



NOAA BUSINESS REPORT 2003

U.S. DEPARTMENT OF COMMERCE • NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

An aerial photograph of a large, deep blue lake nestled in a valley between dark, forested mountains. The lake's surface is calm, reflecting the sky. A small boat is visible in the middle of the lake, leaving a white wake. In the background, snow-capped mountain peaks rise against a blue sky with scattered white clouds.

Setting Our Sights



Jim Wark, Airphoto

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Setting Our Sights

Moving NOAA into the Future



*Conrad C. Lautenbacher, Jr.
Under Secretary of Commerce
for Oceans and Atmosphere*

The National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce has established itself as one of the world's premier scientific and environmental agencies. At NOAA, science gains value when we apply our scientific knowledge to a wide range of services important to every citizen. From our climate predictions that influence farming and financial decisions, to our hydrological products that affect public utilities and energy consumption, NOAA has a critical role in our Nation's economic security. Our 12,500 employees focus NOAA's \$3.6 billion budget toward understanding

and improving the Nation's environmental and economic health and security, and providing real and tangible products and services.

NOAA's work directly affects the daily lives of all Americans across the Nation and has economic significance that helps determine the Nation's gross domestic product. We are experts in climate, with its cooling and warming trends. We are an agency that manages fluctuating fisheries and marine mammal populations. We observe, forecast, and warn the public about the rapidly changing atmosphere, especially severe weather. We monitor currents and tides, and beach erosion. We survey the ocean bottom and provide mariners with products for safe navigation. We operate the Nation's most important constellation of Earth-observing environmental satellites. Finally, we make all this knowledge and exploration available to citizens everywhere, including schools and young people across the Nation through our Web site at www.noaa.gov. We consider this educational aspect to be a vital part of our mission of advancing environmental assessment, environmental prediction, and natural resource stewardship for our Nation.

Investing in People and Infrastructure

NOAA used its resources in fiscal year 2003 to invest in its people and infrastructure, as well as in initiatives in climate, energy, homeland security, and high-priority research, science, and services. During FY 2003, some of NOAA's major accomplishments were:

- producing the first-ever Climate Change Strategic Plan as mandated by the 1990 U.S. Global Change Research Act;
- increasing international cooperation to manage living marine resources through the International Commission for the Conservation of Atlantic Tunas and International Whaling Commission;
- reducing the average age of NOAA ships by 5.4 years from 33.6 years to 28.2 years;



NOAA's work directly affects the daily lives of all Americans across the Nation and has economic significance that helps determine the Nation's gross domestic product. Photo: Port of Seattle

- expanding the NOAA Weather Radio system to reach 95 percent of the American public;
- hosting an Earth Observation Summit in Washington, D.C., that resulted in the agreement to develop a 10-Year Implementation Plan for a comprehensive Earth Observing System;
- increasing hydrographic surveying outsourcing through contracts by 104 percent since FY 2002;
- issuing the first ecological forecast of the dead zone in the Gulf of Mexico;
- reaching agreement on the European meteorological satellite organization's (EUMETSAT) Joint Transition Activities regarding the Polar-orbiting Operational Environmental Satellite Systems Agreement—Germany, June 2003;
- activating the first operational Solar Imager (SXI) on GOES-12;
- increasing the abundance of Pacific salmon stocks listed under the Endangered Species Act; and
- initiating 200 new grassroots fishery habitat restoration projects.

Exercising Fiscal Responsibility

NOAA is also doing its part to exercise fiscal responsibility as stewards of the Nation's trust, as well as being caretakers of America's coastal and ocean resources. In the same way that NOAA is responsible for assessing the Nation's climate, we are responsible for assessing and improving our management capabilities. NOAA will continue to respond to key customers and stakeholders. We will leverage our programs and investments by developing associations that most efficiently and economically use resources and talent, and that most effectively provide the means for successfully meeting mission requirements.

NOAA completed the first phase of its new Planning, Programming, and Budgeting System process—the Program Baseline Assessment. By doing so, we have reached a major milestone in implementing the first complete cycle of this new process. The substantive work that was done has yielded a much better understanding of the capabilities NOAA has to achieve its current mission and how successfully we have set our sights for moving NOAA into the future.

A handwritten signature in black ink, reading "Conrad C. Lautenbacher, Jr." in a cursive script.

Conrad C. Lautenbacher, Jr.
Vice Admiral, U.S. Navy (Ret.)
Under Secretary of Commerce for
Oceans and Atmosphere and
NOAA Administrator



NOAA HIGHLIGHTS



111th Aerial Photography Squadron

Management Improvements

Building an Effective, Efficient, Unified NOAA

NOAA Adopts Principles of Matrix Management

During FY 2003, NOAA established a Program Review Taskforce (PRT) to examine NOAA's strengths and opportunities for improvements. The PRT recognized that the management system and structure in place at NOAA were not the best possible approaches for addressing the challenges of NOAA's future missions.



*James R. Mahoney, Ph.D.
Assistant Secretary of
Commerce for Oceans and
Atmosphere*



*Timothy R.E. Keeney
Deputy Assistant Secretary of
Commerce for Oceans and
Atmosphere*

The application of matrix management to NOAA's organization and programs is the foundation for the structural changes in NOAA that were initiated in FY 2003. Matrix management is a cooperative approach to managing programs that span across two or more NOAA organizations. Program managers are given total responsibility and accountability for their programs' success, while functional managers provide technical and business assistance. Matrix management is also the driver for fundamental program and project management changes that reflect the transition of NOAA to a more corporate and integrated organization.

The following programs have been designated as matrix managed: Air Quality, Aquaculture, Climate, Coral Reefs, Ecosystem Research, Environmental Modeling, Habitat Restoration, Homeland Security, Invasive Species, NOAA Emergency Response, Protected Areas, Space Weather, Undersea Research and Exploration, and Weather and Water Science and Technology Infusion.

Planning, Programming, and Budget Execution System Implemented

The PRT proposed an organizational structure and management process that modifies NOAA headquarters, while improving NOAA's corporate decision-making processes. Specifically targeted are those processes that are critical to supporting the Budget and Performance Integration Initiative of the President's Management Agenda.

NOAA determined that it could significantly improve its corporate decision process by introducing matrix management and establishing a NOAA-wide requirements-based management process linked with the planning, programming, and budgeting processes. The new Planning, Programming, and Budget Execution System is a formal, systematic structure for making decisions on policy, strategy, capability development and deployment, and resource allocations for accomplishing NOAA's mission.

Fisheries Science Programs Separated from Regulatory Programs

NOAA's fisheries science programs provide the scientific basis for regulatory decisions to fulfill the agency's mandates. To be successful, scientific programs must be relevant, responsive, respected, and right. How the programs are organized relative to regulatory programs has an important influence on how well the science performs relative to these four criteria. The more closely scientific programs are associated with management programs, the more likely they are to be responsive and relevant. However, separating scientific programs from management programs organizationally generally improves credibility (i.e., respect) and quality (the likelihood of being right).

In 2003, NOAA Fisheries elevated the organizational status of its scientific programs, based on careful evaluation of the tradeoffs between alternative organizations. It established a Director of Scientific Programs and Chief Science Advisor reporting to the Assistant Administrator for Fisheries, with direct line authority over all scientific programs. Prior to this change, regional scientific programs had reported to Regional Administrators, who are also responsible for implementing regulatory mandates.



NOAA Administrative Services Strengthened

The recurring dynamics of budget shortfalls, hiring freezes, and other limitations have placed NOAA's financial and administrative offices under severe and unsustainable pressure. To address these matters systematically, NOAA hired a contractor to study and recommend ways to improve the quality and efficiency of NOAA's financial and administrative functions. NOAA will implement the following recommendations from the study:

- reengineer NOAA's financial and administrative services functions to improve quality and consistency;
- adopt a functional service delivery model (i.e., field operations report to their respective headquarters functional manager);

NOAA's fisheries science programs provide the scientific basis for regulatory decisions to fulfill the agency's mandates. To be successful, scientific programs must be relevant, responsive, respected, and right.

- conduct a study of financial and administrative services performed within NOAA's line offices (as part of an end-to-end business process reengineering effort); and
- establish a Transition Management Office to assess the study's recommendations and plan necessary implementation activities.

As NOAA moves forward, our goals are to ensure the appropriate service delivery and organizational model, use our resources wisely, and balance these aims with the interests of employees who will be affected by change.

NOAA's Vision

To move NOAA into the 21st century scientifically and operationally, in the same interrelated manner as the environment that we observe and forecast, while recognizing the link between our global economy and our planet's environment.

NOAA's Mission

To understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet the Nation's economic, social, and environmental needs.

NOAA's Core Values

People, Integrity, Excellence, Teamwork, Ingenuity, Science, Service, Stewardship.

Benefits to the Nation

Consistent with its results-oriented approach to strategic planning, NOAA is committed to maximizing the benefits of its products and services in terms of improvements to our Nation's environment, public safety, and economy.

Excellence in NOAA's Leadership

PRESIDENTIAL RANK AWARDS

Scott B. Gudes, former Deputy Under Secretary of Commerce for Oceans and Atmosphere

Rolland A. Schmitt, Director, Office of Habitat Conservation, NOAA Fisheries

Dr. Susan Solomon, Senior Scientist, Aeronomy Laboratory, NOAA Research



Meritorious Rank Award Recipients

John D. Cunningham, Program Director, National Polar-orbiting Environmental Satellite System, National Environmental Satellite, Data and Information Service

Dr. Fred C. Fehsenfeld, Senior Scientist, Aeronomy Laboratory, NOAA Research

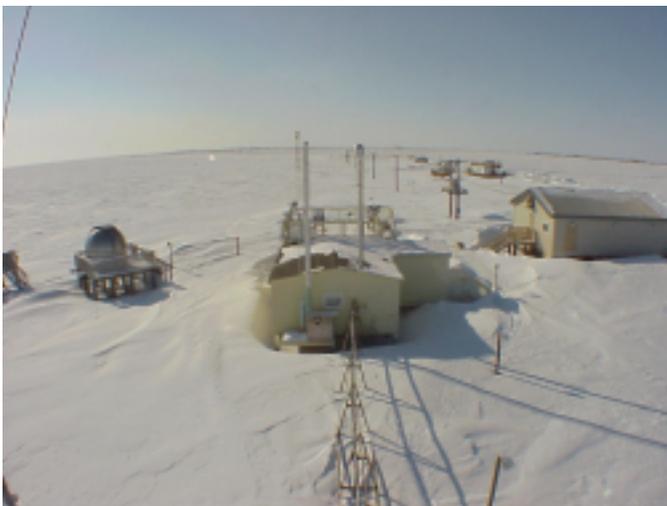
Dr. Harry R. Glahn, Director, Meteorological Development Laboratory, National Weather Service

Bruce Hicks, Director, Air Resources Laboratory, NOAA Research

Dr. Ernest Hildner, Director, Space Environment Center, NOAA Research

Dr. Joe Schafer, Director, Storm Prediction Center, National Weather Service

Dr. Richard W. Spinrad, Assistant Administrator, National Ocean Service



DEPARTMENT OF COMMERCE AWARDS

Gold and Silver Medals

Six individuals, 14 groups, and 8 organizations in NOAA received the Department of Commerce Gold and Silver Medals. These awards annually recognize extraordinary achievements that support the Department's mission. The Secretary awards the Gold Medal, the Commerce Department's highest honorary award, for distinguished performance characterized by extraordinary, notable, or prestigious contributions to the Department and/or one of its operating units.

Bronze Medals

The Under Secretary awarded the Department's Bronze Award to 19 individuals, 26 groups, and 23 NOAA organizations. This medal is the highest form of honorary recognition for superior service to NOAA and the Department of Commerce.



NOAA AWARDS

Individuals and groups received the following NOAA awards during a ceremony held October 24, 2003.

- Administrator Awards, recognizing employees or groups who made significant contributions to NOAA;
- Diversity Spectrum Awards, recognizing employees who have made the special effort to enhance the NOAA workplace;
- Technology Transfer Awards, recognizing innovation; and
- Career Awards, recognizing long-term achievement in advancing NOAA's goals and mission.



Scientists at NOAA's centers and laboratories conduct cutting-edge, award-winning research. Shown here is the Climate Monitoring and Diagnostics Laboratory's Barrow Observatory.

Key Congressional Hearing Highlights



Debra Larson, Director,
Office of Legislative Affairs

NOAA's FY 2004 Budget Requirements

In testimony on March 19, before the House Committee on Resources, Subcommittee on Fisheries Conservation,

Wildlife, and Oceans, Admiral Lautenbacher stated: "NOAA activities and operations contribute to the Nation's economic and environmental health. This budget request allows us to provide essential support to the programs that enhance our scientific understanding of the oceans and atmosphere, in order to help sustain America's environmental health and economic vitality. NOAA is at the forefront of

many of this Nation's most critical issues, from weather forecasting to fisheries management, from safe navigation to coastal services, and from environmental observations through NOAA's satellites to climate research and ocean exploration."

International Fishery Conservation and Management Issues

On May 22, Dr. William T. Hogarth made the following statement before the House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans: "NOAA Fisheries and our Federal partners at the Department of the Interior and the State Department, working in concert with state, tribal, and other partners, have accomplished and are continuing to accomplish an impressive program of internation-

al living marine resource conservation and management."

Soil Carbon Sequestration

On June 6, 2003, James R. Mahoney testified before the Senate Committee on Commerce, Science, and Transportation's Subcommittee on Science, Technology, and Space, citing the importance of soil carbon sequestration in reducing net greenhouse gas: "A Nation that grows its economy is a Nation that can afford investment in research and development of new technologies. For agriculture, this investment will likely have the added benefits of increased agricultural production, improved soil quality, and increased soil carbon sequestration."

FY 2003 KEY EVENTS

October 15, 2002

NOAA laboratories received the 2002 Excellence in Aviation Award for contributions to the Federal Aviation Administration's Aviation Weather Research Program. NOAA's Environmental Technology Laboratory was recognized for its work on detecting in-flight icing conditions in clouds, and NOAA's National Severe Storms Laboratory was recognized for its contribution to uses of weather radar for aviation safety products.

December 16–18, 2002

The National Environmental Satellite, Data and Information Service (NESDIS) and the National Aeronautics and Space Administration's (NASA's) Office of Earth Sciences held a science workshop, which focused on cooperation under the existing U.S.–Indo Memorandum of Understanding for Scientific Cooperation in the Areas of Earth and Atmospheric Sciences.

January 2003

NOAA's Aeronomy Laboratory scientist Jim Meagher became a member of the Scientific Advisory Committee of the Hong Kong and Pearl River Delta Pilot Air Monitoring Project. The broad scientific aims of the two-year project are to enhance scientific understanding of air quality problems in the Hong Kong/Pearl River Delta region, especially with regard to ozone and fine particles.

January 2003

NOAA's Environmental Technology Laboratory flew its Polarometric Scanning Radiometer (PSR) on NASA's P-3 research aircraft. The PSR is a unique air-based imaging system that simulates satellite-based imaging capabilities. The global mission plan spans nine months and consists of seven aircraft flights under the satellite to calibrate precipitation, snow, sea ice, and soil moisture mapping at various locations around the world.

January 2

NOAA's Weather Forecast Offices serving California assumed fire weather forecasting responsibility, to provide around-the-clock support to the state's land management agencies.

January 8

Thomson Multimedia, Inc., announced at the Consumer Electronics Show in Las Vegas, Nevada, that the hazards NOAA Weather Radio network would be integrated for the first time into television. Known as AlertGuard, this new capability was first made available to consumers in seven new flat-screen RCA TV models in May 2003, and later expanded to other RCA models.

January 13

The National Weather Service (NWS) and the Federal Emergency Management Agency conducted three week-long courses at NOAA's Tropical Prediction Center in Miami, Florida. Each course was regionally tailored to emergency managers' locations and threats.

Key Congressional Hearings—FY 2003

Date	Congressional Committee	Subject	NOAA Witnesses
January 8	Senate Committee on Commerce, Science, and Transportation	Greenhouse Gas Reductions and Trading	Dr. James R. Mahoney, Assistant Secretary of Commerce for Oceans and Atmosphere
January 9	Senate Committee on Commerce, Science, and Transportation	Recent Oil Spills and the Required Phase-out of Single-Hull Tanker Vessels	Timothy R.E. Keeney, Deputy Assistant Secretary of Commerce for Oceans and Atmosphere
February 25	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Convention on International Trade in Endangered Species	Dr. Rebecca Lent, Deputy Assistant Administrator, NOAA Fisheries
February 27	House Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment	FY 2004 NOAA Budget Request	Jamison S. Hawkins, Acting Assistant Administrator, National Ocean Service
March 12	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Oceans, Atmosphere, and Fisheries	FY 2004 NOAA Budget Request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator
March 13	Senate Committee on Armed Services, Subcommittee on Military Readiness	Amendments to the Marine Mammal Protection Act; the Clean Air Act; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Resource Conservation and Recovery Act (RCRA); and the Endangered Species Act	Dr. William T. Hogarth, Assistant Administrator, NOAA Fisheries
March 13	House Committee on Science, Subcommittee on the Environment, Technology, and Standards	Harmful Algal Blooms and Hypoxia: Strengthening the Science	Dr. Donald Scavia, Chief Scientist, National Ocean Service
March 19	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	FY 2004 NOAA Budget Request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator
March 27	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Hydrographic Services Amendments; H.R. 959, the National Oceanic and Atmospheric Administration Oceanography Amendments; and H.R. 984, the National Oceanic and Atmospheric Administration Authorization Act	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator
April 1	Senate Committee on Armed Services, Subcommittee on Readiness and Management Support	Impact of Environmental Laws on Military Readiness and the Administration's Legislative Proposal to Address Those Impacts	Dr. Rebecca Lent, Deputy Assistant Administrator, NOAA Fisheries
April 29	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans, and Subcommittee on National Parks, Recreation, and Public Lands	Invasive Species	Stephen B. Brandt, Director, Great Lakes Environmental Laboratory
May 6	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans, and Subcommittee on National Parks, Recreation, and Public Lands	H.R. 1835, the National Readiness Security Act of 2003, a Bill to Amend the Endangered Species Act of 1973 to Limit Designation as Critical Habitat of Areas Owned or Controlled by the Department of Defense, and for Other Purposes	Dr. William T. Hogarth, Assistant Administrator, NOAA Fisheries

January 16 and 25

NASA's SOLSE/LORE shuttle mission and the NASA-sponsored SORCE satellite mission launched on separate satellites from California's Vandenberg Air Force Base. These missions carry payloads critical for understanding the solar space environment and the solar radiation budget, and are an important part of the NOAA National Polar-orbiting Operational

Environmental Satellite System's (NPOESS's) risk-reduction efforts for future sensors. NPOESS is NOAA's planned next generation of satellites to be launched starting at the end of the decade.

January 21 and 24

NOAA's National Geophysical Data Center chaired the Global Observation of Forest Cover workshop on Southeast Asia fire

monitoring. The workshop addressed efforts to build a system that shares fire information, and discussed using NOAA's Geostationary Operational Environmental Satellite (GOES-9) for monitoring fires in Asia. The workshop was held in Fukuoka, Japan, as part of the Asia-Pacific Advanced Network Earth Monitoring and Disaster Warning Working Group.

Date	Congressional Committee	Subject	NOAA Witnesses
May 22	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	International Fisheries Issues	Dr. William T. Hogarth, Assistant Administrator, NOAA Fisheries
June 2	House Committee on Government Reform, Subcommittee on National Security, Emerging Threats, and International Relations	Following Toxic Clouds: Science and Assumptions in Plume Modeling	Bruce B. Hicks, Director, Air Resources Laboratory
June 4	Senate Committee on Indian Affairs	Tribal Fish and Wildlife Management Programs in the Pacific Northwest	D. Robert Lohn, Northwest Regional Administrator, NOAA Fisheries
June 6	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space	Climate Change and Carbon Sequestration	Dr. James R. Mahoney, Assistant Secretary of Commerce for Oceans and Atmosphere
June 12	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space	U.S. Role in International Fisheries Management	Dr. Rebecca Lent, Deputy Assistant Administrator, NOAA Fisheries
June 24	Senate Committee on Environment and Public Works, Subcommittee on Fisheries, Wildlife, and Water	Federal Columbia River Biological Opinion	D. Robert Lohn, Northwest Regional Administrator, NOAA Fisheries
July 15	House Committee on Science, Subcommittee on Environment, Technology, and Standards	NOAA's Satellite Programs	Gregory W. Withee, Assistant Administrator, National Environmental Satellite, Data and Information Service
July 16	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Oceans, Fisheries, and the Coast Guard	Marine Mammal Protection Act	Dr. Rebecca Lent, Deputy Assistant Administrator, NOAA Fisheries
July 16	Senate Committee on Governmental Affairs, Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia	Great Lakes Restoration Management	Timothy R.E. Keeney, Deputy Assistant Secretary of Commerce for Oceans and Atmosphere
July 24	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Reauthorization of the Marine Mammal Protection Act: H.R. 2693	Dr. Rebecca Lent, Deputy Assistant Administrator, NOAA Fisheries
July 30	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space	U.S. Government Agency Cooperation in Space Coordination	Gregory W. Withee, Assistant Administrator, National Environmental Satellite, Data and Information Service
August 19	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Marine Mammal Protection Act Reauthorization	James Lecky, Assistant Regional Administrator for Protected Resources, Southwest Region, NOAA Fisheries
September 11	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Highly Migratory Species	John H. Dunnigan, Director, Office of Sustainable Fisheries
October 14	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	Non-native Oysters in Chesapeake Bay	Frederick G. Kern III, Acting Chief, Coastal Resource Health Branch, National Centers for Coastal Ocean Science
October 22	Senate Committee on Commerce, Science, and Transportation, Subcommittee on Oceans, Fisheries, and the Coast Guard	New England Groundfish on Amendment 13 to the Northeast Multispecies Fishery Management Plan	Dr. William T. Hogarth, Assistant Administrator, NOAA Fisheries
October 30	House Committee on Science, Subcommittee on Environment, Technology, and Standards	Space Weather	Dr. Ernest G. Hildner III, Director, Space Environment Center
October 30	House Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans	International Commission for the Conservation of Atlantic Tunas	Dr. William T. Hogarth, Assistant Administrator, NOAA Fisheries

January 30

NESDIS announced its activation of the new Geostationary Operational Environmental Satellite, GOES 12.

February 3

NOAA introduced a new Web-based product for locating information on Nationwide sea level variations and trends (<http://www.coops.nos.noaa.gov>). The

product provides long-term trends and the decadal, interannual, seasonal, and monthly variations of the average (mean) sea level at 117 coastal water-level stations in a graphical and accessible format.

February 3-4

NOAA joined other senior space agency officials in Geneva, Switzerland, to participate in the World Meteorological

Organization's (WMO's) Consultative Group on High-Level Satellite Matters.

February 5

NOAA chaired a meeting of the Committee on Earth Observation Satellites' Strategic Implementation Team (SIT), which addressed the status of both the Integrated Global Observing Strategy (IGOS) and the IGOS 2nd Adequacy Report being developed for the United



Nations Framework Convention on Climate Change.

February 7

At NASA's request, NWS archived high-resolution data to assist in NASA's investigation of the space shuttle *Columbia* catastrophe. NWS Doppler radar detected the debris plume from the shuttle across northern and central Texas and western Louisiana.

February 10

NOAA implemented the Port of New York/New Jersey Operational Forecast System, which provides mariners, port managers, and spill response teams with present conditions (nowcasts) and future conditions (forecasts) of water levels and currents in the New York/New Jersey harbor.

February 10–12

NWS addressed the energy industry at the National Association of State Energy Officials' (NASEO's) Energy Outlook Conference. NWS was invited to speak at the conference as a result of recent meetings in which NASEO and the Department of Energy's Energy Information Administration expressed the industry's need for more understandable and energy-specific, long-lead temperature products.

February 12–13

NOAA's Weather Forecast Office in Pueblo, Colorado, hosted the Rocky Mountain Fire Weather Coordination meeting. NWS personnel provided a demonstration on the new Interactive Forecast Preparation System's graphical forecast editor capabilities, and participants discussed and coordinated prod-

ucts, services, and activities for the 2003 fire weather season.

February 18–28

NOAA was part of the U.S. delegation to the United Nations Committee on Peaceful Uses of Outer Space Scientific and Technical Subcommittee meetings in Vienna, Austria. A special area of interest at the meetings was organizing space applications for sustainable development as a follow-on to the World Summit on Sustainable Development.

March 6–8

NOAA participated as a delegate to the Summit for the Sustainability of the Gulf of Mexico Shrimp Industry, in Houston, Texas. Sponsored by the Gulf of Mexico and Caribbean Regional Sea Grant College programs, the summit focused on issues surrounding the shrimp industry and development of a strategic plan for sustaining the industry.

March 18

The NOAA Weather Forecast Office in Chicago provided weather support to a Top Officials (TOPOFF) exercise to test the resources of Wheaton, Illinois, by simulating chemical, biological, and radiological attacks. TOPOFF simulations are counterterrorism training exercises conducted by the Department of Homeland Security.

March 19

NESDIS and the General Services Administration hosted a ground-breaking ceremony for the NOAA Satellite Operations Facility in Suitland, Maryland. The new building will house the critical NOAA operations for satellite operations, associated data processing, U.S. search-and-

rescue mission control operations, and other supporting functions.

March 20

After the initiation of military action by U.S. forces in Iraq and Kuwait, the Operational Significant Event Imagery program in the NESDIS Satellite Services Division began processing imagery of Iraq and surrounding areas from NOAA's Advanced Very-High-Resolution Radiometer, NASA's Moderate Resolution Imaging Spectroradiometer, and Europe's METEOSAT.

March 27–29

NESDIS co-sponsored the Satellites and Education Conference XVI at California State University in Los Angeles. This conference is internationally recognized as the premier conference for educators who are interested in learning process and technology skills to help students understand space and earth science.

March 30–April 1

NOAA sponsored the 4th Conference on Expanding Opportunities in Oceanic and Atmospheric Sciences in Tallahassee, Florida. Hosted by Florida A&M University, the conference focused on the expanding opportunities for minority-serving institutions in NOAA-related sciences.

April 7–10

NESDIS and the Office of Policy, Planning, and Integration participated in the 11th meeting of the Global Climate Observing System Steering Committee in Melbourne, Australia. The group expects to agree on final recommendations and conclusions of the Second Adequacy Report and has instructed the secretariat to present the document to the United



Nations Framework Convention on Climate Change.

April 25

NOAA Fisheries held a ceremony dedicating Joe's Creek, a 14-acre wetland site in the Cross Bayou area of Boca Ciega Bay, declaring it restored 10 years after three ships collided and spilled several thousand gallons of jet fuel, diesel, and gasoline near the entrance of Tampa, Florida.

April 30–May 1

NOAA's Climate Monitoring and Diagnostics Laboratory Office held its 2003 annual meeting in Boulder, Colorado, at which scientists and program managers from international organizations presented their latest results regarding the measurement and modeling of climate-forcing agents, such as greenhouse gases, aerosols, and solar radiation.

May 5–24

Vice Admiral Conrad C. Lautenbacher, Jr., addressed a plenary session of the 14th WMO Congress in Geneva, Switzerland. Other NOAA participants at the conference included NESDIS Assistant Administrator Gregory W. Withee, former NWS Assistant Administrator Jack Kelly, and Helen Wood, Senior Advisor for Systems and Services.

May 8

Crew on the Northwest Fisheries Science Center's vessel *HAROLD STREETER* spotted a low-flying aircraft in Padilla Bay, Washington, that crashed into the water. The crew immediately halted all tow-netting operations, released a small vessel to the incident scene, and pulled the plane's pilot out of the water.

May 15

NWS provided five-day hurricane forecasts in place of its former three-day forecasts during the 2003 hurricane season. This change is the culmination of two years of customer feedback and testing.

June 5

NESDIS Assistant Administrator Gregory W. Withee, together with his counterpart from the United Nations Educational, Scientific and Cultural Organization (UNESCO), co-chaired the 10th Partners Meeting of the Integrated Global Observing Strategy at UNESCO in Paris.

June 16–19

The International Whaling Commission held its annual meeting in Berlin, Germany. The U.S. delegation was led by U.S. Commissioner Rolland Schmitt, and included NOAA, the Bureau of Indian Affairs, the U.S. Department of State, tribal and non-governmental organization representatives, and Congressional staff members.

June 23–24

Vice Admiral Conrad C. Lautenbacher, Jr., led a delegation of NOAA senior leadership to the European Organization for the Exploitation of Meteorological Satellites headquarters in Darmstadt, Germany.

August 3

NOAA's R/V *ATLANTIS* returned to port after completing the Ocean Exploration mission "Windows to the Deep." On this expedition, scientists made use of the *ALVIN* submersible and other tools to explore the biology, physics, and chemistry of seafloor methane seeps at water depths of 2,000–2,800 meters off the coast of the southeastern United States.

September 9–10

NOAA's National Sea Grant College Program, in cooperation with the Maryland and Virginia Sea Grant programs, sponsored a conference in Annapolis, Maryland, called "Oyster Research and Restoration in U.S. Coastal Waters: Strategies for the Future."

September 14

NOAA scientists from the Climate Monitoring and Diagnostics Laboratory launched balloon-borne instruments to measure important climate-forcing and ozone-depleting gases in the upper atmosphere over New Mexico. The launch is part of "Observations of the Middle Stratosphere," a joint program between NASA and NOAA to validate trace gas observations by satellite and to examine the recovery of stratospheric ozone following the enactment of the Montreal Protocol and its subsequent amendments regulating ozone-depleting substances.

September 14–25

Representatives from 15 midwestern NWS Weather Forecast Offices participated in workshops with state emergency management officials to enhance ties between these critical partners who help distribute NWS products, including severe weather warnings, directly to the American public.

September 20–October 1

NOAA hosted an 11-member delegation from the Chinese Meteorological Administration, which spent a day touring facilities at NOAA's Satellite Office.



OPERATIONS, PRODUCTS, AND SERVICES



111th Aerial Photography Squadron

National Ocean Service

Managing and Conserving Coastal Resources



Richard W. Spinrad, Ph.D.
Assistant Administrator

The coastal environment is one of our Nation's most valuable assets. It provides food for people and essential habitat for thousands of species of marine animals and plants. A healthy coast is vital to the U.S. economy. Such industries as marine transportation, commercial and recreational fishing, tourism and recreation, and homebuilding all depend on a vibrant coastal environment. However, an ever-increasing, more concentrated population stresses the coast in many ways. The coast and its uses face threats from erosion, loss of wetlands, limited access, pollution, overdevelopment, and fierce storms. The challenge to the Nation and to the National Ocean Service (NOS) is to balance our use of coastal and ocean resources today with the need to protect, preserve, and restore these priceless realms for future generations.

ACCOMPLISHMENTS

North Atlantic May Be New Hotbed for Harmful Algal Blooms

In July 2003, several species of whales were found dead in open waters off Massachusetts near Georges Bank. The NOAA Fisheries Marine Mammal Stranding Network collected tissue and fluid samples, which the NOS Biotoxins Analytical Response Team analyzed. The NOS team identified certain microscopic plants and confirmed high levels of neurotoxin domoic acid. Because this was the first documentation of domoic acid in the northeastern United States, the range of harmful algal blooms may exceed current estimates.

New Technologies Detect and Track Harmful Algal Blooms

In 2003, NOS-supported scientists deployed new optical detection technology on autonomous underwater vehicles (AUVs) to detect harmful algal blooms (HABs). The pairing of technologies demonstrated that AUVs equipped with optical instrumentation can detect and track HABs, map blooms in three dimensions, and monitor the surrounding environment. The AUVs are controlled from land or ship, while data are transmitted by satellite to scientists at distant locations. This is the latest in a series of innovative HAB cell and toxin detection technologies through the NOS-led interagency Ecology and Oceanography of Harmful Algal Blooms Program (ECO HAB).

Winged Robots Could Be Sentinels for Monitoring Duty

NOS used winged underwater vehicles off Florida's coast to help forecast and monitor toxic blooms of the reddish plankton *karenia brevis*.

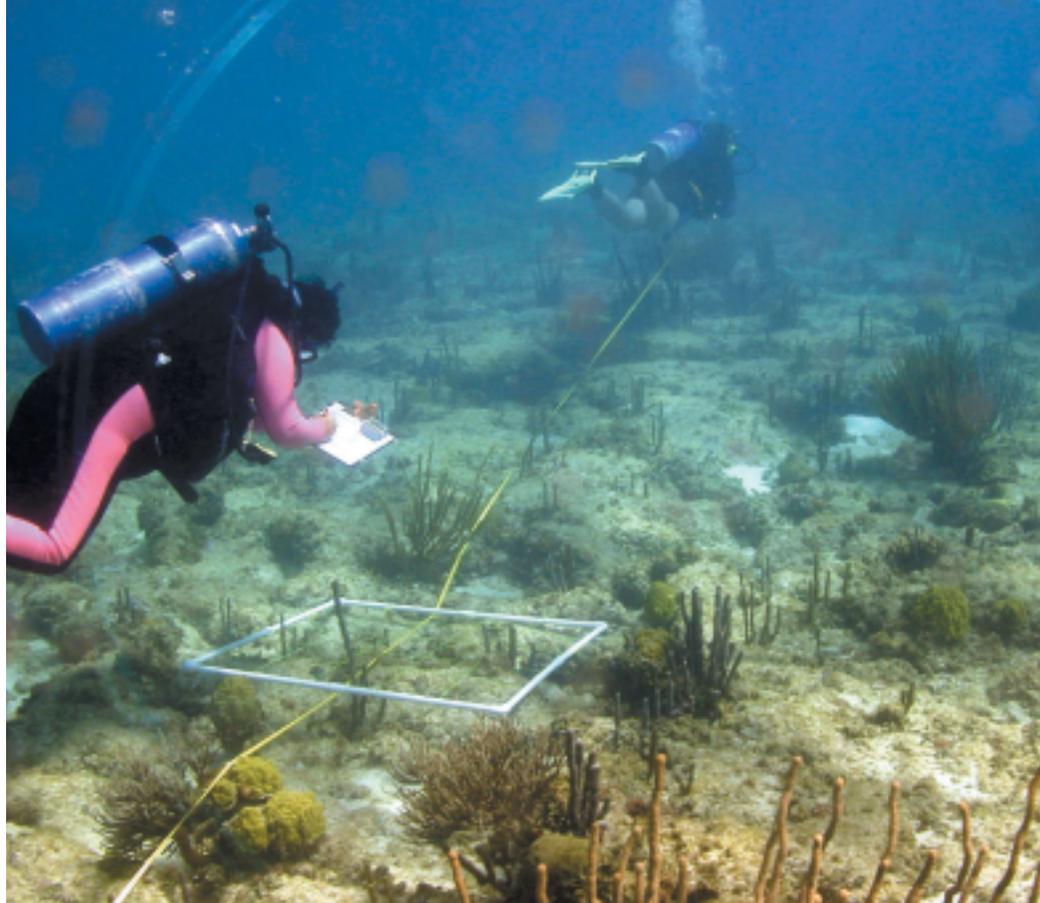
Red tides from this organism can last up to 18 months. They contaminate shellfish and can expose thousands of residents and tourists to toxic aerosols. The winged robots glided through the water gathering temperature, salinity, and plankton data at high resolutions never before obtained. The new data will be combined with information from ships and satellites to alert coastal communities of impending bloom events.

MPA Federal Advisory Committee Established

The Marine Protected Areas (MPA) Federal Advisory Committee was established with 30 members who represent a broad stakeholder community, including scientists, academia, commercial and recreational fishermen, state and tribal resource managers, environmentalists, and other resource users. The Committee's responsibilities include providing recommendations to the Secretaries of the Departments of Commerce and the Interior on implementing Section 4 of MPA Executive Order 13158. Some recommendations may include advice and guidance regarding a national system of MPAs, MPA stewardship and effectiveness, and national and regional MPA coordination.

NOS Moves Ahead of Coral Reef Mapping Schedule

Mapping coral reefs provides a foundation for a variety of reef conservation and management measures, such as reducing threats to coral reef ecosystems. In 2003, NOS expanded its National Coral Reef Monitoring Program to provide additional monitoring and assessments of reef conditions. The expanded program, which is based on partnerships with states, territories, and other Federal agencies, includes the collection, analysis,



and reporting of long-term coral reef ecosystem monitoring data. During 2003, NOS completed enough coral reef mapping in the U.S. Pacific to bring the total area of mapped shallow U.S. coral reef ecosystems to 60 percent—up from 10 percent in 2000 when the effort began. This new milestone puts NOS ahead of the schedule set by the U.S. Coral Reef Task Force to have all U.S. shallow-water coral mapped by 2009.

Scientists Support Cleanup and Search-and-Rescue Efforts

NOS responded to 136 marine events, including oil and chemical spills, search-and-rescue efforts, and other emergencies in 2003. As the Federal agency responsible for providing scientific support during such events, NOS is among the first on the scene at a spill. After spills, NOS scientists immediately begin providing critical information about the movement of the spilled material. NOS then evaluates response options and dangers to

The NOS National Coral Reef Monitoring Program provides a foundation for a variety of reef conservation and management measures, such as reducing threats to coral reef ecosystems. In 2003, NOS expanded the program to provide additional monitoring and assessments of reef conditions.

coastal resources and communities, and makes recommendations to the Federal, state, and local agencies responsible for cleanup operations. Also in 2003, at the request of the Spanish government, NOS sent a team of scientists to assist in responding to the oil spill from the *T/V Prestige* off the coast of Spain.

NOS Makes the Polluter Pay

In April 2000, a pipeline owned by Pepco, a provider of gas and electricity, spilled 140,000 gallons of oil into the Patuxent River from its facility in Aquasco, Maryland. NOS determined that the spill damaged 76 acres of wetlands, contaminated 5,432 pounds of fish and shellfish, killed 143 birds, and degraded several areas of the Patuxent used for



recreation. In a cooperative settlement that NOS secured this year, Pepco will pay \$2.7 million to fund restoration projects, such as creating tidal marsh and enhancing shoreline beach, acquiring and restoring ruddy duck nesting habitat, creating an oyster reef sanctuary, and increasing recreational opportunities.

Buzzards Bay Gets Help from Emergency Responders

On April 27, 2003, the *Bouchard* barge 120 spilled 98,999 gallons of oil after hitting an obstacle in Buzzards Bay, Massachusetts. NOS was among the first responders and provided the U.S. Coast Guard with information on the spill's trajectory, its potential impacts on the shoreline, cleanup strategies, chemical analysis, and basic oil spill science for public outreach. NOS worked with the Commonwealth of Massachusetts on fishery closures, endangered species issues, and a natural resource damage assessment to identify and restore injured resources. The trustees are implementing studies to determine the full extent of injuries to shoreline habitat, birds, and wildlife, and recreational uses, and will begin

restoration projects once the full extent of injuries is known.

Aerial Images Help to Rebuild North Carolina Coast

When Hurricane Isabel slammed the North Carolina coast on September 19, 2003, it created a new inlet near Cape Hatteras Village. In the days following the category 2 storm, NOS mounted a digital camera on the bottom of a NOAA Twin Otter aircraft to take aerial photographs of the changed coastline. The camera was equipped with a built-in Global Positioning System (GPS), which allowed each image to be precisely referenced to latitude and longitude. The NOAA aircraft took approximately 1,000 images at the request of North Carolina's Emergency Management Agency and the Department of Natural Resources. The referenced images are assisting in cleanup and rebuilding operations.

NOS Celebrates Historic Lewis and Clark Survey Work

NOS has joined the more than a dozen other Federal agencies in the nationwide celebration of the Lewis and Clark Expedition. During the next three years, NOS will set a

As the Federal agency responsible for providing scientific support during oil and chemical spills, NOS is among the first on the scene at a spill. NOS scientists provide critical information about the movement of the spilled material and make recommendations to the agencies responsible for cleanup operations.

Vessels that navigate the Great Lakes now have an additional measure of safety due to the availability of GPS data from a newly established continuous operating reference system located on Lake Huron. Photo: Aero-Imaging, Inc.





series of commemorative geodetic survey markers at signature sites along the Lewis and Clark National Historic Trail. In addition to their commemorative value, the geodetic markers serve as a link to highly accurate GPS positioning.

Improved Technologies Enhance Navigation Safety

Vessels that navigate the Great Lakes now have an additional measure of safety due to the availability of GPS data from a newly established continuous operating reference system (CORS) at a water-level site located on Lake Huron at Harbor Beach, Michigan. In addition to GPS, the data-rich station is equipped with meteorological sensors and a water-temperature sensor. When integrated into a network of other similarly equipped CORS stations, the data relate water-level changes to shifts in the Earth's crust throughout the

Great Lakes region. The technology also will improve forecasts of atmospheric and lake conditions by NOAA's Forecast Systems Laboratory and NOAA's Great Lakes Environmental Research Laboratory.

Ecological Forecast Indicates Gulf Dead Zone Needs More Help

NOS' decade-long support of directed scientific studies of the Gulf of Mexico led to a scientifically based Action Plan in 2001 that specified the initial watershed nutrient reductions needed for a healthy Gulf. In 2003, NOS-supported scientists worked to improve ecological forecasting for the Gulf of Mexico, which resulted in the first-ever forecast of the dead zone off the Louisiana and Texas coasts. The improved ecological forecast indicates that nutrient load reductions beyond those suggested by the 2001 Action Plan may be necessary.

Thousands of shrimp boats trawl the northern Gulf of Mexico, where shrimp and other important commercial species avoid hypoxic areas. In 2003, NOS-supported scientists worked to improve ecological forecasting for the Gulf, which resulted in the first-ever forecast of the dead zone off the Louisiana and Texas coasts. Photo: William B. Folsom, National Marine Fisheries Service

Cityscapes Models Support Homeland Security

During 2003, the NOAA Citation aircraft collected LIDAR (Light Detection and Ranging) datasets of 12 major cities. These datasets allow for three-dimensional modeling of cityscapes for a variety of homeland security needs. Using this technology, and in cooperation with the U.S. Army and the National Imagery and Mapping Agency, NOS can respond to a threat against homeland security within six hours. This capability did not exist before September 11, 2001.



DNA Detectives Help Keep Sea Turtles Off the Menu

All sea turtle species are endangered or threatened, and despite protection by U.S. and international law, they are still poached for consumption and handicrafts. In 2003, NOS scientists developed a DNA-based method for identifying cooked and raw meats, eggs, and trace evidence, such as blood. The new method is a powerful new tool for sea turtle conservation, and gives law enforcement the scientific muscle to prosecute poachers. Earlier methods for identifying species were only useful on fresh tissue and could not aid in cases where eggs were seized or where meat was cooked, such as in restaurants.

Mapping Completed for Great Lakes and Most of West Coast

NOS is creating a national baseline of land cover data for the coastal United States. Using a variety of devices, including satellite sensors, aircraft, and on-the-ground field-work, researchers are creating maps to assess urban growth and document landscape changes over large areas. Contracts with remote-sensing firms in 2003 completed work for the Great Lakes region

and most of the West Coast, and in 2004 the focus will be on the Gulf of Mexico. In addition to the land cover maps, NOS is creating digital elevation data for some areas. Adding subsequent years to the land cover baseline database will result in a comprehensive trend analysis of land use in the coastal zone—an invaluable tool for communities trying to balance the need to preserve natural resources and the desire to develop property.

Improved Weather Information Tools Save Lives

NOS develops numerous tools and information vehicles to protect the public from hazardous weather. For example, geographic information systems enable the public to view a flood forecast in much the same way a weather forecast is presented. The historical hurricane tracking system Web site allows users to pinpoint their geographic location of interest and learn about the intensity and frequency of storms in their area over the last 100 years. Helping people learn about storms was also the goal behind the special weather series developed by NOS and the Weather Channel. Each of these tools helps the public understand

Despite protection by U.S. and international law, sea turtles are still poached for consumption and handicrafts. In 2003, NOS scientists developed a DNA-based method that is a powerful new tool for sea turtle conservation, and gives law enforcement the scientific muscle to prosecute poachers. Photos: Marty Sniderman, Digital Stock Corporation (top); ©Tyler Swanson (bottom)

PRODUCTS AND SERVICES

Nautical Charts

NOS produces the Nation's nautical charts in paper and electronic formats. These charts are indispensable to safe, efficient marine transportation and national security.

Shoreline Mapping

NOS surveys 95,000 nautical miles of U.S. coastline to provide an accurate and official delineation of the national shoreline for nautical chart production and coastal resource management. The growth and sustainability of U.S. shipping, manufacturing, exports, and

coastal development depend on accurate shoreline mapping.

Real-time Data

By providing real-time information about water levels, tides and currents, salinity, and weather conditions in ports, Physical Oceanographic Real-Time Systems (PORTS) mitigate coastal hazards and minimize delays in marine transportation. Recreational boaters also use PORTS to avoid groundings and collisions during inclement weather.

Unique Ocean and Coastal Areas

NOS manages a system of 13 National Marine Sanctuaries and 25 National

Estuarine Research Reserves. These unique areas foster scientific research, public education and recreation, and environmental stewardship through Federal, state, local, and private partnerships. They also contribute jobs and dollars to local economies.

Coastal Ecosystem Monitoring

By measuring water quality, contaminants, sources of pollution, biodiversity, and changes in the use of coastal land and waters, NOS helps states and communities to sustainably use and protect their valuable resources.

how hazardous weather affects individuals and their communities.

International Forums Provided for Coastal Resource Managers

Coastal management is a global affair, with more than 50 percent of the world's population located on the coast. In 2003, NOS brought coastal resource managers from around the world together to help them share information, collect resources, and learn about new processes and technologies. One of these conferences was Coastal GeoTools '03, where information about appropriate technologies for coastal management was the focus of the discussions and demonstrations. Another important gathering was Coastal Zone '03, the world's largest conference for the coastal resource management community. Nearly 800 professionals from over 25 countries attended. Other conferences this year focused on such

NOS maintains the National Spatial Reference System, which serves as a baseline for all types of highly accurate navigation, survey, and positioning work. The system tells mariners where they are and where other ships and potential navigation hazards are for safe under-keel and under-bridge (air-gap) clearance. Photo: 111th Aerial Photography Squadron.



Emergency Response

NOS responds to more than 100 marine oil and chemical spills every year, providing information to the U.S. Coast Guard for containing and cleaning up spills. NOS also works closely with the U.S. Environmental Protection Agency and other partners to protect and restore coastal resources damaged by releases of hazardous materials.

Pinpoint Positioning

NOS maintains the National Spatial Reference System, which serves as a baseline for all types of highly accurate

navigation, survey, and positioning work. For example, the system enables ships to pinpoint their location within three to five meters at all times and in all weather, and is used as the basis for all Global Positioning System data.

Decision-making Support

NOS provides a wealth of science, training, and tools to help coastal communities make decisions about such concerns as land use, waterfront development and revitalization, habitat conservation and restoration, and water

quality and quantity. For example, Geographic Information System maps of coastal habitats and information about storms and other risks help coastal managers mitigate a range of potential hazards.

Coastal Research

NOS conducts and supports research on a variety of issues that threaten coastal waters, habitats, and ecosystem and human health, including pollutants, harmful algal blooms, invasive species, and changes in land use and climate.



Underwater grasses are extremely important to the health and productivity of Chesapeake Bay and the many rivers and streams that feed it. NOS is participating in efforts to plant underwater bay grasses to help restore the site's vital natural habitat.

topics as smart growth and coastal and ocean observing systems.

Survey Assists Efforts to Improve Policies on Docks and Piers

While residential dock and pier management may not make the headlines, many coastal managers spend much of their time on this issue. NOS completed a comprehensive inventory of policies and laws regarding residential docks and piers for the states of North Carolina, South Carolina, Georgia, and Florida. The publication includes Federal laws, state laws and regulations, permitting policies, and contact information for each of the states. Coastal states throughout the country are using this infor-

mation as they work to improve their dock and pier policies.

Training Course Helps to Resolve Conflicts

Negotiating among the many competing demands for coastal resources is one of the most difficult tasks faced by state coastal resource management programs. In response to requests from state programs, NOS developed a "Public Issues and Conflict Management" training course, in which participants learn techniques that help them avoid or diffuse conflicts in potentially contentious public meetings. The overall goal is to increase the participants' ability to design, conduct, and control meetings in public forums. This course is just one of the many courses offered by NOS to the Nation's coastal managers. This past year, 1,355 members of the coastal resource management community took advantage of these courses.

Bringing Coastal Resource Management to the People

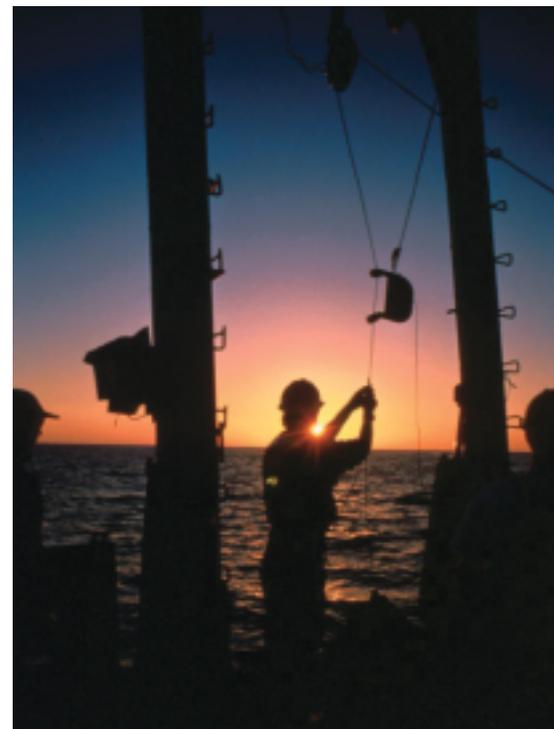
To increase its effectiveness, NOS is embarking on an ambitious plan to regionalize some NOAA products and services. One of the best examples of this effort is the Pacific Services Center, which is located in Hawaii and serves all of the U.S. Pacific Islands. This past year, the Pacific Services Center worked with its constituents and partners to provide technical training, modernize geodetic controls, develop maps and other data products, and support the economic valuation of coastal resources. An added, but

equally important, benefit is the insight this work provides NOAA as the agency looks for new ways to address the Nation's coastal issues.

National Initiative Helps Mitigate Impacts of Coastal Storms

NOAA's Coastal Storms Initiative is a nationwide effort to lessen the impacts of storms on coastal communities. This initiative helps local, state, and Federal organizations work together to use coastal observing systems data to develop new and improved storm-related tools, data, information, forecast models, and training opportunities. The pilot effort in Florida provided valuable data after Tropical Storm Edouard. Increased numbers of tide and water-level gauges, combined with bathymetry and a new river circulation model, improved weather and on-shore flooding predictions. A risk and vulnerability tool helped emergency managers identify potentially risky areas in advance of the storm, and a three-dimensional storm-surge animation helped people see—and better understand—the projected water levels.

Night and day investigations are conducted at Cordell Bank National Sanctuary to observe the changes that occur in marine organisms. Many organisms stay near the bottom during daylight and migrate toward the surface as darkness falls. Photo: Jamie Hall, Cordell Bank National Marine Sanctuary





FUTURE OUTLOOK

The National Ocean Service intends to be the global leader in the integrated management of the ocean. By positioning products and processes for the decades ahead, NOS will continue to ensure that the Nation's coastal and marine resources remain safe, healthy, and productive to meet ever-increasing food, energy, security, environmental, and economic challenges. Specific priorities include:

- *People*—People are the foundation of NOS' success. Therefore, NOS will continue to invest in training and career enhancement, offering opportunities for NOS staff to lead at all levels of the organization.
- *Observations*—NOS will be a global leader in designing and implementing an integrated ocean observing system. This

includes incorporating both *in situ* and remotely sensed measurements, which provide valuable information for protecting and managing ocean and coastal resources.

- *Modeling*—NOS will be a global leader in applying existing and developing new models to forecast future ocean and coastal conditions to meet the needs of coastal managers and commercial and recreational users.
- *Watersheds*—NOS will be a global leader in applying a watershed approach in managing ocean and coastal resources, acknowledging that the ocean ecosystem is inclusive of white water, brown water, blue water, and the atmosphere.
- *Partnerships*—NOS will be a global leader in forging partnerships across all sectors of society, to maximize the impact of

NOAA's nationwide Coastal Storms Initiative lessens the impacts of storms on coastal communities by helping local, state, and Federal organizations develop new and improved storm-related tools, data, information, forecast models, and training opportunities.

individual efforts and ensure that resource management decisions are made in an integrated manner.

- *Technology*—NOS will be a global leader in identifying and applying existing technologies, and supporting the development of new technologies, that will enhance our ability to understand and more effectively manage ocean and coastal ecosystems.
- *Mission*—NOS will continue to assess opportunities for integrating critical ocean and coastal management activities.



National Marine Fisheries Service

Sustaining, Protecting, and Rebuilding Our Nation's Living Oceans



*William T. Hogarth, Ph.D.
Assistant Administrator*

NOAA's National Marine Fisheries Service (NOAA Fisheries) bears the stewardship responsibility for the world's largest exclusive economic zone (EEZ). Americans depend on the EEZ's living marine resources for food, jobs, recreation, tourism, medicine, and many industrial and commercial products, and are increasingly recognizing the importance and value of healthy marine ecosystems to the quality of life of present and future generations.

NOAA Fisheries protects and preserves the Nation's living marine resources and their habitats through scientific research, fisheries management, law enforcement, and habitat conservation. We are a world leader in fisheries research, providing the scientific foundation for soundly managing living marine resources. NOAA Fisheries is also a leading voice for commercial and recreational fisheries in the Atlantic and Pacific Oceans and the Gulf of Mexico.

New legislation, evolving management philosophies, and scientific advances have created opportunities for enhancing the management of our living marine resources. NOAA Fisheries managers and scientists will continue to adopt the necessary tools and apply fiscal and programmatic resources to ensure the integrity of our marine ecosystems and to sustain the socioeconomic and aesthetic benefits Americans derive from them.

Marine fisheries are big business, generating approximately \$60 billion of the Nation's gross national product. U.S. consumers spent about \$55 billion for fishing-related products in 2002; commercial fishermen landed 9.4 billion pounds of fishery products, supporting employment for 250,000 harvesters and processors; and 17 million Americans spent more than \$20 billion on recreational angling. As we face new challenges in the 21st century, we will continue to focus on rebuilding and sustaining fisheries and protected species to their long-term potential, and maintaining a delicate balance of achieving multiple objectives that produce the greatest benefits to the Nation.

ACCOMPLISHMENTS

Top Accomplishments

National Bycatch Strategy Implemented

Several NOAA Fisheries teams worked throughout 2003 to implement the agency's National Bycatch Strategy. Regional teams assessed NOAA Fisheries' progress over the past five years to implement conservation and management measures that minimize bycatch to the extent practicable, and the mortality of bycatch that cannot be avoided. Regional teams

also drafted bycatch priorities and implementation plans, which will guide bycatch monitoring, research, management, education, and outreach activities in FY 2004 and 2005. In addition, a newly formed National Working Group on Bycatch completed a report outlining a national approach to standardized bycatch monitoring programs. International bycatch minimization efforts also accelerated in 2003, as a team of NOAA Fisheries gear experts traveled to Ecuador to conduct nine workshops on sea turtle research and conservation methods, which were attended by more than 800 fishermen. Similar bycatch technology-transfer missions are planned for Asia, Africa, and Latin America during 2004.

Substantive Changes Recommended for National Standard 1

NOAA Fisheries has undertaken a significant review of the Magnuson–Stevens Act’s National Standard 1 guideline for fisheries management (“Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry”). The goal of the review has been to clarify, simplify, or amplify the current NS1 guideline to make it easier for all affected parties and the public to understand and use. The recommendations reflect ideas exchanged during numerous teleconferences among NS1 Working Group members, along with input from public comments, a NOAA Fisheries-wide workshop, a Science Board meeting, and meetings involving staff and leadership throughout NOAA Fisheries science centers, regions, and headquarters. The most substantive recommended changes in terms of

their influence on fishery management practices are to strengthen the requirements for quickly ending overfishing, but at the same time to simplify and, within limits, to increase the flexibility of stock rebuilding times.

Constituent Outreach Yields Extensive Feedback

NOAA Fisheries Assistant Administrator Bill Hogarth commissioned a series of public meetings around the Nation to gather input on how to improve fisheries management from the constituents most directly affected. The sessions sought comments on the key issues facing fisheries management, including who is responsible for these issues, how to best address them, how to improve the federal fishery management process, what performance measures should be developed to ensure proper implementation, and how to more effectively communicate agency actions to constituents. The meetings were very well attended, involving more than 1,000 people, with approximately 400 written and oral comments received. Attendees were supportive of this outreach initiative, saying they were grateful for a chance to comment and that NOAA Fisheries appears to be moving toward being more transparent and communicative. Follow-up workshops, including a national meeting, are being planned for 2004.

Regulatory Streamlining Project Presented to Congress

The Regulatory Streamlining Project (RSP) is a coordinated effort by NOAA Fisheries to institute innovations and reforms to improve the process for developing fishery management actions. The RSP, as presented to Congress, entails the following key compo-



Local politicians and fisheries managers aboard the Oyster Recovery Partnership vessel Robert Lee pitched in with spat-on-shell oyster planting at Chesapeake Bay restoration sites. NOAA’s Chesapeake Bay Office sponsored the event.

nents in various stages of implementation: revising the documented process for complying with all applicable laws and integrating mandatory timelines (the Operational Guidelines); using the National Environmental Policy Act (NEPA) process to ensure timely and public input from all interested parties; establishing a national training program; hiring NEPA coordinators; delegating decision-making authority to appropriate levels; undertaking initiatives to utilize technology (such as e-rule-making); addressing science issues; and evaluating and prioritizing workforce needs.

NEPA Training Seminars Conducted

NEPA training is a high priority for NOAA Fisheries and Fishery



target biomass level, and most overfished stocks have rebuilding plans in place. NOAA Fisheries will continue to work with the Fishery Management Councils and other partners to reverse the over-exploitation of valuable stocks.

FMP Amended for Atlantic Tunas, Swordfish, and Sharks

As a result of two stock assessments, in November 2002, NOAA Fisheries began amending many of the shark-related management measures in the Fishery Management Plan (FMP) for Atlantic Tunas, Swordfish, and Sharks. The resulting Amendment 1 revises the rebuilding time frame for large coastal sharks to 26 years; changes a number of commercial and recreational regulations; specifies certain bycatch-related measures, including requiring dip nets and line cutters on bottom longline vessels; establishes criteria to use regarding adding or removing sharks from the prohibited species group; establishes a display permit for fishermen who wish to harvest sharks only for public display; updates essential fish habitat identifications for sandbar, blacktip, finetooth, dusky, and nurse sharks; and provides other measures.

Cooperative Experiment Yields Promising Results

In 2001, NOAA Fisheries released an Endangered Species Act biological opinion that found the pelagic longline fishery for Atlantic tunas and swordfish was jeopardizing the continued existence of leatherback and loggerhead sea turtles. Although NOAA Fisheries closed much of the international fishing waters in the North Atlantic to U.S. pelagic longline fishermen, fishermen from other countries not bound by U.S. fishing laws continued to fish in the Northeast Distant Statistical Area (NED).

At the request of U.S. fishermen, NOAA Fisheries staff began to work directly with them to test gear modifications to reduce sea turtle bycatch without reducing the catch of the target species. Preliminary data suggest the treatments examined by the experimental fishery may reduce sea turtle interactions by 50–92 percent, depending on turtle species and hook and/or bait treatment combinations. NOAA Fisheries is currently evaluating data from the final year of the experiment, is developing regulations that seek to reopen the NED to U.S. fishermen, is considering similar regulations for the Pacific longline fishery, and is exporting the new gear technology to other nations that operate pelagic longline fleets.

Amendments to Magnuson–Stevens Act Proposed

After several years of internal study and consultation with stakeholders, NOAA Fisheries completed work on 26 proposed amendments to the Magnuson–Stevens Fishery Conservation and Management Act, obtained clearance from the Office of Management and Budget, and formally submitted the amendments to Congress as the Administration’s proposals in June 2003. The amendments addressed such themes as harmonizing rules for approving Fishery Management Plans and the accompanying regulations, crafting more appropriate definitions of overfishing and overfished, developing standards governing individual fishing quotas, streamlining provisions for fishing capacity reduction programs, and imposing tougher fines and penalties for infractions of fishery regulations.

NOAA special agents are charged with protecting the Nation’s living marine resources under a variety of Federal laws and regulations. Enforcement activities include investigating criminal and civil violations; seizing contraband and illegal goods; and strengthening voluntary compliance through public awareness and education.

Management Council staff. During 2003, 24 training seminars attended by 570 staff members were held throughout NOAA Fisheries. A NEPA training calendar and seminars are posted on the NOAA NEPA Web site.

Sustainable Fisheries

Report to Congress Shows Marked Progress

The *Report to Congress on the Status of the U.S. Fisheries for 2002* indicates that steady incremental progress has been made in rebuilding the Nation’s stocks, and that some stocks are showing remarkable progress. For example, the Gulf of Maine/northern Georges Bank silver hake fishery has been successfully rebuilt, the northern stock of red hake has been rebuilt to 165 percent of its

Biannual Meeting Focuses on Strengthening Partnerships

NOAA Fisheries hosted the second Biannual State Marine Fisheries Directors–NOAA Fisheries meeting in San Diego, focusing on improving state and Federal partnerships through better communication. Twenty-seven state and territorial agencies and organizations were represented, along with NOAA Fisheries headquarters and regional leadership, and a representative from the U.S. Fish and Wildlife Service. Attendants identified areas where NOAA Fisheries and its partners can improve communication and developed several recommendations for actions or general policy changes.

Protected Resources

Cooperative Efforts Aid Kemp's Ridley Recovery

In 2003, 8,000 Kemp's ridley sea turtle nests were documented, a significant rise from the 700 nests documented in 1985. The increase can be attributed to two primary factors: full protection of nesting turtles and their nests in Mexico,



and the requirement to use turtle excluder devices in U.S. and Mexican shrimp trawls. Without the full protections afforded the turtles under the Endangered Species Act, the species would most likely have become extinct in the early part of this century.

Right Whales Get the Right Attention

In January 2003, NOAA Fisheries completed a draft "Strategic Plan to Reduce Ship Strikes of North Atlantic Right Whales." The comprehensive, multi-year, multi-agency strategy includes a blueprint of domestic and international actions for reducing mortalities to this highly endangered species.

Stock Assessment Plan Developed for Protected Species

NOAA Fisheries' draft plan for improving marine mammal and turtle stock assessments describes the stock assessment needs

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required by the Endangered Species Act and the Marine Mammal Protection Act; current levels of monitoring effort and the resulting status of mammal and turtle assessments; and the additional resources required to help ensure recovery of species listed under the two acts by providing minimum reliable, precise estimates of distribution and abundance for use by the regulated community. Information needs were based on NOAA Fisheries' analysis of programs under Federal laws and on workshops that included representatives of the U.S. Navy, Marine Mammal Commission, and Minerals Management Service. A final plan is expected to be completed in 2004.

Grants Support Rescue of Stranded Marine Mammals

The John H. Prescott Marine Mammal Rescue Assistance Grant Program provides grants for the rehabilitation of stranded marine mammals; data collection from living or dead stranded marine mammals; and facility upgrades, operation costs, and staffing needs. During 2002 and 2003, the program administered approximately \$10 million through more than 120 research and management awards to enhance scientific understanding of the role of marine mammal health in the ecosystem and improve agency stranding response efforts through a national network.



Habitat Conservation

NOAA Works with Communities to Restore Habitat

During FY 2003, the NOAA Community-based Restoration Program restored 2,296 acres of vital fishery habitats, reopened 225 miles of stream to provide access to anadromous fish, and provided funding and technical expertise to more than 200 new projects. Major community-based restoration projects included removing a dam in Plymouth, Massachusetts, and restoring a mile and a half of natural pools and riffles in the Town Brook; stabilizing stream banks in Alaska; removing derelict fishing gear from northern Puget Sound; and restoring kelp in Southern California and oysters along the South Carolina coast.

Chesapeake Bay Watershed Program Established

A new Bay Watershed Education and Training (B-WET) Program established in the NOAA Chesapeake Bay Office funded 20 grants to provide 6,300 students with a

NOAA Fisheries conducts research to monitor and reduce the impacts of human activities on protected species, such as sea turtles, as well as to estimate their abundance and other biological parameters.

meaningful Bay or stream outdoor experience and 1,260 teachers with professional development opportunities in the area of environmental education.

Science and Technology

Species Information System Developed

NOAA Fisheries has developed a database management system to maintain, update, and report on species-level information contained in its *Our Living Oceans* reports on living marine resources and habitat, and its annual reports to Congress, which summarize the status of managed stocks. Enhancements are being planned to support additional reporting requirements and to initiate an effort to integrate data on U.S. fisheries with international data distributed through the United Nations Food and Agriculture Organization's Fisheries Global Information System.

Local Fisheries Knowledge Project Sets Sail in Maine

The Local Fisheries Knowledge Pilot Project got underway in Maine during 2003. Designed to be an outreach project for high school students and the vehicle for developing a new database tool for

PRODUCTS AND SERVICES

Annual Report on the Status of Fisheries

The annual *Report to Congress on the Status of Fisheries of the United States* reviews the status of 932 fishery stocks in the U.S. exclusive economic zone and identifies stocks that are overfished, or are approaching a condition of being overfished, under definitions mandated by the Magnuson-Stevens Fishery Conservation and Management Act.

Regional Stock Assessments

NOAA Fisheries Science Centers provide the scientific basis for a wide range of management options for preserving living marine resources, while supporting the economic performance of the domestic fisheries sector.

Seafood Inspection

NOAA Fisheries provides a variety of professional inspection services to the fishing industry, which ensure compliance with all applicable Federal food regulations. Annual participants include more than 2,500 importers and exporters of fish and fish products.

Law Enforcement

NOAA special agents are charged with protecting the Nation's living marine resources under a variety of Federal laws and regulations. Enforcement activities include investigating criminal and civil violations; seizing contraband and illegal goods; implementing advanced technologies through a Vessel Monitoring System program to monitor and verify positions of fishing vessels using satellite-based tools; and strengthening Community-Oriented Policing and Problem Solving to promote voluntary compliance through public awareness and education.

managing local fisheries, the project is a first step toward accessing and analyzing local fisheries' knowledge in support of better management decisions.

Workshop Focuses on the Role of Economics in Fisheries Management

NOAA Fisheries convened a "Spatial Modeling in Fisheries Economics Workshop," focusing on the role of economics in designing and evaluating the cost-effectiveness and efficiency of marine protected areas. Reducing inefficiencies and developing marine reserve designs that lead to long-run ecological and economic benefits are crucial to fisheries management because the short-run costs of marine closures can be significant for fishermen.

Survey Produces Statistics on Atlantic Recreational Fishery

In 2003, NOAA Fisheries implemented a new For-Hire Survey to provide more efficient coverage of fishing effort and catch on charterboats and headboats on the Atlantic Coast. The survey was developed in cooperation with for-hire industry leaders and the Atlantic Coastal Cooperative Statistics Program.



Survey Supports Southeastern Recreational Fisheries

In 2003, NOAA Fisheries began a survey in the Southeast designed to forecast changes in effort and the net economic benefits and costs stemming from changes in regulations across the red snapper, grouper, king mackerel, and dolphin recreational fisheries. NOAA Fisheries also completed its analysis of the economic impacts of marine recreational expenditures in the United States.

Undergraduate Scholar Recruited

A NOAA Education Partnership Program Undergraduate Scholar,

In 2003, NOAA Fisheries began a survey in the Southeast designed to forecast changes in effort and the net economic benefits and costs stemming from changes in regulations across red snapper, grouper, king mackerel, and dolphin recreational fisheries. Photo: William B. Folsom, National Marine Fisheries Service

majoring in mathematics, was recruited to NOAA Fisheries from the University of Maryland, Eastern Shore. The scholar spent the first summer internship with the Research, Analysis, and Coordination Division, becoming familiar with the principles of population dynamics and quantitative stock assessments. The second

With limited Federal resources to enforce more than 3.4 million square miles of open water, thousands of miles of coastline, and hundreds of active ports, NOAA Fisheries' Joint Enforcement Agreements are critical to the Nation's efforts to protect its living marine resources. Most joint enforcement work is characterized as at-sea and dockside patrols, which involve boarding commercial and recreational fishing boats, to check for compliance with Federal and state fishery management regulations; inspecting fish processors; and dealing with human interactions affecting marine mammals.

Habitat Conservation

The Coral Reef Conservation Program conducts cruises to the Northwestern Hawaiian Islands, American Samoa, and the Mariana Archipelago to monitor and assess the conditions of coral reef ecosystems, transfer technology to local resource management agencies, and give managers the information they need to successfully manage these ecosystems. Working with many Federal, state, and local partners, the coral program has removed almost 725,000 pounds of derelict fishing gear from the Northwestern Hawaiian Islands since 1996.

Conservation and Recovery of Protected Species

NOAA Fisheries conducts research to monitor and reduce the impacts of human activities on protected species, as well as to estimate their abundance and other biological parameters. The resulting information is used to develop measures to minimize impacts and to generate management products, such as lists of depleted, threatened, and endangered species, and recovery, conservation, and take-reduction plans.

summer internship will focus on completing a senior research project while in residence at a Fisheries Science Center, under the guidance of senior stock assessment scientists.

Constituent Services

Fisheries Management Conference Features Key Speakers

In November, NOAA Fisheries partnered with the Regional Fisheries Management Councils to convene "Managing Our Nation's Fisheries: Past, Present and

Future." The conference featured speeches from Senator Ted Stevens (R-AK), one of the principal architects of the federal law that governs fishery management; Deputy Secretary of Commerce Samuel W. Bodman; NOAA Administrator Vice Admiral Conrad C. Lautenbacher, Jr., and representatives from every public- and private-sector organization interested in the Nation's living marine resources.

Sportfishing Leadership Conference Held

In February, NOAA Fisheries and the recreational industry held the Sportfishing Leadership Conference, which provided for an expansive dialogue on marine conservation and recreation issues. The conference laid the groundwork for collaborative approaches to marine policymaking that better represent and engage the agency's recreational fishing and boating constituency. Key recommendations resulting from the conference included establishing a more viable NOAA Fisheries office dedicated to recreational fishing and boating

issues, targeting more resources to saltwater angler data collection, and developing clear science-based guidelines for designating marine protected areas.

International Activities

Conference Highlights National Fisheries Observer Program

More than 200 delegates from 22 countries attended the 2nd International Fisheries Observer Conference in New Orleans in November 2002, which was organized and convened by NOAA Fisheries. The conference highlighted NOAA Fisheries' observer programs in a global forum, recognizing NOAA Fisheries' leadership role in the use of at-sea observer methodologies to collect fishery-dependent data. As a result of the conference, a global network has been developed, leading to further advances in sampling design research, monitoring technologies, and deployment strategies in industrialized and artisanal fishery observer programs worldwide.

NOAA Co-sponsors International Deep-Sea Corals Workshop

NOAA and the Irish Marine Institute co-sponsored a deep-sea corals workshop, held in January 2003 at the National University of Ireland in Galway. Thirty-two



U.S. marine recreational fisheries contribute significantly to the quality of American life, as an important source of fun and food, as well as a major contributor to the economic well-being of coastal communities.

Coordination of National Volunteer Networks

NOAA Fisheries coordinates the efforts of networks of volunteers who patrol beaches nationally to observe and report incidences where marine mammals or turtles strand dead or alive due to a variety of reasons. These networks collect valuable information and tissue samples that help support assessing the status of the populations, particularly when con-

taminants, biotoxins, or disease are threatening protected species. When animals are alive, network members attempt to rehabilitate them and return them to the ocean under specific guidelines and regulations.

International Conservation

NOAA Fisheries provides scientific, management, policy, and financial support to a variety of international efforts designed

to conserve protected species and biodiversity throughout the world. This support includes participation in the International Whaling Commission and the Convention on the International Trade of Endangered Species of Fauna and Flora.

scientists and managers participated, representing nine countries from North America and Europe. The workshop report emphasizes the need for an international deep-sea corals action plan; articulates the concept of a State of the Deep-Sea Corals Report; describes research themes and critical information needs for mapping, biology and ecology, and paleoclimate analysis; describes potential collaborative projects for 2003 and beyond; and proposes an international, trans-atlantic, deep-sea corals research expedition.

Limits Set on International Trade of Endangered Species

At the most recent Conference of the Parties, held in November 2002, members focused increasing attention on the protection and regulation of international trade in marine species. NOAA was instrumental in adding whale sharks, basking sharks, and seahorses to species regulated by the Convention on International Trade in Endangered Species, providing total protection to bottlenose dolphins in the Black Sea, and defeating proposals to re-open international trade in great whales and hawksbill sea turtles.

Free Trade Agreements Improve U.S. Market Access

NOAA Fisheries made major contributions to negotiations of free trade agreements to improve market access for U.S. seafood and seafood products. Examples include agreements with Singapore, Chile, Morocco, Australia, Central American and Western Hemispheric countries, as well as global efforts at the World Trade Organization. In a specific product negotiation in concert with Peru, the United States brought and won a case against



the European Union's restrictions on species to be included in its definition of canned sardines.

Fisheries Agreements Successfully Negotiated with Canada

NOAA Fisheries successfully negotiated fisheries agreements for the Pacific Salmon Commission Protocol, Fraser River salmon, and sharing Pacific whiting with Canada. As a result, Canada reopened its ports to U.S. fishing vessels, which, upon obtaining the necessary licenses, may land fish and reprocess in Canadian ports.

NOAA Fisheries successfully negotiated fisheries agreements for the Pacific Salmon Commission Protocol, Fraser River salmon, and sharing Pacific whiting with Canada. As a result, Canada reopened its ports to U.S. fishing vessels, which, upon obtaining the necessary licenses, may land fish and reprocess in Canadian ports. Photo: William B. Folsom, National Marine Fisheries Service

NOAA Plays Leading Roles in Conservation of Tuna Fisheries

NOAA Fisheries is preparing for the entry of the Convention for the Conservation and Management of Western and Central Pacific Highly Migratory Fish Stocks, which will



NOAA Fisheries is preparing for the entry of the Convention for the Conservation and Management of Western and Central Pacific Highly Migratory Fish Stocks, which will establish a conservation regime for tuna fisheries worth in excess of \$1.5 billion. Photo: William L. High, National Marine Fisheries Service

establish a conservation regime for tuna fisheries worth in excess of \$1.5 billion. NOAA Fisheries also continued in multiple leadership roles with the International Commission for the Conservation of Atlantic Tunas, which succeeded in restructuring its many groundbreaking provisions using trade measures in support of its conservation measures into a single program addressing all species.

Law Enforcement

VMS Program Expands Coverage

In 2003, NOAA Fisheries expanded its Vessel Monitoring System (VMS) infrastructure to provide near-real-time, comprehensive, national surveillance of fishing vessels throughout the U.S. exclusive economic zone and the Pacific and Atlantic oceans. Because mapping ocean waters into marine protected areas is a significant aspect of the future management of America's oceans, expanding the use of VMS provides one of the strongest potential solutions to supplementing traditional NOAA Fisheries enforcement activities.

Contracts Awarded to State and Territorial Partners

To address NOAA's massive jurisdiction and mission more efficiently and effectively, Congress appropriated \$9.5 million during 2003 with state and territorial fishery enforcement agencies through Joint Enforcement Agreements with 23 coastal states and territories. The first series of agreements has resulted in state and territorial partners' providing more than 33,000 hours of at-sea patrols, 35,000 hours of land-based (dock-side) patrols, and 1,000 hours of public outreach.

Office for Law Enforcement Receives National Reaccreditation

NOAA Fisheries' Office for Law Enforcement received national reaccreditation this summer, a voluntary process for law enforcement agencies to demonstrate their compliance with national law enforcement best practices. After an on-site assessment in April by the Commission on Accreditation for Law Enforcement Agencies, a private group, NOAA's law enforcement arm became the first federal law enforcement agency in the country to be reaccredited by the commission.

FUTURE OUTLOOK

Achieving effective ecosystem-based conservation and management of living marine resources in collaboration with our partners will depend to a large degree on our success in determining, obtaining, and constantly improving the science, management, and institutional requirements needed to increase and sustain the tremendous potential value from these resources. NOAA Fisheries has

identified six areas for improving existing programs, processes, and strategies that, when accomplished over the next five years, will move us toward achieving our stewardship goals:

- improving the information base for stewardship;
- determining abundance and yield;
- reducing bycatch;
- eliminating overcapacity and overfishing;
- conserving and recovering endangered species; and
- protecting and restoring living marine resources.

To meet our mandates and expectations, we must also construct a safe, efficient, and secure infrastructure to complement the high-caliber science and management programs proposed for NOAA Fisheries. New investments in information technology, facilities, research technologies, and human capital improvements are needed. We will take maximum advantage

of technologies to streamline the execution of our mission and provide efficient services to the American public. Also, we will strengthen our workforce by adding the new skills and abilities required to meet our increasing responsibilities, including a greater emphasis on public education, communication, and stakeholder participation in the governance process.

To meet our goals of recovering and sustaining fisheries and protected species, we will incorporate substantive economic data and analyses into an integrated bio-economic policy framework that can forecast trends and outcomes of policy options. This framework will include evaluating the trade-offs between competing policy objectives that may jeopardize the sustainability of fish populations.

In short, within two to three years, we will significantly improve our conservation and management efforts, face fewer legal challenges, and provide better service to our constituents.

Office of Oceanic and Atmospheric Research

Where Science Comes to Life



*Richard D. Rosen, Ph.D.
Assistant Administrator*

NOAA's primary research and development organization, the Office of Oceanic and Atmospheric Research (NOAA Research), studies the Earth system from the deep ocean to the sun. NOAA Research delivers the products and services that help us to understand and predict environmental changes on local to global scales and at time scales from days to centuries.

The NOAA Research network consists of 12 internal research laboratories and extramural research at 30 National Sea Grant university programs, 6 undersea research centers, a research grants program through the Office of Global Programs, and 13 cooperative institutes with academia.

Ultimately the information that NOAA Research provides is used by decision makers at all levels to prevent the loss of human life and conserve and manage natural resources while maintaining a strong economy. NOAA Research is integrated across three central research themes: ocean, coastal, and Great Lakes resources; climate; and weather and air quality.

ACCOMPLISHMENTS

Record-Breaking Solar Storms Forecasted and Monitored

In the autumn of 2003, NOAA researchers helped to forecast solar storm activity and capture images of storms of record-breaking magnitude. Using the NOAA GOES-12 satellite's Solar X-ray Imager (SXI), the researchers produced images of some of the largest solar flare activity on record. The SXI technology was a culmination of more than 20 years of effort among NOAA, the U.S. Air Force, and the National Aeronautics and Space Administration's (NASA's) Marshall Space Flight Center. The SXI provides solar images at one-minute intervals around the clock, except for brief periods during orbital eclipses. Airline operations use this type of space weather information to divert flights during periods of strong solar activity to protect crews and passengers from excess exposure to radiation.

Ocean Explorer Web Site Receives Accolades

Scientific American presented the NOAA Ocean Explorer Web site with its 2003 Sci/Tech award, recognizing it as one of the top five "Earth and Environment" Web offerings in the world. *Science* magazine also awarded the site a "Best of the Web" recognition. Averaging 4,000 to 5,000 visitors a day, the number of visitors to the site has doubled since 2002, reaching more than 1.5 million visitors in 2003. During its third year of operation, the site is achieving its overarching objective of communicating ocean



Crew members aboard the RONALD H. BROWN prepare to deploy a bongo net to collect plankton samples in the area of the Kick 'em Jenny volcano in the Antilles Volcanic Arc (near Grenada).

science and exploration in new and exciting ways to the public. In addition to *Scientific American* and *Science*, major media outlets that continued to feature and cite NOAA Ocean Explorer include the Discovery Channel and *NewsDay*.

Access to Greenhouse Gas Database Enhanced

NOAA Research's Climate Monitoring and Diagnostics Laboratory currently maintains a global atmospheric greenhouse gas database that is one of the world's best sources of high-quality greenhouse gas data. In May 2003, NOAA launched an interactive data viewer to provide near-real-time Web access to the data. Besides allowing NOAA researchers to better assess the quality of their data, the interactive data viewer Web site (<http://www.cmdl.noaa.gov/ccgg/iadv/>) is an easy-access portal that makes data available to educators, students, policymakers, the press, and private industry.

Drought Conditions Attributed to Ocean Influence

Science magazine published a report by NOAA scientists in 2003

that showed important clues to the origin and nature of drought in the United States during 1998–2002. The combination of cold sea-surface temperatures in the eastern tropical Pacific and warm sea-surface temperatures in the western tropical Pacific and Indian oceans caused widespread drying in the Southwest and West and along the Eastern Seaboard, and in southern Europe and southwestern Asia. The results of this study suggest that these mid-latitude regions will continue to face an increased risk of drought in the future if sea-surface temperatures continue to be warmer than normal.



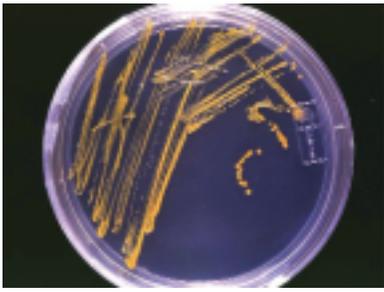
NOAA Increases Its Investment in Marine Aquaculture

Through its investments in off-shore aquaculture in such areas as Hawaii, Florida/Puerto Rico, New Hampshire, the Gulf, and the mid-Atlantic, NOAA Sea Grant hopes to establish an environmentally sustainable, profitable offshore aquaculture industry in the United States and the Caribbean. In addition to creating a major source of global food production, investments by NOAA and other entities in marine aquaculture will help to alleviate stress on natural stocks, create jobs, and address the U.S. trade deficit.

NOAA Radar Tracks Columbia Debris

NASA investigators used radar information from a network of wind profilers operated by the NOAA Forecast Systems Laboratory to discover crucial clues to the cause of the *Columbia* space shuttle disaster. Just as radar can detect airplanes, NOAA radar can detect particles in the atmosphere and show their changing position as they descend through the atmosphere. Given the fine scale of shuttle debris falling to Earth, this type of radar data was indispensable to the investigation.

NOAA Research's Climate Monitoring and Diagnostics Laboratory currently maintains a global atmospheric greenhouse gas data base that is one of the world's best sources of high-quality greenhouse gas data, collecting data from a variety of technologies, such as this CO₂ air sampler.



As one of the Nation's leading supporters of high-risk, early-stage drug discovery, NOAA Sea Grant has repeatedly demonstrated the value of marine organisms as sources of new anti-cancer, anti-inflammatory, and anti-microbial compounds.

Biotechnology Research Discovery Suppresses Virus

As one of the Nation's leading supporters of high-risk, early-stage drug discovery research, NOAA Sea Grant has repeatedly demonstrated the value of marine organisms as sources of new

anti-cancer, anti-inflammatory, and anti-microbial compounds. Sea Grant researcher William Fenical of Scripps Institution of Oceanography recently discovered a set of novel peptides, called halovirs, from a marine-derived fungus, which suppress replication of the herpes virus in mammalian cells. Dr. Fenical has applied for a patent on the discovery, and San Diego-based Nereus Pharmaceuticals has sought licensing rights.

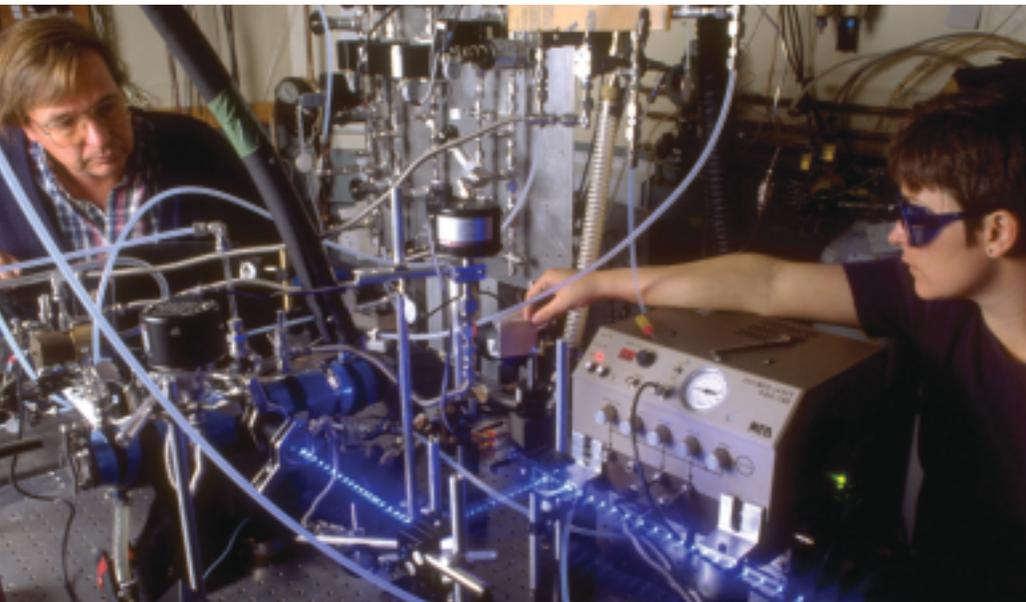
NOAA Scientists Support President's Climate Change Initiative

The Climate Change Science Program, a joint Federal program of the President's Committee on Climate Change Science and Technology Integration, has recently issued its strategic plan to

address some of the most complex questions and problems dealing with global climate variability and change. The program reflects an unprecedented outreach to more than 1,200 scientists and stakeholders, as well as representatives of over 35 countries. During the next four years, NOAA will be developing tools to support decision makers, and will be leading or supporting the development of 21 of the program's synthesis and assessment products, which range from the study of carbon cycle dynamics and greenhouse gas emissions to projections of future climate change.

Improving Great Lakes Forecasts Could Save Millions

The shipping industry is highly sensitive to small changes in water levels of the Great Lakes. For example, a two-centimeter error in a forecast can translate into a loss of \$1.5 million for one ship carrying cement over a year. This year, NOAA's Great Lakes Environmental Research Laboratory began improving its Great Lakes water-level forecasts, and is on track to decrease the margin of error in these forecasts by one centimeter by 2007.



The Aeronomy Laboratory in Boulder, Colorado, conducts scientific research on the chemical and dynamic processes of Earth's atmosphere, concentrating on the lower two atmospheric layers known as the troposphere and stratosphere.

PRODUCTS AND SERVICES

Environmental Observation and Monitoring

NOAA scientists collect global air samples to learn how the composition of the atmosphere varies over time, monitor ozone in the atmosphere, record solar radiation, and conduct oceanic observations. Much of these data are collected through partnerships all over the world. These time series measurements have allowed scientists to resolve important

scales of oceanic and atmospheric variability. In addition, long-term observations of a variety of physical, chemical, and biological parameters are used to monitor environmental conditions and to provide a baseline against which future changes can be assessed.

Interagency Field Experiments

NOAA Research scientists lead and participate in field experiments focused on the study of significant environmental phenomena. These experiments improve

our ability to understand and predict global behavior of the Earth's climate and atmosphere. Major campaign foci include ocean-atmosphere coupling in the eastern tropical Pacific; natural and anthropogenic climate forcing by aerosols and their feedbacks on regional and global climate; intercontinental transport of manmade pollution, with an emphasis on ozone, fine particles, and other chemically active "greenhouse" compounds; and physical processes that occur in the oceanic and atmos-

“Science on a Sphere” Travels Nationwide

In NOAA Research’s “Science on a Sphere,” four projectors cast rotating images onto a sphere approximately six feet in diameter, creating the effect of Earth in space. The sphere makes difficult information about Earth’s atmosphere easier for audiences to visualize and understand. This year the exhibit was displayed at five sites around the Nation, including at the American Meteorological Society Conference and before the Committee on Earth Observing Systems.

Capabilities for Forecasting Severe Weather Improved

NOAA’s National Severe Storms Laboratory has improved the regional accuracy of products used by National Weather Service forecasters. Advances have also been made in the WSR-88D weather radar–Warning Decision Support System (WDSS-II). These improvements have significantly contributed to the increased forecast lead times provided by the National Weather Service.

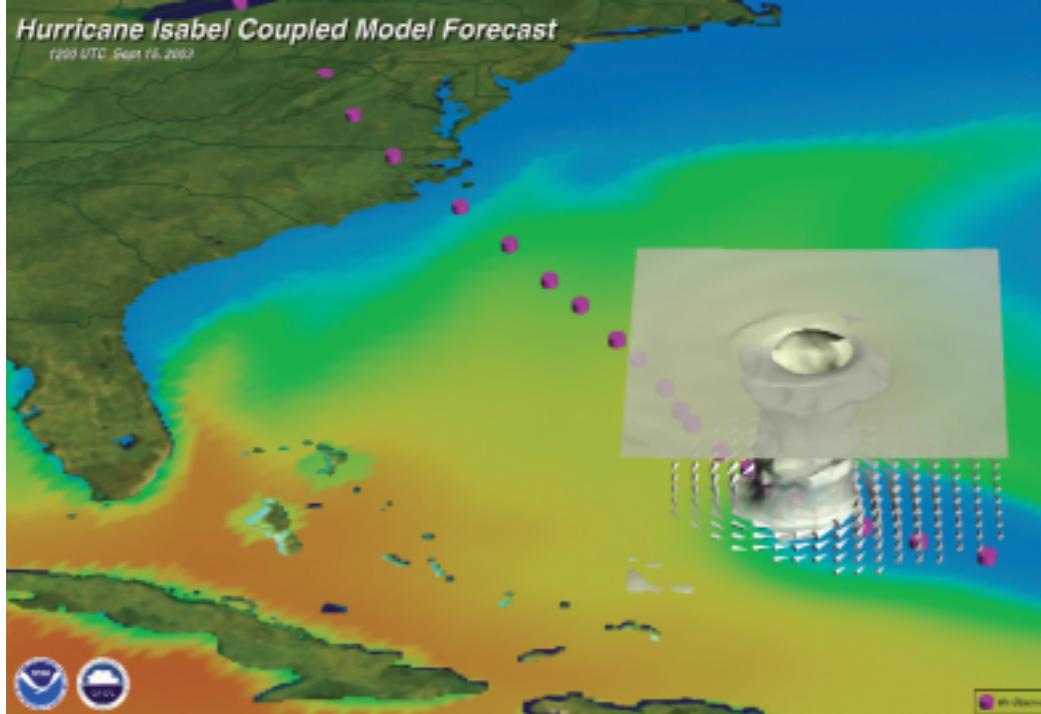
FUTURE OUTLOOK

NOAA Research strives to balance its near-term responsibility to address the needs of its primary customers both inside and outside of NOAA with its long-term com-

pheric regions influenced by ocean surface waves.

Global Models

NOAA Research models of the atmosphere, ocean, and climate have increasingly sophisticated predictive capabilities, giving leaders in government and industry a greater understanding of the range of possible future outcomes of today’s decisions.



mitment to conduct visionary research that will be critical for managing future environmental and societal threats. This dual responsibility requires us to perform research that leads to the transfer of information and new technologies, as well as to explore the unknown and develop important new concepts. Through increased dialogue with our constituents, we are working to be more responsible to our customers’ and partners’ needs and to engage our partners as we set new directions for research.

The NOAA Research vision is to create, through inspired research, the scientific basis for more pro-

NOAA’s National Severe Storms Laboratory has improved the regional accuracy of products used by National Weather Service forecasters, such as this coupled model forecast of Hurricane Isabel.

ductive and harmonious relationships between humans and their environment. Society will increasingly rely upon accurate weather and climate information to diminish the harsh impacts of droughts, flooding, and other environmental threats. NOAA Research is committed to building services that help citizens respond to these threats, as well as examining these phenomena for potential opportunities in key areas, such as agriculture and natural resource management.

Scientific Assessments

NOAA Research plays a leading role in periodically assessing the state of scientific understanding of many environmental issues facing government and industry decision makers.

Operational Products

NOAA Research supports a variety of operational products, including:

- providing the Nation’s official source of space weather alerts and warnings;

- collecting real-time data from moored ocean buoys for improved detection, understanding, and prediction of El Niño and La Niña events; and
- supporting an interactive Web-based model used to predict the consequences of atmospheric releases of radioactivity and other potentially harmful materials.

National Weather Service

Working Together to Save Lives



*David L. Johnson
Assistant Administrator*

The United States is the most severe weather-prone country on Earth. Each year, Americans cope with an average of 10,000 thunderstorms, 2,500 floods, 1,000 tornadoes, as well as an average of 6 deadly hurricanes. About 90 percent of all presidentially declared disasters are weather related, causing approximately 500 deaths and \$11 billion in damages every year. Weather is directly linked to public safety, and about one-third of the U.S. economy (about \$3 trillion) is sensitive to weather. During 1997–98, seasonal and interannual variations in climate, such as El Niño, led to economic impacts on the order of \$25

billion. All of these impacts are further magnified by current socioeconomic trends, such as population growth in severe weather-prone areas of the country, drought, and increasing demands for fresh water.

NOAA's National Weather Service (NWS) provides weather, water, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas. In performing this critical mission, NWS provides for the protection of life and property and the enhancement of the national economy. NWS data and products form a national and international information database and infrastructure that, in turn, serve other governmental agencies, the private sector, the public, and the global community.

Weather services cost each American household about \$13 a year. This investment allows NOAA to issue more than 734,000 forecasts (fire, weather, public, aviation, and marine), 850,000 river and flood forecasts, and 45,000–50,000 potentially life-saving severe weather warnings annually. Key NOAA customers, such as industry, state and local governments, and emergency managers, are demanding more reliable and more specific weather, water, and climate information for use in their decision making. These multiple demands all point to the need to sustain and improve NWS' core observing, forecasting, and warning services.

ACCOMPLISHMENTS

NWS Praised for Performance in Tornado Warnings

From May 4 through May 10, 2003, NWS issued approximately 400 tornado warnings in the Midwest, with an average lead time of 18 minutes. NOAA's investments in modern weather technologies and new science reaped significant returns during this seven-day tornado outbreak. NWS received praise for its performance from Missouri Gov. Bob Holden, Oklahoma Gov. Brad Henry, and several news organizations.

Forecast Office Receives Iowa's Golden Dome Award

On June 6, 2003, Iowa Gov. Tom Vilsack presented the Golden Dome Award to the staff of the NWS Weather Forecast Office in Des Moines. The staff was recognized for its efforts as part of a team that developed and implemented the Iowa AMBER Plan (America's Missing: Broadcast Emergency Response). The plan is a voluntary, cooperative program between law enforcement agencies and local broadcasters to broadcast emergency alerts to the public via NOAA Weather Radio when a child has been abducted and is believed to be in danger. The National Center for Missing and Exploited Children has endorsed the use of the AMBER Plan to assist in the most serious child abduction cases and is promoting the use of such emergency alert plans nationwide. The governor honored the AMBER Team, which is comprised of several state and local agencies and the broadcast associations, during a ceremony

held in the Iowa state capitol rotunda in Des Moines.

NOAA Weather Radio Reaches a Broader Audience

During FY 2003, NWS added 103 National Weather Radio (NWR) stations to its network of 859 stations on the air, extending the system's benefits to more Americans. For example, during the Veterans Day tornado outbreak in November 2002, NWR issued a warning that led to the evacuation of a movie theater in Van Wert County, Ohio, saving more than 50 lives. NWS also promoted the NWR system for All Hazards capabilities, including broadcast of civil emergency messages from local officials, and began participation in the AMBER Plan at various Weather Forecast Offices.

NWS Performance Earns High Rating

NWS has been recognized inside and outside of the government as a leader in performance-based management. In FY 2003, NWS was rated sixth out of 234 programs



NWS Service Assessment Team member Steve Letro, Meteorologist-in-Charge of the Jacksonville, Florida, Weather Forecast Office (left) talks to Claude Robinette near where the former General Motors assembly plant's United Auto Workers facility once stood. The building, across the road from the main plant, was destroyed by the May 2003 Oklahoma City tornado. Photo: Marilu Trainor, National Weather Service

reviewed under the Office of Management and Budget's Program Assessment Rating Tool. In support of the Budget and Performance Integration initiative, which is a key component of the President's Management Agenda, NWS will continue to link budgeting and investment review to performance by establishing and tracking key service improvement goals.

From May 4 through May 10, 2003, NWS issued approximately 400 tornado warnings in the Midwest, with an average lead time of 18 minutes. NOAA's investments in modern weather technologies and new science reaped significant returns during this seven-day tornado outbreak. Photo: Joe Golden, National Weather Service

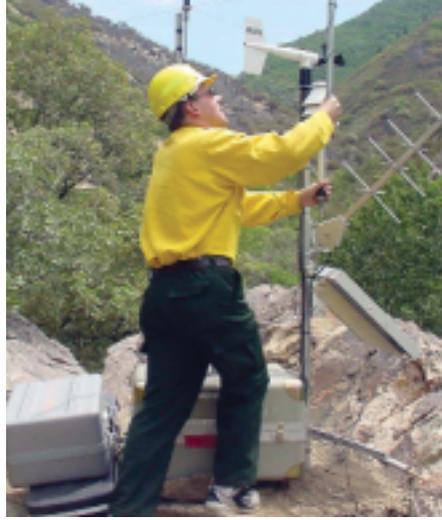


Accuracy of Hurricane Forecasting Continues to Rise

NOAA's National Hurricane Center issued two weeks of advisories on Hurricane Isabel, through its landfall near 1:00 p.m. EDT September 18, 2003, and inland movement across the U.S. mid-Atlantic and northeastern states. Isabel, which had been at Category 5 on the Saffir-Simpson Hurricane Scale several days earlier, made landfall at Category 2 strength. The preliminary 48-Hour Forecast Track Error (a Government Performance and Results Act measure) was 61 nautical miles, having an error of no more than 130 nautical miles.

NWS Forecasts Record Winter Storm

The most significant winter storm since the Blizzard of 1996 struck the East Coast beginning February 15, 2003. NWS provided an average



On-site weather support from NWS personnel is critical during hazardous events. Shown here is NWS Incident Meteorologist Chuck Redman from the Weather Forecast Office in Boise, Idaho, setting up the portable FireRAWS meteorological equipment near a wildfire in Farmington, Utah. Photo: Marilu Trainor, National Weather Service

winter storm watch lead time of 32 hours and an average winter storm warning lead time of 17 hours, with the latter being well above the NWS national performance goal of 14 hours for the fiscal year. Blizzard conditions and coastal flooding along portions of the mid-Atlantic and southern New England coasts prompted emergency and disaster declarations in New York, New Jersey, West Virginia, Maryland, and Delaware. An estimated 100,000 customers lost power in West Virginia, with 20,000 in the Carolinas, 62,000 in Ohio, and 6,000 in Virginia. Airports for Washington, Baltimore, New York, and Philadelphia largely shut

NWS' Advanced Hydrologic Prediction Service (AHPS) played a major role in preparing five eastern Kentucky counties for a flood on February 15, 2003. As heavy precipitation surged across the region, the Weather Forecast Office in Jackson, Kentucky, issued flash flood warnings based on the AHPS and other hydrologic applications.

down, stranding thousands of passengers trying to depart from and arrive in the region.

Kentucky Officials Commend Hydrologic Prediction Service

NWS' Advanced Hydrologic Prediction Service (AHPS) played a major role in preparing five eastern Kentucky counties for a flood on February 15, 2003. As heavy precipitation surged across the region, the Weather Forecast Office in Jackson, Kentucky, issued flash flood warnings based on the AHPS and other hydrologic applications. The local rescue squad saved nearly 50 people from rising water at several locations throughout Floyd County. Eddie Patton, Director for Disaster Emergency Services for the county, said: "Because NWS told us when, where, and how high the rivers would crest, we were able to redirect our emergency services to locations that needed the most help." Eric Thomas, Assistant Director of the East Kentucky Science Center in Prestonsburg, expressed similar appreciation: "I doubt we would have been able to come through this time with such a minimal loss of property without the assistance the staff of the Jackson National Weather Service gave to us."

NWS Begins Issuing Digital Forecasts

On September 30, 2003, NWS took its first step into the digital forecast era with its initial implementation of the Interactive Forecast Preparation System (IFPS). Weather Forecast Offices across the conti-



mental United States will be operationally producing 10 text bulletins using the IFPS software developed, tested, and deployed over the past few years. In addition, underlying grids used to produce the bulletins will be made available for external customers in the National Digital Forecast Database. These grids will be provided on an experimental basis to afford NWS the time needed to evaluate the forecast grid's quality, obtain customer feedback, and refine the underlying information technology's architecture. NWS will transition the majority of these grids to official status in fiscal 2004.

The National Digital Forecast Database is replacing various independently prepared products and services for specific geographic areas with one integrated, consistent data set. The transition of NWS from producing text products to a digital database will enable NOAA partners and customers to view NWS information in new, convenient visual forms (including digital, tabular, image, graphic displays), and to customize information for themselves and their customers.

StormReady Label Proves Correct for Ohio County

When a severe storm outbreak struck the Midwest on November 10–11, 2002, Ohio's Van Wert County StormReady community placed a series of warning alert systems in public locations. Following the warning, quick action by Van Wert Cinemas manager Scott Shaffer and his staff moved more than 50 adults and children out of theaters in the multiplex and into safer conditions in a hallway and restrooms. Minutes later, a tornado tore off the building's roof and tossed cars into the screen and front seats where people had been sitting minutes earlier. The tornado



NWS Warning Coordination Meteorologist Tanja Fransen discusses local weather at the Valley County Fair in Glasgow, Montana, with a couple of farmers who are NWS volunteer weather spotters. Photo: Tom Salem, National Weather Service

touched down in Van Wert County 13 minutes after the warning was broadcast and struck the movie theater 28 minutes after the broadcast.

"If we hadn't gone through the StormReady process and gotten our warning system in place before this storm, a lot of people would not have gotten the warning, and we could have lost many more lives," said Van Wert County Emergency Manager, Rick McCoy. "All communities across the country need to look at becoming StormReady, because at some point they're going to have severe weather of some kind. People shouldn't say 'it can't happen here,' because it can."

NRC Study Endorses Digital Forecast Database

A recent National Research Council study has concluded that the National Digital Forecast Database is "basically sound, functioning well, and serving the needs of the Nation." The study recognizes the key role the database will play in the future provision of NWS products and services, as well as the advantages it will bring

Andy Ervin works on a recording rain gauge at a Cooperative Observer climate site in Fulton, Illinois, one of just a few sites in the country located on the Mississippi River.

Photo: Andy Ervin, National Weather Service (using timer on camera)





Hydrometeorological Technician Leon Wasinger installs a staff gauge on the banks of the Whitewater River, three miles northwest of Augusta, Kansas. The gauge is used to read river levels during flooding. Photo: Janet Spurgeon, National Weather Service

to NWS partners in the public, private, and academic sectors. One of the study's basic recommendations is for NWS to continue activities essential to its mission, including unrestricted access to publicly funded forecasts and related information products in a timely manner and at the lowest possible cost to users.

Ribbon-Cutting Ceremony Held for New Supercomputer

On June 6, 2003, NWS celebrated the activation of its new supercomputer with a ribbon-cutting ceremony at the IBM Corporation facility in Gaithersburg, Maryland. The new supercomputer more than doubles the computing speed of the system it replaced, enabling NWS, for example, to provide hurricane forecasts and warnings out to five days, compared to the current two-day capability. Housing the supercomputer at the IBM facility provides the greatest computational capability for the money spent. Through this arrangement, IBM sustains this computer at its own facility, and staffs and maintains the system.

High-Tech Meteorology Helps NOAA Forecast Fire Weather

NWS implemented the All-hazards Meteorological Response Systems (AMRS) nationally for the summer 2003 wildfire season. The equipment, which combines advanced computer software and two-way satellite communications,

PRODUCTS AND SERVICES

Next-generation Radar (NEXRAD)

NWS forecasters use NEXRAD to detect and acquire information about tornados, severe thunderstorms (containing damaging winds, hail, turbulence, and lightning), and heavy precipitation (leading to flash flooding and heavy snow). NEXRAD is a tri-agency program of NWS, the Federal Aviation Administration (FAA), and the U.S. Air Force (USAF).

Automated Surface-Observing System (ASOS)

Getting more information on the atmosphere, more frequently, and from more locations is the key to improving forecasts and warnings. ASOS, the Nation's

primary surface weather-observing network, observes, formats, archives, and transmits observations automatically. ASOS systems are designed to support weather forecast activities and aviation operations, along with the needs of the meteorological, hydrological, and climatological research communities. ASOS routinely and automatically provides computer-generated voice observations directly to aircraft in the vicinity of airports, using FAA ground-to-air radio. These messages are also available via a telephone dial-in port. ASOS transmits special reports when conditions exceed pre-selected weather elements thresholds. The ASOS program is a joint effort of NWS, the FAA, and the Department of Defense.

IBM SP Supercomputer

The IBM SP supercomputer runs complex numerical weather models that generate products that NWS and private-sector meteorologists use as the basis for their forecasts. The supercomputer's added capabilities and speed allow forecasters to predict extreme weather several days in advance.

Advanced Weather Interactive Processing System (AWIPS)

AWIPS is the central nervous system of NWS forecast operations and the information technology network that carries observations, data, and forecast models to NWS forecasters. With AWIPS, forecasters integrate and exploit all the data from the observing systems and numeri-

provides NOAA meteorologists high-speed access to state-of-the-art weather data when at a remote location without relying on the use of phone lines. The fast download speeds are advantageous for IMETs (incident meteorologists), since they require large, highly perishable meteorological data sets to

perform their jobs. The IMETs have the FX-NET software on their laptop computers, which allows them to receive observational forecast information while in the field, and to overlay satellite images and numerical forecast computer models.

FUTURE OUTLOOK

In a world of rapidly expanding technology, scientific capabilities, and expectations, NWS faces the challenge of providing weather data and information to citizens, public officials, and private companies when and where they want it, in a form they can easily understand. To achieve this goal, NWS will obtain and use more data and will increase its computer power at its local offices and national centers to provide more accurate, frequent, time- and space-specific data and information than ever before. As NWS makes more of its data and information available in digital form, conversion into text, graphics, or other forms will be easier for NWS and others.



Student intern Rebecca Waddington (right) of the Monterey, California, Weather Forecast Office challenges students to use their lungs to remove air from a bell jar with an enclosed altimeter. Presented at the Tri-Valley Expanding Your Horizons Workshop for young women in February, this experiment was used in conjunction with demonstrations illustrating the effects of pressure using everyday objects. Photo: Jon Bonk, Weather Forecast Office student intern

cal weather prediction models onto one platform. AWIPS enables rapid diagnosis of weather systems and the generation of timely, accurate warnings of severe weather.

NWS Telecommunications Gateway (NWSTG)

NWSTG is the Nation's telecommunications hub for collecting, processing, and distributing weather data and information. This telecommunications center provides national and global data exchange services using automated communication resources, transmitting a wide variety of environmental data. NWSTG operates around the clock to acquire and process observations;

construct messages; and disseminate messages and files of observations, analyses, and forecast products. Customers worldwide use data processed by NWSTG, affecting a wide range of economic and emergency management decisions.

National Data Buoy Center (NDBC)

The NDBC is the focal point for data buoy and associated automated meteorological monitoring system technology. It provides operational, marine data from about 70 moored buoy stations in the Atlantic and Pacific oceans, the Gulf of Mexico, and the Great Lakes, and operates about 60 C-MAN (Coastal-Marine Automated Network) stations.

NOAA Weather Radio (NWR)

The NWR network has more than 750 transmitters, covering the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. Working with the Federal Communications Commission's Emergency Alert System, NWR is the single source for the most comprehensive weather and emergency information available to the public. NWR also broadcasts warning and post-event information for all types of hazards—both natural (such as earthquake and volcano activity) and environmental (such as chemical releases or oil spills).

National Environmental Satellite, Data and Information Service

The Nation's Eye on the Environment



Gregory W. Withee
Assistant Administrator

As the operator of the Nation's civil operational, environmental satellite system, NOAA's National Environmental Satellite, Data and Information Service (NESDIS) observes our Earth, our oceans, and our atmosphere every day and uses these observations to benefit all people and sectors of society. Composed of the Geostationary Operational Environmental Satellites (GOES) and the Polar-orbiting Operational Environmental Satellites (POES), the system provides the U.S. space-based component of a global environmental monitoring system. On behalf of the Department of Defense, NESDIS also operates the Defense Meteorological Satellite Program (DMSP) spacecraft. And on behalf of the Department of Commerce, it licenses the operation of commercial remote-sensing space systems.

NESDIS manages the largest collection of atmospheric, geophysical, and oceanographic data in the world. It contributes to the national economy by providing environmental data for energy distribution, the development of global food supplies, and the management of natural resources. NESDIS also provides data and information to a broad spectrum of users—for example, NOAA forecasters issuing severe storm warnings, researchers studying the environment, and national and international space agencies.

ACCOMPLISHMENTS

Construction Begins on Satellite Operations Facility

On April 11, 2003, NOAA and the General Services Administration hosted a ground-breaking ceremony for the NOAA Satellite Operations Facility. This new facility will house NOAA's satellite operations, satellite data processing operations, U.S. search-and-rescue missions, and the National Ice Center. It will replace the existing Federal Building 4 in Suitland, Maryland, which is more than 40 years old. Distinguished guests attending the ceremony included Deputy Secretary of Commerce Samuel W. Bodman, NOAA Administrator Conrad C. Lautenbacher, Jr., GSA Administrator Stephen Perry, NESDIS Assistant Administrator Gregory W. Withee, Maryland's Governor Robert Ehrlich and Representative Albert Wynn, and Prince Georges County Executive Jack Johnson.

GOES-12 Begins Coverage of the East Coast and Atlantic

Launched in July 2001, the Nation's most advanced environmental satellite was in on-orbit storage mode, until NOAA engineers activated it on April 1, 2003. The new GOES-12 replaced GOES-8, which hovered above the East Coast and Atlantic Ocean for nearly 10 years. GOES data, combined with data from Doppler radar and automated surface observ-

ing systems, help National Weather Service forecasters issue short-term weather forecasts and warnings. Among the sophisticated instruments onboard GOES-12 is the world's most advanced solar storm detector, the Solar X-ray Imager, which provides space weather forecasters with real-time images of the sun's broiling atmosphere. This information helps pinpoint when solar activity might harm billions of dollars worth of commercial and government assets in space and on land.

NOAA Hosts Earth Observation Summit

In December 2002, NESDIS presented a proposal to the White House to host an Earth Observation Summit. With the White House's enthusiastic endorsement, the Summit activities were initiated and culminated in a successful event on July 31, 2003. The representatives of 33 member nations of the European Commission attending the event adopted a declaration of political commitment to cooperate on Earth observations.

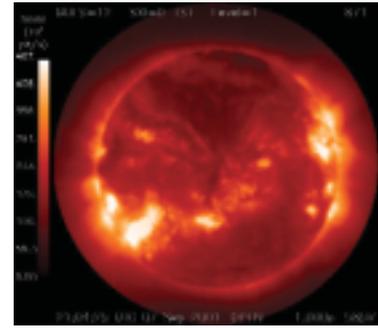
Architecture Established for Observation System

NESDIS has designed an architecture that will define a consistent set of principles, policies, and standards that will guide the engineer-

ing of NOAA observing systems and infrastructure in a way that ensures their alignment with mission requirements. Envisioned as a step to a national architecture, the NOAA Observation System Architecture can facilitate understanding of the relationships among observing systems. The purpose of a target architecture is to provide an integrated view of observing systems linked to a specific mission and a framework for examining future requirements and costs. Additionally, a targeted architecture serves to aid in the discovery of gaps and any duplication, thereby leading to a more cost-effective overall observation system. In the end it can help to make observations accessible by all customers and assist in NOAA's participation in national and international observing systems. An Observation Council has been formed to oversee the development of the architecture and related activities.

GOES-9 Backs Up Japanese Satellite

Pursuant to an agreement signed by Under Secretary Conrad Lautenbacher in May 2002, in the spring of 2003 the United States loaned GOES-9 to the Japan Meteorological Agency to back up Japan's aging geostationary satellite.



In the autumn of 2003, NOAA GOES-12 satellite's Solar X-ray Imager captured spectacular images of solar storms of record-breaking magnitude.

This required bringing GOES-9 out of its stored in-orbit configuration, and upgrading capabilities at the Fairbanks, Alaska, Command and Data Acquisition Station to command and control the satellite. The NOAA-Japan Meteorological Agency agreement will provide critical meteorological coverage over the Western Pacific, including continuous coverage of U.S. interests and territories in the region.

Search-and-Rescue Program Celebrates 20 Years of Service

On October 16, NOAA and the State Department hosted a reception commemorating the 20th anniversary of the launch of the first international search-and-rescue satellite program, which has saved more than 14,000 lives since its inception in 1982. The Cospas-SARSAT system was initially developed under an agreement among Canada, France, the former Soviet



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NOAA Search-and-Rescue Satellite-Aided Tracking (SARSAT) Saves Lives

- *April 24:* Two U.S. Coast Guardsmen were saved in the vicinity of Yaupon Beach, North Carolina, when their small vessel took water over the bow and began flooding.
- *May 17:* A United Kingdom helicopter rescued three people onboard the sailing vessel *Shockwave*, which had capsized 10 nautical miles (NM) southwest of the Isle of Wight.
- *May 25:* The captain and crew of *Mi Niña* were rescued 17 NM east of Biscayne Bay, Florida, after the captain activated the vessel's beacon when the vessel began to sink.
- *June 1:* The Coast Guard in Miami launched an aircraft to rescue three people on the sailboat *Joy* 100 NM east of Jacksonville, Florida.
- *July 6:* Four crew members were rescued by the Coast Guard near Port Angeles, Washington, when SARSAT detected a distress signal from *Bad Stew Too*, a vessel that had run aground and had begun to take on water.
- *July 8:* When SARSAT detected a signal off New Haven, Connecticut, where the owner of a sailboat was suffering symptoms of a heart attack, the Coast Guard located the boat and transported the owner to waiting emergency medical personnel.
- *July 10:* After SARSAT detected an emergency radio beacon from a helicopter that had crashed in Alaska when its engine failed, Alaska state troopers located the pilot, who was in good condition, and transported him to safety.
- *July 10:* A person onboard the sailboat *Kai Aka*, who was unconscious and had been experiencing seizures for three days, was rescued 645 NM southwest of San Diego, California, when SARSAT detected a distress signal.
- *July 26:* When the *Reliance* ran aground while fishing off Santa Rosa Island, California, it sent a distress signal, which the nearby *Lady Raquel* picked up, and retrieved two people from a life raft and transported them to safety.
- *September 1:* The captain and crew of the fishing boat *Reaction* were rescued 70 NM west of Eureka, California, after activating the emergency beacon when heavy seas compromised the vessel's structural integrity.
- *September 7:* The Coast Guard rescued fishermen aboard the *Amber Marie* when SARSAT detected their emergency signal in the vicinity of Yarmouth, Maine.

Union, and the United States as a means of creating a single system that would provide the most efficient and effective means of detecting and locating people in distress. At present, 32 countries and two organizations are formally associated with the Cospas-SARSAT program. During the reception, NOAA Administrator Vice Admiral Conrad Lautenbacher addressed participants and read a Presidential Proclamation. Dignitaries from the French and Russian space agencies, as well as leaders from the National Aeronautics and Space Administration (NASA), the U.S. Air Force, and the U.S. Coast Guard, attended the celebration.

Personal Locator Beacon System Becomes Operational Nationwide

Personal Locator Beacons became operational on July 1 in the continental United States, giving outdoor adventurers access to the technology used in the lifesaving satellite-tracked distress alerts carried by aviators and mariners. When activated in an emergency, the beacons emit a signal that can be tracked by a worldwide satellite search-and-rescue system. Their availability will greatly increase the safety of the millions of people who explore the Nation's wilderness every year. The beacons' advanced features include global

PRODUCTS AND SERVICES

Weather and Climate Ocean Observation

NESDIS satellites provide a robust, integrated, comprehensive satellite observing system that protects the Nation and its economic infrastructure from the threats of severe weather, extreme environmental events, and unusual climate and their often devastating impacts. The global, continuous, environmental observations that NESDIS satellites provide drive weather and climate-forecasting

models. NESDIS observations also contribute to the preservation of marine and coastal habitats, safeguard navigation and transportation, and provide search-and-rescue capability.

Geostationary Satellite System

NESDIS operates a system of environmental satellites in geostationary orbits to provide data for short-term weather warnings and forecasts. Known as GOES, these satellites orbit the Earth at 22,600 miles above the equator. Two GOES satellites remain operational at all times—one providing coverage for the

eastern United States and most of the Atlantic Ocean, and the other providing coverage for the western United States and the Pacific Ocean basin.

GOES satellites provide images of the entire United States every 15 minutes. NESDIS can also acquire GOES images as frequently as every minute to monitor the development of severe weather. The National Weather Service uses GOES temperature and water vapor data in powerful numerical prediction models to form the basis of local weather forecasts and warnings of severe weather events.

positioning system (GPS) technology, which makes it easier and quicker for NOAA satellites to pick up distress signals and relay an accurate location to rescuers.

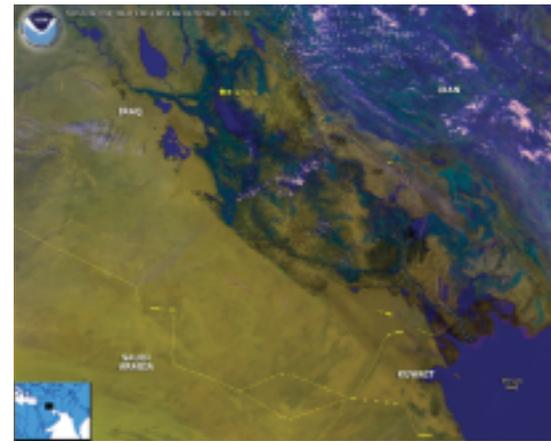
NOAA Contributes to Iraq Efforts

During military activities in Iraq, NOAA Operational Significant Event Imagery (OSEI) program analysts collected imagery of Iraq and the Persian Gulf from March 23 through April 15, 2003. NOAA polar-orbiting satellite images showed hot spots and thick black smoke in southern Iraq from burning oil fields blowing into western Kuwait. In addition to being used to brief NOAA and NESDIS management on developing situations, these images were published by

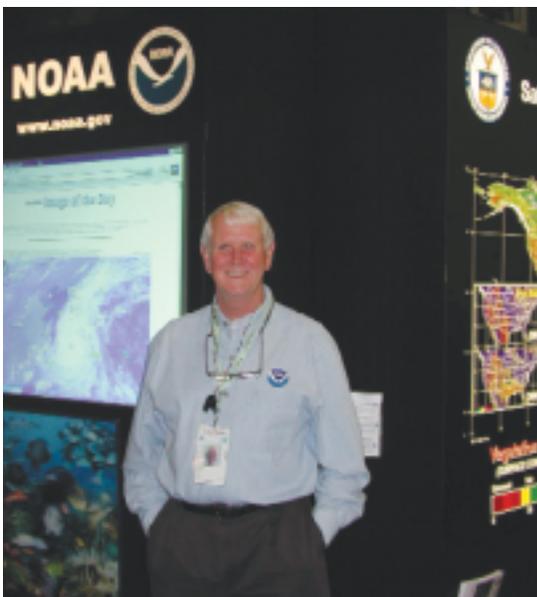
numerous media outlets, including ABC News, CNN, the Associated Press, Reuters, Yahoo News Services, and *Federal Computer Week*.

NOAA Provides Real-Time Reports on Hurricane Isabel

NESDIS contributed real-time environmental information on Hurricane Isabel in mid-September, tracking and monitoring the storm as it progressed to the East Coast of the United States. NOAA satellite information and imagery from GOES and POES satellites were used as part of NOAA and U.S. government efforts to prepare for Isabel, and provided National Weather Service forecasters a more accurate picture of the storm's path.



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FUTURE OUTLOOK

International events and technological progress have reshaped the global context in which NESDIS operates. Anticipating this rapid pace of change is vital to creating NESDIS' vision for the future. Several factors—including future environmental observing capabilities, new information technology,

and the growing needs and expectations of our numerous customers—will present opportunities for delivering improved products and services to meet future challenges.

Our national security, economy, and environment have become inextricably linked. No single environmental observing platform can

Peter Allen, who recently retired from NOAA'S Public Affairs Office, provided support for the Earth Observation Summit.

GOES images are also converted to videotape for use on national television weather shows.

Polar-orbiting Satellite System

The NESDIS Polar-orbiting Operational Environmental Satellite (POES) system provides an uninterrupted flow of critical global information used in numerical weather models. Continuous global temperature and humidity values from the POES system provide critical inputs for quality three- to five-day and long-range temperature, precipitation, and snow forecasts. The system also monitors global sea surface temperature, indicating

the location, onset, and severity of such events as El Niño as early as possible. Longer lead times of these impending events allow emergency and agricultural managers to activate plans to reduce the impact of floods, landslides, and droughts.

The U.S. government has traditionally maintained two polar weather satellite systems, one for civil purposes and one for military purposes. In 1994, a Presidential Decision Directive created the National Polar-orbiting Operational Environmental Satellite System (NPOESS)

to converge these programs. As implemented under the Presidential Decision Directive, NPOESS will save \$1.6 billion over the life of the program, compared to the cost of continuing and upgrading the current series of POES and Defense Meteorological Satellite Program satellites. Administered by the Departments of Commerce and Defense and NASA, NPOESS will provide an improved and cost-effective, single national system capable of satisfying both civil and national security requirements for real-time, space-based, remotely sensed environmental data.



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fulfill all environmental remote-sensing requirements. Our customers need the best mix of observations from available and planned observing platforms and sensors. The upcoming expansion of advanced satellite instruments and data from such systems as the National Polar-orbiting Operational Environmental Satellite System and the European polar meteorological satellite program (MetOp) is a daunting challenge, as we move toward the production of significantly better forecasts from numerical weather prediction models.

In this new century, our greatest challenge is to use operational satellite observing systems comprehensively so as to extract the best-quality products possible as we plan for observing systems that

serve both weather and climate system needs. We must also realize the full potential of current and future satellite and ground-based data, and provide timely environmental data relevant to current and future economic and environmental issues on local, regional, national, and global scales.

To be the source for the most comprehensive and easily accessible satellite products, data, and environmental information and assessments in the world, NESDIS will continue to operate and develop the world's premier environmental satellite systems, leading efforts with other agencies and countries to establish a global observing system to meet the world's weather, climate, ocean, and hazards support information needs. NESDIS will

Advanced NPOESS sensors will deliver higher-resolution atmospheric, oceanic, and terrestrial data, enabling more accurate short-term weather forecasts and severe storm warnings. NPOESS also offers the added advantage of serving the longer-term data-continuity requirements of the climate community for improved global climate assessment and prediction. NPOESS will also provide improved measurements and information about the space environment necessary to ensure reliable operations of space- and ground-based systems, and will continue to provide surface data collection and search-and-rescue capabilities. The tri-agency NPOESS program is well along the path to creating a high-performance integrated polar satellite system that will cost less, be more responsive to user demands, and deliver higher capability than that available today.

Environmental Data and Information Services

The NOAA Data Centers provide worldwide environmental data and information products and services in the atmospheric, marine, solid earth, and solar-terrestrial sciences to meet the needs of users in commerce, industry, agriculture, science,

and engineering; the general public; and Federal, state, and local agencies. Environmental data and information maintained by NOAA are vital to practically every economic sector and are used in making decisions critical to national defense; industrial productivity; energy development and distribution; world food supplies; public health, safety, and welfare; and development of natural resources. Environmental scientists and observers also have a critical need for long time-series of historical and recent global data to assess long-term environmental trends, to evaluate the current state of the environment, and to predict future environmental conditions and events. This makes NOAA data archives a national treasure that our country must maintain.

National Climatic Data Center

Located in Asheville, North Carolina, the National Climate Data Center (NCDC) archives billions of meteorological observations, making it the largest climate data center in the world. The NCDC receives, processes, archives, and disseminates surface, marine, upper air, radar, and solar radiation data and environmental observations.

The NCDC serves a large and diverse community, responding to more than one million requests a year. It makes environmental data and information available through on-line immediate Internet access and through off-line delivery of products. Users include climate researchers, engineers, agribusiness, emergency planners, attorneys, government agencies, and the public. Economic sectors benefiting from NCDC data include energy development and conservation, power and food production, healthcare, construction decision and scheduling, air pollution control, and transportation. The NCDC also performs climatic applications studies for other government agencies, including NASA, the Environmental Protection Agency, and the Departments of Defense and Energy.

National Oceanographic Data Center

The National Oceanographic Data Center (NODC) in Silver Spring, Maryland, maintains the largest collection of publicly available oceanographic information in the world, including hundreds of millions of records gathered from ocean observation programs conducted over the past 150 years. These data document the physical and chemical properties of the oceans, currents, weather, and biota as observed from ships, buoys, and satellites.

also implement new technologies to archive and provide access to massive amounts of new data becoming available that describe our climate, fulfilling growing customer requirements for quality and timely state-of-the-art products and services. Those technologies include synthetic aperture radar, hyper-spectral imaging, and the laser-based Light Detection and Ranging (LIDAR) instruments.

NESDIS employees maintain more than 500 unique databases that contain information on natural hazards, such as tsunamis, volcanoes, earthquakes, and phenomena in space; studies of Earth's magnetic and gravity fields; topography and ecosystems; marine geology and geophysics; glaciology; upper atmosphere physics; and the space and solar environments.



The NODC provides access to these data to more than 270,000 users each year, including ocean researchers within NOAA, other agencies and academia, environmental program managers, educators, and maritime industries. Examples of these products and special topic data sets include the Marine Environmental Buoy Database, the Atlas of Surface Marine Data, and the World Ocean Circulation Experiment Data Set.

The NODC also operates the NOAA Library and Information System, which consists of the NOAA Central Library in Silver Spring, Maryland, and the Seattle and Miami Regional Libraries. The NOAA library data collection consists of more than 1.7 million volumes and thousands of visual images on topics related to NOAA's diverse missions. Access to the library collection and information services is available through the World Wide Web, which routinely handles more than 250,000 queries a month.

National Coastal Data Development Center

NESDIS established the National Coastal Data Development Center (NCDDC) at the Stennis Space Center in Mississippi in 2002, to archive and provide access to

the long-term coastal data record. Coastal resource managers, the research community, coastal weather forecasters, fisheries managers, and others have demanded that marine data be made more accessible to help our Nation acquire a better understanding of the health of our coastal environmental quality. The NCDDC's goal is to improve the quality of, and accessibility to, marine data characteristics, such as chemistry, biology, and geology, and such physical parameters as water levels, bathymetry, winds, and waves.

Working with Federal, state, and local agencies, academic institutions, nonprofit organizations, and the private sector, the NCDDC will create a unified, long-term database of coastal data sets. It will also develop and maintain a catalog of available coastal data, ensure the quality of these data, and provide on-line access to the coastal user community. Additionally, the NCDDC will produce retrospective analyses and trend information to help form the basis for environmental assessment and public policy.

National Geophysical Data Center

The National Geophysical Data Center (NGDC) in Boulder, Colorado, ingests,

compiles, archives, and disseminates a wide variety of scientific data ranging from information about the interior of the Earth to solar activities. The NGDC maintains more than 500 unique databases that contain information on natural hazards, such as tsunamis, volcanoes, earthquakes, and phenomena in space; studies of Earth's magnetic and gravity fields; topography and ecosystems; marine geology and geophysics; glaciology; upper atmosphere physics; and the space and solar environments.

The NGDC meets the needs of a diverse community of users, servicing more than 1.5 million requests a year. Data users include scientists; researchers; the private sector; Federal, state, and local governments; academia; and the public. The NGDC places particular emphasis on providing data to the Earth science research community to support work on global change, resource exploration, and basic science. The NGDC also operates World Data Centers for Solar-Terrestrial Physics, Marine Geology and Geophysics, and Solid Earth Geophysics at its Boulder location.

NOAA Marine and Aviation Operations

On the Sea and in the Air



Rear Adm. Nicholas Prahl
Deputy Director, NMAO and
NOAA Corps

The mission of NOAA Marine and Aviation Operations (NMAO) is to manage, operate, and maintain the Nation's largest civil fleet of research and survey ships and aircraft, which collect data for NOAA's environmental stewardship assessment and prediction programs. NMAO also manages NOAA's Diving Program and the NOAA Commissioned Corps, the Nation's seventh uniformed service.

NOAA ships and charter ships support a wide range of ocean and atmospheric activities, including fisheries and coastal research, nautical charting, and long-range ocean and climate studies. The ships are specially equipped and designed to support NOAA programs, and have unique data collection capabilities. For example, NOAA fishery survey vessels can conduct joint operations of fishery stock assessments and oceanography, giving scientists a complete picture of a fish species, its habitat, and its surrounding environment.

NOAA aircraft operate throughout the Nation, collecting data for programs ranging from hurricane prediction research, to snow-pack surveys for flood prediction and water resource management, to marine mammal surveys. NOAA aircraft are specifically modified to carry instruments needed for NOAA missions, and are unique in their ability to support atmospheric and hurricane surveillance and research programs.

NOAA Corps Officers operate, manage, and maintain NOAA ships and aircraft and bring their operational expertise to land-based assignments. NOAA Corps Officers work in locations as diverse as the South Pole and Australia, carry out Chief Scientist duties on NOAA's hydrographic survey ships, and serve in management and technical positions throughout all of NOAA's Line Offices.

ACCOMPLISHMENTS

NMAO Supports Homeland Security Preparedness

NOAA platforms and NOAA Corps officers continued to support the Nation's homeland security preparedness during FY 2003. A NOAA Corps officer was selected to lead the agency's overall homeland security efforts and to coordinate these activities with other Federal agencies. In addition, NOAA's Citation aircraft flew mapping missions in 12 major cities and provided the data sets to the U.S. Army Joint Precision Strike Demonstration and the National Imagery and Mapping Agency (NIMA). This innovative partnership with the U.S. Army and NIMA resulted in high-resolution digital elevation mapping of large cities for homeland security preparedness in exchange for NOAA's access to sophisticated

Allen Shimada,
National Marine
Fisheries Service

Department of Defense LIDAR systems for research and development of remote-sensing standards.

NOAA Platforms and Charters Advance Data Collection

NMAO employs a mix of NOAA platforms and charters to fulfill NOAA's data collection needs. The data support such varied missions as climate change research, nautical charting, flood forecasting, fisheries management, and ocean exploration. During FY 2003, NOAA aircraft logged more than 2,900 flight hours, and NOAA ships recorded 2,935 operating days in support of NOAA programs. Thirty-one percent of NOAA's total aircraft use and 61 percent of NOAA's ship time (not including contracts for hydrographic survey data) were met through outsourcing.

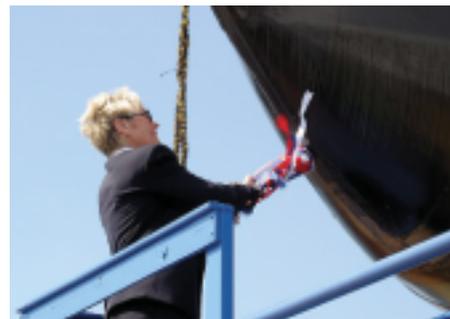
Ship Construction Program Records Major Milestones

NOAA's fleet modernization passed a major milestone in 2003, with the christening and launching of the *OSCAR DYSON*, the first of four planned new fishery survey vessels (FSVs). The *DYSON* is a state-of-the-art, acoustically quiet vessel that will be home ported in Kodiak, Alaska, beginning in late

2004. The ship is named after the pioneer of Alaska's groundfish industry and will focus much of its research on Alaskan pollock, one of the Nation's most profitable commercial fisheries. Construction on NOAA's second FSV has begun, with an expected delivery date of 2006. The second FSV will replace the *ALBATROSS IV*, which is home ported in Woods Hole, Massachusetts, and is almost 40 years old.

NMAO Acquires Former Navy Vessels

NMAO made important strides in modernizing the NOAA fleet in FY 2003. Four former Navy vessels were acquired to replace four aging NOAA ships. The four newer vessels have a combined average age of 14 years, compared to 38.5 years for the older vessels. The *McARTHUR* was replaced by the former T-AGOS ship *INDOMITABLE*, and was recommissioned *McARTHUR II* in May 2003. That same month, the *WHITING* was decommissioned and replaced by the Navy T-AGOS ship *LITTLEHALES*, which was later recommissioned *THOMAS JEFFERSON* after the father of the Nation's nautical charting program. In January 2003, the Navy T-AGOS ship *ADVENTUROUS* was recommissioned *OSCAR ELTON SETTE* at its home



NOAA's fleet modernization passed a major milestone in 2003, with the christening and launching of the OSCAR DYSON, the first of four planned new fishery survey vessels. Shown here christening the ship is Mrs. Peggy Dyson-Malson, sponsor of the DYSON.

port in Honolulu. The *FERREL* was replaced by a former Navy Yard Torpedo Test craft renamed *NANCY FOSTER*, after the late Assistant Administrator of the National Ocean Service.

NOAA Acquires Third Twin Otter Aircraft

NMAO acquired a third DHC-6 Twin Otter aircraft to support its Ecosystem Management, Climate, and Commerce and Transportation mission goals. The aircraft will be

NOAA Corps officer Ensign Middlemiss operates the NOAA ship NANCY FOSTER, which entered service in 2003. The former Navy Yard Torpedo Test craft was renamed NANCY FOSTER, after the late Assistant Administrator of the National Ocean Service.





Data collected by NOAA's heavy aircraft during Hurricane Isabel had a significant effect on the success of the National Hurricane Center's predictions of the storm's track and intensity. Shown here flying in tandem are NOAA's Gulfstream G-IV Jet and Orion P-3.

based in Tampa, Florida, at NMAO's Aircraft Operations Center.

Heavy Aircraft Collect Critical Data on Hurricane Isabel

Data collected by NOAA's three heavy aircraft during Hurricane Isabel had a significant effect on the success of the National Hurricane Center's predictions of the storm's track and intensity. The G-IV, which flew in Isabel's steering currents, helped reduce errors in the five-day forecast model generated at the NOAA National Centers for Environmental Prediction in Suitland, Maryland. Besides helping forecasters at the National Hurricane Center determine when the hurricane would begin a gradual turn to the north-

west, this information depicted clues in the surrounding environment that would weaken Isabel as it made the turn. Being able to accurately target the landfall region and avoid unnecessary evacuations has a tremendous economic impact, since evacuating a coastal area can cost up to a million dollars a mile, depending on the local population and industrial infrastructure.

Education/Outreach Program Manager Position Created

NMAO created a new Program Manager position this year to enhance its NOAA Teacher at Sea and education/outreach activities. The NOAA Teacher at Sea program offers teachers opportunities to sail on NOAA ships and other research vessels to gain hands-on research experience. The Program Manager is developing a Program Plan to expand the Teacher at Sea

program through partnerships and the introduction of aircraft flight opportunities. In addition, the Program Manager is enhancing existing outreach efforts using NOAA ships and aircraft.

"Name a NOAA Ship" Contest Launched

In cooperation with NOAA's Office of Education and Sustainable Development, NMAO launched NOAA's first "Name a NOAA Ship" contest, in which students in New England have been invited to name the second fishery survey vessel under construction. The ship will be home ported in Woods Hole, Massachusetts, when it becomes operational in 2006. The purpose of the contest is to provide an educational opportunity for students to learn about local living marine and coastal resources as they perform research to support their selection of a ship name. The contest ended January 31, 2004, and the winning team will be announced in May.

Multibeam Sonar Workshops Address Technology Gap

NMAO and NOAA's Office of Coast Survey co-sponsored two workshops on multibeam sonar in February and October 2003. This ocean mapping technology measures water depth along a large swath of seabed, enabling 100 percent coverage of the seafloor. Many NOAA programs can benefit

NOAA's Commissioned Corps operates, manages, and maintains NOAA ships and aircraft, and brings its operational expertise to land-based NOAA programs through rotational assignments. Shown here are NOAA Corps officers, the ship's crew, and others in front of the THOMAS JEFFERSON, which was transferred to NOAA from the U.S. Navy and commissioned in 2003.



from this technology. During the workshops, representatives from NOAA Line Offices, NMAO, and the University of New Hampshire's Center for Coastal Ocean Mapping/ Joint Hydrographic Center discussed NOAA's future multibeam sonar needs for the NOAA fleet.

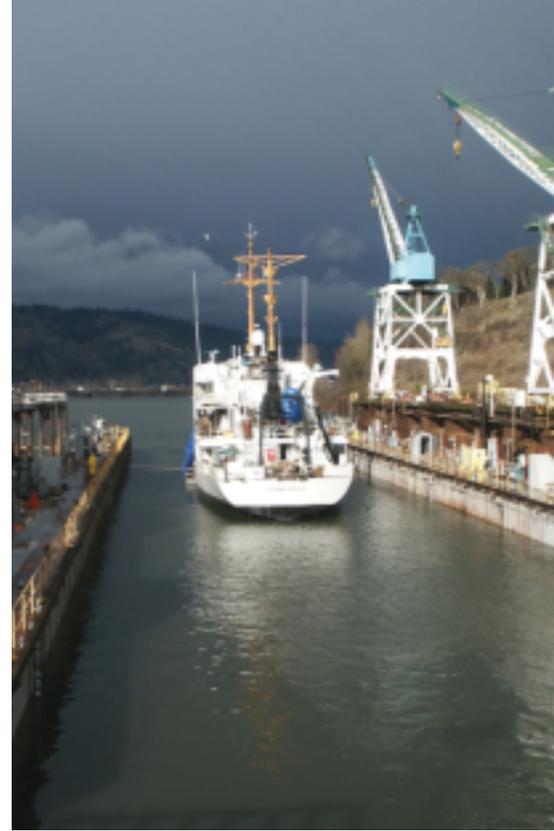
New Safety Initiatives Announced

NMAO reinforced its safety culture in FY 2003 by launching a number of initiatives, including a new safety newsletter, implementation of the NOAA Administrative Order on Small Boats, and training classes to bring NOAA's seagoing employees into voluntary compliance with International Standards of Training, Certification, and Watchkeeping. NMAO also hosted an aircraft safety and policy development workshop on the use of non-NOAA aircraft. NOAA char-

ters, rents, leases, or otherwise acquires in excess of 1,500 flight hours annually on non-NOAA aircraft.

FUTURE OUTLOOK

As emerging mission requirements, such as homeland security, ocean exploration, and habitat mapping, place additional demand for ship and aircraft data acquisition in the future, NMAO will face the challenges of providing capable platforms, up-to-date technology, and highly skilled personnel. NMAO will continue to seek a proper mix of in-house and contracted work to meet these needs, while working to improve the efficiency of existing NOAA platforms, modernize or replace aging platforms, and recruit and retain a technically competent workforce.



In May 2003, the NOAA ship McARTHUR was replaced by the Navy T-AGOS ship INDOMITABLE, and was recommissioned McARTHUR II.

PRODUCTS AND SERVICES

Outsourcing Support

NMAO provides guidance and staff support to NOAA programs for obtaining chartered platforms. NMAO recommends chartering options to NOAA programs and ensures the platforms are safe and outfitted to meet program requirements.

Data Collection

NOAA ships and aircraft have sophisticated data collection capabilities, such as Doppler radar on the *RONALD H. BROWN* and WP-3D Orion hurricane research aircraft. Each ship is equipped with an NMAO-developed Scientific Computer System, which integrates data from shipboard and deploys sensors into one central system, enabling scientists to make research decisions based on real-time data access and visualization. The Fisheries Scientific Computer System addresses the specific needs of fisheries data collection. Additionally, NMAO developed the Internet at Sea program, which enables ships at sea to connect to the Internet and transmit

research data, real-time images of ship personnel and scientists at work, and other valuable products and services.

NOAA Diving Program

The NOAA Diving Program oversees and manages NOAA diving personnel, equipment, and activities to ensure that all diving operations are performed safely and efficiently. The program provides beginner and specialty dive training to NOAA employees and outside agencies, including the Federal Bureau of Investigation, the U.S. Environmental Protection Agency, the U.S. Secret Service, the U.S. Fish and Wildlife Service, and local law enforcement.

NOAA Corps

NOAA's Commissioned Corps operates, manages, and maintains NOAA ships and aircraft, and brings operational expertise to land-based NOAA programs through rotational assignments. Officers work under a military-style personnel system, giving them the flexibility to move rapidly into disaster-response situations, such as locating the downed aircraft of John F. Kennedy, Jr., and TWA

Flight 800; and flying remote-sensing missions over the collapsed World Trade Center.

NOAA Teacher at Sea Program

Now in its 13th year, the NOAA Teacher at Sea Program has enabled more than 380 educators to gain hands-on NOAA research experience at sea. Approximately 30 educators each year, ranging from kindergarten through college, spend time aboard NOAA hydrographic, oceanographic, and fishery survey and research vessels. Teachers become a part of the NOAA research team and crew by living and working side-by-side with the scientists. This unique opportunity provides the teachers with a new understanding of NOAA science and shipboard life that enriches their curricula and lives. While onboard, many teachers write daily logs, take photos, and interview scientists and crew. Some teachers also take advantage of using the Internet to communicate their experiences to students back home through Internet at Sea capabilities.

Office of International Affairs

Building Global Alliances



William J. Brennan, Ph.D.
Deputy Assistant Secretary for
International Affairs

International affairs is one of NOAA's core capabilities, essential to the support of NOAA's overarching mission goals. For this reason, International Cooperation and Collaboration was designated in NOAA's Strategic Plan as one of the agency's six crosscutting priorities for the 21st century.

To advance NOAA's mission, the Office of International Affairs (OIA) provides policy advice and support with respect to negotiations, partnerships, and other NOAA international interests and activities. Over the past year, Vice Admiral Lautenbacher has met with leaders of

ocean, climate, and space organizations from around the world to promote international cooperation and support for expanding the present global observing system. NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather- and climate-related events and providing environmental stewardship of our Nation's coastal and marine resources.

To enhance NOAA's international capabilities, an International Affairs Council has been established that is NOAA's focal point for international policy, activities, and important crosscutting topical areas. Through this Council, NOAA's international activities are managed using matrix management principles to ensure coordination, cooperation, and communication on international activities, and to enhance the visibility of NOAA's international activities and accomplishments.

ACCOMPLISHMENTS

U.S. Convenes First Earth Observation Summit

The first Earth Observation Summit was convened in July 2003 at the U.S. Department of State, to establish a working group that will prepare a 10-year plan for implementing an international, comprehensive, integrated, and sustained global Earth observation system. Ministerial-level representatives from the G-8 and other countries with an interest and significant role in observing systems attended the summit, as well as representatives from international organizations, such as the World Bank and the World Meteorological Organization (WMO). The White House appointed Vice Admiral Lautenbacher to be the U.S. representative to the intergovernmental working group.

The summit raised the visibility of the need for a comprehensive, integrated, and sustained system that will monitor global climate and environmental systems, and provide international decision makers the enhanced climate and Earth system data they need. Summit participants also ensured a new level of cooperation toward investing in an Earth



observation system by adopting a declaration that put forth the principles for developing a global system for taking the pulse of planet Earth.

NWS and WMO Conduct Hydrologic Forecasting Course

The National Weather Service (NWS) and the WMO conducted a hydrologic forecasting course and workshop at the training center in Kansas City, Missouri. NWS sponsored the travel and tuition expenses of the 17 participants selected from national meteorological services from around the world.

NWS Hosts International Day at AMS Annual Conference

NWS hosted an international day at the 83rd Annual Meeting of the American Meteorological Society. The event focused on “Emerging Issues & New Technologies Impacting National Meteorological and Hydrologic Services.” OIA provided financial assistance to the meteorological and hydrologic service representatives from developing countries.

NOAA Participates in Bilateral Negotiations

The U.S. delegation led by Deputy Under Secretary Jack Kelly participated in official bilateral negotiations hosted by China in Beijing, Xian, and Guilin, and by Korea in Seoul.

NOAA Leads International Delegations Central Asia

As part of an NWS project implementing a snowmelt and river

The first Earth Observation Summit was convened in July 2003 at the U.S. Department of State, to establish a working group that will prepare a 10-year plan for implementing an international, comprehensive, integrated, and sustained global Earth observation system. The White House appointed Vice Admiral Lautenbacher to be the U.S. representative to the intergovernmental working group.

forecasting system in Central Asia, OIA led a study tour for a delegation of specialists in hydrology from Central Asia. The project and tour were funded by the U.S. Agency for International Development.

Mexico

In a four-week hands-on session, NWS and the National Environmental Satellite, Data and Information Service (NESDIS) trained a representative from the Mexican meteorological service on how to estimate precipitation based on satellite data. This training was funded by the NWS Mexico PROMMA project.



Vice Admiral Conrad C. Lautenbacher, Jr., and William J. Brennan attended the Earth Observation Summit.

Peoples Republic of China

During FY 2003, NOAA hosted several delegations from the People's Republic of China:

- As part of the Cooperative Agreement in the Field of Atmospheric Science and Technology between the Chinese Meteorological Administration (CMA) and NOAA, a 14-member delegation from CMA traveled to various NWS and NOAA Research facilities around the country.
- Under the China-U.S. bilateral agreement, NOAA led a 10-day study tour of NOAA facilities around the country to increase understanding of NOAA's operational structure. Visits were made to NESDIS, the National Centers

for Environmental Protection, NWS headquarters, the Tropical Prediction Center/National Hurricane Center, and NOAA's Boulder facilities, including the National Center for Atmospheric Research, the Forecast Systems Laboratory, and the Space Environment Center.

- NWS hosted a delegation of 18 engineers, researchers, and other representatives from China's Zhejiang Province. The group, which visited NWS headquarters and the NWS Forecast Office in Los Angeles, was particularly interested in the Advanced Hydrologic Prediction Service, the Hydrologic Information Center, and the Hydrology Laboratory.
- A delegation of 19 government officials and executives from the earthquake bureaus of more than six provinces in China visited NESDIS. They were interested in NESDIS' hazard support activi-

ties for earthquakes, focusing on observing, analyzing, assessing, responding to, and mitigating earthquake hazards.

Republic of Korea

NWS hosted a delegation of three South Koreans from the Korean Meteorological Agency and three representatives from the Enterprise Electronics Corporation. The delegation, which was interested in NWS radar technology, examined the NEXRAD radar technology in Sterling, Virginia, and Birmingham, Alabama.

Republic of Vietnam

NWS hosted two visiting scientists from the Vietnamese hydrometeorological service for a four-month training course on NWS Forecast System software and operations at the Southeast River Forecast Center in Peachtree City, Georgia. This study tour was conducted through the Vietnam-U.S. bilateral agreement.

Also, under the Vietnam-U.S. bilateral agreement, NWS conducted a two-week study tour for a Vietnamese delegation, visiting NWS facilities in Washington, D.C.; Kansas City, Missouri; Norman, Oklahoma; and Denver, Colorado. The tour focused on overviews of NOAA and NWS and new technologies in weather forecasting.

United Kingdom and Canada

Peter Ewins of the United Kingdom Meteorological Office and Pierre Dubreuil of the Canadian Meteorological Office were the guest speakers at the NWS Corporate Board Meeting.

World Meteorological Organization

NWS hosted the incoming WMO's Secretary General Michel Jarraud of France on a visit to NWS headquarters, the National Center for

In a ceremony at the 53rd Council of EUMETSAT, Vice Admiral Lautenbacher and Dr. Tillmann Mohr, EUMETSAT's Director General, signed the Joint Transition Activities Regarding the Polar-orbiting Operational Environment Satellite Systems Agreement.



Environmental Protection, the U.S. Geological Survey, and the NWS Forecast Office in Sterling, Virginia.

NOAA and EUMETSAT Fortify Ongoing Partnership

NOAA and the Europe Meteorological Satellite Organization (EUMETSAT) signed the Joint Transition Activities Regarding Polar-orbiting Operational Environment Satellite Systems Agreement at EUMETSAT Headquarters in Darmstadt, Germany. The signing, which high-

lighted the continuation of a strong relationship between two of the world's leading Earth observation organizations at the heart of a combined European–U.S. collaboration, will ensure the ongoing delivery of vital environmental data well into the second decade of the 21st century.

Vice Admiral Lautenbacher and Dr. Tillmann Mohr, EUMETSAT's Director General, also signed an Agreement for Access to Data from the Meteosat Second-Generation (MSG) Satellites. This

agreement is a follow-up to the 1995 agreement between EUMETSAT and NOAA, which granted NOAA and its official U.S. affiliates access to Meteosat data. The current MSG agreement will allow NOAA and its U.S. affiliates access to the new products available from the MSG satellite that was launched in August 2002. The NOAA–EUMETSAT partnership is a model for international cooperation and coordination in building an integrated and sustained global Earth observing system.



FINANCIAL AND PROGRAM PERFORMANCE



Jim Wark, Airphoto

Budget Overview



*Maureen E. Wylie
Chief Financial Officer*

NOAA's total budget appropriation was \$3.3 billion for FY 2003. These funds were directed toward fulfilling NOAA's statutory and legal obligations, as well as Congressional responsibilities. They provided for equipment, direct labor, and other expenses that support NOAA's mission. Over the last 10 years, NOAA's appropriated funding level has grown by 90 percent (Figure 1).

NOAA's budget is composed of several appropriations and special fund accounts. NOAA's two main appropriations are Operations, Research and Facilities (ORF) and Procurement, Acquisition and Construction (PAC). The ORF account funds core NOAA operations, such as advanced, short-term forecast and warning services; management of fisheries and protected species; and responsibilities for sustaining the health of coastal ecosystems. NOAA's PAC account was created in FY 1999 in response to requirements of the Federal Acquisition Streamlining Act of 1996. This account captures funding for multi-year capital projects and seeks advanced appropriations for projects that are in the acquisition stage. NOAA's other accounts, aggregated in the Non-ORF Total Budget Authority, include the Damage Assessment and Restoration Revolving Fund, the Coastal Zone Management Fund, and various fisheries funds.

FIGURE 1
NOAA Budget Growth (in billions)

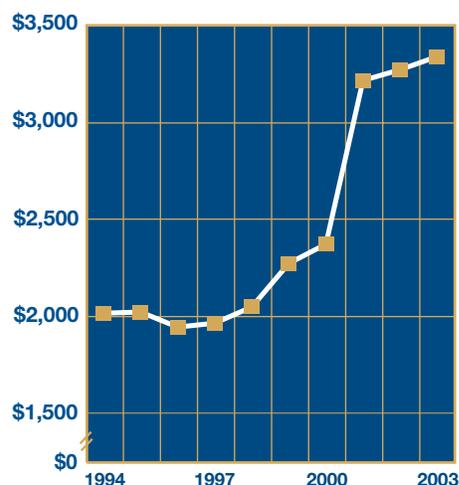


TABLE 1
Entity and Non-entity Assets (in thousands)

	FY 2003	FY 2002
Intragovernmental Assets	\$2,801,877	\$2,535,155
Fund Balance with Treasury	2,716,116	2,473,209
Accounts Receivable, Net	57,504	34,826
Investments in Treasury Securities, Net	—	—
Advances and Prepayments	28,257	27,120
Non-intragovernmental Assets	\$4,182,445	\$4,130,610
Cash and Other Monetary Assets	2,395	1,105
Accounts Receivable, Net	36,252	38,809
Loans Receivable and Related		
Foreclosed Property, Net	190,321	185,371
Inventory, Materials, and Supplies	75,246	72,232
General Property, Plant, and		
Equipment, Net	3,867,375	3,822,542
Advances and Prepayments	4,882	3,291
Other	5,974	7,260
TOTAL ASSETS	\$6,984,322	\$6,665,765

FIGURE 2
Fund Balance with Treasury (in millions)

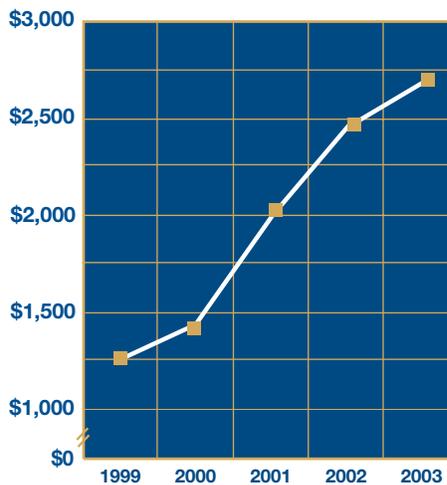
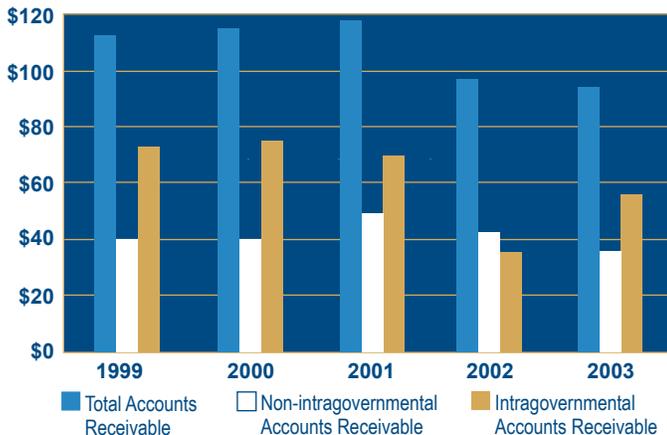


FIGURE 3
Accounts Receivable, Net (in millions)



ASSETS

The FY 2003 Consolidated Balance Sheet reflects total assets of more than \$6.9 billion (Table 1) and primarily consists of the following:

Fund Balance with Treasury

The Fund Balance with Treasury of \$2.7 billion primarily consists of appropriated funds to pay current liabilities and finance authorized purchase commitments (Figure 2).

Accounts Receivable, Net

Accounts Receivable, Net of \$93.7 million consists of intragovernmental (Federal agency) accounts receivable of \$57.5 million and non-intragovernmental accounts receivable of \$36.2 million (Figure 3). Outstanding billed and unbilled reimbursable services provided to other Federal agencies comprise the majority of NOAA's accounts receivable. Accounts receivable are established to receive payments for direct and indirect costs of services provided to another Federal agency or to a non-intragovernmental entity.

Loans Receivable and Related Foreclosed Property, Net

Loans Receivable and Related Foreclosed Property, Net of \$190.3 million consists of monies disbursed by the Fisheries Finance Program to private lenders for guaranteed loans in default, and monies disbursed as direct loans to finance various National Marine Fisheries Service loans totaling \$12.9 million and \$177.4 million, respectively (Figure 4).

FIGURE 4
Loans Receivable and Related Foreclosed Property, Net (in millions)



Inventory and Related Property

Inventory and Related Property of \$75.2 million consists solely of operating materials and supplies, which in turn consist of tangible personal property to be consumed in normal operations (Figure 5). The majority of operating materials and supplies are located at the National Logistics Support Center and are used mainly by the National Weather Service. NOAA's inventory, comprised primarily of maps and charts, was transferred to the Federal Aviation Administration during FY 2001.

General Property, Plant, and Equipment

General Property, Plant, and Equipment is stated at net book value of \$3.8 billion (Figure 6). It consists mainly of construction work in progress, satellites and weather systems, and structures and facilities with net book values of \$2.2 billion, \$1.3 billion, and \$0.3 billion, respectively. Satellite and launch services are generally procured under long-term, multi-satellite contracts, which provide for payments by NOAA over the contract periods.

LIABILITIES

The FY 2003 Consolidated Balance Sheet reflects NOAA liabilities totaling \$1.1 billion (Table 2). The following significant liabilities represent monies owed for goods and services that have been received but for which payment has not yet been made.

FIGURE 5
Inventory and Related Property (in millions)

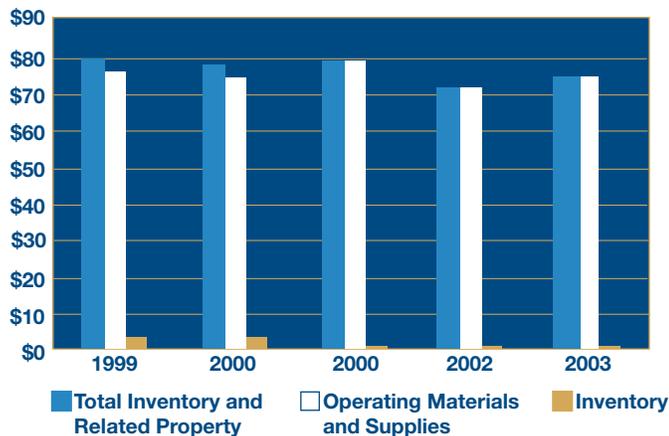


FIGURE 6
General Property, Plant, and Equipment (in millions)

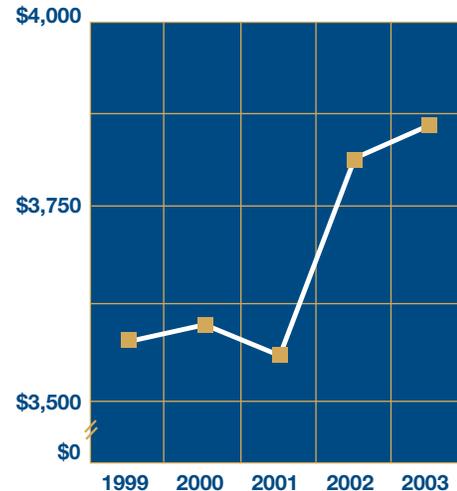


TABLE 2
Entity and Non-entity Liabilities (in thousands)

	FY 2003	FY 2002
Intragovernmental Liabilities	\$323,605	\$322,576
Accounts Payable	62,696	58,940
Debt to Treasury	182,501	183,313
Resources Payable to Treasury	12,251	14,725
Unearned Revenue	47,442	45,739
Other	18,715	19,859
Non-intragovernmental Liabilities	\$794,653	\$859,076
Accounts Payable	84,936	77,671
Accrued Payroll and Annual Leave	107,137	96,667
Actuarial FECA Liability	53,631	50,373
NOAA Corps Pension	326,600	316,200
NOAA Corps Retirement Health Benefits	42,077	136,577
Accrued Grants	38,678	33,213
Environmental and Disposal Liabilities	49,161	81,652
Capital Leases	15,880	23,810
Unearned Revenue	31,745	35,227
Other Liabilities	44,808	7,686
TOTAL LIABILITIES	\$1,118,258	\$1,181,652
Net Position	\$5,866,064	\$5,484,113
Unexpended Appropriations	2,424,514	2,044,578
Cumulative Results of Operations	3,441,550	3,439,535
TOTAL LIABILITIES & NET POSITION	\$6,984,322	\$6,665,765

FIGURE 7
Accounts Payable, Net (in millions)

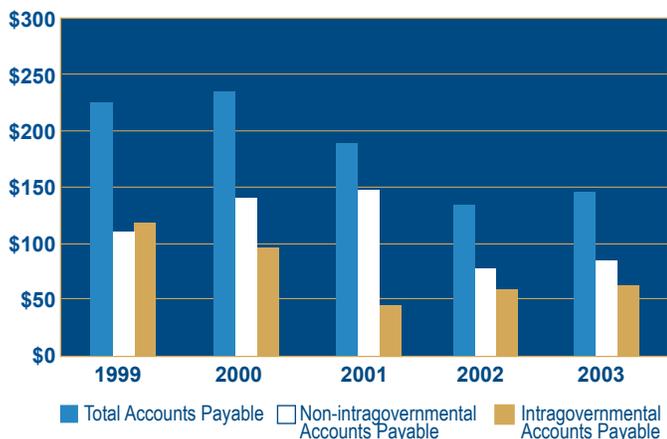


FIGURE 8
Unearned Revenue (in millions)

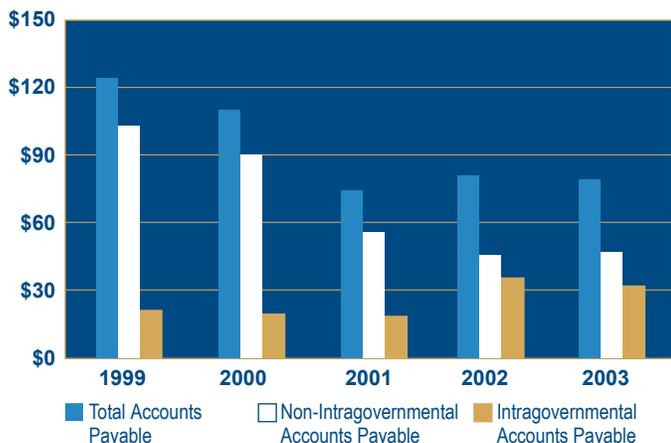
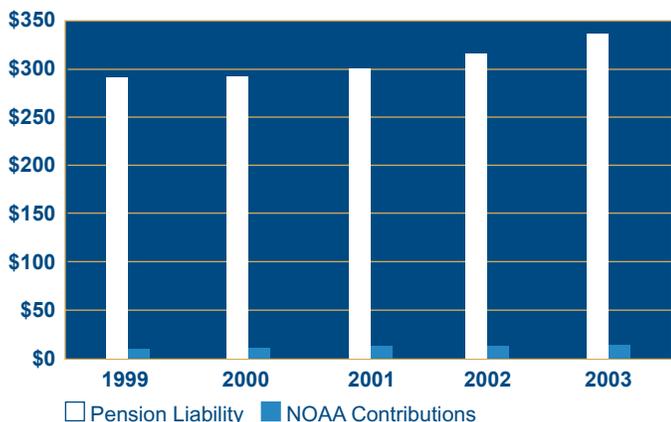


FIGURE 9
NOAA Corps Pension Liabilities (in millions)



Accounts Payable

Accounts Payable of \$147.6 million consists of \$62.7 million of intragovernmental accounts payable and \$84.9 million of non-intragovernmental accounts payable (Figure 7).

Unearned Revenue

Unearned Revenue of \$79.1 million consists of intragovernmental and non-intragovernmental unearned revenue of \$47.4 million and \$31.7 million, respectively (Figure 8). The majority of NOAA's unearned revenue consists of amounts advanced to NOAA by other Federal entities (such as the Federal Aviation Administration and the Department of Defense), and non-intragovernmental entities, for goods and services to be furnished. Unearned revenue decreased by 36 percent from FY 1999 to FY 2003, due to a greater prevalence of cost reimbursable agreements relative to advance reimbursable agreements.

Future Funding Requirements

Future Funding Requirements of \$615.1 million represent liabilities not funded by budgetary resources, including a NOAA Corps pension liability of \$326.6 million, NOAA Corps retirement health benefits of \$42 million, accrued leave balances of \$83.5 million, Federal Employee Compensation Act actuarial and accrued liabilities of \$64.1 million, environmental cleanup costs of \$38.9 million, capital lease liabilities of \$15.8 million, contingent liabilities of \$37 million, and other liabilities of \$7.2 million.

Liabilities not covered by budgetary resources result from the receipt of goods or services in the current or prior periods, or from the occurrence of eligible events in the current or prior periods, for which appropriations, revenues, or other financing sources of funds necessary to pay the liabilities have not been made available through Congressional appropriations or current NOAA earnings. As of September 30, 2003, the total amount of liabilities classified as unfunded exceeded the \$355.1 million in available unobligated appropriations by \$260 million. These liabilities are presented as unfunded, rather than allocating portions of each of them to appropriated funds.

NOAA Corps Pension Liabilities

NOAA Corps Pension Liabilities of \$326.6 million, as mentioned above, represent non-intragovernmental liabilities not covered by budgetary resources relating to the NOAA Corps Retirement System (Figure 9). The NOAA Corps Retirement

System is a noncontributory, defined-benefit plan covering all active-duty officers, retiree annuitants, and surviving families totaling 612 as of September 30, 2003. During FY 2003, NOAA contributed \$14.3 million to the NOAA Corps Retirement System.

FLUCTUATION ANALYSIS

The following balance sheet fluctuations were noted between FY 2002 and FY 2003 financial statements:

Total Assets

NOAA's total assets increased by approximately \$318.5 million from September 30, 2002, to September 30, 2003. The majority of the increase in total assets is attributable to increases in Fund Balance with Treasury, Intragovernmental Accounts Receivable, and General Property, Plant, and Equipment of \$243 million, \$22.6 million, and \$44.8 million, respectively.

Total Liabilities

Overall, NOAA's total liabilities remained constant between September 30, 2002, and September 30, 2003.

EQUITY

NOAA's Unexpended Appropriations increased by approximately \$380 million from FY 2002 to FY 2003. The \$2.4 billion of unexpended appropriations consists of \$2.1 billion of outstanding undelivered orders and \$0.3 billion of unobligated funds.

Appropriated Capital Used

The FY 2003 Statement of Changes in Net Position reports the beginning net position, the items that caused net position to change during the year ended, and the ending net position. The majority of the activity in this statement involves two components of net position—net cost of operations and appropriations used (revenues), totaling \$3.3 billion and \$3.1 billion, respectively.

Appropriated capital used represents revenue or a financing source to NOAA made available through Congressional appropriations. Appropriations are recognized as financing sources at the time the related expenses are incurred and the assets are consumed in operations (Figure 10).

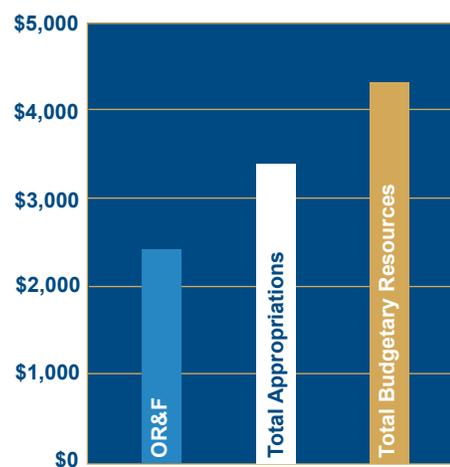
Budgetary Resources

The FY 2003 Statement of Budgetary Resources details how budgetary resources were made available, as well as their status at the end of the period. NOAA received approximately 78 percent, or \$3.4 billion, of its budgetary resources of \$4.3 billion through appropriations (Figure 11). Of the \$3.4 billion, NOAA's ORF appropriation received \$2.4 billion. Other major sources of budgetary resources include unobligated balances carried over from FY 2002 and spending authority from offsetting collections, totaling \$504.6 million and \$251.9 million, respectively. Of the total budgetary resources of \$4.3 billion, \$3.9 billion was obligated during FY 2003.

FIGURE 10
Appropriated Capital Used (in millions)



FIGURE 11
Budgetary Resources (in millions)



U.S. Department of Commerce
National Oceanic & Atmospheric Administration
14th & Constitution Avenue, N.W.
Washington, D.C. 20230
www.noaa.gov

National Ocean Service
www.nos.noaa.gov

National Marine Fisheries Service
www.nmfs.noaa.gov

NOAA Research
www.oar.noaa.gov

National Weather Service
www.nws.noaa.gov

National Environmental Satellite, Data and Information Service
www.nesdis.noaa.gov

NOAA Marine and Aviation Operations
www.oma.noaa.gov

Office of Finance and Administration
www.ofa.noaa.gov

