will, in turn, provide decision makers with information that can be used to regulate inputs.

Assessments of extremes by the climate research community will be correlated with frequency/severity of coastal storms, information that can be used by the public in deciding whether one coastal region might be safer than another.

By more accurately determining rate of sea level rise/fall and inundation, coastal communities and ecosystem managers will have better tools for assessing impacts.

New standardized geodetic datums will provide a better definition of storm surge elevation and will become the basis for evacuation maps.

Bathy-topo products based on vertical datum applications will allow the creation of GIS layers of sea level change and inundation, thus, improved risk assessment.

STRATEGIES

Monitor and Observe

CO-OPS will develop a quick response measurements capability.

CO-OPS will provide broader, sustainable, operational measurements to the ENSO community that will support the development of more reliable ENSO predictions.

CO-OPS will integrate other sensors such as water quality sensors (DO, nutrients, etc.) into the CO-OPS monitoring infrastructure resulting in multi-parameter observing systems.

CO-OPS will continue to investigate the utility of transition the NOAA/OAR CREWS network to operational status.

Understand and Describe

Water quality models linked with circulation models will result in the ability to predict water quality characteristics of an ecosystem by knowing the rates and sources of inputs.

Data fusion (combining data sets), data mining (supporting detailed analysis of trends, spatial/temporal), and data modeling (technology for comparing large similar data sets from different

sources) will be ongoing and evolving activities that will make more data available to the public for future applications.

Assess and Predict

CO-OPS will develop warning/guidance tools (predictions/statistics) that will provide coastal decision planners with more reliable information for decision making.

CO-OPS will continue discussions relative to transitioning HAB forecasting to the CO-OPS operational infrastructure.

Operational oceanographic models (statistical, hydrodynamic, forecast/nowcast, two or three dimensional) will provide rich data sets for estuarine/regional areas. Model skill will be evaluated against observations, thus ensuring user confidence for decision making.

Engage, Advise, and Inform

CO-OPS will develop and provide efficient ways for constituents to express their needs for products and services, and desired changes to those products and services.

Bathy-topo products based on vertical datum applications will allow the creation of GIS layers of sea level change and inundation.

Bathy-topo products will allow users to see shore-line variability relative to existing conditions, a tool for coastal planners.

CO-OPS will develop technology transfer and training for better use of products and services by customers which will, in turn, broaden the customer base.

New tidal datum products will delineate fishery boundaries, serve as land references for Marine Protected Areas (MPAs), and shell fish lease sites (mari-culture industry).

New technologies will be developed to make it easier for land use planners to incorporate tidal datums into construction set back zoning.

Frequency analysis (inundation/duration) will become a standard marsh management tool.

Vulnerable areas will be identified based on sea level variability and land movement (geodetic datums).

Mission Goal 2: CLIMATE

Understand climate variability and change to enhance society's ability to plan and respond. Society exists in a highly variable climate system, with conditions changing over the span of seasons, years, decades, and longer. Given such stresses as population growth, drought, increasing demand for fresh water, and emerging infectious diseases, decision makers need a reliable structure and process for receiving accurate, timely, relevant climate information to guide them in managing resources to maximize the benefits and minimize the impacts of climate variations.

OUTCOMES (BENEFITS)

A monitoring network of appropriately spaced observation stations, all geodetically controlled, will provide links among sea level trends and geodetic reference points. This capability (absolute sea level) will distinguish regional changes in sea level from local land movement.

Better science will enhance protection of life and property by providing better information on extreme changes in climate. New warning and guidance tools will be developed.

New topo-bathy products will allow better visual representation of coastal climate change.

STRATEGIES

Monitor and Observe

CO-OPS will install more monitoring stations in key areas (high variability) to better resolve differences.

CO-OPS will continue to build the U.S coastal component of the Integrated and Sustained Ocean Observing System (IOOS) by partnering with organizations to integrate the NOS backbone components with regional monitoring capabilities. Backbone components include climate quality observations (acceptable data quality and sustainable).

Understand and Describe

CO-OPS will fully link the observation network to geodesy, requiring close coordination with the National Geodetic Survey.

CO-OPS will form partnerships with the climate community to leverage our operational long term measurements capability with climate research.

CO-OPS will develop technologies to better determine sea level variability in areas that are rapidly changing.

New bathy-topo products will allow researchers to assess climate variability geo-spatially.

Assess and Predict

CO-OPS will provide broader, sustainable, operational measurements to the ENSO community that will support the development of more reliable ENSO predictions.

Through climate research, CO-OPS will be able to distinguish between climate changes from human-induced (anthropogenic) change.

Engage, Advise, and Inform

CO-OPS will develop and provide efficient ways for constituents to express their needs for products and services, and desired changes to those products and services.

CO-OPS will fully mine the CO-OPS climate data base in concert with the climate community to provide a new generation of products, such as frequency analyses, to assist in coastal engineering and planning to prevent flooding of coastal structures, and prevent loss of property and life. These same products will support coastal restoration projects.

CO-OPS will develop technology transfer and training for better use of climate products and services by our customers which will, in turn, broaden the climate community customer base.

Mission Goal 3: WEATHER AND WATER

Serve society's needs for weather and water information.
Hurricanes, tornadoes, floods, and other severe weather events cause an average $11 billion in damages every year to the U.S. economy. With so much at stake, NOAA's role in observing, forecasting, and warning of environmental events is expanding. Economic sectors and the public are increasingly using our weather, air quality, and water information to improve their operational efficiencies and manage environmental resources.

NOAA is strategically positioned to conduct sound science and provide integrated observations, predictions, and advice to support decision makers' responsible management of environmental resources. Bridging weather and climate time scales, we will continue to collect environmental data and issue forecasts that help protect life and property and enhance the U.S. economy.

OUTCOMES (BENEFITS)

Assessments of extremes by the climate research community will be correlated with frequency/severity of coastal storms.

An expanded climate quality monitoring capacity will result in improved flood warnings.

Improved product delivery technologies (wireless Internet, etc.) will provide the weather and water community with more efficient access to CO-OPS' products and services.

Improved warning/guidance products will be made available resulting from access to data that is not presently available.

CO-OPS will continue to build the U.S coastal component of the IOOS by partnering with organizations to integrate the NOS backbone components with regional monitoring capabilities. This densification of operational monitoring networks will provide increased resolution and accuracy for informed decision making. Predictions, based on accepted harmonic constants, will be available at all measurement sites.

The National HF Radar Program (a partnership activity) will provide surface current maps (new source of current data) for the coastal United States.

STRATEGIES

Monitor and Observe

The CO-OPS 100% requirement is to (1) operate and maintain a spatially distributed National Water Level Observation Network composed of a Federal Backbone augmented by cooperative regional stations; (2) operate and maintain a national Physical Oceanographic Real Time System that services the top 150 US seaports; (3) conduct short term tide and current measurements to update tidal

datums, tide and current predictions, and other products; (4) provide fast response support to natural or manmade hazards (storms, oil spills) or Homeland Security events, and (5) operate and maintain a national High Frequency Radar network at 150 locations to provide surface currents.

A mirrored data management system that eliminates a single point of failure is necessary to assume primary operation if required in the case of a Continuity of Operations Plan (COOP) event. The mirrored data management system, located at CO-OPS/FOD in Chesapeake, Virginia, will be kept synchronized with the CO-OPS HQ Silver Spring system.

CO-OPS will make more data types accessible via user friendly media that can be used for multiple purposes.

Six-minute data telemetry via GOES coupled with Xpert DCPs and new sensor technology will result in systems characterized as providing faster response, enhanced decision making, lower maintenance, easier installations, more reliable, and more reliable.

Understand and Describe

The provision of mean/min/max water level information from an expanded operational water level monitoring capacity will allow assessments of extremes by the climate research community.

Assess and Predict

An expanded climate quality, operational monitoring capacity will expand the accuracy of weather forecasts as well as ENSO predictions.

Technology will evolve resulting in CO-OPS providing more reliable information in support of storm induced flood inundation predictions.

Engage, Advise, and Inform

CO-OPS will develop and provide efficient ways for constituents to express their needs for products and services, and desired changes to those products and services.

Real-time data and related data products will continue to be made available for storm and Tsunami warnings.

Mission Goal 4: COMMERCE AND TRANSPORTATION

Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation

Transportation systems are our Nation's economic lifelines. As U.S. dependence on surface and air transportation grows over the next 20 years, and as maritime trade doubles, better navigation and weather information will be critical to protect lives, cargo, and the environment.

NOAA's products and services are essential to the safe and efficient transport of people and goods on the water, in the air, and on the land. Reduced risk of marine accidents and oil spills, better search and rescue capabilities, and other efficiencies derived from improved information and services could be worth over $300 million a year around the Nation's coasts.

We are committed to improving the accuracy and timeliness of our marine forecasts; providing advanced electronic navigational charts and real-time oceanographic information; and maintaining a consistent, accurate, and timely positioning network for safe and efficient marine navigation, aviation, and ground transportation.

OUTCOMES AND BENEFITS

Expanding the sensor suite and number of monitoring sites will increase the use and effectiveness of physical oceanographic and marine meteorological products and services in support of safe and efficient marine and intermodal transportation.

Expanding the sensor suite and number of real-time monitoring sites will support homeland security by allowing more efficient port and harbor ship operations and evacuation.

Making all operational monitoring programs real time will expand the user base.

A more robust new sensor evaluation and transition process will provide marine transportation users with better information for making navigation decisions.

New technology tidal zoning will allow for faster and more efficient chart delivery.

Web based on the fly tidal current charts will allow users to create custom products to fit specific needs.

Operational model nowcasts and forecasts will provide critical navigation information for larger spatial areas. NOS will continue developing standards for operational models. Relative to homeland security, regional and estuarine models will support evacuation, navigation safety, emergency response (hazards, WMD), and other military defense decisions.

STRATEGIES

Monitor and Observe

CO-OPS will make all operational monitoring programs real time. CO-OPS will expand the sensor suite to provide a more comprehensive environmental profile. CO-OPS will improve the reliability of backup systems. CO-OPS will continue to add additional station sites to provide complete National coastal coverage.

New operational sensors (visibility, buoy-mounted ADCP, air gap, waves, etc.) will be made available for inclusion as components of PORTS® installations.

Understand and Describe

The Ocean Systems Test and Evaluation Program (OSTEP) will evaluate and transition emerging measurement technologies to increase the capabilities, efficiencies, utility, and accuracy of our products and services.

Establish the National HF Radar Program which will provide surface current maps in support of marine transportation and other applications.

Fully automated data processing and analysis will allow CO-OPS to provide a broader navigation product suite while requiring fewer FTEs.

CO-OPS will continue to develop a more robust data processing and communications pipeline that will support homeland security operations for ports and harbors with reliable (bullet proof) delivery of data.

CO-OPS will continue developing GPS and VDATUM applications for new products in support of improved decision making.

Assess and Predict

CO-OPS will develop/improve harmonic predictions to provide more accurate predictions for each station location. The basis for this capability will be a database of accepted harmonic constants for each time series of sufficient length.

On the fly tidal current charts will result from technology provided by of faster and more cost efficient computers.

Operational model nowcasts and forecasts, developed in concert with the NOS/OCS Coast Survey Development Laboratory (CSDL), will evolve to allow vessel route forecasts and on demand model runs resulting in more efficient ship operations.

CO-OPS will make new tidal zoning/tide reducer products and services, such as TCARI, operational to increase the accuracy and resolution of water levels throughout survey zones.

Engage, Advise, and Inform

CO-OPS will develop and provide efficient ways for constituents to express their needs for products and services, and desired changes to those products and services.

On the fly hydrographic and shoreline tidal zoning will result in more accurate end products that will, in turn, reduce dredging costs, among other benefits.

Web based technical reports and notices will result in more timely information for a wider constituent community.

Bathy-topo products will allow users to see shore-line variability relative to existing conditions, a tool for port infrastructure planning.

Relative to homeland security and transportation, CO-OPS will engage emergency responders and military support operations for port operations, security planning, decision validation, and customized applications.

CO-OPS will develop technology transfer and training for better use of products and services by our customers which will, in turn, broaden the customer base.

CO-OPS CROSS-CUTTING PRIORITIES

Capacity - People and Partnerships
CO-OPS will foster public understanding of operational oceanography and environmental monitoring to assist citizens at all levels of government and the general public to make informed decisions. CO-OPS' strategy to meet the public's needs is to strengthen core capabilities through additional partnership links with outside groups including private organizations.

To improve the operational readiness of the NOS real-time, modular, end-to-end, monitoring infrastructure, CO-OPS has strengthened every component from observing system, to communications, to processing, and to dissemination. Changes in infrastructure capabilities have required CO-OPS to undergo significant changes in organizational culture. This cultural shift now forms the basis for management and resource decisions. CO-OPS is a highly leveraged organization that is in the business of partnering with other parties to meet the needs of a broader user community. The strategy for the future includes building upon and enhancing the existing NOS operational infrastructure and culture which has emphasized cross-program and cross-NOAA integration.

The CO-OPS mission growth has been accomplished through advances in technology and outsourcing, while streamlining the number of personnel required to maintain the internal core workforce capability. Present outsourcing activities validate the CO-OPS business strategy of using outsourcing as a tool to satisfy workforce requirements for new starts and to enhance existing programs. A CO-OPS operating principle is to focus the core workforce capability on the establishment and maintenance of NOS program and technical standards, validation and certification of data and information products, research and development, and quality control/assurance (QA/QC) of data and information products. Validation, certification, and QA/QC all link to the liability associated with CO-OPS data, information products, and services. A second CO-OPS principle is to maintain a core intellectual capability that includes succession for key personnel.

Standard CO-OPS business practices include examining and documenting existing CO-OPS core responsibilities, capabilities, and competencies including a vision of how these might look in the future; identifying present outsourcing activities and other potential activities for partnership development; and providing CO-OPS personnel with a clear understanding of the role of the Federal workforce today and in the future. CO-OPS will maintain a sufficient internal workforce capability that ensures continuity, succession, and mission accomplishment. The intent is to broaden and strengthen CO-OPS' base of fundamental science and operational monitoring expertise.

In recent years, it has become apparent to all that CO-OPS' products and services can be leveraged to support a broader constituent base. NOS recognized that the program functions not only describe and predict changes in the coastal ocean environment, but also help conserve and manage wisely the Nation's coastal resources to ensure sustainable economic opportunities. The validation of the broader CO-OPS mission has not resulted without pain. To maintain a bare bones core capability, CO-OPS has been forced to streamline the program workforce and to develop innovative business practices. This cultural shift now forms the basis for management and resource decisions.

CO-OPS is held accountable for a set of core responsibilities as defined in the annual operating plans. The capacity to satisfy CO-OPS' core responsibilities requires a set of core capabilities and competencies developed for specific workforce functions, presently defined as follows (1) Requirements Analysis, Systems Design, Partnership Development, (2) Information Technology, (3) Field Operations, (4) Applied Science - Circulation Modeling, Oceanography, Meteorology, Geodesy, Engineering, and (5) Program Management. As new initiatives are implemented, such as HAB Forecasting, new competencies will be integrated into the CO-OPS workforce capacity.

CO-OPS growth in new areas (National HF Radar Program, HAB Forecasting, etc.) will require monitoring infrastructure and modeling enhancements. CO-OPS is assuming the lead for providing the NOS contribution for the operational coastal component of the U.S. Integrated Ocean Observing System (IOOS). Expanding the suite of sensors (parameters and quantity) will require a corresponding expansion in sensor testing and evaluation, CORMS real-time quality control, commercial communications, field platform design/installation/integration, data and information management, and product development. Expanding the number and function of operational models will require additional partnerships with both the academic and scientific consulting communities.

CO-OPS is actively looking for new technology solutions to satisfy NOAA's mission through the Department of Commerce (DoC) Small Business Innovation Research (SBIR) Program. In partnership with small business, CO-OPS solicits proposals for operational ocean instrumentation, measurement, and data/information dissemination systems on an annual basis. Of particular interest to CO-OPS are long-term and real-time water quality monitoring systems and a new water level measurement technology that does not require in-water sensors. These new potential solutions represent the future for NOAA coastal ocean monitoring. The incorporation of these technologies into existing programs would require additional funding and the work would be accomplished through outsourcing.

Earth Observing System (EOS)/Global Ocean Observing System (GOOS)/Integrated Ocean Observing System (IOOS)

CO-OPS will work with local, regional, national and international partners to contribute to the earth observing system, concentrating on the IOOS portion, which is the National part of EOS/GOOS, but also contributing to the global portion. This end-to-end system includes not only collection of observations such as our water level, currents, salinity and meteorological data, but also data analysis, product production, data standards and protocols, and data management/archival to satisfy customer requirements. Together with other observational, processing and data management systems found in the federal/state/local agencies, private sector and academia, the IOOS is designed to address the following societal goals:

- improve weather forecasts and predictions and climate change
- improve safety and efficiency of marine operations
- provide more timely predictions of natural hazards and their impacts
- improve national security
- reduce public health risks
- sustain, protect and restore healthy marine and estuarine ecosystems

- sustain, protect and restore marine resources.

Traditionally, CO-OPS has focused on marine operations and changes in sea level as a factor in climate change. In recent years, CO-OPS has expanded into other areas such as coastal resource management, natural hazards, and public health issues, including oil spill response, as new applications and techniques of integrating data and viewing the environment more holistically are uncovered and implemented. CO-OPS will develop new capabilities, techniques, products and services to support, in various degrees of applicability, all of the aforementioned goals. To take on such a challenging task, CO-OPS will seek out and leverage new/existing partnerships, utilize contracts and grants creatively, develop new and enhance existing skills of its workforce, and continue to maintain the standards of excellence that customers and partners have come to expect.

Homeland Security

CO-OPS manages the NOS real-time monitoring infrastructure that includes PORTS® and NWLON. The entire CO-OPS budget is in support of this infrastructure, an integral Homeland Security activity. The incapacity of this critical infrastructure would have a debilitating impact on the defense and economic security of the Nation. Critical infrastructure includes select services and capabilities that are maintained in the face of unconventional threats, including terrorist attacks. This NOS real-time monitoring capability allows the safe and efficient movement of military and commercial shipping in and out of harbors, ports, and Naval bases. The critical subsystem components include the Continuous Operational Real-Time Monitoring System (CORMS), Data Management Subsystem (DMS), and the National PORTS Database (NPDB).

Single points of failure have been identified for this critical infrastructure, the most critical being that no backup function infrastructure exists external to NOS Headquarters, Silver Spring, MD.
In the absence of the dissemination of real-time observations, decision makers would be forced to rely on published tide and tidal current predictions, and the associated decrease in margin of safety. Presently, if NOS Headquarters, Silver Spring, were to be incapacitated, a mirrored back up real-time monitoring infrastructure does not exist.

Presently, in the event of an emergency, CO-OPS can provide key local emergency responders with the ability to access local PORTS® and NWLON installations directly via local telephone communications. CO-OPS has replicated at Chesapeake, Virginia, those components of the real-time monitoring infrastructure that would allow the dissemination of data and information over the Internet as it appears today. These data would not be quality controlled and the measurements would not be processed and certified. Initiatives have been developed that would allow, at Chesapeake, a mirrored capability that could be brought totally online within 12-24 hours and provide all services including staffed, 24X7, quality control. NWLON is a key component of the NOAA Tsunami Warning System and is operationally linked to the National Weather Service AWIPS/AFOS system for storm surge monitoring.

In support of Homeland Security, there is a need to accelerate the implementation of PORTS® for high risk cities that presently do not have a PORTS® installation. In the event of a major terrorist incident where there is a forced evacuation of a harbor or detour of ships, NOAA's real-time and

forecasted tide and current information are invaluable to support safe passage and continued maritime commerce. The PORTS® marine models are also being enhanced to support predictions of the oceanic and atmospheric dispersion of hazardous materials to protect people and the environment. PORTS® provides rapid updates of water levels, tides and currents. These data are used to calculate underkeel clearances for a vessel's transit, thereby reducing the possibility of ships going aground, blocking other vessels and channels, spilling contaminants, or becoming additional targets. For example, an explosion triggered on a Liquified Natural Gas vessel or oil tanker trapped in port would likely cause large areas of destruction.

NOAA's models of oceanographic and atmospheric conditions which are provided through PORTS® provide crucial advance data for re-routing of vessel traffic, port conditions forecasts, and low visibility navigation to keep traffic moving and prevent congestion or delays in other less affected areas. Marine modeling also supports predictions of the oceanic and atmospheric dispersion of hazardous materials to protect people and the environment and could assist in the prediction of movements of free-floating mines. Access to accurate real-time water level data and model forecast guidance allows U.S. port authorities and maritime shippers to make sound decisions regarding maximizing tonnage (based on available bottom clearance), and limiting passage times, without compromising safety.

International

CO-OPS has had a long and productive partnership with Canada through the International Joint Commission (IJC) and the Great Lakes Commission (GLC). The Canadian partnership focuses on the Great Lakes Water Level Network that is a subset of the NWLON. The International Joint Commission is an independent binational organization established by the Boundary Waters Treaty of 1909. Its purpose is to help prevent and resolve disputes relating to the use and quality of boundary waters and to advise Canada and the United States on related questions. The Treaty requires that the United States and Canada, together, approve projects that affect the levels and flows of waters along their common boundary. Under the IJC, CO-OPS supports the following International Boards, (1) International St. Lawrence River Board of Control, (2) International Niagara Board of Control, and (3) International Lake Superior Board of Control. The main duty of the St. Lawrence Board is to ensure that outflows from Lake Ontario meet the requirements of the Commission's order. Water diversions in the Niagara River for hydroelectric power projects in both countries were approved by the 1950 Niagara Treaty. Water diverted from the river above Niagara Falls is returned to the river below the Falls. The 1950 Niagara Treaty specifies the minimum amount of water that must flow over the Falls at different times. The Lake Superior Board provides the Commission with advice on matters related to adverse hydrologic conditions on the lakes, and levels and flows in the St. Mary's River.

The Great Lakes Commission is a binational public agency dedicated to the use, management, and protection of the water, land, and other natural resources of the Great Lakes-St. Lawrence system. In partnership with the eight Great Lakes states and provinces of Ontario and Quebec, the GLC applies sustainable development principles in addressing issues of resource management, environmental protection, transportation, and sustainable development. CO-OPS, in partnership with GLC, has created a NOAA regional data portal for coastal observations by enhancing GLC's Great

Lakes Information Network (GLIN). The GLC flagship decision support product is the GLIN, a website that links all Great Lakes information and data sites, serving as the central information source for the Great Lakes community. CO-OPS has partnered with the GLC to use GLIN to broaden dissemination of (synergize with) NOS Great Lakes programs and products. NOS has developed a premier web resource for acquiring and disseminating vital environmental measurements (water levels, currents, winds, barometric pressure, air and water temperature, and other related hydrologic and meteorological data), real-time and historical. This multi-year Agreement will allow NOS to partner with the GLC to use GLIN to broaden dissemination of (synergize with) NOS Great Lakes programs and products.

CO-OPS has most recently worked co-operatively with the Mexican Navy as part of a NOAA/Mexico Joint Hydrographic Survey that is to take place off the coast of Mexico near Tampico in the Gulf of Mexico. CO-OPS provided a two-week training session to a Mexican Navy officer in tidal data collection, processing, and datum computation and in the application of tides to hydrographic surveys. CO-OPS will be collecting tide data from two Mexican stations during the survey to compute MLLW datum and to provide tide reducers for the survey operations.

Originally coordinated through the International Hydrographic Organization (IHO), CO-OPS exchanges tide and tidal current predictions with 22 countries on an annual basis in electronic format. The mission of the IHO is to ensure the provision of adequate and timely hydrographic information for world-wide marine navigation and other purposes, through the endeavors of national hydrographic offices.

CO-OPS was requested by DoC/NOAA to submit an implementation plan for the reconstruction of the water level observation network in Central America, an intergovernmental cooperative effort, funded through USAID, to assist Central American countries affected by Hurricane Mitch with the reconstruction of damaged infrastructure. CO-OPS used the Agreement for Technical Cooperation (ATC) between NOAA and the Organization of American States (OAS) to facilitate the implementation of the plan and achieve the objective of updating the sea level data and the reconstruction of the geodetic network in Central America. The project (1) installed state-of-the-art sea level and meteorological monitoring stations and updated the local Mean Sea Level (MSL) at these stations to support the development of a geodetic framework for Central America, (2) developed a national and regional capacity for the operation and maintenance of the stations, and (3) strengthened professional and technical skills of host country agencies and regional institutions through technical transfer and capacity building.

CO-OPS and AES Puerto Rico (AES) partnered for the design, installation, operation, data collection, and processing of a circulation survey of Las Mareas Harbor, Puerto Rico. AES is constructing a coal fired power plant in Las Mareas Harbor on the southern coast of Puerto Rico. Coal will be transported via Panamax bulk carriers into the harbor. In the interest of safe and responsible transportation, AES, the ship operators, and the marine pilots need accurate information concerning the tides and currents that the bulk carriers will encounter as they approach and transit through the narrow inlet. To that end, AES desired that NOS design and implement a circulation survey of Las Mareas Harbor and the nearby coastal waters. NOS is the Government agency responsible for the generation of tide and tidal current predictions.

CO-OPS 100% REQUIREMENT

The 100% requirement is to (1) operate and maintain a spatially distributed National Water Level Observation Network composed of a Federal Backbone augmented by cooperative regional stations; (2) operate and maintain a national Physical Oceanographic Real Time System that services the top 150 US seaports; (3) conduct short term tide and current measurements to update tidal datums, tide and current predictions, and other products; (4) provide fast response support to natural or manmade hazards (storms, oil spills) or Homeland Security events, and (5) operate and maintain a national High Frequency Radar network at 150 locations to provide surface currents.

The National Water Level Observation Network, a backbone of the Integrated Ocean Observing System, requires measurements at 300 locations to provide the adequate spatial coverage needed to meet its national mission as well as provide a nucleus around which regional cooperative water level stations can integrate. NWLON stations are also equipped with other physical oceanographic and meteorological sensors. A new non-contact microwave water level sensor will be integrated into the NWLON that will eliminate issues associated with in-water sensors and reduce maintenance costs. All NWLON stations will disseminate quality controlled real time data that will provide a national baseline for the Physical Oceanographic Real Time System. The 300 stations of NWLON will be augmented by approximately 200 cooperative regional stations which operate to NWLON standards and are focused on specific regional and local requirements. An assumption is that regional partners will share costs for the installation and long-term maintenance of these stations. Together, these two components form the 500-station observation network envisioned by OCEAN.US. A specific requirement of the NWLON and regional network is for all stations to have precise geodetic datum connections using land leveling and GPS observations.

Over 98% of the nation's cargo passes through the top 150 US seaports. For those seaports where their real time data needs are not met by existing NWLON stations, a National PORTS program will provide quality controlled real time data from a suite of off-the-shelf sensors such as water level, currents, salinity, air-gap (bridge clearance), air and water temperature, wind speed and direction, barometric pressure, and other parameters. A wave observation capability will be integrated into the PORTS suite of sensors. An initial assessment of the needs of each of the top 150 US seaports has identified where additional measurements both by type and location are needed to provide real time data that will most efficiently support safe and efficient navigation. The assessment for each seaport would be validated through meetings with the local user community before any new platforms would be established. NOAA will transition from a cost-shared approach to full federal funding to meet the recently enacted provision in the Hydrographic Services Improvement Act (HSIA) that requires NOAA to do so. This will require the full assumption of the operation and maintenance costs at the existing 10 PORTS in FY 2006 (which cover 32 individual seaports) and a 10-year plan to implement PORTS at the top 150 seaports.

Short-term current observations conducted on a periodic basis are required to maintain NOAA's Tidal Current Prediction Tables, published annually, in an accurate status. U.S.

Coast Guard regulations require that Tidal Current Prediction Tables be carried by commercial vessels over 1600 gross tons. There are 2,700 locations in the Tidal Current Tables, which have been prioritized into two tiers. The first tier has 350 locations that support high priority ports and require observing once every 10 years to maintain accuracy of predictions. The remaining 2,350 locations in the second tier require observing once every 25 years to maintain accuracy of predictions. Stations that serve as reference stations for tide prediction may have to be occupied for several months. Implementation of a national High Frequency Radar at 150 locations would be used to collect surface currents so that complete water column current information and higher resolution spatial coverage can be obtained.

Short-term tide observations conducted on a periodic basis are required to update published tidal datums and tide and current predictions that are published on an annual basis. US Coast Guard regulations require that Tide Prediction Tables be carried by commercial vessels over 1600 gross tons. States use tidal datums for setback lines, property boundaries, and other uses. The U.S Army Corps of Engineers (USACE) uses NOAA tidal datums for dredging project control. Some of this requirement is met through reimbursable projects with state, local, or federal agencies. Short-term water level stations required for updates to the International Great Lakes Datum (IGLD) on the Great lakes are also part of the 100% requirement. These stations, once connected by GPS observations, enable the VDatum transformation required for implementation of Kinematic GPS hydrographic surveying.

A quick response capacity will provide tide, current, wave and other data when there is a natural disaster, Homeland Security event, a search and rescue scenario, or hazardous material spill. This capacity consists of a suite of sensors such as water levels, currents, waves, and meteorology equipped with real-time communication technology enabling first responders to receive critical information. This capacity would utilize logistical and other support from NOAA Navigation Response Teams and would provide 24-hour response to most areas of the U.S.

Traditional in situ current observation sensors measure currents in the water column but stop below the surface, leaving an important gap in the data. A new technology, High Frequency Radar, has been developed that can measure surface currents and non-directional waves over large areas and is ready for transition into an operational status. OCEAN.US has called for a National system of nested HF Radars to support navigation, vessel tracking for Homeland Security issues, drive forecast models, assist search and rescue efforts, and other purposes. A National system of 150 locations has been identified by OCEAN.US; approximately 30 regional HF Radar observatories exist to form the initial basis for the system. A National framework operating under consistent standards for equipment, operating procedures, data formats and processing and analysis, quality control and other facets is required to implement this high priority.

Even with heavy reliance on service contracts to accomplish much of the 100% requirements for oceanographic observations, a larger facility, will be required as existing facilities are optimized. An alternative to a larger facility would be to staff additional field facilities in

regions of high concentrations of observing systems and to co-locate with existing NOAA facilities such as GLERL or National Marine Sanctuaries in Michigan for the Great Lakes region. Benefits of a distributed presence would be reductions in travel costs, improved response times, improved oversight of regional contracts, direct interaction with regional observing systems, and improved services to local constituents. Complementing this would be a systems support contract for a facility that would conduct centralized procurement, receipt, acceptance testing, and shipping to observation sites that would resolve the increased requirement for warehouse space and testing facility.

The 100% requirement is to: operate and maintain oceanographic forecast systems in all major U.S. water bodies (44); and maintain ecological forecast systems in five U.S. areas that will provide daily to weekly forecasts. Specific elements are:

The Operational Forecast Systems (OFS) will provide high resolution, numerical hydrodynamic model based nowcasts and forecasts of water levels, currents, waves, water temperature and salinity in 44 major water bodies. For each water body, the OFS will reliably produce and disseminate quality controlled hourly nowcasts (24 times per day) and 0-30 hour forecasts (four times per day) of these parameters. The OFS products will be integrated with NOAA's product suite of tidal predictions and observations and will supply a critical complement by providing enhanced spatial resolution and accurate forecasts that extend (0-30 hours) beyond real-time observations. This integrated NOAA product suite will provide the Nation's marine users with the required information for informed decision-making. These models can enable significant economies in marine transportation primarily through more efficient vessel scheduling that optimize transits. Advance knowledge of tide and current conditions can minimize the fuel used by vessels (e.g. sailing with the currents) as well as optimize the amount of cargo they can load if underkeel clearance is an issue. Models also support hazardous material response, search and rescue, scientific research, coastal flooding warnings, and other applications. NOAA has determined a 100% requirement program that enables it to achieve the operational capacity of OFS in 37 water bodies by FY10 and complete the requirement of 44 OFS in following years.

User-driven requirements have also identified need for various types of ecological forecasting model systems (i.e. Harmful Algal Bloom forecasts) that are used to protect public health through advance closure of shell fisheries and other stocks, more efficiently manage marine resources, and other benefits.

The Secretary of Commerce is authorized to conduct the following activities: Analysis and prediction of tide and current data; Processing and publication of data, information, compilations, and reports). The 100% requirement is to: fully maintain Tide and Tidal Current Prediction product line; quality control and disseminate real time oceanographic and meteorological observations; fully maintain tide and water level datums, and fully maintain product lines and applications that support other NOAA Strategic Goals. Specific elements are:

Maintenance requirements for NOAA's oceanographic products and services, tide and water level datums and other derived data products are driven primarily by user requirements and the

level of observations collected. All data must be quality controlled at some level, processed, analyzed, verified, transformed into various products and applications, archived and disseminated through a variety of media. Information technology services are critical to the success of this area. Dissemination activities must include enhancement of existing Web-site services to include connections to appropriate enterprise GIS and portal development.

The provision of real-time oceanographic and meteorological data to marine commerce, U.S. military vessels, U.S. Coast Guard vessels, dispersion models and other Homeland Security assets has been identified as a critical function under the NOAA Continuity Of Operations Plan (COOP). A mirrored data management system that eliminates a single point of failure is necessary to assume primary operation if required in the case of a COOP event. The mirrored data management system, located in Chesapeake, Virginia, will be kept synchronized with the Silver Spring system.

The need for 24x7 quality control for real time data is primarily driven by (1) user requirements, (2) the level of observations collected, and (3) the requirement for NOAA to accept liability for real-time services. The Continuously Operating Real-Time Monitoring System (CORMS) is a blend of human watchstanders using automated tools to monitor real-time data dissemination activity for all programs (NWLON and PORTS) and follow response protocols for data and system problems. Automated programs based on artificial intelligence and case based rules are continually updated to improve performance.

Continued research, development and systems integration of oceanographic sensors and related components for integration into NOAA's in situ oceanographic observation systems such as the National Water Level Observation Network, the National Current Observation program, and the Physical Oceanographic Real Time System. There is always a need to improve existing instrumentation to improve reliability, accuracy, and functionality, as well as implement new sensors to address parameters requested by users. A good example of both of these is a new non-contact microwave sensor that is currently being developed for a bridge clearance application (air-gap) but holds great promise as a replacement primary water level sensor for the National Water Level Observation Network as well as a non directional wave sensor.

Continued research, development and systems integration of high frequency radar technology that can provide surface current information over large geographic areas. HF radar data can significantly improve forecast models, can improve navigation safety for both commercial and recreational vessels, can identify vessels for Homeland Security purposes, and can be used in other applications such as search and rescue. Existing point based current measurements typically provide data for the entire water column except for the surface and this technology completes that measurement.

Tidal datums, tidal zoning and water level observations are required to support both hydrographic and shoreline surveys. The National Water Level Observation Network (NWLON) collects the long-term tide data necessary to produce accurate tidal datums and to provide tide control for surveys, either directly from the NWLON stations or through short

term deployments of gages. Work is accomplished prior to the start of survey and mapping activities to determine the correct placement of water level gauges so that water level correctors can be determined that meet strict standards and requirements. Depths on nautical charts are referenced to chart datum, or Mean Lower Low Water (MLLW). Hydrographic survey data must be corrected to MLLW. Shoreline surveys must be conducted in conjunction with the desired stage of tide so that the proper land-sea interface is delineated. Resource requirements for these services are driven by the hydrographic program 100% requirement to adequately survey the critical and navigationally significant areas and the shoreline program requirement to adequately define the nation's 95,000 nautical miles of shoreline. Based on this, the capability to support 160 hydro survey projects and 16 shoreline survey projects by FY2010 is required as well as implementation of new technology that integrates tidal datum modeling with kinematic GPS, hydrographic surveys and LIDAR shoreline surveys.

CO-OPS PROGRAMS

NATIONAL WATER LEVEL PROGRAM

NOAA manages a National Water Level Program (NWLP) to meet the Nation's needs for water level observations, vertical datum control, and tide predictions. NOAA's direct statutory authority to conduct this program is the Coast & Geodetic Survey Act of 1947, as clarified through the Hydrographic Services Improvement Act of 1998, and amended in 2002.

While the NWLP supports multiple NOAA missions and applications, its primary function is to support safe and efficient marine navigation. The NWLP is a national reference system (a federal backbone for an end-to-end system of water level observations, data management, and data analyses and product dissemination to users). The observational component of the program is the National Water level Observation Network (NWLON) which presently consists of 175 long-term continuously operating water level stations in the U.S. coastal zone, including the Great Lakes and Atlantic and Pacific Ocean Island possessions and territories. The NWLP is the foundation for the ability of the Physical Oceanographic Real Time System (PORTS®) to support real-time services for navigation and supports NOAA's storm surge and tsunami warning programs.

NATIONAL PHYSICAL OCEANOGRAPHIC REAL-TIME SYSTEM (PORTS®) PROGRAM

The National Physical Oceanographic Real-Time System (PORTS®) Program is a National Oceanic and Atmospheric Administration (NOAA), National Ocean Service partnership program designed to provide the maritime community with high quality, real-time oceanographic and meteorological data. PORTS® is a decision support tool which improves the safety and efficiency of maritime commerce, assists coastal resource management, and aids recreational boaters. Real-time information can be obtained via telephone or the internet by accessing the PORTS® website or voice data response system.

The NOAA PORTS® program is based on a partnership with the local community. NOAA's contributions include technical oversight of the design, installation, and operation of PORTS®, the data quality control of all PORTS® information, and the development of national standards. In addition, NOAA continues to develop, test and evaluate new sensors, data collection, and data telemetry systems to enhance real-time measurement capabilities. The local community's contribution includes providing funds for the PORTS® implementation and operations.

OCEAN SYSTEMS TEST AND EVALUATION PROGRAM

CO-OPS manages the Ocean Systems Test and Evaluation Program (OSTEP) to facilitate the transition of new sensors and systems to an operational status. Demand for real-time coastal oceanographic and meteorological data is growing quickly and it is critical that the systems utilized are accurate, reliable, and cost effective. OSTEP tests instruments to ensure that CO-OPS requirements are met, develops operational deployment and implementation processes, and establishes quality control criteria.

Each new sensor added to the suite of instruments brings additional liability and exposure. OSTEP provides the necessary quality assurance on the front end of the data collection and distribution effort. OSTEP develops defensible justification for the selection of instruments used for CO-OPS installations, and subsequent validation procedures for the devices traceable to U.S. National standards or other accepted standards.

OSTEP is a matrix-managed program and consequently draws upon all CO-OPS resources. The success of the program is a tribute to the dedication of all CO-OPS personnel who have enthusiastically accepted additional tasks to improve NOS products and services.

NATIONAL CURRENT OBSERVATION PROGRAM

NOAA manages a National Current Observation Program (NCOP) to meet the Nation's needs for current observations, tidal current predictions, and other tidal current products. NOAA's direct statutory authority to conduct this program is the Coast & Geodetic Survey Act of 1947, as clarified through the Hydrographic Services Improvement Act of 1998, and amended in 2002. While the NCOP supports multiple NOAA missions and applications, its primary function is to support safe and efficient marine navigation. The NCOP is a national reference system (a federal backbone for an end-to-end system of current observations, data management, and data analyses and product dissemination to users). The observational component of the program is the conduct of systematic short term measurements at a number of locations each year. A primary objective of these observations is to ensure that the Tidal Current Prediction Tables are maintained in an accurate status.

NATIONAL OPERATIONAL COASTAL MODELING PROGRAM

The primary objective of the National Operational Coastal Modeling Program (NOCMP) is to develop a national network of Operational Nowcast and Forecast Hydrodynamic Model Systems (hereafter OFS) to support NOAA's mission goals and priorities.

OFS consist of the automated integration of observing system data streams, hydrodynamic model predictions, product dissemination and continuous quality control monitoring. State-of-the-art numerical hydrodynamic models driven by real-time data and model forecast guidance will form the core of these end-to-end systems. The OFS will perform nowcast and short-term (0 hr. - 48 hr.)

forecast predictions of pertinent parameters (i.e., primarily water levels and currents and in some cases salinity, temperature, waves, etc.) and disseminate the results to users.

OFS will be implemented in critical ports, harbors, estuaries, Great Lakes and coastal waters of the United States and will join NOS' operational oceanographic capabilities to form a national backbone of real-time data, tidal predictions, data management and operational modeling. This national backbone will serve a broad base of users that rely on NOS' product suite for informed decision making. In addition to improving the safety and efficiency of commercial shipping and recreational boating, other direct applications of this information include: improving national security; proactively preventing, mitigating and responding to natural hazards and oil spills; facilitating safe, efficient and quality recreational use of coastal waters; aiding search and rescue, forensic and law enforcement operations; improving coastal storm warnings; facilitating coastal management and stewardship; as well as providing opportunities for basic research.

The NOCMP will support NOAA's mission goals and priorities and is consistent with the missions, visions and ongoing collaborations of OCS and CO-OPS. In addition, these goals complement proposed components of the Coastal Integrated Ocean Observing System (IOOS) and the identified role of a national backbone of observations, data management and modeling (Ocean.US, 2002). NOS has been a leader in research, development and implementation of OFS for NOS' Physical Oceanographic Real-time Systems (PORTS®) . Success with these systems has led to developing long-term strategies for the implementation of OFS and the establishment of the NOCMP.

NATIONAL COASTAL OCEANOGRAPHIC APPLICATIONS AND SERVICES OF TIDES AND LAKES (COASTAL) PROGRAM

The National Coastal Oceanographic Applications and Services of Tides and Lakes (COASTAL) Program, includes outreach, technology transfer, and guidance to assess the needs of and promote user understanding of non-navigation (and non-traditional) applications for water level products such as long-term sea level trends, marine boundaries, coastal flooding warning, habitat restoration, and other applications. The Program assesses the needs of users, particularly state coastal resource managers, in these areas, to more efficiently provide service. Working through the research and development capability, the Program develops new products and services, as appropriate. As a matrix managed activity, technical managers are assigned, as needed, to each major region (East Coast, Gulf, West Coast, Alaska/Pacific, Great Lakes) and work through the Coastal Zone Management Program, Coastal Services Center and other outreach components (Navigation Managers, Sea Grant port specialists, etc.) primarily to provide specialized expertise in water level applications and in the integration of water level products in coordination with other NOAA services to meet user needs. The Program will determine the specific requirements of each state or local entity, identify solutions, and utilize cost-shared projects to address and solve local needs for marine boundaries, coastal flooding, restoration and other coastal resource management applications. The program will continue to integrate the expertise and capabilities of other NOAA offices, such as NOS/OCS, NGS, ORR, and CSC and NMFS.

Appendix A

CO-OPS CORE VALUES AND GUIDING PRINCIPLES

The following values and principles have provided the basis for decision making by CO-OPS over our long and successful history of providing critical products and services to a broad base of constituents. These same drivers will continue to shape CO-OPS as plans are developed for the future.

Success results from building a strong base of constituents. CO-OPS has been successful in gaining recognition and support from Congressional members from a number of states owing to constituents voicing a need for CO-OPS products and services.

CO-OPS must be vigilant in maintaining state-of-the-art technology for measurement systems, sensor assessment, information management, communications, and product distribution. Technology is an integrated capability. New systems expand capability and connectivity.

We live in a real-time world. People want information now. All decisions must reflect this reality.

CO-OPS must always hold data and information products to the highest standards. CO-OPS must always be able to audit data quality from environmental signal to end product. Always look for new and innovative ways to give constituents the sense that they are getting the very best when doing business with CO-OPS.

Be willing to take some calculated risks. CO-OPS must remain out front and continue pushing the technology envelope.

One person with vision and tenacity can make the difference between a program being eliminated and that same program being recognized as a winner. That same person, in a leadership position can direct and inspire others to collectively create totally new programs such as PORTS (airbag and seatbelt of the maritime transportation industry) or COASTAL.

It is better to do the right thing slowly than to not do anything. OSTEP growth has been painfully slow and has just now really become sustainable. The future of OSTEP includes expanded third party applications. Users will come to OSTEP with funds in hand to assess and develop new technology. Future users will use OSTEP (Seal of Approval) as a marketing tool. The OSTEP infrastructure (test bed) will grow which will, in turn, attract additional business. Once again, the customer is buying a level of comfort they might not get anywhere else.

CO-OPS needs to continue moving forward on all levels where there is user interest. While doing so, leadership must decide how to best allocate resources based on broad program needs.

Not knowing what might be the next program genesis, the office must keep numerous sticks in the fire.

CO-OPS can take existing capabilities and create new business opportunities simply by devoting a sufficient level of resources to the new task. Once again, leadership must decide how to best allocate resources based on broad program needs.

There are countless benefits with doing business in concert with partners. Shared ownership of an activity leverages the resources (including intellect) of all partners. In addition, non-Federal partners have license to influence the legislative process. Partnerships are resource intensive. Considerable effort goes into the partnership process.

CO-OPS strengthens core capabilities through additional partnership links with outside groups including private organizations. CO-OPS is a highly leveraged organization that is in the business of partnering with other parties to meet the needs of a broader user community. The strategy for the future includes building upon and enhancing the existing NOS operational infrastructure and culture which has emphasized cross-program and cross-NOAA integration. CO-OPS mission growth has been accomplished through advances in technology and outsourcing, while streamlining the number of personnel required to maintain the internal core workforce capability.

CO-OPS' success is directly linked to IT capacity. CO-OPS must maintain computational equilibrium with other IT intensive organizations. Further, the office network infrastructure must allow seamless capability to fully utilize computational capacity. CO-OPS will stay current with IT hardware and software technology in general and solicit and engage specialists in IT fields such as AI that can apply the technology to solve real world operational problems.

If CO-OPS is going to continue to grow, the office must increase the capacity to satisfy field operations (where the rubber meets the road) demand.

Outreach (success breeds more success) is defined as an organized effort to extend services beyond usual limits, as to particular segments of a community. CO-OPS must continue spreading the message.

CO-OPS biggest challenge is making full use of abilities and resources. The present number of FTEs will increase at an insignificant rate. CO-OPS FTEs represent the office core capability. How does the office make best use of core capability personnel? CO-OPS must continue to outsource to grow and meet ever increasing demands. We do this through partnerships (shared responsibilities) and contracting. Contracting includes (1) bringing in personnel to work along side of us and (2) funding others to perform specific functions. The only question is how do we best outsource (conserve overhead).

Appendix B

ACRONYMS

ADCP	Acoustic Doppler Current Profiler
AOP	Annual Operating Plan
COASTAL	Coastal Oceanographic Applications and Services of Tides and Lakes
COOP	Continuity of Operations Plan
CO-OPS	Center for Operational Oceanographic Products and Services
CORMS	Continuously Operating Real-Time Monitoring System
CREWS	Coral Reef Early Warning System
CSC	NOS Coastal Services Center
CSDL	Coast Survey Development Laboratory
DCP	Data Collection Platform
DO	Dissolved Oxygen
ENSO	El Nino-Southern Oscillation
FOD	Field Operations Division
FTE	Full Time Equivalent
GIS	Geographic Information Systems
GLERL	Great Lakes Environmental Research Laboratory
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
HAB	Harmful Algal Blooms
HAZMAT	Hazardous Material
HF	High Frequency
HSIA	Hydrographic Services Improvement Act
HQ	Headquarters
IOOS	Integrated and Sustained Ocean Observing System
IT	Information Technology
NCCOS	NOS National Centers for Coastal Ocean Science
NCOP	National Current Observation Program
NGS	National Geodetic Survey
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOCMP	National Operational Coastal Modeling Program
NOS	National Ocean Service
NWLON	National Water Level Observation Network
NWLP	National Water Level Program
OAR	NOAA Office of Oceanic and Atmospheric Research
OCRM	Office of Ocean and Coastal Resource Management
OCS	Office of Coast Survey
OFS	Operational Forecast Systems
ORR	NOS Office of Response and Restoration

OSTEP	Ocean Systems Test and Evaluation Program
PORTS®	Physical Oceanographic Real-Time System®
TCARI	Tidal Constituent and Residual Interpolation
U.S.	United States
USACE	U.S. Army Corps of Engineers
WMD	Weapons of Mass Destruction