NOAA REPORT

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News Briefs

Chief Financial Officer Appointed: Joseph T. Kammerer has been appointed NOAA's chief financial officer and chief administrative officer. Kammerer will head the newly-organized Office of Finance and Administration, which will report directly to NOAA Administrator D. James Baker. The new office replaces the Office of the Comptroller and the Office of Administration. This will strengthen and streamline the functions of the Office of Finance and Administration through the combination of the management team, Baker said.

Kammerer is currently director of planning for the National Security and International Affairs Division of the General Accounting Office. His extensive experience with the Federal government includes positions as deputy assistant secretary of defense; director of manpower, logistics, and support forces at the Department of the Navy; and associate assistant administrator at the Department of Energy. His private sector experience includes positions with McDonnell Douglas' Astronautics Company as chief financial officer and vice president for fiscal management.

Ship Hunts for Red October—and Finds It: The crew and scientists of the NOAA research vessel *Townsend Cromwell* dropped their swordfish sampling work to save two injured fishermen and their sinking fishing vessel *Red Oc-*

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Downtown Portland, Ore. came close to being flooded by the record level of the Willamette River during the recent Northwest floods. Sandbags were at the ready to shore up the city's seawall.

Early, Accurate Forecasts Save Lives in NW Floods

Early flood warnings of several days by NOAA's National Weather Service has garnered widespread praise in the Pacific Northwest, which saw record and near record flooding in early February.

The flooding affected a major portion of Oregon, Washington, Idaho and Montana from February 5th through the 9th. It was the worst in some 30 years in many locations, with record flooding occurring on many of the rivers. Some of the most significant flooding occurred in the Willamette basin in Oregon, with severe flooding in the cities of Portland and Salem. Accurate and timely warnings and forecasts of the flooding were broadcast all over the region, to both the public and emergency managers.

14 New Records Set

In the region, 14 rivers established new record flood levels: the Grand Ronde, Nehalem, Pudding, Sandy, South Yamhill and Tualatin Rivers in Oregon; the Chehalis, Cowlitz, Lewis, Klickitat, Nisqually, Skookumchuck and Yakima Rivers in Washington; and the Coeur D'Alene River in Idaho.

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Accurate Forecasts Temper Rivers' Wrath

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Snowpacks of one to three feet throughout the region gave the floods their needed water. The Coastal and Cascade Mountain ranges saw snowpack of one to three feet at the low- to mid-elevations, while the West Central Mountains of Idaho had a two to three foot snowpack at the mid-level elevations. East of the Cascades, there were Large areas with one foot of snow east of the Cascades, and freezing rain over the Central and Northern Willamette Valley and the northwest coastal areas of Oregon added to the mix.

By Sunday, February 5, temperatures turned much warmer and heavy rain started falling over the Pacific coast. The rain became very heavy on Tuesday, with the Oregon city of Eugene receiving almost five inches in 24 hours. The heavy rain continued over the west with no abatement until Friday.

East of the Cascades, rain and melting snow caused increased flow in the ice covered streams and rivers.

Between 5,000 and 10,000 homes like the one above were flooded during the recent Northwest floods, and nearly 30,000 people were evacuated.

As the week progressed, the ice broke loose in many places, resulting in jamming which caused repeated pooling and release of water, flooding homes and land and damaging bridges.

Highest Flows Since 1964

In Oregon, flows on the Willamette River were the highest since 1964 and placed the low lying downtown area of Portland at great risk. With the early warnings issued by the NWS the city was able to erect additional barriers on their seawall for added protection. The crest came within a few inches of the top of the seawall.

Elsewhere across this four state area, other rivers hit new record flows. While these were not as dramatic as the Willamette River, they nevertheless were of great concern.

Even with the NWS's accurate and timely forecasts, the floods caused major damage to the region. Ten deaths have been reported, although some can only be superficially linked to the floods. Nearly 30,000 people were evacuated in the region, with 22,000 coming from the Willamette Basin. Between 5,000 to 10,000 homes were flooded, and roads and highways suffered major damages. Interstate highways were temporarily closed and many secondary roads were not only closed but received major damage. Several bridges were washed away.

Read Us on the Web

In order to bring *NOAA Report* to you faster and easier, we've begun to put this newsletter on the Internet. And usually, it will be up on NOAA web site before you get it at your office.

Using the portable document technology of Adobe Acrobat, which is rapidly becoming a standard on the Internet, you can read the latest issue on your computer, and print out what you want—the whole issue or only certain pages.

Full instructions for accessing NOAA Report On Line, including retrieving the Acrobat software and integrating it with your web browser, are available at http://www.noaa.gov/public-affairs/report1.html. And in the near future, we'll be putting up back issues, too.

We Know Where You Are

Global Positioning Puts Nation on the Map

Be here now.

But where are we, really? Aside from the more profound existential mysteries evoked by this question, NOAA has the answer for you. At least to within a centimeter or two, thanks to NOS's National Geodetic Survey (NGS).

NGS is charged with establishing and maintaining our National Spatial Reference System—literally the common set of coordinates which lets us agree upon where anything is. Tracing its roots to the Coast Survey, established in 1807 by Thomas Jefferson, NGS maintains a network of hundreds of thousands of extremely high precision reference marks throughout the Nation. These points, often marked by a 3-inch metal disk, provide the common base of reference to correlate longitude, latitude, height, scale, and orientation throughout the Nation, and are used for a variety of scientific and engineering applications, including mapping and charting.

With the development of the Global Positioning System (GPS) by the Defense department, the business of fixing position has become extremely precise. The GPS consists of 24 satellites which continuously broadcast position and time data to users throughout the world. Users figure their position on the earth by measuring their distance from a group of the satellites at one time.

Although the military has access to much higher precision GPS signals, civilians can obtain positions accurate to about 100 meters horizontally and about 300 meters vertically. Non-GPS technologies, based on the old system of brass markers, have been able to determine the location of an object five miles from a reference mark to within an accuracy of three inches, but this has been a time consuming and expensive task. It could take days, or even weeks to survey a long line far from reference mark.

Because of its closeness to the national surveying and positioning community, NGS has been at the forefront of developing the GPS system, especially in establishing ways of making the system usable by civilians. To bring the National Spatial Reference System into the digital age, NGS is in the process of replacing its venerable (and massive) system of brass discs with a few hundred new high precision reference stations. Each state will then leverage the Federal reference system by tying a denser system of reference points to it. Using the new system and a GPS receiver, users will be able to fix their position to within a few centimeters, quickly.

Also, NOAA has worked closely with the Coast Guard to develop a precise GPS-based maritime navigation system for our coastal waters. This cooperation has resulted in high praise from GAO for effective interagency cooperation.

The new system will enable a new generation of private sector services including:

- GPS guided navigation systems for ships. When combined with NOAA's new generation of digital

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Rainbow of Topics for Earth & Sky

Here's the schedule for Earth & Sky radio spots for March that are sponsored by or related to NOAA:

March 2: Earth's Atmosphere
March 3: Wind
March 8: Zodiacal Light
March 12: Blizzard of 1888
March 13: Arc Rainbows
March 14: Rainbow Colors
March 15: Circle Rainbows
March 16: The Glory
March 21: Lightning and Grass
March 23: Rain and Floods
March 26: JASON program (students team up with ocean scientists)
March 27: Why the Sea is Salt

Earth & Sky RADIO SERIES

Transcripts of recent Earth and Sky segments, along with other information about the program, are available on the Internet at http://www.earthsky.com. Actual Earth and Sky broadcasts are also available on the Internet using RealAudio, a technology that allows you to listen to broadcast material through your computer in real time. Earth and Sky broadcasts in RealAudio are available at http://www.realaudio.com/contentp/rabest/earthsky.html.

The Washington, D.C. affiliate for Earth & Sky is WDCU-FM, 90.1, airing Monday through Friday at 8:00 a.m. For the station nearest you, or for a faxed copy of the scripts, call Jeanne Kouhestani at 202/482-6090 or e-mail her at *jeannek@pa@noaa* (Banyan) or *jkouhestani@hq@noaa.gov* (Internet).

Focus On...

NOAA & the 1996 Atlanta Olympics

Come this summer, it won't be only the world's greatest athletes who will show off their stuff in Atlanta. The 1996 Summer Olympics will give NOAA's National Weather Service a chance to give the world a glimpse of what could be the future of weather forecasting.

Along with many other American public entities and private corporations, NWS is supporting the Atlanta games in a big way. With a state of the art network of technology and experienced field staffers, the NWS will be able to demonstrate the vastly improved capabilities that will be at the fingertips of forecasters through the Nation in just a few years.

The requirement to provide weather support for the 1996 Olympic Games has triggered an acceleration in the NWS's development and integration of numerical models and forecast systems that otherwise might not have been perfected and ready for operational use until the turn of the century. For example, in support of the Olympics, several new tools have been assembled to assist meteorologists in forecasting areas of thunderstorm development and evolution with a level of accuracy never before possible. These tools include:

- The National Centers for Environmental Prediction's (NCEP) 15 km resolution Eta (Eta-15) forecast model, which will provide timely and high resolution information to Olympic forecasters;
- The Forecast System's Laboratory's (FSL) Local Analysis and Prediction System (LAPS), which will enable forecasters to analyze surface conditions much more rapidly and with a higher resolution than ever before possible;
- Colorado State University's Regional Atmospheric Modeling System (RAMS), which uses data from LAPS to generate very high resolution local weather predictions, resulting in highly precise and timely forecasts;
- The Cooperative Institute for Research in the Atmosphere's RAMM Advanced Meteorological Satellite Demonstration and Interpretation System (RAMSDIS), which will provide forecasters with a host of high resolution GOES satellite images, such as infrared, nighttime fog, water vapor and daytime reflectivity imagery;
- The National Severe Storms Laboratory's Warning Decision Support System (WDSS), which integrates data from many sources, including Doppler radar sites and lightning strike sensors, giving forecasters all the information they need to make fully informed decisions about the potential of severe storms.

One of the many automated remote weather observing stations to be used to collect weather data during the Olympic sailing events off the Georgia coast. This one is located at the U.S. Coast Guard station at Tybee Island, Ga.

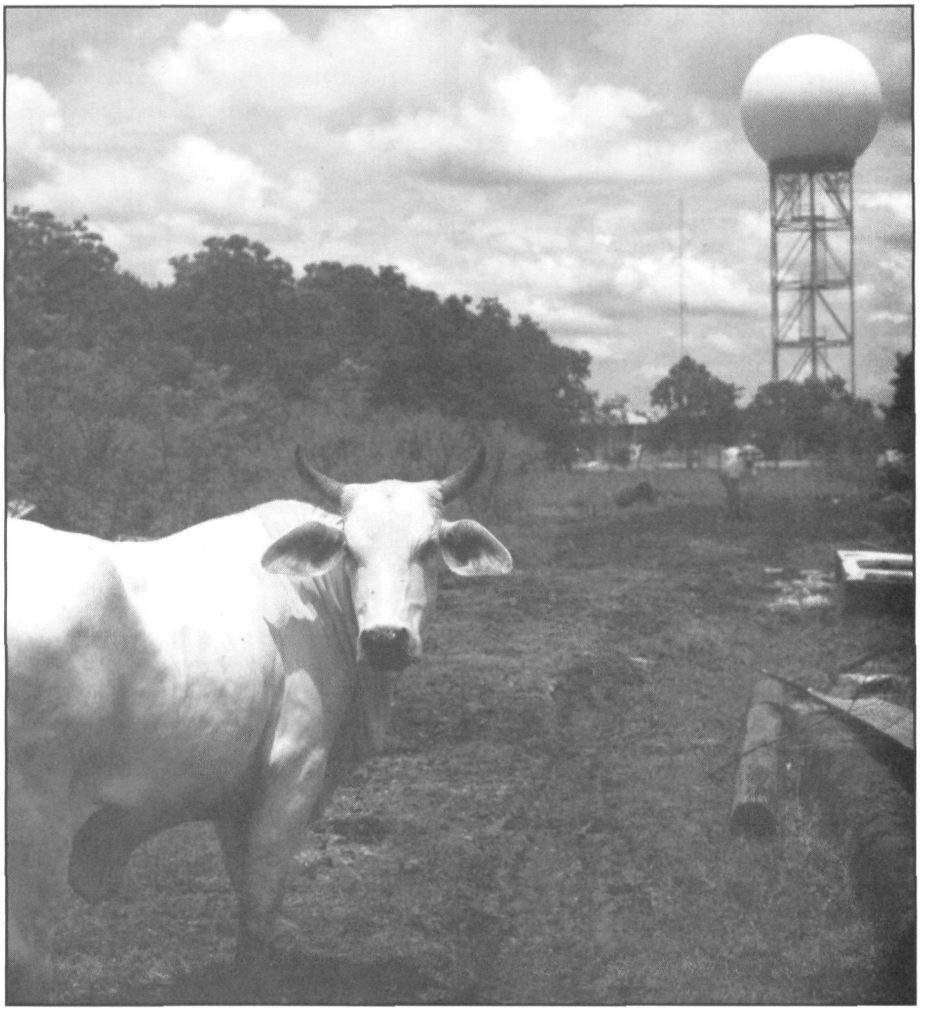
The extensive use of these systems by Olympic forecasters is expected to demonstrate the practicality of generalizing the use of similar technology throughout the nation.

IMPROVED DATA INTEGRATION CAPABILITIES

In order to make the Olympics as weathersafe as possible, the Atlanta Committee for the Olympic Games (ACOG) asked the National Weather Service to provide venue-specific weather warnings and forecasts. Since the new forecast and warning tools described above can process huge amounts of data quickly, forecasters at the Olympic Weather Support Offices will be able to meet that need. These tools are capable of integrating many different kinds weather data from a plethora of sources. Indeed, one of the characteristics that separate this generation of forecast and warning tools from those currently in widespread use is that,

rather than being limited on the amount and type of data they can process, they are designed to integrate data from various sources. In addition to the vast amount of data available from new systems already in the NWS's inventory of meteorological tools, including WSR-88D radars, Automated Surface Observation Systems (ASOS), and the next generation of Geostationary Operational Environmental satellites (GOES), Olympic forecasters will have at their disposal data from:

- nearly 100 surface observing sites operated by the University of Georgia, Auburn University and the Georgia and South Carolina Departments of Forestry. These sites are capable of providing observations automatically every 15 minutes.
- three buoys, operated by the National Data Buoy Center off the Georgia coast, will provide offshore wind, wave and temperature data every hour. In addition, two of NDBC's buoys will transmit reports by radio every ten minutes.
- two supplementary upper air soundings taken daily from six locations in the Southeast United States.



This Doppler radar site will help NWS forecasters warn Olympic competitors and visitors of the potential of severe weather.

THE OLYMPIC WEATHER SUPPORT COMMITTEE

In November 1992, at the request of the Director of the Atlanta Organizing Committee (now the Atlanta Committee for the Olympic Games or ACOG) and at the direction of Secretary of Commerce, Ron Brown, the National Weather Service formed the Olympic Weather Support Committee (OWSC). Under the supervision of the Director of the National Weather Service's Southern Region, Harry Hassel, the OWSC identified and assembled the hardware, software and communications needs that would enable the agency to deliver the high quality of weather services necessary to protect athletes, support personnel and spectators who will be involved in the Games. That formidable task could only be accomplished with a high level of cooperation among many NOAA elements, several of which were represented on the OWSC, and other state and federal agencies. A list of the OWSC members is attached.

THE OLYMPIC WEATHER SUPPORT OFFICES

The National Weather Service will support Olympic operations from two offices: the Olympic Weather Support Office located in Peachtree

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Focus On:

NOAA and the '96 Olympics

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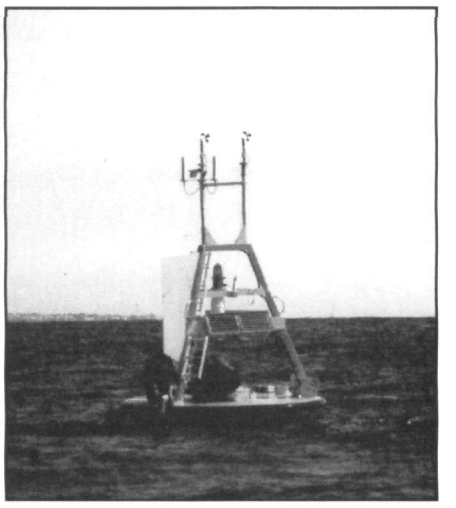
City, and the Olympic Marine Weather Support Office located on Wilmington Island near Savannah. The staffs of the two offices come from varied backgrounds and have been selected from locations all across the United States. While most forecasters are National Weather Service Meteorologists, some will be coming from Australia and Canada.

The yachting competition is one of the most weather-sensitive of the Olympic events. Not only is the competition reliant upon weather conditions for its success, but the safety of the competitors and spectators, many of whom will be in small boats on the open waters, is of great importance.

THE OLYMPIC WEATHER SUPPORT OFFICE

Several key individuals have been identified and selected to oversee planning, development and operations at the OWSO. These include a Meteorologist-in-Charge, a System Administrator, and a Science and Operations Officer. The Meteorologist-In Charge, Lans P. Rothfusz, coordinates with external users such as ACOG, develops strategies to provide products and services to the Olympic customers, and serves as the day-to-day manager of the Olympic weather support project. The System Administrator, Clark Safford, assembles the hardware components of the Olympic Weather Support System, and manages the flow and storage of data. The Science and Operations Officer, J. T. Johnson, on loan to the NWS from the National Severe Storms Laboratory for a period of 20 months, focuses on the operational application of new science and technology; training the forecasters; monitoring the quality of data and the output of numerical forecast models, and assessing the performance of the software.

To conduct weather forecast and warning operations, the OWSO's core staffing will consist of a cadre of 15 NOAA meteorologists, three meteorologists from the Canadian Atmospheric Environment Service, and one meteorologist from the Australian Bureau of Meteorology. The NOAA meteorologists hail from all over the United States. For the most part, these individuals come from the ranks of operational National Weather Service forecasters. They were chosen because of demonstrated skills in specific areas which will be critical to the Olympic weather support effort, such as forecasting small scale weather events, knowledge of the output and characteristics of the numerical models of the atmosphere which will be used, and familiarity with the project's hardware and software. The Canadian meteorologists were chosen not only because of their demonstrated meteorological skills, but because they are bilingual, being fluent in both the English and French languages. Consequently, they will assist in the provision of weather support and in the translation of weather forecasts and warnings into the French language, one of the two official languages of the Olympic Games. The Australian meteorologist will be participating to gain insight on how to provide similar support when the Games are held in Sydney, Australia, in the year 2000.



This NOAA data buoy, located five miles offshore of Tybee Island, Ga., will collect information for the Olympic sailing competition and is in the center of the course.

In the summer of 1995 the entire OWSO forecast team, including individuals selected as alternates, were assembled in Peachtree City for five days of intensive training on the technology and operations. The teams were brought in groups of three or four in an overlapping fashion, so the period of training extended from July 24 through August 22, 1995. During the training, forecast and warning support was provided for a number of sports events in the Atlanta area, collectively known as "Atlanta Sports '95." These events, conducted in conjunction with ACOG, were a precursor to the games themselves and afforded an opportunity for a number of entities, including the NWS, to conduct a "dry run" of providing support services to the Games.

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Military Radars Used To Map Ocean Currents

Military "over-the-horizon" radars, designed to scan the horizon for enemy bombers and ships, can be put to valuable peacetime use such as mapping ocean currents, according NOAA scientists in Boulder, Colo.

Researchers Thomas M. Georges and Jack A. Harlan at NOAA's Environmental Technology Laboratory have, for the first time, used two U.S. Navy high-frequency radar systems to map open-ocean currents off the coast of Florida. In a paper published in the Feb. 1 issue of *Nature*, Georges and Harlan describe the experiment where they used the over-the-horizon (OTH) radars located in Texas and Virginia to measure ocean currents 900 miles from the radars.

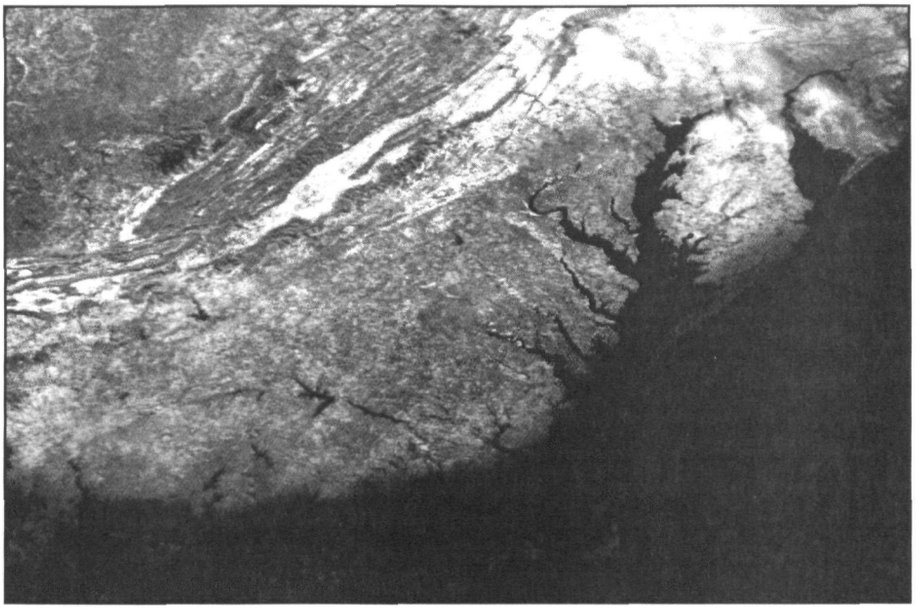
Potential for Caribbean & Gulf Mapping

The success of this experiment indicates the potential for using OTH radars for mapping the circulation of the entire Caribbean Sea and Gulf of Mexico. Little is known about the ocean circulation in these areas, or how the currents that become the Gulf Stream merge and travel up the East Coast of the United States. "We know practically nothing about ocean currents and how they change with time," Georges said. "Yet, it's of great importance for fisheries management, search and rescue efforts, and studies of climate change."

Only two percent of the radar systems' potential coverage was used to perform this test, indicating the possibilities of using these and other OTH radars to map huge areas of the ocean. Previous studies have employed one radar to look at ocean currents but by using overlapping radar fields, a more complete picture of ocean currents was achieved.

The radars employ huge transmitting and receiving antenna arrays that were originally designed by the military to track aircraft and ships. These OTH radars work by bouncing high-frequency radio beams off the ionosphere, an electrically charged layer in the upper atmosphere. In the early days of radio, it was discovered that by bouncing radio signals off the ionosphere, shortwave signals could be received thousands of miles away.

According to Georges, several OTH radars around the world that now lie idle could be mapping other features of ocean circulation, such as boundary currents and mesoscale eddy systems, which could give us a new, more detailed picture of ocean circulation.



Snow Wonder

Ever wonder why no one answered when you called Washington in January? Here's an image taken from a NOAA Polar satellite in January showing virtually all of the mid-Atlantic covered in snow (white areas). Snow covered areas as far south as North Carolina. Also, NOAA's National Climatic Data Center has included the Blizzard of '96 in its list of billion dollar weather disasters. Preliminary estimates of $2 billion in damages and related costs were enough to put it on the same roster as Hurricanes Opal and Marilyn in 1995, and the 1995 floods in Texas, Louisiana, Mississippi and California.

NATIONAL MARINE FISHERIES SERVICE
1871 125th ANNIVERSARY 1996
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

New Logo Honors 125 Years

NMFS, the Nation's oldest conservation organization, celebrated 125 years of marine fisheries research, conservation, and management on Feb. 9. And a new logo has been developed to honor that achievement. Look for it throughout this anniversary year.

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tober, 550 miles northeast of Honolulu last month. At midnight Tuesday, Feb. 6, the NOAA Corps ship started the hunt for the *Red October* under rough seas after receiving the distress report of two injured fishermen and their 75-foot boat taking on water with nearly three feet already onboard. Early Wednesday morning and 286 nautical miles later, the research crew found a crippled *Red October* and immediately started rescue operations.

The two injured fishermen were transferred to the *Townsend Cromwell* in stable condition, received further medical attention and were returned to the *Red October* the next day reportedly in good condition. The NOAA crew also transferred drinking water, food, dry clothes and bedding to the other four fishermen

News Briefs

and performed repairs to the *Red October's* leaky propeller shaft area and fixed the water pumps.

NOAA Funding Supports Chesapeake Bay Estuarine Study: Through its Coastal Ocean Program, NOAA has awarded a team of researchers $650,000 to study effects of multiple environmental stressors on the Patuxent River Estuary in the Chesapeake Bay. The grant is for the second year of a projected six-year, $6 million study. Traditionally, studies of coastal ocean degradation have focused on a single stressor such as nutrients, trace inorganics, and low dissolved oxygen levels. The Patuxent study, led by Dr. Denise Breitburg of the Academy of Natural Sciences' Benedict Estuarine Research Laboratory in St. Leonard, Md., is designed to look at how all of these stressors interact to impact a single coastal ecosystem.

NWS Covers Olympic Weather

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OLYMPIC MARINE WEATHER SUPPORT OFFICE

The yachting competition is one of the most weather-sensitive of the Olympic events. Not only is the competition reliant upon weather conditions for its success, but the safety of the competitors and spectators, many of whom will be in small boats on the open waters, is a matter of concern. To meet the unique requirements of the weather sensitive venue and to ensure that adequate forecast and warning capabilities are available to provide for the safety of competitors and the spectators, an on site weather support office is needed. OMWSO will be located at the Olympic Marina on Wilmington Island, a short distance from the yachting competition area.

To conduct weather forecasting and warning operations, the OMWSO core staffing will consist of five NOAA meteorologists, one meteorologist from the Canadian Atmospheric Environment Service, and one meteorologist from the Australian Bureau of Meteorology. The forecasters were chosen based on their skills in marine weather forecasting. In addition, several of the individuals have experience in piloting small boats, and one of the forecasters has experience in international yachting competitions.

In the Summer of 1995, the members of the OMWSO team were assembled in Peachtree City at the OWSO for two days of intensive training. The team then traveled to the OMWSO on Wilmington Island and on July 26, 1995, began forecast and warning support operations for an international regatta taking place in the same area scheduled for the Olympic competition in 1996. The regatta, taking place under the auspices of ACOG, gave forecasters the opportunity to gain experience in providing the type of weather support services which will be required during the 1996 Olympic yachting competition.

Global Positioning

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nautical charts, this will provide a total electronic navigation solution that will greatly increase the safety of marine transportation and reduce the incidence of groundings and collisions (there are currently thousands each year).

- When combined with high precision surveys of airport runways, cockpit mounted GPS receivers will allow pilots to perform precision instrument only landings in *zero* visibility!
- GPS controlled tractors, when tied to crop/field databases, are ushering in a new era of super-precision farming, in which fertilizers and pesticides can be applied with pinpoint accuracy, helping coax high yields out of each small parcel of a large field. The resulting reduction in total volume of chemicals yields not only a more productive farm but decreases the excess chemicals that run into the watershed.

—Eliot Hurwitz

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National Oceanic and Atmospheric Administration

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