



## National Water Level Program

**OBJECTIVE:** The National Water Level Observation Program (NWLP) supports the goals of the NOAA Strategic Plan with a National capability of water level measurements and a suite of products and services that meets a full spectrum of user needs. Program efforts are conducted under a documented quality assurance umbrella such that application of water level measurements and derived products and services can be reliably and confidently applied by all users; from real-time application to long term sea level variations.

**PURPOSE:** NWLP resources and activities are especially targeted towards supporting the Promote Safe Navigation and Advance Short-Term Warning and Forecast Services elements of the NOAA Strategic Plan. The continuity of the observation components of the NWLP over time has also resulted in Program products being applied to the Implement Seasonal to Interannual Climate Forecasts and Predict and Assess Decadal to Centennial Change missions. The foundation of the Program is the National Water Level Observation Network (NWLON), a network of 189 continuously operating water level measurement stations in the U.S. coastal zone, including the Great Lakes and U.S. Territories and Possessions. The NWLON provides the National vertical water level reference datum system for the NOAA Nautical Charting Program, PORTS activities, HAZMAT activities, US Army Corps of Engineers (USACE) dredging and coastal construction activities, and the coastal monitoring, surveying and mapping activities of coastal states and other federal, state, and local agencies. The NWLP also provides a standard set of tidal prediction products and services for the user community. The NWLON, because it is a coastal network of observation locations, provides real-time and near-real time information to NWS storm surge and tsunami warning forecasting activities at the national, regional, and local level.

**BENEFITS:** Specifically, the operational capabilities of the NWLP are critical to:

1. the Nautical Charting Program by establishing the vertical reference datums from which charted water depths are calculated. Accurate hydrographic surveys and chart products could not be produced without a robust and modern observational network,
2. the PORTS Program by using key existing NWLON stations and establishing reference datums at new locations used in local real-time dissemination of water level and ancillary data,
3. the NWS short-term warning and forecast activities by providing real-time and near real-time access to data for use in marine forecast systems and models, coastal storm surge forecasts, and the hurricane forecasting and modeling activities of the National Hurricane Center,
4. application by other federal, state and local agencies. For instance, the USACE for coastal zone regulation, dredging, and coastal construction; FEMA for disaster mitigation and analysis; and coastal states for surveying, mapping, and marine boundary applications.



## NATIONAL WATER LEVEL PROGRAM

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### MODERNIZATION AND RESEARCH AND DEVELOPMENT ACTIVITIES

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#### BACKGROUND

#### MODERNIZATION

1. Complete the installation of the next generation water level measurement systems (NGWLMS) into the NWLON. Six tide stations and 21 Great Lakes stations still have obsolete 30-year old technology gauges operating which are not adequate to meet program missions. The old technology gauges will not meet the requirements for real-time data access by PORTS, NWS, and hydrographic surveys
2. Develop, procure, and deploy new "out-of-water" water level measurement sensors for the NWLON and other applications. The present acoustic sensors require substantial "in-water" protective wells and underwater components that are costly to maintain. There is also a need to upgrade the NWLON Data Collection Platform (DCP). The current NWLON DCP is based on 15 year old computer technology that limits the onboard data processing and quality control.
3. Continue software development and enhancements to the NWLP Data Processing and Analysis System (DPAS) in headquarters. These include upgrading to latest operating system, database, and PC workstation technology, implementation of automated procedures in the production of standard output products, developing remote linkages from DPAS to field operations, and further development of Internet Home Page and Telnet interface capability.

#### RESEARCH AND DEVELOPMENT

1. Develop and implement, with Coast Survey Development Laboratory (CSDL), an automated continuous tidal zoning program that will replace the manual, time consuming tidal zoning methodology used now. This will allow for faster application of tide reducers in the nautical chart production pipeline.
2. In partnership with the Nautical Charting Division, coastal states, and private industry; continue to support the development of portable water level measurement system technology for short-term measurement requirements.
3. Conduct a NWLP Network-Size Study to insure optimal utilization of resources in support of OPSD's Mission.

# Providing Real-Time Environmental Data for the Mariner

Promote Safe Navigation Strategic Plan Goal

## NOAA Legislative Issue Paper

### 105th Congress

April 1997

202-482-4981

Contact: Richard Legatski | Dave Jansen

#### ISSUE

Authorization of a national Physical Oceanographic Real-Time System (PORTS) program.

#### BACKGROUND

PORTS is a decision support tool that provides quality controlled real-time water level, current, and other critical oceanographic and meteorologic data from an entire bay or harbor to mariners through a variety of user friendly forms. The data are used to promote safe navigation as well as enhance the cost efficiency of maritime commerce. Large economic benefits can be realized through accident avoidance, increased cargo capacities, and more efficient transit scheduling. Healthy coastal ecosystems are sustained through hazardous materials spill avoidance, improved response capabilities when spills do occur, and better data for coastal resource program managers.

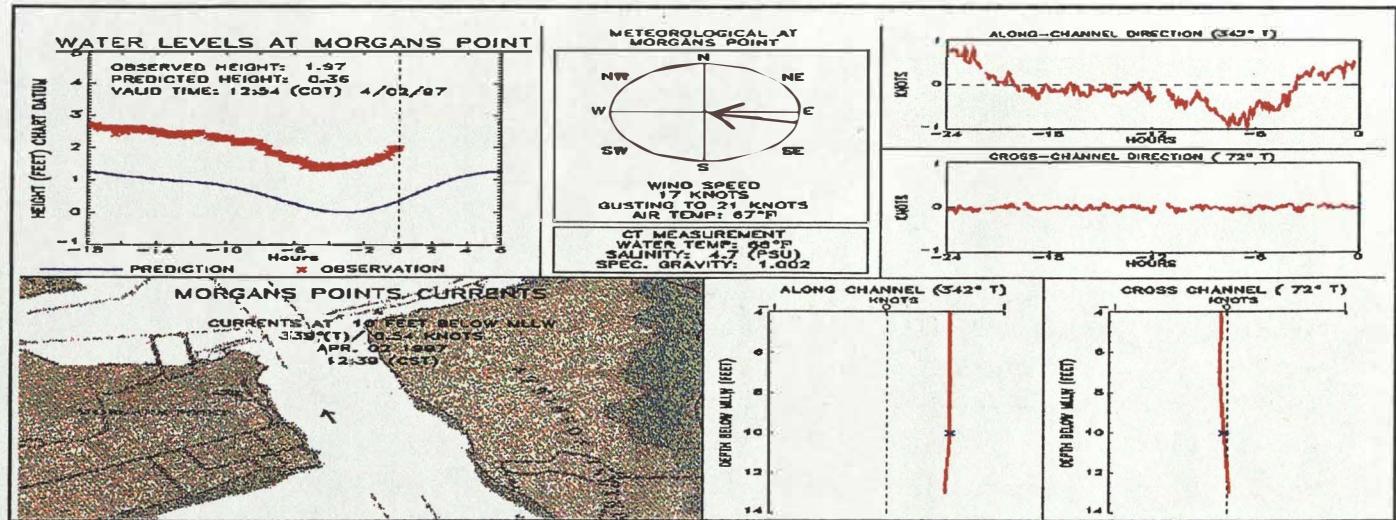
There are currently four PORTS operating in the United States (Tampa Bay, New York/New Jersey, Houston-Galveston, and San Francisco Bay).

Authorizing legislation would establish an open, consistent, process whereby PORTS could be implemented where needed on a case by case basis, through close collaboration with the local maritime community, and with prerequisites clearly specified in advance.

Each PORTS would be implemented through a local partnership, with the design, and installation being a joint, cost-shared effort. A signed, long term commitment by the local partner for the operation and maintenance (O&M) would be a prerequisite for the establishment of a PORTS.

NOAA would remain responsible for overall data quality control of all data collected and distributed by the PORTS and for the O&M costs associated with NOAA's base safe navigation mission.

In today's increasingly competitive international arena, the real time data services provided by PORTS are commonly found in many foreign ports and harbors. This, among other factors, is leading the shipping industry to consider US ports and harbors as lacking in the basic technology and services considered standard for world class ports. This failure to minimize safety risks, and maximize the efficiency of the commerce passing through our Nation's busy ports and harbors, is placing the US at an ever-increasing disadvantage in the global marketplace.



Sample Screen Display from the PORTS in Houston Galveston

**WHO IS AFFECTED:**

Marine Pilots  
Maritime Organizations  
Port Authorities

Commercial Carriers  
Cruise Lines  
Bulk Exporters

Oil Tankers  
Waterway Operators  
Natural Resource Managers

US Coast Guard  
US Navy  
US Army COE

**FACTS TO CONSIDER:**

- The health of maritime commerce is critical to the health of the US economy. Sea-going commerce has tripled in the last 50 years, and more than 98 percent of U.S. foreign trade by weight moves by sea. In 1991 the commercial shipping industry supported 1.5 million jobs, provided personal income of \$52 billion, and generated almost \$20 billion in Federal, State, and local taxes.
- About 3,500 commercial shipping accidents occur in US waters each year. Shipping accidents can not only be extremely expensive, but can have severe consequences to the environment. Crude oil, petroleum products, and chemical products total almost one half of all waterborne commerce by weight in the United States. Clean up costs for the Exxon Valdez spill alone are estimated to be around \$3 billion.
- In March of 1993, the oil tanker M/V POTOMAC TRADER ran aground in New York City's East River, causing extensive damage to its bottom plating, rudder and propeller. If not for the vessel's double hull, it is likely that a major oil spill would have occurred. The US Coast Guard accident report found the failure to determine whether the depth of water in East River was adequate for transit as the primary cause of the grounding. The report noted the occurrence of abnormally high and low tides at the time and that access to real time tide information may have prevented the accident.
- The Association of Maryland Pilots recently raised Baltimore's maximum draft from 39.5 feet to 41 feet - a direct result of the pilots' use of real-time water level data from NOAA gauges in Chesapeake Bay. Similar impacts have been seen in the Delaware River and Bay System, in Portland, Oregon, and in Tampa, Florida. Estimated revenue increases per transit range from \$36,000 to \$288,000 for each additional foot of draft for large bulk and container ships.
- The PORTS in San Francisco Bay enabled more precise and efficient deployment of spill response efforts in the recent CAPE MOHICAN oil spill.
- Although installed primarily to promote safe and efficient navigation, PORTS have numerous secondary benefits. Coastal resource managers use PORTS information to help create circulation models and to conduct in-depth investigations of bay and harbor ecosystems as just one example of many applications.
- NOAA is developing the Continuous Operational Real-Time Monitoring System (CORMS), a 24 hour a day/seven days a week, automated system to quality control the real time data being disseminated by PORTS.



# PORTS Information

## **Advances National Safe Navigation and Coastal Management Protection Mandates**

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FROM:

Michael Wiers, CO-OP

Accurate bathymetry combined with real-time water level and current information from PORTS, particularly when presented in digital form on moving map displays, reduces the margin of channel depth uncertainty. The economic benefits of this information are direct and immediate to ports. In one recent case at the Port of Oakland, a ship using improved tide information was able to remain at the dock longer than it could have using predicted tides, and off-load additional containers. As a result, the shipping line saved the cost of shipping the containers to Oakland from its next port of call. More recently, J.D. Nielsen, Senior Vice President of Maersk Lines, was quoted in the *Journal of Commerce* on March 24, 1997 as saying three feet of extra draft in the Port of Oakland were worth \$3.5 million per year to his shipping company alone.

Were a hazard spill to occur, first responders may also use PORTS data to validate trajectory models and other spill response tools, with the result that spill response is more effective and efficient. Such was the case on March 18, 1996 when a barge carrying more than 714,000 gallons of oil broke open in Galveston Bay. At the time of the spill there were strong and sustained winds from the north and Galveston Bay was in a significant flushing mode. NOAA's HAZMAT Team immediately obtained access to the Houston/Galveston PORTS data and were able to determine that the predicted tides and currents were not what was really going on at the spill site. As a result of the PORTS data, HAZMAT was able to create a trajectory that accurately predicted the initial movement of the oil that guided in the containment and clean up of the spill.

This same PORTS information is critical for the management and protection of coastal resources. Where dredging is required, for example, current and water level data can assist in project design, help identify dredge spoil disposal options, help execute projects to minimize harm to coastal resources, and to plan beneficial use of spoils, should that be a viable alternative. Coastal managers need the data collected for navigation and positioning purposes to address a broader set of coastal resource issues for the future such as change analysis, land-use assessment, wetland restoration, monitoring nonpoint-source pollution, identifying hazardous waste sites, modeling sediment and containment fates, and other uses. In Galveston Bay, coastal managers are planning to use PORTS data to determine flooding of wetlands for the purpose of mosquito control and to monitor environmental conditions of commercial oyster beds. In today's economic and political climates, these natural efficiencies are critical: the need to collect data and distribute information for the maritime community results in comprehensive information essential to sustain coastal ecosystems that would otherwise be deemed too costly to produce.



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
OFFICE OF THE GENERAL COUNSEL  
Washington, D.C. 20230

Our second recommendation is that NOS should implement a PORTS quality control program as soon as possible. The disclaimer should be considered an interim measure only, pending the implementation of the quality control program. Without such a quality control program, there is the potential for a substantial public relations problem. The disclaimer should only be used as a temporary measure.

November 4, 1996

MEMORANDUM FOR: Richard Barazotto, OES  
Michael Weiss, GCOS *M. Weiss*  
Disclaimer for PORTS Data

FROM: SUBJECT:  
Per your request, GCOS reviewed and revised the disclaimer you provided for the Physical Oceanographic Real-Time System (PORTS) program. GCOS also consulted with DOC/GC's liability attorney and his comments have also been incorporated into the disclaimer. However, both GCOS and DOC/GC have the following concerns regarding this matter and recommend you take the corrective steps discussed below.

The PORTS real-time data are provided by NOS for use by the commercial shipping industry when entering and exiting ports such as San Francisco and Tampa Bay. NOS has brochures describing the PORTS program which specifically encourage vessel operators to use the PORTS data to save time and money. Through its brochures and other media highlighting the benefits of PORTS, NOS is engendering reliance by shippers on the PORTS data. However, NOS is aware that the PORTS data it is providing and encouraging vessel operators to use may contain inaccuracies. Encouraging reliance on the PORTS data while also having knowledge that such data may contain inaccuracies, which could result in groundings or other accidents, puts NOAA at substantial legal risk. The fact that the inaccuracies are not readily apparent to a mariner increases the likelihood of a maritime accident and possible liability to NOAA.

Consequently, GCOS and DOC/GC recommend that NOS take the following steps. First, we agree that NOS should immediately begin using the attached disclaimer. The disclaimer should be used every time the PORTS real-time data is provided to the public. The disclaimer will put users on notice that the PORTS data may contain inaccuracies. While promoting the PORTS and having a disclaimer may be contradictory (either the data is reliable or it is not), we believe the disclaimer should protect NOAA from liability. However, should an incident occur that results in legal action against NOAA, it is possible a court could reject the disclaimer and hold NOAA liable. This would likely be based on the fact that NOS is actively encouraging the use of the PORTS data for navigation while at the same time having knowledge that the data provided may be inaccurate, thus putting mariners at risk.

PRIVILEGED\*\*ATTORNEY - CLIENT\*\*PRIVILEGED



Our second recommendation is that NOS should implement its PORTS quality control program as soon as possible. The disclaimer should be considered an interim measure only, pending implementation of the quality control program. Further, should an incident occur that results in damage, injury or death, regardless of whether the disclaimer protects NOAA from liability, there is the potential for a substantial public relations problem that could mar not only the PORTS program, but the credibility of NOAA in general. This is another reason the quality control program should be implemented as soon as possible.

Please call me at 713-2967 if you have any questions or need additional assistance.

Attachment:

cc: G.Tallia  
T.Connor, DOC/GC

## DISCLAIMER

These PORTS data have not been subject to NOS' quality control procedures and, therefore may contain inaccuracies. Although NOS is making these data publicly available, NOS does not warrant, endorse, or recommend the accuracy of these data and the user assumes the entire risk related to the use of these data. In no event will NOS be liable for any direct, indirect, incidental, consequential, special, or exemplary damages, lost profits, injury or death resulting from any use or misuse of these data.



## CORMS: Continuous Operational Real-Time Monitoring System

### Ocean Systems Test & Evaluation Facility

**OBJECTIVE:** The objective of the Continuous Operational Real-Time Monitoring System (CORMS) is to develop and implement a 24 hour/day monitoring and quality control capability to ensure the availability and accuracy of tide and current observations that are used for navigation and safety of life and property decisions. An operational CORMS will support three of the goals described in the NOAA Strategic Plan; Promote Safe Navigation, Sustain Healthy Coasts, and Advance Short-Term Warning and Forecast Services. CORMS will be used to immediately support the application of data by real-time and near real-time users.

**PURPOSE:** CORMS can be categorized as a quality control and decision support system that combines the use of real-time communications, data analysis, system monitoring GUI (graphic user interface), and system “watch dog” and notification capability. When implemented, CORMS, will (1) ingest real-time and near real-time data and information; (2) determine data completeness; (3) measure data quality; (4) generate statistics used to evaluate system performance; (5) provide decision making information for possible field team response; and (6) communicate to real-time and near real-time users the identification of invalid or suspect data. CORMS will have a direct link to field personnel so they can respond to information provided by CORMS in the resolution of data problems. The information sources of CORMS will be the National Water Level Observation Program (NWLOP) and the Physical Oceanographic Real-Time Systems (PORTS). These operational real or near real-time systems are operated solely by, or in partnership with, the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office of Coast Survey (CS), Oceanographic Products and Services Division (OPSD).

**BENEFITS:** The implementation of CORMS will have significant benefits to a wide variety of NOS users, both real-time and near-real time. The most important benefit is that CORMS will allow NOS to continue to provide real-time data services. Without CORMS, the quality of data from NOS real-time observing systems, such as PORTS, would remain questionable, at best. The NOS General Counsel has determined that this uncertainty in PORTS data quality places NOS at “substantial legal risk.” General Counsel further concluded that the fact that potential PORTS data inaccuracies would not be readily apparent to a mariner increases the likelihood of a maritime accident and possible liability to NOAA. CORMS will improve overall data quality assurance of real-time measurements, reduce NOAA’s potential liability and will make these observations more useful for other applications.



## National Water Level and Current Data Program

### Ocean Systems Test & Evaluation Facility

The National Ocean Service (NOS) is an agency that provides hydrological, oceanographic and meteorological data and services to the nation's coastal and Great Lakes communities.

The goal of the planned Ocean Systems Test & Evaluation Facility (OSTEF) in Norfolk, VA, is to provide oceanographic and marine meteorological data quality assurance to a degree required for NOS to accept legal liability for observations and derived products and services. It will be one essential component in navigation safety and marine resource management information product and service quality assurance.

There are four objectives of OSTEY:

- 1) Evaluation of new technology for use in measurement systems;
- 2) Integration & Test (I&T) of field measurement systems;
- 3) Development Test & Evaluation (DT&E) to determine measurement system readiness for operational deployment; and
- 4) Life cycle evaluation of system performance, operations, and maintenance.

OSTEF must provide three basic data quality assurance capabilities:

- 1) Measurement standards traceable back to the National Institute of Standards and Technology of sufficient accuracy in the field to determine an uncertainty budget for measurements used directly as observations and for validation of hydrodynamic model predictions;
- 2) Legally identifiable organization and management with the authority and resources needed to meet the goal; and
- 3) A quality process appropriate to the type, range and volume of calibration and testing activities to meet the most demanding OPSD product and service quality assurance requirements.

OPSD will provide the capability through a partnership with the Naval Surface Warfare Center/Carderock Division, the National Institute of Standards and Technology (NIST), Old Dominion University, and commercial partners in systems development. OSTEY will be accredited against ISO 25 standards under the National Voluntary Laboratory Accreditation Program (NIST) to ensure that the three capabilities are continuously improved to meet evolving program requirements.



## Cooperative Research & Development Agreement

The National Ocean Service PORTS is an oceanographic and marine meteorological observation and prediction system providing decision support for safe and efficient navigation and effective marine resources management. NOS implementation of a National PORTS is limited by funds, personnel, and technical expertise. A Cooperative Research & Development Agreement (CRADA) pursuant to and in compliance with 15 U.S.C. section 3710a has been proposed with Lockheed Martin.

Under this agreement NOS will "provide exclusive license to Lockheed Martin to use PORTS for Marine Traffic Management applications in return for support in the development of a National PORTS, for which NOS assumes legal liability for information, and a royalty for Lockheed Martin products and processes that utilize PORTS."

A Research Plan has been developed which identifies three areas of cooperative Research & Development:

- 1) Integrated PORTS Products and Process Teams including Federal Agencies, academia, and contractors will be defined and lead by Lockheed Martin to develop and integrate PORTS, CORMS, and OSTEF into a PORTS Quality Process to ensure that NOS can meet its legal liability for information provided.
- 2) Marine Traffic Management decision support systems will be integrated with PORTS. The PORTS in NY/NJ will be integrated with the USCG Vessel Traffic Service and information provided aboard vessels using Lockheed Martin's PILOTLINK™ carry on piloting electronic chart display system. PORTS technology will be incorporated into Lockheed Martin Traffic Management systems worldwide.
- 3) An extensible National PORTS Architecture will be developed to allow user extensions of functionality and application scope without need for system re-design and NOAA or Lockheed Martin intervention. It will enable PORTS to be extended by Federal and academic research groups to include physical transport processes in the marine ecosystem, GIS based resource risk management, and value added applications for as yet undefined user classes.



## HARBOR MAINTENANCE TRUST FUND RECONFIGURATION

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**ISSUE:** NOS' navigation safety programs are seriously underfunded. Present climate in Congress makes it unlikely that the required increase in funds can be provided through the appropriation process alone. Previous efforts to encourage the ports/harbors to help fund NOS program activities have not been generally successful because most ports/harbor believe that they have already made their contribution to these activities through taxes paid to the Harbor Maintenance Trust Fund (HMTF). NOS must establish a mechanism to gain access to these funds collected from U.S. ports and harbors.

**BACKGROUND:** The HMTF was established to fund activities related to improving the safety of U.S. ports. The funds collected result from a fee assessed on the value of commercial cargo passing through the ports. The port of NY & NJ pays approximately \$80 million in taxes every year into the HMTF. The Port Authority of NY & NJ estimates that they receive an approximately 30% return on this investment. The largest beneficiary of funds provided through the HMTF is the U.S. Army Corps of Engineers (USACE). The USACE use these funds to support dredging operations. When the HMTF was established, a portion of the funds collected were identified for NOAA's use to improve navigation safety (e.g., tides/currents, charting, marine weather, etc.). At present, three factors are affecting NOS' prospects for gaining access to these funds: 1) While the authorizing legislation provided a formula for determining NOAA's share of the collected funds, it did not provide a mechanism for NOAA to draw on these funds; 2) Even if NOAA could access HMTF the fund is presently "on budget", consequently, every dollar removed from the fund to support our programs would be offset by a reduction in our appropriation; and 3) the HMTF has been ruled unconstitutional by a federal court.

**DISCUSSION:** The issue of HMTF unconstitutionality may provide an opportunity for NOS to gain access to additional funds. Most port authorities believe that the HMTF will be ruled unconstitutional by the Supreme Court. They also believe that the HMTF will be reconstituted in some form. Two of the main objections expressed by the ports to the HMTF is that the ports feel that they do not derive benefit from the HMTF commensurate with their investment, and they further believe that they have no influence over how the funds are spent on their behalf. Discussions with a several port authorities have resulted in a framework for a reconfigured HMTF that may be acceptable to Congress and would allow NOS' programs to be funded at levels beyond our current appropriations.

The new concept would allow the ports to either pay the tax as they presently do, or to take a "tax credit" of up to 50% of the assessed tax by placing funds in a locally administered harbor maintenance fund. The port authorities would be required to use these funds for harbor improvements, which complies with the intent of the original HMTF. Approval of the tax credit would be contingent on the local port authority executing a Memorandum of Agreement with the responsible Federal agency (i.e., NOAA, USACE, etc) which would detail exactly how the funds would be spent. Through these

partnerships, the Federal agencies would still exercise stewardship over the funds, however, the local authorities would have a much greater sense of ownership over how their tax dollars were spent. These funds would be available to install and operate a national network of Physical Oceanographic Real-Time Systems (PORTS), contract for hydrographic surveys, and help fund NWS weather buoys and other services.

Using the example of the Port of NY & NJ above, the local port authority could assign up to \$40 million each year to their local fund for harbor services. This approach, if implemented, has more potential for providing access to revenues to support NOS activities than any conventional budget initiative imaginable. This approach is also consistent with the concept of "reinvented" government, where services are provided in partnership with local funding. This approach simply allows the locals a more direct say in how their funds are spent.

**RECOMMENDATION:** Develop a joint NOS/NWS strategy to present this approach to the major port authorities and key Congressional staff to determine feasibility.