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# Information for Decisions OCEANS 86

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Washington, D.C.,  
September 23-25, 1986



Office of Oceanography and Marine Assessment  
National Ocean Service  
*National Oceanic and Atmospheric Administration*  
*U.S. Department of Commerce*

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**"INFORMATION FOR DECISIONS"  
OCEANS 86**

Information is a valuable resource in a world filled with data. Advanced computers, communications technology, and remote sensing capabilities currently provide marine scientists, engineers, and resource managers with more data than can be interpreted and converted to meaningful information and knowledge. This problem is further compounded by difficulties in communicating scientific and engineering information in a timely and effective manner to institutions and people that make decisions about the use of coastal and oceanic resources.

Still, these decisions are made constantly in Congress, state legislatures, executive agencies at all levels of government, in board rooms, and by individual citizens. They are made over a wide spectrum of space and time scales--from national (or international) to local, from long-range to real-time. Appropriate information of varying types and quality is required to improve decisions affecting the use of coastal and oceanic resources throughout this spectrum.

This exhibit displays only a few of the unique capabilities being developed by NOAA's Office of Oceanography and Marine Assessment to generate and communicate information for decisions. These capabilities range from the organization of information on the life history distribution of important fish, shellfish, and marine mammals throughout the Exclusive Economic Zone of the USA, useful for long-range planning for the multiple use of oceanic resources, to real-time information required for the safe response to spills of hazardous materials in coastal areas. It includes a capability to communicate with NOAA water level and current measurement systems to provide real-time information for navigation.

Additional information on these capabilities is attached or can be requested from Charles N. Ehler, Director, Office of Oceanography and Marine Assessment, National Ocean Service, National Oceanic and Atmospheric Administration, 6001 Executive Boulevard, Rockville, MD 20852; telephone, (301) 443-8487.

## Computer Mapping and Analysis System for Living Marine Resources

### *Fact Sheet*

o For the past six years a major program has been undertaken to map the **spatial and temporal distributions** of species life histories within four regions of the U.S. Exclusive Economic Zone: the East Coast, the Gulf of Mexico, the Bering, Chukchi, and Beaufort Seas, and the West Coast and Gulf of Alaska. The program is part of a larger effort of strategic assessments of the nation's coastal and ocean regions.

o The work is a cooperative effort of scientists and analysts from NOAA's **National Ocean Service** and **National Marine Fisheries Service**, and also includes scientists from other state and federal agencies and academic institutions.

o To date life-history distributions over **300 species** have been mapped: 88 invertebrates; 114 fishes; 7 reptiles and amphibians; 50 birds; and 45 mammals.

o Each map portrays in a consistent and comprehensive manner the spatial and temporal distributions of adult, juvenile, and reproductive **life stages** of a species. Additional information on areas of abundance, commercial and recreational harvesting, and migrations and movements are also included, as appropriate. With each map is a written description that summarizes legal status and management, population size and trends, habitat preferences, life history, behavior, and other attributes.

o Each species map is translated into **digital form** and entered into a computerized data system. The digital data base and supporting software are structured to provide straightforward access to information on both individual species and groups of species. Several simple, yet highly informative, **analytical operations** can be performed. For example, composite distribution maps can be generated for any combination of species, species characteristics, life history, stages, and time periods. Similarly, the relative importance of any spatial unit can be evaluated by species, life stage, and time period.

o Over the past five years the system has been used by a number of federal agencies to assist in regulatory and management activities. These agencies include the Environmental Protection Agency, the Department of Interior (Minerals Management Service), and the U.S. Coast Guard.

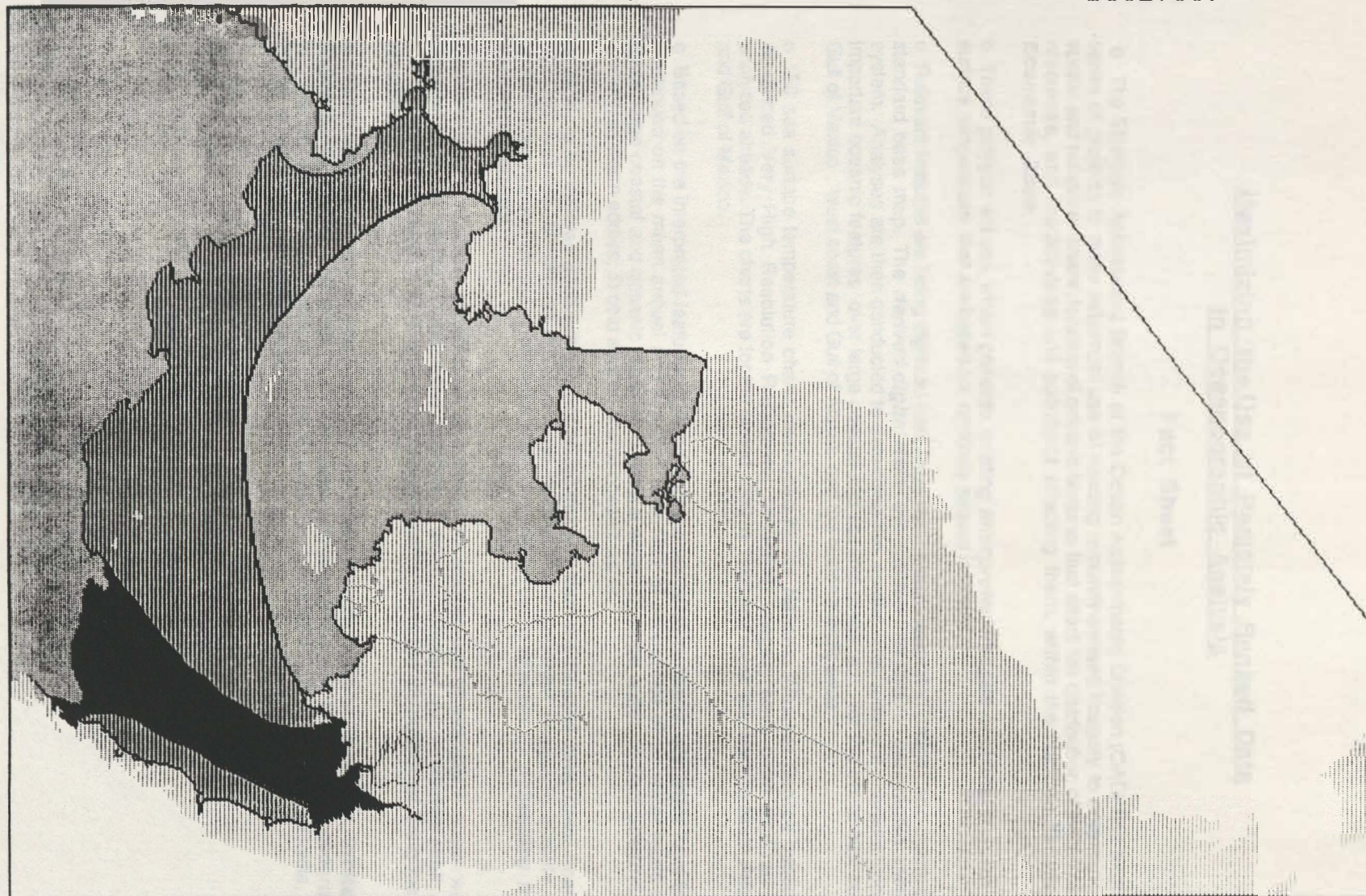
o Results of this work are **published** in the Living Marine Resources sections in a series of regional data atlases: Eastern United States Coastal and Ocean Zones Data Atlas (1980, out of print), 45 plates, (60 species); the Gulf of Mexico Strategic Assessment Data Atlas (1986), 71 plates (73 species); the Bering, Chukchi, and Beaufort Seas Strategic Assessment Data Atlas (in press, publication in early 1987), 75 plates (92 species); and the West Coast and Gulf of Alaska Strategic Assessment Data Atlas (publication in 1988), 80 plates (120-130 species).




o Additional information on this program is available from Thomas F. La Pointe, **Strategic Assessment Branch** (N/OMA3I), **Ocean Assessments Division**, Office of Oceanography and Marine Assessment, National Ocean Service, NOAA, 11400 Rockville Pike, Rockville, MD 20852 or telephone (301) 443-8843.



Sockeye Salmon (*Oncorhynchus nerka*)

B302700.



	ADULT AREA (June)	2	42	100	J
	MAJOR ADULT AREA (June, July)	3	42	101	JJ
	MAJOR ADULT CONCENTRATIONS (June, July)	4	42	102	JJ



## Maximizing the Use of Remotely Sensed Data in Oceanographic Analysis

### Fact Sheet

o The Strategic Assessment Branch of the Ocean Assessments Division (OAD) has begun a series of projects to make maximum use of existing remotely-sensed imagery to determine the spatial and temporal characteristics of oceanic features that affect the distribution of living marine resources, and the activities and pollutants affecting them, within the Nation's **Exclusive Economic Zone**.

o These projects will use, where possible, existing **Interpreted Images** or charts, e.g., for sea surface temperature, that are based on remotely sensed imagery.

o Relevant features are being digitized from large numbers of interpreted images and charts on a standard base map. The **derived digital data** are entered into OAD's geographic analysis system. Analyses are then conducted to determine the spatial and temporal characteristics of important oceanic features over large coastal and oceanic areas, e.g., for the entire east coast, Gulf of Mexico, west coast and Gulf of Alaska, and the Nation's arctic seas.

o 150 sea surface temperature charts developed by the National Weather Service based on Advanced Very High Resolution Radiometer (**AVHRR**) imagery have been digitized and analyzed already. The charts are for the period 1980 to 1986 and cover the western North Atlantic and Gulf of Mexico.

o Based on the interpreted features digitized from the temperature charts, **statistics** have been developed on the mean annual and seasonal frequency of occurrence of six water types over these large coastal and oceanic regions: 1) coastal water; 2) slope water; 3) Gulf Stream/Loop Current; 4) warm eddies; 5) cold eddies; and 6) oceanic water.

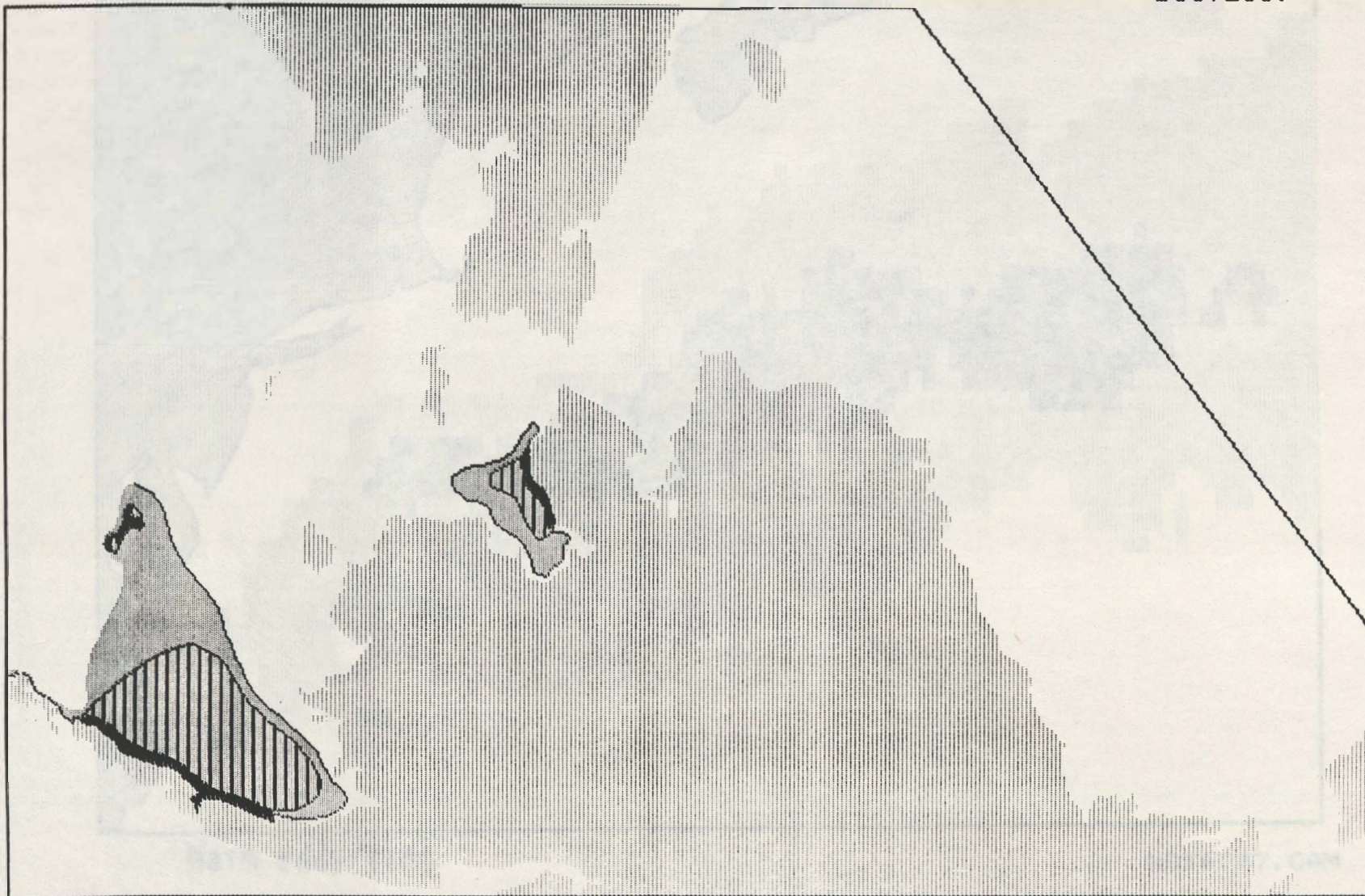
o Work to be initiated soon will use enhanced imagery from the Coastal Zone Color Scanner (**CZCS**) and the AVHRR to develop large numbers of interpreted images to identify and characterize regions on the continental shelf of the east coast affected by **outwelling from estuarine waters**.




o Information from these projects will be used in the assessment of alternative ocean waste disposal sites, the effects of land based pollution on adjacent areas of the continental shelf, and to improve understanding of how oceanic characteristics affect the distribution of living marine resources.

o Additional information on these projects are available from Craig N. Robertson, **Strategic Assessment Branch (N/OMA31)**, **Ocean Assessments Division**, Office of Oceanography and Marine Assessment, National Ocean Service, NOAA, 11400 Rockville Pike, Rockville, MD 20852 or telephone 301/443-8843.

RED KING CRAB (*Paralithodes camtschatica*)

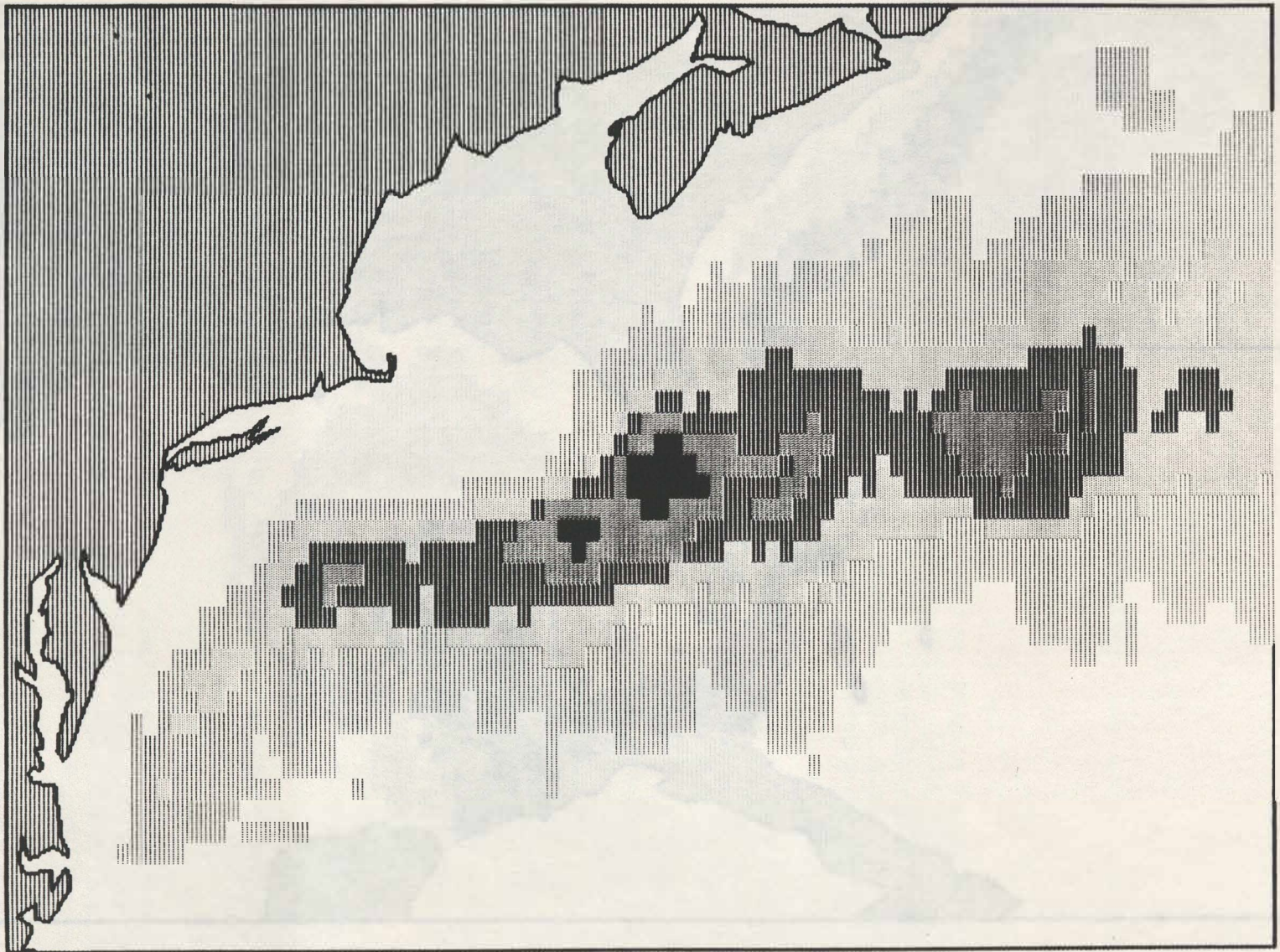
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	ADULT AREA
	MAJOR ADULT AREA
	JUVENILE AREA

1	23	100	JFMAMJJASONDY
2	23	101	JFMAMJJASONDY
3	23	400	JFMAMJJASONDY





Warm eddy/ring

NSTAT7.OAM

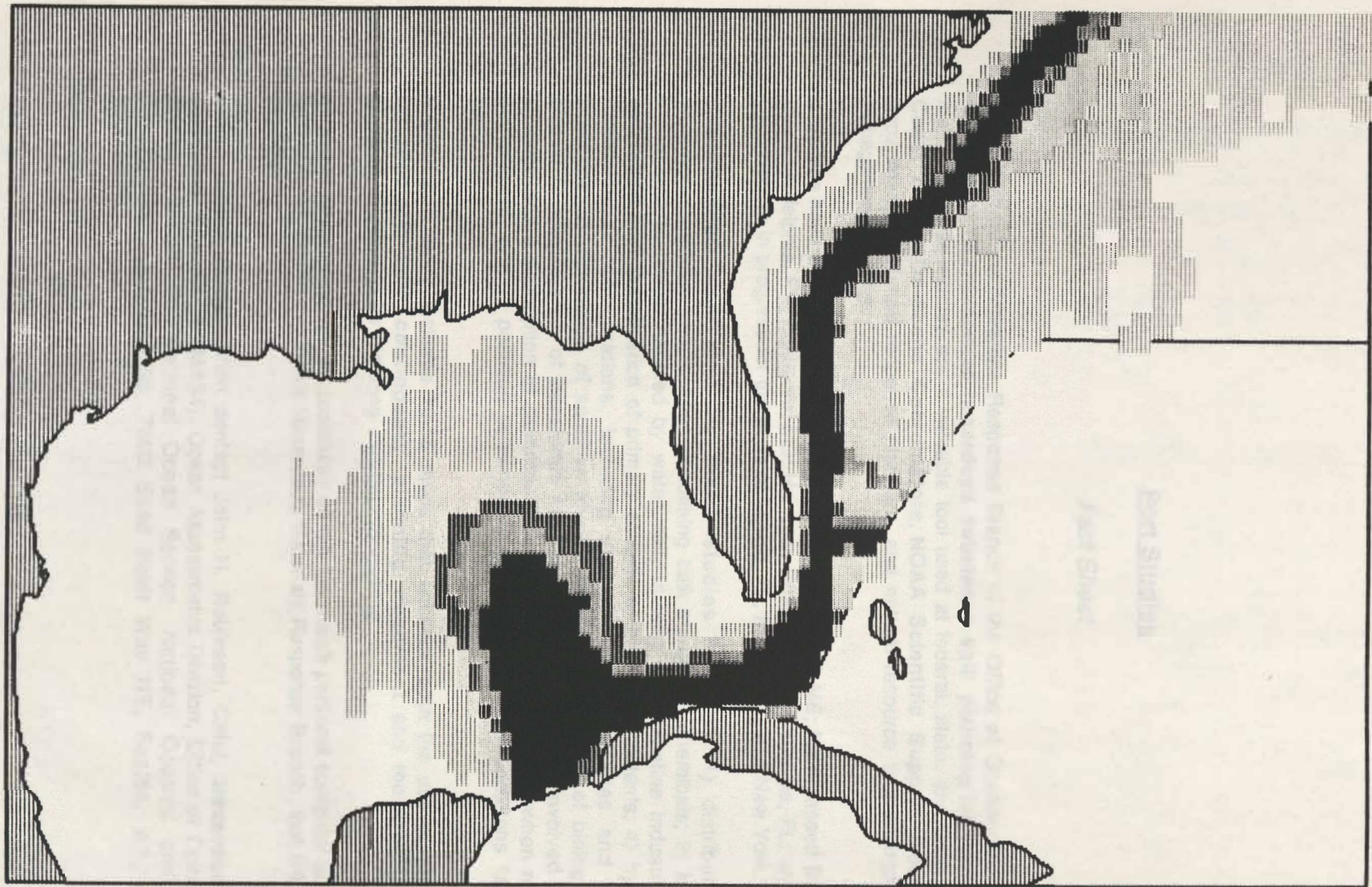
4

percent occurrence

96







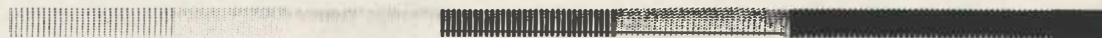
Gulf Stream-Loop C.

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4

percent occurrence

96

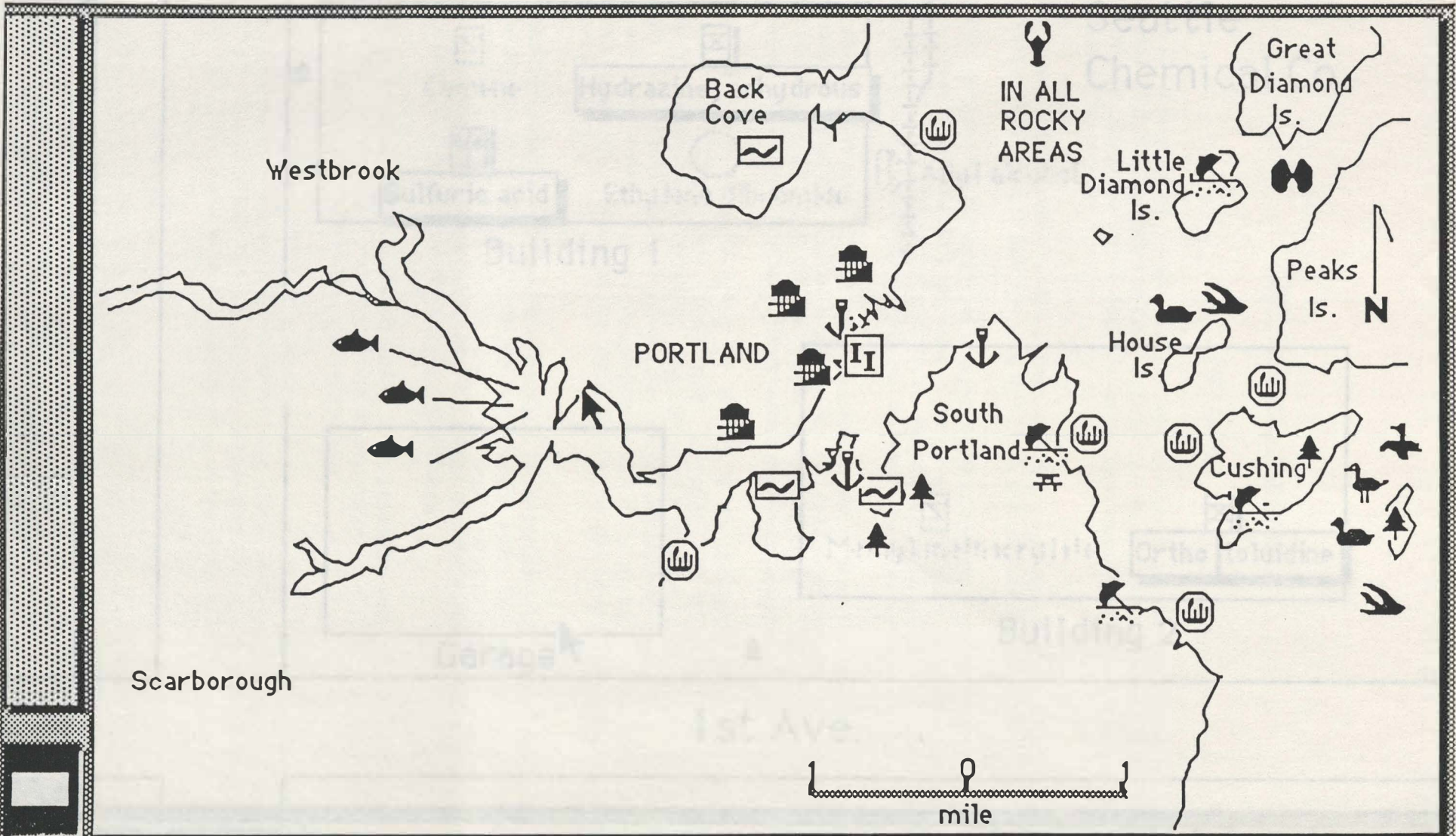




## Port Studies

### *Fact Sheet*

- o The Hazardous Materials Response Branch of the Office of Oceanography and Marine Assessment has completed **hazardous substance spill planning** for eight major ports in the USA; these studies are a valuable tool used at federal, state, and local levels by **U.S. Coast Guard On-Scene Coordinators, NOAA Scientific Support Coordinators**, fire departments, pollution response planners, and natural resource and environmental quality management agencies
- o Studies have been completed for **eight ports**: Portland, ME; Narragansett Bay, RI; Boston, MA; Philadelphia, PA; Baltimore, MD; Hampton Roads, VA; Jacksonville, FL; and Los Angeles, CA. Work is in progress for the ports of Tampa, FL, Mobile, AL, and New York, NY
- o **Information contained in these studies** includes: 1) distribution of major waterfront terminals and facilities containing bulk storage of chemicals; 2) identification of routes and materials handled by water, rail, trucking, and pipeline industries; 3) spatial distribution and identification of primary sources of historical incidents; 4) hydrological and climatological considerations, including example spill trajectories and selected spill scenarios; 5) distribution of sensitive shorelines and identification of biological resources at-risk; 6) identification of hazardous materials most likely to be involved in a pollution incident, and a description of chemical behavior of those substances when released to the environment; and 7) pollution response strategies and recommendations for contingency planning
- o Each port study includes 10-15 maps that enhance both the use of the study as an **introductory spill contingency planning document** and the synthesis of various types of information for planning and decisionmaking
- o Future port studies will be accessible on the Macintosh personal computer using a software package, developed by OMA's Hazardous Materials Response Branch, that links graphic and text files
- o For additional information contact John H. Robinson, Chief, **Hazardous Materials Response Branch (N/OMA34)**, Ocean Assessments Division, Office of Oceanography and Marine Assessment, National Ocean Service, National Oceanic and Atmospheric Administration, Bin C15700, 7600 Sand Point Way NE, Seattle, WA, or call (206) 392-6273



Prev

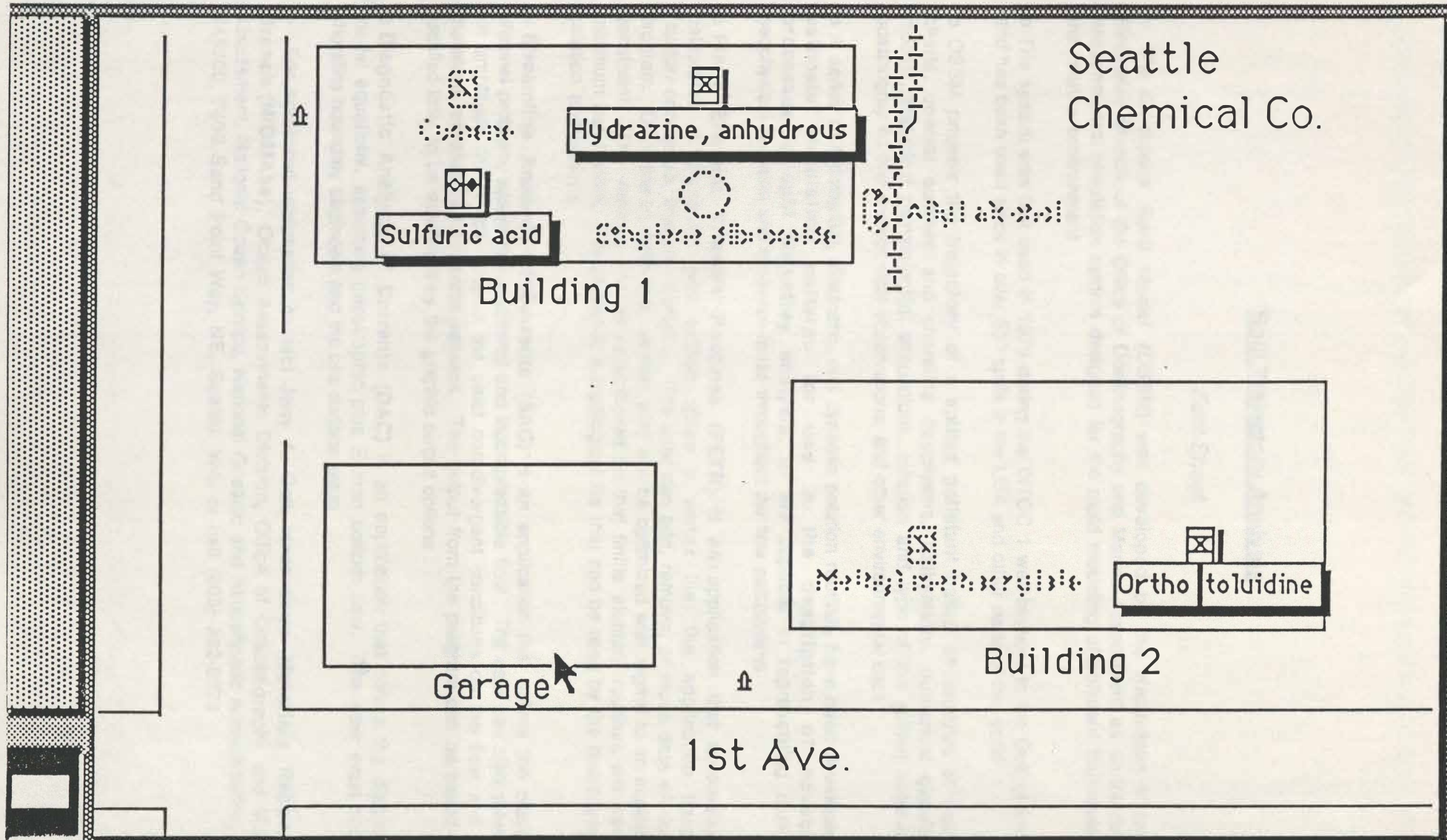
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Map Labels: (19 unselectable)

Info

Link



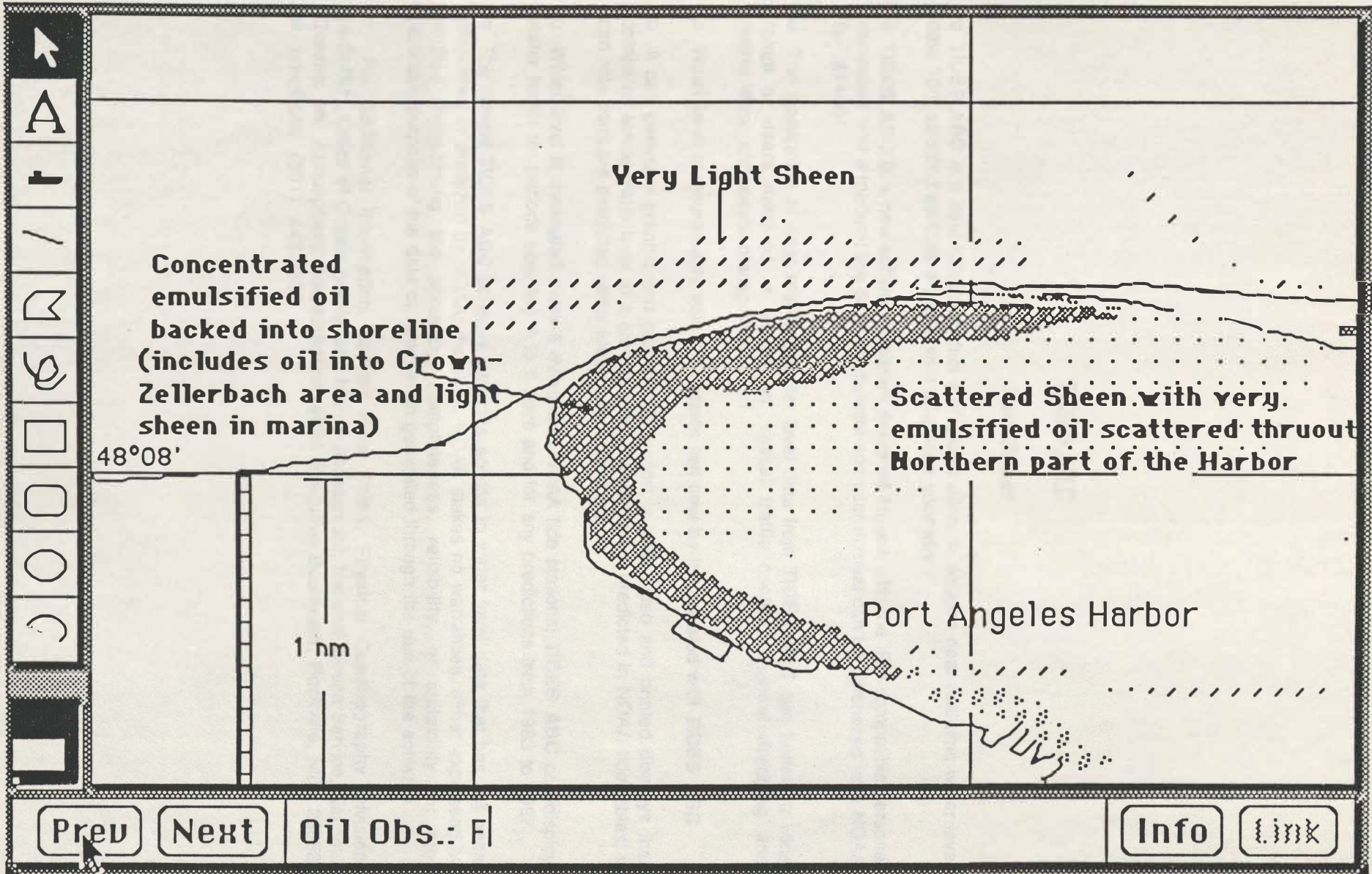


## Spill Trajectory Analysis

### *Fact Sheet*

- o The **On-Scene Spill Model (OSSM)** was developed by the Hazardous Materials Response Branch of the Office of Oceanography and Marine Assessment as an interactive environmental simulation system designed for the rapid modeling of pollutant trajectories in the marine environment
- o The system was first used in 1979 during the IXTOC 1 well blowout in the Gulf of Mexico and has been used since in over 500 spills in the USA and other parts of the world
- o OSSM projects the **trajectory of a spilled pollutant** based on analysis of nautical charts, coastal outlines and shoreline descriptors, bathymetry, numerical circulation models, statistical climatological simulations, location and type of the spilled substance, oceanographic and meteorological observations, and other environmental data
- o A series of topological, kinematic, and dynamic solution routines have been developed to **estimate circulation patterns for use in the description of advective processes in spill trajectory analysis**; all are capable of representing complex geophysical domains and conserve mass throughout the flow calculations
- o **Finite Element Triangle Routines (FETR)** is an application that automatically calculates a triangular grid system given a vertex file; the application handles multiply-connected, irregular domains. The user can add, remove, or move data within the program. Once the triangles are created, they can be optimized with regard to an equilateral constraint. The vertices can be renumbered so that finite element routines will have a minimum band width. The output is a topological file that can be read by the hydrodynamic solution applications
- o **Streamline Analysis of Currents (SAC)** is an application that solves the classical channel problem, assuming irrotational and incompressible flow. The user can also solve for an amplitude factor that relaxes the strict non-divergent conditions on the flow and can therefore represent tidal current patterns. The output from the program can be saved and recalled later to be examined by the graphic output options
- o **Diagnostic Analysis of Currents (DAC)** is an application that solves the diagnostic model equations, assuming geostrophic plus Ekman bottom flow. The user must specify shoreline boundary segments and the sea surface setup
- o For additional information contact Jerry A. Galt, **Hazardous Materials Response Branch (N/OMA34)**, Ocean Assessments Division, Office of Oceanography and Marine Assessment, National Ocean Service, National Oceanic and Atmospheric Administration, Bin C15700, 7600 Sand Point Way, NE, Seattle, WA, or call (206) 392-6273





## TIDES ABC

### *Fact Sheet*

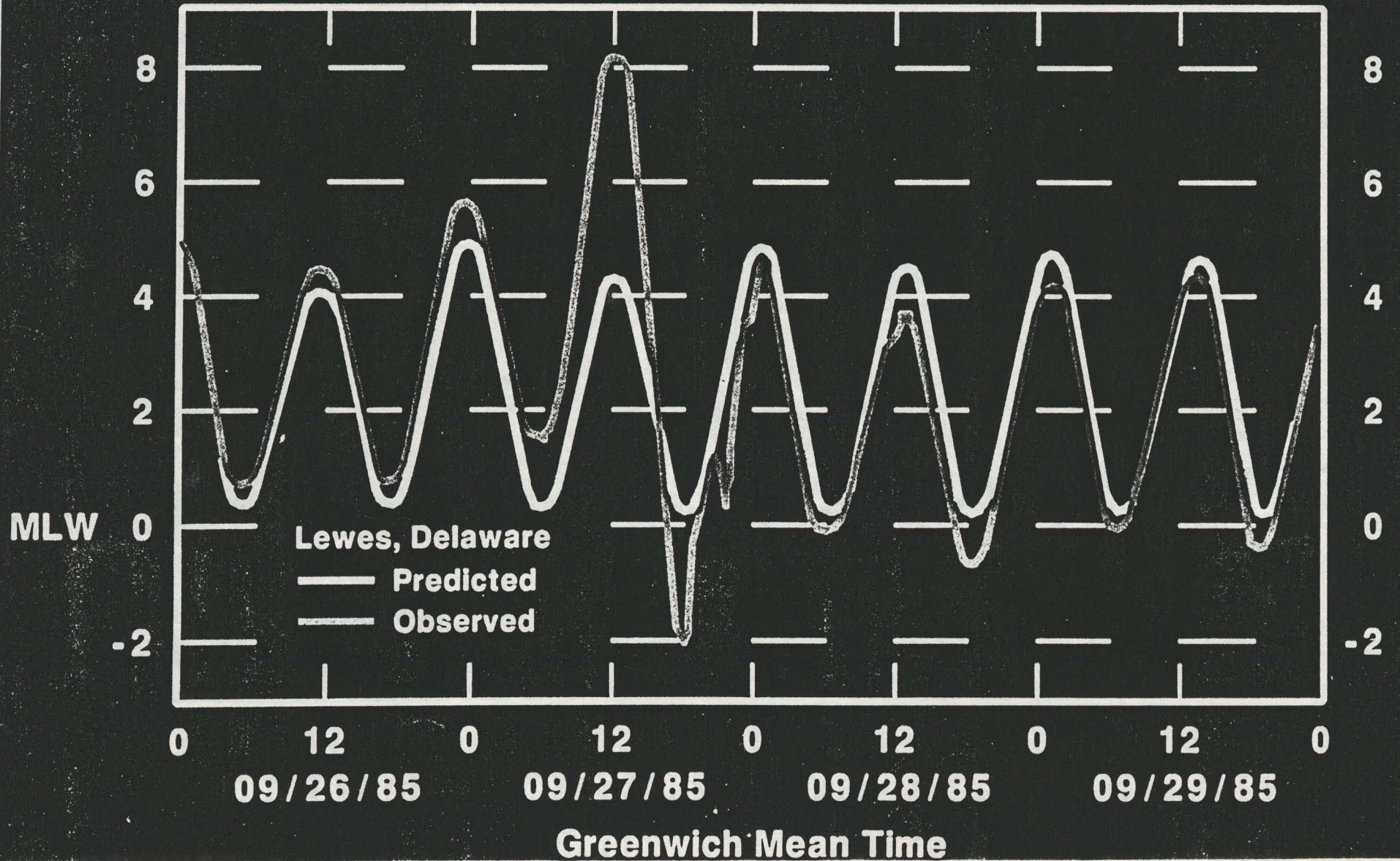
- o **TIDES ABC** is a new NOAA product that allows users to acquire near real-time water level data from selected stations equipped with telephone telemetry
- o **TIDES ABC** is a new software program designed for use with the IBM-compatible personal computers and a modem; the program diskette and user manual can be purchased from NOAA for \$1400
- o The application of near real-time water level data from **TIDES ABC** can benefit a wide range of users involved in navigation, vessel traffic control, channel dredging and maintenance, and coastal management
- o Water level measurements from 17 stations can now be interrogated with **TIDES ABC**
- o It can generate graphic and tabular information in both video and printed displays that compares actual water level at a station against water levels predicted in NOAA tide tables; it can also compare predicted water levels with anomalies
- o Water level is measured every 6 minutes at NOAA tide stations; **TIDES ABC** can display water levels for periods covering 1 to 6 days and for any predictions from 1983 to 1997
- o The current **TIDES ABC** software provides access to water level data that has not been processed or analyzed by NOAA; therefore, NOAA makes no warranties, either expressed or implied, concerning the accuracy, completeness, reliability, or suitability for any particular purpose of the data or information generated through the use of the software
- o For additional information, contact Paul Chinn, Physical Oceanography Division (N/OMA1), Office of Oceanography and Marine Assessment, National Ocean Service, National Oceanic and Atmospheric Administration, 6001 Executive Boulevard, Rockville, MD 20852 or telephone (301) 443-2357



# TIDES ABC GRAPHICS DISPLAY

Feet

Feet

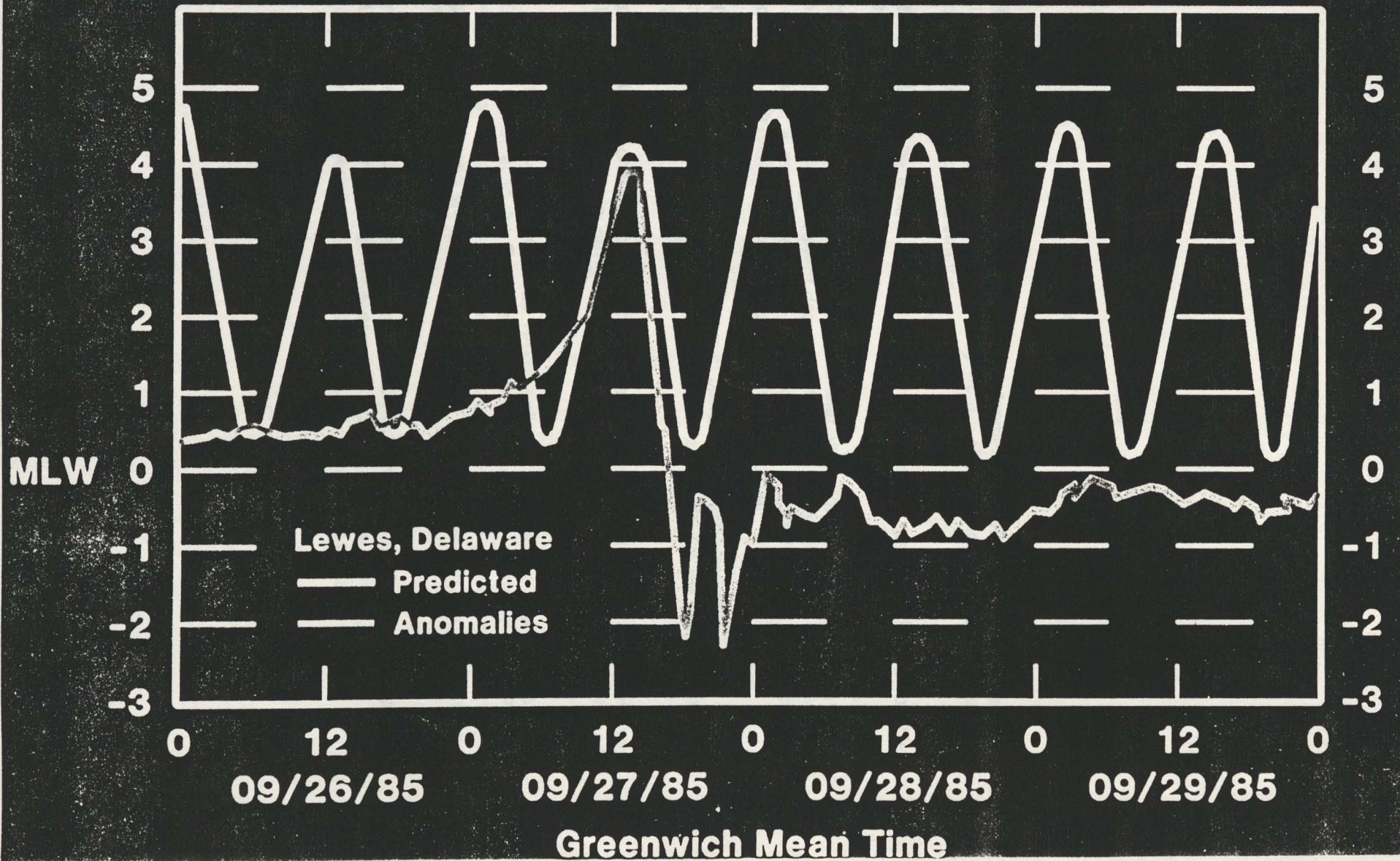




# TIDES ABC GRAPHICS DISPLAY

Feet

Feet



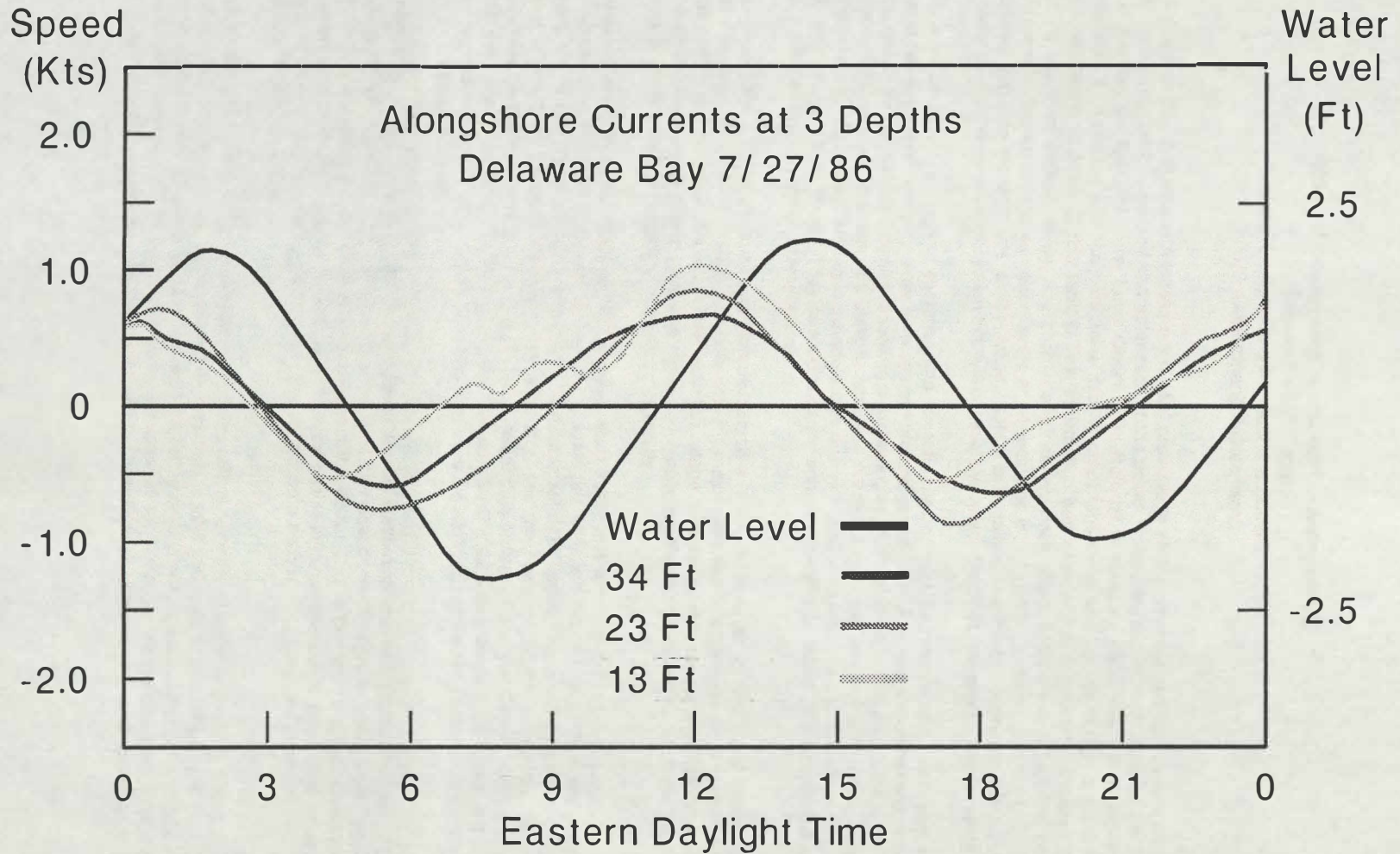


## CURRENTS ABC

### *Fact Sheet*

- o **CURRENTS ABC** is a NOAA product under development that will allow users to acquire near real-time water current velocity data directly from a Remote Acoustic Doppler Sensing (RADS) system with telephone telemetry;
- o **CURRENTS ABC** will be a new software program designed for use with IBM-compatible personal computers and a modem;
- o **CURRENTS ABC** is a menu-driven program that interrogates RADS current meter stations on demand and displays current data at various depths in the water column for the previous 12-24 hours; it can provide predictions for the next 12 hours; it can generate graphic and tabular information in both video and printed displays;
- o The RADS unit is mounted on the sea floor with upwardly directed acoustic beams. Water flow is continuously measured from the sea floor to the surface by the Doppler shift in acoustic signals;
- o In a harbor, shipping channel, or estuary the data collected can provide real time and predicted information for use in navigation, search and rescue operations, and oil and hazardous materials spills response;
- o NOAA now operates two experimental RADS units with telephone telemetry, one in Delaware Bay and the other in the Government Cut Channel in the entrance to the Port of Miami; agreements have been reached between NOAA, who will provide technical assistance, and local port authorities who will establish permanent RADS systems in the Port of Miami and the Port of Anchorage; and
- o For additional information, contact Gerald Appell, Ocean Systems Division (N/OMA41), Office of Oceanography and Marine Assessment, National Ocean Service, NOAA, 6001 Executive Boulevard, Rockville, MD 20852, or telephone (301) 443-8026

# CURRENTS ABC GRAPHICS DISPLAY





Office of Oceanography and Marine Assessment  
National Ocean Service  
National Oceanic and Atmospheric Administration  
U.S. Department of Commerce

The Office of Oceanography and Marine Assessment (OMA) provides to decisionmakers and other users the best available scientific information on selected characteristics of the ocean, estuaries, and coastal areas of the USA. For example, it operates the National Water Level Observation Network to measure water levels at 171 locations around the coastline. It processes and analyzes these data to predict the times and heights of high and low tides and publishes four annual volumes of tide tables. This information has been critical for national defense, safe navigation, marine boundary determination, and coastal engineering since about 1850 when NOAA first began measuring water levels. It also measures water levels at 54 locations in the Great Lakes to help the U.S. Army Corps of Engineers regulate water levels of the lakes. OMA is installing the Next Generation Water Level Measurement System, a highly automated system that will completely replace the NWLON over the next 5 years.

NOAA has conducted circulation surveys of estuaries and coastal areas of the USA since about 1890. However, circulation surveys have required relatively large amounts of time and money. OMA is now experimenting with the use of numerical circulation models and new measurement technologies to develop improved circulation products, including circulation data atlases, real-time circulation data, and current and circulation forecasts under various meteorological conditions. Numerical circulation models can describe total circulation in estuaries including the effects of tides, weather, and river flows. They can significantly enhance traditional NOAA tide and tidal current predictions that are based only on astronomical factors.

Since the passage of Title II of the Marine Protection, Research and Sanctuaries Act of 1972 and the National Ocean Pollution Planning Act of 1978, NOAA has conducted a major program of assessments of the effects of human activities on the marine environment. OMA activities range from long-term, comprehensive "strategic" assessments of national marine and estuarine environmental quality problems to on-scene, real-time "tactical" advice during emergency responses to spills of hazardous materials.

OMA's Strategic Assessment Program maintains an operational capability with which to evaluate the environmental and economic effects of national policies and management strategies affecting the use of coastal and oceanic resources of the USA. It has developed and maintains large, national data bases such as the National Coastal Pollutant Discharge Inventory, the National Estuarine Inventory, and the National Shellfish Register. It uses thematic maps for data presentation and has already published major data atlases of the East Coast (1980) and Gulf of Mexico (1986); data atlases of the Bering, Chukchi, and Beaufort Seas (1987) and the Gulf of Alaska and West Coast (1988) are in production. The data contained in these atlases are being automated to improve the timeliness with which they can be applied to assessments for decisionmaking.

Since 1984 OMA has conducted an operational monitoring program, the National Status and Trends Program, that is providing comprehensive, high quality information about the toxic chemical contamination of bottom-feeding fish, mussels and oysters, and sediments at 150 stations throughout the USA. This is the first time that a nationally uniform set of techniques has been used to measure environmental quality in important coastal and estuarine areas. A related program of applied assessments is examining the relationship between contaminant exposure and the reproductive capacity of fish populations.

Finally, OMA's Hazardous Materials Response Program provides critical scientific support to the U.S. Coast Guard during spills of oil and hazardous materials. Each year OMA responds to over 200 spills in coastal areas of the USA. NOAA scientific support includes on-scene assistance, spill trajectory predictions, chemical hazard analysis, and environmental sensitivity analysis. OMA personnel also participate in simulation exercises designed to prepare federal, state, and local authorities to deal more effectively with the complexities of real emergency spill events.