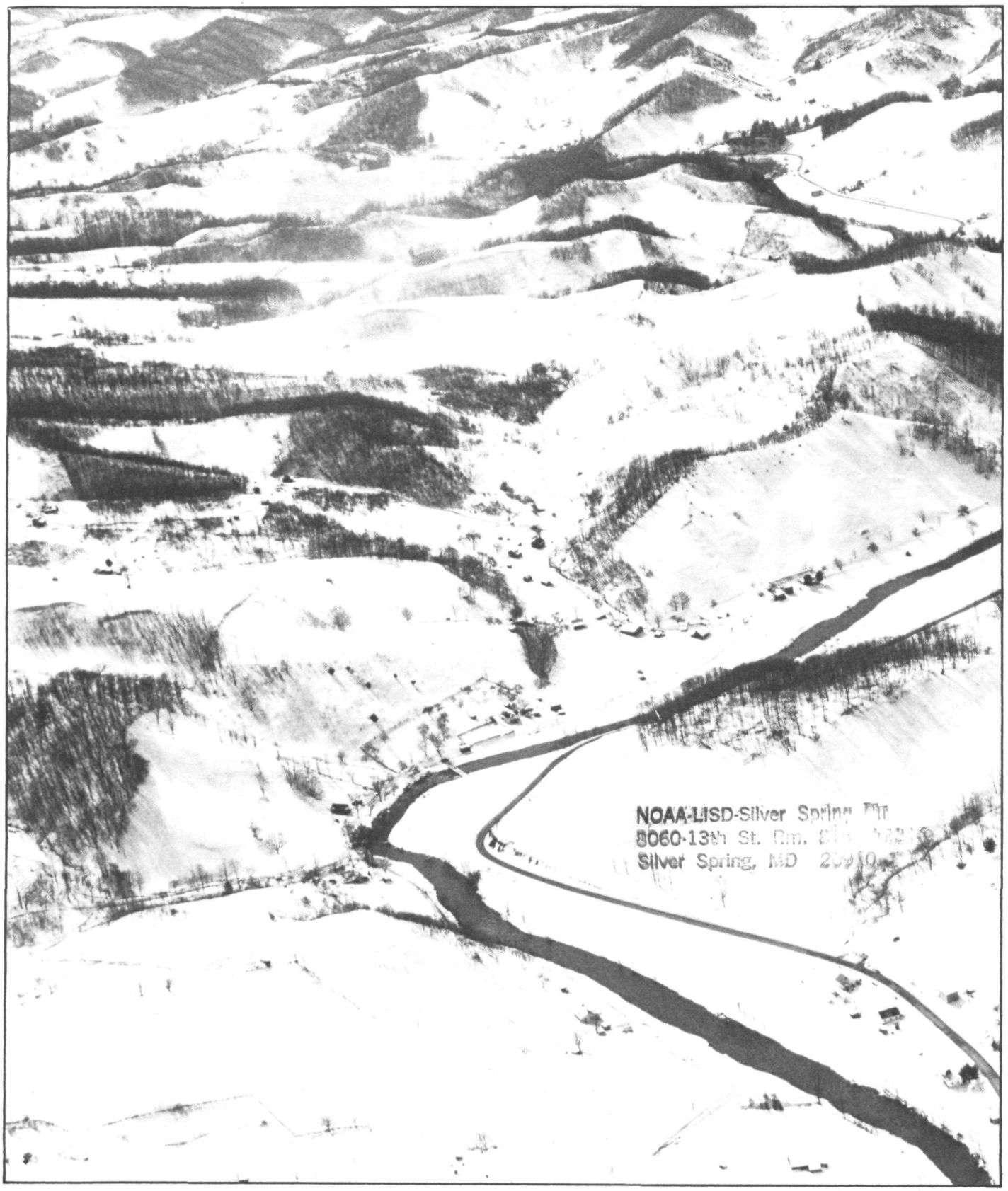
Volume 13 Number 1 Winter 1983

noaa



NOAA-LISD-Silver Spring
8060-13th St. Rm.
Silver Spring, MD

National Oceanic and Atmospheric Administration

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov

HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
July 23, 2010

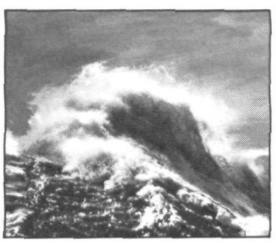
Volume 13

Number 1

Winter 1983

noaa

COVER: A winter snowscape, courtesy of the American Red Cross.



Story page 10

Story page 16

Story page 20

Story page 23

Newsline 3

Fishermen Help Themselves To Improved Weather Services 4
MAREP spells a fair swap for mariners and meteorologists

Profiling the Atmosphere 7
A new system for upper-air weather soundings emerges.

View from Space 9
Landsat: A Sharp Eye in the Sky.

Peril of the Rogue Waves 10
Weather Service studies "freak" waves which endanger mariners.

Directions 14

Automating NOAA's Shipwreck File 16
Introducing what may be the ultimate source of shipwreck information.

Hypothermia: Deep and Deadly Chill 18
Getting wet in cold weather can kill you.

Banner Days In Baltimore 20
"NOAA Week" attracts thousands to agency exhibits.

NOAA Center Taking Shape in Seattle 23
A progress report on the Western Regional Center, opening this year.

Seafare 27
Try Chowder for a Change.

U.S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
Dr. John V. Byrne, Administrator

A. Joseph LaCovey
Director, Public Affairs

Thomas B. Calhoun
Art Director

NOAA (USPS 417-370) is published quarterly by the Office of Public Affairs, National Oceanic and Atmospheric Administration, Rockville, Md. 20852, to acquaint readers with the policies and programs of the agency. The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget.

Views expressed by authors do not necessarily reflect NOAA policy. No permission necessary to reproduce contents except copyright photos and other material so designated.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Second Class postage paid to Finance Dept., USPS, Washington, D.C. 20260.

Newsline

Winter '83: Mixed Bag, But Moderate

By the time you read this, you'll have an idea of how well it all worked out. Dr. Donald L. Gilman, chief of the National Weather Service's predictions branch, flew in the faces of the caterpillar-and-treebark watchers recently to predict that this winter will be milder than normal on the east coast, colder over most of the west, and wetter than usual everywhere except along the nation's northern rim. He said the chances of a relatively cold season exceed 55 percent from the Great Plains westward everywhere except along the Mexican border and in the far northwest. They exceed 60 percent from western Kansas and Nebraska through the Rockies and Great Basin to central California and reach a maximum of 70 percent in the basin areas surrounding the Great Salt Lake. The chances of a relatively wet winter were said to exceed 55 percent in most of the South, the lower Midwest, and the East Coast states as far north as New York and Connecticut, reaching 60 percent in the Ohio-Tennessee Valleys and coastal states from Delaware to Florida. The probability of a wet season also exceeds 55 percent from New Mexico, Colorado, and Wyoming southwestward to Southern California and reaches 60 percent in Utah and adjacent parts of Arizona and Nevada.

Science Study: Bering On The Rocks

Where does the pack ice go in the Bering Sea? This winter NOAA scientists will investigate it, prior to developing a theoretical computer model for use in forecasting ice position changes. The knowledge will affect design and placement of offshore oil rigs, prediction of safe routes for tankers and resupply craft, and the work of vessels involved in the Bering $570 million-a-year fishing industry. The ice edge, according to James E. Overland of the Pacific Marine Environmental Laboratory, continually moves into and away from the open water. Science needs to learn more about how motion, shape alteration, and melting contribute to the ice edge's location and properties. Weather's involved, too. When the winter wind blows off the ice pack toward the open ocean, the ice advances into the sea and the floes along the edge are pushed into warmer water. When the wind shifts, blowing back, the ice is driven to the north and is recompacted. This is believed to cause fractures, rafting, and ridging far into the pack.

Fish Sales Soar At Paris Food Show

Good news for U.S. seafood exporters and Atlantic tuna fishermen: the exporters recently wrote a record $20 million in product orders at the NOAA-sponsored exhibit at the SIAL World Food Fair in Paris; William B. Folson of the National Marine Fisheries Service said results far exceeded expectations. American companies exhibiting at the international food show also reported more than 1400 sales leads and nearly 100 contacts with foreign businessmen and women interested in representing U.S. producers. As to the fishermen, the International Commission for the Conservation of Atlantic Tuna has increased the number of bluefin that can be caught next year in the western Atlantic from the current 1160 metric tons to 2660. The reason: 1982 catches were too low to allow setting of conservation levels with sufficient accuracy. The U.S. share will rise from 605 metric tons to 1387; Canada's from 250 to 573; and Japan's from 305 to 699.

Major Mineral Find In Atlantic

The largest deposit of valuable metallic minerals ever found on a slow-spreading ocean ridge has been discovered 10,000 feet below the surface of the Atlantic, 1800 miles east of Miami. It is rich in manganese, for which the U.S. depends wholly upon imports; and large deposits containing copper, zinc, and silver may lie under it, according to a team of oceanographers who investigated the area, in the submersible Alvin. The group included Dr. Peter Rona of NOAA, chief scientist; Drs. Geoffrey Thompson, Michael Nottl, and Jeffrey Karson of Woods Hole Oceanographic Institution; and Karen Von Damm of the Massachusetts Institute of Technology. Rona said intermittent deposits were found in an area two miles long and a mile wide on the wall of the rift valley of the mid-Atlantic Ridge, a volcanic mountain range running down the middle of the ocean.

Canada Leaf Boon to Snowmakers

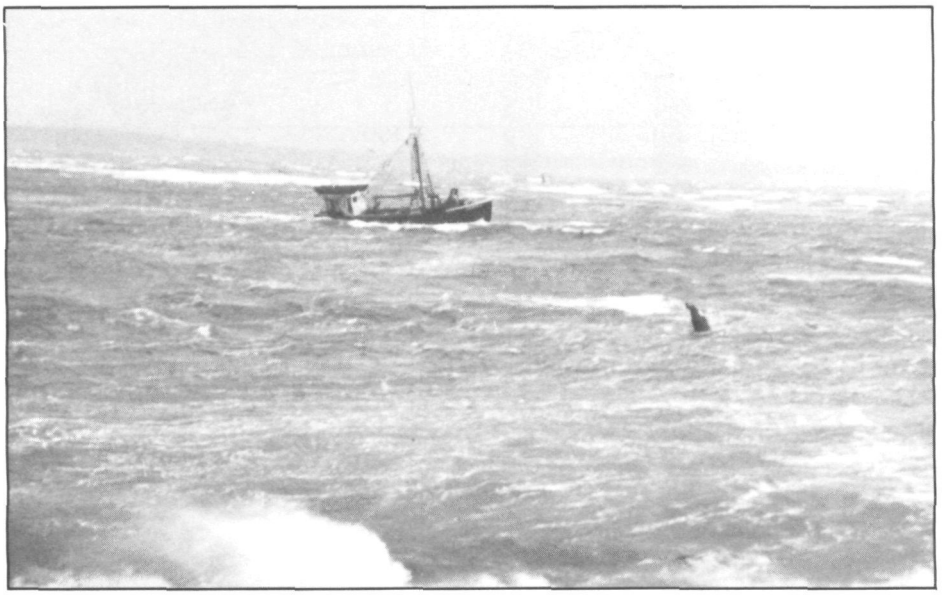
NOAA is nothing if not versatile. Shortly after the announcement of the major mineral discovery 10,000 feet below the Atlantic surface came another fascinating find thousands of miles away. Leaves from a tree in Alberta, Canada, may bring longer ski seasons and major savings to the $125-million-a-year snowmaking industry. Dr. Russell C. Schnell of the Cooperative Institute for Research in Environmental Sciences, a joint NOAA-University of Colorado research group, has shown that adding an ice catalyst—derived from the leaves—to water used for snowmaking increases the snow yield substantially, and often cuts associated energy costs by as much as one-quarter. It also appears the system can produce artificial snow earlier than usual in the ski season, at warmer-than-usual temperatures. Ski operators worldwide spend at least $125 million annually to make snow, approximately $70 million of it in energy costs, according to industry sources.

Sharp-Eyed Laser May Aid Forecasters

A laser beam device which automatically signals the difference between rain and snow has been developed by NOAA for possible use at unmanned weather stations. The laser weather identifier produces different signals when raindrops, snowflakes, or hail pass through its beam, according to Dr. Ting-i Wang, until recently a scientist at NOAA's Environmental Research Laboratories. Several prototypes are being tested at weather stations throughout the United States, where personnel are interpreting the signals, but Wang said the instrument can be computer-read and data integrated into the present weather networks. In addition to identifying the different types of precipitation, the identifier lets scientists measure the total water falling on the ground over a relatively large area, information useful for hydrology studies, agricultural irrigation systems, and flash-flood warnings. The device might be modified for use at unmanned airports to tell pilots if precipitation were rain or snow.

Airborne Doppler Data Valuable

As a hurricane, September's storm Debby barely made the grade. But NOAA scientists consider it memorable anyway. During Debby's 5-day life as an Atlantic hurricane scientists demonstrated that Doppler radar can be used in aircraft, and that instrument packages parachuted into the storm's path can provide forecasters a wide range of data almost instantly. Temperature, humidity, wind, and pressure readings were sent from descending dropwindsondes to the National Hurricane Center and National Meteorological Center, according to Dr. Stanley L. Rosenthal, director of the National Hurricane Research Laboratory. The information was incorporated into forecasts at the National Hurricane Center and combined with other global weather data for computer-prepared guidance to National Weather Service offices at the National Meteorological Center. Scientists, for the first time, used Doppler radar from aircraft during Debby, overcoming vibration and antenna stabilization problems some had considered insuperable.



When the going gets rough weather information is especially valuable to the fisherman.

Fishermen Help Themselves To Improved Weather Services

Christine Duerr and
Capt. Charles H. Nixon

As the 83-foot stern trawler began to haul up its net from the bottom of the North Atlantic, the winds began to intensify. Within a brief hour the weather changed drastically, and the vessel had moved from clear skies and gentle ocean swells to an area of 60-knot winds and 20-foot seas as it fought its way to home port and safety.

Situations like this are not that uncommon for those who make their living from the sea. Boats fishing 10 hours away from port which receive notice that bad weather is 4 hours away are at the mercy of the elements and must weather the storm as best they can. For the deepsea fisherman, bad weather "comes with the territory."

The National Weather Service is well aware of the fact that the consequences of storms at sea may be much more severe than storms on land. As early as 1902 the old Weather Bureau was sending forecasts by "wireless" to ships at sea. In 1905, the first radio weather report was received from a ship at sea.

Today, as at the turn of the century, a major difficulty facing weather forecasters is an insufficient network of reporting stations from ocean areas.

A novel system of filling in the data gaps is now underway in the Northeast by NOAA, the fishing industry, and the University of Rhode Island. Weather reports received from vessels fishing on Georges Bank to Wilmington Canyon off the Delaware coast are fed to the National Weather Service for use in updating marine forecasts. In exchange for the fleet's information, revised forecasts are relayed back to them for use in deciding whether to continue fishing or return to port.

MAREP Is Born

The vessel weather reporting system called the Mariner Report (MAREP) Program was born out of a forum established in March, 1981, under the leadership of Paul A. Jacobs, chief of the NWS Marine Weather Services Branch. Around 20 representatives from the commercial fishing industry, the Coast Guard, the Sea Grant Program, the NWS, state fisheries agencies and the New England Safe Boating Council sit on the forum, initially chaired by Howard Nickerson of the New England Fisheries Steering Committee.

The forum was charged with exploring ways to improve marine weather forecasts, and it was clearly evident that a better knowledge of what was happening at sea was central to the group's objective.

From North Carolina to Maine, there are only four offshore buoys which transmit weather data hourly. These provide valuable information, but each buoy represents an outlay of $200,000 a year. Also, because the sea is such a harsh environment, maintenance is difficult. The Georges Bank buoy, a particularly important one to fishermen, is among them. Some reports are received from commercial vessel traffic, but these are often not from the major fishing grounds. The best solution, then, seemed to lie in obtaining reports directly from fishermen at sea. "Since fishermen are literally observers at sea, they have the capacity, ability, and the willingness to make these reports and to relay these

(Christine Duerr is a marine affairs writer at the University of Rhode Island. Capt. Nixon is a NOAA Corps officer.)

back to the Weather Service. We find this a tremendous benefit to the forecast program, which in turn, benefits the mariner," says Jacobs.

The concept is not an entirely new one. For years, an Alaskan fisherman's wife, Peggy Dyson, has been relaying vessel reports to the weather service and broadcasting weather information to the Alaskan fleet. In New England, the crucial task of overseeing communications between the fishing industry and the NWS was given to the University of Rhode Island's Duncan Amos. Working closely with him as the liaison to the Boston weather office was Charles H. Nixon, a NOAA Corps captain, who was on assignment to URI.

Reluctant Reporters

Amos, who is familiar with fishermen around the world, knew that despite the need fishermen have for better information, they would be reluctant to report on weather if they had to reveal their location. Competition in the Northeast is so fierce between boats that fishermen are notorious for refusing to tell their own family members where they were fishing for the day. The best chances for the program to succeed appeared to lie in working through an established organization within the commercial fishing industry which would be willing to conduct the pilot program.

The obvious choice was the Point Judith Fisherman's Co-operative, one of the leading fishery co-operatives in the United States. Over the years, URI has established a close working relationship with the Co-op through its gear research and other fishery-related programs. After only one meeting with the board of directors, the Co-op offered its commitment to the project. Under the new arrangement, Co-op personnel would man the radio station, with the URI Sea Grant Program paying for personnel costs during the first year of the pilot project.

The next step was to establish a radio station at the Co-op's headquarters in Galilee, R.I. consisting of a Co-op-supplied single sideband radio, and a telecopier, furnished by the National Weather Service. Co-op personnel attend the radio at 7 a.m. and at noon to receive reports from boats which are then relayed via the telecopier to Boston. Around 10 a.m. the NWS issues an updated forecast to the Co-op, which is then broadcast to the boats. In addition, a specially prepared 36-hour prognostic weather chart is received at the Co-op and posted on its bulletin board.

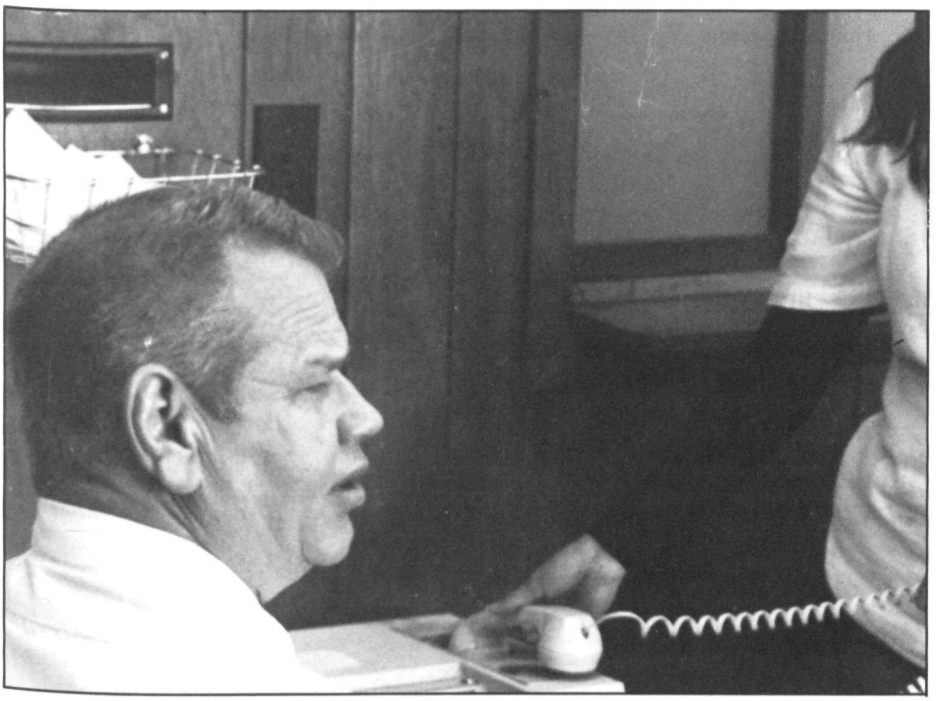
To promote the project, weather reporting folders were provided to all Co-op vessels when the captains picked up their weekly settlement sheets. Folders have also been distributed to fishermen in other ports such as Shinnecock, New Bedford, and Newport. Inside the folder are log sheets asking for information on wind speed and direction, wave height, swell, surface, and air temperature, weather and visibility conditions, and other significant weather events such as gusty winds or freezing spray. To avoid the problem of revealing fishing grounds fishermen are asked to give only a general location.

The program began in August of 1981 on a trial basis, Mondays through Fridays. The first caller was Captain Richard Champlin of the F/V Allyson and a member of the Co-op's board of directors. As the program progressed, reports came in from fishermen in other areas and, also, from non-fishermen. One of the most faithful reporters during the first few weeks was the dive boat for the Andrea Doria salvage team, which, of course, was extremely concerned with weather conditions.

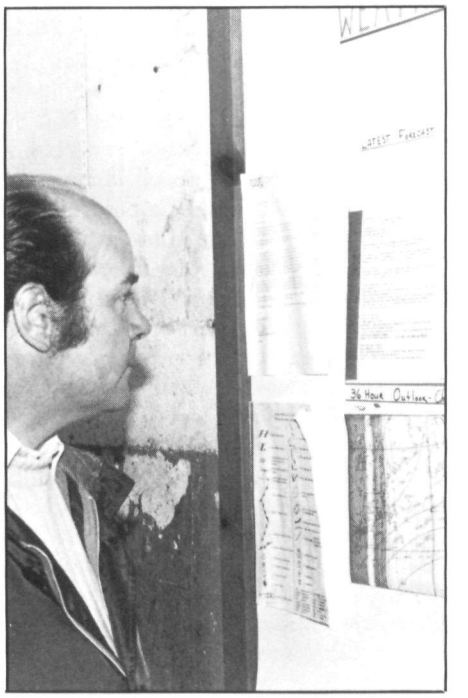
It didn't take too long for Co-op operators to figure out that there were many more boats listening then were calling in. Nina Lockhart, one of the Co-op employees who started with the program, would sometimes open up with an intriguing reference to fish prices for the day. When boats would call in for further explanation, she would require a weather report before answering the query. "Other operators would withhold answers to boats asking about the weather forecasts until the boats filed a report," adds Amos.

At those times when a storm is developing south of Rhode Island, it becomes

Rod Winslow (left) of the Weather Services Boston office supervises transmission of weather data. Duncan Amos (below) checks the co-op weather board.



Credit: Chris Duerr



clear that the reports are being used by the fishermen. They will call in between broadcasts to ask about the latest reports from the boats and the Weather Service's prognosis. The answer helps them decide whether to fish for a few more hours—time which can make the difference between having a good trip of fish or a "broker" trip which won't even meet expenses.

At the Weather Service's Boston office, Rodney C. Winslow reports being extremely pleased with the MAREP returns they have been getting—from 100 to 150 a month. "Even though the daily numbers aren't large, the fact remains that before we weren't getting any," he points out. These reports have helped forecasters in pinning down the exact location of low pressure centers and in issuing small craft advisories and warnings much sooner.

In November of 1981, after the program's initial trial period, the MAREP system went to 7 days a week. Operators also began accepting reports over a VHF channel. Since many Point Judith boats, particularly nearshore boats, lacked single sideband radios, program leaders felt that fishermen with VHF would also send in reports providing information about nearshore areas.

As fog settles in, many fishing boats stay at dockside, but the fishing ground may be clear. MAREP may help these vessels turn a profit in spite of discouraging local conditions.

Program Spreading

The success of MAREPs had encouraged Maine fishermen to begin planning for a program centered in the Gulf of Maine. Gail Johnson, of the Maine Fishermen's Wives, has been leading efforts to establish a MAREP program in Portland, with the help of the Universities of Maine and New Hampshire and the Maine Fishermen's Co-operative and the Portland office of the NWS. Recreational boaters also have been benefiting from the reports. During the summer of 1982, a Marshfield ham operator and recreational boater, Warren Waitkus, collected reports from Massachusetts Bay and relayed these to the Boston NWS. He then rebroadcast forecasts to those in his listening area. In late August, the Pt. Judith Fisherman's Coop added an additional 7 a.m. broadcast of forecasts to vessels sailing in the BOC round-the-world, single-handed sailing race which left Newport, R.I.

The success of the New England and Alaska MAREP has led to establishment of programs in Washington and Oregon, and plans for similar programs in the Carolinas. Thus, what may be emerging is a network of coastal radio stations for the collection of hundreds of reports daily, enabling forecasters to respond with greatly improved marine services.

Coincident with these developments, a recent study by the National Advisory Committee on Oceans and Atmosphere on NWS services includes a recommendation that the Federal Communications Commission liberalize its licensing and regulatory policies regarding "limited coastal radio stations." This recommendation, if accepted, would be a shot in the arm for developing a national MAREP system.

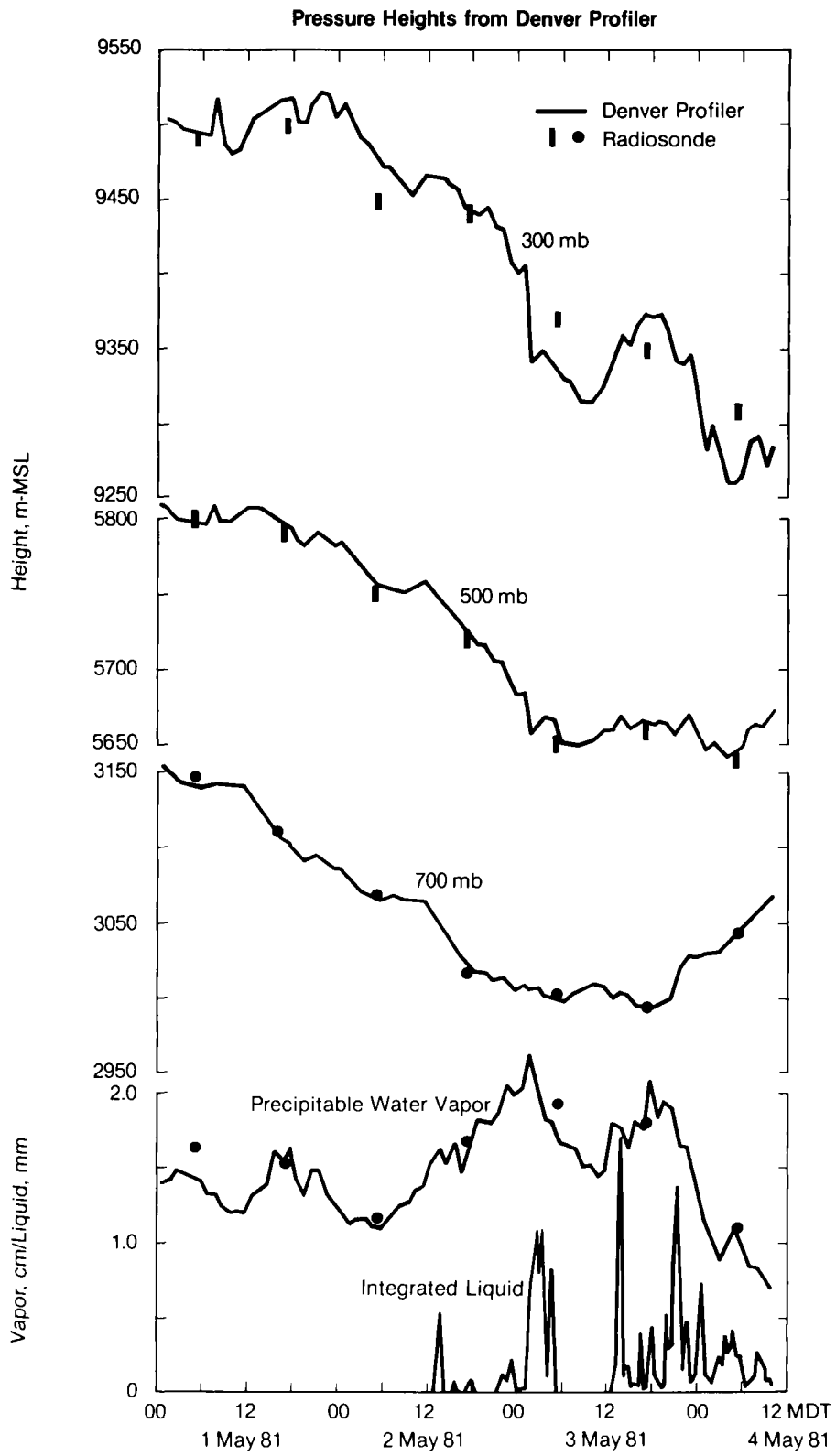
Besides the MAREP program, there have been other changes resulting from the establishment of communication lines between the NWS and the commercial fishing industry. On the basis of input from the fishing industry, forecast areas in the Atlantic will be broken down into major oceanographic features, such as canyons, rather than in latitude and longitude, since fishermen navigate primarily with the use of Loran C bearings.

Another new feature added as a result of the Marine Users' Forum is a plan to produce a Marine Weather Package for broadcast on coastal NOAA Weather Radio VHF stations in the early morning. NOAA Weather Radio was designed as a 24-hour-a-day mass dissemination broadcast to the public of weather forecasts and warnings. It includes information for both the general and marine publics. Since pre-dawn listeners are primarily fishermen and other mariners who must get an early start, it seemed logical to design a comprehensive marine-only package for early morning broadcast unencumbered by information of little or no interest to the mariner.

Jacobs explains that this broadcast package will include a weather synopsis, coastal and offshore forecasts, advisories and/or warnings, a radar summary, buoy and platform reports, and coastal observations. The 5-minute marine-only package will come on the air at about 3:30 a.m. and will be broadcast for about a half-hour without interruption. This new service has been tested successfully on the Boston and Hyannis NOAA Weather Radio stations since December 1981.

The true worth of these cooperative efforts to improve marine weather forecasting is hard to quantify. However, in a region and in an industry where weather information is closely bound to safe, economical operations, the Mariner's Reporting System is a positive self-help step forward for America's fisheries. ■

NOAA Profiles the Atmosphere



Close agreement is seen between the Denver Profiler readings taken every 20 minutes and forming an almost continuous record, and the conventional radiosonde readings made at 1-hour intervals and appearing as a series of points with no intervening data.

William J. Brennan

At some point in the future weather forecasters may be spared what surely must rank as one of the more burdensome tasks of their profession—launching weather balloons every 12 hours on the hottest, coldest, stormiest days and nights. And the research development which may make this possible also will make most of the data gathered by balloons available every 20 minutes rather than every 12 hours.

This is one promise of the Profiler, a system of data collection instruments tied into a computer and now being tested by NOAA's Environmental Research Laboratories at the Denver Weather Service Forecast Office. The profile being made is of significant features of the Earth's atmosphere such as pressure, temperature, and moisture content, data vital to weather forecasters.

A product of ERL's Wave Propagation Laboratory, the Profiler is one of those imaginative systems which not only opens up new research opportunities, but also has the potential for revolutionizing operational procedures. Its ability to measure meteorological parameters continuously in time, as compared with radiosonde data obtained operationally in the U.S. once every 12 hours, and for research purposes rarely more than once every 3 hours, is its strongest suit, making it a system everyone is watching with great interest.

The solution, of course, was to tie these instruments, as well as more conventional surface instruments such as anemometers, together by computer, generating atmospheric profiles equivalent to those provided by a radiosonde. Since all but the VHF radar were on-site at the Denver WSFO—the VHF radar is at another location 30 miles northeast of Denver—it was a relatively simple process for those wise in the ways of computers to make the hook-up. The resulting system not only gave profiles on a near-continuous basis, it pretty much operated itself, in fair weather or foul, with no moving parts in the remote-sensing instruments. The human factor in obtaining profiles had been pretty much eliminated, aside from reading computer print-outs.

Data for PROFS

The Profiler is currently supporting a study aimed at improving local-area weather forecasting; the PROFS (Prototype Regional Observing and Forecasting Service) project. This effort seeks to make weather data from all existing sources and instrumentation available to forecasters in a variety of computerized formats. It is a state-of-the-art effort, stretching existing weather data-collecting instruments and computer processing to their limits.

In surveying existing sensors—remote and "in-site"—Dr. David C. Hogg of the Wave Propagation Laboratory was struck with the realization that ground-based instruments were available which, in total, provided all the measurements that balloon-borne radiosondes provide; winds, temperature, humidity and pressure. The only problem was that no single instrument provided all. A VHF radar, originally built by ERL's Aeronomy Laboratory, and a new UHF Doppler radar supplemented one another in measuring winds at varying altitudes. A dual-channel radiometer had the ability to measure total water vapor and liquid in a vertical column of the atmosphere above it, while a four-channel millimeter-wave radiometer could measure temperature profiles. When data from the two were combined with surface data, humidity profiles also became available.

Advantages Cited

Operationally, if the Profiler is shown to be cost-effective in comparison with balloon-launched radiosondes, there will be a number of potential advantages:

- Numerical weather predictions from NOAA's National Meteorological Center in Camp Springs, Md., currently are tied to the 12-hour cycle of the radiosonde upper air network. Vertical profiles available continuously would allow more frequent updating of the NMC models, continuous monitoring of evolving meteorological fields with resulting improved analysis, fine-tuning of the models, and input of both temporal averages and time derivatives to the models.
- Local weather forecasters at Weather Service Forecast Offices could use Profiler-provided data to update and adjust their own area forecasts on a continuous basis.
- Continuously available Profiler data could serve as invaluable input to simple physical models being developed for short-term (three to six hours) forecasting.

But the potential for the Profiler doesn't end there. Researchers see great advantages to the availability of data continuously, and as a matter of fact a strong plea for the loan of a Profiler system has been received from the Meteorology Department of the Penn State University; a request that had to be denied in view of the fact that only the single prototype system at the Denver WSFO exists.

Profiler Applications

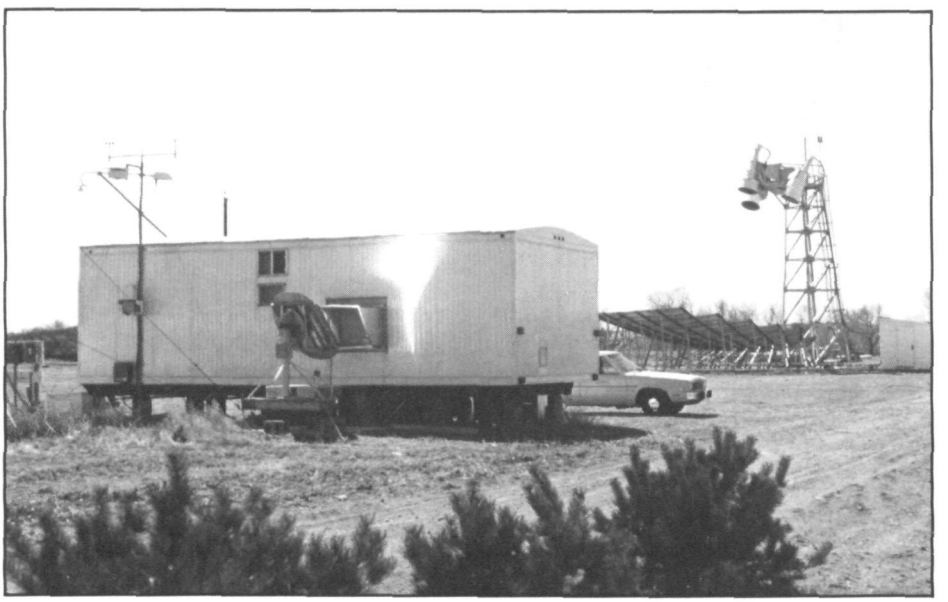
Prediction of weather phenomena such as fronts, thunderstorms, flash floods, chinook winds and land-sea breezes are among those to which Profiler data could be applied, giving instantaneous, continuous vertical profiles prior to and during the events.

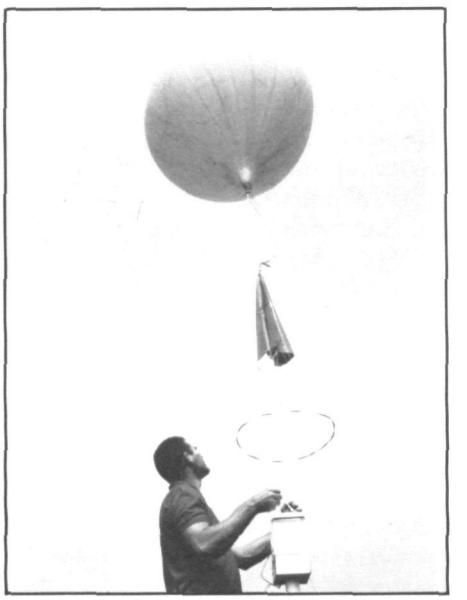
In general, Hogg believes that modelling each different atmospheric phenomenon will require Profiler data sets specifically created for the specific purpose. And, since all meteorological phenomena do not occur in a given geographical area, or on a given spatial scale, at least some of the future Profilers undoubtedly will be transportable.

This latest point, alone, hints at the problems still facing Hogg and his colleagues in the Wave Propagation Laboratory. Not only must they somehow create a production model of the Profiler that is more cost effective than present-day radiosonde balloon launches—itself a gigantic challenge; they also have to think in terms of at least some systems designed for mobility.

The challenges are not unique at the Environmental Research Laboratories, however. There is precedent for solving such problems. And when the problems are solved, when the potential of the Profiler has been fully demonstrated, and the money found for Profilers to become a standard piece of equipment at forecast offices in the sometime future, official personnel not only can anticipate improved forecasting results, but also the demise of a sometime-disagreeable job-related task, the launching of radiosondes. ■

An unobtrusive trailer houses the Denver Profiler which may some day replace the cumbersome radiosonde.





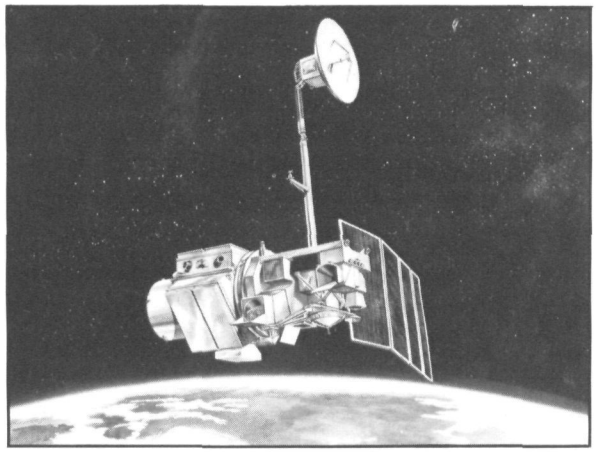
VIEW FROM SPACE

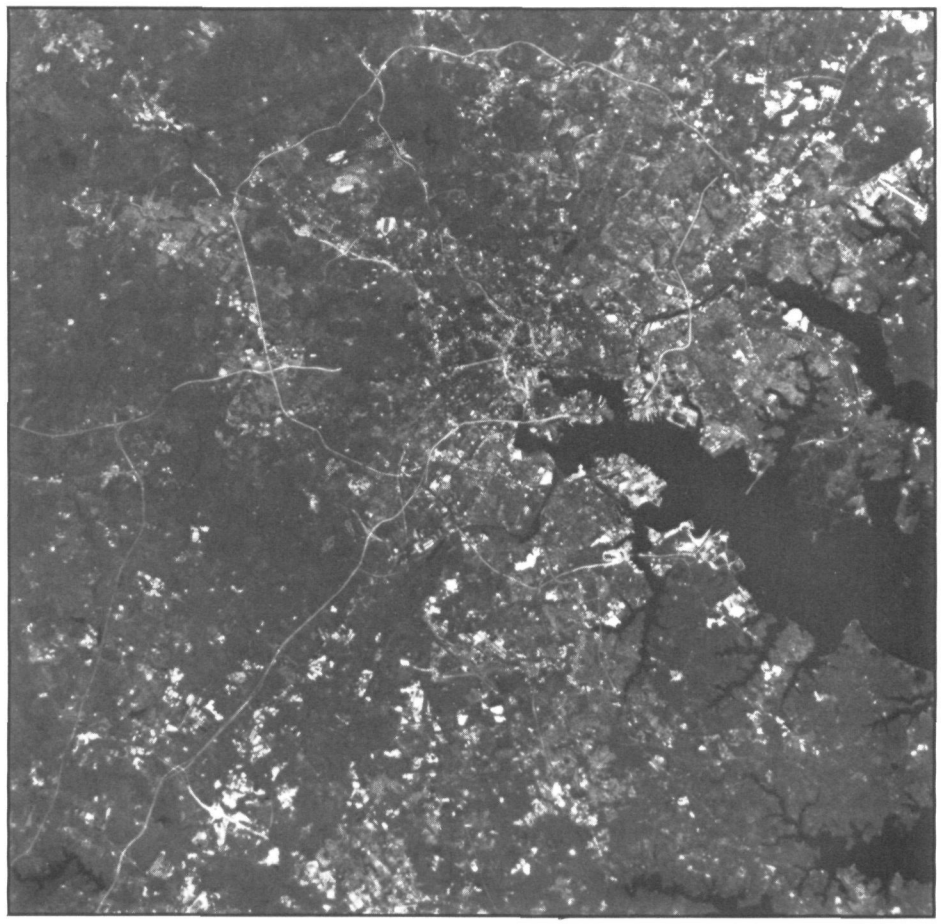
Landsat: A Sharp Eye in the Sky

This photograph of Baltimore was taken from an altitude of approximately 430 miles on July 29 from the Landsat 4 satellite. The satellite, launched by NASA in mid-July, came under the operation of NOAA on Jan. 31, 1983. The satellite contains a new thematic mapper which gives a resolution of 30 meters. The runways of Baltimore-Washington International Airport are seen in the lower center of the photo and the Baltimore Airpark runways can be seen in the upper right. Major arterial transportation systems are also seen.

The satellite, in polar orbit, makes 14.5 passes around the earth each 24 hours and repeats an area every 16 days. Each Landsat scene covers an area of 115 x 115 miles.

The Landsat program has been an experimental one conducted by NASA for approximately 10 years. Imagery from the satellite is used to help forecast crop yields, manage rangelands and forests, explore for minerals and petroleum, assess water quality, gauge the effects of natural disasters, and plan land use. ■





Peril of the Rogue Waves

"... their crests sweep up in a furious anger... until their front forms an almost perpendicular wall of green rushing water that smashes on a ship's deck, flattening steel bulwarks, snapping 2-inch steel stanchions, and crushing deckhouse and lifeboats like egg shells..."

(*Shackleton's Boat Journey,* Cdr. F. A. Worsley, 1916)

Don Witten

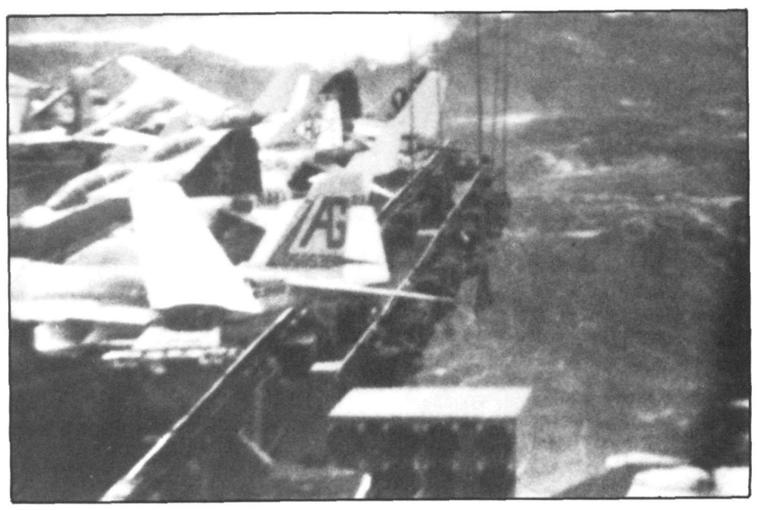
They are called "freak" waves, rogue waves, episodic, pyramidal, and even solitary waves. Regardless of what name they go by, the dangerously large ocean waves that sometimes appear in storms command the utmost respect from all mariners.

No wonder! Such waves have crushed the superstructures of numerous ships and have sent less fortunate ones to a watery grave.

In April 1966, the Italian liner "Michelangelo" was struck by a massive wave which suddenly towered high over the 25-30 foot storm waves through which the vessel was sailing 800 miles east of New York. Steel superstructures gave way, water smashed through inch-thick glass windshields 81 feet above the waterline, and the bulkhead under the bridge was forced back 10 feet. Three people perished and 12 others were injured.

The Cypriot tanker "Cretan Star" was less fortunate: she vanished in a storm 400 miles southwest of Bombay, India, with a loss of all hands in 1976. The final radio message from the ship reported that she had been hit by a huge wave.

What can be done about such waves when they are encountered unexpectedly? Not too much other than try to negotiate them. But, if one knows where to expect such massive waves, they might be avoided.



A huge wave, more than 50 feet tall (above) rushes toward a tanker in the Bay of Biscay during a winter storm. At left, another giant wave as seen from the deck of the aircraft carrier USS Independence.

Forecasting the individual large wave is not possible. But NOAA is trying to learn more about them in order to identify the conditions and locations most probable for their development.

Observations Needed

The National Weather Service, has issued an international call for special wave observations to the 1,600 cooperative observers aboard the American and foreign vessels who voluntarily participate in the U.S. Cooperative Ship Observing Program. The call was published in the summer issue of NOAA's *Mariners Weather Log,* distributed quarterly to the observers.

Daily observations radioed from these cooperative observers are vital to the marine weather warnings and forecasts issued by the National Weather Service. Additional sources of observations for these forecasts include satellite imagery, automated buoys, offshore platforms, the U.S. Coast Guard, and others.

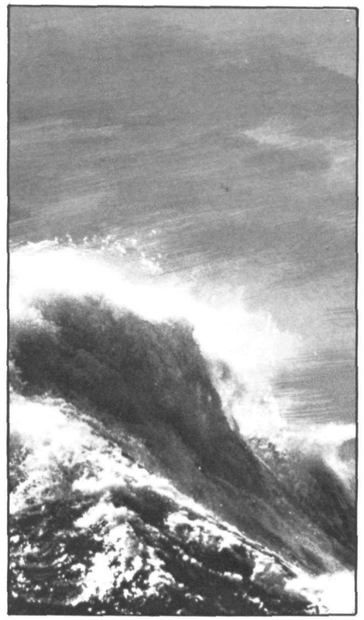
Large, storm-spawned waves are different from tsunamis, the so-called "tidal waves" which are created by undersea earthquakes or volcanic eruptions. In the open ocean, tsunamis travel at speeds up to 500 miles an hour at heights of only a few inches. They slow down and steepen when they reach the shore where they can tower 100 feet high or more.

"Ocean waves in general have been studied for years. But, because of limited and often-disputed observations, too little is known about the large, anomalous waves or the conditions under which they form," Jerry Nickerson, Marine Observations Program Leader at the Weather Service, says.

With the exception of tsunamis, all ocean waves are produced basically by the stress of the wind on the water. The waves travel in trains of varying frequency, energy, and speed. When waves from two different storms meet, their energy can combine to produce exceptionally large waves. Such a wave can be a mass of water measuring many stories high. It lives temporarily, sometimes advancing across the ocean, sometimes breaking to produce an avalanche of tons of dead weight.

Although unusually large waves generally are associated with storms, a number of other factors contribute to their development, including currents, water depth, and shore topography.

The swift-moving Agulhas Current and a narrow, continental shelf along the coast of the Cape of Good Hope in South Africa, for example, contribute to the development of large waves in this area. Waves towering as high as 100 feet can be expected here at least once every 5 years on the average, according to a study by Robert Quayle of NOAA's National Climatic Center.



The bane of the mariner—great, long-crested ocean waves—can form in far-distant storms and take them unaware.

Cape Rollers

Waves observed off the Cape of Good Hope routinely are large enough under normal circumstances. Forty-foot waves are common observances even when skies are clear and the winds are blowing at only 25 miles an hour. Called "Cape Rollers" by many seamen, these waves are in fact swells, that is, waves that have traveled beyond their region of wind source. "Cape Rollers" originate in distant storms in the south.

These swells can nearly double in height when they encounter the Agulhas Current from a direction opposite to its northeast-to-southwest flow, and parallel to the continental slope along the coast.

An increasing number of ship encounters with large waves off South Africa are coming to light because many more large ships sail around the Cape to reach the west today. They are too large to navigate the Suez Canal and reach the

Atlantic Ocean through the Mediterranean Sea.

On May 17, 1974, the Norwegian oil tanker Wilstar was steaming southwestward off South Africa, carried along by the Agulhas Current in an effort to save time and fuel. The 132-thousand ton vessel had encountered a gale blowing from the south and "Cape Rollers" were slamming into her in a sequence of seven at a time.

A Hole in the Sea

The captain reported that in one sequence, the seventh wave did not hit the ship when expected. Instead, there was no sea in front of the bow, only a "hole." The bow fell into the "hole" and then the seventh wave, higher than the bow, crashed onto the ship. The Wilstar lost her bulbous bow. Steel hull plates almost an inch thick were torn away and beams thicker than railroad tracks snapped. Damage was estimated at $1.2 million.

Large waves also occur off the coast of North Carolina's Cape Hatteras, an area where many intense storms are born. Too many ships hitching a ride through this area in the northward flowing Gulf Stream end up at the bottom of the sea. No wonder seamen call this area the "Graveyard of the Atlantic."

In March 1971, the tanker Texaco Oklahoma was northeast of Cape Hatteras, struggling against a powerful gale which blew out of the northeast. Her decks were awash with 40-foot waves. Suddenly, the 632-foot long vessel broke in half and eventually sank. Thirty-one of the ship's 44 crewmen perished.

Was the mishap due to a large wave? No one is certain. But the incident did occur in a storm and at a location where large waves might be expected to develop; along the north wall of the Gulf Stream where the warmer water of this current meets the cooler, surrounding water.

Seamen who have experienced the impact of large waves have likened the event to their ship striking a mine or being torpedoed. Some have considered themselves lucky to survive as the vast weight of water has descended upon the ship's upper decks.

A Harrowing Experience

Commander I. R. Johnson of the British Royal Navy, now retired, writes:

"When I was serving on the cruiser Birmingham during the Second World War, we had an experience between Durban and East London one night which I recall the more vividly for being on watch at the time. We were about 100 miles south-southeast of Durban on our way to Cape Town (South Africa), steaming fast but quite comfortable into a moderate sea and swell when suddenly we hit a 'hole' and went down like a plummet into the next sea which came green over A and B turrets and broke over our open bridge. I was knocked violently off my feet, only to recover and find myself wading around in 2 feet of water at a height of 60 feet above normal sea level.

"The ship was so jarred by the impact that many of the men below thought we had been torpedoed and went to emergency stations. The Captain immediately reduced speed but the precaution proved unnecessary as the moderate conditions returned as before and no further 'holes' appeared."

Tales of huge waves can be found through the chronicles of the sea. But it has only been in more recent years that their existence has been accepted.

In 1827, for example, Captain Drumont D'Urville, a French scientist and naval officer in command of an expedition, reported encountering waves 80 to 100 feet high. He was scorned by the world's scientific community at that time for his "exaggerations."

Mounting Evidence

Scientists had to think twice about the existence of unusually large ocean waves as a result of another incident reported a few years later. Admiral Fitzroy, who made the first national weather forecast in England, recorded a case in the 1830's where a wave estimated to be 60 feet high swept over the sailing ship Thetis. According to his report, the vessel fell into a trough between two great wave crests during a full gale. The ship was so far below the sea level that the wind went out of its sails.

In 1916, Sir Ernest Shackleton made an epic voyage of survival in an open boat from Elephant Island to South Georgia, off Cape Horn, South America. His account of a "freak" wave vividly portrays the terror of these encounters.

"At midnight I was at the tiller and suddenly noticed a line of clear sky between the south and southwest. I called to the other men that the sky was clearing, and then a moment later I realized that what I had seen was not a rift in the clouds but the white crest of an enormous wave. During 26 years' experience of the ocean in all its moods I had not encountered a wave so gigantic. It was a mighty upheaval of the ocean, a thing quite apart from the big white-capped seas that had been our tireless enemies for many days. I shouted, 'For God's sake, hold on! It's got us!' Then came a moment of suspense that seemed drawn out into hours. White surged the foam of the breaking surf. We were in a seething chaos of tortured water; but somehow the boat lived through it, half-full of water, sagging to the dead weight and shuddering under the blow. We baled with the energy of men fighting for life, flinging the water over the sides with every receptacle that came to our hands, and after 10 minutes of uncertainty we felt the boat renew her life beneath us. She floated again and ceased to lurch drunkenly as though dazed by the attack of the sea."

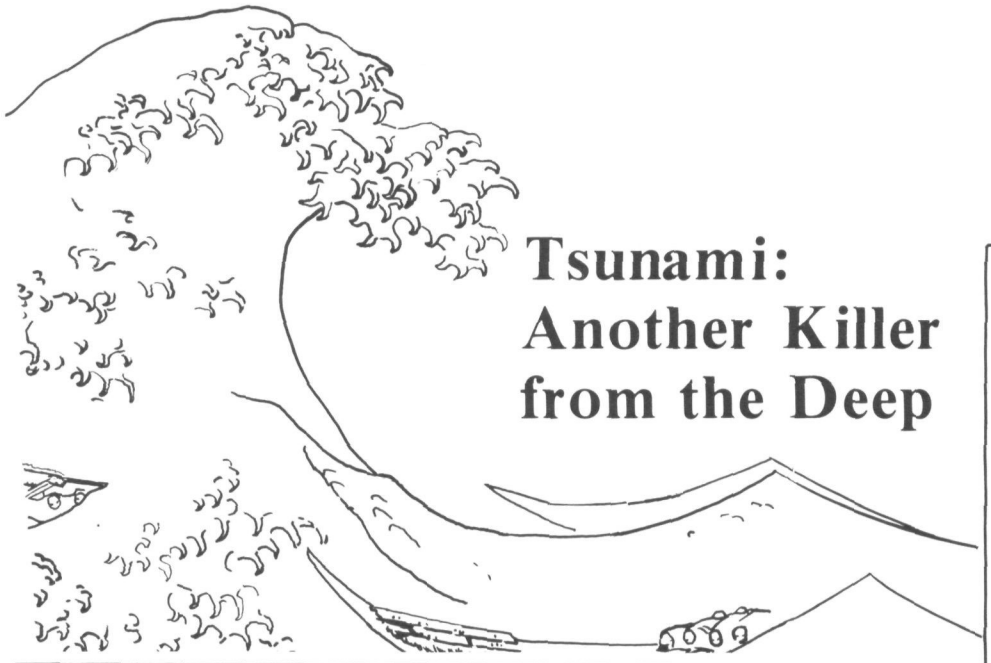
Record Holder

The August 1934 issue of the *U.S. Naval Proceedings* carries an account of the largest wave ever assessed, calculated to be 112 feet high. It was reported by Lt. Cdr. R. P. Whitemarsh, who was aboard the USS Rampago on February 7, 1933, during a severe storm in the North Pacific.

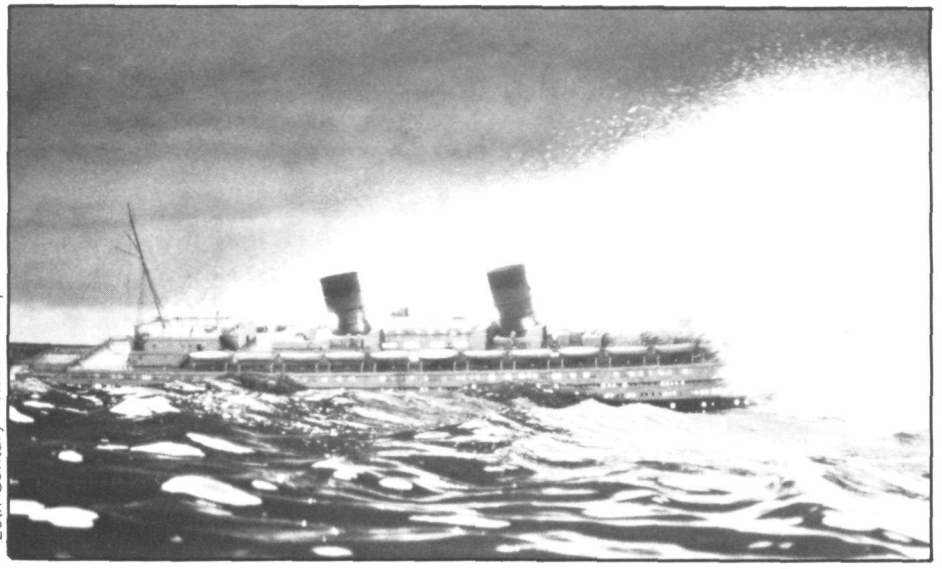
Acknowledged wave expert Dr. Laurie Draper of the Institute of Oceanographic Services in Wormley, England, thinks the highest wave ever measured was 83 feet high. It was recorded by wave meters onboard the weathership India on January 23, 1975. The ship was located in the North Atlantic at the time.

Many mariners around the globe have either experienced unusually large waves or have heard about them from those who have. All, undoubtedly, would agree with Sir Ernest Shackleton who wrote of his 1916 encounter with a "freak" wave, "Earnestly, we hope that never again would we encounter such a wave."

But seamen will encounter these giants as they roam the globe. Hopefully, reported observations of the unusually large ocean waves will allow forecasters eventually to predict the conditions under which the waves develop. Based on this capability, warnings could be issued to help protect seamen wherever they sail.■



Tsunami: Another Killer from the Deep



©20th Century-Fox Film Corp.

The tsunami in fact and fiction. At top, an ocean liner is overturned in The Poseidon Adventure. Above, a man faces death during a tsunami at Hilo Harbor, Hawaii, in 1946

Tsunamis are the so-called "tidal waves" generated by submarine earthquakes. Unlike the storm-spawned rogue waves discussed in the accompanying article, tsunamis (pronounced "soo-nahm-mees") grow to dangerous proportions only when they enter the shoaling water of a coastline. Tsunami waves can crest to heights of more than 100 feet and strike with devastating force.

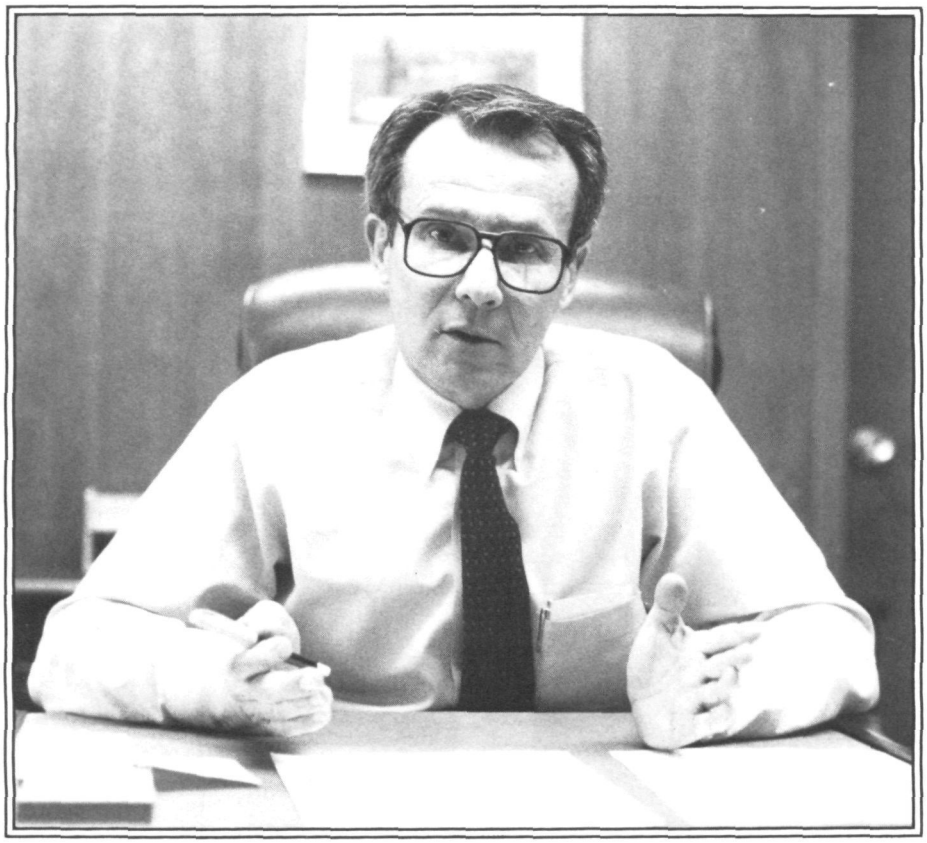
Minutes after a 1946 earthquake in Alaska, waves more than 100 feet high demolished the lighthouse at Scotch Cap on Unimak Island killing five. Less than 5 hours later, the first waves struck Hawaii. When the tsunami subsided, 159 persons were dead, 163 injured, and the islands had suffered some $25 million in property damage in the worst natural disaster in Hawaiian history.

Other tsunamis have been even more deadly. The eruption of Krakatoa in 1883 generated a tsunami which killed 36,000 in the East Indies. Tsunamis striking Japan's coastlines killed 27,000 in 1906 and 1,000 more in 1933.

Much of the loss of life in these waves was due to the lack of warning of their approach. Today, the Pacific Tsunami Warning Center in Hawaii provides these lifesaving warnings. Earthquake information from seismograph stations and data from tide stations throughout the Pacific are passed on to the Center. Watches and warnings of tsunamis for all U.S. territories and States bordering the Pacific are disseminated to NOAA Weather Service Offices and other agencies which, in turn, furnish the information to the public. By international agreement, the watch and warning information also is passed on to other countries and territories throughout the Pacific Basin.

A regional tsunami warning system in Palmer, Alaska, is operated for the protection of Alaska and the Aleutian Island chain.

Restructuring of NOAA Provides A Framework for the Future



There's a new look at NOAA.

In November, NOAA Administrator John V. Byrne approved a restructuring of the agency which replaced former major line components and major program elements with five line components. Each headed by an Assistant Administrator, they are the National Ocean Service, The National Weather Service, the National Marine Fisheries Service, the National Environmental Satellite, Data, and Information Service, and the Office of Oceanic and Atmospheric Research.

In addition, an Office of Budget and Finance and an Office of Administrative and Technical Services were established as NOAA staff offices, replacing components of the former Office of Management and Budget.

"I believe that the way an organization is structured does make an important difference in how well the people in the organization function," Dr. Byrne said.

"...the way an organization is structured does make an important difference in how well the people in the organization function."

"I think the reorganization will improve the management efficiency of our agency. It strengthens the leadership of NOAA. It brings together areas of common interest and common focus; most obviously, the combining of many related functions into the new National Ocean Service and into the new National Environmental Satellite, Data, and Information Service. Communications within and among line components will be enhanced, and we will be better able to achieve more with the limited resources that are available to us."

Here's how the restructuring will affect the functions and responsibilities of the various NOAA elements:

Five staff offices, including the NOAA Corps, General Counsel, Congressional Affairs, Public Affairs, and Civil Rights, remain unchanged.

The remaining staff offices will assume some changed responsibilities. They include:

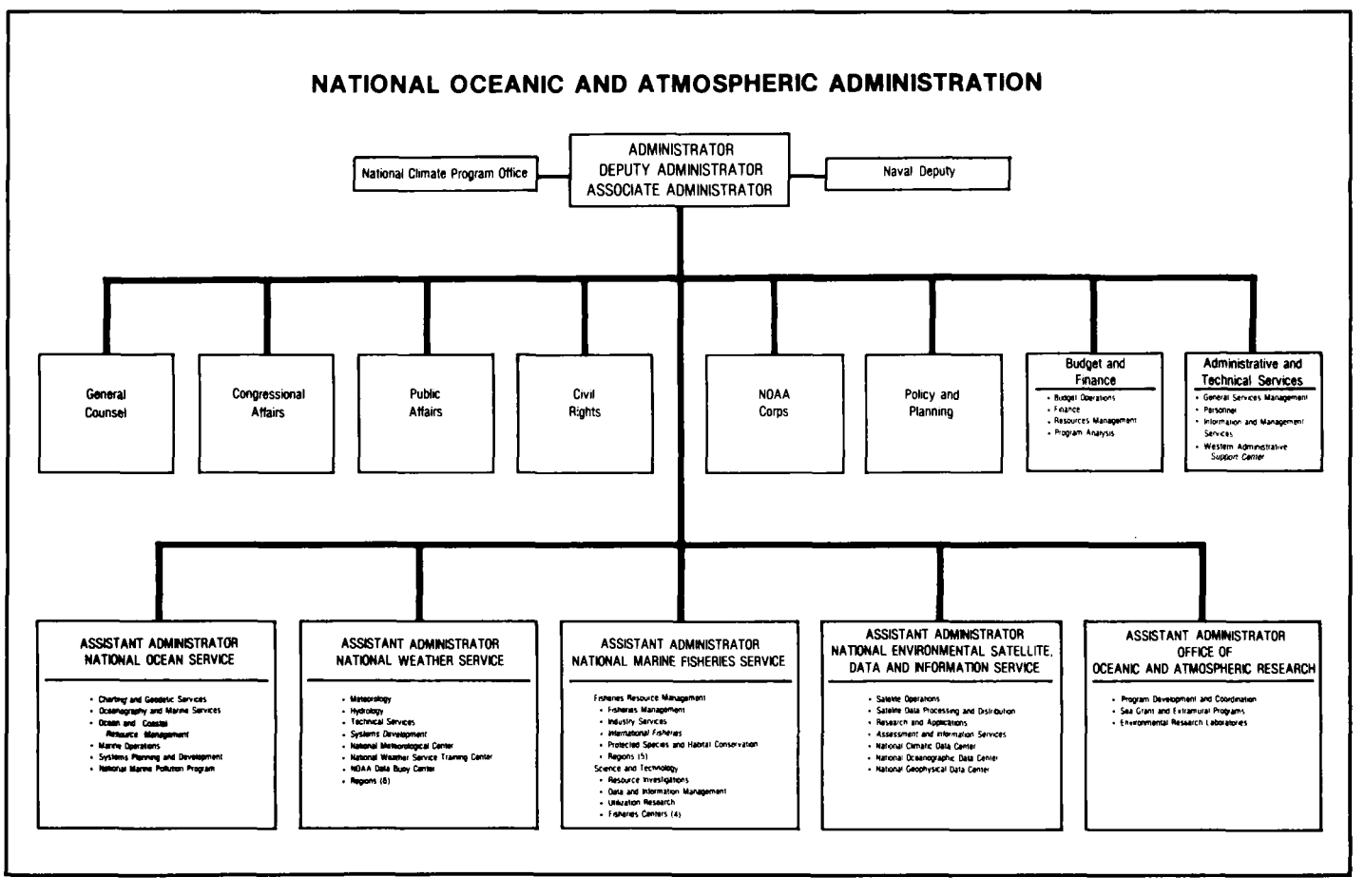
- *Office of Policy and Planning.* This office provides specialized staff support to the Office of the Administrator, and to the line components. Its functions include responsibilities for policy analysis, long-term planning, international and interagency liaison, and ecology and conservation coordination.
- *Office of Budget and Finance.* Budget and finance are important

tools in the overall management of NOAA's activities. This office provides staff support for NOAA's budget formulation and execution activities and serves as the focus for management of NOAA's financial resources. The office encompasses the functions assigned to the Office of Budget Resources and Management as well as the Office of Finance.

- *Office of Administrative and Technical Services.* This office provides staff support in the areas of personnel, facilities, computing, management systems, and administrative operations and provides day-to-day support to the line components in these areas.

The responsibilities of the five line components include:

- *National Ocean Service.* This organization provices a focus for the development of a comprehensive strategy within NOAA to address the increasing uses and opportunities of the oceans. The component groups most of NOAA's ocean-related activities, except those dealing with living marine resources carried out by the National Marine Fisheries Service. Its functions include NOAA's mapping, charting, geodesy, marine pollution, ocean mining and energy, and coastal management responsibilities. Supporting activities include those areas related to marine operations, ocean engineering, and technology development.
- *National Weather Service.* In recognition of the importance and size of the Weather Service, this unit now reports directly to the Administrator. Its basic functions remain the same. Supporting services include NOAA data buoy activities.
- *National Marine Fisheries Service.* The basic functions of NMFS remain unchanged.
- *National Environmental Satellite, Data, and Information Service.* Much of the work NOAA performs involves providing data and information services to users both inside and outside the agency. In recognition of the close relationship between the satellite data gathering capabilities of the agency (NESS) and NOAA's data and information processing and dissemination functions (EDIS), these two activities were brought together. This new organization will eventually include climate activities.
- *Office of Oceanic and Atmospheric Research.* This office will conduct long-term and fundamental research through ERL and extramural programs to support NOAA missions. In addition, this office will ensure closer and more direct coordination with the applied research and development work located within the four service-oriented line oragnization. ■



Automating NOAA's Shipwreck File

Jack Stringer

Few can deny that the discovery of an underwater wreck is the ultimate goal of the intrepid diver. For many divers, however, this search is seldom consummated because information concerning the location of the shipwreck has been neither readily available nor accessible—that is, until the advent of the computer.

Only about 200 of the Nation's marine surveyors, researchers, salvagers, and scuba divers know of AWOIS, the new (and what may be the ultimate) source of shipwreck information.

Developed by NOAA's National Ocean Service, AWOIS is the acronym for Automated Wreck and Obstruction Information System. It's a computer-based file currently containing 3,100 specific records which have been or may be considered for investigation by the National Ocean Service for its charting responsibilities.

"The system is, in fact, a modification of a procedure that has been in existence for years," said Dennis J. Hill, who began to develop the new system only 2 years ago.

"The difference between this new method and what we've been doing in the past," he said, "is that we're now using the computer to file all our historical items, which makes them available whenever we develop a hydrographic survey plan."

The computerization of the cartographic source of navigational hazards, such as wrecks, shoals, and piling, also has resulted in significant cost savings. "With such comprehensive descriptive information on navigation hazards," said Hill, "our hydrographers often complete an investigation successfully without conducting expensive searches with echo sounders, side-scan sonar, or by wire drag, a system that requires two ships steaming along parallel courses towing a submerged cable that snags on potential hazards to navigation."

The information that Hill seeks for the AWOIS is obtained from NOAA's Office of Charting and Geodetic Services and includes hydrographic and topographic surveys, chart files, Coast Pilot and archival records. Additional entries come from Power Squadrons, Coast Guard Auxiliary chart correction programs, and from other Federal agencies such as the Coast Guard, Corps of Engineers, Navy and Army, and private citizens.

"There is a significant amount of copyrighted material in the file," Hill said. When the system is completed, it will contain an estimated 20,000 entries. Since new information requires intensive research, the AWOIS file is not expected to be completed before the year 2000.

In the meantime, the system grows. Although incomplete, records are now available for all U.S. waters, including Hawaii, Alaska, the Great Lakes, and the waters of the U.S. Trust Territories.

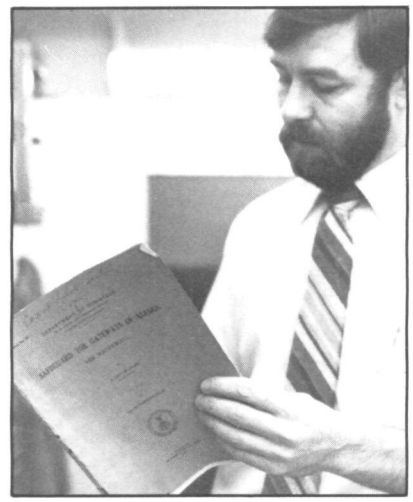
Hill says that the largest amount of data in computer are weighted toward the upper east coast of the United States. "The reason for this emphasis," he said, "is that our present practice is to research those areas active in NOAA hydrographic projects."

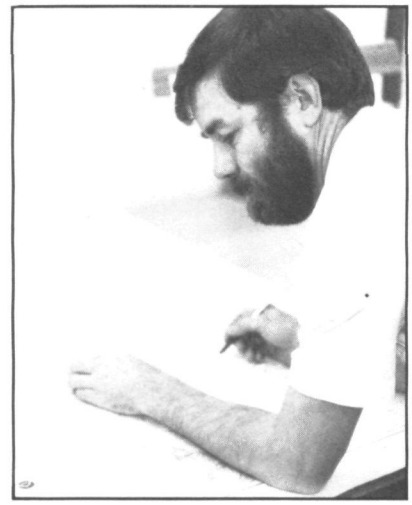
In recent years, the sea lanes of the Delaware and Chesapeake bays have been a prime area for investigation by the two NOAA ships, the Rude and Heck. It was on such a project in the Delaware Bay that an unknown 19th-century ship, possibly a British cargo vessel, was discovered between Lewes, Del., and Cape May, N.J.

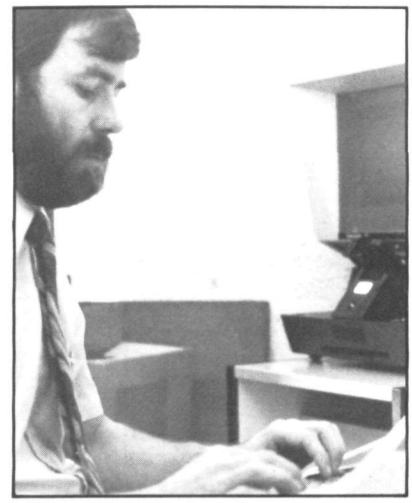
The commanding officer of the two wire drag vessels said in his report that the wreck lay in 39 feet of water, about 15 miles from Lewes, 7½ miles south of Cape May and 12 miles east-northeast of Cape Henlopen, Del.

NOAA scuba divers found nothing remaining of the wreck's superstructure. The ship's cargo, however, laid

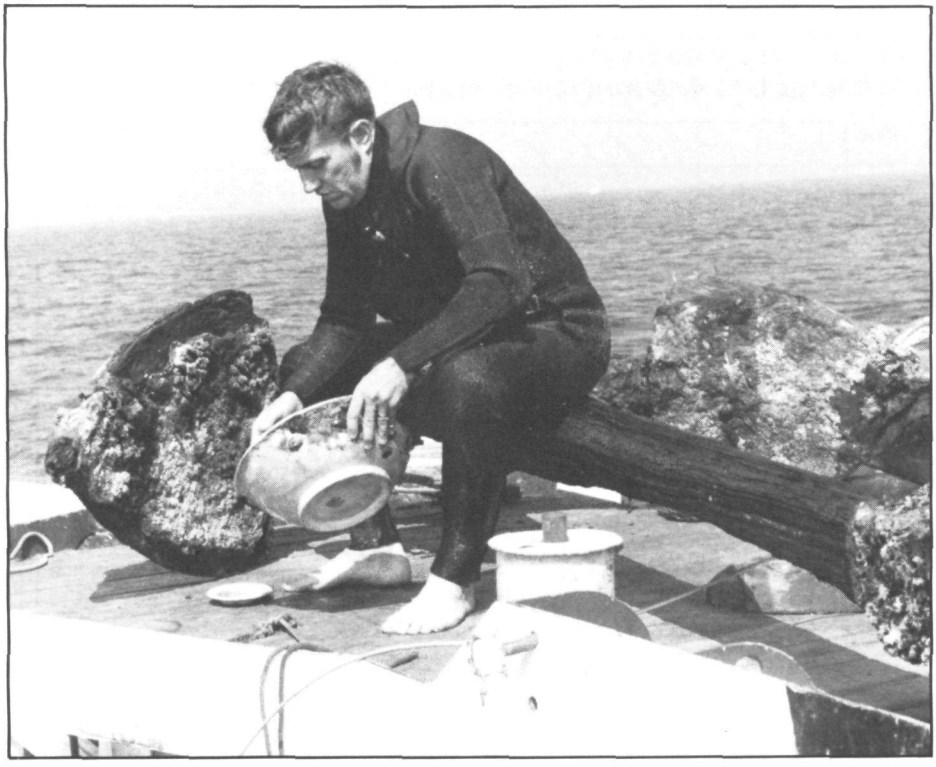
Dennis J. Hill, who developed the wreck information system, searches old records and checks chart data before making a computer entry.







"Treasure" brought up as a result of the wire drag operations of the Rude and Heck may be of historical rather than monetary value.



open on the bottom, and consisted of thousands of pieces of neatly packed British-made chinaware. The Coast Guard was notified of the wreck's location, which now appears on NOAA's nautical charts as a wreck symbol.

At the mouth of the Choptank River in the Chesapeake Bay, the Rude and Heck were investigating a charted sunken wreck when the ship's sonar recorded another "substantial obstruction" nearby. Identified only as a deteriorated wreck with a small metal house on the after portion, the ship was located at a depth of 41 feet. Divers investigated and found the wreck was a wooden vessel, close to 100 feet long and about 18 feet wide. Its cargo, hundreds of milk-glass molassas pitchers, lay buried in the ship's silt-filled hold. This wreck was later identified as the Old Bay Line steam packet, New Jersey, lost in the Chesapeake in 1870.

"The Rude and Heck," said Hill, "are the only vessels of their kind in operation in U.S. waters." The two craft, working together, locate underwater obstructions by towing a wire between them, suspended from surface buoys. When the wire catches on an obstruction, it becomes taut, forming a "V." Last fall, the two ships dragged a 1 nautical mile-wide strip north of Long Island, N.Y. Currently, they are working in the Gulf of Mexico seeking any object which may be hazardous to shipping.

Requests for AWOIS information come from all over the United States, Canada, and Europe. Inquiries should provide information within specific areas, preferably using latitude and longitude to define their limits.

"The public does not get any copyrighted materials," said Hill. "We will send, instead, the title and publisher of the relevant document." In many instances, copyrighted material is the only source of information for AWOIS records. This is used to supplement other nautical charting sources as well as to indicate the presence of uncharted wrecks requiring NOAA field investigations.

AWOIS data, filed on magnetic tape, is immediately accessible, making known the status of every item in the system and the type of investigation required. A recent improvement in the system allows it to produce a graphic output which consists of an overlay depicting wreck obstruction symbols that can be placed over any existing chart.

Standard fees for AWOIS data generally range from $10 to $20, but can exceed $50. The fee also entitles requesters to users' guides that contain a 180-item wreck bibliography. Assistance will also be provided if a user has difficulty in interpreting any of the AWOIS data.

Further information on the AWOIS program can be obtained from the Hydrographic Surveys Branch, National Ocean Service, NOAA, Rockville, MD, 20852. ■

Cold water survival

Hypothermia: Deep and Deadly Chill

NOAA divers know that when they're required to work in cold water or even moderately warm water for long periods, protective clothing must be worn.

The NOAA Diving Manual tells them that water has a specific heat approximately 1,000 times greater than that of air and a thermal conductivity 24 times greater than air. This means that the body loses heat much faster in water than in air of the same temperature.

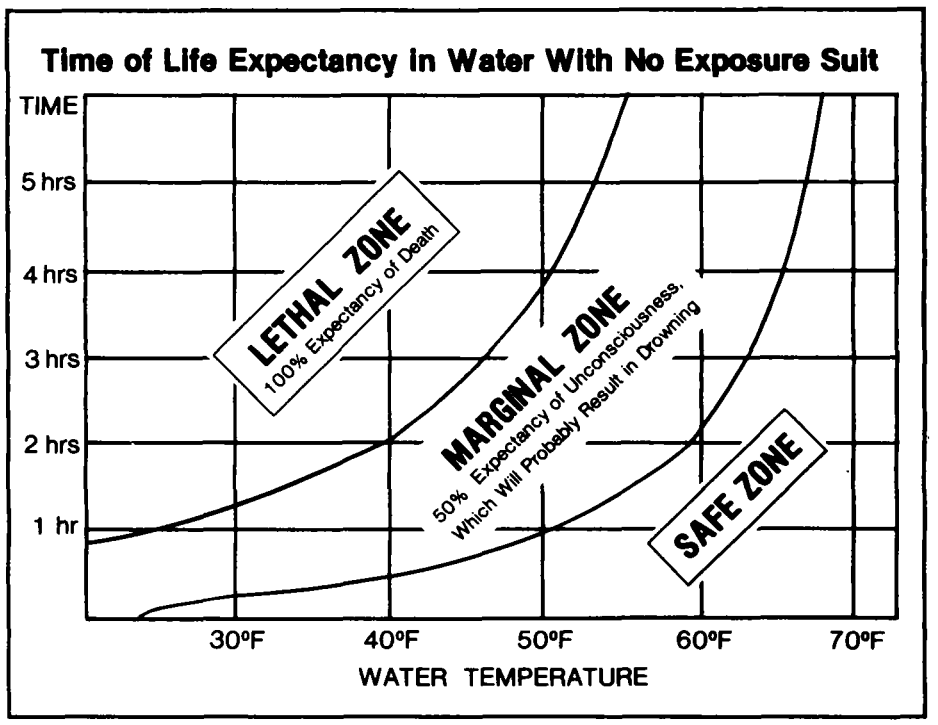
When water temperatures get below 80° F. the body can become chilled in an hour or so unless involved in moderate activity. Below 60° F., rubber suits or other protective devices are needed.

This dangerous chill from prolonged exposure to cold is called hypothermia. It occurs when the deep tissue or core temperature of the body falls below about 97° F. and malfunctions in normal physiology begin to take place. Mild hypothermia can impair judgment while severe cases can lead to death.

But divers, presumably, are in the water of their own volition. If it's cold, they know it beforehand and have a choice of coming out at the first signs of discomfort or protecting themselves with a variety of diving suits ranging from standard foamed neoprene wet suits to special extreme cold water suits through which heated water is circulated.

There are, of course, those who are not afforded this choice.

The passengers and crew of commercial ships at sea, fishing boats, yachts and cabin cruisers, small craft and other pleasure boats always must face the unlikely, not unthinkable possibility that they may be forced to abandon ship. In the wintertime and in northerly latitudes this already dangerous action is exacerbated by the cold. Sea stories abound of the few minutes of life left to the seaman who falls into arctic waters. Make no mistake, it's a dangerous and frightening situation to be in. But the



NOAA Diving Office says there are procedures which can significantly increase the chances of survival even in extremely cold water. Records show that ship sinkings, even in the worst cases, usually require at least 15 to 30 minutes, affording valuable time for preparations.

If your boat is in trouble and it appears likely to sink, radio for help. Give your position as accurately as possible. Give the number of crew, describe any injuries, and identify your boat type. Make visual distress signals such as smoke and flares. Remain aboard until sinking is inevitable.

Here are procedures recommended by the U.S. Coast Guard:

- Locate and don a personal flotation device as quickly as possible.
- Try to enter the water in a lifeboat or raft to avoid wetting insulating clothing and losing body heat.
- Wear several layers of clothing because the trapped air provided insulation. Even in the water, the extra layers of clothing will reduce the rate of body heat loss.
- Especially protect the head, neck, groin, and the sides of the chest, as these are areas of rapid heat loss.
- If it is necessary to enter the water, do so slowly to minimize the likelihood of increasing breathing rate, swallowing water, shock, and death. If jumping is necessary, pinch the nose and hold the breath.
- Once in the water, orient yourself with respect to lifeboats and floating objects. Also button up and turn on signal lights as quickly as possible before manual dexterity is lost.
- Do not attempt to swim except to reach nearby craft, fellow survivor, or floating object. Swimming will pump out the warmed water between the body and clothing

layers and cause the blood to move from the body core to the extremities, thus increasing body heat loss.

- Keep the head and neck out of the water.
- The best position to conserve body heat is to hold the knees against the chest (or cross lower legs and raise knees as much as waves and stability permit) with arms tight around the side of the chest. Keep knees together to avoid heat loss from groin and inner thighs.
- If others are nearby, huddle together with maximum body contact.
- Board a life raft or floating object as soon as possible.
- Keep a positive attitude; a will-to-live *does* make a difference.

The accompanying chart, describing symptoms and first aid for victims of hypothermia, was prepared by the United States Yacht Racing Union with assistance from the University of Rhode Island Sea Grant Program. It is a portion of a larger waterproof card design for sailors which also can be beneficial to fishermen, small craft operators, duck hunters, trappers, and others whose activities may bring them into contact with the water and a possible case of hypothermia. The card, sold by USYRU, Box 209, Newport, RI, 02840 is copyright and used here with permission. ■

RANGES OF HYPOTHERMIA SYMPTOMS

Note: Most physical symptoms vary with each individual and may be unreliable indicators of core body temperature. Only a low-temperature rectal thermometer gives reliable core temperature (the mouth cools too rapidly). In general, as body temperature falls, symptoms will increase.

MILD CONDITION
(36-34°C, 97-93°F)
- Shivering, cold hands and feet
- Still alert and able to help self
- Numbness in limbs, loss of dexterity, clumsiness
- Pain from cold

MODERATE CONDITION
(34-32°C, 93-90°F)
- Shivering may decrease or stop

SEVERE CONDITION
(32-28°C, 90-82°F)
- Shivering decreases or stops
- *Loss of reasoning and recall*, confusion, abnormal behavior
- Victim appears drunk; very clumsy, slurs speech, denies problem and may resist help
- Victim semiconscious to unconscious
- Muscular rigidity increasing

CRITICAL CONDITION
(28°C, 82°F and below)
- *Unconscious*, may appear dead
- Little or no apparent breathing
- Pulse slow and weak, or no pulse found
- Skin cold, may be bluish-gray color
- Eyes may be dilated
- Very rigid

United States Yacht Racing Union
Box 209
Newport, RI 02840

HYPOTHERMIA FIRST AID

ALL CASES
- Move victim to dry shelter and warmth
- Handle gently
- Remove wet clothes — cut off if necessary
- Apply mild heat (comfortable to your elbow) to head, neck, chest and groin — use hot water bottles, warm moist towels
- Cover with blankets or sleeping bag; insulate from cold — keep head and neck covered

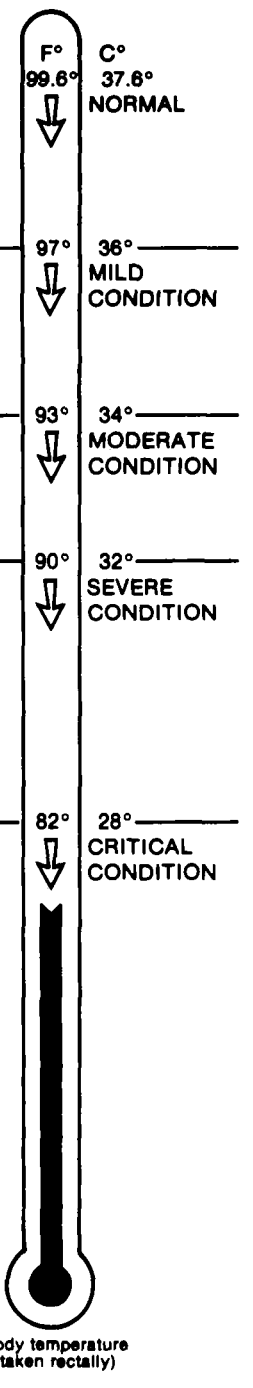
MILD CASES
- *Primary task is to prevent further heat loss and allow body to rewarm* itself
- Give warm, sweet drinks — *no* alcohol
- Apply gentle heat source to stabilize temperature
- Exercise to generate heat
- Keep victim warm for several hours

MODERATE CASES
- Same as above
- Limit exercise
- Offer sips of warm, sweet liquids only after victim is *fully conscious*, begins to rewarm, and is able to swallow
- Have victim checked by doctor

SEVERE CASES
- Obtain medical advice as soon as possible using your radio
- Assist victim, but avoid jarring him — rough handling may cause *cardiac arrest or ventricular fibrillation of heart*
- No food or drink
- Ignore pleas of "Leave me alone, I'm O.K." *Victim is in serious trouble* — keep continuous watch over victim
- Treat as for shock — lay down in bunk, wedge in place, elevate feet, keep immobile
- Apply external mild heat to head, neck, chest, and groin — keep temperature from dropping, but avoid too rapid a temperature rise
- Transport soon, gently, to hospital

CRITICAL
- *Always assume patient is revivable — don't give up*
- Handle with *extreme care*
- Tilt the head back to open the airway — look, listen, and feel for *breathing and pulse for one to two full minutes*
- If there is any breathing or pulse, no matter how faint or slow, *do not give CPR*, but keep close watch on vital sign changes
- Stabilize temperature with external heat sources; also use naked chest-to-back warming by other crew member (leave legs alone), and/or use rescuer's warm breath exhaled in victim's face and in unison with his breathing
- If no breathing or no pulse for one to two full minutes, *begin CPR immediately*
- *Medical help imperative — hospitalization needed*

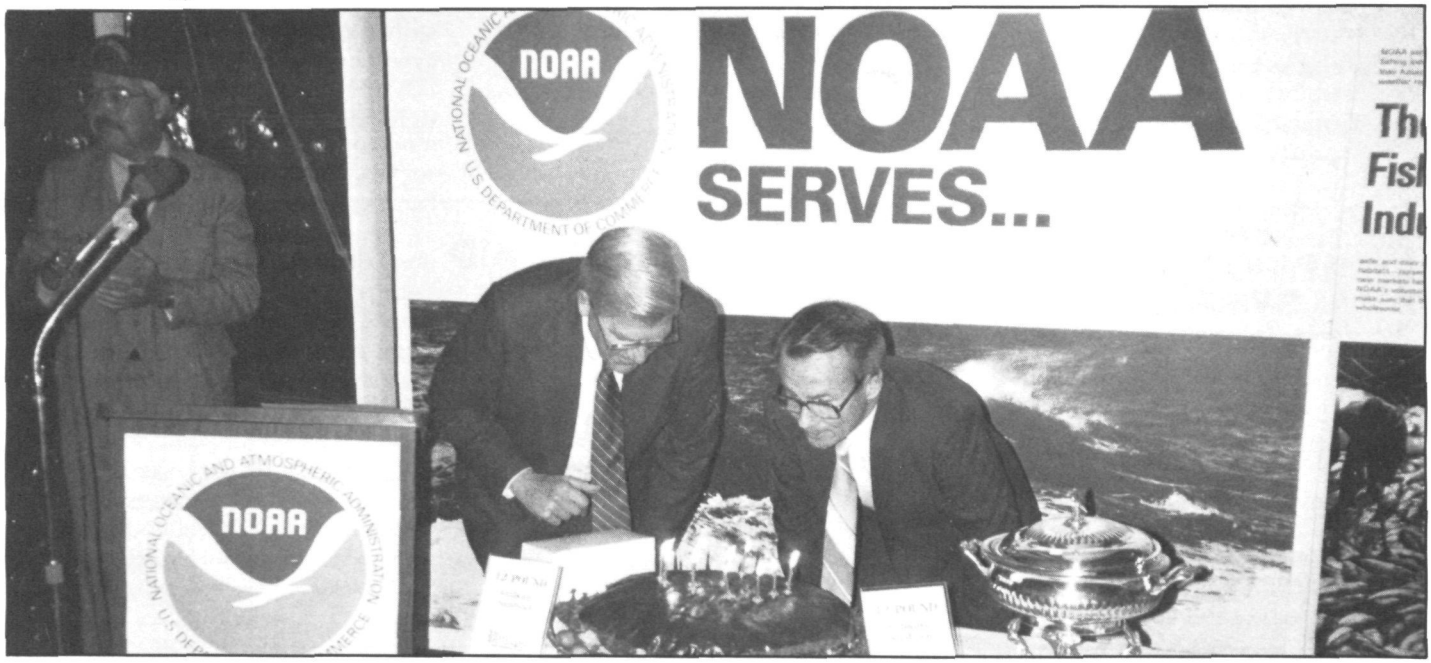
WARNING
- First aid for severe and critical hypothermia is to add heat to stabilize temperature only. Rapid rewarming may be fatal; it will, at least, cause complications. Allow body to rewarm itself slowly.
- Body core temperature lags behind skin temperature during rewarming. Keep victim protected for extended period after apparent full recovery or medical help arrives. Many hours, even days, are required for return to normal temperature. Avoid reexposure to cold.
- Always assume hypothermia is present in all man-overboards.
- In a helicopter rescue, protect victim — especially the head —from rotor blast wind chill.



NOAA Serves

Banner Days In Baltimore

Gerald D. Hill, Jr.



It was NOAA's birthday, too, (12th, thank you), and Dr. Byrne (top, at right) and Martin Millspaugh, President, Charles Center Inner Harbor Management, Inc., were on hand to celebrate with a suitable cake.

NOAA put on a show in Baltimore and more than 33,000 people came.

"NOAA Serves", the theme of the event, portrayed through exhibits and demonstrations the many services provided by NOAA that affect the lives of all Americans.

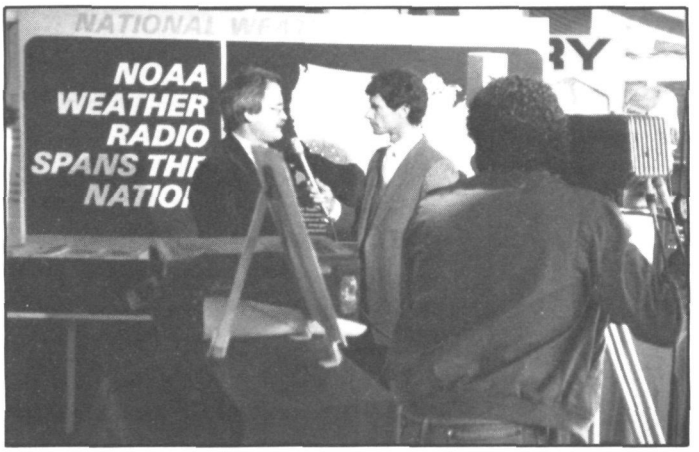
Baltimore's Mayor Donald Schaefer proclaimed the week of October 23-31 as NOAA's week in Baltimore as the agency highlighted its continuing contributions to public safety, marine commerce, the Nation's fisheries, weather services, and other missions.

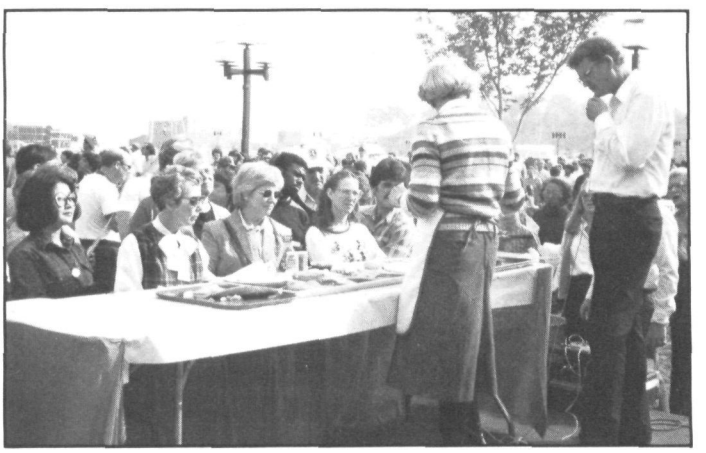
The focal point of NOAA's week was a 40 foot by 120 foot tent located near the Light Street pavilion at the Inner Harbor which, for the first time in a number of years, put exhibits from all the major components in one location.

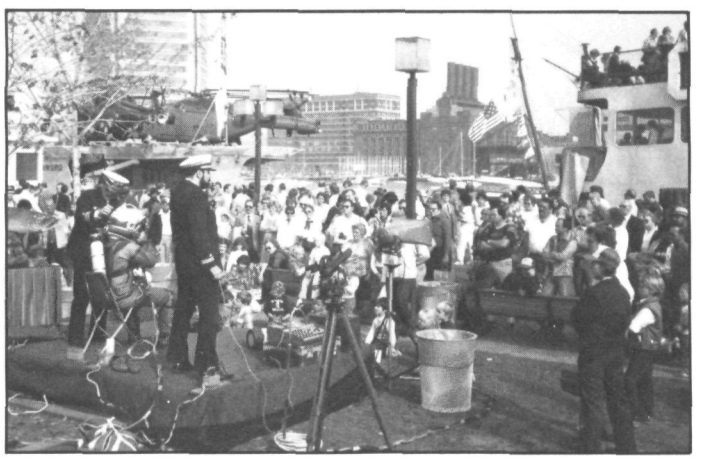
In addition to the exhibits, demonstrations were held daily in front of the tent, featuring Lawrence the Talking Trout, a weather balloon launch, diving equipment, and seafood preparation.

Other "NOAA Serves" exhibits included an endangered species exhibit at Baltimore's National Aquarium, a film at the Top of the World Trade Center, a display at the Pratt Street Pavilion, and a historical weather exhibit at Ft. McHenry.

One of the focal points was the NOAA vessel Mt. Mitchell. The 231-







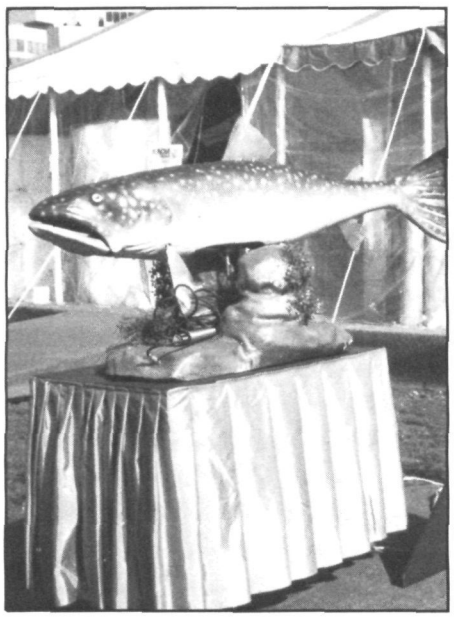
foot hydrographic vessel was open to the public from October 23-27 and drew more than 7,000 visitors.

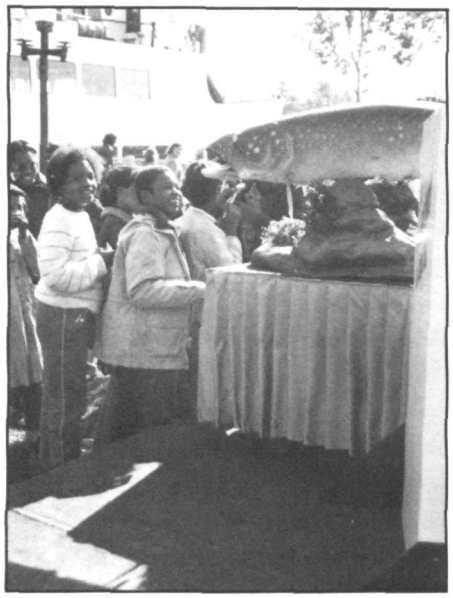
Additionally, the National Weather Service and the National Ocean Survey participated in the departure ceremonies of the clipper ship Pride of Baltimore when it began its 17,000 mile trip to the Pacific Northwest. The Weather Service equipped the vessel to serve as an official marine weather observer during the voyage and NOS provided navigational charts.

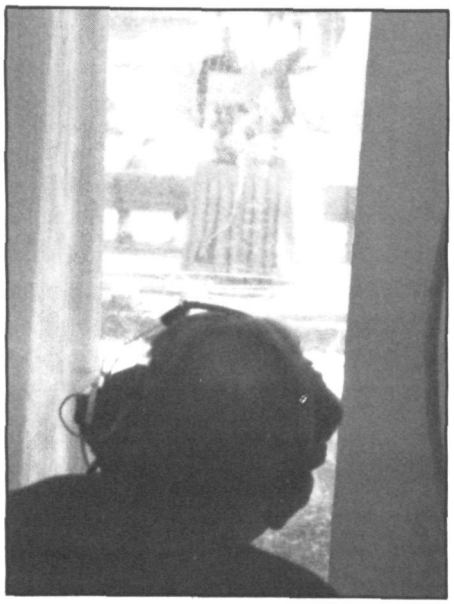
A highlight was a users' conference held in the National Aquarium. The conference, led by NOAA Administrator John V. Byrne, drew over 200 leaders in offshore industries. These included tanker and liner executives, fishermen, energy producers, and experts in related industries.

There were press coverage, balloon launches, tours on the Mt. Mitchell, fish preparation demonstrations, a deep sea diver in full rig, and crowds, crowds, crowds. For some it was just too much of a good thing.

The attendees were exposed to the many services available to them from NOAA to include new oceanographic and marine weather services to support offshore energy production, marine transportation, and fishing. Among other services discussed were satellite data production; systems to measure, display, and disseminate real-time information on tides and water levels; and special assessments that can be used for site selection and design, construction, and operation of offshore facilities.■







Talking Trout Hauls In Visitors

"Hey! Hello! Stop and talk to me," calls the perky voice and the kids twist their heads about in unison to see who's speaking.

It's Lawrence the Lake Trout, and he's just caught another batch of delighted kids. He'll joke with them, answer some thoughtful and some outrageous questions, and—just maybe—he'll coax them into the big tent at Baltimore's Harbor Place to learn more about NOAA.

Lawrence is a 5-foot fiberglass model built with careful attention to such details as coloring and proportions, and stuffed with an ingenious arrangement of wires and electric motors which allow him to speak and move with remarkable alacrity.

The life-like Lawrence belongs to the University of Minnesota Sea Grant Extension Program where he was hatched as an educational tool in 1978. He was an instant success, and since then he's been on the road charming hundreds of thousands kids and adults from Seattle to San Francisco to Galveston to Washington to States throughout the Midwest, especially around his home waters, the Great Lakes.

But Lawrence is not strictly a fresh water fish. The University of Minnesota will loan him out for a worthy cause, and the NOAA Serves exhibition in Baltimore last October was just that. Lawrence held court each day outside NOAA's tent where he chatted with passersby, answering questions about the agency, talking about fish and fishing, and exchanging banter with bemused audiences.

Operating the fantastic fish for NOAA were Ryck Lydecker, Rich Wheeler, and Gene Cope, who took turns hiding behind a display inside the tent and answering questions put to Lawrence as they came in through a headset connected to the fish's audio circuits.

Lawrence's temporary owners were quite pleased with the public's response to the talking trout.

"The fish is a great promotional tool," operator Rich Wheeler of the National Marine Fisheries Service said after spending an afernoon at the controls. "People seem to listen to the fish as a disinterested party—not somebody with something to sell. Lawrence is believable."

Lawrence's mission for NOAA sounds much simpler than it actually was: to attract people to the NOAA exhibit by imparting a little information, a little showmanship, and a lot of charm.

The crowds drawn in by the learned lake trout attest to his success as a first-rate salesman of good will for NOAA.

October Dedication

NOAA Center Takes Shape in Seattle

Hal Alabaster

The old and new looks at Seattle: a hanger (top) to be refurbished, and the Employee Services Center (above).

No doubt about who occupies the Operations building at NOAA's Western Regional Center. This view is from the main entrance.

NOAA's Western Regional Center, now under construction in Seattle, will concentrate the largest variety of NOAA programs at a single location in the United States. It will also house approximately 900 NOAA employees, the largest number outside the Washington, D.C., metropolitan area.

Situated on 114 acres, on the western shore of Lake Washington, the facility is composed of nine major structures and a staging pier. Three of the new buildings will provide offices and laboratory facilities for NOAA components and a fourth will be an auditorium with seating for almost 300, and two seminar rooms. The fifth will be an employee services center and the sixth a shops—heated warehouse building. Two existing buildings, once used as aircraft hangars by the Navy, will be refurbished to provide indoor workspace and covered storage. The original control tower building also will be refurbished to provide temporary office space. A single staging pier will provide temporary berthing facilities for occasional visits by NOAA vessels and a small boat basin will be available for use by launches.

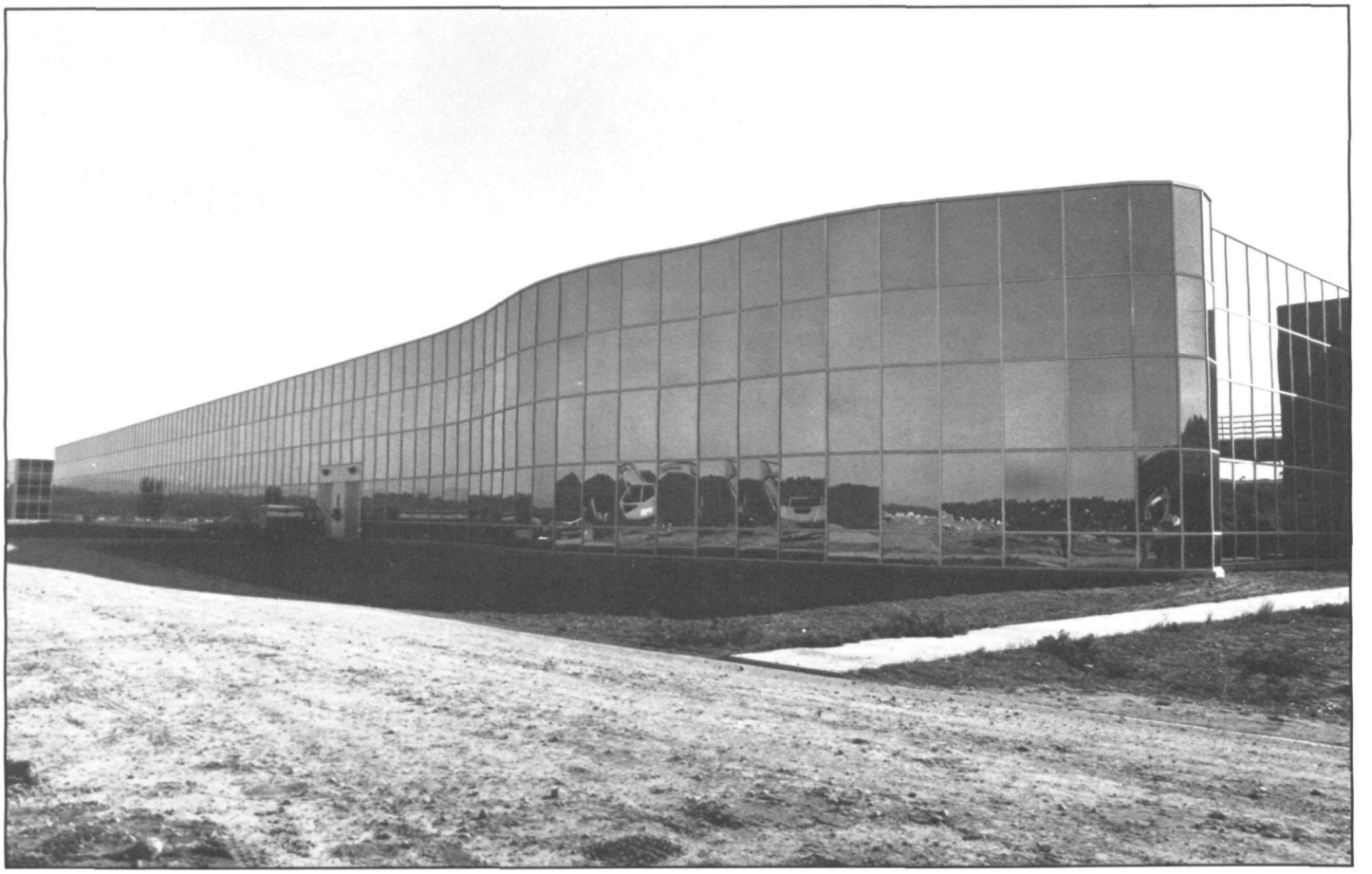
In addition to the buildings, an extensive landscaping effort is planned, with the objective of creating a campus-like atmosphere at the Center. As part of the government's Art-in-Architecture program, in cooperation with the National Endowment for the Arts, and the Seattle Arts Commission, five nationally known artists have been commissioned to create special works of art at various outside locations throughout the area.

The site of a former Naval Air Station, the Sand Point facility has a long history of interest and involvement with local government and citizen groups (*NOAA* Vol. 12, No. 2, Spring 1982). The initial planning for the project began in 1975 with the development of a draft environmental impact statement. That document was made final in 1976. However, a supplemental was prepared and published in 1978.

First Steps

Initial construction began in late 1977 with the development of an access road across Navy property. Work began on the site in mid 1979 with the removal of the old runways and the creation of a berm around a portion of the site. The purpose of the berm was to contain materials to be dredged from Lake Washington in preparation for construction of pier facilities. Actual dredging began in late 1979. By the time the work was completed, approximately 490,000 yards of bottom materials were removed and placed inside the berm to dry and settle prior to landscaping, creation of parking facilities, and other site improvements.

Construction of the first structure,



the Operations building, also began in 1979. It was completed and occupied in early August 1981. The two-story building was developed along two parallel courses: first, to be energy efficient and conform to Government standards set to meet low energy consumption goals; second, to be aesthetically pleasing and establish the visual environmental standards for the remainder of the facility. The north, south and east walls are faced with reflective spandrel glass, providing a minimal impact on the visual setting. Also, by selecting reflecting glass the solar heat gain through the windows is reduced in the summer, while in the winter passive heat is permitted to enter the building. These design features, combined with a state of the art heat pump and heat recovery systems, using heated water storage, has resulted in a highly energy efficient building. An article in the magazine of the American Society of Civil Engineering states "the design for the Western Regional Center of the National Oceanic and Atmospheric Administration may rate right at the top with the rest of the energy savers. This building will surpass by far the goal of energy saving, set by the General Services Administration, for a maximum of 55,000 BTU per square foot per year." Experience after a year of operations shows this prediction to be true, as the usage to date is close to 30,000 BTU per square foot per year.

Center Tenants

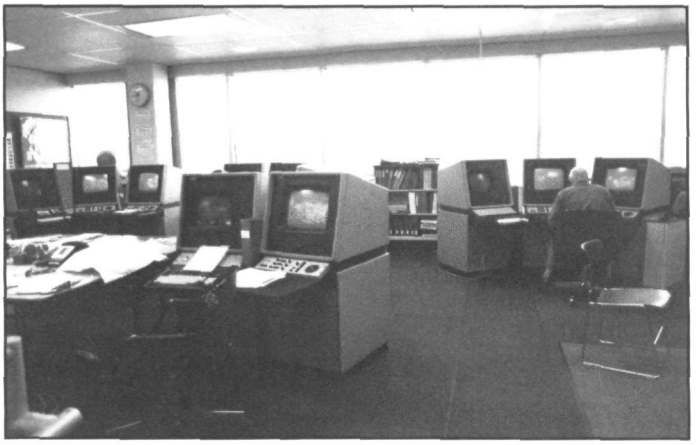
Over 240 employees are located in the building. The major activities are: the Seattle Forecast Office of the National Weather Service, the Northwest Regional Office of the National Marine Fisheries Service, the Western Administrative Support Center, including Personnel, Finance, Administrative Services, and Facility Engineering and Management, the Northwest Office of the General Counsel, representatives from the NOAA Data Buoy Office, NOAA Diving Office, and Environmental Data and Information Service and, on a temporary basis, the Office of Marine Pollution Assessment.

The next structure scheduled for completion is the Employee Services Center. This building, located just to the east and in line with the Operations Building will house an employee cafeteria, medical facilities and a conference room. Arrangements are being completed with the Washington State Commission for the Blind to provide management of the food service facility. Medical care will be provided by a full time nurse. The facility includes a treatment room complete with modern equipment for basic medical needs. A doctor will be available on contract for emergencies and periodic routine visits.

A third structure, a Shops Complex Building, will be available for occupancy in December. This will be a one story building with a partial mezzanine. It will provide a heated warehouse and space for a variety of shops. A large door facing the north will enable small NOAA launches to be brought into the building. A mobile boat hoist will be used to transport the launches. The shops will include facilities for carpentry, painting, metal working, instrument repair, and assembly.

Research I and II

Research activities will be conducted in two major buildings identified as Research I and Research II. The first, Research I, is scheduled for occupancy in the Spring of 1983 and Research II will be available in early 1984. The exterior



The Operations building shows its glass faces from Lake Washington (opposite and above) which result in a light and airy look in interior halls (right) and the AFOS Center (top).

construction of both structures matches that of the Operations and Employee Services buildings. The exterior walls on the south side are insulated metal panel. The north, east, and west sides are constructed with reflective spandrel glass. The buildings are arranged 60 feet apart in overlapping rows parallel to the Lake Washington shoreline, and are set back 200 feet from the water. This arrangement allows maximum aesthetic views while providing service and entry access to each structure. Each building is linked to the parking area by a covered steel pedestrian bridge from the second level.

While similar in their outward appearance, the interiors of each Research building will be designed to meet the particular needs of the occupants. Primarily, Research I will house the Pacific Marine Environmental Laboratory, the Nautical Chart Processing Division of the Pacific Marine Center, and the Office of Marine Pollution Assessment which will move from its current location in the Operations Building. Research II will be used exclusively for fisheries research with selected units from the Northwest and Alaska Fisheries Center moving to the new location in 1984. Some units of the fisheries center will remain at their present location near the University of Washington.

"L" Shaped Pier

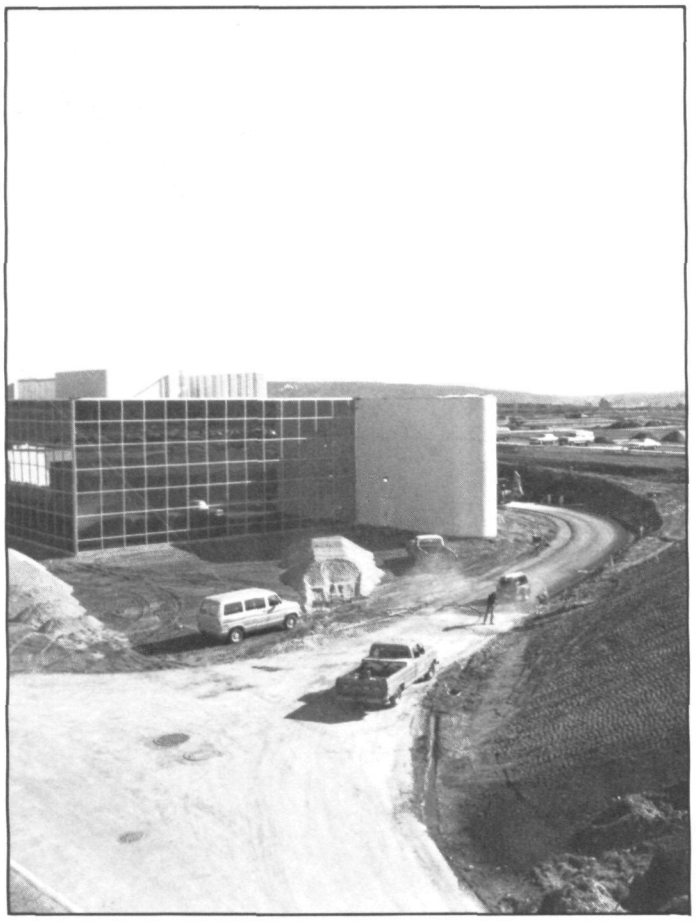
Two additional structures will complete the new buildings at the facility, an Auditorium and a staging pier for occasional visits by research vessels.

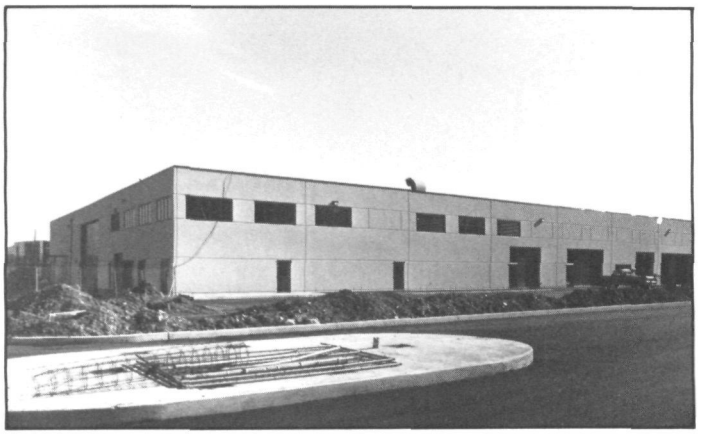
The staging pier will extend into Lake Washington on the north shore of the site into an area named Pontiac Bay. It will extend 192 feet into the lake and then make a 90 degree turn to the west. The portion of the pier parallel to the shoreline will be 252 feet long. It will provide berthing for up to two NOAA vessels. Two smaller piers each 70 feet long will be constructed inside the larger "L" shaped pier. The deck of all the piers will consist of precast concrete panels with a reinforced concrete topping slab. Pier utilities including mechanical, electrical, and communication lines will be installed beneath the decks. Low angle lighting wil be installed around the edge of the pier. Three overhead lights will be located along the outer portion for overhead illumination. Additional lighting will be installed in the adjacent shoreside staging area.

The auditorium will be located just south and slightly east of the entrance to the Operations building. Providing seating for almost 270 people, the auditorium will have a stage and be equipped with a sound system and projection room. The lobby will include space for a cloak room, restrooms, and a coffee bar. The lobby design includes areas suitable for displays and other graphics and has a large center skylight in the ceiling. Two seminar rooms will provide seating for 50 to 75 people.

The covered bridges from each main building will provide access to adjacent parking lots from the main entrance of each building. Parking will be provided for approximately 700 vehicles. While there will be no reserved parking, special spaces will be marked for the handicapped, visitors, and some government vehicles.

Extensive landscaping is planned, and is now underway in and around the parking areas and throughout the site in





Still more of NOAA's new look in Seattle includes Research I (left), the shops/heated warehouse (top), and Research II (above).

general. The majority of the open areas will be seeded with a special mix of field grass, while a campus seed mix will be used in areas close to the buildings. Over 1,800 trees will be planted, comprising 26 different species including, maples, poplars, cottonwoods, western red cedar, myrtle, and hawthorne. Also, over 4,200 shrubs will be planted using 19 different species, including azaleas, lilacs, dogwoods and various berry trees. Vines, perennials, and other plants will provide additional ground cover.

Art In Architecture

In support of the government's Art-in-Architecture program, plans have been developed for artwork at the facility. Five artists were selected by a panel whose members were chosen by the National Endowment for the Arts and the Seattle Arts Commission. Early in 1982, the artists met with agency officials, representatives of the architectural firm, and local community residents, to develop initial thoughts for their work. In June 1982, the artists returned to Seattle to present their final proposals. These were then submitted to, and approved by, the NOAA Administrator. Coordinated with the overall design of the site, the art will serve as a visual and practical experience for visitors and employees.

Siah Armajani will provide two pedestrian bridges, along the shoreline path leading from the city park adjacent to the south side of the Center. The bridges will be pre-cast concrete with exposed aggregate in terracotta color.

Scott Burton will provide a terrace piece at the end of the shoreline path North of the Operations Building. It will be constructed of concrete inlaid with stainless steel to form a 3 foot by 5 foot grid pattern and will incorporate rock settings and unique sculptural objects.

George Trakas will construct a side pathway which will provide access to the water including a series of steps, seating, and platforms extending over the water.

Doug Hollis will create a "sound garden" located atop a knoll near the south boundary with the park. Using pipes, the sound generated will be in muted tones with the pitch dependent on the direction and velocity of the wind.

Finally, Martin Puryear will create an observation piece constructed of cast concrete sections placed next to each other in a spiral fashion.

Work has started on some of the pieces and completion is expected by June of 1983. In reporting to the Chairman of the National Endowment for the Arts, Leonard L. Hunter III, the Assistant Director, Visual Arts, commented "We feel this project is unprecedented. Never has a community, a City Arts Commission, and a Federal agency worked together so well. I am convinced that this project is going to be one of the most important art in public places projects in this decade."

Many share this enthusiasm, not only for the art program, but for the entire project. Conceived in the early seventies and many years in planning and development, it is now possible to see the reality of the project and its magnitude can be appreciated. With planning now underway for a dedication ceremony, in October of 1983, the facility will be a singular achievement for consolidation, increased management efficiency, and agency coordination. It will be a NOAA facility in every sense of the word and concept. ■

Try Chowder for a Change

Winter and chowders seem made for each other. Whether you're planing a quick, nourishing lunch for the kids or a simple, hearty meal for weekend guests, a seafood chowder can be a welcome change from more traditional winter meals.

The recipes given here are classic members of the seafood cuisine typical of the Maritime Northeast. Both can be prepared ahead of time and, if reheated carefully to just below the simmer, actually improve in flavor the day after they're made.

NEW ENGLAND CLAM CHOWDER

3-4 dozen medium to large hard-shelled clams
5-6 cups cold water
2-4 oz. salt pork, preferably lean (about a 2-inch cube), finely diced
3-4 medium boiling potatoes, peeled and cut into a ¾-inch dice
2 cups half and half (or 1 cup milk and 1 cup light cream)*
1 large onion, very finely minced
2 tbs. chopped parsley

Place thoroughly washed clams in a large pot and barely cover with cold water. Bring the water to a boil and simmer gently just until the clam shells open, about eight to ten minutes. Discard any clams that remain closed.

Strain the clam liquor through several layers of washed cheesecloth and reserve. Let the clams cool.

Saute the salt pork in a deep, heavy saucepan until it renders its fat and has begun to brown. Add the onion and cook slowly until it turns transparent, about ten minutes.

Add the diced potatoes, season to taste with salt and pepper, and simmer slowly until the potatoes are just tender, about ten minutes.

Remove the clams from their shells, adding any broth to that already saved. Chop the clams coarsely and add them, with the strained broth, to the onions.

Just before serving, stir in the half and half and re-heat gently. Don't allow the chowder to boil. Garnish with parsley. Serves 6-8.

*Rhode Island, as opposed to New England, clam chowder omits the cream. The result is a rather plain-looking grayish broth that allows all the delicious flavor of the clams to come through.

This fish chowder from New Brunswick is considerably more robust than the clam chowder, and is enriched with milk, butter, and both sweet and soured cream. Served with homemade cornbread, salad, and beer or a crisp wine, it makes a perfect late Sunday dinner on a cold winter's night.

NEW BRUNSWICK FISH CHOWDER

2-3 pounds firm-fleshed fish fillets like cod, turbot, or haddock
2 cups water
1 bay leaf
4-5 medium boiling potatoes, peeled and roughly diced
2 tsp. salt
6 tbs. butter
1 cup diced celery
2 cups thinly sliced onion
2 tbs. flour
4 cups scalded milk
1 cup light cream
1 cup commercial sour cream
3 tbs. finely chopped parsley

Carefully simmer the fish uncovered in water in a large saucepan until just barely done, about five minutes. The fillets should still hold together in fairly large chunks. Remove the fish with a slotted spoon and set aside. Discard any skin and bones.

Add potatoes and bay leaf to the broth and cook until tender, adding up to a cup of water, if necessary.

Meanwhile, in a smaller saucepan, saute the celery and onions in butter until they are tender and have rendered up some of their moisture, about ten minutes. Don't allow them to brown. Stir in the flour and saute 2-3 minutes.

Add the vegetables and reserved fish to the simmering stock and potatoes. Cook until slightly thickened. Remove the bay leaf.

Combine the sweet and soured cream and stir until smooth. Off heat, add them, with the hot milk, to the chowder.

Garnish with parsley and serve immediately. Serves 6-8. ■

NOTE

In Fall *NOAA Magazine* the article entitled "Drowned... and yet they lived" neglected to mention that the diving reflex research involved was conducted by the University of Michigan Sea Grant Program.

United States
Government Printing Office
Division of Public Documents
NOAA Magazine
Washington, D.C. 20402

Official Business

AN EQUAL OPPORTUNITY EMPLOYER

Postage and Fees Paid
U.S. Department of Commerce
Com-210

Second Class Rate

Even a clam can evoke wonder - See page 20