# MAKING MAREP WORK

## Proceedings
## 1985 National MAREP Conference and Workshop



NATIONAL SEA GRANT COLLEGE PROGRAM
NATIONAL WEATHER SERVICE

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1985 National MAREP

Conference and Workshop

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Robert Landis
National Weather Service

The primary mission of the National Weather Service is the warning of severe weather and its potential impact. The impact from severe weather is particularly important and involves several aspects including the preparedness function. The National Weather Service (NWS) participates with other agencies, such as the Federal Emergency Management Agency (FEMA) and the Marine Advisory Service, to prepare people to deal with the effects of severe weather. The potential impact of severe weather also includes waves and changes in surface ocean conditions. Whether it is for people in tornado alley or those who live and work along the coast and in offshore waters, NWS has a commitment to provide warnings of severe weather. This commitment is equally applied to all segments of society.

Perhaps more than any other kind of activities, maritime activities are the most sensitive to changing weather. Mariners probably have been involved in forecasting and observing the weather more than any other segment of society. Their sensitivity to telltale weather signs is beneficial in the severe weather warning system. Until recently, only mariners on large merchant ships systematically provided weather observations in this way.

On land, a key factor in the warning system is a cooperative program that includes spotter-observers. It is these types of cooperative observations that often provide the basis for severe weather and tornado warnings. The same thing is true in aviation, through a program called PIREP, or pilot reports. The pilots who are experiencing severe icing, turbulence, etc., report on severe weather conditions, thus enabling their colleagues and fellow aviators to benefit from them through the warning network. MAREP is the first attempt to organize such a program in the marine area. There is an additional opportunity to expand this concept through the use of new technology to make it more efficient. Pilot projects during the past two years have provided considerable information on how to implement and automate MAREP.

However, there are several unknowns that need collective thinking if they are to be resolved. How automated will the program be? How will it work? Will it be the same or different as it changes locales? The program for a national MAREP system ultimately depends upon the collective wisdom and experience of all those in the field.

The key part of MAREP is the recruitment and training of the participants. When NWS first began to get involved with MAREP, it was fairly short-handed in terms of personnel. An appeal to Sea Grant's Marine Advisory Service for help resulted in the establishment of approximately 30 MAREP programs around the coast. By all measures, these programs have been major successes.

The weather service is convinced that MAREP is going to be part of its operational data strength. At present, the weather service is determining how MAREP can be handled as a part of its future communications, a program called Advanced Weather Information Processing System (AWIPS). For those who are not familiar with the system, communications are centered at present around a system called AFOS. This system is becoming outmoded, and a whole new communication and work station technology (AWIPS) is in the planning and design stage. The system is expected to be fully operational in the early 1990s.

The strong bonds between the National Weather Service and the Sea Grant Marine Advisory Service have been good and natural ones. The continuance of such bonds cannot help but be beneficial.

A number of groups and individuals have made solid contributions that helped bring MAREP to this point and furthered the work of the conference. The Federal Communications Commission, represented by Gary Soulsby and Jack Bazhan at the conference, has been a silent but by no means inactive partner. Ron Becker conceived the workshop and was a prime organizer. Jim Salevan has been the leader of one of the more innovative MAREP programs at the University of Delaware and also helped to organize the conference. Facilities were arranged by Phil Johnson and deputy director Jeff Walker of the NOAA Northwest Ocean Service Center. Nancy Schlomann and Paul Jacobs have made significant contributions to the conference and to MAREP.

# SEA GRANT COMMITMENT TO THE MAREP CONCEPT

William Stubblefield
National Sea Grant College Program

The National Sea Grant College Program is enthusiastic about MAREP and considers it a shining example of cooperation among various NOAA elements that are working together to promote or improve products to marine users. Sea Grant's commitment to MAREP comes from its own functions and philosophy. Sea Grant marshalls the intellectual talents and capabilities of the nation's universities and marine research institutions to promote the development and the wise use of the nation's marine and Great Lakes economic sector. This is done through approximately 135 different institutions in 29 states, the District of Columbia, Guam, and Puerto Rico. Equally impressive are the thousands of scientists, educators, lawyers, economists, and Marine Advisory Service agents all working together on common problems. Sea Grant supports their activities in three topical areas: (1) research, (2) education, and (3) extension outreach. Each of these, in some way, interacts with the MAREP concept, but the group that is the most active is the Marine Advisory Service.

Over the last two decades, Sea Grant Marine Advisory Service agents have built a bond of trust with both commercial and recreational fishermen that is probably unequalled anywhere within the federal government. This friendship is manifested in several ways.

A number of successful programs were initially viewed with skepticism by the marine sector, especially commercial fishermen, who were reluctant to become involved with anything smacking of government bureaucracy. But this attitude was gradually overcome and a healthy blend of trust and respect now exists between marine agents and their counterparts in the marine sector. As a result, many useful programs have been implemented.

MAREP does not necessarily require much support, as its positive aspects are so great that it can survive with or without Sea Grant. Still, Sea Grant and its marine advisory agents are proud to claim some part in promoting the great advance that MAREP has experienced in the last couple of years and believe that future cooperation will enhance MAREP even more. Sea Grant appreciates the opportunity for cooperative work with NWS.

Sea Grant's efforts for MAREP have taken various directions and have occurred on various levels. The national Sea Grant office has certain hopes for MAREP. We hope to see MAREP expand throughout the entire country. Everyone who has been to sea realizes that there is a variance between what is given as a forecast and what exists as an on-site situation. This variance can only be stabilized by the MAREP concept. Ideally, each fisherman, before leaving port on a given day, will have the opportunity to get weather forecasts that have been improved by on-site observations. Sea Grant wants very much to be part of this growth and development.

Of course, these wishes for further growth and development are constrained by the realities of budget. Sea Grant is in a period of tight budgeting. This retrenchment requires that each state Sea Grant program evaluate existing activities against what it would like to do. Some state programs have been very aggressive in redirecting their limited resources to support MAREP. Other state programs have been more cautious; with limited resources, they've taken a wait-and-see attitude.

One purpose of this conference is to determine where MAREP is, where it would like to go, and what is needed to get it there. This type of information is what Sea Grant managers are seeking. For this reason alone, I expect this to be an extremely useful conference.

# THE NATIONAL WEATHER SERVICE OVERVIEW OF MAREP

Paul A. Jacobs
National Weather Service
Office of Meteorology

Marine warnings and forecasts are a major element of the National Weather Service (NWS) mission. Yet, despite information from satellites and observations from ships, data buoys, offshore platforms, and coastal stations, large expanses of ocean and the Great Lakes remain data voids. Shipping, fishing, recreational-boating, and offshore exploration in these data-sparse areas involve people who can supply a wealth of information. To take advantage of these potential observers, the NWS, in cooperation with the Marine Advisory Service of the National Sea Grant College Program, has launched a Mariner Report (MAREP) program. Patterned after aviation Pilot Reports (PIREP), the MAREP concept seeks to recruit private coastal marine radio stations and mariners on a volunteer basis to relay weather and sea state observations to NWS forecast offices. These data are combined with other information to issue and update marine warnings and forecasts. Where possible, products are relayed to the radio stations for broadcast to mariners as a payback for their participation. As of October, 1984, there are 30 MAREP locations around the country supplying an average, per site, of six to 30 reports a day to NWS. Automation techniques to minimize manual workload are being tested at sites on the east and Gulf coasts. Results from these tests and experience gained from the present network will form the basis for a national MAREP program. A nationwide MAREP network is planned involving approximately 100 radio collection sites to provide expanded data coverage within the 200-mile Exclusive Economic Zone and the Great Lakes.

An important mission of the National Weather Service is the provision of warnings and forecasts in the marine environment to support safe and efficient operations by public maritime activities. Twenty-four weather service forecast offices and approximately 50 smaller weather service offices provide marine prediction services for designated coastal, offshore, high seas, and Great Lakes areas (Figure 1). Merchant ships, fishermen, recreational boaters, offshore drilling industries, and coastal communities depend on these services for their safety, livelihood, and leisure. The contribution of these activities to the nation's economy within the 200-mile Exclusive Economic Zone (EEZ) is greatly dependent on the ability to conduct operations in the face of environmental conditions that can change from dead calm to hurricane proportions in a matter of hours.

## Forecast Formulation and Data Dependency

It has often been stated that predicting future events is both a science and an art. Forecasting, whether it be the outcome of a horse race, the economy, or the weather, depends upon the collection and analysis of pertinent data that portray past and present conditions. A simple technique, of course, is assembling the data into a trend of

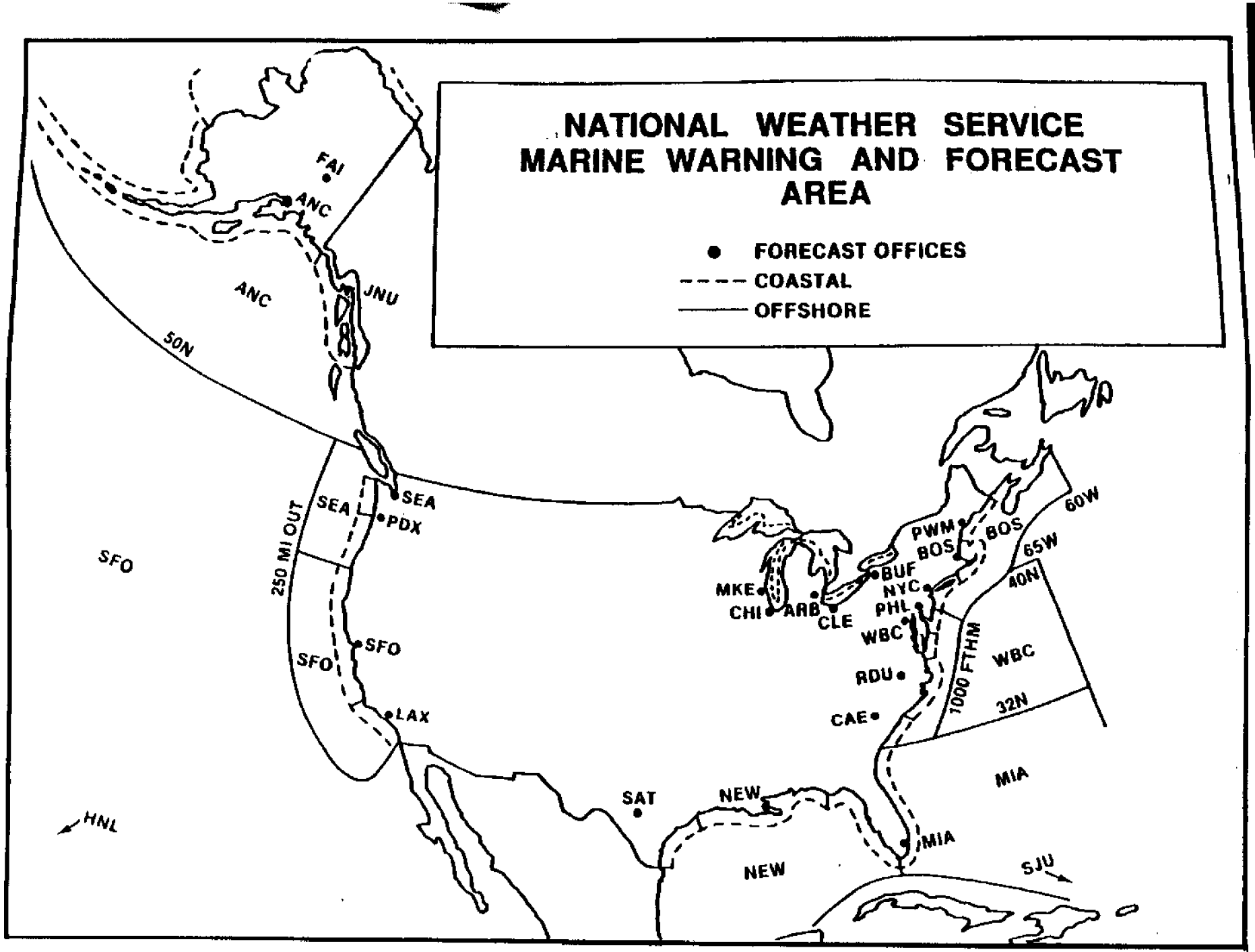
NATIONAL WEATHER SERVICE
MARINE WARNING AND FORECAST
AREA
FORECAST OFFICES
COASTAL
OFFSHORE
FAI
ANC
ANC
JNU
50N
SEA
SEA
PDX
250 MI OUT
SFO
SFO
SFO
LAX
HNL
SAT
NEW
NEW
MIA
SJU
MKE
CHI
ARB
CLE
BUF
PWM
BOS
BOS
NYC
PHL
WBC
RDU
CAE
60W
65W
40N
1000 FTHM
WBC
32N
MIA

Figure 1

events and extrapolating this trend to some future time. More sophisticated forecast techniques are based on numerical models derived from mathematical representations of physical processes. These models use observed data to predict future events. Weather forecasters make use of both methods. The output from computerized numerical models is adjusted by the forecaster's evaluation of present and past conditions to formulate weather forecasts. It is not surprising that, in meteorology, the higher the number and frequency of accurate observations, the more accurate and detailed the forecast.

Forecasters are faced with a difficult challenge in predicting winds, visibility, precipitation, and general weather conditions for periods out to five days. As much as 24 hours in advance, they must also warn of the onset of oceanic and Great Lakes storms on scales ranging from tens to thousands of square miles. These are basic requirements for maritime activities in order to plan operations and make decisions on whether to leave port, change a navigation route, head for safe harbor, or safeguard personnel, equipment, and cargo. Yet from the coastline to the high seas there are relatively few representative weather observations available for use in numerical models and by the forecaster. This paucity of information limits the ability to provide detailed quantitative predictions of oceanic weather elements. The challenge is especially great within the EEZ and the Great Lakes, which possess the highest concentration, diversity, and range of marine activities and mariner experience. These area also exhibit the greatest variability of wind and sea state because of land-sea interaction, bathymetry, and ocean thermal structure.

Forecasters generally rely on weather observations from fixed observing stations reporting hourly or more frequently. Airport observing stations are an example of this reliability. Hourly reports of wind speed and direction, wind gusts, sea level pressure and pressure tendency, air temperature, visibility, obstructions to vision, cloud cover, present weather (rain, snow, thunderstorms, etc.), and diurnal data such as maximum/minimum temperature and cumulative precipitation provide a complete depiction of surface weather conditions. So-called "special" reports by human observers and automated stations based on elements exceeding threshold values (e.g., reduction of visibility to less than one mile) alert forecasters issue a warning. Satellites, radar, and upper air soundings complete the major elements of the observation system, but are limited in their ability to provide quantitative information.

## Filling Data Gaps

Despite the diversity of data sources, additional observations are needed by the forecaster to monitor conditions and respond with detailed warnings and forecasts on a localized basis. Severe-storm spotter networks and cooperative observers help to fill in data gaps and assist forecasters to respond to severe weather situations affecting life and property. For example, in the NWS aviation program, airport observations are the basis for terminal forecasts but do not provide enough information for flying conditions predicted in Route and Area Forecasts

and In-Flight Advisories. To help meet these requirements, aviators for many years have provided PIREPS of conditions aloft: turbulence, icing, visibility, cloud bases and tops, and winds. Balloon-borne upper air soundings and vertical temperature profiles by satellite provide indicators of these elements, but do not substitute for direct observations of in-flight weather conditions.

Observations by citizens on the ground and pilots in the air are invaluable to forecasters and represent a "self-help" mechanism by which data fed into the forecast system are fed back to the cooperator in the form of updated weather information. In the case of PIREP, pilots are also helping each other by alerting their fellow aviators to trouble ahead even before the forecast is amended or a warning issued. This pattern of cooperation-response translates into enhanced safety, efficiency, and cost savings (Figure 1).

## The Marine Data Base

In the marine environment, forecasters do not have the benefit of a dense network of fixed marine observing stations that report hourly. About 40 coastal and deep-ocean moored buoys and 31 automated coastal headland stations are distributed along the nation's 12,400-mile coastline (Figure 2). The headland stations report wind speed and direction, wind gusts, sea level pressure, and air temperature, but data are not available for waves, sea water temperature, and visibility. All of these parameters (except visibility) are reported by the buoy network. The offshore oil and gas industry has been very cooperative in providing additional marine data to NWS, but these are primarily in the northwest Gulf of Mexico and reports vary in frequency. The Coast Guard provides observations from about 190 coastal stations. However, most of the locations are not representative of the land-sea transition zone and are not reported hourly. The number of stations is diminishing because of budgetary considerations and personnel reductions.

The major element of the marine data base farther offshore is represented by merchant ships that participate in the international Volunteer Observing Ship (VOS) program organized by the World Meteorological Organization. There are a total of 7000 VOS ships worldwide. The United States has recruited and maintains over 1800 of these vessels. The VOS system is a vital contributor to the World Weather Watch program by providing data to major meteorological processing centers for use in numerical forecast guidance, local and regional forecasts, climatological applications, and research. The VOS reports are distributed to external users such as commercial meteorologist, oceanographers, and private ship-routing companies.

VOS observations are normally taken only every six hours at synoptic reporting times (00 GMT, 06 GMT, etc.). However, only two of the four reports per day are transmitted to NWS because of radio officer watch schedules. These reports are subject to delay and can reach forecaster hours after observation time. Reports are generally confined to major transoceanic trade routes and in areas where ships try to make use of or avoid prevailing ocean currents. Very few VOS reports are

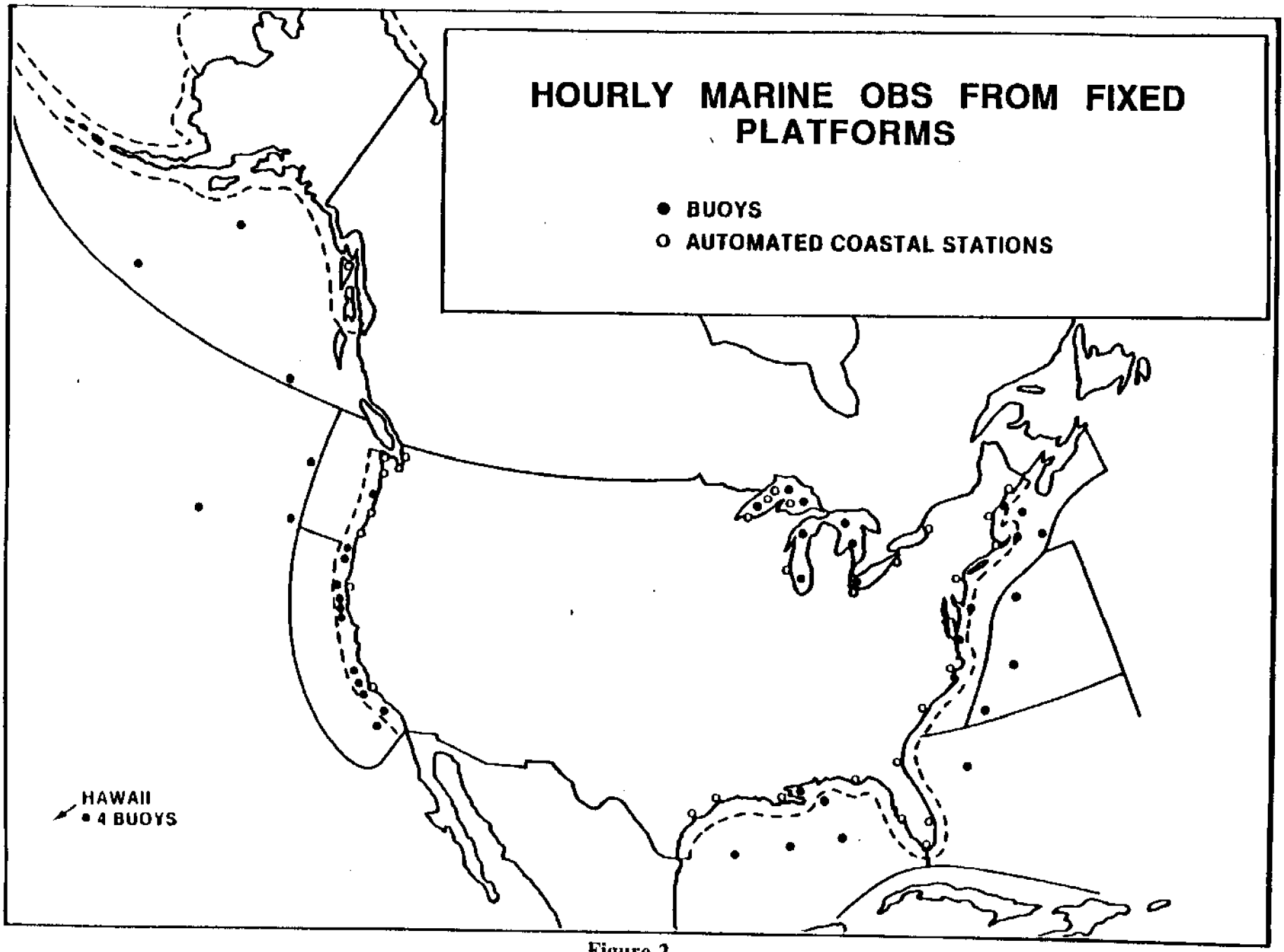
HOURLY MARINE OBS FROM FIXED PLATFORMS
● BUOYS
o AUTOMATED COASTAL STATIONS
HAWAII
• 4 BUOYS

Figure 2

available within 50 miles of shore as ship personnel are usually busy with various navigational and communication tasks related to port arrivals and departures. In addition, ships normally avoid heading into known areas of severe weather, which further reduces the amount of valuable information on storm movement and intensity that could be derived from wind, air pressure, and wave observations. These factors result in the relatively small number of ship weather observations available to NWS in near real time as indicated in Figure 3.

An example of the large differences in data from land to sea is shown in Figure 4, which compares roughly equivalent areas. Land stations outnumber coastal and ocean stations by more than 2 to 1. Factoring in the frequency of reporting, the 24 hour land-to-ocean observation ratio becomes greater than 4 to 1.

## The Mariner Report Program

NWS marine forecasters are continually on the firing line to provide reliable warnings and forecasts to the maritime public. Each day literally thousands of craft, ranging from small pleasure boats to 100-foot fishing trawlers to ocean-going freighters, ply the waters near the coast and on the Great Lakes. Each of these vessels represents a potential observing platform whether or not meteorological instruments are carried on board.

The MAREP program recruits mariners on a volunteer basis to report marine weather elements while underway or at their point of operation such as an offshore fishing ground. The term MAREP was deliberately coined as a corollary to PIREP to convey to the mariner his or her kinship with the aviator in terms of navigation and the effects of weather on safety and operating efficiency. The link between MAREP observers and forecasters are marine radio facilities known as limited coast stations (LCS). These are licensed by the Federal Communication Commission (FCC) to provide two-way radio services for local or regional maritime groups via VHF-FM and HF-Single Sideband. The FCC has approved the participation of the LCS in the MAREP program.

Figure 5 illustrates the MAREP concept. Fishermen, harbor pilots, tug and barge operators, recreational boaters, and other mariners provide voice reports of weather conditions in plain language to the LCS either on a prearranged schedule or when conditions differ significantly from the forecast. The radio operator at the LCS copies the reports on a log sheet. At the conclusion of the reporting period the observations are relayed to the NWS forecast office by phone, telecopier, or computer terminal. The MAREPs are used by the marine forecaster along with other data to (a) issue an immediate warning if the MAREPs indicate existing or potentially hazardous weather, such as high winds and waves; (b) amend a previously issued forecast, to make a significant but noncritical change; and (c) formulate the next scheduled forecast.

A major feature of the program is the payback or self-help aspect. Warnings, amendments, or scheduled marine forecasts are relayed to the LCS immediately for broadcast to the mariners who initially supplied the

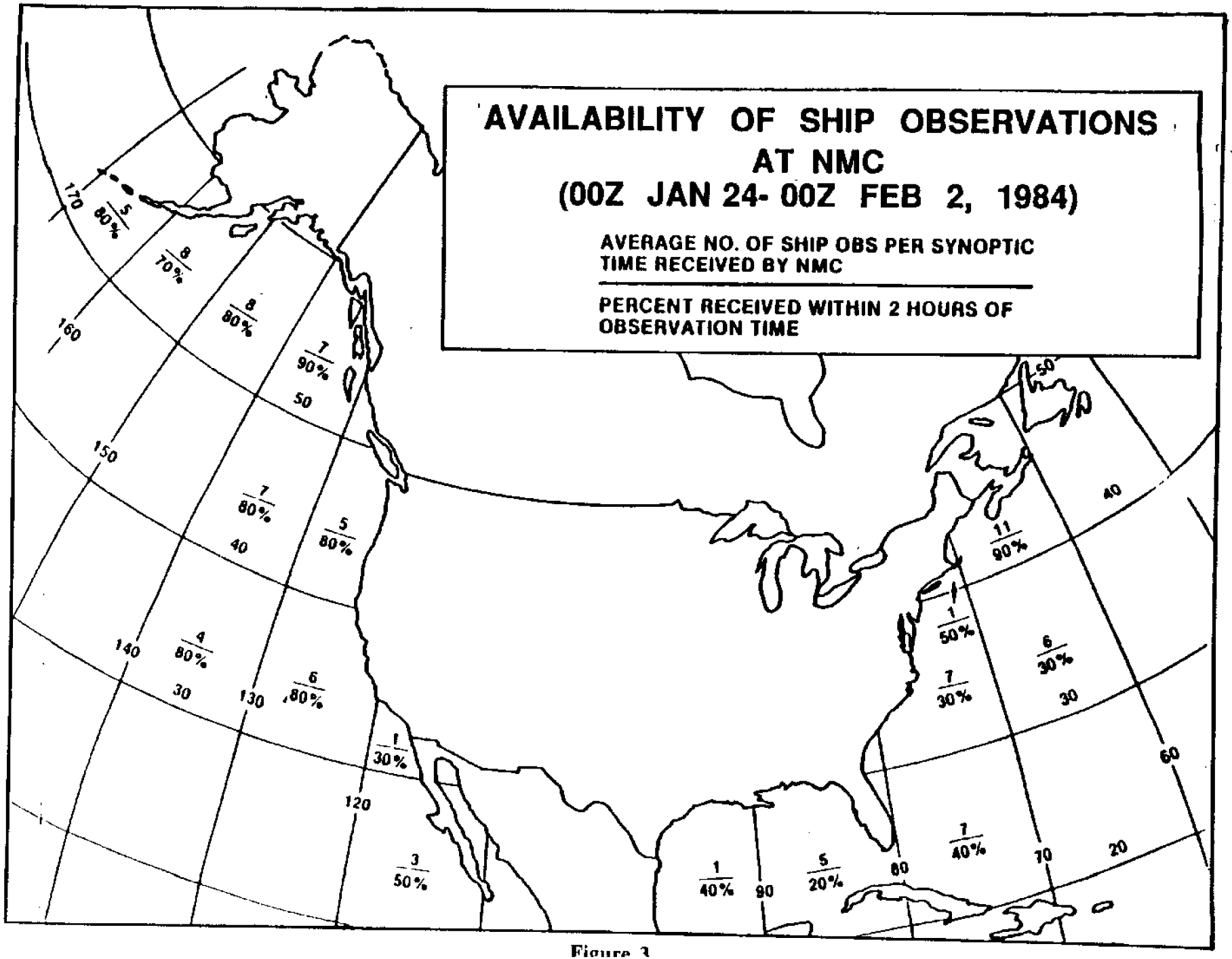
AVAILABILITY OF SHIP OBSERVATIONS
AT NMC
(00Z JAN 24- 00Z FEB 2, 1984)
AVERAGE NO. OF SHIP OBS PER SYNOPTIC TIME RECEIVED BY NMC
PERCENT RECEIVED WITHIN 2 HOURS OF OBSERVATION TIME
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
5/80%
8/70%
8/80%
7/90%
7/80%
5/80%
4/80%
6/80%
1/30%
3/50%
1/40%
5/20%
7/40%
1/50%
7/30%
6/30%
11/90%

Figure 3

# LAND VS MARINE OBSERVATIONS

**FIXED STATION REPORTS (6 BUOYS, 6 AUTOMATED COASTAL, 12 USCG STATIONS)**

**AVERAGE NO. OF SHIP OBS PER SYNOPTIC TIME RECEIVED BY NMC**

**PERCENTAGE RECEIVED WITHIN 2 HOURS**

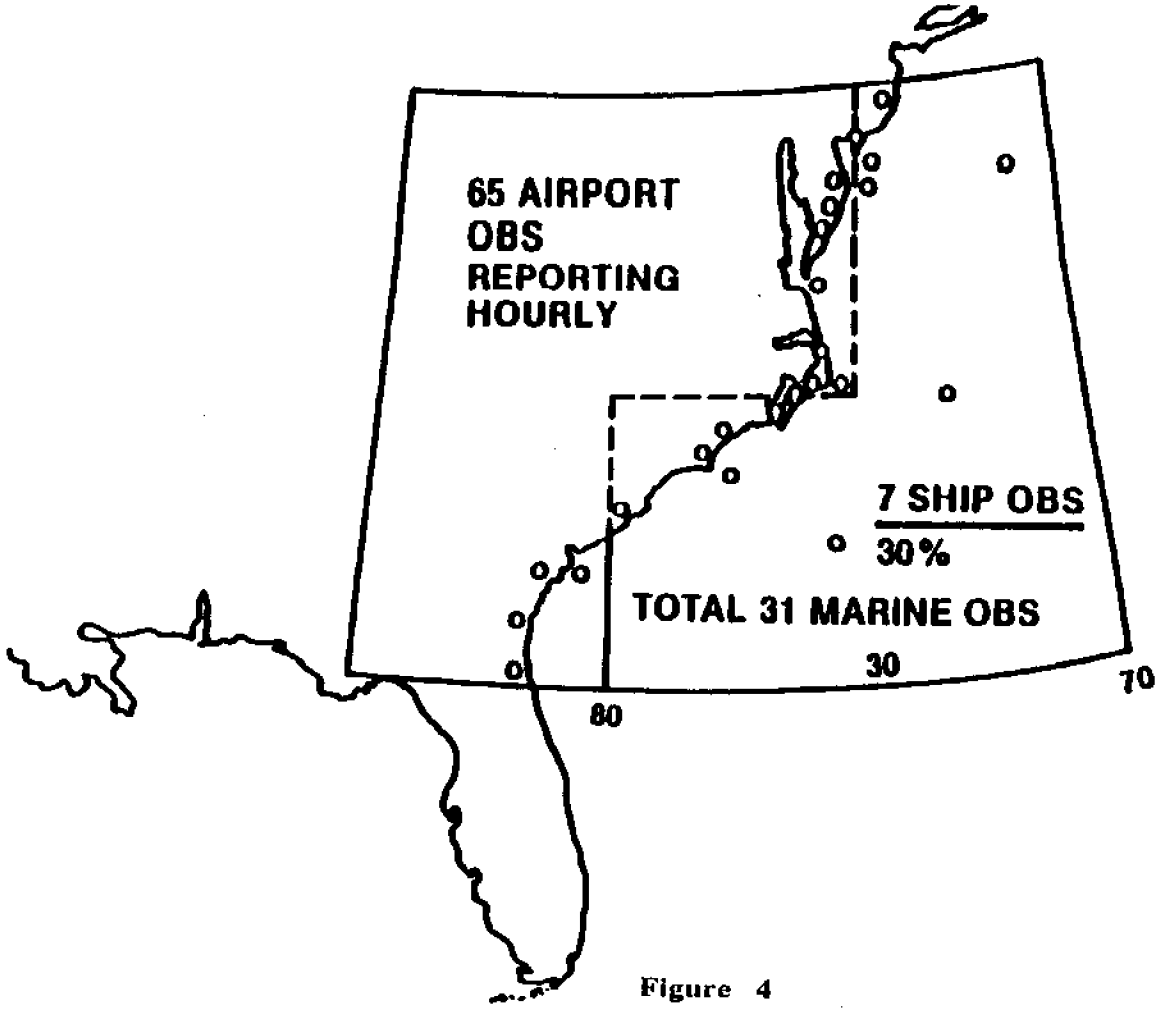


Figure 4

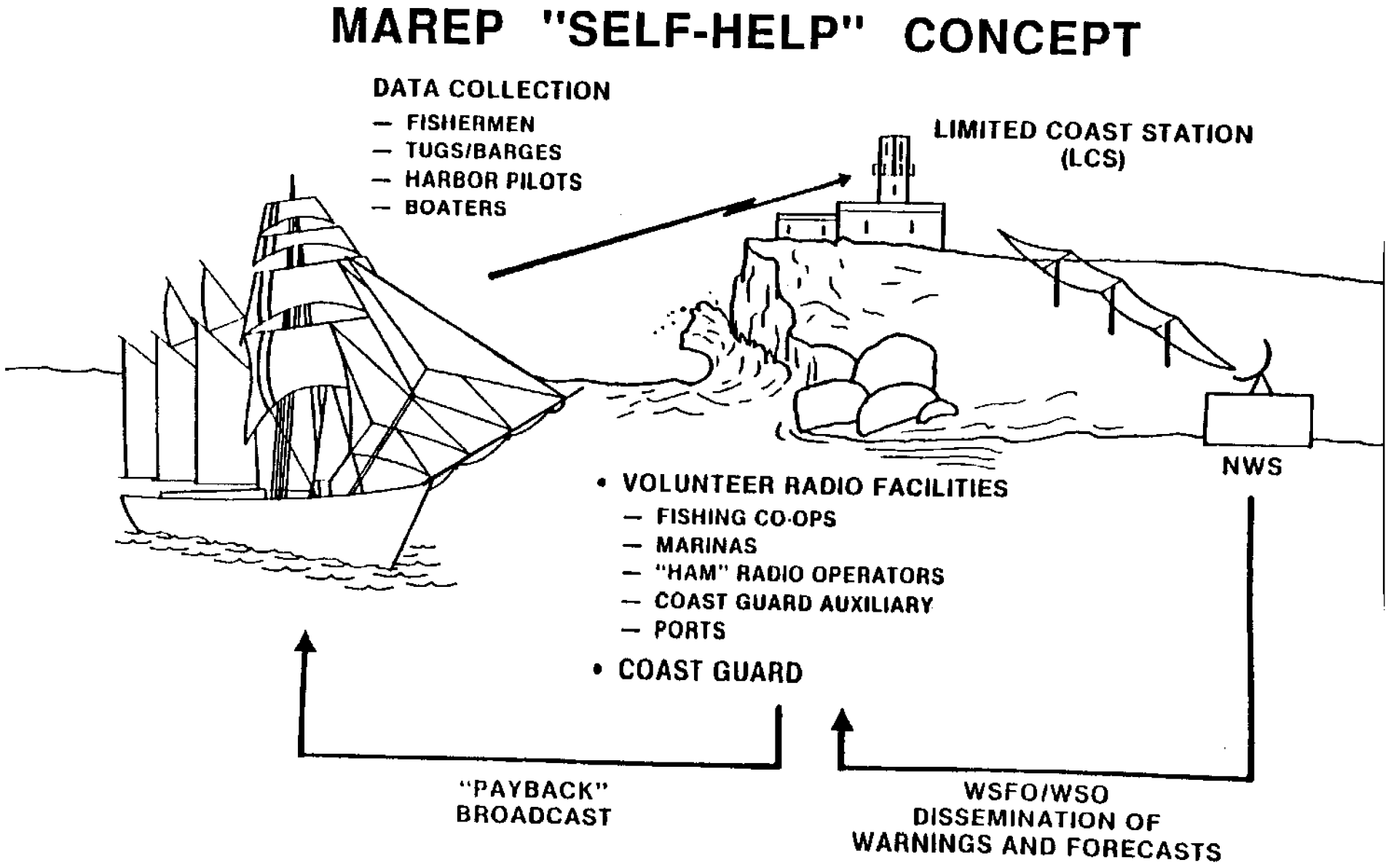
MAREP "SELF-HELP" CONCEPT
DATA COLLECTION
— FISHERMEN
— TUGS/BARGES
— HARBOR PILOTS
— BOATERS
LIMITED COAST STATION
(LCS)
NWS
• VOLUNTEER RADIO FACILITIES
— FISHING CO-OPS
— MARINAS
— "HAM" RADIO OPERATORS
— COAST GUARD AUXILIARY
— PORTS
• COAST GUARD
"PAYBACK"
BROADCAST
WSFO/WSO
DISSEMINATION OF
WARNINGS AND FORECASTS

Figure 5

MAREPs as well as to other vessels "working" the same frequencies as the radio station. This payback mechanism reinforces and encourages MAREP participation because mariners know that their observations are being used to update area-wide information. Moreover, the accuracy of warnings and forecasts is improved by the availability of more data to the forecaster. In addition to these broadcasts, updated forecast information is aired immediately by NOAA Weather Radio, Coast Guard communication stations, and marine public correspondence stations operated by communications companies. These are the primary weather dissemination outlets serving maritime activities. The payback broadcast aspect of MAREPs via LCS broadens the NWS dissemination program to insure the mariner's access to marine warnings and forecasts.

The MAREP concept began in 1975 in Kodiak, Alaska. Peggy Dyson, the wife of a fisherman, operates a limited coast station to provide communications for Alaskan fishing fleets operating hundreds of miles out in the Gulf of Alaska, across the Aleutians, and the Bering Sea. The NWS Alaska Region initially recruited Mrs. Dyson to make supplementary weather broadcasts. She later expanded her services to include the collection of weather reports. An average of 30 observations a day, seven days a week, is relayed through the MAREP program in Kodiak. On countless occasions, fishermen have stated that these reports made the difference between life and death because of the resultant warnings that were issued. Mrs. Dyson has been recognized on numerous occasions for her contributions to maritime safety.

Based on the success of MAREP in Alaska, NWS began developing plans for a natonwide MAREP network in cooperation with the Marine Advisory Service (MAS) of the National Sea Grant College Program. MAS can be considered the maritime counterpart of the Agricultural Extension Service. State MAS extension agents provide expertise and information to fishermen, seafood processors, recreational boaters, and coastal marine activities on matters relating to productivity, operating methods, safety, and technology. MAREP is considered a natural extension of the agents' roles in linking NOAA services to marine endeavors.

NWS forecast offices in each coastal state are working with state MAS program leaders and Sea Grant colleges to recruit volunteer MAREP observers and coastal radio stations. To date there are 30 MAREP programs in operation in 21 of the 30 coastal states including the Great Lakes (Figure 6), with the goal of expanding the program to provide MAREP capability to all NWS coastal forecast offices. The number and location of observations on any given day vary with fishing and transport operations, fish migratory habits, boating season, regulated fishing days, and even the weather. The average number of reports collected per day ranges from about six to 30 for each MAREP collection site, representing new meteorological data in key areas previously unavailable to marine forecasters.

## MAREP Automation

As MAREPs develop into a regular part of a mariner's navigational routine, NWS must develop an efficient mechanism to collect and process

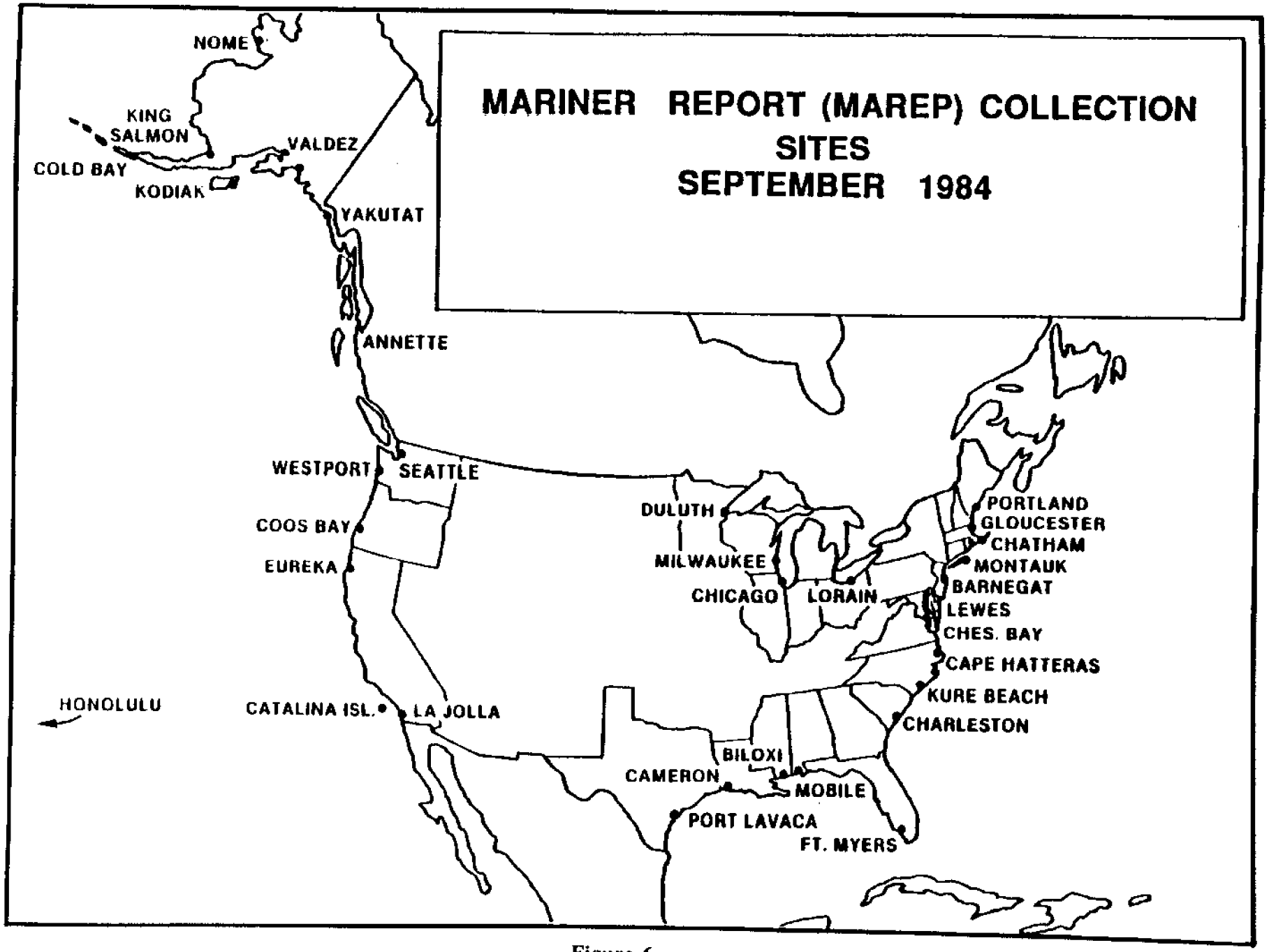
MARINER REPORT (MAREP) COLLECTION SITES
SEPTEMBER 1984
NOME
KING SALMON
COLD BAY
KODIAK
VALDEZ
YAKUTAT
ANNETTE
WESTPORT
SEATTLE
COOS BAY
EUREKA
HONOLULU
CATALINA ISL.
LA JOLLA
DULUTH
MILWAUKEE
CHICAGO
LORAIN
PORTLAND
GLOUCESTER
CHATHAM
MONTAUK
BARNEGAT
LEWES
CHES. BAY
CAPE HATTERAS
KURE BEACH
CHARLESTON
BILOXI
CAMERON
MOBILE
PORT LAVACA
FT. MYERS

Figure 6

these data. A demonstration project was begun in January 1984 to automate the relay of MAREPs to and from the LCS. The MAREP programs were selected for the project: Lewes, Delaware, and the Gulf of Mexico (Biloxi, Mississippi; Cameron, Louisiana; and Port Lavaca, Texas). The limited coast stations at these locations were supplied with either a TRS-80 Model 100 terminal or an Apple IIe microcomputer for the entry of MAREPs. The observations are transmitted into the NWS Automation of Field Operations and Services (AFOS) computer system either directly through an asynchronous communications port or via a host microcomputer linked to AFOS. The observations are reviewed by the forecaster for errors and the message header is quickly modified for transmission to other NWS offices linked by AFOS. The radio operator also uses his terminal to obtain warnings and updated marine forecasts based on the MAREPs.

In the case of Lewes, Delaware (Figure 7), the marine products issued by the Washington, D.C., forecast office are called up from the University of Maryland Extension Service computer. The Lewes LCS can obtain updated local weather information from Cape Henlopen, Delaware, to Virginia Beach, Virginia, and the continental shelf area from Hudson Canyon to Cape Hatteras, as well as all marine warnings and forecasts for the entire eastern seaboard issued by other NWS offices. This complete marine information package is automatically collated and transmitted to the University of Maryland computer by the AFOS system at the Washington D.C. forecast office on a scheduled basis and arranged in a menu format for product selection (Figure 8). The Lewes MAREP radio station is thus able to broadcast any product for the Atlantic area that might be requested by mariners. Other NOAA marine information related to fisheries, oceanographic data, notices to mariners, nautical chart updates, etc. make this system a comprehensive marine information service for anyone with a microcomputer and a telephone communications interface.

The automated MAREP and product access demonstrations are being evaluated by NWS as the basis for a national MAREP automation plan. This is a joint project with the National Sea Grant Office to extend the capabilities afforded by the University of Maryland Marine Information Service to all Sea Grant colleges around the country as well as continuing the recruitment of MAREP observers and volunteer radio stations. MAREP automation means more coastal and offshore data for forecasters, greater efficiency in data relay and processing, improved warnings and forecasts, and convenient access by the MAREP limited coast stations to a wide range of updated NOAA marine products.

## Summary and Conclusions

Forecast formulation begins with an analysis of prior and current atmospheric conditions. The more extensive the data base in space and time the better the output from numerical models and the operational forecast issued to the user. The paucity of representative and frequent marine observations makes the marine forecaster's job especially challenging. The large number of commercial and pleasure craft operating within the 200-mile EEZ affords NWS the opportunity for improving

# MID-ATLANTIC AUTOMATED MAREP DEMONSTRATION

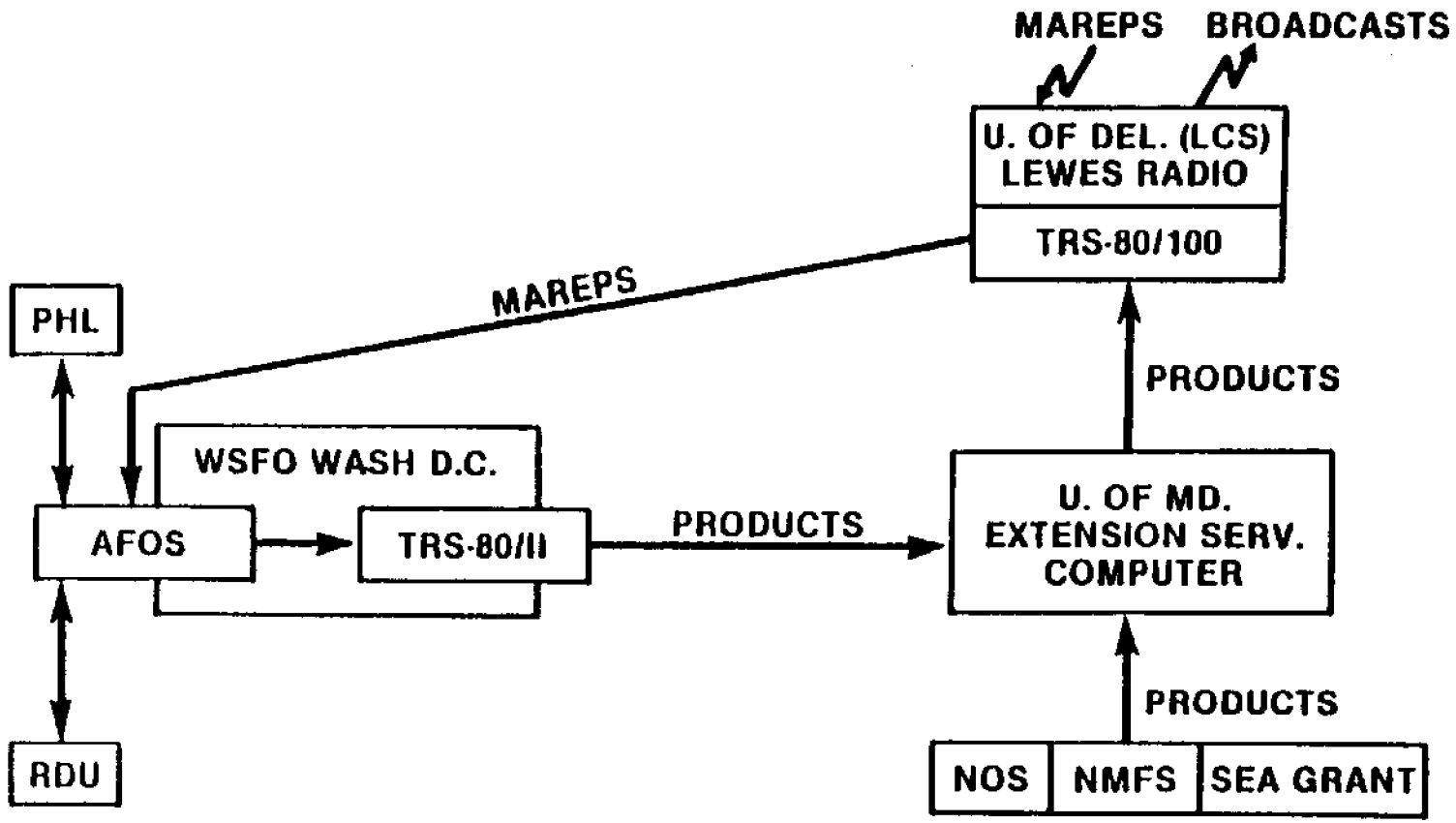


Figure 7

# EXAMPLE PRODUCT MENUS

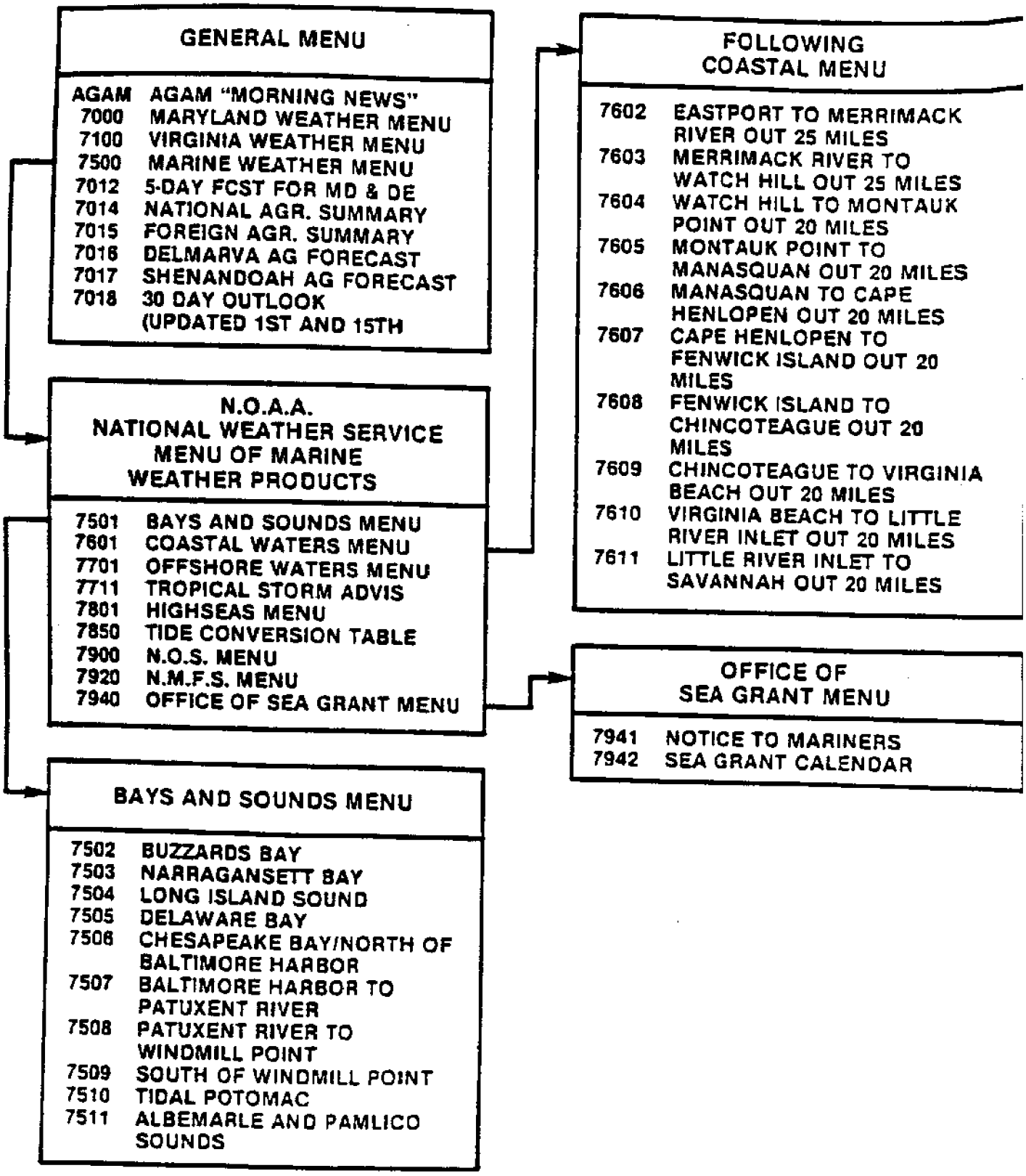


Figure 8

marine data acquisition and providing more dependable marine services. The joint NWS - NOAA Sea Grant MAREP program is recruiting mariners and coastal radio stations to relay weather observations for use with other data sources to update warnings and forecasts. Mariner participation is encouraged by the reception of the latest information directly from the MAREP collection sites in addition to standard marine dissemination outlets. Plans are being made to expand the present network of 30 MAREP locations to about 100 sites around the country in the coming years providing forecasters with a significantly improved marine data base within the 200-mile EEZ. In addition, the program will be automated through the use of microcomputers at the MAREP sites for more efficient input of data to NWS and retrieval of updated products. The product access part of the MAREP program is planned via state Sea Grant college computer facilities based on the automated MAREP demonstrations now underway.

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# REGIONAL MAREP STATUS
# NWS PANEL DISCUSSION

Kevin C. McCarthy
Eastern Region

The National Weather Service eastern region's area of responsibility runs from South Carolina to Maine on the Atlantic and also includes two Great Lakes: Ontario and Erie. Eleven MAREP base stations are currently operating, with an additional four expected to open in the near future. (Three sites on Long Island, for example, are simply waiting for a computer at the NWS office at Kennedy Airport to be returned from the repair shop.)

MAREP began in the eastern region as a result of the November, 1980, storm on George's Bank, which claimed a number of commercial fishing vessels and several lives. Soon after this incident, a series of meetings began at the NWS office in Boston. These meetings continue to serve a dual purpose: first, to provide mariners with a better understanding of the capabilities of the NWS to forecast conditions at sea; second, to better acquaint NWS meteorologists with the weather needs of the marine community. The meetings led to the establishment of the first MAREP base on the Atlantic coast at the Point Judith Fisherman's Cooperative, Rhode Island, in the summer of 1981.

Like Point Judith, most MAREP sites are commercial operations that already have connections with the mariners providing the reports. Other examples are Montauk Marine Basin, Long Island, and Cape Fisherman's Supply, Cape Cod. Both of these deal with commercial fishermen and collect the majority of their reports from the fishermen they know. Efforts to obtain reports from sport fishermen and yachtsmen have thus far been relatively unsuccessful, simply because they are not on the water every day, and locating appropriate base stations has been more difficult.

All sites have VHF radios and also seven single-band capabilities. With SSB, the Atlantic coast is covered fairly well. Reports are routinely received from 50 to 100 miles at sea and have been received from as far as 250 miles. VHF, with its shorter range, provides incomplete coverage.

Nearly all base stations operate on a scheduled basis, although a few do collect reports when the observed weather differs from that forecast. Collecting at other than unscheduled times increases the workload on both the base operator and the NWS staff.

The number of reports per day is about 30, which, though a big improvement over the number of reports available prior to the MAREP program, is still a small number when compared with the size of the coastline involved. For example, two reports per day for two Great Lakes are inadequate.

While there are relatively few reports collected each day, the number is slowly growing as more collection sites become operational. Most reports are relayed via telephone. This is burdensome for both the site operators, who are generally volunteers taking time from their businesses, and the NWS staff, who must take time from their regular duties. Besides studying the observations and related information received from conventional sources, and formulating, typing, and disseminating the forecasts, the NWS staff must take the MAREP information and combine it with the other information. To improve efficiency, we are attempting to automate existing programs. Without automation, expansion of the number of collection sites obtaining data from local mariners is not feasible.

Most of the operations report on a scheduled basis for several reasons. They are businesses, and cannot be trying to listen to the radio all day long. Thus, they are asked to get on the radio at specified times to request information from the boats. The mariners on the boats of course know the times to be reporting or listening for the radio contact. These reports, thus systematically collected, can be given back to the weather service at the best time for assimilating into the forecast. This arrangement meets the needs of everybody.

The optimum situation would be to have reports coming in around the clock; but because the businesses are basically daytime operations, most of the reports come in during the day. One lighthouse keeper in Massachusetts reports four times a day, including one report at midnight. The number of reports varies from about 30 to 60 per day, with 30 being usual. In nice weather, when more boats are out, the number is a little higher.

There is an operation on Chesapeake Bay that is open on weekends only, sending in reports then but not during the week. When it is considered that before MAREP there were no reports, 30 is a very nice number. But when the area of responsibility is considered, an area including the Atlantic coast from South Carolina through Maine and also two of the Great Lakes, 30 reports really aren't very many. There are, on the average, only two reports per day on the Great Lakes; this is totally inadequate. Further reports should be available there, but there is no labor to collect them.

There are only four sites relaying information by computer. This means that most observations are collected and written down as they are received from the boat. The operator then has to read them in, one at a time, to weather service personnel, who also have to copy them down. The information is then put into the NWS computer, but a lot of time has been lost in the handling. Automating the process would make everybody's job a lot easier.

Ed Young
Southern Region

The MAREP program in the southern region is about a year old. The oldest site is at Fort Meyers, Florida, where the forecast office at

Miami recruited the Fort Meyers Amateur Radio Club to provide radio participation. The MAREP broadcast goes out about 40 miles; most of the reports thus come from daytime fishermen, or fair weather fishermen. Commercial fishermen are not enrolled in the program at present.

About four MAREPs are collected per day. They are solicited at 1:00 p.m.; the forecast office in Miami calls the Fort Meyers radio, then telecopies the information back to the forecast office, and the forecast office gets the information put into the forecast. Then the MAREPs are put on AFOS and sent back to Tampa. Tampa makes the information available on NOAA Weather Radio, and it goes back out to the fishermen.

Fort Meyers fishermen are not only giving observations, they are receiving them. New sites are just coming on line. Paul Coreil is here from Cameron, Louisiana, and David Veal is here from Biloxi, Mississippi. A radio operator in Port Lavaca, Texas, at Kingfisher Marina, is assisting MAREP. Port Lavaca should be able to get the single sideband out in the Gulf. The problem in the Gulf of Mexico and for much of the program is the lack of data. There are a lot of oil rig reports in the central Gulf to fill in some of the gaps, but there is no information in the northeast and western Gulf.

The coastal winds forecast goes out 50 miles. Forecasters are making forecasts, but they have very little idea of what is actually going on. NWS managers' feedback is that mariners want accurate marine forecasts. MAREP is a very important part of the marine program. NWS looks forward to increasing its cooperation with Sea Grant.

Johnny Smith
Central Region

The MAREP program in the Great Lakes owes its existence to the Marine Advisory Service. There are three locations in the upper Great Lakes: Chicago, Milwaukee, and Duluth. A fourth will be established in lower Michigan, probably in the Detroit area, within the next 30 days. There is no question about the value of these reports, but in any six-hour period, it is considered lucky to get two reports per lake. It is pretty tough for the general boating public when forecasts have to be made without initial data.

The MAREP program in the Great Lakes suffers because it is on a seasonal basis. The ice usually forms about January; until April, there is so much ice that it deters boating, and so observations are lost. It is necessary to go back every year, talk to the observers, re-recruit them, get new people, and talk to Marine Advisory Service agents and get them to relocate the collection points. It is hoped that the three main points of collection in the Great Lakes will be there for quite some time. Last year, there was an average of 6-12 reports a day; lack of funding and personnel has prevented that kind of effort this year. Another problem is that the process, which is all manual, is extremely labor-intensive, but new system called Remote Observations System Automation (ROSA), has been developed to relieve the necessity for

labor. Don Whitman represents the task team in the central region developing this system.

Don Whitman
Central Region

ROSA is just being tried out at Milwaukee. It's not in use there yet, so it is a little premature to be talking about results. There will be training to teach the Milwaukee people how to use it.

ROSA was designed to aid in getting the river and rainfall reports in from cooperative observers. Needed was a way for the observer to put data in without having to handle it.

The encoder pad designed to do this goes a bit beyond touch tone. The observers code in their observations; they can also store, review, and correct observations. They dial an 800 number, which is answered by a ROSA computer that formats the observation and passes it directly to AFOS. A marina in Milwaukee using one of these encoder pads will collect 10-12 observations; it can use the encoder pad to send the observations directly in to AFOS. Encoders can be provided to ships that have radio telephone systems on board; obsevations can go directly from the ship into the computer system. The pads are about $100 at NWS cost. The ROSA computer will accept any ASCI data that is transmitted on 300 baud. People do use it with other computers. Multiple observations can be sent at the same time.

Kenneth E. Lilly, Jr.
Western Region

Ocean weather and wave observations from vessels participating in MAREP form an important segment of the marine data network along the U.S. west coast. These reports, along with scattered observations from ships in the Cooperative Ship Observation Program and from 17 environmental buoys anchored off the coast, make up the observations network over the ocean. Meteorologists use the data mainly in two ways: (1) for drawing surface weather analysis maps; (2) as a description of prevailing conditions over the ocean at the start of the forecasting process and for updating their forecasts and warnings.

MAREP observations from fishing vessels, tugboats, and other vessels are especially important because most of these reports come from areas within 60 nautical miles of the shore. This zone is where the vast amount of small craft (vessels less than 65 feet in length) activity occurs and is the region where most weather-related accidents involving small craft are likely to happen. It is an area subject to unusual wind and wave patterns.

Winds along the mountainous west coast, for example, can be blowing a weak five to ten knots over the beach to a few miles offshore, yet be gale force (37-47 knots) or higher just over the horizon. Small craft skippers departing pleasant conditions in port have no inkling that

dangerously rough seas lie just beyond their visible horizon--neither does the forecaster, so he has posted no warnings. Similarly, some 50 nautical miles farther away, an inbound skipper notices nothing unusual. Yet, between these two vessels, winds have concentrated in a narrow band, wreaking havoc on unseaworthy boats and unseasoned crews lured offshore by unusually fine conditions over the preceding days.

Just such an event occurred off the Washington coast in September 1979, resulting in several sinkings and drownings. MAREP observations were not available, and a zone of high winds blossomed, undetected by environmental buoys several hundred miles offshore and by coastal observing sites. In March 1985, a similar event took place; only this time, MAREP observations from Westport filled in the gap, and forecasters got the warning out. This is but one example of small-scale weather phenomena in the nearshore zone requiring a much denser network of observing sites. MAREP observations help fill this need and provide information not available from any other sources. Additionally, the mariners who are monitoring the transmission of these observations often get an idea about conditions they may encounter later on. This information is very useful for planning purposes.

At present the National Weather Service is involved with four MAREP sites (Figure 1) along the west coast and is in the process of establishing a fifth one. The table below gives some facts about each MAREP station.

U.S. WEST COAST MAREP SITES - JUNE 1985

| Location | Operator | Established | Approx. Number of Reports/Yr. | Method of Comms. to NWS Office |
|---|---|---|---|---|
| Seattle, WA | Marine Exchange | Feb 1984 | 200 | telecopier |
| Westport, WA | Mrs. Josie Dyas | Mar 1980 | 2,000 | telecopier |
| Coos Bay, OR | Port of Coos Bay | Aug 1982 | 2,900 | telecopier |
| Eureka, CA | U.S. Coast Guard | Dec. 1984 | 1,100 | telephone |
| *Santa Catalina, CA | ----- | ----- | ----- | ----- |

*WSFO Los Angeles is working with an individual to collect observations from boats in the Channel Island area off southern California.

The low cost for this program--about $6,700/yr. for supplies, equipment repair, and a small stipend for our Westport operator--is highly dependent on the volunteer spirit and dedication of our MAREP operators and observers. Without their outstanding efforts, this program would not be possible and our forecasters would lose about 6,000 near-shore reports each year so vital to marine safety. MAREP will

remain as one of our primary links to that part of the maritime community most vulnerable to the forces of the sea.

During the MAREP Conference, Commander Charles Gott of the SEA USE Council in Seattle kindly supplied four copies of monthly plots of MAREP reports from Coos Bay, Oregon. These are included here because they show that most of the observations are concentrated in the coastal region. Coos Bay has a single-sideband radio, which permits it to receive reports more than 1,000 nautical miles away and all along the west coast. (See pages 29-32.)

Richard Przywarty
Alaskan Region

The program started back in the late sixties. The primary interest then was just a dissemination system. Observations were wanted, but the primary goal was dissemination first, with data collection second. The reason for the order of these goals was that it was necessary to get the forecast for one of the largest, data-sparse areas, and also to get data to one of the most weather-sensitive groups (Figure 2).

The area of responsibility for this region is a little over half the nation's coastline. There are over 6,600 miles of coastline along Alaska, and from 18,000 to 20,000 boaters out there at any one time. In the late sixties, a dedicated marine forecast unit was established at Anchorage. One of the nice benefits of such a unit, in addition to the local forecast studies, was its liaison work for the National Weather Service. During one visit to Kodiak, the NWS learned that it was not really getting observations, and its forecasts were not being received by as many fishermen as had been thought. Part of this situation was caused by the fact that marine radio frequencies hadn't been standardized. The FCC was just starting to standardized frequencies. It was discovered that a 4125 single sideband could reach a lot more fishermen. Also in the mid-seventies, people from the NWS met Peggy Dyson. Peggy was already broadcasting to members of her family, giving them whatever information she could get. It was a very small operation. Peggy agreed to go into a routine operation for the NWS, broadcasting its forecasts, and the NWS upgraded her equipment. Standard radio frequencies among the fishing industry and offshore marine operators and Peggy Dyson's dedication to the operation were essential in getting MAREP operating. At that time, however, it was not called MAREP.

The program has remained basically unchanged from when Peggy started. She broadcasts the forecasts and collects the observations. What has changed is the number of observations received. The program started at the NWS offices mainly because it is a 24-hour operation. There are MAREP programs at the southern tip of southeast Alaska at Annette, Yakutat, Kodiak, King Salmon, Cole Bay, and Nome (Figure 2). These are all single sideband; HF broadcasts are on the upper sideband of 4125. Valdez and Yakutat also have experimental MAREP programs. The program is beginning to use VHF radio and ship-to-ship radio.

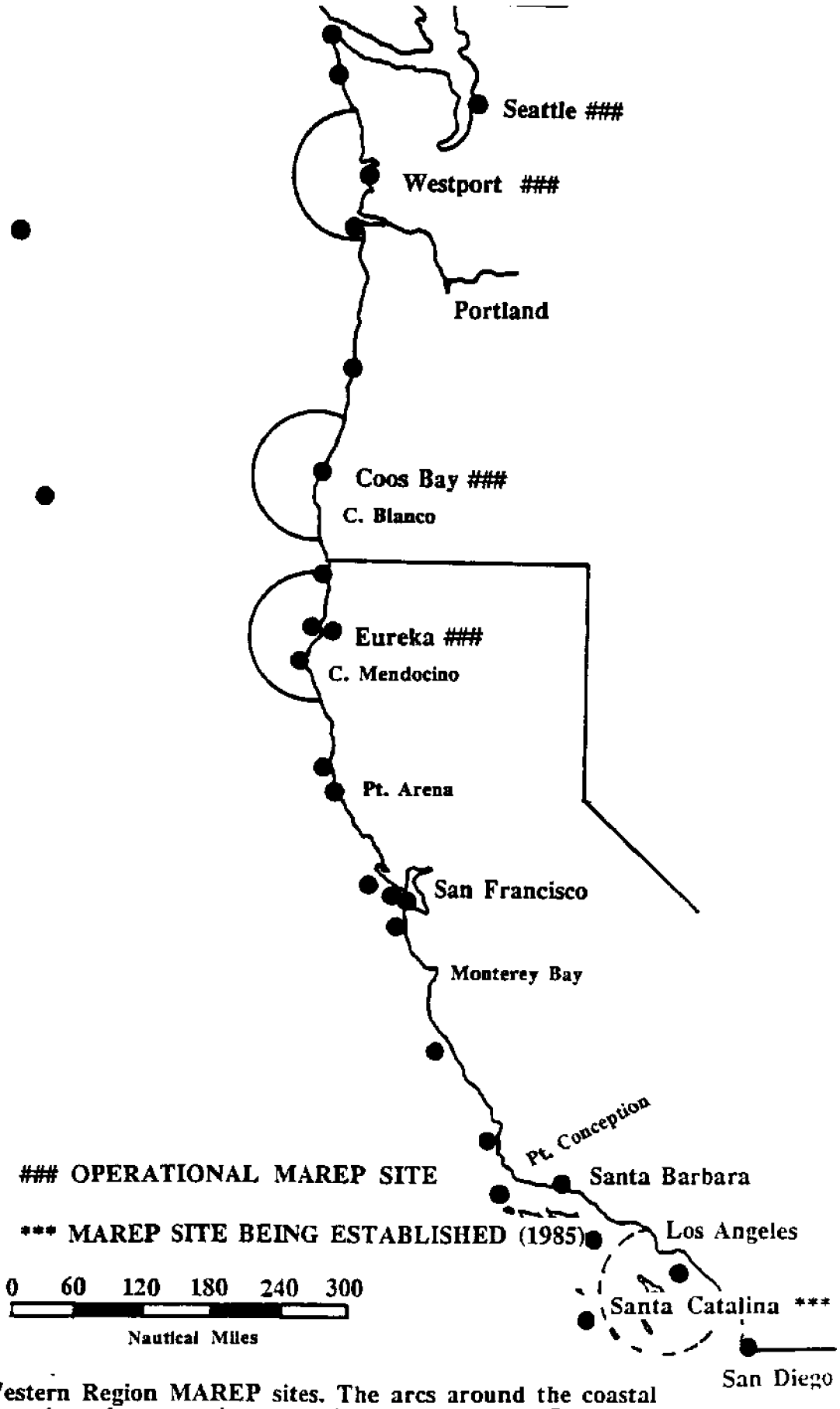
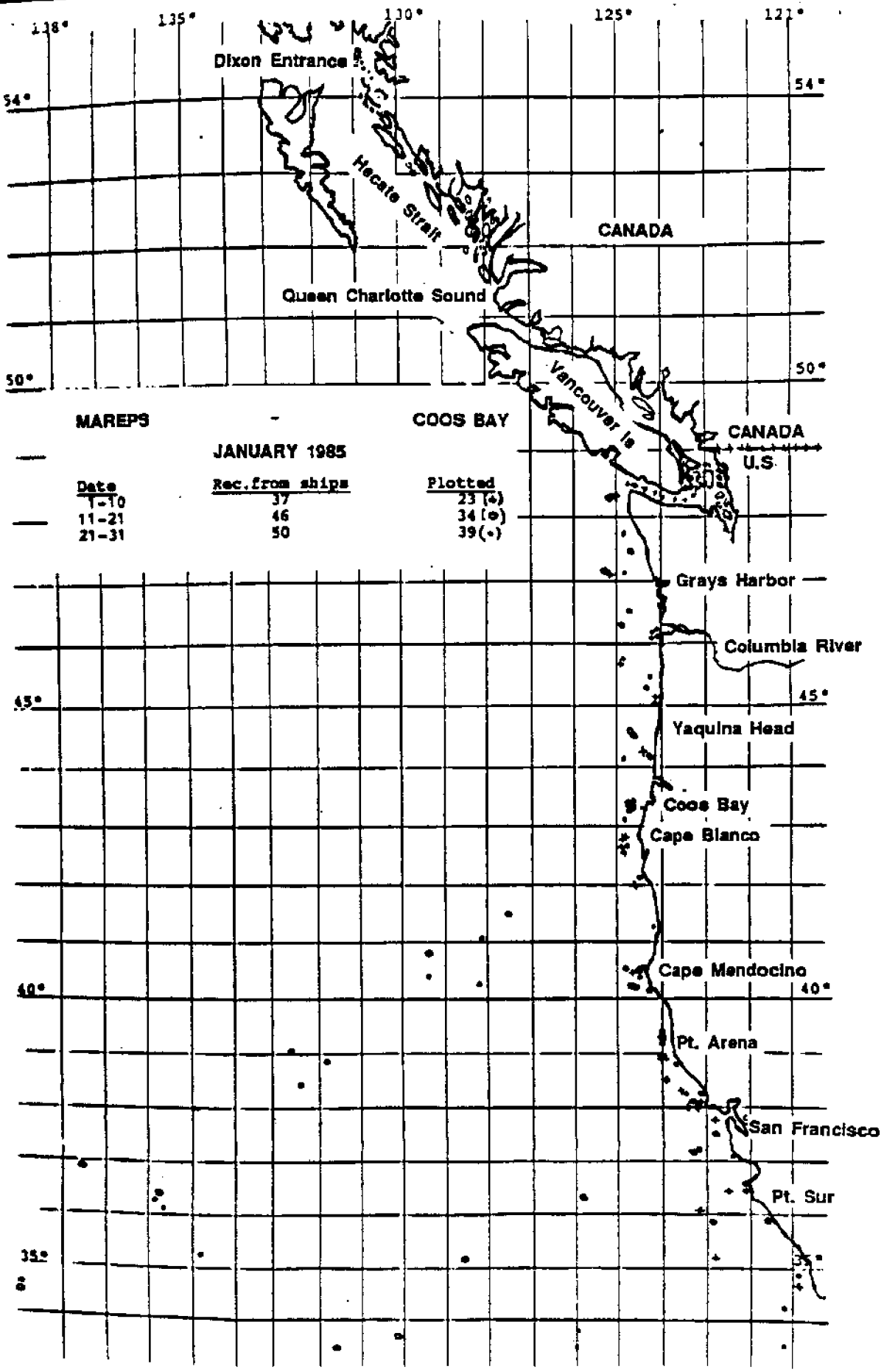
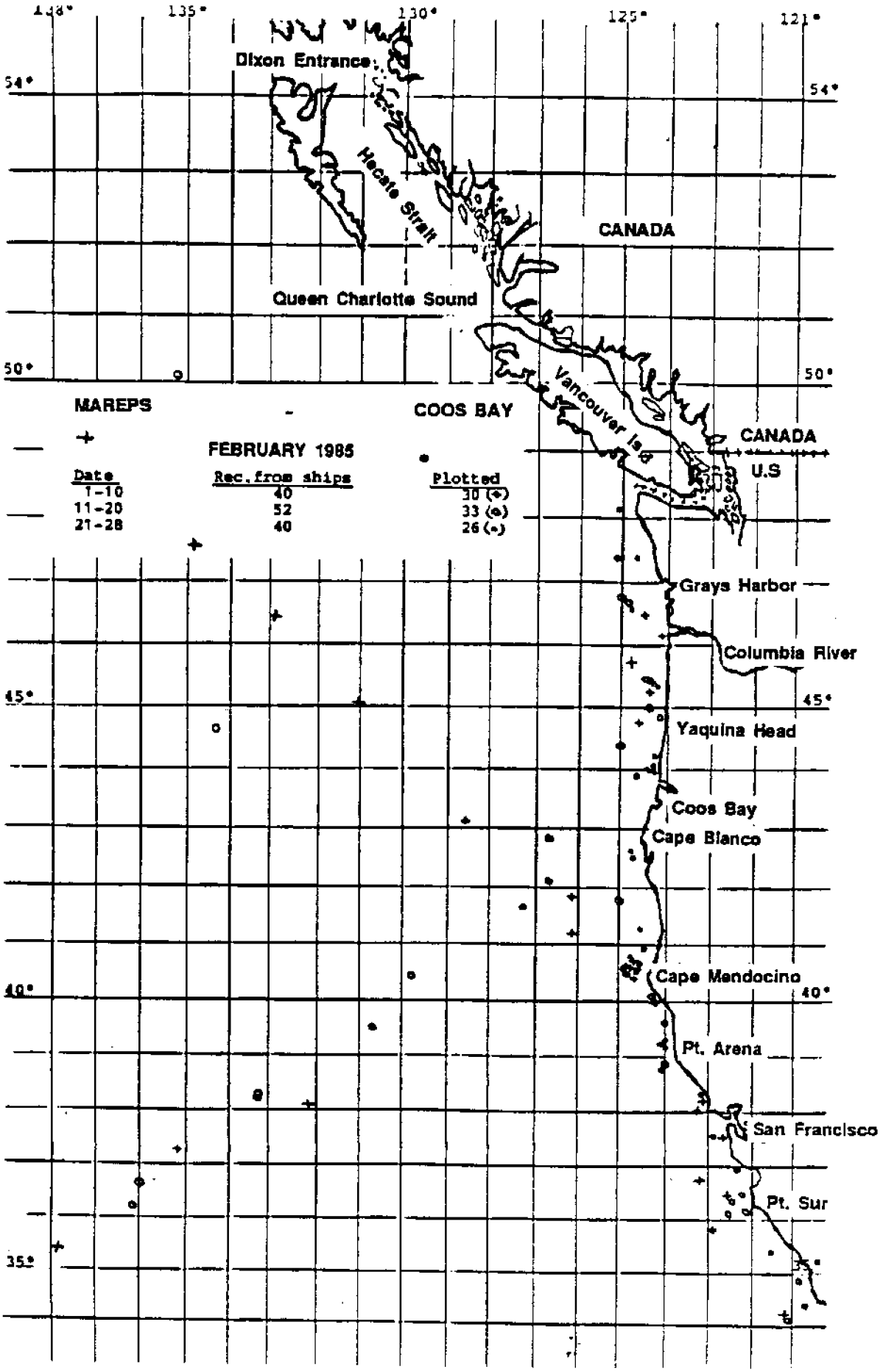
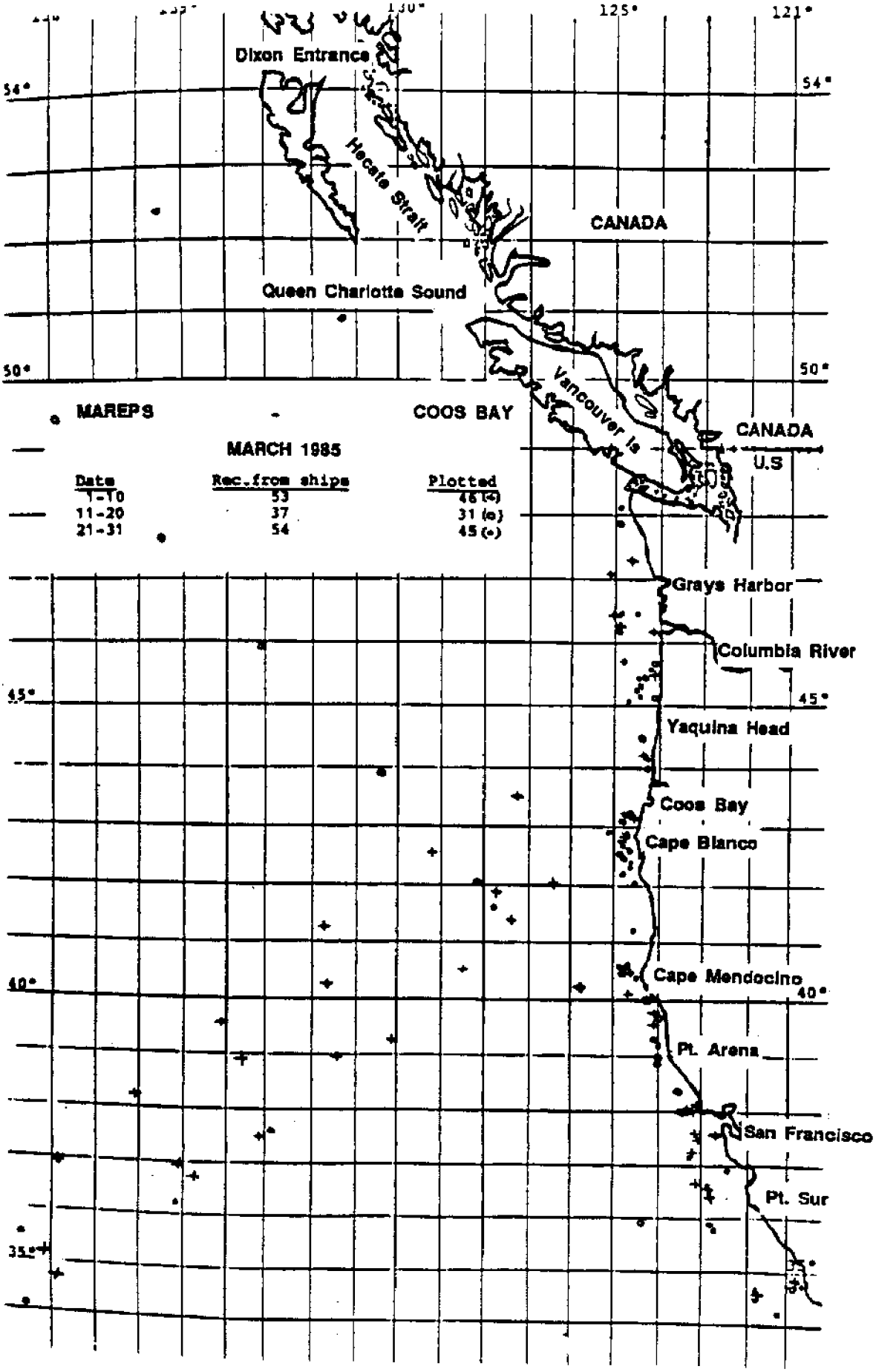
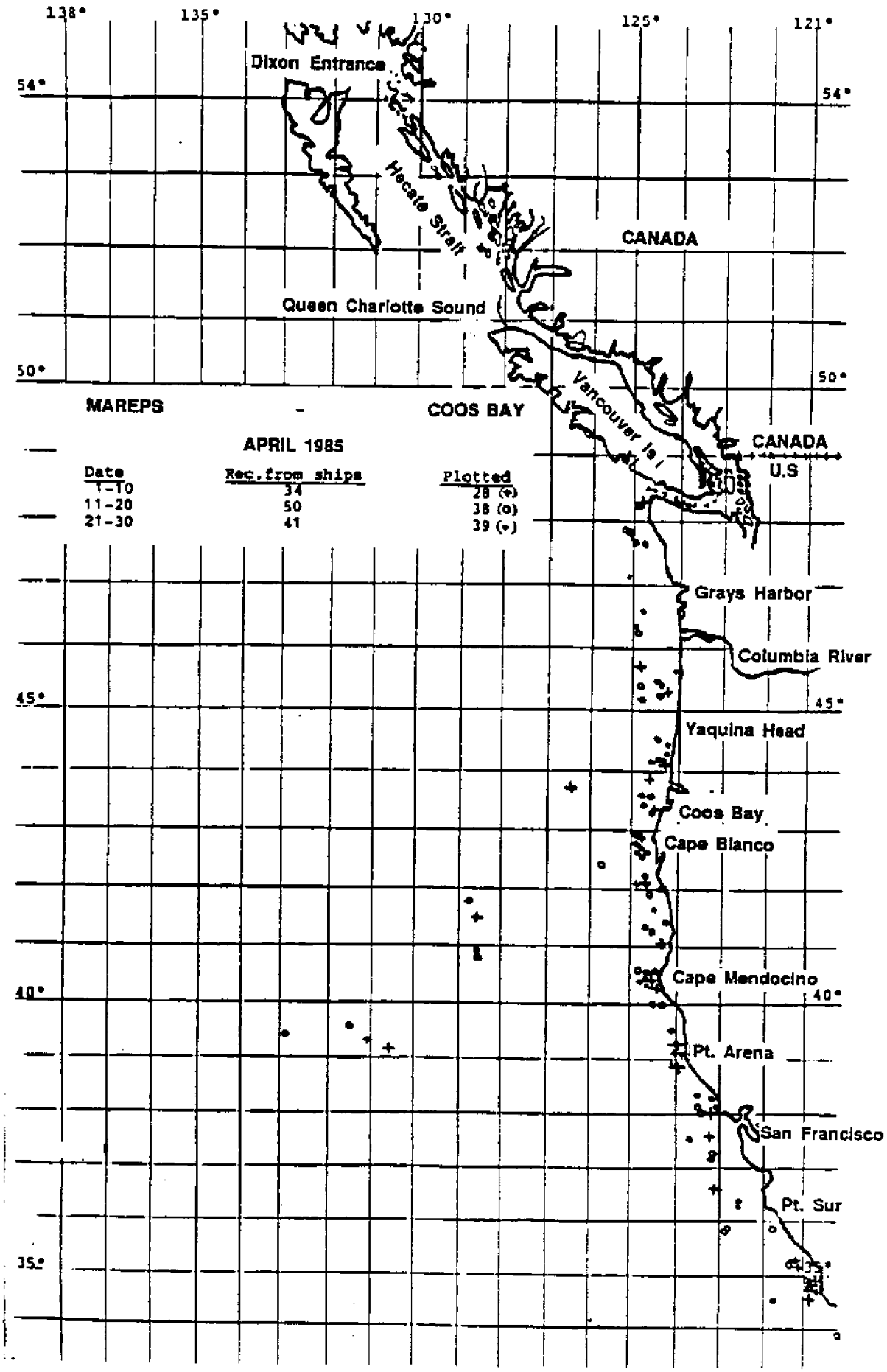


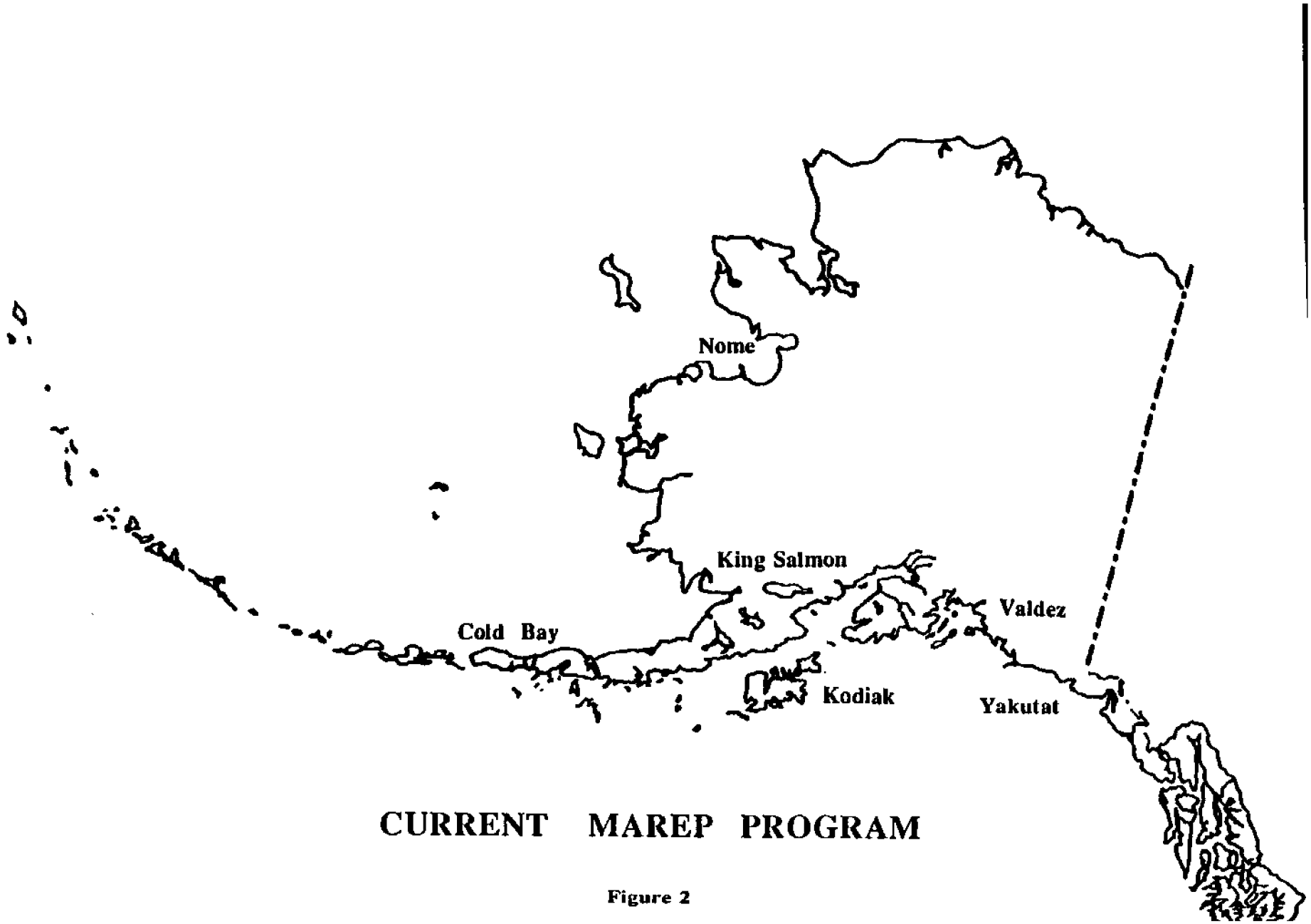

**Figure 1.** NWS Western Region MAREP sites. The arcs around the coastal locattions show the approximate maximum range of VHF communications (60 nm). Dots indicate the location of environmental buoys and coastal weather observing sites.


MAREPS - COOS BAY
JANUARY 1985
Date | Rec.from ships | Plotted
1-10 | 37 | 23 (•)
11-21 | 46 | 34 (o)
21-31 | 50 | 39 (•)
Dixon Entrance
Hecate Strait
Queen Charlotte Sound
CANADA
Vancouver Is
CANADA
U.S.
Grays Harbor
Columbia River
Yaquina Head
Coos Bay
Cape Blanco
Cape Mendocino
Pt. Arena
San Francisco
Pt. Sur
54°
50°
45°
40°
35°
138°
135°
130°
125°
121°


140°
135°
130°
125°
121°
54°
50°
45°
40°
35°
Dixon Entrance
Hecate Strait
Queen Charlotte Sound
CANADA
Vancouver Is.
CANADA
U.S
MAREPS
COOS BAY
FEBRUARY 1985
Date
1-10
11-20
21-28
Rec. from ships
40
52
40
Plotted
30 (+)
33 (o)
26 (-)
Grays Harbor
Columbia River
Yaquina Head
Coos Bay
Cape Blanco
Cape Mendocino
Pt. Arena
San Francisco
Pt. Sur


130°
125°
121°
54°
50°
45°
40°
35°
Dixon Entrance
Hecate Strait
Queen Charlotte Sound
CANADA
Vancouver Is.
CANADA
U.S
MAREPS - COOS BAY
MARCH 1985
Date | Rec.from ships | Plotted
1-10 | 53 | 46 (•)
11-20 | 37 | 31 (o)
21-31 | 54 | 45 (•)
Grays Harbor
Columbia River
Yaquina Head
Coos Bay
Cape Blanco
Cape Mendocino
Pt. Arena
San Francisco
Pt. Sur


138°
135°
130°
125°
121°
54°
50°
45°
40°
35°
Dixon Entrance
Hecate Strait
Queen Charlotte Sound
CANADA
Vancouver Is.
CANADA
U.S
MAREPS - COOS BAY
APRIL 1985
Date
1-10
11-20
21-30
Rec. from ships
34
50
41
Plotted
28 (+)
38 (o)
39 (•)
Grays Harbor
Columbia River
Yaquina Head
Coos Bay
Cape Blanco
Cape Mendocino
Pt. Arena
San Francisco
Pt. Sur




# CURRENT MAREP PROGRAM

Figure 2

The NWS is trying to talk to the small boaters, those who don't necessarily have the HF single sideband. The majority of the observations come from the fishing industry, but there is also a steady flow from the tug and barge operators. Depending upon the season of activity, there can be as many as 60 MAREP observations per day and as few as 12 in the dead of winter. Most of these come in through Peggy Dyson. Communication is through an FAA circuit at the weather stations. For example, if Nome's program has been growing because of the development in the Bering Sea, the WSO will collect the observations at the office and put them into the circuits immediately available out of the FAA central computer in Kansas City. One of the advantages of dealing with the program right in our offices is that observations are available a lot more quickly. Peggy Dyson has an input terminal through which she sends her observations straight into Kansas City, thus getting rid of the labor-intensive aspects that create problems.

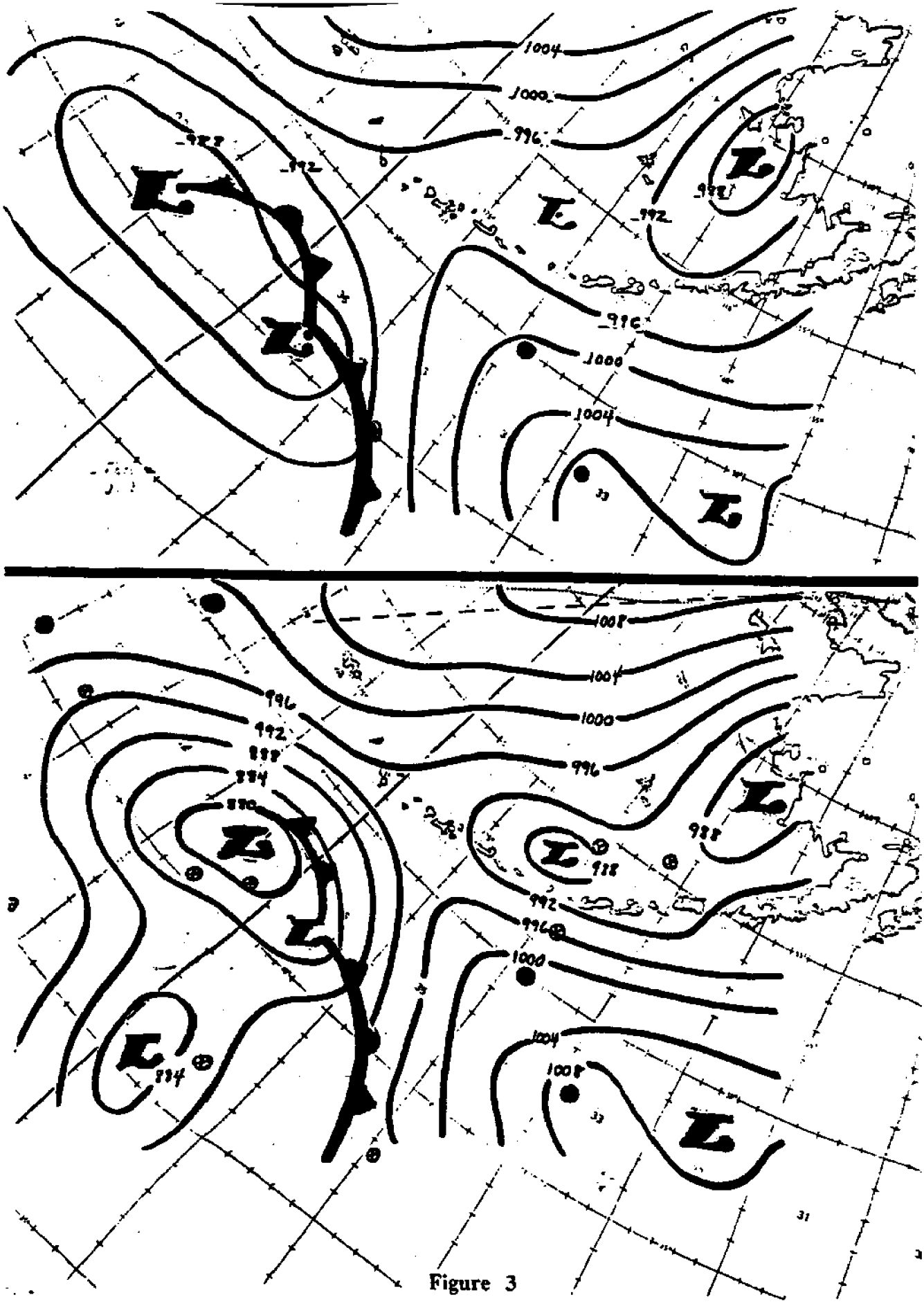
Without the computer, the process is slow. The mariners call Peggy, she writes down the observations and then calls them in. Two penalties have to be paid: (1) a delay in the observations, and (2) loss of valuable station time when a staff person sits there copying observations and then retyping them.

The value of the program hasn't been just the observations. The program has yielded much more than just data. There has been good feedback throughout the marine community, not just from Peggy Dyson, but from the Sea Grant marine extension agents, and everybody at all these locations involved in reporting. The value of the program becomes clear when it is viewed from a perspective larger than simply gathering data.

There have been major programmatic changes in the way it operates, based on direct feedback from users. The forecast area of responsibility has changed; it has been subdivided into areas that are more responsive to the needs of users. Terminology used in the forecasts has been standardized, and new products based directly on user feedback have been added. Programs are really enhanced when suggestions are acted on; when the change turns out well, the program's credibility increases. The people listen to its originators.

For example, Peggy Dyson will call in to the person working the forecast shift. She'll be talking to a captain, and she'll do a telephone link-up. The NWS staffer can talk directly to the ship captain at sea and hear the wind howling and the waves crashing. This gives the experience an immediacy that underscores the value of MAREP. The data, of course, are used to develop local forecasts and to issue amendments to earlier forecasts.

The data that we receive from the MAREP program are extremely valuable. Figure 3 shows a before-and-after surface analysis based on late data received from Peggy. The top chart was analyzed using land-based stations and data from ships at the two data points shown. The second chart is from the same time, only with some later data available. The late data points are shown as circled x's. The analysis changed


1004
1000
996
992
988
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996
992
988
984
980
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988
992
996
1000
1004
1008
L

Figure 3

significantly and it resulted in an amended forecast of near-storm conditions for the central Aleutian Islands.

A successful MAREP program relies upon four fundamental aspects: (1) When the broadcasts occur, they have to be on time. (2) They need to be of professional quality: good, clear, and concise. (3) NWS personnel must be helpful and friendly, and avoid being cold bureaucrats. (4) Forecasts must be well-written.

In 1983, Peggy Dyson collected over 8,000 observations. This number was down in 1984, under 8,000, but 1985 should see over 8,000. Data entry is labor-intensive. Automated data collection is only one aspect of the MAREP program. The other aspect is the feedback and dissemination of forecasts.

Mike Morrow
Hawaii

MAREP in Hawaii is probably 25 to 30 years old, putting it ahead of programs in other regions. Reports come from barges in the channels between the Hawaiian islands. Two commercial passenger luxury liners give reports. There is also a very extensive ham radio network. The program does not have AFOS. CB radios are used. The area of responsibility does not include the amount of coastline or land area most regions have, but there is a lot of water. There is a net that reports at 12 noon and then again at 7:00 p.m. The island of Oahu is completely circled with CB operators. Automation is not common in Hawaii.

Audience Discussion

MAREP was not designed to replace a permanent fixed network, or satellite data, or coastal radar data, or any other system that NOAA is working on. The agency is still trying to identify permanent data requirements to support the services that it provides. MAREP is looked upon as a gap filler, a way of involving the community It opens the door to dialogue with the marine community.

The notion of self-help leads to some modifications that could possibly be made. The question of how many observations are needed to make a forecast, or what data requirements are, is very difficult to answer because of variation across areas. Climatological patterns, day-to-day weather patterns, affect the answer. When the weather turns bad, mariners are in the position to fill in these gaps in data.

# SEA GRANT MARINE ADVISORY SERVICE
# OVERVIEW OF MAREP

Robert J. Shephard
National Sea Grant Office

Sea Grant is committed to the MAREP program. MAREP has been in operation for approximately three years, and from this meeting is going to come direction, as well as any corrections that need to be made. My job is to focus on the role of Sea Grant's Marine Advisory Service. The Marine Advisory Service is assisting in establishing a framework of cooperation among Sea Grant, the National Weather Service, the National Ocean Service, the Coast Guard, and other agencies. This network has a common goal--to provide a service of benefit to the user. Service is the bottom line.

Paul Jacobs and Glen Flitner first proposed MAREP in 1982. At that time, the Sea Grant Marine Advisory Service was heading in the direction of regional programs, though it only had one in operation. The proposal suggested a joint program. Today it is much more formal and much more efficient than it has been in the past. Alaska talked about such a program in the late 1960s, calling it MAREP. The University of Rhode Island and Coos Bay were indeed the first pilot programs of MAREP. The University of Rhode Island may have had the greater degree of publicity, perhaps because it was on the east coast, but Coos Bay went right along with the University. They were probably the first two pilot MAREP programs conducted by the National Weather Service and Sea Grant.

It is essential to do more than talk about MAREP; it is necessary to demonstrate that the program is accomplishing much and it must have its performance evaluated. MAREP also falls within the Department of Commerce. Funding problems and restrictions exist, but in time, and possibly as a result of this conference, much more support will be seen coming in at the highest levels. But it's the performance of the MAREP program that is going to count.

The next step is the regionalization process. There are five regions. The Great Lakes region includes the area from Minnesota through New York. The northeast region extends from Maine through New York and the middle atlantic region contains the area from New Jersey through North Carolina. The southeast region is from North Carolina through Texas, and the pacific region includes Hawaii, Alaska, Washington, Oregon, and California. Regional organization seemed wise to the Sea Grant Marine Advisory Program because of the need to link resources. MAREP can benefit from this.

This session should reveal what is being done in regard to the MAREP program, as well as what holes and problems there are across the nation.

# REGIONAL MAREP STATUS
# SEA GRANT MAS PANEL DISCUSSION

Christine Hagerman-Pennisi
Great Lakes

In the Great Lakes region, MAREP volunteers are composed primarily of charter fishermen, though there are also several commercial fishermen (from Minnesota and Wisconsin) and shippers (from Illinois/Indiana). A third of Ohio's volunteers are boaters.

In numbers, Michigan leads the area in 1985 with 87 volunteers (all charter fishermen). In 1984, Ohio had 33 volunteers; Minnesota, 10; Illinois/Indiana, four; and Wisconsin, six.

The areas covered by these volunteers are extensive: In Michigan and Ohio, all harbors are covered; in Illinois/Indiana, all harbors but those in northern Illinois; in Wisconsin, the three main harbors; and in Minnesota, the area extending 30 miles on either side of Duluth/Superior.

In publicizing MAREP, Sea Grant-sponsored meetings and workshops take place annually throughout the Great Lakes area. Minnesota sponsors one large meeting per year; Michigan holds nine regional workshops for charter fishermen and one workshop for commercial fishermen. Ohio sponsors three regional workshops per year.

In Minnesota, Wisconsin, and Ohio, 75% of the volunteers participate regularly, though in Illinois/Indiana only four report regularly. Michigan volunteers do not yet report regularly.

In Minnesota and Wisconsin, weather reports are called by volunteers into bases and the information is then transferred to the National Weather Service. In Illinois/Indiana, volunteers call the NWS directly, except for reporters near the Chicago Crib, who call a base station. Michigan reports a serious problem in that there are not enough base stations to accommodate the data, and in Ohio, an unreliable marine radio station is the base for transferring data. Future plans in the Great Lakes region call for greater promotion of the program through advertising and news media coverage. Wisconsin intends to add a 3:00 a.m. call-in, to establish an 800 telephone number, and to make a formal evaluation of program benefits. Illinois/Indiana intends to refine current efforts at recruitment and data transfer. Michigan reports that more help is needed from NWS.

All programs in the Great Lakes states report a generally effective relationship with NWS. In all areas, NWS has assisted with training and, in Wisconsin, the liaison has led to the initiation of other projects. But Minnesota reports that direction from NWS is sometimes not clear, and all areas express the need for more program recognition and incentives for volunteers. Wisconsin reports problems with equipment and with staff reliability, and Michigan needs more and stronger NWS channels and a better system for delivery of information to users.

Bob Buerger
Northeast

The initial goal of Sea Grant is education. In the northeast, most of the Sea Grant programs stress agreement with the concept of MAREP, but their overall goal is education. In some states, there is some difficulty in determining where the educational role fits in with the MAREP program. Northeast Sea Grant activity in MAREP ranges from very successful programs, to programs that have failed, to no MAREP activity at all.

New York's MAREP program began in 1983, as a cooperative venture with the National Weather Service. When the NWS and Sea Grant began to talk about MAREP, this was a fairly new concept. How would the public become aware of the MAREP concept? One of the things that was done in New York was to prepare a slide-tape show, an educational tool that could be used with audiences to explain the MAREP concept in an audio-visual form. New York was also involved with the whole idea of NOAA Weather Radio use. It was seen as important that those involved with the MAREP program have a good feeling about NOAA Weather Radio, which is such an important component of it. On eastern Long Island, many of the professional and recreational boaters were not able to pick up NOAA Weather Radio forecasts. Consequently, bringing these people into the MAREP pool would be difficult. The NWS and Sea Grant worked together with county government and federal agencies to provide another transmission tower for NOAA Weather Radio for the eastern end of Long Island. Those that come into the program as observers now have better access to the reports.

In 1984, Sea Grant decided to become involved with MAREP by helping start MAREP programs in both the Great Lakes and on the New York marine coast. These stations were started on a volunteer basis only. Neither the NWS nor Sea Grant supported these stations with dollars or equipment. As a consequence, the MAREP program really didn't take off in 1984, except for one station on Long Island. The Great Lakes had a number of reporting stations and land-based stations, but the actual number of reports that came in was small. This was, with that one exception, also the case for Long Island.

In 1985, we moved into a much more active role with some support from the NWS in supplying equipment. There are actually four stations on the marine coast; three of these are supplied with NWS equipment. More active participation is anticipated for the marine coast. The Great Lakes program depends primarily on volunteers using their own equipment. An extensive awareness and educational training program should yield more involvement in MAREP and thus more observations.

Moving up the coast, Connecticut shares the Long Island Sound with New York. In 1984, Connecticut was involved with the New England Users Forum. This forum looked at numerous marine educational programs that a number of New England states might be involved in. One of these was better weather forecasting--MAREP. A great deal of effort was expended on discussions at this forum, and there was hope that

there would be tangible results. However, in 1985, there was no program involvement in Connecticut.

Rhode Island was one of the first programs to institute a MAREP program. The program was very successful program for the first year, partially because Sea Grant used new development money to actually hire the operators for the land-based radio units. Staff people of a fisherman's co-op were hired to man the radios for two reports daily. At the end of the first successful year, Sea Grant monies were pulled out. The fisherman's co-op was asked to pick up the program; when they declined, the MAREP program input died out in the Rhode Island area. Some of these states mentioned in this summary have MAREP programs, but do not have Sea Grant involvement. Rhode Island now has no input into MAREP at all.

Massachusetts has an interesting program, not along the traditional MAREP lines discussed thus far. Sea Grant involvement in Massachusetts has been to design an on-line land-based station. The problem is that it has no reporting component from out on the water. An individual who wants to use the system can take his personal computer, link it with a Sea Grant-supported station at the Massachusetts Maritime Academy, and get an updated forecast on what weather conditions. Once again, these forecasts are no better than the forecast an individual could get from another source, because they do not have that water-based component. This is Massachusetts' first venture into MAREP; they of course hope to expand into an on-the-water type reporting component to supplement their present activity.

New Hampshire and Maine have no commitment from Sea Grant to the MAREP program.

Most of the northeast Sea Grant programs admit that there are both problems and opportunities in being involved with MAREP. Funding is naturally among the problems. Given an abundance of funding, Sea Grant would undoubtedly go with the MAREP program right away. Staffing is another problem, particularly in some of the northeast states, where Sea Grant staffs are very small. A state such as New Hampshire has two Sea Grant extension agents who cover a wide range of different marine topics. Some of the states say, in effect: "Yes, better weather information is important, but we also see other educational opportunities that are more important and at this time, we're not going to allocate our limited funds to the MAREP concept."

All of the programs have shown interest in MAREP, as they realize that better marine weather is important to many of their user groups, and they see opportunities for playing an important educational role, which is Sea Grant's goal. There are Sea Grant agents who have the interest but not the time to work in MAREP, even though they know many would like to see better weather information and would be willing to participate.

In terms of specific program areas, NOAA Weather Radio is one example of a program that we assume everyone is using. That's not the case; there are many people out there who are not using it.

Better reports are needed. There's an opportunity for Sea Grant to work with users to provide that linkage of what's valuable information, and to improve the information coming back for use in weather forecasts.

James Salevan
Mid-Atlantic

There are approximately five operations up and running in the mid-Atlantic region from New Jersey to North Carolina. There is a woman who successfully uses a single sideband in Barnegat, New Jersey; she's an eastern version of a Peggy Dyson or Josie Dyas. There is one operation at Lewes, Delaware, with the Marine Advisory Service, using both VHF and single sideband. There is one at Annapolis, Maryland, run on the weekends for the Chesapeake Bay. At Cape Hatteras, North Carolina, there is a center run by the Coast Guard. Finally, down at Kure Beach, North Carolina, Sea Grant is involved with the NWS in a VHF station that seems to be doing well.

North Carolina Sea Grant has a novel idea, and is seeking state government funding to make it a reality. It wants to set up an actual climatological center that will take forecasts from NWS and make those more precise. There are areas along the coast on which it is felt the NWS does a good job, but the need is still there to have area-specific forecasts.

In Lewes, information recorded goes onto a computer; it's coded in, a button is pushed, and it goes into the NWS computer. Stickers are distributed telling fishermen and boaters the time of reports and the frequencies used to remind them when the weather information is on the air.

There were 2,484 observations in 1984. The program must be publicized in order to increase and keep participation. Video tapes to describe the program, its uses and benefits, are planned, one geared to recreational boaters and one to commercial fishermen. There's quite a conflict between the two groups, a conflict that shouldn't be moved into a lecture hall; hence, two separate videos. The video will be available in early 1986.

Paul Coreil
Southeast

The most important fishery in the southeast region is shrimp; it's in trouble right now with the increase in imports. Many fishermen are not keeping their vessels seaworthy because of the poor pricing structure in the shrimp fishery on the Gulf coast and in the southeast region. Thus, MAREP reports will continue to be important, particularly since many of the vessels leaving Cameron, Louisiana, carry no insurance.

In the southeast region, some areas have taken more of an educational approach, publicizing the MAREP program. The stations in Louisiana and Mississippi are housed in the marine extension agents' offices. In Port Lavaca, Texas, a new station will be operated by volunteers; the contact person is the operator at Kingfisher Marina. Joe Surovich will be one of the contact persons; he'll be publicizing and promoting the program in that area. Under current plans, 10 oil and gas crewboats will send in reports once a day. Galveston is a possible location for another station.

The Cameron station is the only one in operation in Louisiana at the present time. Commercial shrimpers send in reports off the coast at Cameron. Plans are to increase our reports from offshore production platforms, as there are a large number of platforms offshore that could send in reports from farther out. Three reports come in once a day at 10:00 a.m. The range of the VHS radio--about 20 miles--is a limiting factor.

Future plans involve computers in six of our agents' offices. If MAREP continues to work well, these agents will either have MAREP stations in their offices, or serve as co-operators.

David Veal represents the extension office in Mississippi, whose MAREP program went on-line in April 1985. The marine agents there are the contacts persons. They receive reports from charter boats, tug boats, channel pilots, and shrimp boats or any boats operating off of the Biloxi coast. Currently, they are getting reports twice a day, two to three reports per session; e.g., six reports per day. Originally, they used a VHF radio, with the resultant range problem. A 100-watt unit is used now, and this has increased the range to about 55 miles.

Bill Hosking of the Alabama Marine Advisory Service in Mobile is watching MAREP to see how it's accepted on the Gulf coast. If he is satisfied, he will put a station in at Mobile. The only station in Florida is the volunteer station at Fort Meyers previously discussed. Ham operators are used in Florida. The station has been operating since March, 1983, so it's a little older than those in other states. The ham operators call on phone lines into Miami with the reports received from commercial shrimp trawlers and fishing vessels. Six reports per day, every three hours from 6:00 to 10:00, are received. As the program grows, stations could be put in at Jacksonville, Miami, Palm Beach, Cedar Key, Tampa, and St. Petersburg.

Mac Rawson, Georgia Sea Grant, is taking a wait-and-see attitude at present, but hopes to get a station in the Georgia area if MAREP continues to grow. Tom Sweeny, South Carolina, reports that there is a volunteer-operated station at Chimes Creek, South Carolina, near Charleston. It has been on line since fall, 1982, and is operated by Red Simmons. Reports come in once a day from commercial fishing vessels. Myrtle Beach, South Carolina, will have a station on line in the next few weeks. Puerto Rico is not participating at this time.

There is a problem with competition among boats. The boats don't want to give their locations, because there is a lot of competition where

the vessels are catching different fish. Therefore, they don't give their vessels' names in the reports. There are also some radio problems.

John Doyle
Alaska

This conference is revealing a difference in the needs of the two different agencies within NOAA. Sea Grant's expectations of and interest in a volunteer reporting system are quite different from those of the NWS. In Alaska, we have problems in a number of areas. However, one advantage is that we're small, and we know everybody. But because of distance, which I separate from size, many of the mariners could not directly receive weather forecasts. They were dependent on short-base, ship-to-shore radio stations generally operated by wives, which is how Peggy Dyson got into the business. She has two sons, a husband, and a very large interest in a floating processor off the Bering Sea. It was imperative that they have good information, and so she had a regular schedule. People listen in because they are getting the kinds of information they need, even though most broadcasters are the old-timers. NWS and the Alaska Sea Grant Program have a long history of cooperation, going back to the sixties. The problem regarding weather forecasts was not that they were necessarily bad, but that people were not used to interpreting weather forecasts. Sea Grant even put on three- and four-day workshops on meteorology to help fishermen interpret forecasts.

Sea Grant first became involved in what has become known as MAREP at a week-long fishermen's forum in Kodiak. The NWS was very well represented, and the discussion started on how to get information out to the Bering Sea. The coverage in that area is good. Peggy Dyson talks to tug and barge operators. She has regular reports from Midway. Sometimes commercial fishermen have a problem with giving their exact locations, especially if they are having a good day.

Sea Grant's involvement has been strictly as a facilitator. Sea Grant began organization in Prince William Sound to serve the commercial fishermen, because of the difference in weather on one side of the sound from that on the other side. Ice masses and mountains create tremendous local weather patterns. A marine advisory agent is searching for a proper operator.

Observations from private contractors become more and more valuable. Peggy Dyson is paid $9,600 a year, and probably spends $12,000 to $15,000, thus taking a loss being a MAREP operator. Any other private cooperative would, in all probability, take a loss, too. A concern is that these people will be worn out. Peggy has remarked, "Well, when I stop this..." When she stops, half of Kodiak is going to stop.

There is a much closer Sea Grant involvement in Coos Bay on the west coast. The equipment was purchased by the National Weather Service, but control of it was given to the Oregon Sea Grant Program under the direction of Paul Heikkila. The actual recruiting and broadcasting is done by the harbormaster at Port of Coos Bay.

Sea Grant is the facilitator at the station in Eureka, California, with the Coast Guard actually manning the station. Eureka had four reports last week. In May, Peggy had 1,015. That is quite a disparity.

Sea Grant marine advisory people at the University of Hawaii report that there is not a great deal of stimulus emanating from the marine user for increased service. Mariners there say they have good weather and do not really need to know anything, except if storms are coming.

There is, obviously, a very diverse marine advisory program on the west coast.

# MARINE RADIO COMMUNICATIONS AND LIMITED COAST STATIONS

Gary Soulsby and Jack Bazhan
Federal Communications Commission

The Seattle District encompasses Montana, northern Idaho, and Washington state. It is responsible for radio laws, treaties, licensing, applications, and technical performance of equipment. The issue at hand is limited coast stations, and how they fit into this program.

There was concern in the initial planning stages that the limited coast service would not, in its present state, allow such operation. However, the rules as currently written do provide for this type of service. No FCC rules need to be modified or changed before this type of program can be implemented.

The geographic area of interest is 250 miles off the coast. Typically, limited coast stations have one VHF frequency, but they can also have Channel 16, the international distress calling frequency. Only one frequency in the medium frequency range has been allowed, but when traffic exceeds that the FCC will grant a second frequency with the proper justification.

The requirement for land-based VHF stations versus ship-based VHF stations in terms of equipment configuration is approval by the FCC. Most newer equipment is listed for both land and ship stations. There are some requirements for ship stations regarding speed of changing channels that do not apply to land stations. A land station does not require one-watt operation but a ship station does.

All CB radio operators have a general grant license. The FCC has declared that everyone, by virtue of his citizenship, is eligible for a CB license. However, if the equipment used is not FCC-accepted, if an operator connects a linear amplifier, goes out of band, or modifies the equipment in some way, it is no longer acceptable, and the operator is no longer licensed.

Government agencies probably could not use the frequencies without going through the Interdepartmental Radio Advisory Committee (IRAC), because those frequencies are still allocated for public use and for FCC administration. Government stations cannot use FCC frequencies without permission from the IRAC. When transmitting on government frequencies, the IRAC must approve.

# MID-ATLANTIC AUTOMATED MAREP DEMONSTRATION AND INTRODUCTION OF MARINE INFORMATION AND DATA ACCESS SERVICE (MIDAS)

Ross LaPorte

Upon its implementation in 1981, the Washington Ocean Services Unit conducted a vigorous fact-finding compaign with the east coast maritime community. This included elements of the commercial fishing and sports fishing interests, and tug boat and barge operators. The purpose of this survey was to establish the meteorological needs of the maritime community and the value of the service they were receiving. For the most part, users were pleased and supportive of our products. However, there were three basic themes that continued to echo: (1) They did not like being tied down near a radio at specified times. If they missed the information, it would be another six hours before the next transmission. (2) Some broadcasters did not speak clearly, or spoke too fast and it was difficult to write down important information such as storm position, points of longitude and latitude and gulf stream boundaries. (3) They did not like having to listen to "all" of the information provided over NOAA Weather Radio or the Coast Guard broadcasts when all that any given individual needed was a very small portion of that total broadcast. It became apparent that there was a need to establish a system whereby maritime groups could get what they wanted, when they wanted it, and in a format they could easily use.

MIDAS is a "user friendly," dial-in, host computer system that is inexpensive to users and allows them to obtain weather and other NOAA information. Also, MIDAS gives users control in choosing the information they want when they want it. It is free, as with NOAA Weather Radio and other National Weather Service information, except for the cost of the telephone call, if it should happen to be long distance, to the host computer. It is recommended that similar MIDAS systems be established throughout the country at strategic coastal locations to provide maximum user access at minimum user cost.

(Mr. La Porte demonstrated MIDAS for the audience, using a Radio Shack TRS-80/Model 100 portable terminal and a TRS-80/Model II "host" computer. The following MIDAS user guide summarizes the demonstration.)

## HOW TO OBTAIN PRODUCTS FROM THE MID-ATLANTIC MARINE INFORMATION SERVICE

First the modems must be compatible. Some terminals are "fixed" but if yours is one which requires setting, the settings are as follows: BAUD=300, BITS=8, PARITY=N, STOPS=1

The telephone number to the host computer, located at the University of Maryland, is 301/454-8700. Once you connect, you will be asked for an ID: Enter WS. Next you will be asked for a Password: Construct your Password from the following:

FIRST LETTER: Are you a

| | |
|---|---|
| Government Agency? ..... | G |
| University? ..... | U |
| Comm. Fisherman or a Co-op? ..... | F |
| Marina or Marine Supplier? ..... | M |
| Weather Service Office? ..... | W |
| Private Individual/User? ..... | X |

NEXT THREE LETTERS: ..... RGN (Region)

LAST FIGURE: Do you reside in

| | |
|---|---|
| New England States ..... | 1 |
| NY, NJ, PA? ..... | 2 |
| MD, DE, VA, or DC? ..... | 3 |
| NC, SC, GA? ..... | 4 |

Example: Commercial Fisherman from New Jersey = FRGN2

From this point on, the Host Computer will prompt you. Simply follow the prompts. A good idea would be, if you have a printer, to print out all the menus so that you need not go through this each time, but go "directly" to the product desired. Also, if you desire more than one product, you can consolidate your request to save time by separating each with a comma. Example: 7505, 7602, 7702, 7510, etc. This is an easy way to print out all the sub-menus from the Main Menu listings in (WMENU). IMPORTANT*** Once you are finished, the Log-Off code is an exclamation point (!). This will take you offline.

If further information is required, please contact:

Ocean Services Unit
National Weather Service Forecast Office
World Weather Building, Room 302
Washington, D.C. 20233
Telephone: 301/899-3296

N.O.A.A.
NATIONAL WEATHER SERVICE
MENU OF MARINE WEATHER PRODUCTS

7501 BAYS AND SOUNDS MENU
7601 COASTAL WATERS MENU
7701 OFFSHORE WATERS MENU
7711 TROPCL STORM ADVIS
7713 OFFSHORE CMAN BUOY DATA
7714 OFFSHORE NLBS BUOY DATA
7801 HIGHSEAS MENU
7850 TIDE CONVERSION TABLE
7900 N.O.S. MENU
7920 N.M.F.S. MENU
7940 OFFICE OF SEA GRANT MENU

7501-->FOLLOWING BAYS MENU

7502 = BUZZARDS BAY
7503 = NARRAGANSETT BAY
7504 = LONG ISLAND SOUND
7505 = DELAWARE BAY
7506 = CHESAPEAKE BAY/NORTH OF BALTIMORE HARBOR
7507 = BALTIMORE HARBOR TO PATUXENT RIVER
7508 = PATUXENT RIVER TO WINDMILL POINT
7509 = SOUTH OF WINDMILL POINT
7510 = TIDAL POTOMAC
7511 = ALBEMARLE AND PAMLICO SOUNDS

7601-->FOLLOWING COASTAL MENU

7602 = EASTPORT TO MERRIMACK RIVER OUT 25 MILES
7603 = MERRIMACK RIVER TO WATCH HILL OUT 25 MILES
7604 = WATCH HILL TO MONTAUK POINT OUT 20 MILES
7605 = MONTAUK POINT TO MANASQUAN OUT 20 MILES
7606 = MANASQUAN TO CAPE HENLOPEN OUT 20 MILES
7607 = CAPE HENLOPEN TO FENWICK ISLAND OUT 20 MILES
7608 = FENWICK ISLAND TO CHINCOTEAGUE OUT 20 MILES
7609 = CHINCOTEAGUE TO VIRGINIA BEACH OUT 20 MILES
7610 = VIRGINIA BEACH TO LITTLE RIVER INLET OUT 20 MILES
7611 = LITTLE RIVER INLET TO SAVANNAH OUT 20 MILES

7701-->FOLLOWING OFFSHORE MENU

7702 = SYNOPSIS OF MAJOR MAP FEATURES
7703 = SABLE ISLAND TO NORTHEAST CHANNEL
7704 = GEORGES BANK FROM NORTHEAST CHANNEL TO GREAT SOUTH CHANNEL
7705 = GREAT SOUTH CHANNEL TO (AND INCLUDING) HUDSON CANYON
7706 = HUDSON CANYON TO BALTIMORE CANYON
7707 = BALTIMORE CANYON TO HATTERAS CANYON
7708 = HATTERAS CANYON TO BLAKE RIDGE
7709 = EXTENDED OUTLOOK
7710 = GULF STREAM PLOT
7711 = TROPICAL STORM WARNINGS AND ADVISORIES
7712 = EAST OF 1000 FATHOMS TO 65 DEGREES WEST

HIGHSEAS MENU

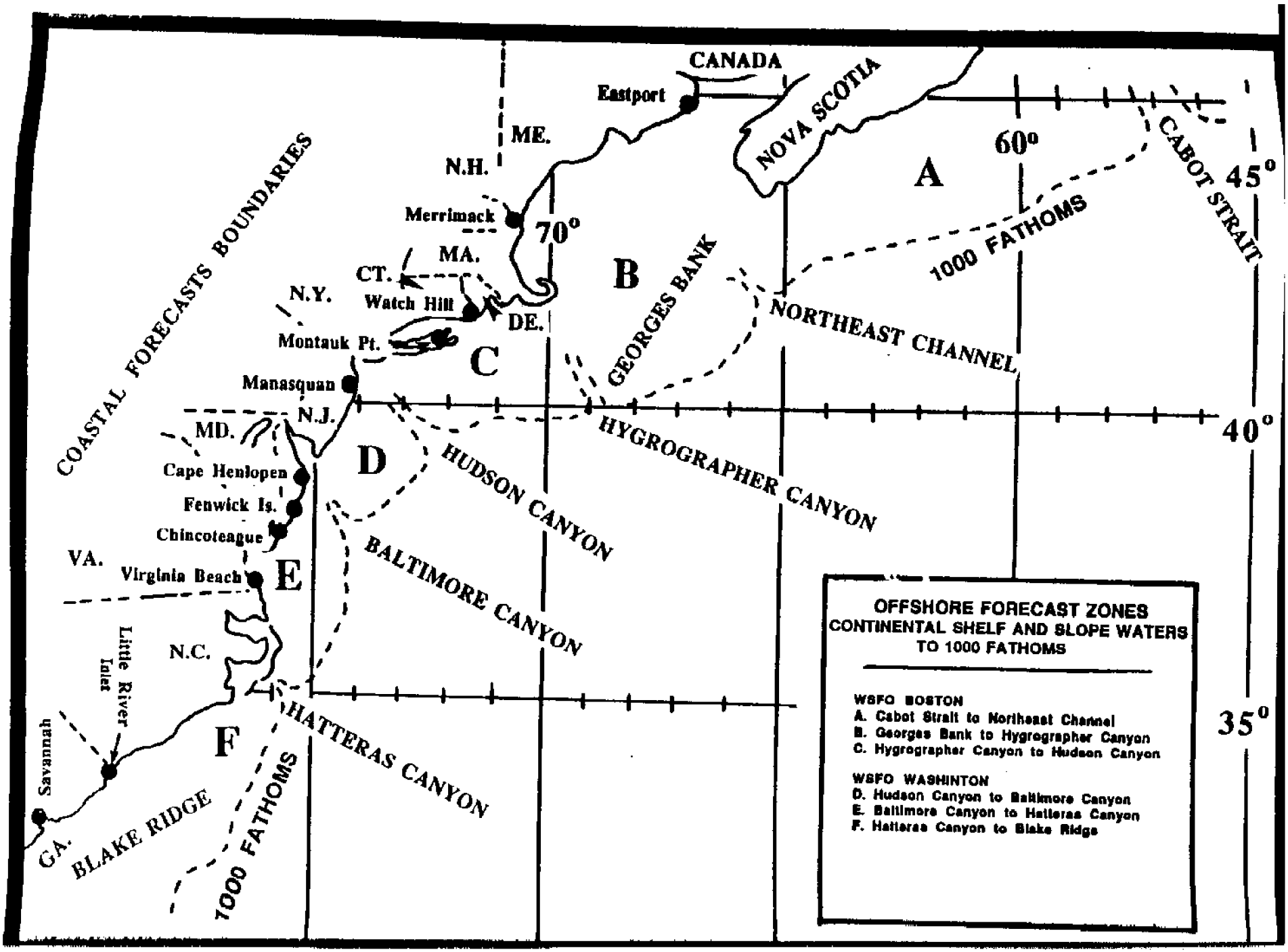
7802 = WARNINGS AND FORECASTS
7803 = ALL OTHER FORECASTS

NATIONAL OCEAN SERVICE MENU

7901 NOTICE TO MARINERS
7910 NAUTICAL CHARTS CATALOG

OFFICE OF SEA GRANT MENU

7941 = NOTICE TO MARINERS
7942 = SEA GRANT CALENDAR


CANADA
Eastport
NOVA SCOTIA
ME.
N.H.
Merrimack
MA.
CT.
N.Y.
Watch Hill
DE.
Montauk Pt.
Manasquan
N.J.
MD.
VA.
Virginia Beach
N.C.
Cape Henlopen
Fenwick Is.
Chincoteague
Little River Inlet
Savannah
GA.
A
B
C
D
E
F
60°
70°
45°
40°
35°
CABOT STRAIT
1000 FATHOMS
NORTHEAST CHANNEL
GEORGES BANK
HYGROGRAPHER CANYON
HUDSON CANYON
BALTIMORE CANYON
HATTERAS CANYON
BLAKE RIDGE
1000 FATHOMS
COASTAL FORECASTS BOUNDARIES
OFFSHORE FORECAST ZONES
CONTINENTAL SHELF AND SLOPE WATERS
TO 1000 FATHOMS
WSFO BOSTON
A. Cabot Strait to Northeast Channel
B. Georges Bank to Hygrographer Canyon
C. Hygrographer Canyon to Hudson Canyon
WSFO WASHINTON
D. Hudson Canyon to Baltimore Canyon
E. Baltimore Canyon to Hatteras Canyon
F. Hatteras Canyon to Blake Ridge

# GULF OF MEXICO AUTOMATED MAREP DEMONSTRATION

Stanley A. Spivey
Computer Management Group
National Weather Service

This afternoon I'll talk about the Gulf of Mexico automated MAREP demonstration (see Figure 1). About the same time that the work was starting on a system on the east coast, Paul Jacobs contacted the southern region and asked if we would be interested in participating in the program. He gave us certain guidelines. One, the system would be automated. Two, it would be easy to use from the operators' point of view, and third, it would be inexpensive. We decided that we would build upon a system that we currently had in operation at our office in Tampa, Florida. We also took into consideration that AFOS asynchronous ports are a scarce commodity. It's not too easy to get a port to support other types of programs. This led us to our decision to use an existing resource.

We have MAREP collection stations and radio stations at Biloxi, Mississippi; Cameron, Louisiana; and Port Lavaca, Texas. We have plans to put one at Mobile, Alabama. This system uses a microcomputer. It's an Apple II-E, one with which we have had experience in the southern region. We were confident that it would provide reliable service and would do the job that we wanted it to do.

The marine reports are collected at the radio station. The information is sent to a Hewlett-Packard 1000 minicomputer at WSO Tampa. The H-P 1000 is comparable with the Data General S-230 that's used for AFOS. We inherited the system through a cooperative program with NASA several years ago. The computer is used primarily to process satellite information during the winter for forecasting the advance of the freeze line in the Florida peninsula. As that system is only used during the winter months and we had some spare time on it, we decided to make use of it. Also, it already had a link authorized to the Tampa AFOS system. Once the information enters the AFOS system, it gets around to the other WSFOs that need the information.

For you who are not familiar with AFOS, let me briefly show you the makeup. There are four regional loops, all connected to the system's monitoring and coordination center in Washington D.C. This is a high-speed data circuit that transmits information at 2400 bits per second. Once the information is put into one of the nodes, it is transmitted to the other offices that need it. (See Figure 2.)

As you remember, I said that one of our goals was to make the system as user-friendly as possible. We felt that the people who would be using this system may not have been exposed to a microcomputer before. In my experience in designing computer systems, the friendlier that you can make them, the more likely they are to be used. We couldn't depend upon a person having a high knowledge of computer systems. So, basically, what we wanted was a system that could be put

# GULF OF MEXICO
# AUTOMATED MAREP DEMONSTRATION

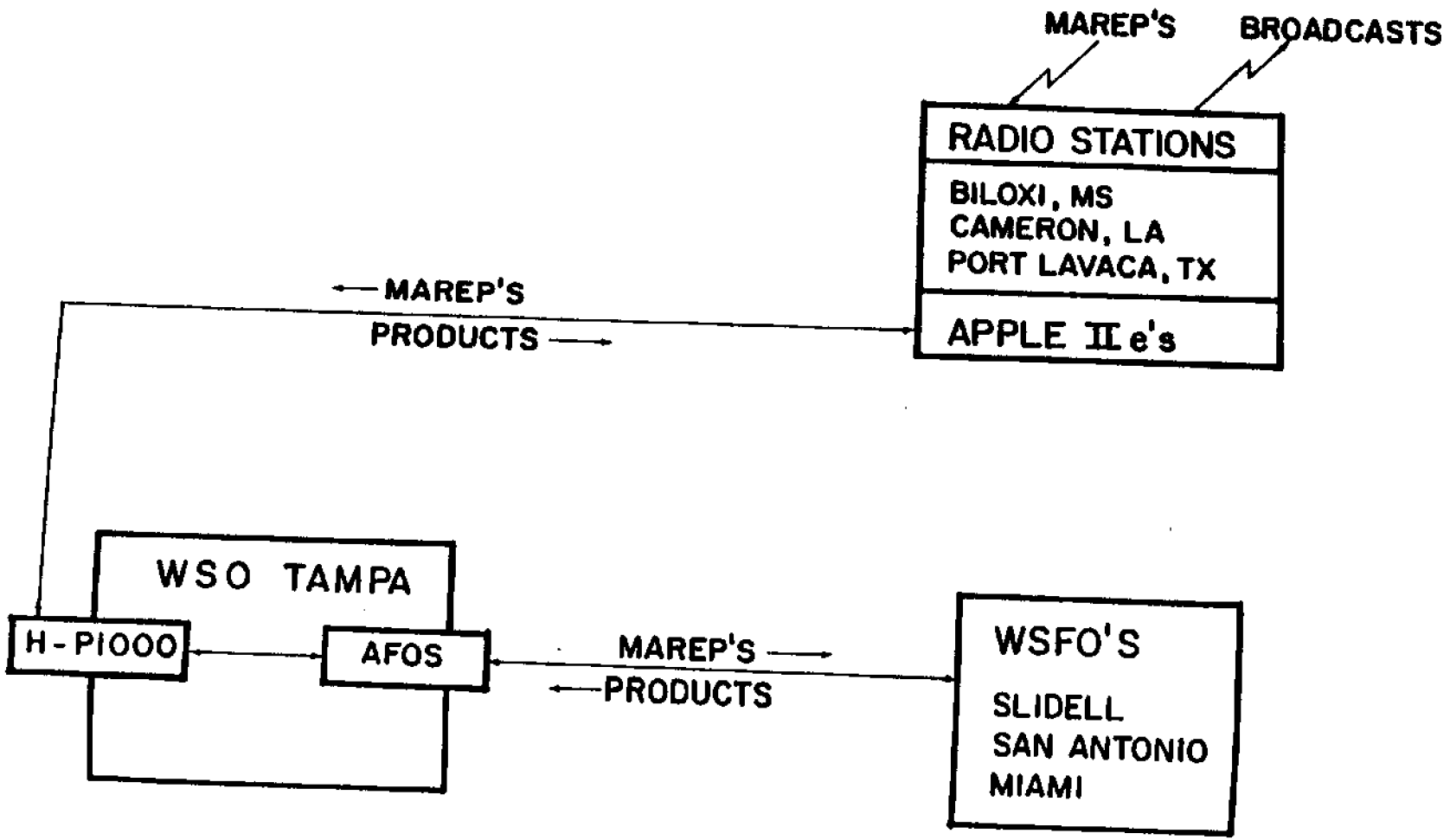
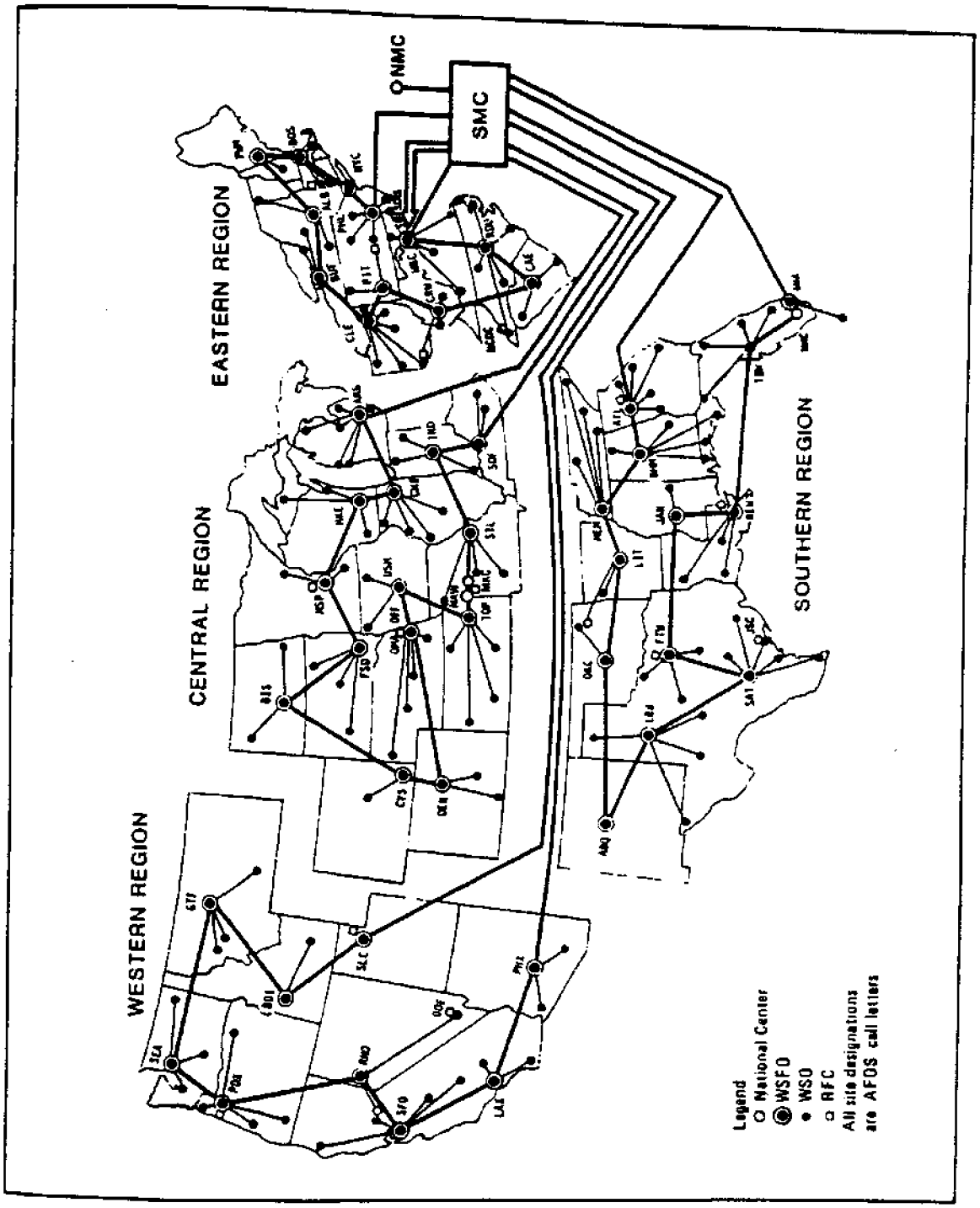



Figure 1




Network of Regional Distribution and State Distribution Circuits

Figure 2

in a diskette and turned on. From there, it would guide the person in entering the marine report and extracting the information needed.

One other goal of our system was to minimize long-distance charges by keeping the connection time to a minimum. The input of MAREPs and the selection of products to retrieve are all done before the telephone call is made.

The system used at each MAREP collection site consists of an Apple II-E microcomputer, a single disk drive, and an Epson FX-80 printer. The software was written by Dr. David Martsoff's staff at the University of Florida, as was the software for the host computer at the NWS office at Tampa Bay, Florida.

Now let's look at the operation of the MAREP system. After the computer is started, the date is entered and the computer repeats it. Then you press "return" and the menu appears. You have seven options. The first option is "enter marine report." You can save, load, print, or delete reports. You can select the NWS products that you want to collect. You can call in the report or collect NWS products. That is, you can collect a product without inputting a report. You can display a collected product and, of course, end the program.

If you select option #1, "enter marine report," this will prompt you to the needed entries. If you need to go back to the menu, you can press "return." Once you enter the ship's name, it repeats the item that you entered so that you can verify it. You then add the local time, your local position, your wind direction and speed, and your wave height. To enter the weather conditions, there are six options: clear, partly cloudy, cloudy, rainshowers, thunderstorms, and fog. You use the cursor keys to bring up each one. Once you've brought up the right selection, you press "return" to enter your choice. You also have the option of putting in your remarks. Once through with this, you press "return" and it shows the information--your report--and you have a chance to check the data for corrections after reviewing. You may then correct any errors or, if it's satisfactory, hit the "Y" and the data is stored. "Return" brings back the main menu.

Choice #2 lets you display all of the ship reports that you've entered or select them individually by the ship's name. Option #3 is "save, load, print, or delete reports."

If you wanted to collect NWS products at the same time that you call your MAREPs in, if you would choose option #4. This gives you the list of weather service products that may be collected. Currently there are only three here, although we are able to have more. We have provided each office with two sets of disks. One was to be used during non-hurricane season. We also have a set that is to be used during hurricane seasons that lists the various choices for the hurricane products. To select a particular product, move the cursor to the desired forecast or product and press "return." An asterisk appears beside the item and the selection is made before you make the telephone connection.

Option #5, "calling reports and/or collecting weather service products," asks if it is okay to dial. You enter "yes" and then it dials the preset number. It keeps you advised of its progress, telling you when your call is completed.

Then it tells you that it is acquiring the coastal marine forecast from San Antonio, which is the selection made. To terminate this, you can press "escape." Once the information has been transmitted from the host computer to your Apple, it tells you when the data have been saved and that it is terminating the phone call. Then it tells you to press any key to continue. Go back to the menu.

Now we will look at a product that has been collected from the host computer, option #6. In this case, I simulated that we had asked for all three products. I chose the coastal water forecast from San Antonio. It will ask me if I want to send the report to the printer. If I say yes, it prints. Or, if I type in "N" for no, it will appear on the screen. Now you have the latest forecast from San Antonio. Finally, select option #7 to end the program.

# GULF OF MEXICO

# AUTOMATED

# MAREP DEMONSTRATION

```
ENTER TODAY'S DATE:  5/8/85

TODAY IS:  5/8/85

O.K.? __


     MARINE REPORT DATA ENTRY SYSTEM (5/8/85)


     (1)  ENTER MARINE REPORT

     (2)  DISPLAY/EDIT/DELETE A REPORT

     (3)  SAVE/LOAD/PRINT/DELETE REPORTS

     (4)  SELECT NWS PRODUCTS TO COLLECT

     (5)  CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

     (6)  DISPLAY A COLLECTED PRODUCT

     (7)  END PROGRAM


                    PLEASE SELECT:  1
```

```
                    MARINE REPORT DATA ENTRY:

                          REPORT # 1

                          SHIP NAME:
                               HIT (RETURN) FOR MAIN MENU

                               MARY LOU MARY LOU

                               ØØØØ

          LOCAL TIME (HHMM):   1535 1535

             LOCAL POSITION:   25SWCAM 25SWCAM

WIND DIRECTION AND SPEED:      SW 1Ø SW 1Ø

               WAVE HEIGHT:    2-5 2-5

        WEATHER CONDITION:     USER CURSOR KEYS TO SELECT

                               PARTLY CLOUDY        PARTLY CLOUDY

                 REMARKS:      RAIN SHOWERS SW      RAIN SHOWERS SW

                    CURRENT VALUES:  5/8/85

                 SHIP NAME:    MARY LOU

          LOCAL TIME (HHMM):   1535

             LOCAL POSITION:   25SWCAM

WIND DIRECTION AND SPEED:      SW 1Ø

               WAVE HEIGHT:    2-5

        WEATHER CONDITION:     PARTLY CLOUDY

                 REMARKS:      RAIN SHOWERS

                    IS THIS DATA CORRECT (Y/N)?  Y

PLEASE WAIT ....

                    MARINER REPORT DATA ENTRY:
                          REPORT # 2

                          SHIP NAME:
                          HIT (RETURN) FOR MAIN MENU
```

MARINE REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 2

DISPLAY/EDIT/DELETE A REPORT

CURRENT REPORTS: 04/18/85

| ## | SHIP NAME |
|---|---|
| 0 | ** DISPLAY ALL SHIPS ** |
| 1 | MARY LOU |

PLEASE ENTER REPORT NUMBER OF PRESS

(RETURN) FOR MAIN MENU: __

MARINE REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 3

REPORT MANAGEMENT:

(1) PRINT ALL REPORTS

(2) SAVE REPORTS TO DISK

(3) LOAD REPORTS FROM DISK

(4) DELETE REPORT IN MEMORY

PLEASE SELECT OPTION OR PRESS

(RETURN) FOR MAIN MENU: _

MARINE REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 4

NWS PRODUCTS THAT MAY BE COLLECTED:

COASTAL MARINE FORECAST -- SAN ANTONIO

OFFSHORE MARINE FORECAST _ NEW ORLEANS

TROPICAL WEATHER OUTLOOK - MIAMI

* = PRODUCT WILL BE COLLECTED

USE ARROW KEYS TO CHOOSE A PRODUCT

PRESS (SPACE) TO SELECT OR UNSELECT A PRODUCT

PRESS (RETURN) WHEN ALL SELECTIONS ARE COMPLETED

MARINER REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 5

```
OK TO DIAL?  (Y/N)  Y

DIALING:  918ØØ8335Ø67

CALL COMPLETED!!

MAREP.NWS/MAREP

SATPLSVCT

GEM.....1230...55.S........SE.15....4-6...

     PTCLDY..THIS.IS.A.TEST........

ACQUIRING:  COASTAL MARINE FORECAST -- SAN ANTONIO

CWFSAT

CALLING DATA CAPTURE ROUTINE...PRESS (ESC) TO ABORT

SAVING DATA TO DISK.

DATA SAVED TO DISK.

HANGING UP...PLEASE WAIT

PRESS ANY KEY TO CONTINUE _
```

MARINE REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 6

DISPLAY A COLLECTED PRODUCT

A COASTAL MARINE FORECAST -- SAN ANTONIO

B OFFSHORE MARINE FORECAST - NEW ORLEANS

C TROPICAL WEATHER OUTLOOK - MIAMI

PLEASE PRESS THE LETTER OF THE PRODUCT OR (RETURN)

TO RETURN TO MAIN MENU __

SEND REPORT TO PRINTER? (Y/N) N
USE CONTROL - S TO START/STOP THE DISPLAY
TYPE CONTROL - C TO ABORT THE DISPLAY

SATCWFSAT
TTAAØØ KSAT Ø81532

COASTLA MARINE FORECAST
NATIONAL WEATHER SERVICE SAN ANTONIO TX
1Ø39 AM CDT WED MAY 8 1985

SYNOPSIS...TEXAS COASTAL WATERS
HIGH PRESSURE OVER THE WEST GULF THIS MORNING WILL WEAKEN TODAY AND TONIGHT.

PORT ARTHUR TO PORT OCONNOR OUT 5Ø MILES
WINDS..SOUTH NEAR 1Ø KNOTS TODAY BECOMING EAST AND NORTHEAST NEAR 1Ø KNOTS TONIGHT AND THURSDAY. SEAS..2 TO 4 FEET TODAY AND TONIGHT. WINDS AND SEAS HIGHER IN AND NEAR WIDELY SCATTERED THUNDERSTORMS THIS AFTERNOON AND TONIGHT.

PORT OCONNOR TO BROWNSVILLE OUT 5Ø MILES
WINDS..SOUTHEAST 1Ø TO 15 KNOTS TODAY. MOSTLY SOUTHEAST 1Ø TO 15 KNOTS TONIGHT AND THURSDAY. SEAS..3 TO 4 FEET TODAY AND TONIGHT. WINDS AND SEAS HIGHER IN AND NEAR ISOLATED THUNDERSTORMS TONIGHT AND THURSDAY.

PRESS ANY KEY TO CONTINUE

MARINE REPORT DATA ENTRY SYSTEM (5/8/85)

(1) ENTER MARINE REPORT

(2) DISPLAY/EDIT/DELETE A REPORT

(3) SAVE/LOAD/PRINT/DELETE REPORTS

(4) SELECT NWS PRODUCTS TO COLLECT

(5) CALL IN REPORT AND/OR COLLECT NWS PRODUCTS

(6) DISPLAY A COLLECTED PRODUCT

(7) END PROGRAM

PLEASE SELECT: 7

REPORTS HAVE NOT BEEN SAVED!!

ARE YOU SURE??? ___

# USER PARTICIPATION AND MOTIVATION: WHAT WORKS? PANEL DISCUSSION MODERATED BY JAMES SALEVAN

John Doyle
Alaska

Sea Grant advisory service personnel in Kodiak, Alaska, have been familiar with the MAREP program since the beginning. There are some factors that are very important to the success of Peggy Dyson's program. Peggy operates 365 days a year; she broadcasts on time, at the same time every day. When Peggy is away for two weeks a year, Marcy Jones replaces her. Peggy is paid $32.00 a day, but she pays Marcy $40.00 a day to replace her.

The weather in the Kodiak area is extremely changeable, so Peggy's services are valuable. Her start-up cost was about $10,000. She has a single sideband. The weather service put in a teletype for her. Peggy also has access to a remote receiver on top of a mountain. This service costs her $30.00 a month. Peggy Dyson does an exhaustive month-end report to the NWS. This report includes every contact she has made, with the vessel's name.

In Peggy's area, vessel superstructure icing is a real problem. She has developed a vessel superstructure icing forecast system which is now in its third generation. This system has prevented loss of life and property. Two-thirds of Peggy's observations come from freighters, tankers, and tugs; fishermen are not her only contacts. A significant question is: how accurate is the information these observers give Peggy? Her own experience with the observers and with the area tells her how to judge accuracy. If she feels that personal observations may be faulty, she asks observers to check their readings. For example, a wave looks larger from the deck of a small boat than it does from the deck of a larger vessel. Peggy is considered part of the maritime community, and this is one reason for her success. An impersonal approach from a government official, say the Coast Guard, would not be as effective as having someone like Peggy involved in MAREP. It would be a large job to build up the confidence of users if recognized government personnel instituted the program. When people like Peggy, members of the maritime community itself, are involved, there is no need to promote the program to users. Get the volunteers started, then step aside and let it go.

David Veal
Mississippi-Alabama Sea Grant Consortium

The MAREP program has had Sea Grant involvement in this region for the past couple of months. Sea Grant marine advisors recognized the need to be involved in the program, and to aid the improvement of forecasts.

Gulf of Mexico weather is relatively predictable, except for tropical storms, so frequent broadcasts are not as important as they would be

elsewhere. Broadcasts are given in the morning and the afternoon by the secretaries in Veal's office. The broadcasts last 15 minutes. The operator gets on the radio and asks for weather observations. Volunteer observers have not been solicited for MAREP; people in the Gulf respond to an open call. However, the NWS has promoted MAREP in its newsletters, press releases, and media outlets. Tugs, dredges, charter boats, and recreational fishermen participate in the program. There is less participation from commercial fishermen than from these sources.

Sea Grant sends the reports to the NWS, which determines their accuracy. The operators do not ask for information that observers do not want to give, but most observers do give the vessel name. When shrimp season opened yesterday, for example, there were 6,400 vessels in a relatively small area, so there are a lot of people who know where a vessel is at any given time. The information given concerns wind direction and speed, wave height, and a general description of weather conditions, such as cloudy, clear, partly cloudy, and so on.

At present, Sea Grant in the Mississippi-Alabama region sees MAREP as an opportunity to improve the quality of weather reports. It is a painless procedure but, nevertheless, Sea Grant does not expect to be involved in it for a long period of time. It is hoped that there will be positive feedback from both the NWS and users, and that within a year, another group can continue it. The Sea Grant philosophy here is to begin educational programs with the idea that if a need is served, another group will take over the program.

Since there is not real gain to volunteers participating in the program, it is not anticipated that finding volunteers will be easy. Observers in MAREP in the Gulf region do not get any reports that NOAA doesn't give them. The Gulf region does not gather reports in the same way that Alaska does, as information is obtained from those who respond to the open request. At this point, only 30 minutes or less a day is involved in MAREP. If the number of observations reaches 8,000 per year, then obviously, some decisions about the system will have to be made. It is already fairly well automated.

Josie Dyas
Westport, Washington

I started with a CB radio, which I used to communicate with my husband, who was a fisherman. I became involved in the Coast Guard search-and-rescue operation, and then the National Weather Service gave me a VHF radio; since that time, I've been calling in MAREPs.

I fished off West Port, Washington, for about 18 years. Then I was involved in an automobile accident, and could no longer fish, so I used the CB radio to stay in touch with my husband. I got emergency relays from the Coast Guard, which didn't have a CB. For example, I would find out what kind of boat was needed for a particular search-and-rescue mission and pass that on.

Six years ago Ken Short approached me about MAREP. I was at first reluctant to become involved, but then saw that this was an effort to improve service to the fishermen. I have now brought forecasters and fishermen together so the users can get an overview of what the forecast office does for them.

My day starts at 4 a.m. and my radio is on 24 hours a day. I'm on the radio on time, at the hours the fishermen expect to hear me. My range is limited; I would like to have a single sideband like Peggy Dyson's.

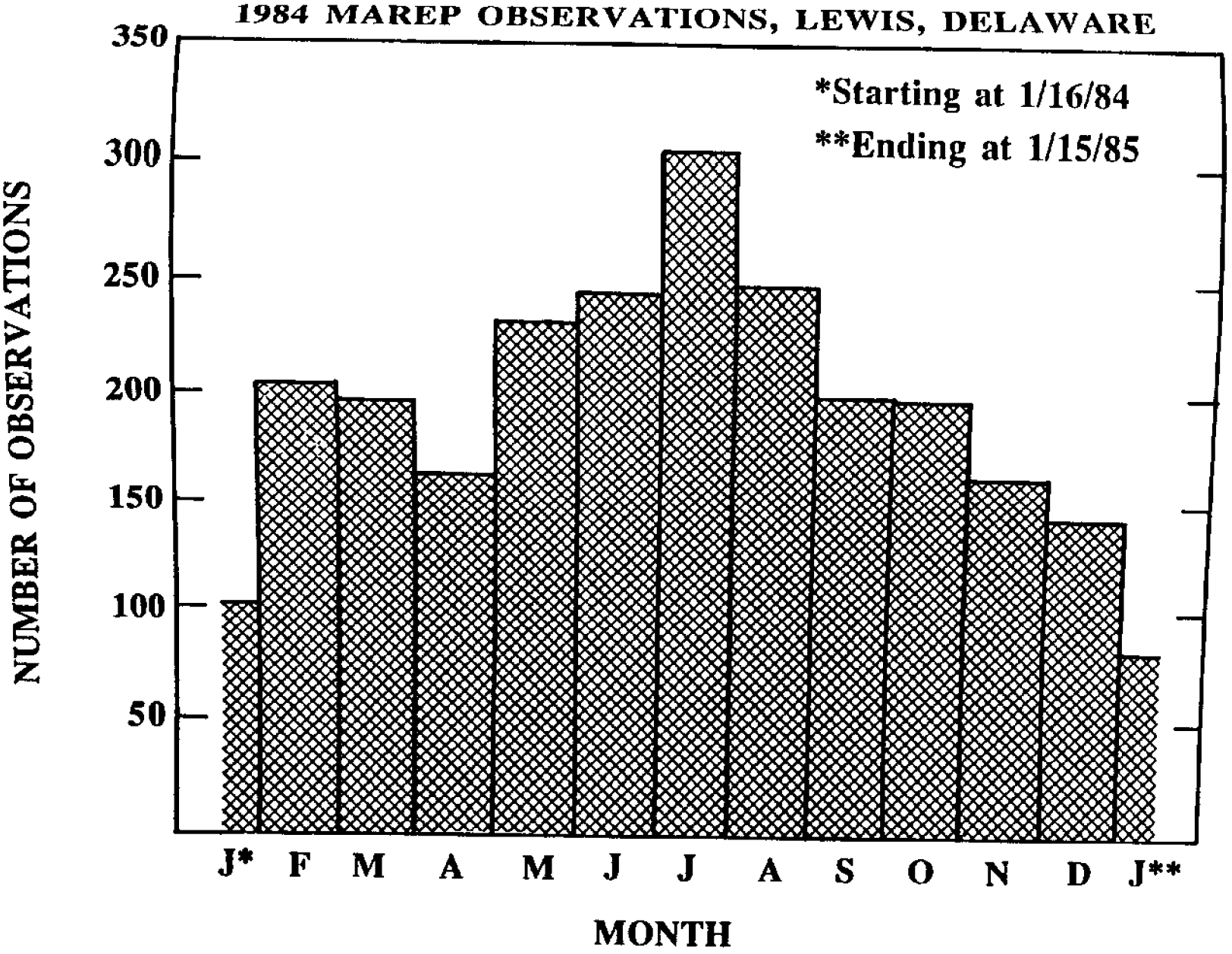
James Salevan
Delaware

An operator should be someone fishermen know, accept, and trust. If an operator gives wrong or outdated information just once, credibility is lost. Some fishermen who would not respond to the Coast Guard respond to Josie Dyas. She works closely with the Coast Guard, however. She was grandfathered into it 11 years ago, and is the only private citizen in the U.S. with Coast Guard meritorial ribbons. Fishermen, forecasters, and Josie Dyas meet, with good results. She wants to update both her equipment and fishermen's input into the system. The program requires dedication and devotion on the part of volunteer operators.

The role of the Sea Grant advisory service agent is to educate potential users about the program. Users need to be told how the program works and the benefits to be derived from participating in it. There are several ways to do this. Many Sea Grant advisory service agents are asked to give seminars to groups. This is an opportunity to talk about MAREP. I often start a talk on MAREP with a slide that shows a forecast for good weather. I ask the participants how many times they have gone to bed with this kind of forecast only to wake up to terrible conditions, shown on a second slide. I use this approach to emphasize the variability of the weather and the importance of frequently updated reports. Sea Grant is the liaison between information sources and users. I would also like to use videos to help create interest in the MAREP program.

It is important to be aware of mariners' needs and to try to meet them. For example, there are 18 buoys offshore in my region. Fishermen frequently asked what the buoys were used for. Sea Grant investigated and found that they were measuring wind speed and direction. This information is now relayed to the NWS and is included in its reports. This is a good instance of the fishermen bringing something up, and it later becoming part of the forecast system.

Observers can be motivated by having the benefits of participation pointed out to them. The most obvious benefit is that MAREP can produce better warnings and forecasts. Other services are available in some systems. Vessels can receive such data as their position in the gulf stream, sea surface temperature, and the like. Operators can pass


1984 MAREP OBSERVATIONS, LEWIS, DELAWARE
*Starting at 1/16/84
**Ending at 1/15/85
NUMBER OF OBSERVATIONS
350
300
250
200
150
100
50
J* F M A M J J A S O N D J**
MONTH

on messages, and, in Delaware, there is the capability to do a phone patch in case of emergencies.

In this area, blind solicitations for marine weather observations don't work too well. The University of Delaware at Lewes operators eavesdrop when they can, and then come in at the end of a conversation between two captains to ask for a weather report. Ten times out of ten, a report is given. The reporting captain is then asked if he wants the weather report Lewes has; if so, he gets it. Sometimes a captain asks for a special report, which is gathered and sent back out to him. Boats in this region are sparse except in the summertime. Then there are more recreational boats. I've tried to instill in the radio operators the need to build rapport with the boaters, and some of them have established real friendships. I have found that participation can wane for no other reason than that it gets old. If there is no center operator like Josie Dyas or Peggy Dyson, center operators must be motivated to go in for two-hour shifts even when there is little action out there.

## Audience Discussion

When asked if their broadcasts are punctual to the minute, seven days a week, as Josie and Peggy's are, panelists said that some broadcast seven days a week, and some only five. David Veal reiterated that users who benefit from the better weather forecasts should be willing to pick up their share of the load. Positive reinforcement for people participating in MAREP can be achieved by recognizing MAREP input from specific places. A good program provides its own momentum.

Josie Dyas said that she receives updated forecasts at 4:15 a.m., and is on the radio by 5:00. She collects observations at 9:30, again at 11:00 a.m., and transmits them to the Weather Service between 1 and 1:30 p.m. There is an updated weather forecast at mid-morning, and again at 3:30 p.m. Josie continues this pattern until 9:30 p.m. when the last forecast is given. She chats with boaters until 11:00 p.m. then signs off, although her radio is on and receives calls all night.

Josie logs all the calls, covering an area of 200 miles. She writes down the observations and gives them to the NWS in Seattle by telephone; she gets their forecasts by telecopier. Josie said that experienced fishermen often sense gales coming when weather signs don't really predict them, and she requests that gale warnings be sent out.

It was noted that Josie is not paid very much, and that Peggy Dyson's new contract will pay her little more than she receives now. A comment was made that coastal radio stations can volunteer to receive and relay forecasts, and in return, the NWS can provide products for their use. Individual operators like Dyas and Dyson should, of course, be paid. Pay has risen from $200 a month in 1975 to $800 a month in 1980. Another cost for operators like Peggy is the electric bill, as a 1,000-watt transmitter is expensive to operate.

In Hawaii, radio operators have approached MAREP people, but have not been offered anything for their participation. Most fishermen

don't trust the government, neither the Coast Guard nor the National Weather Service. People who can talk the language of boaters are needed; the governmental connection should be kept down, and the personal part emphasized. An easy pay-back is when there is a changed forecast because of a MAREP report. If naming the vessel does not seem appropriate, it is possible to credit the update or change to "several small boats in such-and-such a location." In this way, participants see the value of MAREP.

# NATIONAL MAREP PLANNING

## DATA ACQUISITION, INFORMATION ACCESS, AUTOMATION, AND FUNDING

Paul A. Jacobs

This plan describes the development, automation, and estimated cost for a national NWS-Sea Grant MAREP/MIDAS network. MAREP is the effort to improve marine warnings and forecasts through the voluntary participation of mariners and coastal radio facilities as weather observers and data relayers. MIDAS is the effort to create a centralized, automated information retrieval system allowing shore-based mariners and radio stations to receive updated NOAA marine information on demand.

This plan is not intended as a blueprint for implementation, but rather a description of how a national MAREP/MIDAS program could be established. A more detailed planning document will be developed from the recommendations of the MAREP conference workshops, plus coordination with other NWS offices and other NOAA agencies, particularly the Office of Sea Grant. A critical factor will be the response of the National Sea Grant community to the objectives and options described herein.

The objectives of MAREP/MIDAS are:

1. Increase marine weather observations within the nation's 200-mile Exclusive Economic Zone (EEZ) by enlisting the voluntary cooperation of mariners as weather observers at sea.

2. Provide benefits to the marine community in return for their participation in the form of improved warnings and forecasts and expanded access to NOAA marine information.

3. Locate and recruit radio facilities from among the nation's 1800 Limited Coast Stations to collect and relay MAREPs to NWS and broadcast updated NOAA marine information.

4. Open a dialogue between NWS and the marine community focusing on more responsive weather services to promote safety and productivity.

5. Establish a partnership between NWS and the Sea Grant community to improve marine weather services.

6. Instill a sense of self-help within the marine community such that MAREPs, as a regular part of a mariner's navigational routine, will pay off in more reliable and accessible marine weather information.

7. Make weather services an integral educational function of SG/MAS because, by being able to cooperate more safely with better knowledge of adverse weather, mariners will get the

most from the technology and services provided to them by marine advisory agents.

Attempts have been made over the years to involve mariners in a voluntary weather reporting program, similar to aviation Pilot Reports (PIREPs), to get real time feedback on weather conditions and fill data gaps. The MAREP program has its beginnings prior to 1970 when five offices in the NWS Alaskan region were equipped with two-way radios to exchange weather information with fishermen and other traffic. In the mid-seventies, the NWS western region began a tuna boat reporting program in cooperation with radio station WWD in La Jolla. The Alaskan region recruited Peggy Dyson in Kodiak to broadcast marine weather and relay MAREPs to the Weather Service Forecast Office (WSFO) in Anchorage.

Since then, the program has grown to 32 locations along the coastal U.S. and the Great Lakes, relaying to the NWS an average of six to 30 MAREPs daily per site. MAREP's success has been partly attributable to the Sea Grant Marine Advisory Service (MAS). State MAS extension agents form the marine outreach arm of NOAA and have been very helpful--in some cases instrumental--in getting MAREPs started and maintaining programs through recruitment, training, and publicity. MAREP goes beyond increasing data and supplementing dissemination. It is a key for opening a dialogue between NWS and marine users for more responsive services.

## MAREP/MIDAS Status

The MAREP program is composed of 32 coastal radio stations in 21 states collecting observations from mariners via VHF and single sideband (SSB) radiotelephone. Most MAREP collection points are limited coast stations licensed by the FCC to operate on a "limited" number of radio frequencies and serving a local clientele. Other stations are either public correspondence, USCG, NWS stations, or amateur radio nets.

MAREPs are collected at scheduled times or on an ad hoc basis, depending on local arrangements. The reports are relayed to NWS offices by telephone, telecopier, or computer for use in updating marine products. MAREP transmissions end with the receiving NWS office of are distributed on the automated NWS communication system for receipt of reports from another office's forecast area.

The normal models for disseminating updated marine warnings and forecasts based on MAREPs are NOAA Weather Radio (NWR), USCG broadcasts, and marine public correspondence broadcasts. Updates are also furnished to most MAREP radio stations for broadcast as a "pay-back" to mariners for providing at-sea weather observation. Some NWS offices also add a MAREP roundup or NOWCAST to NWR to acknowledge receipt of reports, which serves to encourage user participation.

There are two automated MAREP demonstrations to explore ways of making the program more efficient. A mid-Atlantic demonstration began

in January, 1984, involving WSFO Washington (WBC), WSO Wilmington, DE (ILG), the University of Delaware (Lewes) Radio Station KTD-423 (VHF and SSB), and the University of Maryland Extension Service computer facility. The radio station is manned by graduate students four hours per day seven days a week. MAREPs are entered into a TRS-80/100 terminal by the radio operator using software developed by WBC. The collections are transmitted to ILG for entry into the NWS communication system. At WBC, the observations assist in updating marine products. A clock-timed procedure is run to collate all eastern region marine products, which are converted to Videotex format and offloaded to a TRS-80/model II computer. After quality checking, the University of Maryland computer is dialed up for transmission of the marine package. The radio operator uses the Model 100 to retrieve menu-oriented products from the University of Maryland and prints out desired information for broadcast. In essence, the radio operator's terminal, modem, and printer replace the telephone and telecopier to exchange data and products with NWS for a more efficient operation.

The idea of using a Sea Grant college computer (University of Maryland) as the product source lies in the potential of other NOAA agencies, and perhaps the Coast Guard, making marine information accessible to users through a one-stop host system. In addition to weather, such information as fisheries marketing news, changes in nautical charts, notices to mariners, and various Sea Grant items of interest could be made available to MAREP sites and other users from one source via inexpensive, compatible, off-the-shelf terminals. This cycle of MAREPs in and marine products out is being called Marine Information and Data Access Service or MIDAS.

The other automation demonstration is taking place in the Gulf of Mexico and involves WSFOs in Slidell and San Antonio, the WSO in Tampa, the University of Florida, Louisiana State University (LSU), and MAREP radio stations in Biloxi, Mississippi; Cameron, Louisiana; and Port Lavaca, Texas. The operation is similar to that in the mid-Atlantic, except that an H-P computer loads the data into the NWS southern region communications loop. Selected marine products are offloaded from the NWS system to the H-P computer, and obtained by the three radio stations on the Apples. It is uncertain whether arrangements will be made to have the H-P system serve as a one-stop source for other NOAA marine information, as similarly done at the University of Maryland. The Gulf demonstration began in May 1985. Louisiana Sea Grant at LSU will assist the NWS southern region in evaluating the operation and benefits of the program.

In summary, the past three years have seen the growth of MAREP from a concept to an operational program involving 32 coastal radio cooperators in 21 states producing about 250 weather observations per day within the EEZ. Only three of the 24 WSFOs in the NWS marine program do not have a MAREP program, but they are working on it. These are data that were never available to forecasters before. The reports are treated as unofficial weather observations that are blended into the forecast formulation process, similar to the handling of PIREPs and land-based cooperative observer reports. There are many benefits: more timely warnings and forecasts, more forecaster confidence in the

product being issued, better understanding by the mariner of NWS operations, and higher credibility of NWS marine services with users. The MIDAS concept has been added to the MAREP program to provide an enhanced method of obtaining updated weather information and the potential for retrieving other NOAA marine products from a single computerized source. A great deal of credit goes to Sea Grant's Marine Advisory Service for its assistance in development, recruitment, and user education.

## Future Direction

The following sections outline proposed MAREP/MIDAS expansion plans and several options. Experience has shown that most mariners, especially those who make their living from the sea, are willing to be volunteer observers once it is explained to them that their observations can mean better, more accessible warnings and forecasts. The objective is to develop a variety of NOAA marine products for broadcast to mariners. Figure 1 depicts the MAREP/MIDAS concept.

## MAREP Data Input: A 100 Station Collection/Relay Network

Very high frequency (VHF) and medium to high frequency (MF,HF) single sideband (SSB) voice communications are the primary communication modes between coast radio stations and mariners who confine their operations primarily to the 200-mile EEZ. Most of these mariners have only VHF radio; few have both VHF and SSB. The distinction depends on how far from shore the activity takes place (e.g., day boat fishermen vs those heading offshore for continental shelf canyons). VHF radio range is restricted to line of sight, although signal "skip" on the ocean surface can extend propagation. Range of transmission varies with radio transceiver, antenna, location, elevation, etc. It is assumed VHF coast radio stations can be recruited that can communicate with boats up to 30-50 miles from shore. HF single sideband transmission has a longer range, because the earth's atmosphere aids propagation at these frequencies. Distances up to thousands of miles are common. Even low-power sets can send and receive out to 250-300 miles.

Since the objective of MAREP is to fill data gaps in the 200-mile EEZ, a network of approximately 100 coast radio stations composed of about 80-90 VHF stations and 10-20 VHF/SSB stations should be sufficient. One hundred MAREP radio sites are about equal to the number of NOAA Weather Radio (NWR) stations they can rely on: (a) NWR and USCG SSB stations as their main sources for warning and forecast updates and (b) MAREP radio stations as a supplementary source of updated information.

## MAREP Reporting

Mariners will be asked to report to the following weather elements:

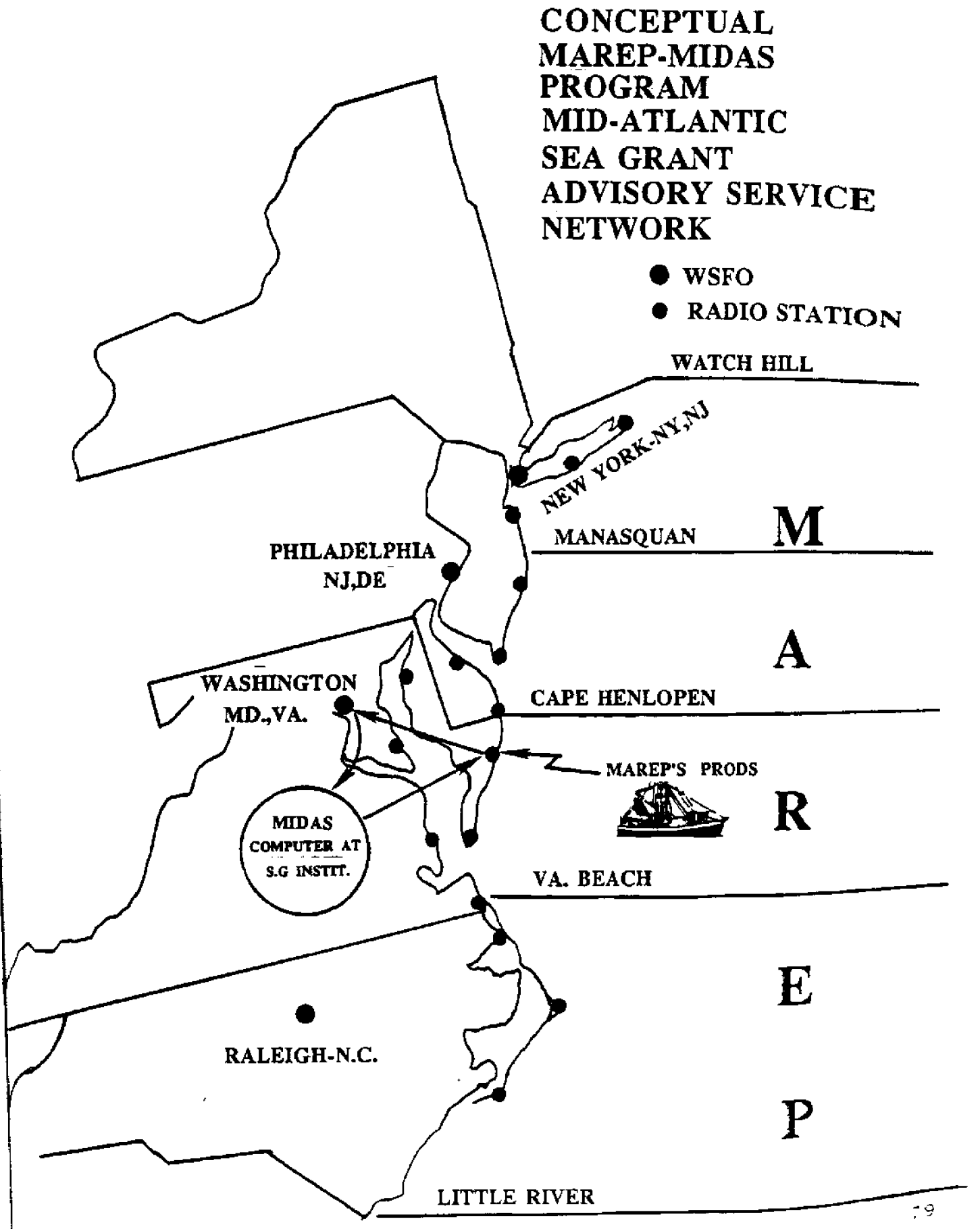

CONCEPTUAL
MAREP-MIDAS
PROGRAM
MID-ATLANTIC
SEA GRANT
ADVISORY SERVICE
NETWORK
WSFO
RADIO STATION
WATCH HILL
NEW YORK-NY,NJ
MANASQUAN
M
PHILADELPHIA
NJ,DE
A
WASHINGTON
MD.,VA.
CAPE HENLOPEN
MAREP'S PRODS
R
MIDAS
COMPUTER AT
S.G INSTIT.
VA. BEACH
E
RALEIGH-N.C.
P
LITTLE RIVER

Figure 1

Primary

Wind speed and direction

Wind gusts
Wave height
(either as wind waves, weather swells, or combined seas

Visibility
Present weather
Mariners will also need to provide:
Date
Time of observation
Ship name or call sign
Location

Secondary

Air pressure
Pressure tendency
Air temperature
Sea water temperature

Remarks (unusual conditions)

Reports do not have to be complete as above (e.g., a barometer may not be carried). Even partial reports (e.g., winds and waves only) are important. The main thing is that mariners report as often and as completely as possible. Reporting arrangements will be on a scheduled basis or ad hoc or both, depending on what can be established. However, a major factor in the efficient use of MAREPs by forecasters is that a standard reporting format be developed for use by every participating mariner and coast radio station. This is important, because MAREPs will be combined with formatted data from other sources (ocean-going ships, buoys, automated coastal stations, radar, etc.) and processed by NWS computers into tabulated listings and analysis charts. The computers will be told to recognize each part of the message. Unless MAREPs are in a standard format, the computer (and forecaster) cannot do its job. Standardized reporting will also enable the mariner to report to any MAREP coast radio station quickly and efficiently.

Figure 2 is an example of a MAREP form being developed as an aid to the mariner in reporting the sequence of information to the coast radio station. The form may also be used to log MAREPs, but there is no requirement to do so. Note that the mariner is only being asked to make a plain language report. The object is to make weather reporting as easy as possible so that it becomes a regular part of one's navigational routine.

Figure 3 is an example of a similar form for use by the coast radio operator. The operator will be asked to enter MAREPS on the form as they are called in by the mariners. This accomplishes two purposes: to record the observations for transmittal to NWS, and to have an official record of MAREPs for data archiving. Archiving is needed for warning/forecast verification, development of climatological data, and research to improve forecast techniques. Thus, the radio station will be asked to mail completed forms to NWS about once a month.

Each coast radio station will be supplied with a computer terminal for transmitting a MAREP collection to NWS several times a day. A data entry format will be called up on the data entered from the MAREP log. The radio operator will be trained to enter the information in a fixed

Mariner Report (MAREP) Log - Ship Station

National Weather Service (NWS) — Sea Grant Marine Advisory Service (MAS)

| Month/Year | Ship Name | Radio Call Sign | VHF / SSB | Home Port (City, State) |
|---|---|---|---|---|
| 3/85 | NINA J. | ABC-123 | VHF X / SSB X | San Francisco, CA |

| Date | Time | Position | | Wind | | Wave | Swell | | Visibility (miles) | Present Weather | Barometer | Rising=R Steady=S Falling=F | Air Temp | Sea Water Temp | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dir. | Speed (knots) | Height (feet) | Dir. | Height (feet) | | | | | | | |
| 05 | 0600 | 37.7 | 123.0 | NW | 20 | 6 | N | 8 | 15 | PTLY CLDY | 998 | R | 53 | 49 | G30 WVS TO 15 FT |
| 05 | 1115 | 37.8 | 123.5 | W | 15 | 4 | | | 20 | CLDY | 1000 | S | 56 | 51 | BK CLDS SW |
| 05 | 1530 | 40.0 | 124.0 | S | 10 | 3 | | | 2 | DRZL FOG | 999 | F | 57 | 51 | FOG ROLLING IN |

Figure 2

**Mariner Report (MAREP) Log - Coastal Station**

National Weather Service (NWS) — Sea Grant Marine Advisory Service (MAS)

| Month/Year | Coastal Radio Station (Name) | Radio Call Sign | VHF / SSB | Location (City, State) |
|---|---|---|---|---|
| 3/85 | U. of Delaware | KTD-423 | VHF X / SSB Y | Lewes, DE |

| Date | Time | Ship Name or Call Sign | Position | Wind Dir. | Wind Speed (knots) | Wave Height (feet) | Swell Dir. | Swell Height (feet) | Visibility (miles) | Present Weather | Barometer | Rising=R Steady=S Falling=F | Air Temp | Sea Water Temp | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03 | 0700 | ABC-123 | 38.5 72.5 | NW | 30 | 15 | NE | 6 | 10 | C | 992 | R | 35 | 50 | GSO WVS to 25 FT |
| 03 | 0715 | NINA J. | 35.2 74.8 | W | 20 | 8 | | | 15 | TSTH | 1001 | F | 42 | 60 | CHOPPY SEA |
| 03 | 1540 | WXYZ | 37.0 75.0 | E | 1 | 4 | | | 2 | RF | | | | | |

Figure 3

format for relay to NWS computers. Most of the information will be entered in a readable form with the exception of "present weather," for which letter codes are used. The instructions on the back of the form explain the data entry procedures. The radio operator will also be asked to do some conversions, depending on the MAREP received (e.g., converting distance and bearing to latitude/longitude), but it is expected that this will be infrequent. Necessary tables will be supplied to the radio station.

## Mariner and Coast Radio Station Recruitment

A cooperative effort should be undertaken between meteorologists in charge of WSFOs with marine programs, and Sea Grant MAS program directors to recruit coastal radio stations and MAREP observers. Figure 4 lists the coastal states, responsible WSFOs, and the estimated number of radio stations required per state. The goal is a network of 100 radio stations. The actual number will be somewhat more or less depending on local requirements, recruitment success, user interest, etc.

## Computer Terminal Equipment for MAREP Radio Stations

NWS will provide computer terminal equipment to radio stations for the entry and relay of MAREPs and retrieval of updated products. The terminal and peripheral equipment (monitor, modem, and printer) will be compatible with both the NWS communications system (to relay MAREPs) and the MIDAS host computer (to retrieve products). There is a proliferation of microcomputer equipment available on the market today that can perform the basic kinds of data entry and retrieval functions envisioned in this plan. One of the objectives is to standardize the hardware throughout the program for purposes of cost savings, maintenance, software development, and user training. NWS specifications of data input, product retrieval, network configuration, communications, and compatibility with the NWS communications specifications will include the standardized MAREP data entry format as described in the section on MAREP reporting.

## WSFO Support to MAREP/MIDAS

Data transmittal will be from the radio station to the nearest NWS office. In some cases the office will be different from the ones listed in Figure 4. For example, in North Carolina, MAREPs might be relayed to the NWS office at Wilmington for further relay to the computer at WAFO Raleigh.

The NWS computer system performs many other communicating and processing functions besides those required for marine services. Therefore, in order to efficiently support the MIDAS product-retrieval system, all "dedicated" marine computers must be similar to those used in the mid-Atlantic and Gulf demonstrations. The marine computer will transmit updated NWS products to the MIDAS system for retrieval by the coast

FIGURE 4

PROPOSED NWS/SEA GRANT COORDINATION FOR NATIONAL MAREP NETWORK

| REGIONAL SEA GRANT PROGRAM | STATE | NO. OF PLANNED MAREP SITES | NWS FORECAST OFFICE |
|---|---|---|---|
| NEW ENGLAND SEA GRANT NETWORK | ME | 4 | PORTLAND |
| | NH | 1 | PORTLAND |
| | MA | 3 | BOSTON |
| | RI | 1 | BOSTON |
| | CN | 3 | NEW YORK |
| | NY | 3 | NEW YORK |
| MID-ATLANTIC ADVISORY SERVICES NETWORK | NY | | NEW YORK |
| | NJ | 3 | NEW YORK/PHILA. |
| | DE | 2 | PHILADELPHIA |
| | MD | 4 | WASHINGTON |
| | VA | 3 | WASHINGTON |
| | NC | 4 | RALEIGH |
| SOUTHEAST MARINE ADVISORY SERVICES | NC | | RALEIGH |
| | SC | 4 | COLUMBIA |
| | GA | 2 | MIAMI |
| | FL | 7 | MIAMI/SLIDELL |
| | AL | 1 | SLIDELL |
| | MS | 1 | SLIDELL |
| | LA | 3 | SLIDELL |
| | TX | 4 | SAN ANTONIO |
| GREAT LAKES SEA GRANT NETWORK | NY | 4 | BUFFALO |
| | OH | 4 | CLEVELAND |
| | MI | 7 | ANN ARBOR |
| | WI | 4 | CHICAGO |
| | MN | 1 | CHICAGO |
| | IL | 1 | CHICAGO |
| | IN | 1 | CHICAGO |
| PACIFIC SEA GRANT COLLEGE PROGRAM | AK | 6 | ANCHORAGE |
| | WA | 4 | SEATTLE |
| | OR | 4 | PORTLAND |
| | CA | 7 | SAN FRAN./LOS ANG. |
| | HI | 1 | HONOLULU |
| | TOTAL | 100 MAREP RADIO STATIONS (85 VHF 15 VHF/SSB) | |

radio station. The same kinds of requirements indicated for the standardization of MAREP terminals apply to the selection of the dedicated marine computer at the WSFO.

## MIDAS Centers

The Maryland Extension Service Computer and the H-P 1000 system at WSO Tampa are demonstrating the feasibility of providing updated weather information to marine users via dial-up from microcomputer terminals. The papers on the mid-Atlantic and Gulf of Mexico demonstrations provide details on how these systems operate. It is proposed that this capability, known as MIDAS, be provided to mariners. MIDAS would store all pertinent marine information relayed to the MIDAS center by NWS and other NOAA agencies and, possibly, other federal and state agencies. MIDAS thus becomes a one-stop, computerized, marine information source for mariners before they put to sea, and, while at sea, a means of obtaining updated information through MAREP coast radio stations. In addition, MIDAS is viewed as the "payback" mechanism for mariners who provide weather observations through the MAREP program. In this regard, the terminal used by a coast radio station to relay MAREPs to NWS is also used to call up information from the MIDAS computer for broadcast (see Figure 5).

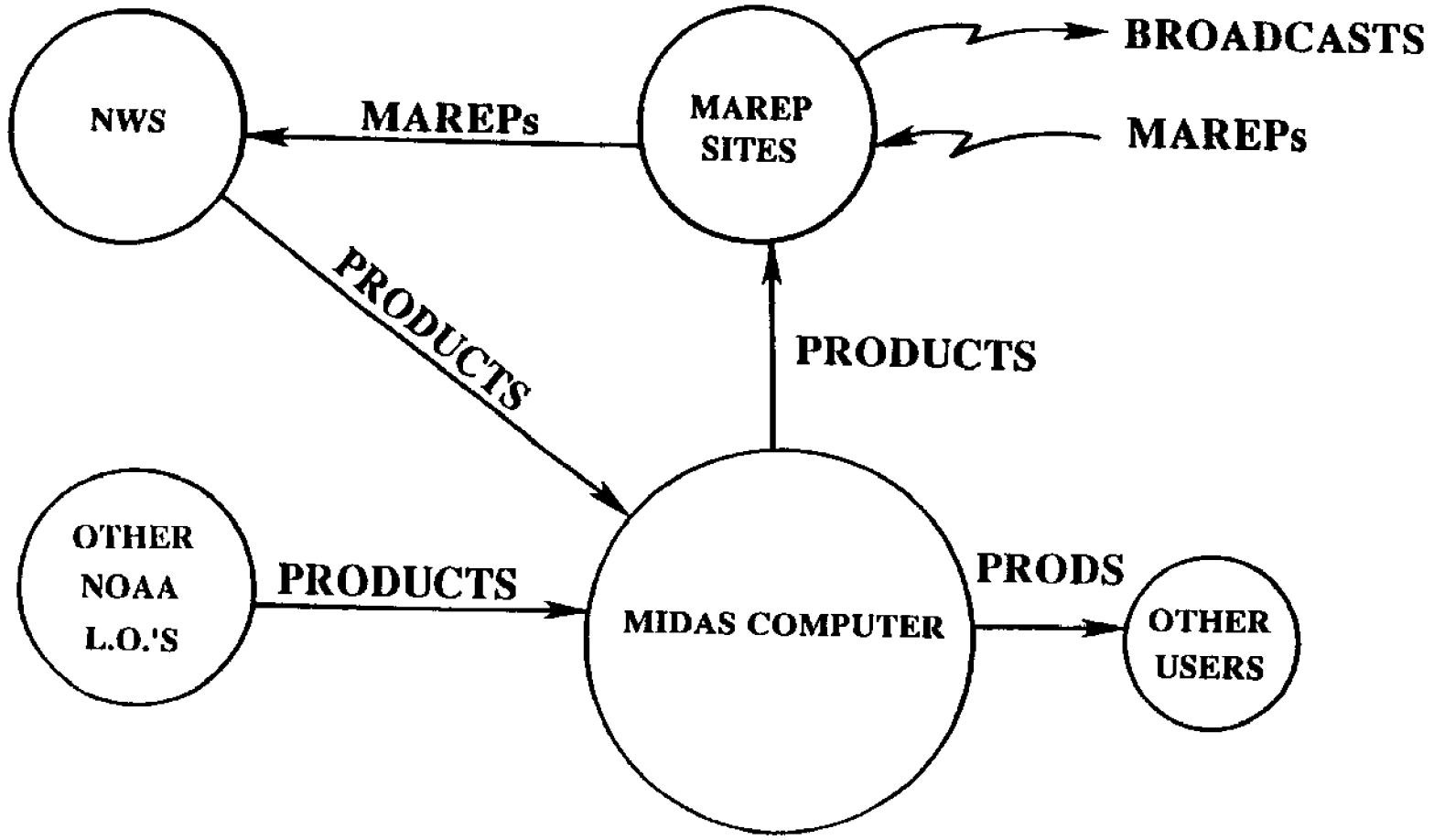
There are several planning options for MIDAS, all of which involve participation of the Sea Grant MAS.

a. State MIDAS Centers

Develop a MIDAS center at a selected facility in each of the 31 Sea Grant programs. It is assumed that existing computer systems in the Sea Grant programs could also be used to support MIDAS storage, processing, and communication functions (i.e., receipt of marine products from NWS and other agencies, menu formatting, and product transmittal to user terminals). A Sea Grant MIDAS computer would receive scheduled and updated marine warnings and forecasts from one or more WSFOs in that state. In some instances a WSFO would relay products to more than one MIDAS center (e.g., WSFO Boston relaying to Massachusetts, Rhode Island, and Connecticut). The objective of this option is to provide a MIDAS service to the marine community, including MAREP radio stations in each state, thus, minimizing the coast of long distance phone calls from user terminals.

b. Regional MIDAS Centers

Develop a MIDAS center at a selected Sea Grant college within each of the five regional Sea Grant networks. For example, Michigan Sea Grant could house the MIDAS center in the Great Lakes Sea Grant network as opposed to individual host computers in each of the Great Lakes states. All MAREP radio stations and other users would retrieve and select products from a regional menu. Under this option, one WSFO in the region would transmit a marine weather package to the MIDAS center compiled from individual WSFO products transmitted on the NWS communication system. This option reduces the number of "dedicated"




MARINE INFORMATION AND DATA ACCESS SERVICE

M I D A S

Figure 5

marine computers to those WSFOs that would be feeding the regional Sea Grant MIDAS computer. However, the cost of dial-up access will be higher for each user in the region.

c. NOAA Regional Ocean Information Centers (OIC)

Should NOAA's long-range plan of developing regional OICs become reality, these facilities could provide MIDAS services. The OICs are designed as one-stop centers serving the information requirements of the marine community across several states. A major OIC objective is improving the delivery of all NOAA marine products. The MIDAS concept would fit in quite well with OIC functions.

## Other Options

There are a number of other options to be explored for developing an automated MAREP/MIDAS system.

a. THE NWS central region has developed the remote observation station acquisition system (ROSA) for automated data collection from land-based cooperative observers. Using touch-tone data encoders, cooperators transmit tonal signals through a telephone line. Several ROSA computers in the region receive and process the data for transmittal into the NWS communications system. The touch-tone pads are inexpensive (about $150 each) and easy to use. The system could be adapted for use by the MAREP radio station after receiving voice reports from mariners. However, a separate computer terminal would be needed to receive products from MIDAS.

b. The manned coastal radio station could be bypassed entirely. To do this, NWS is working on several concepts for data acquisition and dissemination:

   1. Unattended radio relay system at coastal locations for MAREP receipt via VHF radio including a communications link to the nearest NWS office. The mariner uses a touch-tone data encoder, the remote entry alphanumeric device (READ), to transmit observations through the vessel's VHF radiotelephone. A test is being conducted during summer, 1985, in the Norfolk, Virginia, area.

   2. Shipboard microcomputer for data entry and product retrieval. A computerized marine weather dissemination system (C-MAWDS) has been developed for Great Lakes shipping which utilizes the MIDAS principle of dialing into a host computer, retrieving a product menu, and selecting products. Shipboard computers have been successfully demonstrated over the past two years utilizing the Great Lakes VHF direct dial network. The system can also use satellite communications. C-MAWDS also incorporates a graphic display capability, data entry software to send weather observations, and an electronic

mail capability for message exchange with shipping company home offices. Plans are underway to make C-MAWDS operational by 1986; it will in time replace exising NWS voice and radiofacsimile broadcasts (except for NOAA Weather Radio).

Note: An important feature of MAREP is the ability of a fisherman, tug operator, or yachtsman, to talk to a "warm body" on land for more than just the purpose of exchanging weather information. The MAREP base station operator is also able to solicit MAREPs from mariners who, for whatever reason, are reluctant to initiate the contact, but are responsive to a voice from shore. The options that eliminate the MAREP coastal operator in favor of a highly automated ship-to-shore system may run the risk of losing user interest and participation in the program because there is "no one to talk to."

MAREP/MIDAS Communication Data Input:
MAREP Radio Station to Nearest NWS Office

Options: a. regular commercial phone lines (local or long distance calls)
b. 800 Service

There should be no charge to the radio station for relaying data to NWS. A standard telephone modem transmitting at 300 bits per second can relay a typical MAREP in about two seconds, or 30 reports per minute. Assuming 10 MAREPs per collection time, and about three relays per day to NWS, data input should average no more than three minutes per day per MAREP radio station. Based on the proximity of coast radio stations and NWS offices, the cost per call is estimated at 50 cents, or $1.50 per day. This works out to $500 per year per site, or $50K per year for a 100-station national network.

Product Transfer from NWS to MIDAS Center

Products will be transmitted via dial-up from the WSFO marine computer and from other NOAA agencies over existing government FTS lines.

Product Access by MAREP Radio Station and Other Users

Options: a. regular commercial phone lines (local/long distance)
b. 800 Service
c. 900 Service (50 cents per call)

NOAA should absorb the cost for MIDAS access by MAREP radio stations, since the stations are being asked to disseminate information at no cost in exchange for MAREPs. Assuming that product retrieval will take about five minutes per call and that an average of three calls per day would be made per MAREP site, about eight hours per month of

phone time would be used. At an estimated cost of $20 per hour for 800 service, this equates to $160 per month per site or roughly $2000 per year. Annual cost for the 100-station network would be $200K. Other users not participating in the MAREP program would be expected to pay the cost of phone calls. This would require a regular commercial phone port in the MIDAS computer in addition to the 800 number port.

A communications plan will have to be developed to evaluate the various telephone access systems for each MIDAS option described earlier. For example, there are significant differences in cost for interstate vs. intrastate 800 service when a comparison is made between state and regional MIDAS centers. In addition, it may be impractical to restrict the use of free 800 numbers to MAREP cooperators. A possible safeguard could be the use of different password or log-on procedures for MAREP cooperators and other users.

Estimated Costs for National MAREP/MIDAS System With A MIDAS Center in Each State

| | |
|---|---|
| Equipment: $279K | |
| Terminals and peripherals for MAREP radio stations (1.5K ea.) | $151K |
| Dedicated off-line marine computers at 24 marine WSFOs ($4K ea.) | $96K |
| Multiplexers and other modicications at state Sea Grant computer facilities ($2k ea.) | $62K |
| Recurring: $276K | |
| Communications | $250K |
| Maintenance contracts* | $ 26K |

*The options of NWS local or depot maintenance should also be considered, which would require some number of additional MAREP terminals and WSFO marine computers as backup units, plus spares kits.

Cost Benefit

Assuming 100 MAREP sites, collecting about 10 observations per day, the total number of MAREPs per year is 350,000. Assuming a recurring cost of approximately $270K, the cost per MAREP is $.60 per report, which is a fraction of the cost per observation from ships reporting through public correspondence stations or INMARSAT, and the data buoy program. However, MAREPs are not intended as replacements for buoy and synoptic ship reports, but rather to supplement these reports by filling data gaps.

Figure 6 gives a four year phase in-plan, beginning with the automation of the present 30 MAREP sites, recruitment and automation of 70 additional MAREP sites, and annual operating costs for a national

FIGURE 6

MAREP/MIDAS COSTS

| | YEARS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CAPITAL | 1 | | 2 | | 3 | | 4 | | OUTYEARS |
| 24 WSFO HOSTS ($4K) | 96K | | -- | | -- | | -- | | -- |
| 100 MAREP TERMINALS | QTY | COST | QTY | COST | QTY | COST | QTY | COST | -- |
| ($1.5K) | 30 | 45K | 25 | 38K | 25 | 38K | 20 | 30K | |
| SEA GRANT COMPUTER MODIFICATION | 21 | 42K | 10 | 20K | -- | | -- | | |
| RECURRING | | | | | | | | | |
| MAINTENANCE | | | | | | | | | |
| HOSTS $600 EA. | | 15K | | 15K | | 15K | | 15K | 15K |
| TERMINALS $100 EA. | | 3K | | 6K | | 9K | | 11K | 11K |
| COMMUNICATIONS | | | | | | | | | |
| DATA INPUT[1] | | 15K | | 28K | | 40K | | 50K | 50K |
| PRODUCT RETRIEVAL[2] | | 60K | | 110K | | 160K | | 200K | 200K |
| TOTAL | | 276K | | 217K | | 262K | | 306K | 276K |

[1]Est. 50c per call, 1 minute per call, 3 calls per day = $500 per year per site.
[2]Est. 800 service $20/hour, 5 minute per call, 3 calls per day, 8 hours per month = $2000 per year per site.

MAREP/MIDAS system. These costs should be considered a very coarse estimate for a national program, because there are many options for inplementation. However, the table gives a basic idea of the magnitude of resources required to establish MAREP/MIDAS.

Summary

1. Sea Grant and NWS would cooperate in enlisting user support for volunteer weather observations and recruiting 100 MAREP coast radio stations.

2. Radio stations would be equipped with computer terminals to relay MAREPs and retrieve information.

3. MAREPs in standardized format would be transmitted from each MAREP site directly to the NWS computer system at nearby NWS offices.

4. Each Sea Grant program would establish a MIDAS center at an existing computer facility to receive updated marine infromation from NOAA and other agencies. Other options: Regional MIDAS centers; Ocean Information Center MIDAS system; private sector participation.

5. Marine weather products would be offloaded from the NWS computer system to a dedicated marine computer for transmission to the MIDAS Center.

6. Other NOAA agencies, Sea Grant, the Coast Guard, and other organizations would arrange to transmit marine information to the MIDAS center for inclusion in the product menu.

7. MAREP radio stations would retrieve a comprehensive marine information package (weather and nonweather) from MIDAS to make available to marine users by radio or other means.

8. Provision would be made for users not part of the MAREP program to obtain products from MIDAS.

9. According to the expression of interest from Sea Grant programs, the NWS and Sea Grant would develop detailed plans.

## MAREP Program Evaluation Criteria
Richard C. Przywarty, Moderator

Only NWS was represented on the panel; therefore, recommendations will be limited to NWS requirements.

We identified five major aspects of the program that will require extensive evaluation during the initial implementation period (approximately one to two years). A lesser level of evaluation will suffice thereafter. That "lesser level" will be determined later.

The five aspects are data quality and quantity, impacts on forecasts, user feedback, and cost benefits.

1. Data Quality and Quantity

   (a) Quantity - To be performed by the forecast office. Do the MAREPs provide accurate and useful information for warnings and forecasts? No preliminary filtering needs to be performed.

   (b) Quantity - Radio logs of observations should be maintained by the shore-based stations. Logs will be sent to the appropriate forecast office monthly. The forecast office will review the logs for number of observations, distribution, location (gaps), and frequency of observations. Six-month reports on the results of the review would be forwarded to NWS regional office, collated, reviewed, and forwarded to NWS headquarters. Archiving logs will be determined by NWS headquarters.

2. Impacts On Marine Weather Services

Ad hoc reports of instances in which the MAREPs resulted in the issuance of a "significantly" different forecast, amendment, or warning.

3. User Feedback--Documentation

   (a) Documentation of program changes implemented because of user feedback (e.g., forecast areas, wording, dissemination, etc.)

   (b) Training classes held

   (c) Improved relationship with the user community.

4. Cost Benefits

   (a) Costs to establish MAREP operation (NWS-funded radio equipment, computer terminal, communications, possible labor

stipend, equipment maintenance) must be justified by increased data and user satisfaction with weather services.

(b) Cost per MAREP observation should be low. Much below the $4 to $8 per observation from merchant ships transmitted through satellite or commercial coastal marine radio stations.

We have learned that there are several critical factors that must occur for a successful MAREP program. A MAREP broadcast must meet the following minimum criteria.

1. All broadcasts must be on time, every time.

2. All broadcasts must be done professionally, i.e., with a good speaking voice.

3. Broadcasts should be as helpful as possible, i.e., relay a message, repeat a broadcast, and should always be courteous.

4. National Weather Service forecasts must be written as concisely as possible with standard terminology that is understood by the listening audience. Frequently a forecast is broadcast under less than ideal radio propagation conditions.

Peggy Dyson adheres to the first three criteria religiously and her listening audience, credibility, and reputation have grown substantially. We struggle with the fourth but we have made tremendous improvements, again based upon the feedback from our listening audience. If we can emulate the quality of Peggy's service at each of our broadcast locations, the oceans would not be data-sparse regions any more. Indeed, I have watched her weather logs grow in size from the time that six months of observations easily fit into a small briefcase to now, when six months of data fill a large storage box. In 1984, Peggy collected 7,619 observations, an average of nearly 21 observations per day.

The number of observations has grown so large that the process of entering the data into the system has become very time consuming. The entering process is labor intensive and not only takes valuable time away from other duties, but can result in delays in getting the data to the forecaster. We need a computer-assisted or automated method for the data to be entered into the system.

## User Motivation Training, Education, and Publicity
Christine Hagerman-Pennisi, Moderator

I. Publicizing MAREP

One-on-one, face-to-face contact is best.

Seek out leaders in the marine community.

Sea Grant agents
1. know and have direct contact with individuals and groups
2. interact with news media, providing needs

Joint training exercises--introduce MAREP
1. in conjunction with Sea Grant training program
2. "piggy back" on existing training programs/meetings

Move forward in the development of video tape.

II. Mariners' and Base Stations' Participation in Program

Self-help does not work; a mariner will not respond.

Motivations for base station
1. money is hard to get
2. trust between mariner and base station is most important

Finding a participant base station
1. needs to be familiar with National Weather Service procedures and products
2. joint visits between Sea Grant and National Weather Service must be recurring
3. support cannot be dropped

The whole program should be kept simple and flexible. Equipment support should be provided to base stations but not normally to mariners. A phased approach, a gradual involvement with a growing program, should be used.

III. Sustaining Interest

Any program needs recognition
1. public service award
2. letter of appreciation
3. decals
4. business cards for base operator

Acknowledge the input of mariners into amendments of forecasts.

Mention MAREPs on NOAA Weather Radio but probably not boat names.

Maintain contact with visits.

Set up visits to NWS office by Sea Grant agents and mariners and base operators.

Visits should be made by forecasters to base and mariners.

Word of mouth is perhaps best, as it is self-generating.

Newsletters are useful.

IV. Dos and Do Nots

Do not dwell on "self help" to solve problems. Do not try to sell the program by saying that the mariner will get a lot from his participation. That may be true but it is not a selling point.

Do not depend on the Coast Guard for motivation efforts.

Do minimize the appearance of "elitist" government involvement.

Do listen a lot; don't tell them how to run their shops.

Do not specify times for reporting except perhaps for guidelines.

Do not expect mariner participation in a separate marine weather training program. Participation must piggy-back on an existing program.

Do find trustworthy base station operators.

Do motivate base station operators to be conscientious.

Do have uncomplicated training: reduce the amount of reading, reduce mandatory procedures, and shorten training sessions.

Role of the MAS
John Ball, Moderator

Giving Report: Stu Ross

The group, composed of people from both Sea Grant and the National Weather Service, arrived at four general conclusions. By the way, all four coasts were represented by the Sea Grant members on the panel.

First, there were some general areas of agreement. Both the NWS and MAS see significant mutual benefit to be gained in cooperating in MAREP. Specifically, the NWS sees that it will receive better data for forecasting, and the MAS sees an opportunity to train and educate clientele and to be of use to them. The general benefit is that both see the value of MAREP to their mutual concern--marine safety. Both groups see the need for a nationally recognized coidentification with MAREP so that users moving from one region to another will know that Sea Grant and the NWS are in the program together on a nationwide basis. Both see the need for better evaluation of MAREP; this was addressed in an earlier workshop report.

Both the NWS and MAS recognizes the existence and appropriateness of different regional approaches to organizing MAREP and to gathering data. In Los Angeles, for example, it might be helpful to ask for a smog forecast. Both agree that cooperation has worked well to this point, and that although changes and improvements might be made

in how things are organized between Sea Grant and the NWS, this does not seem to be a significant issue at this time.

Secondly, there were some areas of general uncertainty, as is natural between partners in any enterprise. Each seeks more certainty from the other. NWS wants specific information on the MAS role, and the MAS wants a clearer statement of the NWS mission and how MAREP fits into the overall picture so that Sea Grant can become involved more effectively.

Thirdly, the group discussed the specific role of the MAS and came up with these suggestions:

MAS can and should increase awareness of the MAREP program among both boaters and the general public.

MAS can and should, in cooperation with the NWS, identify geographic areas that most need MAREP and where the gaps in data and forecasts are.

MAS can and should identify potential base station operators and observers. The initiative in identifying these people can come from NWS or from Sea Grant; there are all kinds of variations. A base operator might begin collecting observations informally and then hook up with either NWS or Sea Grant. Or one of the groups might locate the operator or observer and bring him or her into the program.

MAS can and should be involved in educating and training base station operators and observers in how to observe and report meteorological data in a usable format so that it can mesh into a larger system.

MAS can and should participate in managing MAREP computer data systems to the extent that this proves useful for state Sea Grant programs. The groups had to face the fact that it would be difficult for all state advisory service programs to work together in a national network, but to the extent that they can, it would be advisable, and this approach has been successful in some cases.

The final conclusion is that both groups need to cooperate and indeed will cooperate.

## MIDAS Center Implementation
Ross LaPorte, Moderator

### MIDAS

The working group considered the feasibility of MIDAS (Marine Information and Data Access Service) as an operational part of the MAREP program and as a user access system. Providing information to MAREP participants at sea was recognized as being a strong feature in soliciting their information. The long-standing MAREP collection site at

Kodiak, Alaska, has a teletype circuit available for such service, and has proved the usefulness of such information. In 1984, a new MAREP collection site was established at Lewes, Delaware. Teletype service to that site was not financially feasible, so they began obtaining weather information from the Maryland MIDAS. This, likewise, has become a strong "selling point" in gathering ship reports. The group was in mutual agreement that MIDAS systems were desirable as part of the MAREP program. However, several recommendations and alterations to the Maryland system were proposed:

1. MIDAS should be a "national" commitment. However, it should not be a centralized host system. MIDAS systems should be made up of individual and distinct (state-by-state) systems.

2. Additional low-cost, efficient micros should be stand-alone units with dedicated telephone numbers. Limited access service telephone numbers would keep the costs to a minimum.

3. Unlike the Maryland system, which provides a variety of information from several NOAA functions, a hosted system would offer only applicable marine weather forecast products for that state (see item 1). A listing of other MIDAS sites and their phone numbers would be one of the products available from the menu.

4. NOAA's Ocean Information Centers (OIC) could host a larger NOAA line organization data base system (similar to that now at Maryland) as a supplement to item 3 above. This larger data base could be obtained by marine extension agents, MAREP collection sites, and the public.

5. MIDAS host systems could be physically located at a Sea Grant location, a coastal WSO, or WSFO, depending on where the largest concentration of calls emanated. This would allow the greatest number of users to have access to the service at the least cost for telephone charges.

6. A sign-on logo would identify this as a NOAA, OSG/NWS cooperative effort. Though this may be a small point, it is important "politically" that the users know who is providing the service.

7. A working committee from OSG advisory groups and the NWS regional offices should be established. This loosely knit group would consist of state Sea Grant agents and the local NWS official in charge. Its purpose would be to provide product consistency throughout the various systems, as well as to determine the addition or deletion of products on any individual system. The members of the workshop emphasized that this local working group be kept "low-key" and not become "bureaucratic."

8. All systems should incorporate PASSWORD software. This feature keeps a "tally" of various user groups, which is

helpful in identifying users. If practical, the software should keep track of which products are being obtained. This provides valuable information for decision making by the committee mentioned in item 7.

MAREP

The workshop group considered several alternatives to present and future MAREP collection sites. However, for the most part, the existing system seems to be working well and paying dividends. Only three items surfaced:

1. MAREP collection sites should be supplied with inexpensive but functional micros at NWS or Sea Grant expense. The radio equipment would be, for the most part, the responsibility of the MAREP collector.

2. MAREP collection sites should relay their reports "directly" to the NWS office. This may or may not be the MIDAS host site. The MAREPs would be incorporated into a separate (stand-alone) micro interface. Most likely, this piece of equipment would be the same micro that is used by the NWS office to upload the MIDAS system regardless of its physical location.

3. A standard computer-compatible format should be adopted for MAREPs. However, the responsibility for following this format should lie with the MAREP collectors and not the mariner. MAREPs would be accepted in any format; even "gee whiz" reports are valuable. The MAREP collector would ask the boater for desired information and put that information into the proper format. The MAREP collector would not, however, do any editing or "adaptive forecasting" of the information received. He would simply translate it into the proper format and transmit it to the NWS office. It would be the responsibility of the NWS forecaster to evaluate the validity of information.

# MEMORANDUM OF UNDERSTANDING FOR MAREP/MIDAS PROGRAM

Robert J. Shephard, Moderator

## Memorandum of Agreement (MOA) Between the National Oceanic and Atmospheric Administration's National Weather Service and the National Sea Grant College Program

### I. Purpose

The purpose of this agreement is to establish policies and administrative arrangements to provide for a working relationship between the NOAA's National Weather Service (NWS) and the National Sea Grant College Program (NSGCP), in those areas of endeavor of the Marine Reporting System (MAREP) determined to be of mutual interest and within the respective authorities of the parties.

This MOA will be entitled the NOAA NWS/OSG MAREP MOA.

### II. Background

NOAA is charged with the responsibility of developing and operating national programs related to the oceans and the atmosphere. These include: (1) management and conservation of selected marine resources for the economic and social good of the nation, and (2) monitoring and predicting weather and environmental conditions for the protection of life and property.

In connection with such programs, the National Weather Service, in 1981 began development of a Mariner Reporting Program (MAREP) that emulated the highly successful aviation Pilot Reporting System (PIREP) throughout the world. The PIREP program allows for voluntary reporting of weather conditions, as encountered by aviators. Similarly, the MAREP program was instituted to observe weather conditions at sea and have them reported back to NWS forecast offices. The NWS approached the NSGCP Office to assist in implementing this ambitious program. The Sea Grant Program is NOAA's outreach program through it's Sea Grant Marine Advisory Service (SG/MAS) agents and specialists located in every Coastal and Great Lakes state and Puerto Rico and Guam.

The fact that weather and sea conditions affect maritime activities is well recognized. By being able to operate more safely with better knowledge of adverse weather conditions, mariners will be able to derive maximum benefit from the technology and services provided them by the SG/MAS Program personnel. Accuracy and timeliness of NWS warnings and forecasts are highly dependent on weather observations in defining initial conditions. The largest concentration of mariners is within the nation's 200 mile EEZ. The need for detailed, reliable, and accessible data is greatest here, yet there are large data gaps which make this requirement difficult to meet.

It is recognized that by involving mariners and communications facilities in a voluntary, organized data gathering effort, the marine community will be contributing to improved NWS warnings and forecasts by helping to increase the "data base" in the EEZ. Voluntary assistance by mariners should be matched by improved access to NOAA marine information through normal channels such as NOAA Weather Radio and Coast Guard broadcasts, as well as dissemination through the SG/MAS program, and services provided by the private sector.

Thus, MAREP is an effort to improve marine warnings and forecasts through the voluntary participation of mariners and coastal marine ratio facilities as cooperative weather observers and data relayers.

## III. Responsibilities

The following responsibilities will be jointly carried out:

A. Seminars/workshops/meetings among state NWS personnel, Sea Grant Directors, SG/MAS officials and MAS extension agents at regional and state levels will be held. Topics covered may include, among others, program familiarization, weather requirements, how MAREPS can help, etc.

B. NWS and SG/MAS officials will arrange seminars with user groups (cross section of state's maritime community) to explain weather services, NWS need for data, propose MAREP program, explain similarities to aviation PIREP program and gain user endorsement.

C. Joint recruitment efforts will be started to find volunteer coastal ratio stations to collect and relay MAREP data. Recruitment of mariners as volunteer observers will be implemented.

D. Both parties will participate in publicity, training of mariners and radio operators, arranging reporting/relay schedules, assistance in FCC radio licensing NWS provision of microcomputer terminals to radio stations, training on the use of terminals to relay observations and retrieve updated products.

E. Development and implementation of an information payback system for rewarding mariner participation.

F. Periodic meetings will be held to review MAREP efforts and refine the program. The objective will be to develop, in the marine community, a sense of permanent, self-help cooperation such that MAREP reporting should be a regular part of a mariner's routine.

G. Support involvement of the private meteorological and oceanographic sectors in the MAREP program in terms of improving specialized environmental services to marine interests.

## SPEAKERS AND PANEL MODERATORS

John Ball
Northwest Ocean Service Center Bin C15700
NOAA
7600 Sand Point Way N.E.
Seattle, WA 98115-0070
(206) 526-6105

Jack Bazhan
Federal Communications Commission
3605 132nd Avenue S.E.
Bellvue, WA 98006

Ronald E. Becker
Louisiana Sea Grant College Program
133 Wetland Resources Bldg.
Louisiana State University
Baton Rouge, LA 70803-7507
(504) 388-6345

Robert B. Buerger
New York Sea Grant College Program
Marine Sciences Research Ctr.
SUNY
Stony Brook, NY 11794
(516) 246-7777

Paul Coreil
Louisiana Sea Grant Marine Advisory Program
P.O. Drawer H
Cameron, LA 70631
(318) 775-5516

John Doyle
Alaska Sea Grant Marine Advisory Program
P.O. Box 103160
Anchorage, AK 99510
(907) 274-9691

Josie Dyas
Forrest Avenue
Westport, WA 98595

Christine Hagerman-Pennisi
Illinois-Indiana Sea Grant Program
Suite 206
17500 Oak Park Avenue
Tinley Park, IL 60477
(312) 532-4369

Paul A. Jacobs
National Weather Service W/OM12
NOAA
Gramax Building
Silver Spring, MD 20910
(301) 427-7278

Robert C. Landis
National Weather Service W/OM12
NOAA
Gramax Building
Silver Spring, MD 20910
(301) 427-7278

Ross LaPorte
National Weather Service
Forecast Office
World Weather Bldg., Room 302
5200 Auth Road
Washington, DC 20233

Kenneth Lilly
National Weather Service W/WR1X5
Western Region
Box 11188 Federal Building
125 S. State Street
Salt Lake City, UT 84147

Kevin C. McCarthy
National Weather Service Eastern Region
NOAA
146 Sylva Road
New Babylon, NY 11703
(516) 228-5456

Michael Morrow
National Weather Service
Forecast Office
Honolulu International Airport
Honolulu, HI 96819

Richard C. Przywarty
National Weather Service
701 C. Street, Box 23
Anchorage, AK 99513
(907) 271-5131

James Salevan
Marine Fisheries Specialist
Delaware Sea Grant College Program
Marine Advisory Service
University of Delaware
Lewes, DE 19958
(302) 645-4250

Robert J. Shephard
Office of Sea Grant
NOAA
6010 Executive Boulevard
Rockville, MD 20852
(301) 443-8886

Johnny Smith
National Weather Service W/CR1X2
Central Region
601 E. 12th Street, Room 1836
Kansas City, MO 64106

Gary Soulsby
Federal Communications Commission
3605 132nd Avenue S.E.
Bellvue, WA 98006

Stanley Spivey
National Weather Service W/SRX3
Southern Region
819 Taylor Street, Room 10A26
Fort Worth, TX 76102

William L. Stubblefield
Office of Sea Grant R/SE-1
NOAA
6010 Executive Boulevard
Rockville, MD 20852
(301) 443-8865

David Veal
Mississippi Sea Grant Advisory Services
4646 W. Beach Blvd., Suite 1E
Biloxi, MS 39531
(601) 388-4710

Donald R. Whitman, Chief
Data Acquisition Division
National Weather Service
Central Region
601 East 12th Street
Kansas City, MO 64106
(816) 374-3226

Edward Young
National Weather Service W/SR1X21
Southern Region
819 Taylor Street, Room 10A26
Fort Worth, TX 76102