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Program Plan
FY 1983 - FY 2002

Marine Environmental Services Division
Office of Oceanography
National Ocean Survey

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey

Program Plan FY 1983 - FY 2002

Marine Environmental Services Division
Office of Oceanography
National Ocean Survey

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for
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FOREWORD

This plan was prepared to document programs carried out by the Marine Environmental Services Division (MESD), Office of Oceanography, National Ocean Survey (NOS). Program histories and authorizations are described. The plan addresses three future periods: the next 3 years, the following 7 years, and the 10-year period ending fiscal year 2002.

The goals and objectives for these periods were extracted from Office of Oceanography documents and guidance, and by the management-by-objective plans of NOS and the Department of Commerce. Results of two recent management studies were also incorporated into this plan; user requirement information were included from an NOS report on the evaluation of MESD program and an NOS report on real-time navigation systems.

Changes of plans are inevitable. Organizations that wish to plan other projects based on the information in this plan should communicate with the MESD staff to learn of any changes.

At present, there are uncertainties about the resources needed to continue MESD programs at their present levels, and planning exercises are being conducted to reorganize the National Oceanic and Atmospheric Administration, including a major reorganization of the NOS. Despite present uncertainties, this plan is issued to document actions necessary to respond to national needs for MESD data and information products.

The plan was developed by a team of MESD supervisors, managers, and scientists, including Samuel E. McCoy (plan coordinator), Charles R. Muirhead, Donald C. Simpson, Bruce B. Parker, Richard C. Patchen, Dinorah C. Esteva, and Elmo E. Long. Thomas L. Allen, Terry L. Mauk, and Laurie D. Collins contributed to the graphics and production of the plan. Management guidance was given by Wesley V. Hull, Associate Director, Office of Oceanography.

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EXECUTIVE SUMMARY

The Marine Environmental Services Division (MESD) Program Plan describes those goals, objectives and tasks necessary to meet the Nation's needs for tide and circulation data and information products and services during the period FY 1983 through FY 2002.

The MESD is in the Office of Oceanography, National Ocean Survey, National Oceanic and Atmospheric Administration. The Division mission is to provide appropriate, timely, and high quality data and information products and services to meet the Nation's needs in coastal and offshore areas by planning circulatory surveys; by conducting special oceanographic investigations and related research; by processing, analyzing, and interpreting the acquired data; and by disseminating the results and findings.

The MESD goals are to:

° conduct investigations of oceanic and estuarine phenomena for marine environmental products and services;

° develop program improvements to meet user needs for data to utilize, manage, and regulate coastal zone resources;

° develop and apply the new technology and techniques necessary to improve and maintain the quantity and/or quality of data collection, handling, analysis and distribution; and

° enhance public awareness of NOS' activities.

The MESD objectives are to:

° plan circulatory surveys;

° process and analyze the data acquired from circulatory surveys;

° prepare tide tables, tidal current tables, tidal current charts, and tidal current chart diagrams for printing and distribution;

° prepare and disseminate circulatory survey reports, technical reports, special predictions, and circulatory survey data to users;

° eliminate the circulatory survey data analysis backlog;

° implement an Information Management, Processing, and Analysis Computerized Technique (IMPACT) system;

° publish and distribute a "Circulatory Survey Manual";

- evaluate, develop/apply, and test numerical circulation models;
- identify the more important requirements and needs of users in order to provide enhanced, effective MESD products and services;
- modify and upgrade the circulatory measurement systems for improved data acquisition and processing;
- design, procure, test and implement an estuarine/shelf physical oceanographic measurement system for acquisition of data from estuarine, coastal, and shelf waters of the major regions of the United States;
- design, procure, test, evaluate and implement real-time current and wind monitoring systems in the Nation's 10 busiest harbors and approaches;
- predict the water movement on continental shelves; and
- develop and publish new oceanographic information reports and atlases.

The MESD goals are derivations of the Office of Oceanography's (OCN) subgoals. The subgoals have been restated to relate specifically to MESD activities. The MESD objectives were determined from OCN guidance, consideration of noted studies, and user needs and requirements.

The MESD aspires to:

- transmit data to the National Oceanographic Data Center within 12 months of data collection;
- update prediction table values within 18 months of data collection; and
- produce survey and special reports within less than 2 years.

To accomplish all goals and objectives, the MESD will require adequate resources. The key factor affecting MESD's capability and capacity to succeed is obtaining additional funds for:

- implementation of an Information Management, Processing, and Analysis Computerized Technique (IMPACT) system designed for processing, analysis, storage and retrieval of MESD data and information;
- staffing the Division with personnel in sufficient numbers, with particular expertise, and appropriate mix of skills;
- procurement of new circulatory measurement system for estuarine/shelf data acquisition and upgrade of present measurement systems; and
- defraying recurring engineering, data quality assurance, and applied research needs.

1. INTRODUCTION

The Marine Environmental Services Division (MESD) has the responsibility to plan circulatory surveys, conduct physical oceanographic investigations, and disseminate the results; it does this in support of the National Ocean Survey (NOS) mission to provide descriptions of the marine environment for marine safety, marine resource development and management, and marine environmental protection. This MESD Program Plan documents and defines the plans of the Division through fiscal year (FY) 2002. MESD goals and objectives were developed to satisfy the goals of the Office of Oceanography (OCN). Near-term goals and objectives are stated for the 3-year period ending FY 1985; mid-term goals and objectives are stated for the 7-year period from FY 1986 to FY 1992; and long-term goals and objectives are assigned to the 10-year period ending FY 2002. Completion of objectives is necessary to achieve the goals. The MESD Program Plan will be reassessed periodically against MESD's capacity, changes in guidance from Office of Oceanography management, changes to the NOS automated data processing systems, and user needs and requirements.

The Global 2000[1] report on energy, Gross National Product, nonfuel minerals, and agriculture projections states that increasing amounts of toxic pollutants will be produced in the decades ahead. There are ubiquitous impacts of scientific and technological development in our use of the seas.[2] As a Nation, we must improve the safety and economy of society's activities along the coast and offshore by providing better ocean information.[3] Results of these referenced studies were used in the development of the MESD Program Plan.

OCN provides data and information to support maritime safety, marine resource development and management, and marine environmental protection. MESD provides descriptions of water movement in the Nation's estuaries and inner shelves. The MESD plans to provide descriptions of the physical processes of both estuaries and continental shelves through a new observational, modeling, and predictive capability. A more complete understanding of the dynamics of estuaries and coastal seas is vital in providing enhanced products and services to users, i.e., those involved in maritime commerce,

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[1] The Global 2000 Report to the President of the U.S.: Volume 1 - The Summary Report, Council on Environmental Quality and the Department of State, 1980, 360 pp.

[2] "Ocean Services for the Nation: National Ocean Goals and Objectives for the 1980's," National Advisory Committee on Oceans and Atmospheres. January, 1981, 67 pp.

[3] "Proposed Atlantic Offshore Program: Executive Summary," Atlantic Offshore Program Planning Workshop. University of Delaware, February 1978, 27 pp.

search and rescue, fisheries, offshore oil and gas, pollution abatement, etc. This Program Plan results from guidance of the Associate Director, OCN, discussions with NOS colleagues, and a review of the literature; it is MESD's response toward meeting the challenges of the next two decades.

2. BACKGROUND

The MESD is one of two divisions operated by the Office of Oceanography. This section describes the program authorization, history, and MESD structure and functions.

2.1. Authorization

The basic authority for the MESD programs is embodied in Title 33 of the U.S. Code, Section 883 (as amended), the Reorganization Plan No. 2 of 1965 (that formed ESSA), and the Reorganization Plan No. 4 of 1970 (that formed NOAA). Pertinent excerpts from this authority are as follows:

> 33 U.S.C., Section 883a. "...the Secretary of Commerce, is authorized to conduct the following activities:
>
> 1. Hydrographic and topographic surveys;
>
> 2. Tide and current observations;..."
>
> 33 U.S.C., Section 883b. "...the Secretary of Commerce, is authorized to conduct the following activities:
>
> 1. Analysis and prediction of tide and current data;
>
> 2. Processing and publication of data, information, compilations, and reports..."
>
> 33 U.S.C., Section 883d. "To improve the efficiency of the National Ocean Survey and to increase engineering and scientific knowledge, the Secretary of Commerce is authorized to conduct developmental work for the improvement of surveying...; and to conduct investigations and research in geophysical sciences (including...oceanography...)."

By Department Organization Order 25-5A, the Secretary delegated to NOAA these functions under this chapter of the Code.

2.2. History of MESD Programs

The Act of February 10, 1807, authorized President Thomas Jefferson "...to cause a survey to be taken of the coasts of the United States, in which shall be designated the islands and shoals, with the roads or places of anchorage,..." The Act further authorized "...such examinations and observations to be made, with respect to St. George's Bank, and any other bank or shoal and the soundings and currents beyond the distance aforesaid to the Gulf Stream, as in his opinion may be especially subservient to the commercial interests of the United States." This Act established the Survey of the Coast, which became the Coast Survey in 1836, the Coast and Geodetic Survey in 1878, and the National Ocean Survey (NOS) in 1970.

Tide and current observations began as ancillary tasks connected with the Coast Survey's hydrographic and topographic surveys. Because of changing needs and demands, the collection of tide and tidal current data expanded from ancillary tasks of hydrographic surveys and ships-of-opportunity to dedicated circulatory survey ships. Today, acquisition of tide and current data, other water movement data, and related meteorological data are routine functions of the NOS Circulatory Survey Program.

Similarly, data collection procedures, including the use of NOAA Ships McARTHUR and FERREL, have evolved taking advantage of new technological advances. The methods of current measurement have advanced from observation of surface currents using a current pole, log line, stop watch, compass, and pelorus, or sextant; to fixed-point measurements with modern day, self-contained, current meters and vertical current profilers. The acoustic Doppler profiling current meter and radar systems to measure ocean surface currents are in advanced stages of development. Future applications of developing technology such as the Doppler and radar mapping promise improved data acquisition procedures and products.

Processing, analysis, and prediction procedures have also changed with the growing sophistication of electronic computers. Manual processing of data has been reduced considerably. Presently, minicomputers process data on both circulatory survey vessels. The NOS tide-predicting machine in use from 1910 was retired in 1965. Predictions were first computed by electronic computer in 1966. To enhance MESD operations further, an automated storage, retrieval, and processing system is being implemented; this will allow more rapid response to user requests.

In recent years, comprehensive circulatory survey projects were completed in:

- Penobscot Bay (1969 - 1970)
- Boston Harbor (1971)
- Cook Inlet (1973 - 1975)
- Puget Sound and Approaches (1973 - 1978)
- Prince William Sound (1976 - 1978)
- Casco Bay (1979)
- San Francisco Bay (1979 - 1980)
- New York Harbor (1980 - 1981)
- Columbia River (1981)
- Chesapeake Bay (1981 - 1982)

MESD plans and coordinates large-scale oceanographic projects of high national interest and importance. The NOS Strategic Petroleum Reserve (NOS SPR) Support Project is an example of the MESD capability and expertise to perform large-scale studies. At the Department of Energy's request, NOS collected 12 months of oceanographic and meteorological data, from June 1978 to June 1979, to develop physical oceanographic characterizations of two proposed brine disposal sites on the Louisiana inner continental shelf. The project was the most intensive physical oceanographic survey carried out along the Louisiana coast; it produced an enormous data set, equivalent to about 20 instrument-years of information.

2.3. Present MESD Structure and Functions

During January 1979, a reorganization established the Office of Oceanography (See Figure A) within the National Ocean Survey. Prior to the reorganization, OCN functions were done in the Office of Marine Surveys and Maps. The long-range goal of OCN is to:

- provide appropriate, timely, high-quality products and services to meet the Nation's need for oceanographic data and information in coastal and offshore areas.

These products and services must be in response to and in support of Department of Commerce policy and NOS management priorities. OCN promotes safety and efficiency in maritime commerce by providing descriptions and predictions of the coastal oceanic environment. This information is also applied to coastal zone management, regulation, and scientific research.

Operating within OCN is the MESD. The MESD is composed of a staff consisting of a Division Chief, Technical Adviser, Applied Research Oceanographer, and Secretary; a Coastal Waves Program (CWP) support group and two branches. The Circulatory Surveys Branch has 17 employees and consists of two sections: the Applications and Requirements Section, and the Analysis Section. The Marine Predictions Branch has eight employees. The present structure of the MESD is shown in Figure B.

OFFICE OF OCEANOGRAPHY

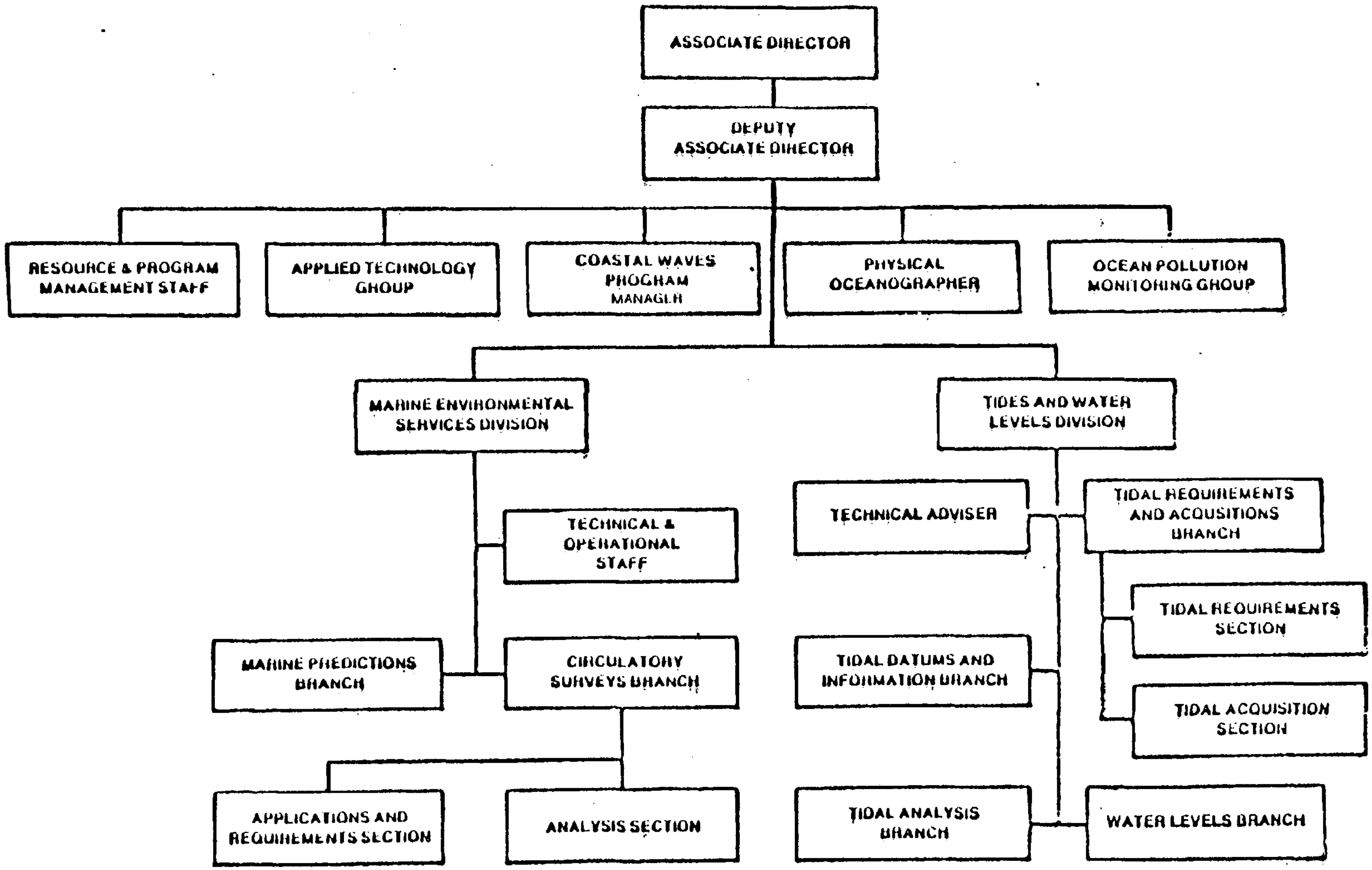
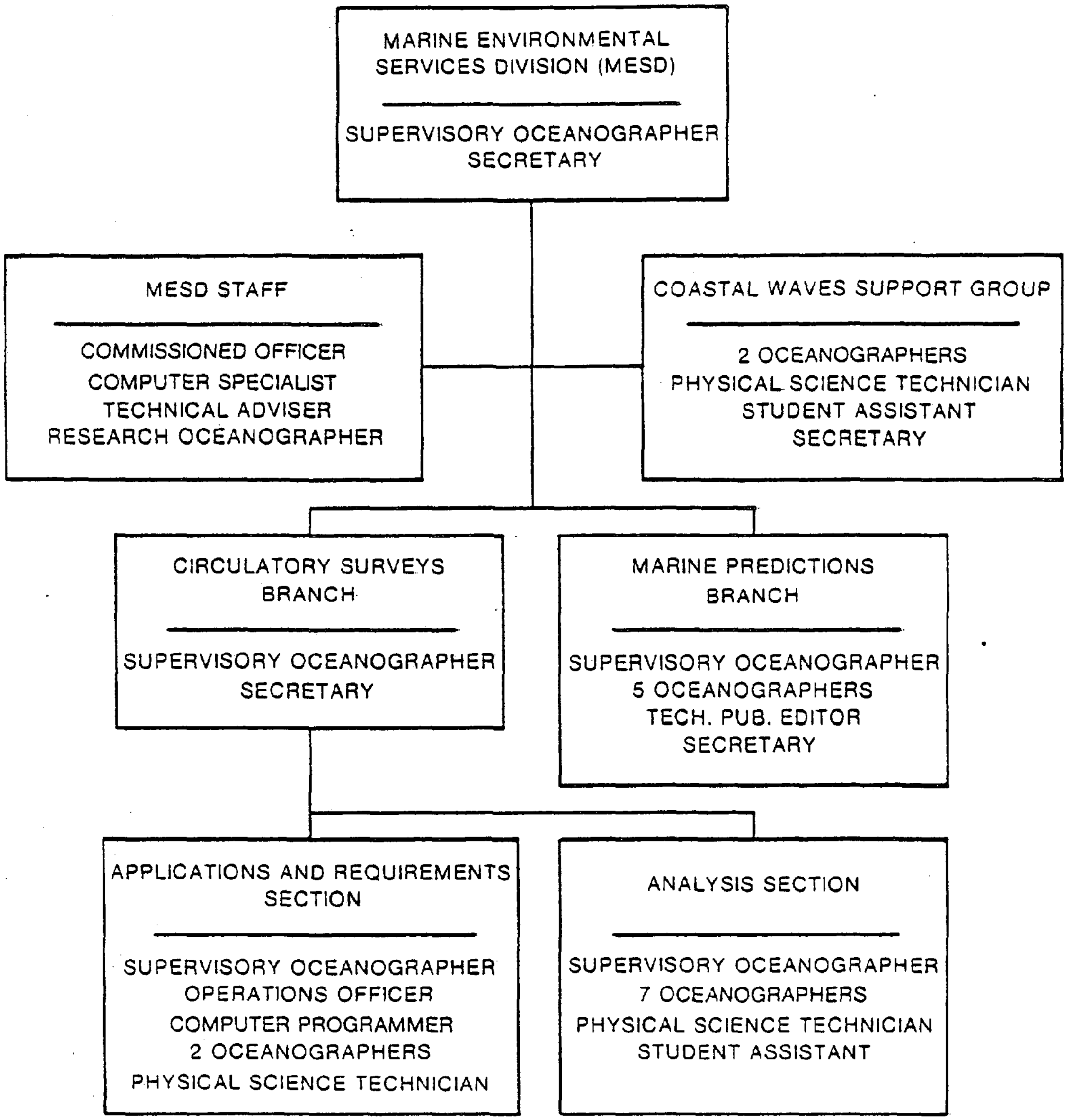


FIG. A



MARINE ENVIRONMENTAL SERVICES DIVISION ORGANIZATIONAL CHART

Fig. B

2.3.1. Marine Predictions Program

The Marine Predictions Program provides marine predictions and publications that aid in safe navigation and management of the marine environment. Tide prediction tables have been published by the National Ocean Survey since 1853. Originally, the tables consisted of astronomical constants which enabled the mariner to make his own predictions of tides. In 1867, the first tables of daily predictions were published; only the times and heights of high waters were presented for the Atlantic and Pacific coasts of the United States. Today, the tide tables are issued annually in four volumes; Europe and West Coast of Africa; East Coast of North and South America; West Coast of North and South America; and Central and Western Pacific Ocean and Indian Ocean. The tables contain daily predicted times and heights of high and low waters for 198 reference stations and differences and other constants for about 6,000 stations.

Current tables were published first in 1890, appearing as a part of the tide tables. They included instructions for obtaining the times of slack water at a few locations from the times of high and low tide. In 1923, two separate volumes giving daily predictions of slack water were published for the Pacific Coast and the Atlantic Coast. The tidal current tables are now issued annually in two volumes; Atlantic Coast of North America, and Pacific Coast of North America and Asia. Daily predicted times of slack waters or minimum currents and predicted times and velocities of maximum currents (floods and ebbs) are presented for 54 reference stations; differences and other constants are provided for about 2,400 stations.

Predicted data are also provided to users on request. The Marine Predictions Branch maintains quality control on the predicted data published in the tide and tidal current tables. The constants derived from observed data are received from the Tidal Analysis Branch, Tides and Water Levels Division, and the Circulatory Surveys Branch. Predictions from that data are evaluated by statistical methods, and are used for updating the tables. These evaluation and test routines are accomplished by automated data processing. An improved data management and information system, presently being planned, will improve the predictive capability.

Special predictions are provided to other government agencies, e.g., U.S. Navy, U.S. Army Corps of Engineers, Environmental Protection Agency, U.S. Geological Survey, and the National Weather Service (NWS). The Marine Predictions Branch provides NWS with 181 sets of predicted tide data each year. These predictions aid in NWS storm surge forecasts and warnings.

In accordance with international agreements, some of the daily predicted tide and tidal current data published in the annual tables are from foreign hydrographic offices. The NOS transmits predicted tidal data to 10 foreign offices, and receives predicted data from 18 offices. Each Nation is responsible to predict data for its own ports. The cooperation of all participating International Hydrographic Office member Nations is important to obtain worldwide coverage.

Requirements for new prediction techniques have been identified and are discussed in Section 3.

2.3.2. Circulatory Survey Program

The data and information products resulting from the Circulatory Survey Program (CSP) are tidal current tables, tidal current charts, tidal current chart diagrams, circulatory survey reports, technical reports, and circulatory survey data sets. These products are derived from the oceanographic data acquired during circulatory surveys. A circulatory survey consists of the acquisition of current meter, tide gage, meteorological (MET) station and conductivity-temperature versus depth (CTD) data. The current meter data include time series of water speed and direction, temperature and conductivity. The meteorological data include wind speed and direction, air temperature, and barometric pressure. Surveys conducted and those planned for calendar years 1982 through 198/ are shown in Figure C; requirements for these circulatory surveys are in Appendix A.

Circulatory surveys on the East Coast are conducted by the 133-foot NOAA Ship FERREL (see Appendix B). The main component of the FERREL's circulatory survey measurement system is the Grundy Environmental Systems Model 9021 current meter, which has been in use since 1978. Circulatory surveys on the West Coast are conducted by the 175-foot NOAA Ship McARTHUR (see Appendix C). The main component of the McARTHUR's system is the Aanderaa RCM-4 current meter, which has been in use since 1973.

The circulatory survey measurement systems of both NOAA ships require upgrading or replacement to provide efficient, one-pass data processing, and to provide more accurate measurements on inner shelves. Presently, shipboard PDP-11/34 computers allow ships' personnel to monitor data acquisition, maintain data quality assurance, and perform preliminary data processing. Enhancement of the shipboard systems is necessary to improve data quality and quantity, improve instrument reliability, and reduce the data processing effort at NOS Headquarters. The goal is to use ships' computer facilities to produce data tapes which can be certified, then analyzed upon receipt at Headquarters. These improvements will complement the new Circulatory Measurements Data Processing (CMDP) system which is operating on both ships.

A plan to complete and update the circulatory survey data products (tidal current tables, circulatory survey reports, and special technical reports) is summarized in Table 1, "Circulatory Survey Data Plan 1969 to 1983." Completion of this plan is the MESD's highest priority during the near-term; it will eliminate the CSP analysis backlog. However, implementation of a data management and information system, and the development of the next generation circulatory survey measurement system are required to ensure against future backlogs and for long-term balance of the program.

NOS is the traditional lead agency for circulatory survey data; it has measured and processed current data routinely since 1844. Requests for water movement data have increased. These requests must be responded to quickly and in a useful format. "Probems and Opportunities in the Design of Entrances to Ports and Harbors," National Research Council (NRC), 1980, recommends the intiation of:

- "...Reliable and economical measurement, reduction, presentation, and storage of environmental data;..."

NOS CIRCULATORY SURVEY PROGRAM
1982-1987

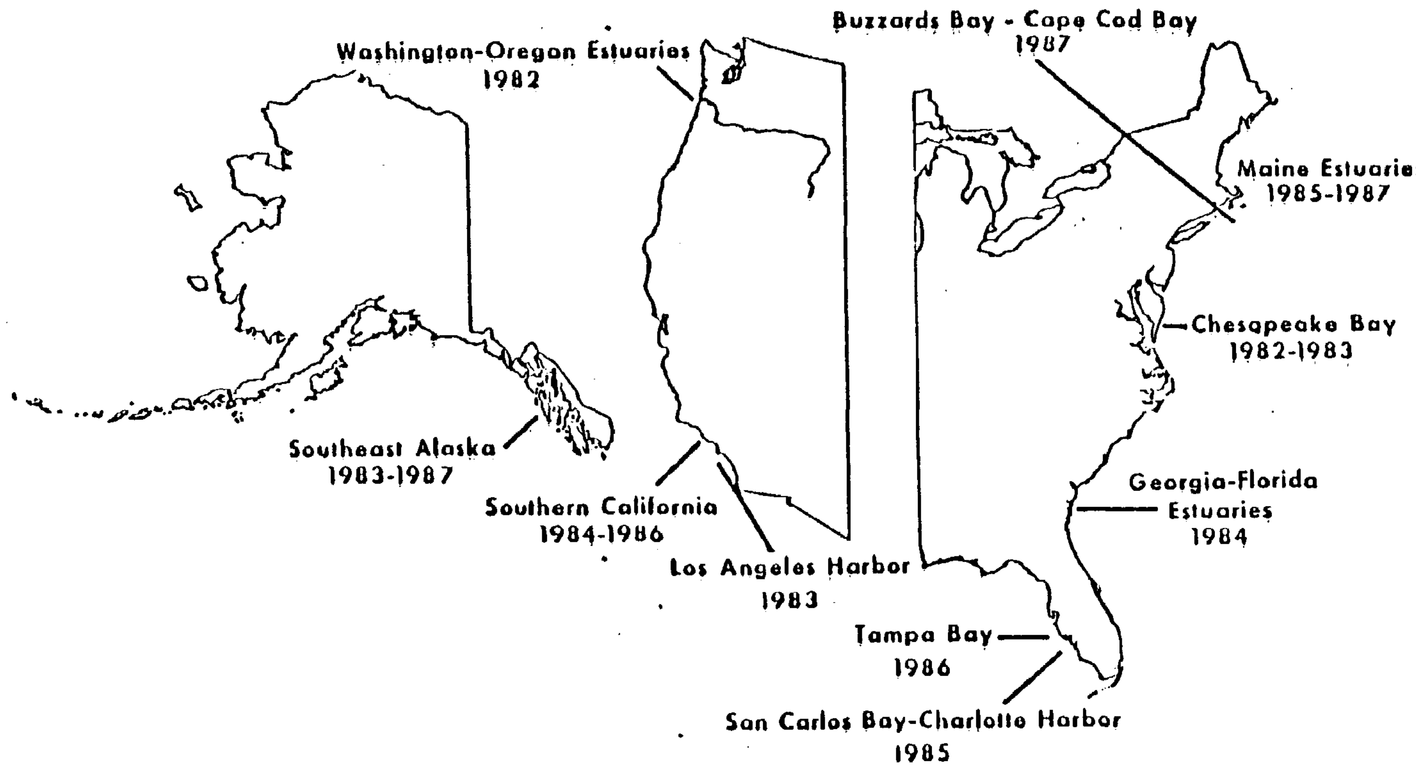


Fig. C

To satisfy user requests for circulatory survey data product and/or services, several actions are in process:

An Information Management, Processing, and Analysis Computerized Technique (IMPACT) system designed for the processing, analysis, storage, and retrieval of MESD data and information is being planned. The IMPACT system will expedite data processing, analysis, and easy access to data information.

The MESD is preparing for acquisition of the next generation circulatory measurement systems by analyzing the propagation of errors from measurement to predictions [Sensitivity Analysis Project (SAP)], and developing Circulatory Surveys Systems Analysis (CSSA) requirements based on its present perception of long-term user requirements.

The MESD is also continuing development of the Data Quality Assurance (DQA) program, which includes total measurement uncertainty analysis of data. The SAP, CSSA, and DQA are programs being conducted with NOAA engineering support groups.

Investigations on improving the analysis of tidal current data and predictions when there are diurnal inequalities were recently initiated.

The MESD will respond within its capacity to the growing need for real-time monitoring of currents in major ports, harbors, and waterways.

Table 1. CIRCULATORY SURVEY DATA PLAN 1969 TO 1983

YEAR	AREA	TRANSMIT TO NODC	ANALYSIS COMPLETE	TABLES UPDATED	SURVEY REPORT	SPECIAL REPORT	MEMO STATUS REPORT	MEMO FINAL REPORT
1969/70	Penobsot Bay ME (Note A)		1/82	1984				6/82
1971/73	South Carolina Estuaries	1973	11/81	1983				7/82
1973	Georgia Estuaries	1974	11/81	1983				8/82
1973/8	Puget Sound and Approaches (Note B)	1979	8/83	1985/6	1980	1977	9/82	12/83
1973/5	Cook Inlet AK	1977	12/82	1984	1981		5/82	2/83
1975/6	Portsmouth Harbor NH	7/82	1/83	1984			6/82	3/83
1975	Oregon Inlet NC	7/82	1/82	1984				6/82
1976	Beaufort Inlet NC	1979	1978	1980		1981		3/82
1976	Cape Fear River NC	1978	1978	1980		1979		3/82
1976/8	Prince William Sound AK	1979	3/83	1985			5/82	5/83
1977	Narragansett Bay RI	1980	2/82	1984				9/82
1977	Georgia Estuaries	8/82	5/83	1985			9/82	7/83
1979	Kings Bay GA	12/81	1979	1982				2/82
1979	Casco Bay ME	12/81	5/82	1984		11/82		
1979	Icy Bay AK	12/81	3/82	1984		10/83		
1980	Georgia Estuaries	8/82	10/82	1984	4/83	12/83		
1979/80	San Francisco Bay CA (Note B)	9/82	5/83	1985/6	1/83	10/84		
1980	New York Harbor	11/62	12/82	1984	4/82	11/84		
1981	New York Harbor	11/82	12/82	1984	4/82	11/84		
1981	Columbia River	1/83	2/83	1984	3/83	7/85		
1981	Chesapeake Bay	1/83	3/83	1985	10/84	10/86		
1982	Grays Harbor WA	5/83	6/83	1985	4/84			
1982	Willapa Bay WA	5/83	6/83	1985	4/84			
1982	Coos Bay OR	6/83	7/83	1985	4/84			
1982	Yaquina River OR	7/83	8/83	1985	4/84			
1982	Chesapeake Bay	7/83	8/83	1985	10/84	10/86		
1983	Los Angeles Harbor CA	4/84	5/84	1986				9/84
1983	Humboldt Bay CA	6/84	7/84	1986	4/85			
1983	Oregon Estuaries CA	7/84	8/84	1986	4/85			
1983	Chesapeake Bay	6/84	7/84	1986	10/84	10/86		

Note A: Penobscot Bay data were collected using four different types of current meters (Roberts Radio, Photo-Geodyne, Ticus I and Ticus II). Only Ticus II data were collected on magnetic tape; other data are on pressure sensitive tapes that require manual reading, on photographic film processed to output cards, and on punch paper. The effort required to digitize and transmit the data to NODC is prohibitive. The Penobscot Bay data will be treated the same as other pre-1970 surveys.

Note B: Applied research is underway to determine an appropriate method of analyzing tidal current data with diurnal inequalities, to be included in Table 2. Dates shown for Puget Sound and Approaches and for San Francisco Bay assume a tested and verified solution during August 1982.

Comments: Present planning by DOC to consolidate ADP services and to move NOS to a UNIVAC facility at NBS could introduce large delays in 1982 and 1983 schedules. Preparation for a move will also divert C21 personnel from improving efficiency and reducing backlog further.

Assumptions made regarding the above schedule include the filling of the position of Chief, Analysis Section by June 1, 1982; overtime for employees will continue to be funded; and, the proposed upgrade of ADP equipment will materialize.

The goal of updating prediction tables and charts within about 18 months cannot be achieved without implementation of C21's proposed Information Management Processing and Analysis Computerized Technique (IMPACT).

As of April 23, 1982

2.3.3. Coastal Waves Program Support

The MESD provides technical support to the Coastal Waves Program (CWP) which is directed by an Office of Oceanography program manager. Support includes planning, oversight of field operations, coordination with other agencies, data processing and analysis, program documentation, and dissemination of data and information. The CWP is designed and planned as one component of a cooperative national effort by Federal and state agencies and the private sector to provide mutually needed wave information. The prime tasks of the CWP are to assure availability of large-scale, long-term data and statistics for all U.S. coastal waters; wave information affecting public safety (especially navigation); and overall coordination of wave programs. Other Federal agencies will provide wave forecasts, some measurements, archival services, and other environmental data needed to support wave studies. The private sector and Federal agencies generally use their own and other data to provide site specific forecasts and statistics to meet particular needs. A high degree of cooperation is expected in measurements, hindcasts, exchange of data, evaluating accuracies, developing models, and improved methods of measurement.[4]

2.3.4. Ocean Pollution Monitoring Program Support

The MESD also provides technical support to the Ocean Pollution Monitoring Program (OPMP) which is directed by an Office of Oceanography program manager. Support includes operation of CSTD instrumentation, data processing and analysis, and documentation. The OPMP represents an integration of ongoing and planned NOAA marine pollution monitoring activities in the Northeast. The program has been designed to obtain the maximum amount of useful data in the most cost-effective way. Pollution monitoring is defined as the systematic, periodic observation of predetermined pollutants in pertinent components of the marine ecosystem over a length of time sufficient to determine (1) existing levels; (2) trends; and (3) variations in the water column, sediments, and biota. Operational pollution monitoring is a subset of monitoring which is used for environmental or resource management by means of extant technologies and organizations.[5]

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4 "Coastal Waves Program," Office of Oceanography, January 1982, 19 pp.

5 "Northeast Monitoring Program, A Pilot Marine Pollution Monitoring Plan," NOAA, October 1981, 40 pp.

3. USER REQUIREMENTS

The products and services provided by MESD are in response to requirements of commercial, military, recreational, research, and other users. These users need information on the physical state of the ocean and coastal seas, including estuaries. Activities along the coasts and offshore can be made safer and more economical by providing this type of marine information. The MESD provides data and information to a broad spectrum of users, ranging from public interests (such as environmentalists and recreationalists) to high technology industries (e.g., offshore petroleum drilling and mineral mining). MESD products and services respond to user requirements by aiding safe navigation,maritime commerce, and environmental management. A MESD objective is to respond to these user requirements through dissemination of tide and tidal current tables, tidal current charts, tidal current chart diagrams, circulatory survey reports, technical reports, special predictions, and the circulatory survey data sets.

MESD provides a variety of marine prediction products and circulatory survey data (see Appendix 8.4.). About 100,000 tide and tidal current publications were distributed during FY 1981. About 900 station-years of miscellaneous predictions were distributed. Approximately 1,000 station-months of circulatory survey data were also provided to users.

The following paragraph from the Foreword, "Problems and Opportunities in the Design of Entrances to Ports and Harbors," Marine Board, National Research Council, 1980, illustrates new requirements:

> "There is increasing demand abroad for this country's coal and food, and increasing domestic demand for imported oil. The ships necessary to profitable trade in this international traffic demand deeper drafts and more room to stop: they present far different characteristics of maneuverability than the ships America's ports were designed to receive. While it was always necessary to know the patterns of tides and currents, the location of hazards, and other facts about the physical environment of ports and harbors, <u>it is now necessary to know much more</u> to design port and harbor works, <u>manage greatly increased traffic, and</u> effect safe passage."

Two of the recommendations in the NRC report are:

" ° Improved and validated models for the prediction of horizontal and vertical ship movements in the particular conditions of harbor entrances;...

° Cost-effective models of the physical environment for prediction of natural conditions and forces, and changes caused by human activity;..."

Pilots and harbor/port entrance design engineers requirements for wind/current response were stated in the NRC report:

"...The ship must be steered at some angle into the current and wind to compensate for a varying lateral force, if it is to remain on a straight course that will maintain adequate clearance between the ends of the harbor breakwaters. The current is likely to be variable, and may be stronger near the ends of the breakwater... Wind set-up, causing the surface water to flow in the wind's direction, is frequently the dominant factor causing water movement in both the vertical and horizontal directions."

The importance of the wind/current response was also described by the National Transportation Safety Board, Marine Accident Report, U.S. Tug Sentinel, Loss of Tow and Resultant Grounding of Barges KONA and AGATTU, Gulf of the Farallones, Pacific Ocean, December 31, 1979. The Safety Board concluded:

"The Safety Board believes that in attempting this course of action the master failed to take into account adequately the effects of wind and current. The wind was southerly between 15 to 30 knots. Such a wind would have struck the portside of the barges, which had large sail areas, and would have caused the barges to be set to the north. The wind induced current, coupled with the Davidson Inshore Current, would have acted against the underwater portions of the barges and caused them to be set to the north. The testimony of the master gave no indication that he had made allowance for these conditions. The Safety Board believes that the master, as a professional seaman, should have been aware of the effects of wind and current and made the necessary allowances or adjustments to counteract these effects."

The need by the ship operators for vertical and horizontal "shear" information when describing the horizontal clearance requirement is addressed also in the NCR report. The most critical points to consider are "...when preparing for an abrupt shear-current...after responding to a shear-current." Maneuverability is a considerable concern; the report states "...with reduced speed comes a reduction of maneuverability and an increase crosstrack variability..." The importance of accurate data at the correct spatial scales is stated by, "...the navigability of a 350-meter-wide waterway with 100 percent accuracy of information about the current is better than the navigability of a 670-meter-wide waterway in which the accuracy of information about the current is 75 percent..." A summary statement made in the report was "...Insufficient information has been collected and analyzed to predict the effect on steering of: Complex three-dimensional currents..."

Users who answer environmental questions, require information concerning surface circulation (e.g., predictions of oil trajectory), or a velocity (shear) at a given depth (layer) in the water column (e.g., to predict dispersion at a sewer outfall or larvae dispersal); sediment transport calculations require a measurement of velocity (or shear) in the bottom boundary layer; and structural engineers and naval architects require information on the velocity shear for determining design criteria.

The NOS task group assigned during 1982 to review and evaluate MESD programs provided some of the documents in Appendix 8.6. The task group held discussions with large ship operators, tug and towboat operators, and the Military Sealift Command. Findings were:

° Use of NOS tide and tidal current tables have economical value (Operation of a 240,000 DWT tanker may average $75,000 a day.).

- Tide tables are used for tanker transiting and tidal current tables are used to plan docking and undocking.
- Water column data (temperature and salinity) and wind data are needed.
- Masters and pilots are dependent on tide and tidal current predictions to plan for passages.
- Hourly height predictions are particularly useful in Cook Inlet.
- Real-time data may be helpful.
- Some container ship masters reported satisfaction with tide and tidal current tables, "as is," and "publications are excellent and give information needed to bring ships in and out."
- Detailed information is needed on currents.

A NOS task group studying requirements for real-time navigation data also provided information on requirements. To date, the task team visited 14 ports, and reported: (1) Much interest has been shown in the application of real-time marine data to the safety and efficiency of marine operations. (2) Real-time data and short-term forecasting of salinity information might be useful since the draft of a vessel increases as it is brought from salt to fresh water. (3) Knowledge of real-time currents would be extremely valuable to all facets of the offshore industry.

Findings and recommendations from the studies of the NRC, MESD task group and the real-time task group, and conclusions from user requirements workshops will be used to identify the more important requirements, interests, and needs of users so that MESD can provide enhanced, more effective products and services.

4. MISSION AND GOALS

This section contains the MESD mission which is derived from the OCN long-range goal. It also provides goals which were adopted from OCN sub-goals. The OCN subgoals are restated here to relate specifically to MESD activities.

4.1. Mission Statement

The MESD mission is to provide appropriate, timely, and high quality data and information products and services to meet the Nation's needs in coastal and offshore areas by planning circulatory surveys; by conducting special oceanographic investigations and related research; by processing, analyzing, and interpreting the acquired data; and by disseminating the results and findings.

4.2. Goals

The MESD goals are stated below. Following each goal is a narrative describing how the particular goal will be achieved.

4.2.1. Goal One is to:

<u>conduct investigations of oceanic and estuarine phenomena for marine environmental products and services</u>.

The MESD plans circulatory surveys for the acquisition of physical oceanographic data from port, harbor, coastal, and offshore areas. The acquired circulatory survey data include measurements of water currents, tides, conductivity, temperature and depth, and also include wind speed and direction, air temperature, and barometric pressure. These data are processed, analyzed, interpreted, and provided to users on demand. The water movement data are used to compute tide and tidal current predictions, to determine circulation patterns, and to define tidal datums and boundaries. To accomplish this goal, MESD must continue the acquisition of data from the estuaries and coastal waters; but it should also acquire data from the continental shelf areas through an improved circulatory survey capability. The data results and findings should satisfy user requests for navigational and circulatory information.

4.2.2. Goal Two is to:

<u>develop program improvements to meet user needs for data to utilize, manage, and regulate coastal zone resources</u>.

The MESD will continue to implement actions to respond to user needs and requirements for data and information products. Accuracy specification and verification procedures are extremely important for the assurance of quality data; the DQA program will be enhanced. New predictive and analysis techniques will continue to be investigated toward satisfying user needs for information on total water circulation. A data management and information system will be implemented to provide timely response to user needs.

4.2.3. Goal Three is to:

develop and apply the new technology and techniques necessary to improve and maintain the quantity and/or quality of data collection, handling, analysis and distribution.

The employment of state-of-the-art technology and techniques by MESD is necessary to enhance data quality and to disseminate data in a timely fashion. The MESD has developed and will refine requirements for the acquisition of a new estuarine/shelf physical oceanographic measurement system. Other requirements, such as those needed for instrumentation to observe currents for real-time data transmittal, will be developed. New techniques, such as numerical modeling of estuaries, will be implemented.

4.2.4. Goal Four is to:

enhance public awareness of NOS' activities.

The principal MESD products are tide tables, tidal current tables, tidal current charts, tidal current chart diagrams, circulatory survey reports, special technical reports and the data sets themselves. The tables and charts are updated with new data from the Tides and Water Levels Division and the Circulatory Surveys Branch. The circulatory survey report details general information about a particular survey. The special technical report presents information resulting from a particular survey and also presents descriptions, interpretations, and analyses of the data.

5. OBJECTIVES AND REQUIREMENTS

This requirements section states MESD objectives which are necessary steps toward achieving the goals. Certain actions are required to accomplish the objectives. These actions are described in the narrative after each objective.

5.1. Near-Term Objectives, FY 1983 - FY 1985, are to:

a. <u>plan circulatory surveys</u>

[Requirements for circulatory surveys are decided by user needs and Federal policy decisions. Planning priorities are established according to NOAA's internal policy, other Federal agency, State agency, research institution, and private user requirements. Some factors which are considered in determining survey priorities are: area vessel traffic, adequacy of historical survey data, changes in bathymetry, changes in circulation dynamics, and future data requirements (e.g., planned marine construction, proposed dump sites, etc.). Surveys are planned through interactions among the Office of Oceanography, Office of Marine Operations, Hydrographic Surveys Division, Atlantic Marine Center, Pacific Marine Center, and supporting NOAA engineers.];

b. <u>process and analyze the data acquired from circulatory surveys</u>

[The circulatory survey ships acquire, evaluate, and initially process data before the data tapes are transmitted to Rockville Headquarters. The shipboard Circulatory Measurements Data Processing (CMDP) system (1) tabulates survey data; (2) compiles translation and malfunction statistics; (3) converts instrument units to engineering units; (4) assigns times to each data point; (5) formats the data; and (6) plots the data. Upon receipt, MESD certifies, processes and analyzes four types of data: current meter data, CTD data, meteorological instrument data, and water level recorder data. Processing of the instrument data tape consists of the translation and conversion of raw data into computer compatible, error-free, time checked data in engineering units. Copies of processed tapes are transmitted to the National Oceanographic Data Center for archival. The processed current data are analyzed harmonically and nonharmonically. Harmonic analysis and least squares analysis determine the harmonic constants. The constants, amplitudes and phase lags, of each tidal constiuent are used to predict the tidal current. The nonharmonic analysis is a numerical comparison between a reference current station and a subordinate current station. Time differences of minimum and maximum currents, and speed ratios; average flood and ebb directions and speeds are calculated. Time series analyses and statistical correlation studies are done on the current meter, CTD, MET, and water level data. Tide data are processed and analyzed by the Tides and Water Levels Division, OCN. These processed and analyzed circulatory data sets are sent to users on request.];

c. disseminate tide tables, tidal current tables, circulatory survey reports, technical reports, tidal current charts, tidal current diagrams, special predictions, and circulatory survey data

[Cooperative interaction among the Circulatory Survey Program, Marine Predictions Program, and Tides and Water Levels Program assures the continuous updating of tide and tidal current data. Stations at selected representative locations are occupied for days, months, and/or years at a time to obtain data series of sufficient length to determine accurate values of the most important harmonic constants. These stations may become the reference stations predicted in Table 1 of the tide and tidal current tables published by the MESD. The other shorter term tide and tidal current stations in the area may appear in Table 2 of the publications. These subordinate stations are related to the reference stations of Table 1 by time and height differences and/or ratios, and time and speed differences and ratios. These values are derived from nonharmonic reductions, comparisons, and analyses of the data. MESD plans to continue providing updated tide and tidal current predictions to foreign hydrographic offices, other Government organizations such as the National Weather Service, and to the user community.

Circulatory survey reports provide descriptions of the quality of the data, sampling rates, locations of stations, time periods of occupation, measurement systems and other information in which a potential user would be interested. The technical reports present detailed information on analyses and interpretations of survey data. Harmonic analysis results are presented in the form of tables, cotidal charts, and corange charts with illustrations depicting various harmonic constituent relationships. Salinity and temperature data are presented as contours of longitudinal transects and time series stations covering the tidal cycle. Implications on circulation and hydrodynamics from the results of various analyses may be discussed, and models may be presented to describe the dynamics of a survey area. The tidal current chart publication consists of a series of charts depicting the velocities at locations of survey stations in a particular waterway. These charts illustrate circulation for 13 time stages of the tidal cycle and present a comprehensive areal view of the tidal current movement. The tidal current chart diagrams are graphs used with the tidal current charts to predict tidal currents at any time of the year. Three tidal current diagram booklets are published annually. The circulatory survey reports, technical reports, and tidal current charts are published as required. The reports are done on survey areas of high interest and importance. There are 12 tidal current chart publications of various U.S. harbors. These are reissued on demand, and revised when data become obsolete. All three publications contain significant navigational and circulatory information. Circulatory survey data sets are sent to users on request, and routinely sent to NODC.];

d. eliminate the circulatory survey data analysis backlog

[Efforts toward elimination of the data analysis backlog have been implemented. This activity was discussed in Section 2.3.2.];

e. implement an Information Management, Processing, and Analysis Computerized Technique (IMPACT) system

[A data management and information system designed for processing, analysis, storage, and retrieval of MESD data and information is needed to respond promptly to user requests. MESD will implement an integrated computer system, IMPACT, which will: process and analyze circulatory survey data in a timely manner; store and allow prompt retrieval of information; be compatible with data requirements of the OCN and with the NOS data management system; and allow for prompt response to requests.];

f. publish and distribute a "Circulatory Survey Manual"

[The "Circulatory Survey Manual" presently in preparation by the MESD will describe circulatory survey planning; the acquisition of circulatory survey data with available technology; data processing and analysis; and the preparation of products for dissemination. This manual will improve interaction among the various groups involved in circulatory surveys. It will document survey procedures, and serve as a training manual and reference for operations and contract personnel.];

g. evaluate, develop/apply, and test numerical circulation models

[These models will predict water circulation and the results will be presented in new MESD products. After assessing available models, those models found to be appropriate will be tested. In areas where no appropriate model exists, MESD will develop models.];

h. identify the more important requirements and needs of users to provide enhanced, effective marine products and services

[Communications between MESD and users and prospective users of MESD products and services must improve. Improved communications will aid in (1) the evaluation of product adequacy; (2) improving cost effectiveness (3) determining program redirections, and (4) improving product quality.]; and

i. modify and upgrade the circulatory measurement systems for improved data acquisition and processing

[An analysis of the existing circulatory measurements systems is required to determine modifications necessary to improve data quality and increase cost effectiveness of data processing.].

5.2. Mid-Term Objectives, FY 1986 - FY 1992, are to:

a. design, procure, test and implement an estuarine/shelf physical oceanographic measurement system for acquisition of data from estuarine, coastal, and shelf waters of the major regions of the United States

[Existing circulatory survey measurement systems do not meet all user requirements. The present current sensor's basic design limits its use to areas having minimum noise contamination (due to waves and swell). Navigational and environmental needs require measurements in some areas where noise levels are high. The traditional uses of the waterways have changed and expanded. For example, the offshore regions of the United States, such as the northeast Atlantic, the Gulf of Mexico, the coasts of Hawaii, Alaska, and California are being exploited increasingly by the fisheries industry, and the oil, gas, and mineral industries. These and other associated users require local water movement data; but they also require physical oceanographic data which describe regional circulation. Acquisition of data from the shelf regions to complement coastal and estuarine data collection will satisfy these demands and aid in meaningful interpretation of regional flow characteristics. The implementation of a new estuarine/shelf physical oceanographic measurement system is necessary to meet the new requirements. Figure D illustrates examples of oceanographic sensors which may aid in responding to the changed and expanded uses of the waterways.]; and

b. design, procure, test, evaluate and implement real-time current and wind-monitoring systems in the Nation's 10 busiest harbors and approaches

[Oceanographic monitoring stations strategically located in the 10 busiest harbors and approaches will transmit data to port services, offices, and/or ships in transit. These permanent systems will provide real-time current and wind data in the form of printouts and/or cathode ray tube displays, will aid in ship traffic control, and improve safe navigation. This objective will require the use of new instrumentation, such as the upward-looking acoustic, remote current meter to measure through the water column, and the application of radar to measure surface currents. This objective relates directly to similar objectives of the Tides and Water Levels Division and the Coastal Waves Program.].

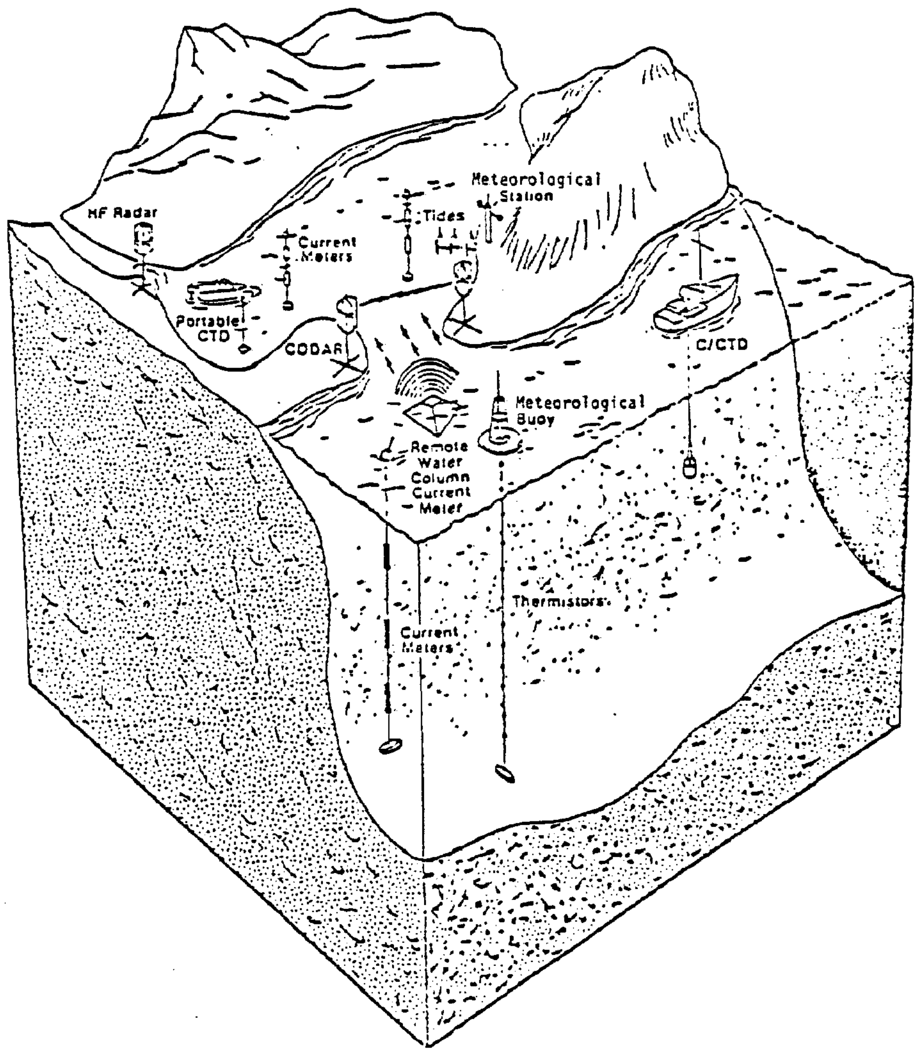
5.3. Long-Term Objectives, FY 1993 - FY 2002, are to:

a. predict water movement on continental shelves

[The MESD will expand its data and information products to descriptions, models, and predictions of coastal seas. This program emphasis will complement similar efforts in bays and estuaries. Where possible, the models will be coupled. Phenomena to be included are mean circulation and variations over different time scales, surface currents, effects of stratification, and meteorological effects.]; and

b. develop and publish new oceanographic reports and atlases

[This objective is an intensive extension of near-term objective h. The publication of the present tide and tidal current tables, tidal current charts and chart diagrams, circulatory survey and technical reports will most likely continue. Future information publications should emphasize conceptual models of the physical environment. The publications willl have descriptions of general offshore marine environmental conditions (climatology); tides and tidal currents, nontidal flow, other physical and chemical properties, and various analyses of water movement in different and overlapping regions. The atlases will include isopleths of physical oceanographic parameters, mean values, and variations over different time scales for users who require detailed technical information. This objective will be coordinated with efforts in other related areas (waves, water quality, sediments, etc.,) to provide for comprehensive information.].



Circulatory Measurement System Requirements
Fig. D

6. OPERATING PLAN

This operating plan lists the tasks necessary to accomplish the preceding goals and objectives. Table 2 lists specific objectives which will satisfy goals. Tasks follow each objective according to time period.

Table 2. MESD Goals and Objectives.

GOAL 1	Objectives:	Near-Term - a, b, h Mid-Term - a, b Long-Term - a, b
GOAL 2	Objectives:	Near-Term - d, e, f, i Mid-Term - a, b Long-Term - a, b
GOAL 3	Objectives:	Near-Term - g Mid-Term - a, b Long-Term - a, b
GOAL 4	Objectives:	Near-Term - c, h Mid-Term - a, b Long-Term - a, b

6.1. Near-Term Objectives and Tasks

a. Plan circulatory surveys.

Task 1. Select survey areas.
Task 2. Develop ship and engineering requirements.
Task 3. Formulate preliminary survey plans.
Task 4. Conduct reconnaissance.
Task 5. Issue draft project instructions.
Task 6. Issue final project instructions.
Task 7. Communicate and interact with ship personnel.

b. Process and analyze new survey data.

Task 1. Verify and certify data upon receipt.
Task 2. Complete processing of data.
Task 3. Analyze data.

c. Disseminate marine information products.

Task 1. Predict tide and tidal current data.
Task 2. Publish tide and tidal current tables annually.

Task 3. Distribute 180 station-years of tide and tidal current predictions annually to the National Weather Service.
Task 4. Distribute 90 station-years of predictions to foreign offices annually.
Task 5. Distribute 600 station-years of miscellaneous predictions annually.
Task 6. Distribute circulatory survey data on demand.
Task 7. Interpret circulatory survey data.
Task 8. Publish circulatory survey reports.
Task 9. Publish technical reports.
Task 10. Produce tidal current charts and diagrams.

d. Eliminate circulatory survey data analysis backlog.

Task 1. Analyze data.
Task 2. Transmit processed data to NODC.
Task 3. Issue memorandum reports.
Task 4. Publish survey reports.
Task 5. Publish special reports.
Task 6. Update tables.

e. Implement IMPACT.

Task 1. Submit Request for Proposal (RFP) for hardware to DOC.
Task 2. Submit RFP for software to DOC.
Task 3. Monitor progress of procurement.
Task 4. Install hardware.
Task 5. Implement software.
Task 6. Test software and hardware.
Task 7. Certify system operational.

f. Publish "Circulatory Survey Manual."

Task 1. Draft first manuscript (including graphics).
Task 2. Submit to editor.
Task 3. Review internally.
Task 4. Revise.
Task 5. Distribute for general review and comments.
Task 6. Revise final manuscript.
Task 7. Publish and distribute.

g. Develop/apply and test numerical circulation model.

Task 1. Continue development of MESD models.
Task 2. Assess utility of existing models.
Task 3. Select candidate model for evaluation.
Task 4. Test model.

h. Identify user requirements and needs.

Task 1. Review information from recent user interaction (MESD Task Group and Real-Time Task Force reports, and user requirements workshops).

Task 2. Secure additional decision-making information.
Task 3. Conduct user workshops in cooperation with OCN.
Task 4. Recommend new and improved products.
Task 5 Publish new and improved products.
Task 6. Recommend necessary program changes.
Task 7. Implement recommendations approved by OCN.

i. Upgrade circulatory measurement systems.

Task 1. Improve data translation.
Task 2. Enhance CMDP.
Task 3. Complete present circulatory measurement systems analysis study.
Task 4. Enhance DQA program.
Task 5. Procure appropriate hardware, software, and instruments as directed by systems analysis study and user requirements recommendations.

6.2. Mid-Term Objectives and Tasks.

a. Implement estuarine/shelf physical oceanographic measurement system.

Task 1. Develop initiative.
Task 2. Complete detailed system description.
Task 3. Test and evaluate (T&E) candidate components.
Task 4. Procure subsystem.
Task 5. Procure system.
Task 6. Complete DQA/Integrated Logistical Support (ILS)/Field Engineering Support (FES) plans.
Task 7. Integrate system (first ship).
Task 8. Modify and integrate system (second ship).
Task 9. Certify systems operational.

b. Implement real-time current and wind monitoring systems.

Task 1. Prepare technical development plan, (in collaboration with Tides and Water Levels Division and Coastal Waves Program).
Task 2. Evaluate candidate systems.
Task 3. Determine requirements for prototype.
Task 4. Issue RFP for prototype system fabrication, T&E, ILS, and FES.
Task 5. Deploy prototype in select harbor.
Task 6. Certify prototype operational.
Task 7. Complete system analysis, upgrade, and specifications for operational systems to be deployed in Nation's 10 busiest harbors and approaches.
Task 8. Issue RFP for 10 operational systems.
Task 9. Deploy systems.
Task 10. Certify 10 systems operational.

6.3. Long-Term Objectives and Tasks

The tasks required to satisfy long-term objectives are inherent in the near-term and mid-term objectives and tasks. Achievement of near-term and mid-term tasks are required for the success of the long-term objectives.

7. RESOURCE REQUIREMENTS

The key factor affecting MESD's capability and capacity to meet its objectives is having adequate resources. Obtaining adequate resources depends in large part on the priorities given to the MESD programs by OCN and NOS management. Personnel in sufficient numbers and with particular expertise are required in the MESD, along with upgraded or replaced measurement systems that will provide for one-pass, cost-effective data processing; a data and information system that will enable the MESD to respond to user needs more rapidly than it can now; and funds to cover recurring engineering, DQA, and applied research needs. Completion of the objectives described in this plan depends on obtaining the necessary resources.

7.1. Personnel Requirements

The MESD's requirements for staffing include:

° fill computer specialist position on Division staff,

° fill vacant oceanographer position in the Marine Predictions Branch,

° fill computer programmer position in the Circulatory Surveys Branch,

° fill two physical science technician positions in the Circulatory Surveys Branch,

° create three oceanographer positions for numerical modeling,

° create mathematician position mainly for modeling,

° create engineering position to manage circulatory measurement systems and real-time navigation information system.

7.2. Equipment and Software Requirements

The MESD's requirements for equipment and software include:

° upgrade of present circulatory survey measurement systems,

° acquisition of new circulatory measurement system for estuarine/shelf data acquisition,

° implementation of IMPACT, including all hardware, software, and documentation.

7.3. Funding Requirements

In addition to the funds necessary for personnel, equipment, and software listed in sections 7.1 and 7.2., the MESD requires funds for:

° user requirements workshops,

° contract editing, graphics and camera-ready copy for "Circulatory Survey Manual,"

- recurring DQA expenses,
- periodic engineering analyses (until engineer position in MESD is filled).

7.4. Projected Returns on Resource Investments

With the resources listed in sections 7.1. to 7.3., the MESD plans to:

- undertake large-scale coastal and shelf studies of national interest,
- determine user needs and demands for MESD products,
- transmit data to NODC within 12 months of data collection,
- update prediction table values within 18 months of data collection,
- produce survey and special reports within 2 years,
- publish in refereed journals,
- add capabilities to measure sea surface currents and continuous vertical profiles of currents,
- develop numerical models, and
- provide real-time oceanographic data.

8. APPENDICES

8.1. Requirements for Circulatory Surveys

8.2. NOAA Ship FERREL

8.3. NOAA Ship McARTHUR

8.4. Listing of Marine Environmental Services Division Products

8.5. FY 1983 Calendar

8.6. User Requirements Documentation

APPENDIX 8.1. REQUIREMENTS FOR CIRCULATORY SURVEYS 1981 - 1987

Maine Estuaries (1985-1987):

Many estuaries along the Maine coast have insufficient current observations. Most past surveys are very old and had insufficient spatial coverage. Only Casco Bay and Penobscot Bay have recent and valid data. Commercial and recreational navigation are extensive in the area. The lobster and fishing industries require circulatory survey data products. The offshore energy development industry also requires the products.

Chesapeake Bay (1981-1983):

Chesapeake Bay is the largest estuary on the East Coast and has the largest economic interest. Three of the main concerns are the oyster, crab, and fishing industries. This area has high scientific interest and NOAA, USGS, COE, Chesapeake Bay Institute, and local universities participate in cooperative programs to study this important bay. Commercial and recreational navigation are extensive. Partial surveys were done from 1963 to 1965. These had insufficient spatial coverage.

Georgia-Florida Estuaries (1984):

Some of the current observations that exist from these assorted estuaries are from the 1930's. New circulatory survey data and products are required for commercial and recreational navigation, the shrimp, fishing, and offshore energy development industries.

Florida Gulf Coast Estuaries (1985-1986):

Current data from these areas are sparse and old. Pensacola Bay Entrance was last observed in 1940, and Tampa Bay was last surveyed in 1963. There are little data of San Carlos Bay and Charlotte Harbor. Natural physical changes, coastal construction, and dredging may have changed characteristics of circulation. Updated circulatory survey products and data are needed for navigation and the fishing industry.

Southeast Alaska (1983-1987):

Virtually no data exists for this area. Current observations from the numerous straits and bays in Southeast Alaska (South and West of Juneau) have been obtained only by hydrographic ships, randomly and in small quantities. The last observations were recorded in 1965. Circulatory survey data and products are needed for commerical navigation, the crab and fishing industries, and fisheries regulation enforcement.

Washington-Oregon Estuaries (1982):

Previous current surveys during the 1930's were of short duration with primitive equipment. Willapa Bay was last surveyed in 1890 for 3½ days using the current pole technique. These old data are inadequate to meet the present day needs of commercial and recreational navigators.

Los Angeles-Southern California (1983-1986):

Current data for most California estuaries are outdated or nonexistent. Humboldt Bay data are over 50 years old. San Diego Bay Entrance was last surveyed in 1934. Updated circulatory survey data and products are needed for commercial and recreational navigation, the offshore energy development industry, and offshore energy regulation enforcement (e.g., the Santa Barbara oil spill was in this area).

APPENDIX 8.2. NOAA SHIP FERREL

Commissioned: June 1968
Designer/Builder: Zigler Shipyards, Inc., Jennings, LA
Homeport: Norfolk, VA

Officers and Crew: 19
Displacement: 360 tons
Length: 133 ft.
Breadth: 32 ft.
Draft: 8.0 ft.
Cruising Speed: 10 kn.
Range: 2,200 nmi.
Endurance: 9 d

Berthing: 20 bunks

Scientific Laboratory Facilities:

Wet oceanographic lab: 40 ft^2
Electronics workshop: 500 ft^2

Winches: One oceanographic winch
Two utility winches
One CTD winch
One BT winch

Cranes and Booms: One telescoping boom
Location: Amidships
One articulated boom
Location: Portside aft

A-Frames: One movable type
Location: Stern

Scientific Equipment:

1 Grundy C/STD system
36 Grundy current meters
DQA Test equipment
2 Aanderaa meteorological stations
2 Lab salinometers (Guildline, Plessey)
15-20 Tide gages (Fischer Porter ADRs and Metercraft and Bristol Bubblers)

Circulatory Measurements Data Processing (CMDP) System: The CMDP is equipped with a PDP 11/34 computer with a 128K memory and a CAMAC interface system which are used for processing circulatory survey data.

LAUNCHES

One 28 ft. diesel Lafco aluminum workboat
One 17 ft. gasoline outboard Mako Marine fiberglass open boat
Two 19 ft. gasoline outboard Monark aluminum open boat

APPENDIX 8.3. NOAA SHIP MCARTHUR

Commissioned: December 1966
Builder: Norfolk Shipbuilding and Drydock, Norfolk, VA
Homeport: Seattle, WA

Officers and Crew: 38
Displacement: 995 tons
Length: 175.0 ft.
Breadth: 38.0 ft.
Draft: 12.1 ft.
Cruising Speed: 12 kn.
Range: 6,000 nmi
Endurance: 17 d

Berthing: 40 bunks
Oceanographic Laboratory: 150 ft^2

Winches: One Northern Line oceanographic winch
One Branden oceanographic winch
One A-frame winch

Cranes and Booms: One telescoping boom, Location: Foredeck; One articulated boom, Location: Starboard quarter

A-Frames: One movable type
Location: Stern

Scientific Equipment:

1 Grundy C/STD system
1 AML portable CTD
1 Soltec C/STD analog recorder
1 XBT system
15-20 tide gages (Fischer Porter ADRs, and Metercraft and Bristol bubblers)
3 Plessey lab salinometers
52 Aanderaa current meters
4 Aanderaa water level gages
3 Aanderaa meteorological stations
DQA test equipment

Circulatory Measurements Data Processing (CMDP) System: The CMDP is equipped with a PDP 11/34 computer with a 128K memory and a CAMAC interface system which are used for processing circulatory survey data.

LAUNCHES

One 26 ft. diesel Monark aluminum workboat
One 17 ft. gasoline outboard Monark aluminum open boat
One 12 ft. gasoline outboard Alumacraft aluminum skiff
One 16 ft. gasoline outboard Boston Whaler fiberglass open boat

APPENDIX 8.4. LISTING OF MARINE ENVIRONMENTAL SERVICES DIVISION PRODUCTS

Tide Tables

Tidal Current Tables

Tidal Current Charts and Diagrams

Special Tide and Tidal Current Predictions

Tide and Tidal Current Harmonic Constants

Circulatory Survey Data

Circulatory Survey Data Reports

Special Technical Reports

Supplemental Tidal Predictions--Alaska

MARINE ENVIRONMENTAL SERVICES DIVISION PRODUCTS

Product	Product Description	Principal User	Use
Tide Tables	Predictions issued annually in four volumes covering the East Coast of North and South America, the West Coast of North and South America, Europe and the West Coast of Africa, and the Central and Western Pacific and Indian Ocean.	Federal Government; State, local, and regional authorities; individual citizens; marine construction and engineering; coastal developers; transportation; offshore facility operations; waste disposal; insurance; fisheries; recreation; R&D; science; academia; law; foreign.	Safe transit through navigable waters, marine commerce, recreational boating and fishing, baseline reference for the location and design of offshore structures, dumpsites, shoreline erosion studies, water quality control & oceanographic research.
Tidal Current Tables	Predictions issued annually in two volumes covering the Atlantic and Pacific coasts of North America. They include the predicted times of slack water and the times and velocities of strength of tidal currents for each day of the year at many of the more important waterways, factors to obtain similar predictions elsewhere, velocities of current at any given time, duration of slack, coastal tidal currents, and in some cases, wind currents.	Federal Government; State; local, and regional authorities; individual citizens; marine construction and engineering; shipbuilding; transportation; offshore facility operations; waste disposal; fisheries; recreation, R&D; science, academia; foreign.	Safe transit through navigable waters, marine commerce, recreational boating and fishing, baseline reference for the location and design of offshore structures, dumpsites, shoreline erosion studies, water quality control & oceanographic research.
Tidal Current Charts and Diagrams	Publications consisting of 12 or 13 charts which depict, by means of arrows and figures, the direction and speed of tidal currents for each hour of the tidal cycle for many of the more important harbors and bays. In some cases, the tidal current charts are complemented with a series of 12 monthly, equal-intervals, tidal current diagrams.	Federal Government; State; local, and regional authorities; individual citizens; marine construction and engineering; shipbuilding; transportation; offshore facility operations; waste disposal; fisheries; recreation, R&D; science, academia; foreign.	Safe transit through navigable waters, marine commerce, recreational boating and fishing, aid in survey planning, validation of numerical circulation models, and oceanographic research.

MARINE ENVIRONMENTAL SERVICES DIVISION PRODUCTS

Product	Product Description	Principal User	Use
Special Tide and Tidal Current Predictions	Special request predictions of time and heights of high and low waters; hourly tidal heights and current speeds; and times of slack waters and times and speeds of maximum flood and ebb currents for specific dates and areas. Information is provided as computer printouts, tapes, and/or plots.	Federal Government; State; local, and regional authorities; marine construction and engineering; shipbuilding; transportation; offshore facility operations; waste disposal; fisheries; recreation, R&D; science, academia; foreign.	Safe transit through navigable waters, baseline reference for the location and design of offshore structures, dumpsites, shoreline erosion studies, water quality control and oceanographic research.
Tide and Tidal Current Harmonic Constants	Unpublished data on file which are used to predict tides and tidal currents. The data are the results of harmonic analysis of the observed tide or tidal currents and are in the form of amplitudes and epochs. They are provided on request.	Federal Government; R&D; science; academia; foreign.	The users can predict tide and currents for special interest areas by using these harmonic constants.
Circulatory Survey Data	These data include measurements of water currents, tides, temperature and salinity structures, meteorological parameters, and other associated data such as dissolved oxygen and waves. These data, available as computer printouts or on magnetic tape, are available as: (1) processed and edited data; (2) harmonic and nonharmonic constants; (3) general, spectral, and rotary current graphic plots; (4) tabulations of salinity, temperature, and density; and (5) cross-sectional and time contouring of salinity, temperature, and density.	Federal Government; State, local, and regional authorities; individual citizens; marine construction and engineering; shipbuilding; transportation; offshore facility operations; waste disposal; fisheries; recreation; R&D; science; academia; foreign.	Input for oceanographic research and numerical hydrodynamic models and determinants and/or indicators for decision and operations in the coastal zone such as sewage disposal, pollution control, location and design of offshore structures, shoreline erosion studies and control, etc.

MARINE ENVIRONMENTAL SERVICES DIVISION PRODUCTS

Product	Product Description	Principal User	Use
Circulatory Survey Data Reports	This report details the circulatory information acquired during a particular survey. A description of quality of the data, sampling rate, locations, time period of occupation, type of instrumentation used, and other information that a potential user would be interested are supplied. The report also describes the format in which these data can be obtained.	Federal Government, State, local, and regional authorities; individual citizens; marine construction and engineering; shipbuilding, transportation; offshore facility operations; waste disposal; fisheries; recreation; R&D; science; academia; and foreign.	To make users and potential users aware of the existence of the data.
Special Technical Reports	This report presents information resulting from a particular circulatory survey and also presents descriptions, interpretations, and analyses of the data.	Federal Government; State, local, and regional authorities; individual citizens; marine construction and engineering; shipbuilding; transportation; offshore facility operations; waste disposal; fisheries; recreation; R&D; science; academia; foreign.	Input for oceanographic research and numerical hydrodynamic models, and determinants and/or indicators for decision and operations in the coastal zone such as sewage disposal, pollution control, location and design of offshore structures, shoreline erosion studies and control, etc.
Supplemental	Predictions issued annually in one volume covering the Alaskan ports of Anchorage, Nikishka, Seldovia, and Valdez. They include not only predicted times and heights of high and low waters but also predicted heights at every hour for each day of the year.	(Same as for Tide Tables)	(Same as for Tide Tables)

APPENDIX 8.5. MARINE ENVIRONMENTAL SERVICES DIVISION (MESD) CALENDAR, FY 1983

October 1982

1 Merit Pay Performance Appraisal and Compensation System (MPP) Begins: October 1, 1982 - September 30, 1983
15 Distribute Draft PI's for Chesapeake Bay (III): C211

November 1982

15 Submit 1-Page Narrative for each Major 1982 Accomplishment to C21: Staff
22 Submit Narratives to C2: C21
15 Distribute Draft PI's for Los Angeles Harbor: C211

December 1982

7-15 Fall Meeting, AGU, San Francisco, CA
15 Submit Final PI's for Chesapeake Bay (III) to C2: C21
31 Commissioned Officer's Fitness Reports to C2: C21

January 1983

14 Submit Revised 5-Year ADP Plans to C21: C21x4, C211, C212
15 Submit Final PI's for Los Angeles Harbor to C2: C21

February 1983

15 Submit Revised 5-Year ADP Plans to C2x4: C21
15 Submit Input to C21 (cc: C21x3) for Revision of MESD Program Plan: MESD Staff

March 1983

17 Submit GWPAS Plans to C21: C21 Staff Employees, C211, C212 (April 1, 1983 - March 31, 1984)
31 Submit GWPAS Plans to C2: C21
31 Begin Progress Reviews with MPP employees: All supervisors

April 1983

1 GWPAS Begins: April 1, 1983 - March 31, 1984
1 Begin Formal Appraisal Discussion (GWPAS 4/1/82 - 3/31/83)
15 Submit Vacation Schedules to C21: MESD Staff
20 Submit Vacation Schedules to C2: C21
25 Submit GWPAS Ratings (4/1/82 - 3/31/83)
29 Last Official Day for Formal Appraisal Discussions
30 Prepare Ship Schedules for FY 1984: C211

May 1983

2 Submit Nominations for Admin.'s Award: Gold, Silver, Bronze Medal Awards to C21: Staff
5 Submit Nominations to C2: C21
26-31 AAAS, Annual Meeting, Detroit, MI
28 Notification of Final Rating (GWPAS) no later
30 Spring Meeting, AGU, Baltimore, MD
31 Submit FY 1984 Travel Estimates to C21: Staff
31 Submit Want List (End of Year Funds, FY 1983) to C21: MESD Staff

June 1983

1-3 Spring Meeting, AGU
1 Begin Preparation of Engineering Requirements for FY 1984: Staff
5 Submit FY 1984 Travel Estimates to C2: C21
5 Submit FY 1983 Want List to C2: C21
8 Submit FY 1984 Eng. Req. to C21: C21x2
15 Submit FY 1984 Eng. Req. to C2: C21
15 Revise MESD Program Plan: C21x3
20 Prepare C21 FY 1984 Budget: Staff
30 Submit Reqst. for FY 1984 Ship Time to C2: C21
30 Submit Tide Tables for Editorial Services: C212

July 1983

1 Begin Development of C21 MBO Plans: C21x3
15 Submit MBO Plans to C21 (cc: C21x3): Staff
15 Submit C21 FY 1984 Budget to C2: (cc: C2x3): C21
22 Submit C21 MBO Plans to C21: C21x3

August 1983

1 Submit C21 MBO Plans to C2: C21
5 Submit Abstracts for all Published/Presented 1983 Scientific Technical Papers/Oral Presentations to C21: Staff
10 Submit Abstracts to C2: C21
15 Review Unfunded C21 FY 1984 Budget Request: Staff
28-31 Oceans '83, MIS-IEEE, San Francisco, CA

September 1983

1 Begin Prog. Reviews w/ GWPAS employees: All Supervisors
15 Submit MPP's (10/1/83 - 9/30/84) to C21: Staff
30 Submit MPP's to C2: C21
30 Submit Tidal Current Tables for Editorial Services: C212

APPENDIX 8.5. MARINE ENVIRONMENTAL SERVICES DIVISION (MESD) CALENDAR, FY 1983

MONDAY:

10:00 a.m. Submit green correspondence to C2: C21

9:00 a.m. Time and Attendance Report due to C2x3: C21

TUESDAY:

THURSDAY:

2:30 p.m. NOS Director's Staff Meeting

FRIDAY:

9:00 a.m. Submit Weekly Report on Significant Activities and Accomplishments to C21 (cc:C21x3): Appropriate Personnel and to C2 (by 12:00 p.m.): C21

9:00 a.m. Submit typing items for the Administrator's Action Agenda to C21 (cc: C21x3): Staff and to C2 (by 12:00 p.m.): C21

9:30 a.m. Office of Oceanography Staff Meeting

1:30 p.m. MESD Staff Meeting (Review and Plan Programs, Analyze Impacts)

MEETINGS:

Circulatory Survey Committee Meeting: Usually held every 6 weeks (occasionally monthly). Committee members will be notified: C2111

FIRST TUESDAY:

1:00 p.m.: NOS Research & Development Council Meeting. PLACE: Director's Conf. Room.

SECOND TUESDAY:

10:00 a.m.: NOS Equal Employment Opportunity Committee Meeting. PLACE: Director's Conference Room.

LAST TUESDAY:

10:00 a.m.: MESD Monthly Program Review. PLACE: Director's Conference Room

REPORTS:

1. Submit Branches and Staff Reports to C21 (cc: C21x3) on the 25th of each month.
2. Submit Division Monthly Report to C2 on the 29th of each month: C21
3. Submit Management-by-Objective (MBO) Monthly Report to C21 (cc: C21x3) on the 28th of each month, if required: MESD Staff
4. Submit MBO Monthly Report for the Division to C2 on the 5th of each month, if required: C21
5. Submit Anticipated Travel Report for the Division to C2x3 the 15th of each month:C21

QUARTERLY:

Submit Milestones Status Reports to:

	C21 (cc: C21x3): MESD Staff	C2: C21
1st Quarter:	12/20/82	1/10/83
2nd Quarter:	3/25/83	4/08/83
3rd Quarter:	6/24/83	7/08/83
4th Quarter:	9/26/83	10/04/83

8.6. User Requirements Documentation

Memorandums

To	From	Subject
OA/C2	OA/C21	Demonstrated Needs for Circulation, Waves and Tides Data
OA/C21	OA/C21x3	Excerpts from Hoffman (EG&G) Report; Circulatory Survey Justifications
RECORD	OA/C21	Military Use of Marine Environmental Services Division Information Products
RECORD	OA/C21x2	Commerical Use of Marine Environmental Services Division Information Products
RECORD	OA/C21	Summary of Telephone Discussions with Users of Marine Environmental Services Division Information Products
OA/C2	OA/C2x1	Comments on Draft Summary of Telephone Discussions with Users of Tide and Tidal Current Prediction Tables and Tidal Current Charts
RECORD	OA/C211	Use of Tidal Current Charts
RECORD	OA/C3x2 OA/C2x2	Trip Report of National Ocean Survey (NOS) Real-Time Marine Navigation Data System Task Team/Galveston and Houston, Texas
OA/C	OA/C1x1	Progress Report: Real-Time Marine Navigation Data Task Force
RECORD	OA/C2x2 OA/C3x2	Meeting Report: National Ocean Survey (NOS) Real-Time Marine Navigation Data Systems Task Team with Maryland Port Authority/Port of Baltimore Officials
RECORD	OA/C2x2 OA/C3x2	Trip Report - Report of Meetings: National Ocean Survey Real-Time Marine Navigation Data Task Team With Superior, Wisconsin, Duluth, Minnesota, St. Lawrence Seaway Development Corporation
OA/C2x2	Sea Grant	Meeting at Superior, Wisconsin, Duluth, Minnesota

To	From	Subject
RECORD	OA/C2x2 OA/C3x2	Trip Report: Meetings Between National Ocean Survey Real-Time Navigation Task Team With Port Everglades, Florida Port Authority, Lake Charles, Louisiana Port Authority, and LSU Sea Grant Agents; Baton Rouge, Louisiana Port Director, Beaumont, Texas Port Authority, LSU University, Sea Grant Marine Advisory Service Agents
RECORD	C2111	Southeast Alaska Circulatory Survey
Honorable Richard Frank, Administrator, NOAA	USCG	Request for assistance in determining current survey requirements
RECORD	C2x2 C3x2	Trip Report - Meeting of the NOS Real-Time Marine Navigation Task Team with the Mariner's Advisory Committee for the Delaware Bay and River
RECORD	C2x2 C3x2	Trip Report - Report of Meetings: NOS Real-Time Marine Navigation Data Task Team at Humboldt Bay, California; San Francisco Marine Exchange; Portland, Oregon Port Authority; Anchorage, Alaska; and Valdez, Alaska

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

December 8, 1981 OA/C21:HRF

TO: OA/C2 - Wesley V. Hull

FROM: OA/C21 - Henry R. Frey

SUBJECT: Demonstrated Needs for Circulation, Waves and Tides Data

REF: "Problems and Opportunities in the Design of Entrances to Ports and Harbors," Proceedings of a Symposium, August 13-15, 1980, Marine Board, Assembly of Engineering, National Research Council

The referenced report contains a wealth of information of direct interest to the Office of Oceanography, e.g., currents, waves, tides, winds, CTD structure. Statements by the Ships and Users Group, the Nature and Environment Group, and the Design and Maintenance Group are excerpted below. These statements, provided by a group as authoritarian as the Marine Board, should be interpreted as definite national needs for physical oceanographic data to support the maritime industry. I recommend that we cite this information when we are asked about user requirements.

- No validated mathematical model exists for predicting ship motion (horizontal and vertical directions) in shallow water, waves, and currents.

- Insufficient information exists for predicting bottom clearance in existing harbor entrances--

  Sinkage/trim
  Wave spectra/swell
  Vertical ship motion
  Detailed currents
  Actual tidal height
  Knowledge of draft
  Salinity

- Insufficient information has been collected and analyzed to predict the effect on steering of:

  Bottom and bottom irregularities due to silting
  Complex three-dimensional currents
  Currents in turns
  Basic suction
  Passing ships

- No analytical method exists for predicting three-dimensional currents on harbor entrance waterways.

- Ensure that the new entrance will provide for safe navigation with respect to tides, currents, winds, waves, channel dimensions, and structure design.
- Determine the accuracy of environmental information, such as waves, winds, tides, currents, and bottom characteristics.
- Develop a consistent data base of waves and currents for port design.
- Develop cost-effective models of waves, currents, water levels, tsunamis, storm surges, sedimentation, and other hydrodynamic processes.
- Develop reliable methods of predicting seiching in harbors.
- Ensure that changes caused in the physical parameters (tides, currents, salinity, etc.) are not so drastic as to cause major adverse environmental effects.
- Develop cost-effective technology for measurement of waves, tides, salinity, sediments, etc.
- Develop real-time systems to provide data on wind, waves, and currents as aids to navigation.
- Solve wave-current interaction problem.
- Cost-effective methods of quantifying physical environmental parameters in coastal areas should be sought.
- There are unmet needs for reliable quantitative hydraulic (and/or) mathematical models for the prediction of tides, currents, waves, salinity, and sediment changes in harbor entrances as a function of various design configurations.
- There is a need for better estimates of shoaling rates in approach channels for different sediments and different waves and currents.
- There is a need for better quantification of physical environmental parameters in coastal areas (i.e., waves, climate, currents, sediment movement, etc.).

cc:
OA/C21x3
OA/C211
OA/C212
OA/C23
OA/C2x2
OA/C2x7
OA/C2x8

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

February 18, 1981 OA/C21:SEM

TO: OA/C21 - Henry R. Frey

FROM: OA/C21 - Samuel E. McCoy *S.E.McC.*

SUBJECT: Excerpts from Hoffman (EG&G) Report; Circulatory Survey Justifications

The following references from "Investigation into Deep-Draft Vessel Berthing Problems at Selected U.S. Naval Facilities", Dr. John F. Hoffman, P.E. have been excerpted. These quotes inherently justify the present, past or future conducting of circulatory surveys in the areas of six deep-draft harbors used by the U.S. Navy. These are the Naval Air Station at Alameda, CA, the Naval Station and Naval Shipyard at Charleston, SC, the Naval Station at Mayport, FL, and the Naval Air Station, North Island, San Diego, CA.

Alameda Naval Air Station:

Alameda Naval Station is located in San Francisco Bay. The ship channel is roughly 4,000 feet long by 1,000 feet wide, extending from deep water in San Francisco Bay to the eastern end of the breakwater. Project depth of the ship channel, turning basin and berthing area is 42 feet below MLLW. This facility is the home port of two aircraft carriers, the U.S.S. Enterprise and the U.S.S. Coral Sea. The nuclear-powered ENTERPRISE (CVN-65) is the largest carrier operating out of Alameda, with an overall length of 1,123 feet, a maximum width of 237 feet, a beam of 133 feet and a maximum draft of 40 feet.

Ships entering San Francisco Bay on a strong flood tide, and passing the south pier of the Golden Gate Bridge close aboard, often experience a strong shear force to the starboard by a peculiar deflection of the current by the bridge pier. This shear cannot be readily overcome by the rudder and, in some cases, has resulted in complete loss of control of the course steered.

Large current eddies having the same effect are found in the vicinity of the foundation piers of the San Francisco - Oakland Bridge and the Richmond Rafael Bridge.

Vessels departing San Francisco Bay on a strong ebb current must use extreme caution to avoid excessive speed which can cause the vessel to take heavy seas on the foredeck.

Pilots indicate a speed of about 10 knots is generally maintained in the channel to assure steerageway against tidal currents and winds. Maximum currents in the channel and turning basin are estimated at about 2.0 knots. Pilots taking ships into Alameda, however, feel currents are sometimes considerably stronger than this estimate. Currents are also said to cause some navigational problems, particularly within the turning basin.

Mayport Naval Station:

Mayport Basin (Ribault Bay), is about 1/2 mile long and about 700 yards wide and is located on the south side of the St. Johns River, Florida about 1-1/2 miles west of the river entrance into the ocean. The river at the point of entry is kept open by means of jetties. Two deep-draft vessels, the aircraft carriers U.S.S. FORRESTAL and the U.S.S. SARATOGA, are homeported in Mayport.

Due to tidal currents in the river at the port of Jacksonville, precautionary measures must be taken and maneuvering done at or neartimes of slack water where possible. Currents in the entrance to the turning basin are variable according to the Chief Harbor Pilot.

Norfolk Naval Station:

Hampton Roads, also referred to from a Navy standpoint as Norfolk Harbor is utilized by both military and commercial shipping. The U.S. Naval Station is located on the southeast shore. All types of U.S. Navy vessels, including submarines, are brought into the harbor and berthed by U.S. Government harbor pilots (civilian).

According to Port Services Officer currents, affected by both tide and wind, influence berthing to the extent that it is desirable to berth vessels in the period from one hour before slack to one hour after slack. There is a scarcity of current velocity data for Norfolk Harbor. Isolated measurements have been made but there is no program of continuous measurements. In Hampton Roads winds greatly influence the currents and at times attain velocities in excess of those given on the Current Tables.

Pensacola Naval Air Station:

The Naval Air Station at Pensacola is located about four miles southwest of the city of Pensacola, Florida on the Pensacola Bay. The U.S.S. LEXINGTON is moored at Pier 303.

There are no tidal constraints to the movement of the U.S.S. LEXINGTON; however, on occasion wind does affect manuevering. There are no data available concerning the velocity of currents in Pensacola Bay.

North Island Naval Air Station:

North Island Naval Air Station is located in Coronado, across the Bay southwest from San Diego, CA. Four aircraft carriers are homeported at North Island. The Fleet Guide - San Diego, Eight edition 1978 indicates that the current is generally in the direction of the channels. Care should be taken while passing Ballast Point, as a cross-current deflected from Ballast Point may cause a ship to take a sudden shear.

Charleston Naval Complex:

The Charleston Naval Complex is located in Charleston Harbor which is formed by the Cooper, Ashley, and Wando Rivers. Nuclear submarines are based at one of the docks and require a 35-foot channel.

Berthing vessels at the Naval Facility requires considerable skill. The presence of a five-knot current at times and a narrow channel width of 600 feet requires berthing by docking pilots. In the approaches to Charleston Harbor, the most important water movements (surface) are rotary tidal currents. Tides higher than predicted result with southerly winds and falling pressure; tides lower than predicted result with westerly winds and rising pressure.

Recommendation: Investigate the feasibility of establishing an array of current meters with read outs in the Port Services Office in order to determine the current variation in various piers and in the channel.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

February 4, 1982 OA/C21:HRF

TO: THE RECORD

FROM: OA/C21 - Henry R. Frey

SUBJECT: Military Use of Marine Environmental Services Division Information Products

Captain Henry C. Morris, Assistant Chief of Staff for Fleet Operations, Military Sealift Command (MSLC) stated, during a telephone conversation with me today, that the operations managers of the MSLC consider the NOS tide and tidal current tables to have great value to them. They consider both tables to be of equal importance, and believe that this is the case throughout the industry.

The tidal current charts are used, but not as much as the tables. The charts are "would like to haves" for the MSLC. More dense data are needed on the tidal current charts.

Captain Morris sees no major usefulness of real-time tides, currents, winds, but thinks they may be useful to others.

cc:
OA/C2 - W. V. Hull
OA/C2x1 - A. J. Patrick
OA/C2x2 - M. Grunthal
OA/Cx21 - G. Younger
OA/C51 - T. Johnson
OA/C35 - T. Richards

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

February 8, 1982 OA/C21:DET

TO: THE RECORD

FROM: OA/C21x2 - Dan E. Tracy

SUBJECT: Commercial Use of Marine Environmental Services Division Information Products

Mr. F. Ricci, Manager of the Port and Navigation Division, CHEVRON Shipping Company, stated during a telephone conversation with me today, that his ship operators find the NOS Tidal Current Tables quite valuable during berthing. The NOS Tide Tables are more important than the Tidal Current Tables, but both are essential. His company needs hourly predictions for several busy harbors, in fact, they purchase these predictions for Yosu, Korea and Mallorca Straits, Spain from local universities.

The CHEVRON Shipping Company controls nine domestic carriers and 43 international flag vessels ranging in size between 35,000 to 800,000 tons. The trend is toward larger vessels and thus an increasing need for tidal predictions.

cc:
OA/C2 - W. Hull
OA/C2x1 - A. Patrick
OA/C2x2 - M. Grunthal
OA/Cx21 - G. Younger
OA/C51 - T. Johnson
OA/C35 - T. Richards

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

February 24, 1982 OA/C21:HRF

TO: THE RECORD

FROM: OA/C21 - Henry R. Frey

SUBJECT: Summary of Telephone Discussions With Users of Marine Environmental Services Division Information Products

Telephone discussions were conducted on January 28, 1982, between members of the Marine Environmental Services Division (MESD) Study Group and six users in the maritime industry. The users were contacted during the preceeding day to:

(1) explain the purpose of the contact and the information sought by NOS,

(2) provide time for internal user consultation (with masters, operations managers, pilots, etc.) prior to the discussion, and

(3) arrange a convenient time for the telephone interviews.

The MESD Study Group invited Capt. Archie Patrick, Deputy Associate Director, Office of Oceanography to attend the discussions. Lt. Cdr. Thomas Richards was on travel status and did not attend. Messrs. George Younger and Thomas Johnson, Dr. Henry R. Frey, Cdr. Melvin Grunthal, and Captain Patrick participated. A draft of this memorandum was provided to each of the participants for comments.

The discussions were held with three operators of large ships, including tankers, general cargo ships, container carriers, break-bulk carriers, and a 1,500 ton seismic survey ship. Two pilots association presidents were contacted. Information was obtained from one towing corporation. The discussions are summarized as follows:

Captain Jerry Aspland
Operations Manager
ARCO
5900 Cherry Avenue
Long Beach, CA 90805
(213) 428-7591, Ext. 321

ARCO operates 12 U.S. Flag tankers and one 1,500 ton seismic vessel. NOS tide and tidal current tables have economic value. They "play the tide" to transit into and out of ports by using the tide tables, and they plan docking and undocking according to tidal current tables. Tidal current charts are not used frequently, but are valuable when considering new ports. If NOS did not produce the tables, ARCO would have to seek private industry to fill the void. The NOS reference stations (table one) should reflect the major economic ports. ARCO operates at Valdez, Puget Sound, San Francisco, Los Angeles/San Pedro, Panama, Mississippi River, Houston, and Philadelphia. Their fleet is split: eight ships on the West Coast, and five ships on the East Coast.

Operation of an ARCO tanker averages $75K per day, or about $3K per hour. Minimizing time to approach, dock, offload, undock, and exit converts to "large" dollars. ARCO sees this as becoming even more important as their tankers become larger (greater than 250K tons DWT).

Captain Aspland expressed a need for wind data accurate to ± 5 knots to model docking and undocking; winds can have even more of an effect on berthing than currents. Real-time and predicted winds are important from a planning standpoint. Wind stations are usually not at waterfronts. He estimates that current speeds should be accurate to ± 0.5 knot. Times of high and low water, slacks, and maximum currents must be within 15 minutes.

ARCO likes to have 6 feet under the keel when entering port. A ship may heel (roll) when turning such that its skegs run deeper than its keel.

ARCO was unaware of where and how to obtain tide and current data.

Captain Aspland mentioned a need for water column data at Valdez (temperature and salinity) to analyze peculiar ships' behavior. He believes that NOS could get industry support for a Valdez project.

He suggested further contacts: Capt. Richard Bonner, LA Pilot, (213) 548-7838

Capt. Dick Jacobsen, Long Beach Pilots, (213) 435-6354

Captain Gerard Hasselbach
Asst. Marine Sup't - Container Ships
American President Line
1950 Franklin Street
Oakland, CA 94162
(415) 271-8000

Need to know times of highs and lows, slacks and maximum currents for planning. Time converts to dollars. He queried ships' masters and operations types and had Captain Larkin on an extension. They operate 15 container ships and 5 break bulk ships. They are satisfied with tide and tidal current tables "as is"--"publications are excellent and give information needed to bring ships in and out." They use tidal current charts, but not on an "everyday basis."

Complained that the 1982 tables were late getting to local vendor. (The lateness appears to be in the distribution system.) They perceive a need to get more into climatology. Need more details about currents, particularly Kuroshio Current and currents in the Bay of Bengal. Had little knowledge or opinion about real-time.

Captain Edward Fulkerson
Manager, Ports and Navigation
Chevron Shipping Company
555 Market Street
San Francisco, CA
(415) 894-5580

Chevron is especially active in the Cook Inlet. They spend much time planning for passages, and use both tide and tidal current predictions. Tidal current tables are accepted as being less accurate than tide tables; "tidal currents are more of an "ify" question." They use times of slacks and maximum speeds. The masters have not asked for additional information, so the management believes that the tables are adequate. Captain Fulkerson believes that real-time data may be helpful, but they must depend on predictions for planning purposes. Hourly heights are useful in Cook Inlet; however, Chevron masters and pilots compute hourly height manually, which indicates that the NOS publication, "Supplemental Tidal Predictions Anchorage, Nikishka, Seldovia, and Valdez, Alaska" has not been publicized adequately.

Captain Russell Bryand
President
Galveston - Texas City Pilots
(713) 935-3310

Astronomic tides are not as important as winds. High and low water times sometimes vary by 2 to 4 hours because of winds. Currents are found up to 3 knots although predictions indicate about 2 knots. When making approaches, cross channel currents in the vicinity of buoys 5, 6, 7 and 8 make manuevering extremely difficult, especially when ships pass one another; this is believed to be due to the effects of an upstream jetty. The currents appear to set toward the southwest about 90 percent of the time. The pilots often call the bridge operator to find whether the current is ebbing or flooding. (An HF radar system mounted on the bridge may be useful.) Captain Bryand thought that real-time water levels and currents near the jetty and buoys 5 to 8 would be useful; now, there is no method of determining the direction of the current before getting into the actual current. He does not use the Coast Pilot regularly.

Captain William T. Mitchell
President
Boston Pilots
Massport Pier 1, Berth 1
East Boston, MA 02128
(617) 569-4500

Captain Mitchell stated that they use our tide tables to bring vessels into port at the earliest possible moment, to satisfy oil company concerns, and that the tide predictions are very accurate. Our current predictions in the main harbor and channel are adequate, but this is not so for the various small inlets within the harbor. Our tidal current charts are helpful but have inaccuracies: Sheep Island, in Hingham Bay and adjacent to the confluence of the Fall River Channel and West Gut, is entirely missing. This area is important for large ship traffic, and it is deficient in showing proper currents.

Captain Mitchell thinks that our data may be more important to coastwise tug captains than pilots, because the coastwise operators are not as familiar with the local waters. Currents prediction near Paddocks Island and Hull Island are too weak.

He expressed a need for real-time tides, especially during passage of LNG tankers. Need both depth under keel and clearance under the Mystic Bridge. He also expressed a need for denser current information on tidal current charts.

Captain Mitchell mentioned a nautical chart deficiency in the outer harbor; there is a crescent-shaped cable area (for degaussing) and, although it is still marked on the chart, local sources believe the cable has been removed. He would like to see the notation removed from the chart to alleviate an anchorage problem.

Captain Leonard Goodwin
Vice President, Operations
Moran Towing Corporation
One World Trade Center
New York, NY
(212) 466-3600

Captain Goodwin reported heavy use of both the tide and tidal current tables; they are "used regularly every day." He indicated light use of tidal current charts. He is "quite satisfied" with our products.

cc:
OA/C2 - W. V. Hull
OA/C2x1 - A. J. Patrick
OA/C2x2 - M. Grunthal
OA/Cx21 - G. Younger
OA/C51 - T. Johnson
OA/C35 - T. Richards
OA/C211 - C. R. Muirhead
OA/C212 - D. Simpson
OA/C21x3 - S. McCoy

C21

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

February 11, 1982 OA/C2x1:AJP

TO: OA/C2 - Wesley V. Hull

FROM: OA/C2x1 - A. J. Patrick

SUBJECT: Comments on Draft Summary of Telephone Discussions with Users of Tide and Tidal Current Prediction Tables and Tidal Current Charts

The draft document appears to adequately summarize the telephone discussions of January 28, 1982. As a whole the comments seem to attach greatest usefulness to the tide tables, followed by the tidal current tables, with tidal current charts running third in order of usefulness. The degree of usefulness of our products seems to be associated more with format than absolute accuracy. It is apparent that different types of users have different preferences in formatting tide and tidal current information. There is some need for daily predictions at a larger number of major ports, or at least a need to disseminate the fact that daily predictions can be made available for other than reference stations published in the tables. As the user changes from one involved with long-range operational planning to one actually operating a vessel on the water, the usefulness of the existing product formats declines because daily predictions may not be available, currents being driven primarily by meteorological conditions, or the necessity of having to arrive at predicted values through a series of arithmetic operations.

The British Admiralty prints on their nautical charts tables of current speed and direction at various points referenced to time of high water at a given reference tide station. The Brazilian Directorate of Hydrography and Navigation shows a current rose on nautical charts. The above are just two examples of alternative methods of orienting our product formats to the needs of vessel operators. We should review these as possible alternatives or supplements to our own way of "doing business" so that maximum service may be rendered to the mariner using our existing data base.

cc:
OA/C21

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

April 7, 1982 OA/C211:CRM

TO: The Record

FROM: OA/C211 - Charles R. Muirhead *Charles R. Muirhead*

SUBJECT: Use of Tidal Current Charts

During the time period of April 1-6, 1982, several telephone calls were made to various individuals in an attempt to get preliminary information on how much the Tidal Current Charts are used. The results of these calls are as follows:

1. Mr. Ken Hilton, Standish Boat Yard and Marina, Tiverton, Rhode Island.

Mr. Hilton is a sales agent of NOS products as well as a user. He uses the Narragansett Bay, Long Island Sound-Block Island Sound, and Narragansett Bay to Nantucket Sound Tidal Current Charts. On how much the charts are used, he stated "use all the time". On how they can be improved, he stated "we are very pleased", and indicated no improvements are necessary. He also indicated the coverage of the charts is adequate for his needs. As a sales agent he indicated that his sales are to small craft owners and that "99.9%" buy them for personal use and not because they are required.

2. Mr. William Shaw, Pierson Yachts, Portsmouth, Rhode Island.

Mr. Shaw is a naval architect and a member of the U.S. Yacht Racing Union. He uses the Narragansett Bay, Long Island Sound-Block Island Sound, and Narragansett Bay to Nantucket Sound Tidal Current Charts. He indicated that he uses them often for both cruising and racing. They are particularly useful in planning sailing schedules. On how they can be improved, he stated they are "very easy to use" and indicated no improvements are necessary. He indicated a desire for charts on the area of Rhode Island Sound.

3. Mr. Charles M. Murphy, District Staff Officer, First U.S. Coast Guard Auxiliary District, Lowell, Massachusetts.

Mr. Murphy uses the Boston Harbor and Narragansett Bay to Nantucket Sound Tidal Current Charts. He indicated he uses them "often". He stated that others also use them as well as the Eldridge Tide and Pilot Book. Mr. Murphy operates a 100 foot, 100 ton offshore charter fishing boat and uses the charts to transverse to and from fishing grounds. He would like to have charts for the offshore area between Cape Cod and Portland, Maine. He also uses the current roses on the nautical charts and would like to see more of these.

4. Mr. John Dalton, District Staff Officer, Seventh U.S. Coast Guard Auxiliary District, Englewood, Florida.

Mr. Dalton does not personally use the Tidal Current Charts, but is sure others do. He indicated that he would be glad to assist in surveying the members of his district on the use of the Tampa Bay Tidal Current Charts.

5. Mr. Dan Bates, Captains Nautical Supply, Seattle, Washington.

Mr. Bates is a sales agent of NOS products and was very helpful. He indicated that sales of the Puget Sound Tidal Current Charts (North and South) are primarily to small boat owners, both commercial and recreational, with the majority being sold to recreation interests. He averages about 12 charts per month sales, but indicated that the NOS charts draw heavy competition from other sources such as various nautical and boating almanacs, which copy the NOS products. He also stated that the Pacific Science Center publishes tidal current charts for Puget Sound (one volume) using output from a computer model which offers many more vectors than the NOS charts. He also stated that the Tidal Current Tables have a high sales volume, 250 copies per month compared to 100 copies per month for Tide Tables.

It is obvious that there is real use of the Tidal Current Charts, particularly in the northeast where five of the twelve existing charts are available. The results of the telephone calls listed above are not conclusive in the amount of usage. Most of the users appear to be small craft operators, both power and sail, commercial and recreational. However, many users of NOS products acquire the information through secondary sources such as the Eldridge Tide and Pilot Book, Reed's Nautical Almanac and Coast Pilot, and the Boating Almanac. There are at least three instances of other sources of just tidal current charts. The University of Rhode Island/Sea Grant publishes tidal current charts for the Narragansett Bay and for Long Island Sound to Buzzards Bay. The Pacific Science Center publishes tidal current charts for Puget Sound. All three of these publications are accomplished by use of numerical models. There are problems in using numerical models for this type of publication, but careful use can greatly enhance the value of the charts.

To get precise information on the use of the NOS Tidal Current Charts would require a significant effort. A good start would be to enlist the aid of the Power Squadrons and Coast Guard Auxiliaries in interviewing their members. Participation in boat shows would provide additional information. However, eventually contacts with local marinas, yacht clubs, and other private boating organizations would be necessary to obtain a clear picture of chart use. This will be a time consuming and somewhat expensive job. However, if we are to ever really know what the usage of our charts is, it will be necessary.

ATTACHMENT G

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

April 23, 1982 OA/C2x2:MCG

TO: Memorandum for the Record

FROM: OA/C3x2 - Melvin J. Umbach
OA/C2x2 - Melvyn C. Grunthal

SUBJECT: Trip Report of National Ocean Survey (NOS) Real-Time Marine Navigation Data System Task Team

The purpose of this trip was to determine the interest of potential users of real-time marine navigation data in the Galveston/Houston area and to assess their willingness to work with NOS in defining performance requirements.

We presented the NOAA goals and objectives to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lake and sea ports. Our discussions focused on the NOS nautical chart digital data base (AIS), and on real-time water level, current, wave, and meteorological information. Various potential applications and the versatility of these data using available and rapidly developing new technology, with emphasis on the gulf ports environment, were discussed in detail. The user charge issue was discussed openly--or as openly as we could considering what little we know of its current status.

Upon arrival at Houston, we briefed Mr. DeWayne Hollin, a member of NOAA's Sea Grant Marine Advisory Program from Texas A. & M., on the concept of a real-time marine navigation data system. Mr. Hollin was interested and suggested (and set up) several contacts in the Galveston/Houston area. Mr. Hollin is well acquainted with the maritime interests of the Texas Gulf area and offered to help us set up a workshop in the Galveston area.

During this trip we attended meetings with the Ports of Galveston and Houston and attended a luncheon of the Galveston Port Safety and Advisory Council. We were invited to speak about real-time marine navigation data at one of the Council's future luncheons. In addition we had an extensive telephone conversation with Mr. John Miloy. Mr. Miloy is Program Director for the Texas Coastal and Marine Council, a group which is interested in vessel accident mitigation along the Texas coast (3 of 11 largest U.S. port complexes are located in Texas). Mr. Miloy extended an invitation for us to speak at one of the Council's future meetings.

Port of Galveston Meeting:

The Port of Galveston is the smallest (in terms of total tonnage) of the Houston/Texas City/Galveston complex. However, it is the closest to the deep water of the gulf and is an aggressive, forward-looking organization. This summer it will begin a project to dredge the Galveston approaches and harbor area from 42 feet to 56 feet. This effort will be privately funded--no small effort since the port is owned by the City of Galveston which has a population of approximately 200,000. The port expects to become one of the largest grain-loading terminals in the United States after completion of the project.

The meeting was held on April 6, 1982, at 1400 at the Port of Galveston facilities in Galveston, Texas. Attending the meeting were:

Mr. C. E. Poe, Deputy Port Director, Port of Galveston
Mr. Ehling N. Carlson, Pelican Terminal Company
Capt. Russel Bryant, Galveston/Texas City Pilots
Mr. C. H. Shepherd III, Lykes Steamship Company
Mr. Ted Thorjussen, West Gulf Maritime Association
Mr. J. Franklin Bryant, Gahagan & Bryant Associates
Capt. Melvin J. Umbach, NOAA, Office of Marine Surveys and Maps
Cdr. Melvyn C. Grunthal, NOAA, Office of Oceanography

The tenor of the meeting was generally positive. The attendees felt that NOAA could provide information to improve the efficiency and safety of vessel operations in the Galveston area. The consensus of the meeting was that a workshop should be held in the area at a later date. Mr. Poe agreed to help coordinate such a workshop.

The following items of interest were raised at the Galveston meeting:

1. NOAA tide and tidal current tables are of little use in the Galveston area because of the effects of meteorological

conditions. One of the participants suggested that the tide tables are accurate about 20 percent of the time. (The current tables are not as accurate as the tide tables.)

2. There is a definite need for real-time currents. These currents are needed during periods of docking and undocking and when a vessel is crosswise to the main channel current while bringing it into the harbor. The average of the current throughout the water column would be acceptable. The Pelican Terminal Company plans to temporarily deploy a current meter off a small vessel during times of need.

3. Very accurate short-term (1-6 hour) forecasts of water levels and currents are needed for the approaches to Galveston Harbor. These forecasts should take all factors into account including the runoff from storms in the Houston area if necessary.

4. Real-time and short-term forecasting of wave information in the approaches to Galveston Bay would be useful. Most waves in the approaches to Galveston Harbor are relatively short period and do not constitute a danger to large ships except in unusual circumstances. Occasionally, however, waves are of such a period as to cause larger ships to pitch excessively. This can be dangerous if the ships are operating near the limits of the channel depth.

5. Chart distribution was again mentioned as a problem. A suggestion was made that regional outlets be provided with equipment to print out updated charts on demand.

6. No great enthusiasm was shown for indicating the vessel's real-time position on a nautical chart background. This attitude probably occurred since piloting (buoy-running) techniques are used in this area.

7. The lack of adequate, accurate short-term weather forecasts was again raised.

8. A suggestion was made that the shipboard receivers be inexpensive, simple and portable. If the receivers were portable, a pilot could bring it aboard, thus relieving the shipowner of the burden of equipping his vessel. Unfortunately, this might effectively take the shipowners out of the funding of the system. If someone else is going to provide the hardware, why should they contribute?

9. Real-time and short-term forecasting of salinity information might be useful since the draft of a vessel increases as it is brought from salt to fresh water.

10. At this time poor Loran-C coverage in the gulf prohibits the use of differential Loran-C as a precision navigation device.

Port of Houston Meeting:

The Port of Houston is the third largest port in the United States. It handles more foreign vessels than any other U.S. port. The port is located approximately 50 miles inland of the mouth of Galveston Harbor via the Houston Ship Channel. The ship channel is dredged to 40 feet below Brady Island and 36 feet above Brady Island. Further dredging below 40 feet is restricted by a tunnel running under the channel. The channel is 300 feet or 400 feet wide except for turning basins.

The meeting was attended by:

Mr. Ted G. Walters, Manager, Marine Department,
Port of Houston Authority
Mr. DeWayne Hollin
Capt. Melvin J. Umbach, NOAA
Cdr. Melvyn C. Grunthal, NOAA

While Mr. Walters was interested in our program, he did not feel that it would be of any particular benefit to the Port of Houston. He suggested that we talk directly to the shippers or to shipping associations. However, he did express interest in sending a representative to a workshop held in the area.

The following points were raised during the Houston meeting:

1. The Port of Houston maintains three tide gages in the Houston Ship Channel, thus giving them access to real-time water levels.

2. Mr. Walters did not consider currents to be a problem in the channel.

3. Fresh water runoff from the heavy storms which are frequent in the area was not considered a problem, either from the standpoint of currents or water levels.

4. Real-time ship positioning and chart updating were not considered to be an advantage in the channel; this attitude probably results from the narrowness of the channel (300 feet to 400 feet) and heavy vessel traffic transiting the channel (an average of about 32 daily).

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

MAR 1 ? 1982

OA/C1xL:PCJ

TO: OA/C – H. R. Lippold, Jr.

FROM: OA/C1xl - Phillip C. Johnson

SUBJECT: Progress Report: Real-Time Marine Navigation Data Task Force

Three site visits will be made in April 1982 by Captain Umbach and Commander Grunthal to areas which have expressed potential interest in real-time digital marine navigation data. The purpose of these initial site visits is to acquaint users with NOS products and capabilities and to begin to assess the level of user interest and their requirements. Sites were selected based on interest, geographic distribution, shipping volume and problems unique to the port. The selected areas are Baltimore/Norfolk (Chesapeake Bay Complex), Houston/Galveston (Houston Ship Channel Area) and Superior, Wisconsin (Great Lakes/St. Lawrence Seaway Complex).

Site selection rationale:

Baltimore/Norfolk:

1. The Port of Baltimore has expressed interest in working with NOS to explore potential benefits of real time marine navigation data delivery systems.

2. The Port of Baltimore has one of the largest discrepancies between predicted and actual tides in the United States.

3. This area is close to Washington, D.C., and has easy access and high visibility.

4. Baltimore and Norfolk (excluding naval cargo operations) are the fourth largest in terms of tonnage in the U.S.

5. The U.S. Army Corps of Engineers intends to increase channel depths to Baltimore, indicating a strong degree of interest in maximizing use of the Baltimore facilities. A real-time tide system could assist dredging operations in addition to increasing the efficiency of shipping operations.

Houston/Galveston

1. The Port of Galveston has shown an interest concerning real-time data on tides and waves to assist in maneuvering ships in and out of the Galveston Harbor.

2. In an interview with members of the Marine Environmental Services Division Task Force, the President of the Galveston/Texas City Pilots Association, stated the following:

   - Meteorological effects were more important than astronomic affects in determining water level — times of high and low tides sometimes vary from the predictions by two or four hours;

   - Real-time tides and currents would be useful in moving ships through the channel - cross channel currents are difficult to predict near the jetty and buoys 5 to 8;

- Local operators need more and better tide and current data for determining operations at SEADOCK, the projected deep water port.

3. The Houston/Galveston Complex is the third largest U.S. port in terms of tonnage.

Great Lakes:

1. The Port of Superior, Wisconsin expressed an interest in the possible benefits that may be realized from a real-time marine navigation data delivery system.

2. The St. Lawrence Seaway and Great Lakes is a major shipping system that should be given equal consideration and exposure as our saltwater seaports.

3. The Great Lakes/St. Lawrence Seaway System is open for commercial navigation only 260 days each year. The Corps of Engineers has determined in a recent study that it is feasible to expand operations throughout a greater portion of the winter months on the Lakes, its channels, and river systems. Fog, heavy precipitation, and ice, during the fall, winter and spring combined with the removal of floating aids to navigation, eliminate totally or restrict' recreational and commercial vessels to daylight movements. The availability of real-time marine navigation digital data, joined with an all-weather, reliable, accurate positioning system could increase the systems commercial capacity by six percent.

Initial site visits require two-person local travel to Baltimore, a two or three day trip to Houston/Galveston, and approximately one week to the Great Lakes area. Representatives from port authorities, harbor commissions, shipping associations, pilot associations, and other interest groups will be interviewed as time permits. As opposed to the major seaports through-out the United States which can be viewed as more-or-less independent activities and operations, Great Lakes ports and the Seaway must be considered as a system. No one piece, or entity of the system operates or functions independently. Therefore, rather than limit the initial meetings to a single part or activity, the St. Lawrence Seaway Development Corporation and the vocal Lake Carriers Association will be contacted to develop a broader constituency and perspective of Lake/Seaway system user requirements. Additional contacts will be made with the Navy, Coast Guard, and Army Corps of Engineers.

cc:
Pyle
Hayes
Bossler
Lanier
Hull
Umbach
Grunthal

ATTACHMENT F

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

OA/C3x2:MJU

MAR 31 1982

MEMORANDUM FOR THE RECORD

FROM: OA/C2x2 - Mel Grunthal *mcl*
OA/C3x2 - Jerry Umbach *JU*

SUBJECT: Meeting Report: National Ocean Survey (NOS) Real-Time Marine Navigation Data Systems Task Team with Maryland Port Authority/ Port of Baltimore Officials

1. The purpose of the meeting was to determine the Port Authority's potential interest in real-time marine navigation data and assess its willingness to work with NOS in defining performance requirements.

2. The meeting was held on March 29, 1982, at 2 p.m. at the Baltimore World Trade Center.

3. Attendees were:

Jim Hogan, Terminal Director, Port of Baltimore
Tom Powers, Manager of Hazardous Materials and Safety Development, Port of Baltimore
Tony Mazzaccaro, Sea Grant Program Leader, University of Maryland (College Park), Marine Advisory Service
Mel Grunthal, OA/C2x2
Jerry Umbach, OA/C3x2

4. Mazzaccaro was asked by Bob Shephard, Director of Sea Grant's Advisory Service, to attend this meeting to assess what role Sea Grant might play if this concept was well received in Baltimore. He seems to be a "fisheries" and research-oriented individual, but expressed a sincere willingness to cooperate and work with us although he is not familiar with the marine transportation industry.

5. We presented, informally, our desires and goal to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lake and sea ports. Our presentations and discussions focused on the NOS nautical chart digital data base and on real-time tides, currents, waves, and weather. Various potential applications and the versatility of these data using available and rapidly developing new technology, particularly with regard to Baltimore, were discussed in detail. The user charge issue was discussed openly.

6. Powers and Hogan, although finding the concept interesting and of potential benefit to other ports and harbors with greater tidal ranges, could foresee little or no application to Baltimore, at least from the Port Authority's perspective. The Baltimore Port Authority envisions itself as lessors and managers of port facilities and providers of terminal services. They believe vessel movements in Baltimore Harbor and its approaches to be efficient and safe, and because of the less than 2 feet of tidal range and low current velocities, do not perceive real-time information to be cost beneficial. Their major concern seems to be deepening the channel from 42 feet to 50 feet. Incidentally, their insurers require the port to contract with AccuWeather for nowcasting and forecasting.

7. The concensus of the attendees was that we were not talking to the right group of people. Hogan and Powers believe it is the vessel owners' or operators' problem to transport goods in and out of port, and that only this group could or should decide whether real-time marine navigation systems are feasible or cost beneficial. We believe the port authorities' role in this initiative should be more active, even to the point of acting as "brokers" or interfaces between the Government and actual users, and think their non-aggressive posture is somewhat shortsighted. However, NOS should not pressure any organization into an uncomfortable position.

8. Powers and Hogan suggest that better contacts would be the shipping companies, pilots associations, and other interest groups. Specifically:

- Association of Maryland Pilots
- American Merchant Marine Institute (Washington, D.C.)
- Master Mates and Pilots Association School (Max Carpenter)
- Steamship Trade Association of Baltimore (Bill Detweiller)
- Foreign flag shipping associations

If they show sufficient interest in such a system, the port administration would most likely become involved on the sidelines.

9. Powers and Hogan both suggest that of the suite of technology, services, and data that NOS could provide, up-to-date chart information seems to be the most appropriate--but reaffirmed that we should work directly with the users to determine their specific requirements. There have been many complaints in Baltimore because the on board information required by the U.S. Coast Guard to operate in U.S. waters (up-to-date nautical charts, tide tables, current tables, Notices to Mariners, and Coast Pilots) are frequently difficult to obtain locally on a timely basis and can cause sailing delays. Providing such updated information might be cost effective because chart correction work is now done manually by one of the mates on an overtime schedule--an expensive proposition. They also believe that real-time access to navigation data combined with a display showing the vessel's position accurately would be useful during severe winter freezes when floating aids to navigation are destroyed or shift.

10. Again, real-time tidal information was not perceived as important. Because of the small range in astronomic tides (less than 2 feet) and low current velocities, little benefit would be derived from "riding the high tide" in and out of Baltimore. NOS might be able to prove this assertion to

be incorrect, but it would require an extensive analysis of tidal flows in Chesapeake Bay and its tributaries. In addition, there are few piers and access channels in Baltimore which can accommodate vessels drawing over 37 feet. (See attachment)

11. The legal implications of providing navigational data electronically should be investigated. What happens if a casualty occurs which was caused by erroneous information provided by NOS or an intermediary?

12. The oyster industry should be contacted to assess the potential usefullness of real-time water conductivity data (salinity) for timely harvesting. Tony Mazzaccaro would be the logical person to follow up on this initiative if we think it's a good idea. It seems like this is the kind of opportunity that Sea Grant would leap on.

13. Strike one! At least we got up to bat.

cc:
OA/C1x1
OA/C2
OA/C3
OA/C513

ATTACHMENT H

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

April 22, 1982 OA/C3x2

MEMORANDUM FOR THE RECORD

FROM: OA/C2x1 - Mel Grunthal
OA/C3x2 - Jerry Umbach

SUBJECT: Trip Report - Report of meetings: National Ocean Survey Real-Time Marine Navigation Data Task Team with:

1. Superior, Wisconsin/Duluth, Minnesota Port Authority officials and potential user constituency representatives; and

2. St. Lawrence Seaway Development Corporation officials at Massena, New York

1. The purpose of the meeting in Superior was to determine the degree of interest of the port authority and potential users in real-time marine navigation data, and to assess their willingness to collaborate with NOS in defining performance requirements.

   A. The meeting was held on April 13, 1982, at 0900 in the City Hall Hearing Room Superior, Wisconsin.

   B. Attendees were:

James M. (Jim) McCarville - Superior Port Director
Mark Olson - Superior Port Authority
Don Jorgensen - Wisconsin D.O.T./Superior Board of Harbor Commission
William Hammann - Superior Board of Harbor Commissioners
Betty Hetzel - League of Women Voters, Superior Board of Harbor Commissioners, and Douglas County Supervisor
Francis (Ed) Stein - Superior City Council
Dennis Van Hoof - Wisconsin Coastal Management, Northwest Regional Planning
Robert H. Johnson - ORTRAN, Superior Midwest Energy Terminal
Captain George Luckenbill - Upper Great Lakes Pilots Association, Duluth, Minnesota
Alan Johnson - Seaway Port Authority of Duluth
Phil Keillor - University of Wisconsin, Sea Grant Institute
Kenneth Bro - University of Wisconsin, Sea Grant Institute
Bruce Munson - University of Minnesota, Sea Grant Institute
Mel Grunthal - OA/C2x2
Jerry Umbach - OA/C3x2
note: U.S. Coast Guard and Corps of Engineers were invited, but did not attend.

C. We presented the NOAA goals and objectives to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lake and seaports. Our discussions focused on the NOS nautical chart digital data base (AIS), and on real-time water level, current, wave, and meteorological information. Various potential applications and the versatility of these data using available and rapidly developing new technology, with emphasis on the Great Lakes environment, were discussed in detail. The user charge issue was discussed openly -- or as openly as we could considering what little we know of its current status.

D. The primary merchant shipping industry concern in the Great Lakes is extending the navigation season further into the winter months. Most floating aids to navigation are removed on a phased basis during the fall, remain out during the hard winter months, and then are gradually replaced in the spring. When these aids are not in place, vessel movement is prohibited during darkness and periods of reduced visibility. Winter aids are highly susceptable to positional shifting caused by ice movements, and are of questionable value for accurate and safe winter navigation.

A broad concencus developed that a precise navigation or positioning system which could automatically superimpose a vessel's position against a chart background would alleviate this problem -- with a mild admonition from a pilot that the industry's objective is to make, not spend, money, and that such technology must be priced reasonably.

E. More accurate up-to-date hydrographic information is needed to operate safely, particularly in the vicinity of lock approaches and narrow channel cuts where vessel propellers scour the bottom and create new shoaling. Ships sometimes have one foot or less clearance between keel and the bottom.

F. Great Lakes Pilots have worked with a real-time marine navigation data system for years -- word of mouth!

G. The Great Lakes tanker fleet has a much better operating safety record than its "saltie" equivalent. The suggestion was made that the cause may be the "salties" unfamiliarity with lake sailing and their relatively lax practices in navigating and piloting. It is not uncommon for a pilot to turn the conn over to the regular watch for an open lake transit, rest a bit, and return to the bridge to find the vessel five or six miles off the desired steaming track. Would real-time, automatically plotted positions improve this situation?

We have no statistics on the relative safety records of the Lakers vs Salties.

H. Accurate, real-time water level information at locks and bridges would be useful. Water-level staffs are located at each lock, but the information is not routinely made available to the pilots. Heavily laden vessels often clear lock sills by only six inches. During hot and sunny days, lake vessels tend to "hog" because of temperature differentials --- decks and superstructures are hosed down with cold lake water to straighten the keel.

I. Real-time current information would be "nice to know" in various areas of Lake Superior, particularly when docking or undocking, and when locking and unlocking.

J. Real-time wave information could prove useful and contribute to safer navigation. Pilots exchange wave and sea condition information via radio and use a combination of U.S. and Canadian official forecasts, and radio and television forecasts for weather.

K. Wave climatology is sadly lacking in the Lakes. This kind of information would be extremely useful for:

1. vessel design -- lake wave characteristics are dissimilar to those of ocean waves.
2. Erosion control studies
3. Waterfront design

L. We were told that real-time ice depth, movement, and open lead information would be particularly valuable during periods of marginal navigating conditions (we weren't smart enough to come up with this ourselves). Vessel operators now make decisions on which shore to run based on pilot cross-talk and radio and television information. Clearly, ice information falls within the scope of the real-time marine navigation data concept.

M. Better, more frequent weather forecasts are needed for safer operations -- both commercially and recreationally -- density of observation and forecast stations should be increased. Operators run the lee shore of the Lakes for safety and efficiency.

N. The most positive response and definition of need for the information, services, and technology discussed above was articulated by the Duluth Pilots Association representative, George Luckenbill

O. There was a general agreement among the participants, and a specific interest expressed by the Port Director, that a workshop is warranted as the next step in defining more concisely future systems performance requirements. The following helpful comments were made with regard to a workshop approach:

1. The Great Lakes and St. Lawrence Seaway should be considered as a single marine transportation system, as opposed to approaching each port uniquely. -- "the sum of the ports is greater than the whole."

2. NOAA should connect with other Federal interests to determine and establish roles, particularly with regard to activities funding.

3. NOAA should develop a draft basic plan (straw-man) for the workshop for consideration of participants.

4. A visual model display of a potential system could prove to be very helpful.

5. The workshop should involve:

   a. Federal Government

   b. User constituency

   c. Technology industry

6. Canadians should participate

P. Sidenotes

1. U.W. Sea Grant has problems with the poor quality of bathymetric data available and requested information on how to get new surveys conducted.

2. They also perceive that they have no input to NOS for survey requirements, and cannot get survey results.

3. Jim McCarville, Port Director, was enthusiastic about a workshop and expressed a willingness to steer our local representative to useful contacts in the industry.

4. Phil Keillor, University of Wisconsin Sea Grant, seems to view his responsibilities from a research and university interest perspective, i.e., lake shore erosion studies, wave climatology, bathymetry, hydrography, current studies, etc; Sea Grant should be the conceptualizers on behalf of the academic/research interests. We are not sure of how much willing help we can get with the needed leg-work, local contact, and mechanics for a successful workshop.

5. The chart shows the Superior "High Bridge" clearance as 123 ft. The bridge was supposed to be built for a 120 ft. clearance. Which is correct? (to OA/C32 for answer to George Luckenbill)

2. The purpose of the meeting with St. Lawrence Seaway Development Corporation (SLSDC)officials was to assess their interest and need for real-time marine navigational data systems and their willingness to work with NOAA in developing user performance requirements.

   A. The meeting was held on April 15, 1982, at 9:00 am at the Corporation operational headquarters in Massena, New York.

   B. Attendees were:

      William H. Kennedy, Resident Manager
      Tom Sizemore, Assistant Resident Manager
      John B. Adams, Chief Engineer
      Henry H. Montroy, Chief, Marine Services
      Joseph C. Simmons, Chief, Lock Operations
      Jerry Umbach, OA/C3x2
      Mel Grunthal, OA/C2x2

   C. SLSDC's primary concern seems to lie in better weather forecasting. Approximately 15% of navigable time is lost between April and November because of bad weather and reduced visibility. Interest was expressed in the concept of using digital chart data, provided that precise vessel positioning would be part of such a system. Money is a serious problem with SLSDC Seaway --tolls increased 18% this year, and will be upped by another 10% next year.

   D. SLSDC has its own problems in getting NOAA nautical charts updated in a timely manner. When the U.S. Lake Service was in business, it took only about one year to get hand corrections applied to a chart -- it takes NOAA much longer now. The reissue cycle timing is not believed to be adequate. SLSDC is a prime user of our charts for a variety of purposes, the most important of which is maintaining floating aids. SLSDC does its own work in placing, removing, and servicing some 300 buoys and fixed aids.

   E. Water level information is always valuable for seaway and lock operations. Staffs are located at all of the locks. SLSDC installed and maintains its own water-level gages (non-telemetering), and telemetering temperature gages. Because of the lock staffs, vessel operators need only to request this information from the lock operator via radio.

   F. Although currents in the seaway and lock areas can present problems to vessel operators, real-time information or observations do not appear to be warranted. The currents are reasonably easy to predict based on the known volume of water being spilled through the locks, hydraulic power plants, and spillways.

G. Wind driven waves within the confines of the St. Lawrence River are not a problem. Vessel wakes are because of shoreline erosion. Wave heights on Lake Ontario are important -- if in excess of 10 ft., barge traffic is restricted.

H. Ice thickness, movement, and open lead information would be extremely valuable during the fall freeze and spring thaw.

I. A committee has been formed to define an optimum Precise all-weather navigation system (PAWNS) for piloting in the Great Lakes and Seaway marine transportation system. Committee membership includes representatives from the U.S. and Canadian Coast Guard, the U.S. and Canadian Seaway Commissions, the St. Lawrence Seaway Development Authority, and SLSDC. We suggested, and SLSDC concurred that it might be a good idea to include NOAA in an advisory capacity because of its in-house expertise and proficiency with precise positioning systems. NOAA would benefit by keeping abreast of PAWNS developments in the Great Lakes with regard to the proposed Real-Time marine Navigation Data System and could assist the committee.

J. SLSDC suggests that the systems cost must be kept low -- owners of older vessels, particularly foreign, are not likely to make substantial investments in this type of equipment.

K. User fees for nautical charts may be a real problem. Lake operators (and the SLSDC) would buy and use Canadian charts if NOAA prices itself out of the market.

L. The operations wing of SLSDC is interested in the real-time marine navigation data concept and is willing to work with NOAA -- however, we have to contact Dave Robb (R&D) in the SLSDC executive headquarters in Washington, DC, to determine the degree of participation and assistance which will be provided.

Recommended additional contacts in the Lakes.

- Lake Carriers Association
- Dominion Marine Association
- Upper Great Lakes Pilots Association
- Lake Pilots Association - Port Huron
- Canadian Pilots Association
- U.S. and Canadian Coast Guard
- U.S. Corps of Engineers
- U.S. Maritime Administration
- RADM Roy Hoffman (USN,Ret), Milwaukee Port Director and Chairman of Western Great Lakes Ports Association
- Gary Failor, Port of Toledo, President, U.S. Section of the International Association of Great Lakes Ports
- Ray Lunn, Port of Oshawa, President Canadian Section of the International Association of Great Lakes Ports
- Harry Benfort, University of Michigan, respected expert on Great Lakes ship transportation system with credibility throughout the industry.

cc: OA/Cx1, OA/C1x1, OA/C2, OA/C3, OA/513

Sea Grant Program
Sea Grant Extension Program
109 Washburn Hall ☐ University of Minnesota/Duluth ☐ Duluth, Minnesota 55812 ☐ (218) 726-8106

TO: Commander Melvyn Grunthal and Captain Jerry Umbach

FROM: Bruce H. Munson, Acting Director

DATE: April 27, 1982

All of us who are involved with the ports of Duluth and Superior would like to thank you for visiting with us and discussing user requirements for the Great Lakes. Real time data could be invaluable to not only navigation of Lake Superior, but also to maneuvering within the harbor.

On the Lake the data which may be most valuable are:

1. ice cover reports - thickness and location of leads;
2. precision positioning;
3. comprehensive weather data for the whole lake (Is there satellite info which would help?); and
4. wave height (Are the models and formulas which would allow for projections of wave heighth given windspeed, wind direction, & fetch?)

I personally feel that real time data could be of considerable value when used within the harbor. Here again precision postioning could be very useful. In addition, water level, current flow, and current direction data could present some of the mishap's we've had in our harbor in recent years. We've had a few boats hit the pier at the Duluth entry and some of the error has probably been due to lack of knowledge of the harbor conditions.

The technologies for data interpretation and retrieval certainly exist. It would be useful to have workshops which demonstrate the various capabilities.

My primary concern would be regarding data input. I'd hate to get the port authorities and captains all excited about technology which would take several years to get in place.

If we at Sea Grant can be of assistance in future workshops please let me know.

jz

ATTACHMENT I

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

May 7, 1982 OA/C3x2:MJU

MEMORANDUM FOR THE RECORD

FROM: OA/2x2 - Mel Grunthal
OA/3x2 - Jerry Umbach

SUBJECT: Trip Report: Meetings between National Ocean Survey Real-time Navigation Task Team with:

1. Port Everglades, Florida Port Authority officials;
2. Lake Charles, Louisiana Port Authority officials, potential user constituency representatives, and LSU Sea Grant agents;
3. Baton Rouge, Louisiana Port Director;
4. Beaumont, Texas Port Authority officials and potential user constituency representatives; and
5. Louisiana State University, Sea Grant Marine Advisory Service Agents

PURPOSE: The purposes of the meetings were to assess the degree of interest of port authorities and potential users in real-time marine navigational data, and to determine their willingness to collaborate with NOS in defining performance requirements.

The NOS Task Team presented the NOAA goals and objectives to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lake and seaports. Our discussions focused on the NOS nautical chart digital data base (AIS), and on real-time water level, current, wave, and meteorological information. Various potential applications and the versatility of these data using available and rapidly developing new technology, with emphasis on the local environment, were discussed in detail. The user charge issue was discussed.

1. The Port Everglades meeting was held on April 26, 1982, at the port offices in Ft. Lauderdale, Florida.

A. Attendees were:

James H. Phifer, Port Director
Bob Richards, Harbormaster
Bob Clapp, Assistant Director of Engineering
Mel Grunthal, OA/C2x2
Jerry Umbach, OA/C3x2

B. As meetings go, this one was relatively unproductive with regard to advancing the cause of real-time navigation data systems. We seem to have caught the port authorities cold as evidenced by their underwhelming response. Pilots and carrier representatives were invited but did not attend. The Florida Sea Grant Marine Advisory Services agent (Dr. Marion Clark, University of Florida, Gainsville) was invited on short notice and did not show up. We did learn an important lesson here --- provide more detailed information in advance to bring our listeners more up to speed.

C. Port Everglades seems to be a small, compact, and well protected facility with easy and safe entry and egress. The port shows relatively few of the problems normally associated with its bigger brothers. Tidal ranges vary from 2 1/2 - 3 feet and current velocities are slight. NOS prediction tables for these phenomena are reasonably accurate. Real-time information might be "nice" to have for pollution control planning or occurrences. Wave data technology stimulated little interest as well.

D. The Port Director agreed to distribute our pamphlets to the local carriers, towing concerns, and pilots; then confer among themselves to decide which technology, data, and services might be appropriate for the Port. Jim Phifer is supposed to let us know the outcome.

E. The Port Authority and Corps of Engineers resurvey the port waters and project channels annually, and they perceive moderate seafloor stability and little need for digital nautical chart information.

F. Port of Palm Beach, Florida may be interested in discussing NOS technology as it has problems with currents.

G. Port engineers like working with NOS charts with the enhanced orthophoto background for inshore features. They were given contacts for more information on the NOS Seaward Boundary Map Series which uses rectified photomosaics at 1:10,000 scale.

H. Although the Port's initial response is low-key, the Director seemed to be interested in attending a workshop sponsored elsewhere (Port Directors like to travel too).

I. The Port has major funding problems and expressed a major concern over the cost of implementing or acquiring such systems.

2. The Lake Charles, Louisiana meeting was held at the port offices on April 27, 1982, at 0900.

A. Attendees were:

Jim Sudduth, Port Director
Jack LeBleu, Port of Lake Charles
Edgar Carpenter, Harbor Docking and Towing Co.

Malcolm Gillis, Lake Charles Pilots Association
David C. Lentz, Gastrans Co.
Dwayne Chatoney, Sabine Towing Co.
Robert Sylvia, LSU Sea Grant, Marine Advisory Service
and of course, Mel and Jerry.

B. Lake Charles is practically a land-locked port about 32 miles inland from the Gulf of Mexico. Normal tidal ranges are 1.5 ft. at the entrance to Calcasieu Lake and about 0.5 ft. at Lake Charles. Currents tend to be light except during freshets. Little flooding occurs unless a major storm hits the area from the Gulf.

C. The Lake Charles pilots have problems with the adequacy and accuracy of buoy placement, and believe the buoys shift position frequently. Water levels are very important to the pilots -- the lake bottom is soft and heavily laden vessels are always "pushing mud." NOS tidal and current predictions are unreliable.

D. As is the case with the other ports we have visited, Lake Charles is concerned about the cost and size of such data systems and real-time telemetering technology, and of the methodology for transmitting this information to ships. Real-time automatic vessel positioning capability is not considered to be important.

E. The pilots have been trying to get a standard nautical chart issued for the Lake area since 1980. Existing chart layouts also need to be revised to better serve the needs of the users. NOS has not been particularly responsive in this matter. Bob Norris will contact Captain Gillis to establish a better dialogue.

F. Attendees' concensus seemed to be that a workshop is the most appropriate vehicle to pursue further such a cooperative effort between the government and industry; and that a local workshop might be better than a regional gathering because of port differences. We agreed to send our final report to Lake Charles after meeting with the initially targeted ports and assessing the overall situation.

G. At Lake Charles we began to get more specific input on the need for real-time systems for the offshore industry --- where usage would have a significant economic pay off. Digital nautical chart data bases, which could be updated on a near real-time basis could be useful in the Gulf, particularly for planning movements and operating oil and gas drilling rigs. Some rigs lease for $40K - 50K per day. By the time NOS shows some of the mobile drilling rigs or platforms on its charts, they are gone!

H. Tug and barge transportation is increasing in the Gulf of Mexico -- this combination is extremely sensitive to wave action when compared to seagoing carriers. Wave amplitude and period combinations play a major role in planning and scheduling jack-up rig operations. Some platforms have wave measuring instrumentation.

I. Knowledge of real-time currents would be extremely valuable to all facets of the offshore industry.

J. Suggested additional contacts:

Sam Giallanza
New Orleans Steamship Association
219 Carodulet
New Orleans, LA

Dr. Eda
Stevens Institute
(for offshore industry)

3. The Baton Rouge meeting was held at the port offices on April 28, 1982 at 1100.

A. Mr. C. W. (Bill) Herbert, Executive Director, was briefed by the NOS road show. Bob Sylvia, LSU Marine Advisory Service, also attended. Mr. Herbert did not see fit to invite anyone else to the meeting and seemed to have little knowledge of marine shipping operations and navigational concerns.

B. Herbert sees little utility of digital nautical chart data applications and expressed no interest in real-time wave, water level, and current information for the Port of Baton Rouge; the port is protected from the Gulf of Mexico by over 150 miles of Mississippi River. Annual snowfall in the northern plains and upriver precipitation are the major influences on river stages.

C. Suggested additional contacts.

Bar Pilots Association,
Lower River Pilots Association, and
New Orleans/Baton Rouge Pilots Association

D. Mr. Herbert will try to make arrangements for NOS to present this program at the Gulf Ports Association semi-annual meeting in Pensacola, September 8-10, 1982. (Ben Murphy, President -- Pensacola)

4. The Beaumont meeting was held in the Chamber of Commerce Boardroom on April 29, 1982, at 1000.

A. Attendees were:

(See attached roster)

B. This was the largest meeting we have been involved in so far, and there was a desire expressed to participate in a workshop. A separate workshop specifically for Beaumont does not appear warranted at this time.

C. Tide and current prediction tables are inaccurate in the Port Arthur, Beaumont, Orange Complex. Local knowledge is mandatory for the safe handling of large vessels, Water levels at the ports and along the

Sabine River are largely affected by precipitation runoff, strong and long northerlies, and major Gulf storm systems. Current information is needed for safer river piloting and shiphandling, and for dock and waterfront design.

D. Access to digital nautical chart data with corresponding computer graphics technology and automatic positioning capability may be worthwhile -- the need for backup hard copy, perhaps by facsimile transmission, was expressed in the event of power failures or communications disruptions. (this type of requirement would be addressed in the conceptual or engineering development phases).

E. The local Coast Guard informed us that establishing safety fairways and auxiliary channels (such as Hampton Roads) are a high priority item in the Lake Charles area. They would like these areas wire-dragged and shown on the charts.

F. Additional recommended contacts:

Ron Brinson, President
Association of American Port Authorities.

G. A lively discussion and bantering with regard to potential user charges for NOS products and services closed the meeting.

5. During the trip we also met with Mr. Ronald Becker and Mr. Robert Sylvia of the Sea Grant Marine Advisory Program at Louisiana State University. Sylvia is developing a low-cost system to provide near real-time (1-3 hours old) wind, temperature and wave data to a wide range of users via phone lines.

He envisions a clientele as diverse as large offshore oil companies or individual fishermen.

Based on their experience in developing this system, Mr. Becker and Mr. Sylvia suggested that NOS involve offshore maritime interests in the development of any real-time marine navigation data system. Specifically, they suggested:

Offshore Operators Committee (Offshore oil industry)
Louisiana Offshore Oil Port (LOOP)
Marine Insurance Companies
National Ocean Industries Association (NOIA)
Offshore Marine Service Association (OMSA)
International Association of Oil Drilling Contractors

Several other important points were brought up during our discussion:

1. Actual waves and currents and short-term forecasts of waves and currents are very important when moving expensive ($10K per day and greater) jack-up drilling rigs. Currents can be determined from satellite sea surface temperature readings.

2. The Vessel Traffic Control System Panel for the Mississippi River can provide NOS with useful information about Mississippi River navigation.

3. NWS Port Meteorological Officers may be a good contact point.

4. The interests of potential small users of real-time marine navigation data should be considered. It is unlikely that this group will be adequately represented at any meeting or workshop and their intersts might easily be overlooked. The design of any Real-Time Marine Navigation Data System should include the ability to access the data at a low cost.

5. Low-lying fog in the river channel is a major problem on the Mississippi River.

Attachment

cc:
OA/Cx1
OA/C1x1
OA/C2
OA/C2x2
OA/C3
OA/C513

R O S T E R

WATERWAYS COMMITTEE MEETING

APRIL 29, 1982

BEAUMONT, TX.

Josh Allen
Allen Investments
1393 Calder
Beaumont, TX 77701
833-8947

Paul Beard
Sabine Propeller
P.O. Box 1057
Port Arthur, TX 77640

Andy Brauninger
Sabine Towing
P.O. Box 1528
Groves, TX
962-0201

Stirling Copp
City of Beaumont
P.O. Box 3827
Beaumont, TX 77704
838-0706

Walter Crawford
Beaumont Navigation District
420 Mariposa
Beaumont, TX 77701
835-7742

J.C. Davis
Gulf Oil Marine
P.O. Box 701
Port Arthur, TX 77640
985-1566

Brian Frank
Beaumont Enterprise
P.O. Box 3071
Beaumont, TX 77704
833-3311

O.L. Fulton
P.O. Box 3033
Port Arthur, TX 77640
722-1922

Fred Heiner
Heiner Farms
P.O. Box 3387
Beaumont, TX 77704
842-1228

Dennis Huffman
Executive Vice President
Greater Port Arthur Chamber of Commerce
4749 Twin City Highway
Port Arthur, TX 77640
963-1107

Carroll Lewis
Texaco
P.O. Box 728
Port Arthur, TX 77640
985-7411

Barry Long
Bethlehem Steel
P.O. Box 3031
Beaumont, TX 77704
838-6821

J.W. Martin
Port of Beaumont
P.O. Box 2297
Beaumont, TX 77704

Capt. James Manry
Manry Marine Consultants
2935 Bryan
Groves, TX 77619
962-4054

J.F. Plangman
Trotti & Thompson
P.O. Box 70
Beaumont, TX 77704
833-7411

Johnny Rozsypal
Corps of Engineers
P.O. Box 157
Port Arthur, TX 77640
985-4383

Cary Seaton
Texaco, Inc.
P.O. Box 1028
Port Arthur, TX 77640
985-7411

Helen Sohlinger
Port Arthur News
% Press Room
Jefferson County Courthouse
Beaumont, TX 77701

D.L. Turpin
Beaumont Navigation District
420 Mariposa
Beaumont, TX 77701
835-7742

J.F. Vandergrift
Capt. Van, Inc.
552 5th Street
Port Arthur, TX 77640
982-2911

H.E. Weaver
Sabine Pilots
5148 W. Parkway
Groves, TX 77619
962-8580

D.P. Wheat
P.O. Box 5187
Beaumont, TX 77702
835-4933

Capt. J.J. Wicks
U.S. Coast Guard
Federal Building
Port Arthur, TX 77640
983-8244

Tommy Williamson
Coastal Construction Co.
P.O. Box 1568
Port Arthur, TX 77640
727-0731

Will Wilson
First Security Bank
P.O. Box 3391
Beaumont, TX 77704

Dow Wynn
Port of Port Arthur
P.O. Box 1428
Port Arthur, TX 77640
983-2011

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

June 29, 1982 C2111:GDP

TO: THE RECORD

FROM: C2111 - Lt (jg) Gary D. Petrae

SUBJECT: Southeast Alaska Circulatory Survey

While preparing to draft the five-year circulatory survey plan of Southeast Alaska, I had occasion to talk with some representatives of the largest users of these waters. My first conversation was with Captain J. Hodgman of the Southeast Alaska Pilots Association. He stated "no one uses the tidal current tables more than we do," and indicated a strong interest on behalf of his association in our plans for the survey. In a follow up conversation, he provided a list of 11 areas that they were very interested in having surveyed. The areas ranged from Skagway in the north to Ketchikan in the south with special interest in Juneau Harbor. Captain Hodgman stated that because of the complex current regime in Juneau they would "love to see a tidal current chart of the harbor."

Foss Launch and Tug Company's Port Captain Tim Lyness was my next source of information. He indicated that they move barges of 220 to 343 feet throughout Southeast Alaska on a weekly scheduled basis. Additionally, they operate an oil barge service to many of the outlying areas in the smaller bays and inlets. Their need for accurate predictions is critical for transiting and docking. He expressed a specific need for data in Sergis Narrows, Wrangell Narrows, and Snow Pass.

This need for accurate predictions in Wrangell Narrows was also stressed by Captain Herbert Stetson, Port Captain of the Alaska Marine Highway System (AMHS). He stated that the AMHS ferries transit the entire area of Southeast Alaska at least once a month in the isolated regions, and as often as two to four times a day through Wrangell Narrows.

Captain Stetson and Mr. Lyness did not indicate that there was a need for tidal current charts but Mr. Lyness said that if they were available they might use them.

I also spoke with Mr. Bob Alberson of the Fishing Vessel Owners Association in Seattle, Washington. Mr. Alberson stated that the members of his association fish mainly off shore of Southeast Alaska. They are interested in current data along the west coast of the area and for Chatham Strait, Ketchikan, Sitka and Petersburg.

cc:
C2
C2x1
C2x2
C21
C211
C2111 - Patchen

13929A

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-NBR/14)
WASHINGTON, DC 20593
PHONE: 202-426-0942

TH-2
27 JAN 1981

Honorable Richard Frank
Director, National Oceanic and
Atmospheric Administration
6001 Executive Boulevard
Rockville, Maryland 20852

Dear Mr. Frank:

The Coast Guard is conducting an investigation of a possibly obstructive bridge across the Atchafalaya River (Berwick Bay) near Morgan City, Louisiana. As part of the investigation, it is desired to conduct a current study of the area. I am requesting your assistance in determining survey requirements and in developing a work statement. It would also be desirable to discuss various contracting sources, including the possibility of NOAA conducting the survey on behalf of the Coast Guard. Dr. Henry Frey was referred to as a possible source of assistance within NOAA.

Your assistance in this matter is greatly appreciated. Should you desire additional information, Mr. George Entwistle of my staff may be reached by telephone on 426-0942.

Sincerely,

A. T. MESCHTER
Acting Chief, Bridge Administration
Division
By direction of the Commandant

MEMORANDUM FOR THE RECORD

FROM: C3x2 - Melvin J. Umbach
C2x2 - Melvyn C. Grunthal

SUBJECT: Trip Report - Report of Meetings: National Ocean Survey Real-Time Marine Navigation Data Task Team at:

(1) Humboldt Bay, California;
(2) San Francisco Marine Exchange;
(3) Portland, Oregon Port Authority;
(4) Anchorage, Alaska; and
(5) Valdez, Alaska.

PURPOSE: The purposes of the meetings were to assess the degree of interest of port authorities and potential users in real-time marine navigational data, and to determine their willingness to collaborate with the National Ocean Survey (NOS) in defining performance requirements.

The NOS Task Team presented the NOAA goals and objectives to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lake and seaports. Our discussions focused on the NOS nautical chart digital data base (AIS), and on real-time water level, current, wave, and meteorological information. Various potential applications and the versatility of these data using available and rapidly developing new technology, with emphasis on the local environment, were discussed in detail. The user charge issue was discussed.

1. The Humboldt Bay meeting was held at Eureka, California, on May 12, 1982.

Humboldt Bay is a large estuarine bay (second largest bay in California) with a large runoff and a dangerous bar. The diurnal tidal range within the bay is 6 to 7 feet. The port serves lumber and paper exporters (it is the largest wood product exporter in California), and boasts an active fishing and recreation fleet. Humboldt Bay also has a budding mariculture industry. Although Humboldt Bay is not a large port in terms of total tonnage, the Task Team thought that it was important to visit the port for several reasons:

(a) The Humboldt Bay Harbor, Recreation, and Conservation District (HBHR&CD) the port operator, showed a high degree of interest.

(b) PORTS (Port Objectives for Real-Time Systems) could have environmental, as well as navigational, implications in Humboldt Bay.

(c) Humboldt Bay shares problems with several ports along the northern California to Washington coastline.

(d) We already planned to be in the area - San Francisco.

Oceanographic/Meteorological Parameters

Tides and Water Levels

The participants at the meeting expressed a strong interest in real-time tidal information.

Present tidal and tidal current predictions are not accurate. This was attributed to major hydrological changes which have taken place in the bay over the past few years.

The port's major carrier, Star Shipping, regularly brings ships with a 35 feet 4 inches draft (27,000 tons) over a bar dredged to 35 feet. They expect to begin using 39 feet 6 inches draft ships (42,000 tons) in the near future. If these ships cannot be operated economically at less than full capacity in Humboldt Bay, Star may have to drop the bay as a port of call and move to San Francisco. Neither Star nor HBHR&CD wanted this.

Real-Time Currents

A strong interest in real-time currents was shown at the meeting.

The U.S. Army Corps of Engineers (COE) conducted a circulatory survey of Humboldt Bay, in conjunction with Scripps and Humboldt State Universities, to establish a computer model of the bay.

The Regional Water Quality Council conducted a circulatory dye test in April 1982.

A circulatory survey of Humboldt Bay is scheduled for FY 1983.

Waves

The bar crossing at Humboldt Bay entrance is very dangerous - three to five fatalities per year on the average. The participants at the meeting thought that the bar had the highest fatality rate per crossing of any west coast bar.

The group noted that wave and swell conditions tended to be worse north of Cape Mendocino than they were to the south and that wave information to the north was often very sketchy.

A U.S. Coast Guard monster navigation buoy is deployed off Blunt's Reef near Cape Mendocino. It might be possible to instrument this buoy to provide oceanographic and meteorological information.

Fog

The participants thought that better information on fog conditions and better short-term fog forecasts would be useful.

Nautical Charting

The group expressed a strong need for a hydrographic survey - they were concerned that the nautical charts were not updated or revised in a timely manner; i.e., a pier which was constructed in 1972 is not yet on the Humboldt Bay chart.

Dr. James Gast, a member of the HBHR&CD and the head of the Department of Oceanography at Humboldt State University, suggested that NOS should put the LORAN C lattice on the Humboldt Bay chart.

Miscellaneous

The group noted that safety of navigation was critical since chlorine, a highly toxic gas, was brought to area pulp and paper mills by ship.

Humboldt Bay is a port of refuge for recreation and fishing boats during heavy storms, particularly in the summer. Five to six hundred boats might be crowded into the bay during such a storm.

Workshop

Humboldt Bay was very interested in a workshop, but did not feel that they were large enough to justify their own. They would prefer not to be included with San Francisco/Southern California.

They felt that it was important to have a representation from the fishing industry and suggested that October/November would be the best time for fishing interests to be represented.

The Chief Executive of the port offered to act as a local contact for planning purposes.

Attendees:

Name	Organization
Charles F. Gulbe	Star Shipping
Paul F. Hoey	Humboldt Bay Bar Pilots
James A. Gast	Commissioner; Humboldt Bay Harbor, Recreation, and Conservation District
Jack Alderson	Chief Executive Officer; Humboldt Bay Harbor, Recreation, and Conservation District
Melvyn C. Grunthal	NOAA/NOS, U.S. Department of Commerce
Melvin J. Umbach	NOAA/NOS, U.S. Department of Commerce

2. The San Francisco meeting was held at the offices of the San Francisco Marine Exchange on May 13, 1982.

The San Francisco Bay complex consists of 9 major ports on San Francisco Bay with a total of about 60 million tons of commerce in 1979. This makes it one of the ten largest port complexes in the United States. The San Francisco Marine Exchange (the equivalent of MAPONY in New York) set up the meeting for us. The results of this meeting were rather depressing. Although we had a good turnout and a relatively good representation, the discussion centered around the cost of the system, cost/benefit ratios, and public versus private dissemination of data. We tried to impress the attendees that we were not yet ready to discuss these problems. However, we were not successful in steering the discussion to user needs and, therefore, did not obtain much useful input.

The following items were raised at the meeting:

(a) There was a general consensus that real-time water level (tide) and current information would be useful. Lesser interest was shown in real-time wave data.

(b) The National Weather Service (NWS) hydrological river forecasts are more accurate than the NOS predicted tides for determining water levels above New York Point (approximately 40 miles inland near Pittsburg, California).

(c) Mr. Robert Langner, Executive Director of the Marine Exchange, requested a comparison of actual versus predicted tides for San Francisco Bay. He also requested the results of the cost/benefit study which MAPONY of New York conducted.

(d) The group was very strong in their desire for system costs, good cost/benefit data, and a determination of the point at which public responsibilities end and private enterprise begins.

Attendees:

Name	Organization
Thomas McCarthy	Thomas McCarthy & Associates
David Greenfield	American Shipper Magazine
Frank C. Boerger	Consulting Engineer
Cdr. Tim Johnson	U.S. Coast Guard - Aids to Navigation
Capt. Paul Nichiporuk	U.S. Coast Guard - Marine Safety
Capt. R. Sommer	U.S. Coast Guard - Marine Safety
Capt. E. C. Greething	SOHIO - Port Captain
Cdr. J. L. Shanoner	U.S. Coast Guard - Vessel Traffic Service
Eugene Serex	Port of Richmond
Peter Mel Hughes	Port of Redwood City
Jack Lambert	Port of Oakland
Capt. H. T. Ziobro	Marine Operations - Matson Naval Company
Gil Anderson	Operator Engineers Local Union 3 - San Francisco

Name	Organization
Paul Janota	Environmental Research and Technology, Inc. COMSAT - Concord, Massachusetts
Barbara Katz	University of California - Sea Grant
Robert Langner	Executive Director, San Francisco Marine Exchange
Cdr. Melvyn C. Grunthal	NOAA/NOS, U.S. Department of Commerce
Capt. Melvin J. Umbach	NOAA/NOS, U.S. Department of Commerce

3. The Portland meeting was held at the Port of Portland offices on May 14, 1982.

The lower Willamette and Columbia Rivers below Portland, Oregon, constitute one of the largest port complexes in the United States with an annual (1979 figures) commerce of approximately 47 million tons. Although Portland is by far the largest port with about 60 percent of the total commerce, other Oregon and Washington ports also handle significant tonnage. Turnout at the meeting was good with five different ports, the COE, the U.S. Coast Guard, and the Columbia River Pilots represented. The response to our presentation was very good with the following points being raised.

Oceanographic/Meteorological Parameters

Tides and Water Levels

Real-time water level information would be useful from the mouth of the river to Portland, about 102 miles. The river pilots presently determine water depth by reading tide staffs located at various points along the river. Unfortunately, these staffs are not visible at night or during periods of low visibility.

The flood tide advances up the river at approximately the same speed as the larger ships. Therefore, the pilot can "ride" the flood tide up the river, taking advantage of the deeper water. Unfortunately, outbound vessels must encounter at least one low tide during their transit from Portland to the ocean. The pilots must therefore schedule their departure to arrive at the most critical point along the river at high tide for their deeper draft vessels.

Currents

Real-time current information would be useful at specific sites along the river, e.g., the Port of Ilwaco, near Longview, and at a bridge in Portland.

Waves

Real-time wave information would be beneficial to: Commercial carriers, commercial fishermen and recreational boaters.

Real-time wave information at the Columbia River Bar is critical for safe bar crossings. Visual observation is presently the best method to determine the danger of crossing the bar. Unfortunately, visual observation is not effective at night and the bar might be improperly closed due to lack of accurate wave information.

Nautical Charting

A low level of interest was shown in real-time positioning on a nautical chart background.

Charts need to be updated and revised more frequently. Terminal 6 on the Willamette River has been in use for 6 years, but is not yet on the chart.

The river pilots use COE river survey charts for navigation - they are a much larger scale than NOAA charts. We have found this technique in use in several other areas.

Concern was expressed over the assignment of liability in case of a grounding or collision if an "electronic" chart was used.

Miscellaneous

The COE was concerned about coordinating the collection of wave information - what is NOAA's responsibility and what is the COE's responsibility. Dr. Leodolph Baer, NOS Coastal Waves Program, informed us that this potential problem has already been resolved and has furnished us copies of the NOAA/COE agreement.

Several participants expressed a desire for more information regarding the costs and the development timeframe for a real-time system.

Mel Maki of COE complimented Mr. Mickey Moss and Lt. (j.g.) Richard Behn of the Pacific Tides Party for their outstanding work in assisting COE personnel on the Columbia River prototype real-time tide system.

Workshop

Both the Port of Portland and the Portland District of the COE expressed a strong interest in having a workshop for the Real-Time Marine Navigation Data System and being one of the ports at which a real-time system is installed.

The Port of Portland considers the Columbia River to be unique and believes that a workshop should be held for those ports along the river.

Attendees:

Name	Organization
Mr. Church	Port of Portland
Lon Rasmussen	Port of Ilwaco
Dennis R. Tisdell	Captains Nautical Supplies
Mr. Patella	Port of Portland
Dave Neset	Director, Marine Services, Port of Portland
Mel Maki	U.S. Army Corps of Engineers - Portland District
Dave Sims	U.S. Army Corps of Engineers - Portland District
Juris Jurisons	U.S. Army Corps of Engineers - Portland District
Dick Lawrence	Port of Vancouver
Jack Patterson	U.S. Coast Guard
Mark Nichols	River Pilots
Bill Bach	Port of Portland
Ogden Beeman	Ogden Beeman and Associates

Name	Organization
Paul R. Monk	Olympic Steamship
Gib Carter	Oregon State University; NOAA Sea Grant Marine Advisory Program
John Fratt	Port of Kalama
Lou Rasmussen	Port of Kalama
Virgil Warden	Port of Longview
Cdr. Melvyn C. Grunthal	NOAA/NOS, U.S. Department of Commerce
Capt. Melvin J. Umbach	NOAA/NOS, U.S. Department of Commerce

4. The Anchorage meeting was held on May 17, 1982.

Anchorage is a relatively small port in terms of total tonnage (1.6 million tons in 1979); however, its small size belies its actual importance. It is the major receiving point for waterborne commerce into Alaska (1979 figures), and the city is of significant political influence within the state.

The port of Anchorage is located at upper Cook Inlet on the southeast side of Knik Arm about 175 miles from the entrance to the inlet. The diurnal range of the tide at Anchorage is 29 feet with an observed extreme low water of 6.5 feet below mean lower low water. Strong currents and swirls in the Anchorage area make navigation difficult. Flood currents of 1.5 knots and ebb currents of 2.5 knots are present near the port facilities and currents of up to 6 knots occur in mid-channel.

Shoals near and in the approaches to Anchorage shift radically from year to year. Ice may be a problem from November through April, but the inlet rarely freezes because of the large tidal range.

Oceanographic/Meteorological Parameters

Tides and Water Levels

Commercial shipping organizations expressed a strong interest in real-time water level information. Determination of high water is critical for scheduling vessel arrival and departure because of the shoals in the approaches to Anchorage. A 1-hour shift due to hydrological or meteorological factors can mean a 5-feet discrepancy between the predicted tide and the actual water level.

Currents

The local tug operator stated that real-time current information would be useful, particularly in the area near the Anchorage wharfs. The currents in this area are often unpredictable, with slack water immediately adjacent to a strong current. The Coast Pilot notes that an eddy flows up Knik Arm during an ebb tide.

Real-time current information and short-term current predictions would be useful along the entire 175-mile length of the approach up Cook Inlet to Anchorage to determine transit times.

Waves

Although no one expressed a need for wave information at Anchorage, a comment was made that the State of Alaska and the COE were gathering wave information near Kodiak for design of port facilities.

Ice

Although upper Cook Inlet does not freeze solid, ice can still be a danger. Ships calling at Anchorage during the winter should have reinforced hulls and protected screws. Real-time information about open water and ice thickness would be useful.

Nautical Charting

The group thought that the Anchorage charts needed to be updated more frequently. Because of the relatively low level of vessel traffic, real-time positioning and the use of electronic charts for navigation were not thought to be necessary at this time.

Miscellaneous

Any real-time system should be kept inexpensive.

The question was raised as to the possibility of adjusting the predicted tide tables by calculating and applying correction factors for wind speed and direction, air pressure, runoff, etc. This concept had been investigated previously by NOS and found to be wanting - it is likely less expensive and simpler to measure the actual water level than to calculate and apply the correctors.

Ice will complicate the placement of sensors to measure real-time data - bottom-mounted sensors may be necessary.

Attendees:

Name	Organization
Ken Hippe	Advance Vessel Agency
John Ball	University of Alaska, NOAA Sea Grant Marine Advisory Program
Jack Brown	Port of Anchorage
Jim Nelson	Sea-Land
Ed Hoffman	Sea-Land
Doug Tipton	Sea-Land
Paul Seguin	U.S. Army Corps of Engineers
W. D. McKinney	Port Director, Port of Anchorage
Ed. Hanzuk	Totem Ocean Trailer Express
Ethan Bradford	Butler Aviation (Petroleum Handling)
Carl Anderson	Cook Inlet Tug and Barge (Pacific Wind)
Cdr. Melvyn C. Grunthal	NOAA/NOS, U.S. Department of Commerce
Capt. Melvin J. Umbach	NOAA/NOS, U.S. Department of Commerce

5. The Valdez meeting was held on May 18, 1982.

Port Valdez is the name given to the body of water extending from Valdez Narrows to the head of the bay. The city of Valdez and the Valdez Marine Terminal lie near the head of Port Valdez with the city on the north side and the terminal on the south side. The Valdez Marine Terminal is the terminus of the Trans-Alaskan Pipeline. In 1979 Valdez handled more than 65 million tons of shipping (seventh largest in the United States in 1979), nearly all of which was crude petroleum shipped outbound.

Valdez is the northernmost ice-free port in North America. However, ice calving off nearby glaciers creates an occasional hazard. The approaches to Valdez are very deep with a minimum of obstructions. The diurnal range of the tide at Valdez is 12 feet and the tidal currents at both Valdez and Valdez Narrows are too light and variable to be predicted. Unfortunately, nontidal currents are appreciable at the head of the bay and are strong enough at Valdez Narrows to affect the low-speed maneuvering of deep-draft vessels.

Oceanographic/Meteorological Parameters

Tides and Water Levels

There appears to be no need for real-time water level information because of the extremely deep water in the approaches to Valdez.

Currents

A circulatory survey by the McARTHUR during 1976 through 1978 found that tidal currents in Valdez Narrows are too weak and variable to be predicted.

The U.S. Coast Guard and SPC Shipping (SOHIO), however, are extremely interested in the nontidal currents for search and rescue and possible oil spill clean-up operations. Real-time current information also would be useful in predicting the paths of icebergs which calve off glaciers near the approaches to Valdez.

Real-time currents also may be useful for docking and undocking operations - unfortunately the Pilots Association was not represented at the meeting, so we do not know how useful such information would be.

Waves

Although wave information is not needed by shipping concerns within Port Valdez, real-time wave information in the Gulf of Alaska would be beneficial. Even the Very Large Crude Carriers (VLCC) delay in Prince Williams Sound awaiting better weather conditions in the gulf.

Weather

Better weather forecasts are needed.

Nautical Charting

No need was expressed for real-time positioning or electronic charts for navigation.

Area charts need to be updated for fishing and recreation - they are still in error from the 1964 earthquake.

Miscellaneous

Valdez is very concerned about tsunami.

Fifty-two to sixty VLCCs call at Valdez each month.

Water level information may become more important; VLCCs with drafts of 78 feet may begin calling at the Valdez Marine Terminal. Berths 3, 4, and 5 at the terminal show depths of from 75 to 87 feet alongside.

Attendees:

Name	Organization
G. A. Zoet	Port Director, City of Valdez
Steve Kelly	SPC Shipping Inc. (SOHIO)
Fred Hanson	City of Valdez - Engineering
Rob Ridgway	City of Valdez - Planning
Cdr. Mike Cavett	U.S. Coast Guard
Lee Doering	SPC Shipping Inc. (SOHIO)
Jim Woople	Alyeska - Port Captain
Cdr. Melvyn C. Grunthal	NOAA/NOS, U.S. Department of Commerce
Capt. Melvin J. Umbach	NOAA/NOS, U.S. Department of Commerce

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

July 19, 1982 C2x2:MCG

TO: MEMORANDUM FOR THE RECORD

FROM: C3x2 - Melvin J. Umbach
C2x2 - Melvyn C. Grunthal

SUBJECT: Trip Report- Meeting of the National Ocean Survey Real-Time Marine Navigation Task Team with the Mariners' Advisory Committee for the Delaware Bay and River

The purpose of the meeting was to assess the degree of interest of port authorities and potential users in real-time marine navigational data, and to determine their willingness to collaborate with National Ocean Survey (NOS) in defining performance requirements.

The NOS Task Team presented the NOAA goals and objectives to provide real-time marine navigation data to improve the operational efficiency and safety of our Nation's major lakes and seaports. Our discussions focused on the NOS nautical chart digital data base (AIS), and on real-time water level, current, wave, and meteorological information. Various potential applications and the versatility of these data using available and rapidly developing new technology, with emphasis on the local environment, were discussed in detail. The user charge issue was discussed.

The meeting was held in Philadelphia, Pennsylvania, on June 3, 1982, during the scheduled quarterly meeting of the Mariners' Advisory Committee at the offices of the Pilots' Association. Turnout at the meeting was very good and response to the presentation was generally favorable. A subcommittee was formed to further investigate the needs for real-time data.

The Delaware River port complex is the second largest in the United States in terms of total tonnage at 164.6 million tons (1979 figures), ranking below only the Mississippi River complex and being approximately the same size as the Port of New York and the Houston/Texas City/Galveston complex. Philadelphia is the major port on the

Delaware River and is 86.5 nautical miles above the Delaware Capes. Channel depths to 40 feet are authorized to a point 24.5 nautical miles above the Philadelphia. The mean tidal range at Philadelphia is 5.9 feet. Fog can be expected during the autumn and winter.

OCEANOGRAPHIC/METEOROLOGICAL PARAMETERS

Tides and Water Levels

The need for real-time tidal information was strongly endorsed--The Pilots' Association, led by Captain Paul Ives, established a 3-gage real-time tide network in 1963. Although it is relatively simple, it is effective--the statement was made that without the system it would be impossible to bring a number of the present larger vessels to Philadelphia.

The U.S. Army Corps of Engineers operates a real-time network of tide gages in the C&D Canal; this canal links the Delaware River with the Chesapeake Bay.

Currents

Current information at site specific points may be useful.

Waves

Interest was shown in obtaining wave information at the mouth of Delaware Bay.

The question was raised as to how wave information could be disseminated to ships.

Weather

As at several prior meetings interest was shown in obtaining better weather data and better forecast; fog forecasts were raised as a particular problem.

NAUTICAL CHARTING

The comment was made that better chart updating procedures were needed.

MISCELLANEOUS

We were again asked for any cost/benefit information.

Regulatory changes might be necessary before real-time information could be used.

The Radio Technical Commission for Marine Services (RTCM) was suggested as a group to whom we might speak about the real-time applications of marine navigational data. The RTCM has experience in coordinating the efforts of Federal agencies with the needs of user groups and the technology of private industry.

Captain Paul L. Ives, an active member of the Pilots' Association and the Delaware Bay and River Mariners' Advisory Group and the Secretary-Treasure of The American Pilot's Association, was a very strong supporter of NOAA and NOS. He is also knowledgeable and articulate--he would be an excellent contact for any marine related activity in the Delaware River and Bay.