NOAA Technical Report NOS CO-OPS 37

IMPLEMENTATION PLAN

PORT OF NEW YORK AND NEW JERSEY OPERATIONAL FORECAST SYSTEM (NYOFS)

Silver Spring, Maryland
September, 2002

noaa **National Oceanic and Atmospheric Administration**

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

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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 NOS' Strategic Plan mission requirements, and to assist in providing operational oceanographic data/products required by NOAA's other Strategic Plan themes. 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.

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Mark Vincent, Eugene Wei, John Kelley, Mike Evans,
Kathryn Thompson Bosley and Rich Bourgerie

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Table of Contents

Executive Summary

The Port of New York and New Jersey Experimental Forecast System (NYEFS) is a National Ocean Service (NOS) project designed to provide improved nowcasts and short-term forecasts of water levels and currents in the New York Harbor and surrounding waters. Reliable information on water levels and currents are important components of NOS' efforts towards promoting safe and efficient navigation in our Nation's waterways. The system is presently in an advanced, stable, experimental stage and is maintained at the NOS Coast Survey Development Lab (CSDL). This document describes the plan for the migration of the system from the present experimental status to an operational status at the NOS Center for Operational Oceanographic Products and Services (CO-OPS).

The NYEFS is a highly integrated suite of programs and scripts that acquires and processes data/information, uses the data/information to run nowcast and forecast hydrodynamic models, and processes and disseminates the model output to users.

The hydrodynamic model is a three-dimensional version of the Princeton Ocean Model (POM) that computes water levels and three-dimensional velocities on a spatially-varying horizontal grid with resolution ranging from 150 to 1000 meters. A finer sub-grid model (horizontal resolution ranging from 70 to 150 meters), that covers channels and bays important to navigation, is nested within the coarse grid.

The model and its supporting architecture is run in both nowcast and forecast modes. Primary inputs to the nowcast model system include real-time water levels and winds from the New York/New Jersey Harbor Physical Oceanographic Real-time System® (PORTS). This model mode performs hourly updates. Four times a day, the forecast model mode performs 30 hour forecasts. Primary inputs for this mode include initialization from the nowcast model, tidal harmonics and forecast guidance of subtidal water levels and winds obtained from operational National Weather Service numerical models.

The operational model will be officially known as "The Port of New York and New Jersey Operational Forecast Model System, and use the acronym of NYOFS. Research and development activities will continue on the separate experimental version of the system in order to provide for future enhancements and refinements.

Once operational, NYOFS will be a valuable new tool for nowcasting and forecasting water levels and currents. Successful implementation of NYOFS will provide several important benefits to the local maritime community, such as providing information for increased margin of safety, maximizing the efficiency of maritime commerce through the harbor, and providing critical information for marine search and rescue and hazardous material spills.

1. INTRODUCTION

The National Ocean Service (NOS) has developed an integrated and automated system for providing model based predictions of the water levels and currents in New York Harbor and surrounding waters (New York and New Jersey Experimental Forecast Model System). Planning is underway for this system to become fully operational, and provide official forecast guidance products to the Nation's maritime users. The purpose of this document is to provide the necessary instructions and details to implement this operational status in an efficient and orderly manner. For completeness, brief overviews of the project background, system and objectives are also provided (Section 1). The methodology needed to implement this project, including the identification of personnel and specific tasks is detailed in Section 2 and Appendix A.

1.1. Project Background

In 1995, the National Ocean Service (NOS) undertook the Chesapeake Area Forecasting Experiment (CAFE), which was a project aimed at improving predictions of water levels within Chesapeake Bay (Bosley, 1996). CAFE accomplished this goal with the development and implementation of automated numerical hydrodynamic models of the bay. The products of these models provide critical nowcast and short term forecast information to the commercial, governmental, and recreational maritime communities. After extensive testing and analysis, CAFE was promoted to a NOS operational system in 2001. To reflect this new status, the system was renamed as the Chesapeake Bay Operational Forecast System (CBOFS).

Based upon the combined success of the prototype CBOFS, and the need for improved oceanographic predictions elsewhere, the NOS has initiated development of forecast systems in other water bodies. New York Harbor is economically important and is characterized by complex hydrodynamic processes. Therefore this water body was selected as the next forecast system for implementation. The ports of New York and New Jersey are ranked in the top three ports in the US as determined by tonnage and dollar value. The Harbor has a complex geometry and circulation patterns, with current shears and eddies in numerous locations, especially in the Bergen Point area, just south of the Ports of Newark and Elizabeth terminals.

1.2. Project Description

The system presently developed for the New York Harbor is known as the "New York and New Jersey Experimental Forecast Model System" (NYEFS). Developed at the NOS Coast Survey Development Lab (CSDL), this system is currently running in an advanced, stable, experimental status. The NYEFS is a highly integrated suite of programs and scripts that acquires and processes data/information, uses the data/information to run nowcast and forecast hydrodynamic models, and processes and disseminates the model output to users.

The hydrodynamic model used is a homogenous, three-dimensional version of the Princeton Ocean Model (Blumberg and Mellor, 1987) that computes water levels and three-dimensional velocities on a spatially-varying horizontal grid with resolution ranging from 150 to 1000 meters. A finer sub-grid model (horizontal resolution ranging from 70 to 150 meters), that covers channels and bays important to navigation, is nested within the coarse grid.

The numerical models are run in two parallel modes: nowcast and forecast. The nowcast mode produces hourly nowcast updates. The forecast mode produces 30 hour forecasts every 4 hours. Critical data needed to drive the nowcast model are obtained from the New York Physical Oceanographic Real-time System® (PORTS). Water level data from the Sandy Hook, NJ and Kings Point, NY PORTS® stations are used for the two open boundaries of the model. The model uses a spatially uniform wind stress obtained from either the Sandy Hook (primary) or Robbins Reef (backup) PORTS® stations. Initialization for the nowcast model is derived from the variables saved at the end of the previous nowcast run (i.e. a restart file).

Initialization for the forecast model is also derived from the final variables saved from the most recent nowcast run. Water levels at the open boundaries are constructed from NOS tidal harmonic predictions and the forecast non-tidal water levels produced by the National Weather Service (NWS) Extra-Tropical Storm Surge (ETSS) model (Chen et al., 1993). A spatially uniform surface (10 meters) wind time series is constructed from the NWS 12 km resolution Eta atmospheric model (Black, 1994).

NYEFS is presently in an advanced, stable experimental status and is maintained at the CSDL. Based upon extensive analysis of the skill and robustness of the system, NOS has determined that the NYEFS merits promotion to a fully operational status and migration to the NOS Center for Operational Oceanographic Products (CO-OPS). To reflect this new status, the system will be renamed the Port of New York and New Jersey Operational Forecast System (NYOFS). In order to allow for future orderly enhancements, a separate experimental version of the system will remain at CSDL and be used for research and development. Extensive details of the configuration and evaluation of the NYEFS are detailed in Wei and Chen (2001, 2002).

NYOFS will join the existing Chesapeake Bay system (CBOFS) as an operational NOS forecast system. Several other systems are under advanced stages of development (i.e. Schmalz, 2000), and are expected to become operational in the future. Most of these systems require the same input products for forcing. To meet this need, a data/information ingest system was developed at CSDL to provide a centralized source to obtain certain products (i.e. ETSS, Eta, etc.). This data/information ingest clearinghouse is named the Operational Data Acquisition and Archiving System (ODAAS). Previously a subset of ODAAS (Kelley et al., 2000) was ported to CO-OPS to service just the needs of the Chesapeake System (CBOFS). However, due to the new demands of the NYOFS and future demands of other systems under development, a logical decision was made to port the relevant ODAAS components to CO-OPS. These ODAAS components will provide key input to the NYOFS, CBOFS and future estuarine forecast systems.

1.3. Project Objectives

The NYOFS will be an additional NOS tool used to provide predictions of water levels and currents to the maritime communities. In general, these nowcast and short term predictions are enhancements over existing NOS products. For example, the model water levels and currents are much more spatially resolved than the few locations of harmonic predictions or observational data sources. Moreover, in most cases the model forecast products are more accurate than the harmonic predictions that only account for the astronomic tide. In addition, unlike observations, the model forecasts can extend beyond the present time.

Upon successful implementation, the NYOFS will perform the following duties:

- acquire real-time water level and meteorological data from the New York Harbor PORTS® ;
- perform quality control and processing of those data to generate model input data sets;
- run a numerical model to produce hourly updates of nowcast water levels and currents;
- use the nowcast as initial conditions for subsequent nowcast and forecast model runs;
- use ODAAS to ingest forecast inputs;
- acquire forecasts of winds and open boundary water levels over the Harbor from ODAAS;
- perform quality control and processing of this information to generate model input data sets;
- run a numerical model to produce forecasts of water levels and currents;
- post process and disseminate both the nowcast and forecast water levels and currents;
- prepare quality control indicators (flags) from which decisions on the dissemination of the nowcast and forecast model products will be made
- archive the nowcast and forecast output.

This Implementation Plan is provided as an instruction manual to guide the transition from experimental status at CSDL to operational status at CO-OPS. The plan details the key tasks, procedures and personnel/team assignments required for a successful, efficient and orderly implementation. Moreover, the proper performance and integration of this plan will ensure the sustained manageability of the operational system.

2. METHODS AND RESOURCES

2.1. Implementation Strategy

As discussed, the NYEFS has been developed in a research environment at the CSDL. During this process, considerable refinement has occurred, which has resulted in a reliable and robust system. In general, the majority of this system will remain intact during the migration to CO-OPS. Many of the implementation tasks will involve porting and adapting existing components to new facilities and designated computer servers. Revisions will also occur to some directory structures, archiving procedures and the formats of certain model graphics and web pages. A notable enhancement of the NYOFS will entail the production of quality control indicator files which will be used by the Continuous Operational Real-time Monitoring System (CORMS).

2.2. Operational Facility

A key component of the implementation will be the deployment of the NYOFS and ODAAS to a suitable operational environment. The NYOFS and ODAAS hardware and communications will be located in the Center for Operational Oceanographic Products and Services (CO-OPS) computer facility in Silver Spring, MD. This existing operational facility (SSMC4 Room 6247) has the necessary security, air handling, network and power resources. Within this facility, both systems will have operational access to required inputs. This facility also provides access and resources for technical staff to perform routine maintenance and rapidly respond to problems.

2.3. Implementation Team

Migration of the NYEFS to the NYOFS will require coordination between the CSDL and CO-OPS staff. A project Implementation Team has been selected from appropriate leaders of these groups and will provide critical guidance, oversight and technical expertise. The CSDL model developer will be assigned the role of Project Manager and will make any scientific decisions necessary during implementation and operation of NYOFS. CO-OPS will assign an Operations Administrator that will be responsible for coordinating the implementation process and eventual oversight of the system. Successful implementation of NYOFS will be the dual responsibility of the Project Manager and Operations Administrator. These two will also be the primary public interface, responsible for educating users and collecting user feedback. A summary of these key project members is provided in Table 1.

2.4. NYOFS Implementation Tasks

Six main categories of tasks are identified that are necessary to carry out an orderly and well documented implementation of NYOFS. These tasks are listed below and described in more detail in the following subsections.

- Hardware Setup and Configuration
- Communications and Networking
- Software Porting and Engineering
- Training
- System Integration
- System Evaluation and Acceptance

Each individual task is detailed in a task assignment sheet which is contained in Appendix A.

2.4.1. Hardware Setup and Configuration

Table 1. NYOFS Implementation Team Members, Affiliations and Special Duties.

NOS STAFF	AFFILIATION	SPECIAL DUTIES
Eugene Wei	CSDL	Project Manager (Model Developer)
Mark Vincent	CO-OPS	Operations Administrator
Mike Evans	CO-OPS	ISD System Administrator
John Kelley	CSDL	ODAAS Developer
Frank Aikman, III	CSDL	
Steve Gill	CO-OPS	
Kate Bosley	CO-OPS	
Rich Bourgerie	CO-OPS	
Chris Zervas	CO-OPS	

A major enhancement of the NYOFS will be the use of new hardware specifically designated for this project. This new system hardware must be setup and configured in order for all subsequent implementation tasks to be completed. A schematic of the NYOFS hardware components and the flow of information between them is shown in Figure 1. Documentation of the hardware components of the operational system will be compiled and included in the overall system documentation.

2.4.1.1. ODAAS Server Setup and Configuration

ODAAS will be run on a new Dell Power Edge 2650 Server that will be purchased, setup and configured. The operating system of this server will be Redhat Linux Version 7.3. Configuration will include software installation, establishing naming conventions, directory structures, length of archive, and backup/restoration procedures. All associated peripherals will also be set up, as well as establishing printer and network access. The domain name of this server will be odaas1.nos.noaa.gov, and the model codes and scripts will run under the generic user account odaaser. If funding permits, a redundant system will be installed (odaas2.nos.noaa.gov), identically mirroring the primary system. Access to this account will be provided to the ODAAS Manager (Dr. John Kelley) and the Operations Administrator. This server will run UNIX scripts, FORTRAN and C Language programs. The standard suite of Redhat Linux with compilers should be adequate for these purposes. At a future point in time, installation of the MYSQL database may be needed.

2.4.1.2. NYOFS Server Setup and Configuration

NYOFS (preprocessing, model simulations , post processing, graphic production etc.) will be run on a new 4 processor SGI Origin 300 , that will be purchased, setup and configured. Configuration will include software installation, establishing naming conventions, directory structures, length of archive, and backup/restoration procedures. All associated peripherals will also be set up, as well as establishing printer and network access. The domain name of this server will be nyofs.nos.noaa.gov, and the model codes and scripts will run under the generic user account nyofser. Access to this account will be provided to the Project Manager and the Operations Administrator. This server will run the following general types of programs: UNIX scripts, FORTRAN preprocessing programs, the FORTRAN numerical model (POM) compiled with Automatic Parallelization Option (APO), and IDL graphics code. Therefore, in addition to the UNIX operating system, the server should have IDL and FORTRAN compilers with APO options installed. For future applications, network Common Data Format (netCDF) libraries should also be installed.

2.4.1.3. Backup Devices Setup and Configuration

Separate backup tape drives will be connected to the ODAAS and NYOFS servers. Weekly backups of specified directories and files will be conducted. Off site storage of previous backup tapes will be conducted in accordance with CO-OPS policies and procedures.

2.4.2. Communication and Networking Tasks

The NYOFS and ODAAS will acquire/disseminate files between systems that are both internal and external to the CO-OPS computer facilities. Intranet and Internet connections as well as Network File System (NFS) exporting/mounting will be used to allow the secure, operational exchange of information. Figure 1 provides a schematic of the proposed network communications.

2.4.2.1. ODAAS Server Communications

ODAAS processes will ftp forecast products (ETSSM, Eta12, AVN) from NCEP servers located in Bowie, MD. Therefore the ODAAS server will require connection to the Internet/Intranet. After acquisition and processing, these products will need to be read accessible by programs on the NYOFS server. To accomplish this, the ODAAS server directory /odaas will be NFS exported to and mounted by the NYOFS server. This exporting and mounting should also be configured for the existing CBOFS server.

An agreement will be negotiated with NCEP to provide CO-OPS with a username and password to insure operational communication with the target computer systems. NCEP's Central Operations will be contacted to add the new ODAAS server's IP address to the appropriate host tables, which will allow ftp and telent access to the NCEP IBM supercomputer.

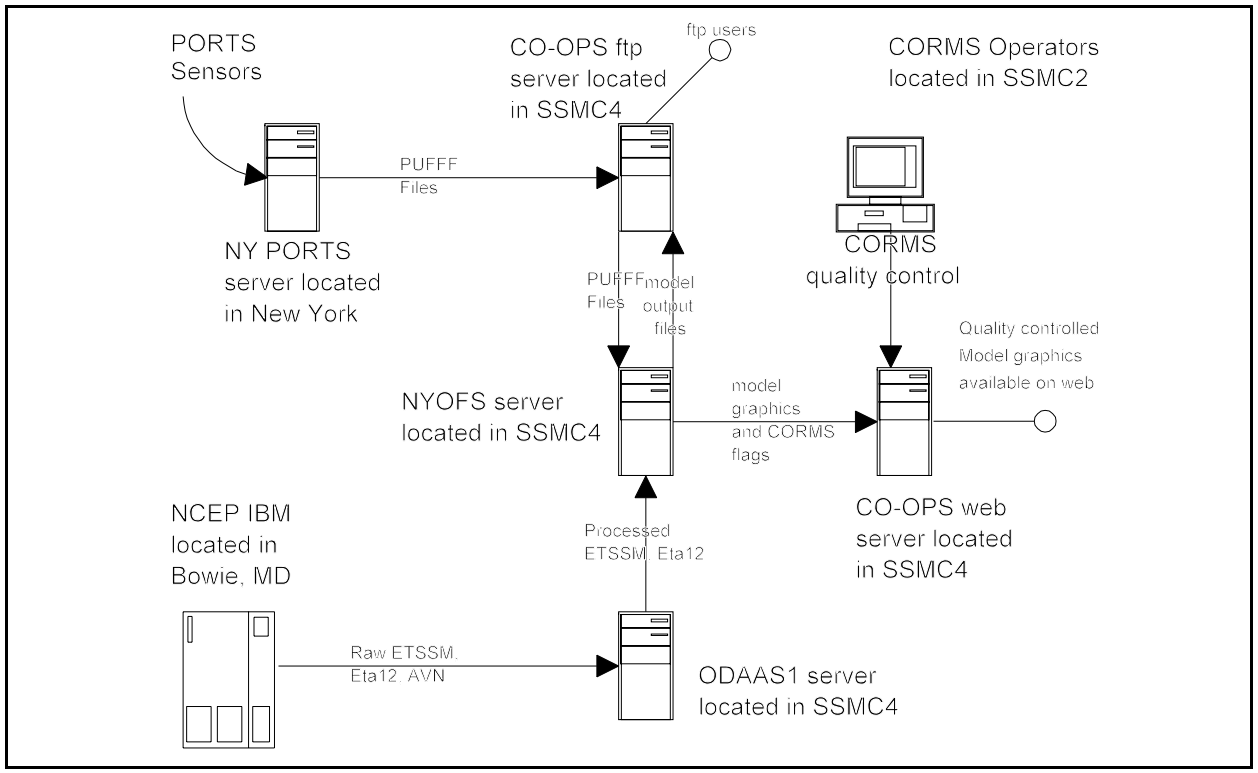

Figure 1. Schematic of the proposed NYOFS computing hardware, networking and flow of information.

2.4.2.2. NYOFS Server Communications

NYOFS processes will read access forecast products from the ODAAS server and real-time PORTS® PUFFF files from the CO-OPS ftp server (tidepool.nos.noaa.gov). Other processes will produce quality control flag files, model output files and model graphics that need to be made available to the CORMS operators, anonymous ftp users and the CO-OPS web pages respectively. This communication will be accomplished by Internet/Intranet connections and NFS exporting and mounting.

Select directories of the ODAAS server and CO-OPS ftp server will be NFS exported and mounted by NYOFS. The model output, graphics and quality control flag files will be written locally to NYOFS directories, which will be exported to and mounted by the CO-OPS ftp server (tidepool.nos.noaa.gov) and webserver (co-ops.nos.noaa.gov).

2.4.3. Software Porting and Engineering Tasks

Successful implementation of NYOFS depends on the completion of the following software engineering tasks. All the scripts, reformatting, archiving, graphics and dissemination software will be ported to the operational platforms (nyofs.nos.noaa.gov, odaas1.nos.noaa.gov), debugged and

tested. The overall flow of data through the NYOFS system will be documented upon completion of these tasks.

The operational NYOFS and ODAAS source code will be added to the CO-OPS software configuration management system. This will allow developers and software maintenance personnel to implement version control of the software releases and better manage the system.

2.4.3.1. ODAAS Software Porting and Engineering

The experimental version of ODAAS ingests and processes numerous products. Only three of these (ETSSM, Eta and AVN) are currently used by the existing NOS estuary forecast models. These functions of ODAAS will be ported to the new CO-OPS based ODAAS Server (odaas1.nos.noaa.gov).

Due to previous testing and evaluation, few revisions are expected to occur during the porting of the ODAAS. Wherever feasible, the integrity (programs, directory structure etc.) should be preserved. ODAAS is currently run on a SGI UNIX server at CSDL, and will be ported to a Dell Power Edge server running Redhat Linux. Therefore, it is expected that some modifications and recompiling will be needed. In addition, updates and modifications that are needed should be conducted at this time. For example, directories, scripts and programs should be renamed/revised to reflect the new name of the Extratropical Storm Surge Model (ETSSM) versus the original Techniques Development Lab (TDL) naming convention.

2.4.3.2. NYOFS Software Porting and Engineering

The existing NYEFS is a mature, robust architecture of programs that automate: acquisition, processing and quality control of data; model simulations; post processing and product dissemination.
This integrated suite of scripts, programs and cron processes will be ported to the NYOFS (nyofs.nos.noaa.gov) server. Due to the rigorous testing and enhancement processes that have occurred, minimal revisions are expected to occur during the code porting. Where ever feasible, the integrity (programs, directory structure etc.) should be preserved. Path names in the programs will be revised to reflect the new locations for obtaining the ODAAS and PORTS® PUFFF products. The procedure for obtaining PUFFF files will be revised from ftp to copy.

2.4.3.3. CORMS Quality Control Parameters Software Engineering

Using the formats and code schemes described in the PUFFF documentation (Evans et al., 1998), software will be written to generate quality control parameter files (i.e. flags) associated with model inputs, processes and outputs. These parameters will be routinely disseminated to the Continuous Operational Real-time Monitoring System (CORMS) (Gill et al., 1997). Standard Operating Procedures (SOP) for the CORMS operator will be written to provide clear interpretation and specific actions for each parameter. For example, the flags will indicate to the operator when the various processes are functioning in a normal, warning or fatal (i.e. terminate NYOFS dissemination) states.

2.4.3.4. IDL Graphics Programs Software Porting and Engineering

The Interactive Data Language (IDL) scripts and programs which produce graphics of the model output will be ported to the NYOFS server. Several revisions will be made to the programs including: improved efficiency, output file format (i.e. .png); date conversions (GMT to EST/EDT); directory structures; and cron process compatibility with a new IDL version.

2.4.3.5. NYOFS Web Pages Software Engineering

The home page for the NYEFS is located on the Coast Survey web site: (http://chartmaker.ncd.noaa.gov/csdl/op/nyfore.html). All CO-OPS operational products are centralized at the web site http://co-ops.nos.noaa.gov. The existing NYEFS pages will be migrated to the CO-OPS site, revised, enhanced and standardized. Where applicable, the CBOFS web pages will be used as templates.

2.4.3.6. NYOFS Software Configuration Control

The final step in the software development process of NYOFS will be to incorporate the software into the CO-OPS software configuration management system. All NYOFS and ODAAS source code will be loaded into the system. The system called Razor, will provide for process management, issue/problem tracking, version control and release management.

2.4.4. Training Tasks

The NYOFS and ODAAS Project Managers will provide the Operations Administrator with an overview of the system processes. This will enable the day to day oversight of the systems to be gradually transferred to CO-OPS. In addition, the Project Manager will provide training sessions to the CORMS operators and to relevant CO-OPS staff. The CORMS operators will be provided details and actions required for each quality control parameter. CO-OPS staff will be provided details of the required system maintenance and potential trouble shooting procedures.

2.4.5. Integration Tasks

The successful implementation of the NYOFS and ODAAS requires the integration of numerous tasks, which are categorized and discussed in the previous sections. A flowchart for completing these tasks in an efficient order is provided in Figure 2. This figure shows the relationship between the various tasks. In this document, there has been a concerted effort to consolidate tasks wherever appropriate. In this light, it should be recognized that certain task sub-components may overlap. The Project Manager, Operations Administrator and Implementation Team members will provide oversight and feedback during the execution of each task.

2.4.6. Evaluation and Acceptance Tasks

In accordance with the procedures described in NOS (1999), the NYEFS has undergone extensive skill and performance evaluations (Wei and Chen, 2001, 2002). Based upon the outcome of these tests, CSDL and CO-OPS agreed that this system would be transitioned to operational status. The overall configuration, logic, model forcings and settings will remain unchanged. The primary revisions to the system entail the use of designated hardware, more streamlined data transfer and the deployment in a maintained and monitored environment. Therefore the skill of the operational system will remain unchanged, while the robustness will be enhanced.

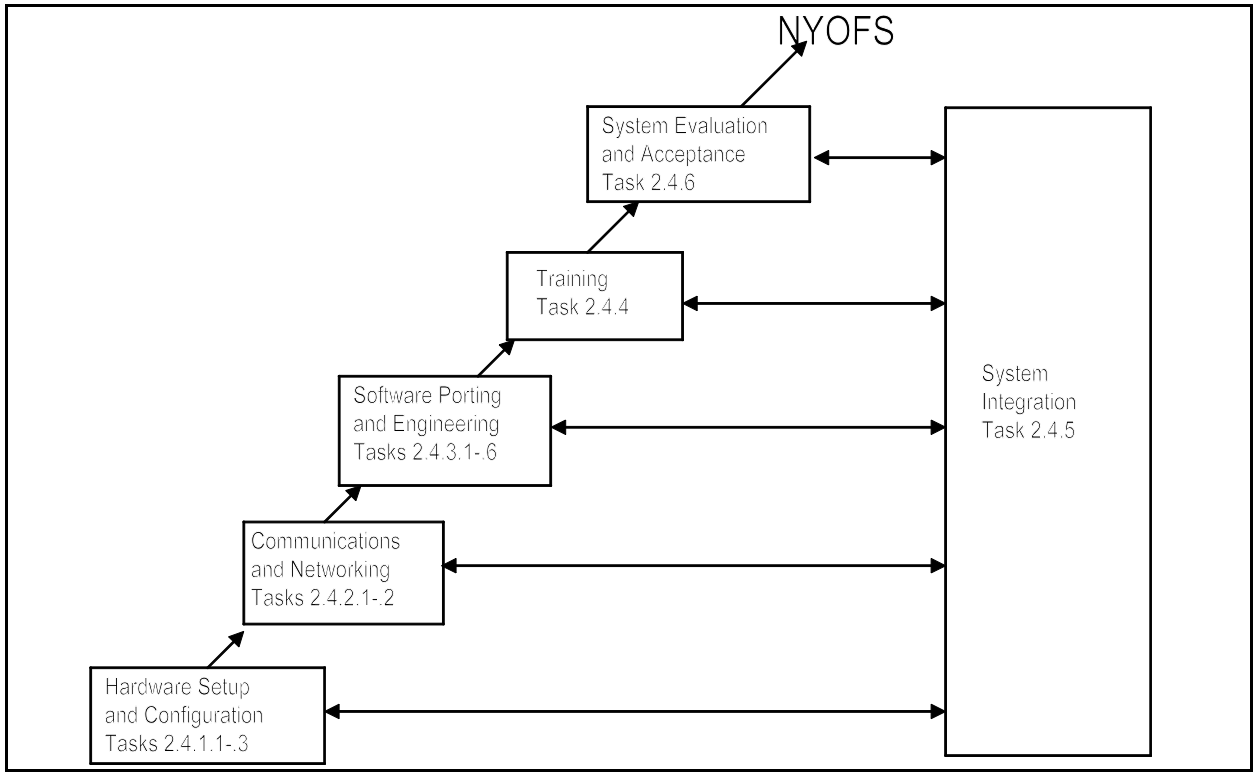

Figure 2. NYOFS Task Implementation Dependencies.

Where possible, each individual component and task product will be tested and corrected if needed. The integrated test or beta version of the NYOFS will be evaluated for a one month period beginning in late August 2002. During this period several criteria will be examined, including: qualitative comparisons between the NYEFS and NYOFS model output; production of accurate quality control flags; reliability of the integrated system; and ability of the system to handle unplanned abnormalities (i.e. outages and data gaps etc.). As a final step, a series of experiments will be conducted where abnormal conditions are forced to ensure that the processes can recover. Furthermore, these experiments will provide testing of the CORMS programs and procedures.

A summary of the results from the evaluation process will be presented to the Implementation team. Based upon the performance of the system, this group will recommend that the system be: designated as fully operational; or undergo revision and additional testing. This recommendation will be forwarded to the Director of CO-OPS for final approval.

2.5. Material and Human Resource Requirements

Implementation of the NYOFS in an operational status and operational environment will require several new hardware and software resources designated for this project. The primary material requirements include the new SGI and Dell servers for the NYOFS and ODAAS computing. Other materials will include the associated software, racks and backup tape drives. The use of the CO-OPS operational facilities, that include existing power, cooling, network facilities, and several acquisition/dissemination data servers, have significantly reduced the material needs. The use of

Table 2. Materials and Costs for the NYOFS Implementation

Material	Target System	Expected Cost
SGI Origin 300, 4 CPU, 1 GB memory, 146 GB disk, CDROM, IRIX OS	NYOFS	$25,000.
Fortran compiler with APO	NYOFS	$1,500.
IDL	NYOFS	$4,000.
Rack	NYOFS and ODAAS	$1,800.
Tape Drive 1	NYOFS	$3,000.
Tape Drive 2	ODAAS	$3,000.
Dell Power Edge Server with Redhat Linux	ODAAS	$4,950.
	Total Expected Material Costs	$43,250

a centralized ODAAS, which is a component of this project, will facilitate the existing (CBOFS) and future (i.e. Houston/Galveston Bay etc.) forecast systems. The primary materials and expected costs are itemized in Table 2.

The human resources required for this project are those associated with migrating an established, developed system to an operational status/environment. In this regard, the tasks and time estimates provided do not account for the previous extensive research, development and testing, or for future operations and maintenance. A total of 710 professional/technical NOS staff hours are estimated for implementation of the NYOFS. Staff hour estimates for each individual task are itemized in Appendix A.

3. SUMMARY

This document details the objectives, strategy, key tasks and personnel/team assignments required for a successful, efficient and orderly implementation of the NYOFS and ODAAS. The proper performance and integration of this plan will facilitate the sustained manageability of the operational system. The implementation of NYOFS and ODAAS will require a highly coordinated multi-disciplinary process involving staff of CSDL and CO-OPS. Six categories of required tasks have been identified including: Hardware Setup and Configuration; Communications and Networking; Software Porting and Engineering; System Integration; and System Evaluation and Acceptance. Members of the Implementation Team will provide the technical oversight and supervision of tasks. Coordination of this process will be provided by the Project Manager and the Operations Administrator.

Once operational, NYOFS will be a valuable new tool for nowcasting and forecasting water levels and currents. Successful implementation of NYOFS will provide several important benefits to the local maritime community, such as providing information for increased margin of safety, maximizing the efficiency of maritime commerce through the harbor, and providing critical information for marine search and rescue and hazardous material spills. NYOFS is expected to become operational in the Fall of 2002.

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Appendix A

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.1.1	ODAAS Server Setup and Configuration
Objective:	To setup and configure the server designated for the Operational Data Acquisition and Archiving System (ODAAS).
Resources Required:	Dell Power Edge 2650 Server, Redhat Linux Version 7.3
Results:	Functional ODAAS server ready for networking and communications tasks
Decisions Required:	Server name, primary directory name, user and account information.
Dependant Tasks:	NA
Estimated Staff Hours:	8
Responsible Party:	Evans and French

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.1.2	NYOFS Server Setup and Configuration
Objective:	To setup and configure the server designated for the New York Operational Forecast System (NYOFS).
Resources Required:	SGI Origin 300, IRIX Operating System Software, Fortran compiler with APO, IDL Software License
Results:	Functional ODAAS server ready for networking and communications tasks
Decisions Required:	Server name, primary directory name, user and account information.
Dependant Tasks:	NA
Estimated Staff Hours:	24
Responsible Party:	Evans and Cassidy

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.1.3	Backup Devices Setup and Configurations
Objective:	To setup and configure the hardware for backing up the ODAAS and NYOFS servers.
Resources Required:	Two internal or external backup tape drives.
Results:	Functional backup capabilities for the ODAAS and NYOFS servers.
Decisions Required:	Frequency and contents of backups, backup tape drive specifications.
Dependant Tasks:	2.4.1.1 , 2.4.1.2
Estimated Staff Hours:	8
Responsible Party:	Evans, Cassidy and French

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.2.1	ODAAS Server Communications
Objective:	To configure the ODAAS server for Internet/Intranet connections and NFS exporting/mounting of disks.
Resources Required:	Network hardware and software configuration
Results:	Functional network and NFS communications for the ODAAS server.
Decisions Required:	Permissions and names of servers and directories to NFS export/mount
Dependant Tasks:	2.4.1.1
Estimated Staff Hours:	8
Responsible Party:	Evans and French

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.2.2	NYOFS Server Communications
Objective:	To configure the NYOFS server for Internet/Intranet connections and NFS exporting/mounting of disks.
Resources Required:	Network hardware and software configuration
Results:	Functional network and NFS communications for the NYOFS server.
Decisions Required:	Permissions and names of servers and directories to NFS export/mount
Dependant Tasks:	2.4.1.2
Estimated Staff Hours:	16
Responsible Party:	Evans and Cassidy

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.1	ODAAS Software Porting and Engineering
Objective:	To port and modify the experimental CSDL version of ODAAS to the designated operational server in CO-OPS.
Resources Required:	Setup and networked ODAAS server, experimental CSDL version of ODAAS code.
Results:	Functional ODAAS to obtain and process forecast guidance products from NCEP.
Decisions Required:	Directory structure, required code modifications for new server/operating system, user accounts and permissions.
Dependant Tasks:	2.4.1.1 and 2.4.2.1
Estimated Staff Hours:	40
Responsible Party:	Kelley

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.2	NYOFS Software Porting and Engineering
Objective:	To port and modify the experimental CSDL version of NYEFS to the designated operational server in CO-OPS.
Resources Required:	Setup and networked NYOFS server, experimental CSDL version of NYEFS code.
Results:	Functional NYOFS that will prepare model data sets, run nowcast and forecast models, post process results and produce quality control flags.
Decisions Required:	Directory structure, required code modifications for new server, user accounts and permissions.
Dependant Tasks:	2.4.1.2 and 2.4.2.2
Estimated Staff Hours:	40
Responsible Party:	Wei

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.3	CORMS Quality Control Parameter Software Engineering
Objective:	To develop the software to produce and process the CORMS quality control parameter files (i.e. flags) for the NYOFS.
Resources Required:	List and importance of all required model inputs. List and sequence of all NYOFS processes.
Results:	Functional software to produce CORMS flags on the NYOFS server that are processed by the CORMS operators
Decisions Required:	List of all needed CORMS parameters; status levels (normal, warning, failure) and resulting procedures for all parameters
Dependant Tasks:	2.4.3.1, 2.4.3.2
Estimated Staff Hours:	32
Responsible Party:	Wei and Evans

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.4	IDL Graphics Programs Software Porting and Engineering
Objective:	To port, modify and/or develop the procedures for generating the IDL graphics of the NYOFS model output.
Resources Required:	Interactive Data Language (IDL) license installed on NYOFS server, experimental version of CSDL NYOFS IDL graphic programs.
Results:	Functional IDL programs to produce the graphics of the nowcast and forecast model water levels and currents.
Decisions Required:	List of plots to produce for nowcast and forecast models, fine grid and coarse grid, station locations, axis labels and date formats, and file output format.
Dependant Tasks:	2.4.3.2
Estimated Staff Hours:	40
Responsible Party:	Wei, Evans and Li

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.5	NYOFS Web Page Software Engineering
Objective:	To engineer the operational version of the NYOFS web pages
Resources Required:	NFS mount to CO-OPS web server, functional model graphics
Results:	Functional operational web pages for NYOFS
Decisions Required:	List of graphics to display for nowcast and forecast models, fine grid and coarse grid, station locations, axis labels and date formats, and file output format.
Dependant Tasks:	2.4.2.2 and 2.2.3.4
Estimated Staff Hours:	32 + 32
Responsible Party:	Wei. Evans and Li

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.3.6	Software Configuration Control
Objective:	To load the NYOFS and ODAAS source code into the CO-OPS software configuration management system.
Resources Required:	Configuration Management Server
Results:	Version Control and Issue tracking of NYOFS and ODAAS source code.
Decisions Required:	NA
Dependant Tasks:	2.4.3.1, 2.4.3.2 , 2.4.3.3, 2.4.3.4 and 2.4.3.5
Estimated Staff Hours:	15 + 15
Responsible Party:	Evans and Li

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.4	Training Task
Objective:	To train all staff members that will be responsible for the operational maintenance, oversight and quality control of the NYOFS
Resources Required:	NYOFS Documentation Reports; Beta version of NYOFS
Results:	NOS staff responsible for maintainig, supporting and trouble shooting the NYOFS will be adequately trained and have access to needed reference materials.
Decisions Required:	Key staff to train, level of training required
Dependant Tasks:	All
Estimated Staff Hours:	16,16,40,16,16 ,16 (total120)
Responsible Party:	Wei, Kelley, Vincent, Evans, Connolly, CORMS operators

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.5	Integration Task
Objective:	To oversee and integrate all tasks associated with the implementation of the NYOFS.
Resources Required:	Commitment of CSDL and CO-OPS to implement NYOFS; System documentation; Input of Implementation team
Results:	Efficient implementation of functional NYOFS
Decisions Required:	Oversight of all implementation tasks
Dependant Tasks:	All
Estimated Staff Hours:	80,80 (total 160)
Responsible Party:	Wei and Vincent

NYOFS IMPLEMENTATION TASK SPECIFICATION	
Task 2.4.6	Evaluation and Acceptance Task
Objective:	To conduct a rigorous one month test and evaluation of the Beta version NYOFS
Resources Required:	Functional Beta version NYOFS; Minimum one month testing period of Beta version NYOFS
Results:	Operational NYOFS
Decisions Required:	Decision whether beta NYOFS should be: 1) accepted as operational; 2) accepted as operational with minor revisions and continued testing; 3) major revisions and re-valuation required.
Dependant Tasks:	All
Estimated Staff Hours:	120
Responsible Party:	Wei, Kelley, Vincent, Connolly, Evans, Implementation Team