



NOAA Business Report 2007

200 Years of Science,
Service, and Stewardship

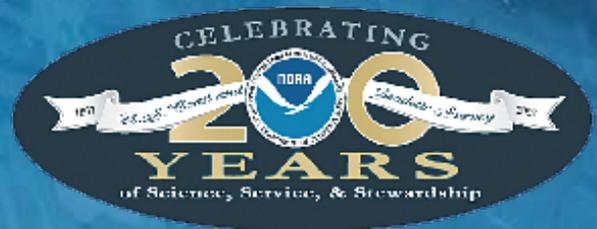


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*Conrad C. Lautenbacher Jr.
Vice Admiral U.S. Navy (Ret.)
Under Secretary of Commerce for
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NOAA: Protecting Lives and Livelihoods

The National Oceanic and Atmospheric Administration (NOAA) is a key component of the U.S. Department of Commerce. Every day, NOAA's work touches the lives of each person in the United States, and the lives of many around the world. From weather forecasts to fisheries management, safe navigation to coastal services, and climate research to ocean exploration, NOAA's products and services contribute to the foundation of a healthy economy—indeed, they impact approximately one-third of the Nation's gross domestic product.

In 2007, NOAA celebrated a milestone: 200 years of science, service, and stewardship to the Nation. NOAA's rich legacy can be traced directly to the establishment of the Survey of the Coast in 1807 by Thomas Jefferson, a watershed moment in our Nation's scientific history. From President Jefferson's vision, to the formation of Weather Bureau and the Commission of Fish and Fisheries in the 1870s, to the passing of major environmental legislation in the 1970s, much of America's scientific heritage is rooted in NOAA.

In addition to producing world-class science, NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate, the delivery of information services for transportation, and the provision of environmental stewardship of our nation's coastal and marine resources. NOAA is also working with its federal partners and more than 70 countries and the European Commission to develop the Global Earth Observation System of Systems (GEOSS), an integrated global monitoring network that will enhance environmental knowledge and public safety across our planet. Finally, NOAA's Web site at www.noaa.gov provides a wealth of knowledge to schools and the public, including those involved in industry and scientific enterprises.

In FY 2007, NOAA continued to apply its scientific and technological expertise to a wide range of issues. Major FY 2007 accomplishments include the following:

In June 2007, the state-of-the-art NOAA Satellite Operations Facility (NSOF) was officially opened in Suitland, MD. NSOF is the new home for NOAA's environmental satellite operations, providing data critical for weather and climate prediction. The 208,271 square foot facility supports more than \$50 million of high technology equipment, including 16 antennas monitoring the operations of 16 on-orbit satellites.

On January 12, 2007, President Bush signed the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act into law. The Act reinforces NOAA's mandate to end overfishing, encourages the use of market-based management programs, calls for improved science, requires NOAA to produce annual catch limits for all regulated species, supports our enforcement efforts, and aids our efforts to curtail illegal, unreported, and unregulated fishing on the high seas.

In May 2007, the United States hosted the 59th Annual International Whaling Commission meeting in Anchorage, Alaska. At the meeting, the United States successfully negotiated 5-year bowhead and gray whale quotas for the Alaska natives.

On October 12, 2007, the Intergovernmental Panel on Climate Change (IPCC) and former Vice President Al Gore were awarded the

Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change." Several NOAA scientists and staff members contributed to this effort, serving as authors, editors, and contributors for IPCC reports; this included Dr. Susan Solomon of NOAA's Earth System Research Laboratory, who served as co-chair of IPCC Working Group 1. The international recognition highlights the importance of NOAA's oceanic and atmospheric research to the global community.

In 2007, NOAA's Great Lakes Environmental Research Laboratory (GLERL) converted a fleet of research vessels from petroleum-based to 100 percent bio-based fuel and lubricants, earning a White House Closing-the-Circle Award in the green purchasing category. GLERL operates research vessels throughout



Jeremy Potter sipping water from a sea ice melt pond with the U.S. Coast Guard icebreaker Healy in the background, Summer 2005. (Photo Credit: Fred Gorell)

the Great Lakes region as scientific platforms for ecosystems research. The conversion was a result of a call for “greening” of government agencies through waste reduction, recycling, and the use of environmentally friendly and sustainable products.

In October 2007, NOAA’s National Weather Service improved warning accuracy and quality by issuing “storm-based warnings” for tornadoes, severe thunderstorms, flash floods, and marine hazards. These new warnings pinpoint the areas where severe weather threats are highest, allowing emergency managers and other disaster response agents to focus their resources where most needed. Storm-based warnings are expected to save an estimated \$100 million annually in response expenses.

Throughout the year, NOAA’s National Climatic Data Center continued its work on the National Integrated Drought Information System (NIDIS). NIDIS provides decision support tools necessary to prepare for and mitigate the effects of drought. Additionally, in November

2007, the “U.S. Drought Portal” website was unveiled. The new site allows resource managers and the public to monitor domestic drought conditions, view forecasts, and learn about how drought impacts their communities.

In January 2007, NOAA’s National Weather Service launched a new 3-month temperature outlook product for more than 1,000 locations across the country. This ground-breaking service provides reliable, advanced forecast information, enabling the agricultural industry, local government officials, and the public to plan, manage risk, and make important economic decisions regarding temperature events.

NOAA’s Pacific Marine Environmental Laboratory, in collaboration with the University of Washington in Seattle, Fisheries and Oceans Canada, and the Institute of Ocean Sciences in British Columbia, launched the first buoy specifically designed to monitor ocean acidification. This new buoy, part of a National Science Foundation project, measures the air-



Surveyor working in Antarctica at the Gerlach Strait, 1994. Photo Credit: Philip Hall

sea exchange of carbon dioxide, oxygen, and nitrogen gas, and the pH—a measure of ocean acidity—of the surface waters. The buoy is anchored in the Gulf of Alaska in water nearly 5,000 meters deep and transmits data via satellite. Rising acidity in the ocean could have a detrimental effect on ocean organisms, with resulting impacts on ocean life and the food chain.

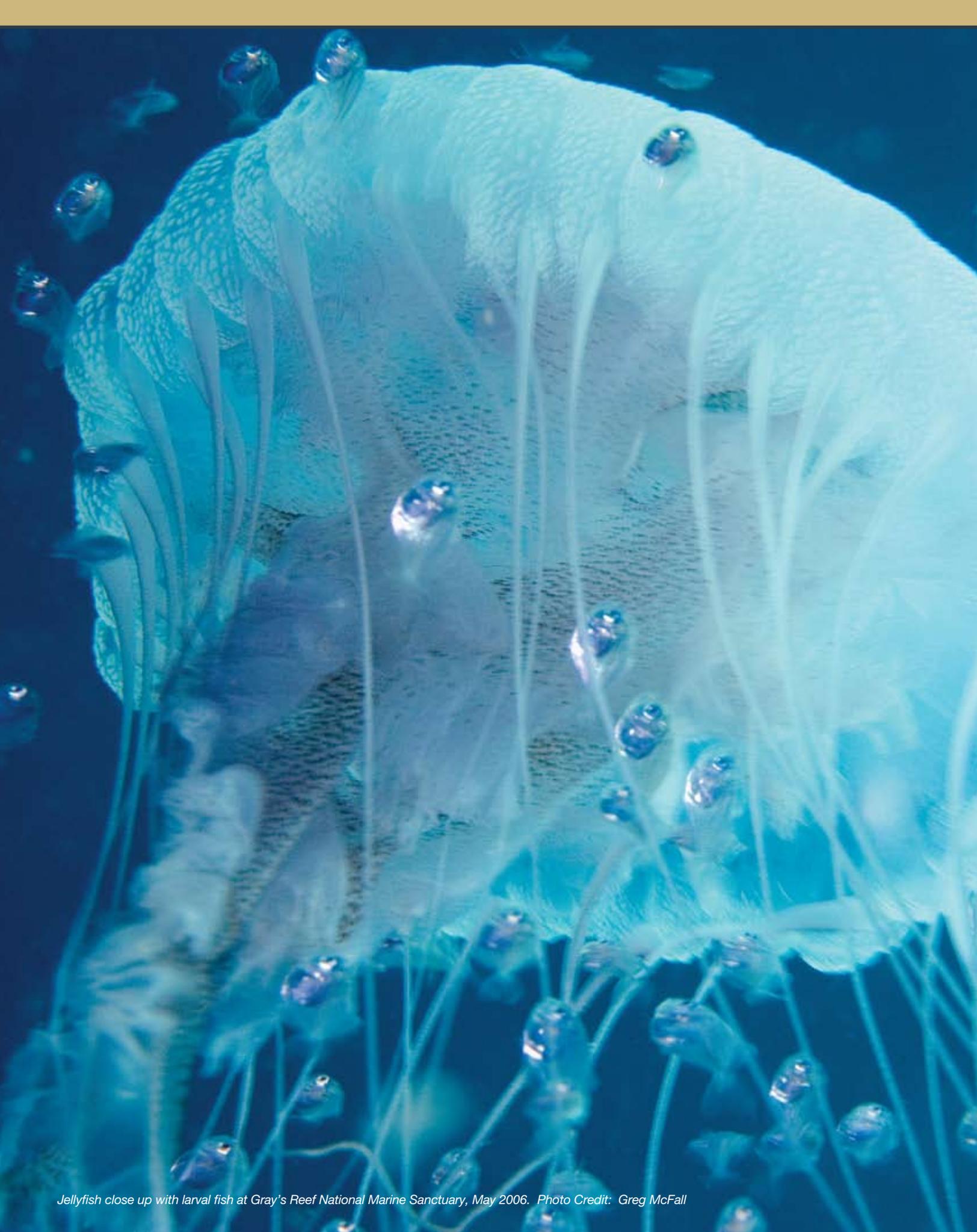
In May 2007, an economics benefits study was released on the Houston Galveston Physical Oceanographic Real-Time System (PORTS®). The study showed that the NOAA program has helped achieve a 50 percent reduction in groundings for ships and a 60 percent reduction for tugs/tows. As highlighted in a speech by Department of Commerce Secretary Carlos Gutierrez, “NOAA’s PORTS® program is estimating to bring \$14 to \$15 million in direct benefits to the Houston-Galveston economy.” Currently, there are 14 operational PORTS® systems throughout the Nation.

In 2007, NOAA’s Integrated Ocean Observing System (IOOS) program made significant progress towards achieving its long-term goals of improving the Nation’s understanding of climate change, safety and efficiency of marine operations, mitigation of natural hazards, and protection and restoration of marine ecosystems. This progress included establishing an IOOS program office and hiring a full time senior director to advance data integration and support regional IOOS development. The IOOS program also created baselines for data flows and conditions for four thematic focus areas (hurricane intensity, coastal inundation, harmful algal blooms, and ecosystem assessment), completed five interoperability tests on five variables (temperature, salinity, sea level, surface currents, and ocean color), and identified a data standards process.

In June, NOAA celebrated the keel laying of the NOAA ships BELL M. SHIMADA (Fisheries Survey Vessel 4) and FERDINAND R. HASSLER (small waterplane area twin hull coastal mapping vessel). In July, the NOAA ship HENRY B. BIGELOW (Fisheries Survey Vessel 2) was commissioned into the fleet before beginning operations in New England. Prior to commissioning, the U.S. Navy completed a battery of underwater acoustic tests that found BIGELOW’s acoustics exceed international standards set by the International Council for the Exploration of the Sea. In September, Phase I of the conversion of the NOAA Ship OKEANOS EXPLORER to an ocean exploration ship was completed, following successful completion of sea trials. Finally, the NOAA ship PISCES (Fisheries Survey Vessel 3) passed a significant construction milestone in December with her christening by Dr. Annette Nevin Shelby, wife of Senator Richard Shelby (R-AL), and subsequent launching.



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Jellyfish close up with larval fish at Gray's Reef National Marine Sanctuary, May 2006. Photo Credit: Greg McFall



NOAA HIGHLIGHTS



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Management Priorities

Expecting NOAA to Perform Well,
and Better Every Year

To respond to an ever-changing world, NOAA must continuously calibrate its programmatic and managerial priorities to determine where to direct finite resources. Although some issues and priorities evolve gradually and are best managed over the long term, others are properly addressed with shorter-term adjustments. In all cases, strategic planning and management of NOAA's activities work best when those who benefit from these activities and those who provide NOAA's services can contribute to the process. Only by involving stakeholders, employees, and partners can NOAA fulfill its vision and mission.

The NOAA Strategic Plan articulates NOAA's long-term corporate vision and mission, four long-term goals for realizing that mission, as well as tangible outcomes marking progress toward each goal, and strategies for employing the agency's capabilities to achieve each outcome. To foster short-term responsiveness to issues and priorities, NOAA's annual planning cycle provides an opportunity to re-evaluate progress, accommodate new developments within and outside NOAA, and adjust programmatic focus areas to ensure progress toward the strategic goals. For this year's planning cycle, NOAA again employed systematic methods for gathering and synthesizing stakeholder views on NOAA's priorities to generate high levels of collaboration with stakeholders and further corporate alignment of NOAA-wide programs on high-impact mission areas.

The current Annual Guidance Memorandum (AGM) identifies the most urgent and compelling programmatic and managerial priorities for FY 2010 to 2014. These reflect the views of NOAA's stakeholders, internal analyses of mission requirements, external trends and drivers, program capabilities, and alternative solutions to achieving NOAA's strategic goals. The following programmatic priorities are featured in the AGM for FY 2010 – 2014.

Ocean and coastal ecosystem management requires productive observing systems and interdisciplinary analyses of regionally-specific ecosystem management problems. Emphasis on marine ecosystem modeling will serve as a basis for complex decision-making for ecosystem management and help optimize the observing system. The priorities are:

- Regional, science-based approaches to ecosystem assessments and management
- Climate variability and ecosystem predictions
- Natural resource management and stewardship

Environmental data and information services are essential for public safety, resource stewardship, and long-term community planning on a national and international scale. NOAA strives to balance improvements to existing information services with the development of new capabilities in response to changing customer demands and societal needs. The priorities are:

- High-impact weather and water events
- Climate information services
- Water information services
- Physical ocean information services
- Aviation weather services
- Building hazard-resilient communities and commerce

Environmental knowledge and expertise are critical to progress from understanding a problem to devising and implementing a solution. Research and development go hand-in-hand with effective communication and education to allow optimal use of NOAA's products. The priorities are:

- Understanding the causes and consequences of climate change and improving climate predictions

- Understanding ocean ecology on multiple spatial and temporal scales
- Building environmental literacy and decision support

Observation, data management, and modeling systems are required to develop new monitoring capabilities, produce more effective management practices, and improve prediction capabilities including NOAA's own capabilities for providing environmental information and ecosystem management. The priorities are:

- Capable and reliable observations infrastructure
- Observation integration and data management
- Ocean and earth system modeling

Organizational support and management determines NOAA's ability to pursue its programmatic priorities. NOAA must develop new organizational approaches and technology-driven service delivery improvements to maximize the value of the public's investment in NOAA. The priorities are:

- Improving service delivery excellence and value to customers
- Strategic use of information technology
- Creating modern, safe, high-quality facilities
- Strategic workforce management



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

NOAA International Affairs

Building Global Alliances

International affairs is one of NOAA's core capabilities, essential to the support of the agency's overarching mission goals. NOAA Leaders serve as the U.S. representatives to the Group on Earth Observations (GEO); Intergovernmental Oceanographic Commission (IOC); World Meteorological Organization (WMO); International Hydrographic Organization (IHO); International Whaling Commission (IWC); International Commission for the Conservation of Atlantic Tuna (ICCAT), among others. For this reason, exercising international leadership is designed in NOAA's Strategic Plan as one of its six crosscutting priorities for the 21st century. To advance NOAA's mission, the Deputy Assistant Secretary (DAS) for International Affairs provides policy advice and support with respect to negotiations, partnerships, and other NOAA international interests and activities. The DAS chairs the International Affairs Council, using matrix management principles to ensure coordination of, and communication on, NOAA's international activities.

International Whaling Commission (IWC)

The 59th Meeting of the International Whaling Commission took place May 28-31, 2007. Hosted by the U.S. in Anchorage, AK and chaired by Dr. William Hogarth, NOAA Assistant Administrator for Fisheries, the U.S. effectively negotiated bowhead and gray whale five-year quotas. By consensus, the Commission renewed the U.S. aboriginal subsistence whaling catch limits for both. Catch limits for humpback whales in St. Vincent and the Grenadines, and for minke, fin and bowhead whales in Greenland were renewed as well. At the opening ceremonies, NOAA Administrator Conrad Lautenbacher joined Alaska Senator Ted Stevens, Congressman Don Young, other Alaskan government and tribal dignitaries, NOAA Deputy Assistant Secretary for International Affairs Dr. William J. Brennan, and Bill Hogarth. Serving as the Acting U.S. Commissioner, Dr. Doug DeMaster led the U.S. delegation, which included representatives from the Departments of Commerce, State, Interior, Navy, Coast Guard, and the Marine Mammal Commission.

Intergovernmental Oceanographic Commission (IOC)

The 40th Assembly of the Intergovernmental Oceanographic Commission (IOC) took place June 19-28, 2007. The meeting was held at the United Nations Economic Scientific and Cultural Organization's headquarters in Paris, France. As the IOC approaches its 50th anniversary (2010) the member states explored the "Future of the IOC" in extensive deliberations. The delegates adopted an updated budget and medium-term strategy, as well as many resolutions relating to promoting the ongoing work of the IOC related to tsunamis, data sharing and management, capacity-building and the Global Ocean Observing System. At the opening ceremonies, NOAA Administrator Conrad Lautenbacher provided a report to the Commission in his role as co-chair of the Group on Earth Observations (GEO). His comments noted the upcoming Earth Observation Summit IV (GEO Ministerial Summit) as an opportunity to advance the vision of IOC through GEO.

The head of the U.S. delegation was Dr. Richard Spinrad, Assistant Administrator of Oceans and Atmospheric Research, who was joined by John H. Dunnigan, Assistant Administrator of the National Ocean Service and NOAA Deputy Assistant Secretary for International Affairs, Dr. William J. Brennan, and other interagency experts.

Antarctic Treaty Consultative Meeting

The 30th Antarctic Treaty Consultative Meeting (ATCM) and 10th meeting of the Committee for Environmental Protection of the Antarctic Treaty took place from April 30 to May 4, 2007. Topics on the agenda included international polar year, tourism and nongovernmental activities, prevention of marine pollution, area protection and management, conservation of Antarctic flora and fauna, and strategic discussions on the future of the Committee for Environmental Protection.

Close up at Gray's Reef National Marine Sanctuary, May 2006. Photo Credit: Greg McFall



Group on Earth Observations (GEO)

The intergovernmental Group on Earth Observations (GEO) is leading a worldwide effort to build a Global Earth Observation System of Systems (GEOSS) over the next 10 years. In November 2007, Vice Admiral Lautenbacher, NOAA Administrator, attended the Earth Observation Ministerial Summit in Cape Town South Africa. Interior Secretary Dirk Kempthorne led the U.S. delegation to the summit. The United States will be presenting programs that we have implemented that deal with drought, air quality, land imaging applications, disaster risk-reduction and others. At the summit, GEO will identify its key early achievements and map a vision for the future of Earth observations.

United Nations General Assembly

The 2006 United Nations General Assembly Sustainable Fisheries Resolution was approved by consensus on December 8, 2006. The resolution calls upon states to adopt and implement fisheries management polices on issues such as

Illegal, unreported, or unregulated fishing, bycatch and discards from fishing vessels, monitoring, control and surveillance,,and overcapacity, in accordance with the U.N. Fish Stock Agreement and other principles of international law. The most contentious topic of discussion during negotiations was the issue of destructive fishing practices. The United States delegation, lead by State Department, and supported by NOAA, promoted rules based on sound science to support sustainable fisheries and end destructive fishing practices as outlined in the Presidential Directive on this subject issued October 2, 2006. The final resolution included management provisions for both regional fisheries management organizations and states to prevent bottom fishing from causing harm to vulnerable marine ecosystems (VMEs) and calls upon the U.N. Food and Agricultural Organization for further technical guidance. This represents the initial stages of significant progress towards greater protection of VMEs on the high seas, and the issue will be reviewed again in 2009.



A buried Pacific sandfish from Southeast Alaska, 2004. Photo Credit: David Csepp



*Northern elephant seal pup, San Simeon, California, Monterey Bay National Marine Sanctuary.
Photo Credit: Robert Schwemmer*

East Asia Seas Congress

NOAA participated in the Second East Asia Seas Congress in Hainan, China, December 12-15, 2006, held by PEMSEA—Partnerships in Environmental Management for the Seas of East Asia. The Congress brought together more than 800 participants, including ministers and officials from 14 regional nations and ocean ministries. During the Congress, NOAA signed a letter of cooperation with PEMSEA to promote and facilitate sustainable development of marine and coastal resources and governance of the large marine ecosystems of the Seas of East Asia.

Tsunamis

The promise of providing worldwide coverage to warn people of impending tsunamis moved a step closer to reality as NOAA joined with Thailand in launching the first Deep-ocean Assessment and Reporting of Tsunami (DART) buoy station in the Indian Ocean. With funding from the U.S. Agency for International Development, NOAA built and provided the DART station on behalf of the U.S. Government. The buoy will be maintained by the Thai Meteorological Department and National Disaster Warning Center. The station's data will be available to all nations through the World Meteorological Organization's Global Telecommunications System and will be part of the Global Earth Observation System of Systems.



Louisa Koch
Director of Education

NOAA Office of Education

NOAA's Office of Education (OEd) provides advice and counsel to the Under Secretary in matters pertaining to education. The OEd, in conjunction with the Education Council, coordinates education activities across NOAA and oversees the implementation of NOAA's Education Plan and Policy. These efforts help to ensure that NOAA's education programs and activities are based on NOAA science and support the agency's crosscutting priority of promoting environmental literacy. OEd also works with external partners to promote environmental literacy efforts that directly benefit the NOAA mission.

OEd strives to improve the efficiency and effectiveness of NOAA's collective education efforts. The office provides crucial coordination for these efforts by chairing NOAA's Education Council. The Education council develops corporate policy and provides strategic advice and direction to NOAA leadership on education issues. The Education Council also serves as a venue and forum for the NOAA education community and enables the chair to represent agency-wide interests effectively in external and interagency education activities. Such coordination functions are typical of a staff office portfolio and analogous to responsibilities of many of the other headquarters offices. OEd is unique among the staff offices in that it also directly implements and manages projects aimed at advancing key educational goals.

ACCOMPLISHMENTS

America COMPETES Act – On August 9, 2007, the President signed into law the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (America COMPETES). This legislation mandates an education program for NOAA. The Act states the Administrator shall conduct, develop, support, promote, and coordinate education activities to enhance awareness and understanding of mission-related sciences. Through the America COMPETES Act, NOAA has been given the task to serve both science and education communities nationally.

Environmental Literacy Grants (ELG) – The Office of Education continues to make awards through the Environmental Literacy Grants (ELG) competition. This program seeks to increase the level of environmental



CoCoRaHS: "A CoCoRaHS volunteer makes backyard weather measurements to contribute a national weather database as part of an OEd grant."

Credit: Henry Regis

knowledge nation-wide through the use of NOAA data in both formal K-12 and informal education settings. Community support and interest in this competition proves to be greater every year, and was at the highest level in 2007. Out of over 180 interested parties, five received funding for education projects lasting between three and five years.

K-12

Environmental Literacy Grants Formal K-12 Education projects will promote changes in the K-12 education system to expand the amount of Earth system science taught in the classroom. In FY 2007, NOAA created partnerships with the following organizations:

Eastern Michigan University for their “Sailing Elementary Teachers Towards Ocean Literacy Using Familiar Water Resources” project. This five-year

project will infuse ocean and Great Lakes content into core courses for pre-service elementary teachers. The project will also update and incorporate these concepts into well-regarded instructional materials (e.g., GLOBE storybooks), train teachers on how to use them, and will measure the environmental, ocean, and Great Lakes literacy of the elementary teachers and their students before and after this instruction is provided.

Maine Mathematics and Science Alliance for their “Earth as a System is Essential – Seasons and the Seas” project. This three-year project will focus on in-depth professional development of in-service middle school teachers in Maine, Massachusetts, and New Hampshire. This professional development will prepare them to serve as teacher resource agents. Building on students’ prior knowledge of seasons in New England, the instructional materials will incorporate ocean-related

Student Ship-Naming Contests: “Student Ship-naming teams from Marina, California and Naugatuck, Connecticut with NOAA Administrator Conrad Lautenbacher, SHIMADA ship sponsor Susan Lautenbacher, Allen Shimada, NOAA ship-naming contest coordinator Robert Hansen, and HASSLER ship sponsor Kitty Sununu at the keel laying ceremony.” Credit: Ray Broussard



Seattle Aquarium: "Teachers participate in NOAA funded workshops through the Seattle Aquarium." Credit: David Plude



material into the curriculum by comparing seasons on land to seasons in the ocean.

University of California, Berkeley/ Lawrence Hall of Science for their "Ocean Sciences Curriculum Sequence for Grades 3-5" project. This three-year project will update and augment instructional materials that are part of the MARE and GEMS programs to create a coherent, standards-based curriculum for grades 3-5 that addresses the ocean literacy essential principles.

JASON – Through a competitive funding opportunity, the JASON Project garnered OEd support for a technology-based science experiential learning program to impact students and teachers in grades 4-9. The program will use telepresence to infuse NOAA's research and exploration into nationally used curriculum units and informal education programs. In 2007, the JASON Project began development of an aquatic ecology curriculum, to supplement their already successful *Operation: Monster*

Storms curriculum. It is anticipated that the JASON project will reach 5,000 teachers and almost 500,000 students and will help establish the education and technology infrastructure to give young students a deep and fundamental appreciation for the world's oceans, atmosphere, climate, and coastal ecosystems.

Intel Science Fair As part of the 2007 Intel International Science and Engineering Fair (ISEF), the Office of Education presented the "Taking the Pulse of the Planet" award to John Christopher Turner, a senior at Lincoln High School in Tallahassee, FL. Turner's project, entitled "The Possible Effects and Predictive Capabilities of the El Niño Southern Oscillation and the North Atlantic Oscillation on Western Hemisphere Warm Pool Variability," represented unique and important research. As part of the award, Turner performed a summer internship with the National Weather Service. The ISEF, which took place in Albuquerque, NM, May 13-19, is the preeminent science fair for pre-college students from around the world.

Einstein – For the third year, NOAA’s Office of Education hosted two Albert Einstein Distinguished Educator Fellows. The fellows are selected master science teachers who work with NOAA and other Federal agencies to help inform educational policy.

Multicultural Students At Sea Together-3 (MAST-3)

MAST-3 is a multidisciplinary program that engages college students in NOAA-related marine research and explores marine policy, the heritage of African Americans and Native Americans on the Chesapeake, and the basics of seamanship. Through support from an OEd grant, the MAST project included a month-long cruise of the Chesapeake aboard a 53-foot sailing vessel, from June 11 to July 6, 2007. They studied the Chesapeake Bay in an interdisciplinary ecosystem-based investigation to understand the exploitation and conservation of marine resources relating to NOAA environmental challenges. The crew was diverse, representing nine colleges or universities and composed of four men, and eight women, evenly divided between undergraduate and graduate students. Eight of the students were African Americans, three were Hispanics, and one was a Pacific Islander. The primary goal of MAST-3 is to increase the diversity of students, particularly those from underrepresented groups, electing to pursue careers in marine sciences.

Informal

Environmental Literacy Grants Free-Choice Learning projects will create new, or capitalize on existing, networks of institutions, agencies and/or organizations to provide common messages about key concepts in Earth system science. In FY 2007, NOAA created partnerships with the following organizations:

The National Mississippi River Museum and Aquarium for their project, “Ocean Interpretive Stations: A Proposal for Pilot

Program for Coastal America Coastal Ecosystem Learning Centers.” This three-year project will support the installation of interactive kiosks at four sites: the Aquarium of the Pacific, the National Aquarium in Baltimore, the National Mississippi River Museum and Aquarium, and the John G. Shedd Aquarium. These “ocean interpretative stations” will employ content from the SI Ocean Hall’s “ocean in the news” kiosks but will augment them with regionally relevant stories. The project is intended to enhance ocean literacy among three million visitors.

The Ocean Project for their project, “Building Environmental Literacy: How the Ocean Community Can Connect More Effectively with the American Public.” This three-year project will follow up on the 1999 study of public attitudes and knowledge about the ocean. The project will conduct qualitative and quantitative research on public ocean literacy with the goal of informing educators at free-choice learning institutions on how best to improve the ocean literacy of their visitors.

SOS – Hampton Through a NOAA OEd grant, Hampton University in Hampton, VA, was able to provide field trips for approximately 1,200 sixth-grade students and teachers from Portsmouth Public Schools, VA, to see educational programming on an installation of Science On a Sphere® at Nauticus. Hampton graduate students served as docents for the field trips. Portsmouth Public Schools is considered a “high needs” school division. This program was judged to be so useful that the Office of Science of Portsmouth Public Schools committed school district funds to sustain this program for the 2007-08 school year.

NOAA’s Science On a Sphere® (SOS) system users network – In FY 2007, the Office of Education created an SOS users network among the informal education community. This group allows institutions that have public displays of SOS and groups

that work with the technology to discuss best practices and plans for advancing the SOS program. To kick off to this endeavor, the Office of Education held a workshop in Baltimore, MD, on January 22-24. The 61 participants represented 24 different organizations, including informal science centers, Federal agencies, universities, and exhibit and visualization specialists.

NOAA Second Life Island – NOAA took a pioneering role among Federal agencies in establishing a significant presence in the virtual reality Second Life environment on the Internet. Over the past year the NOAA virtual island, with support from the Office of Education, incorporated components such as a virtual tsunami, glacier, live feed-real time national weather map, hurricane hunter plane ride, and more. All of these components demonstrate ecological processes in the non-virtual world.

Seattle Aquarium –The Seattle Aquarium’s “Ocean Project,” supported by NOAA OE, had a very successful in the first year of operation in 2007. This included the development of an ocean science teacher professional development workshop in July and a hands-on family workshop on science inquiry in May, as well as the redesigning of the Seattle Aquarium curricula to an ocean science focus. As part of this redesign, the aquarium emphasized marine field

investigations to help teachers learn about real-world research in marine science. The teacher training workshops and the inclusion of NOAA science were well received by teachers and Seattle School District program partners. Presentations by NOAA scientists and staff helped teachers make connections with on-going marine research. More than 1,000 students and over 150 parents from the Seattle region participated in beach field investigations and aquarium program field trips in 2007.

CoCoRaHS – The Community Collaborative Rain, Hail and Snow (CoCoRaHS) Network is a grassroots volunteer network of backyard weather observers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow) in their local communities. This daily information enhances the forecasting and warning capabilities of the National Weather Service. Through OEd support, CoCoRaHS added 12 new states to the network in 2007, exceeding projected growth estimates. Precipitation measurements reported through CoCoRaHS have grown to over 3,300 per day – the equivalent of more than 250 volunteer hours a day. CoCoRaHS now has 23 states in its network and plans to expand the network by six to eight states each year through 2009.

American Museum of Natural History (AMNH) – AMNH has partnered with the OEd and NOAA scientists from the National Centers for Environmental Prediction (NCEP) to produce and distribute biweekly HDTV visualizations of global cloud circulation. These visualizations exemplify and communicate weather and climate patterns through the Museum’s *Science Bulletins* program. In 2007, these visualizations were also transferred to the 22 informal science institutions that subscribed to the *Earth Bulletin*. A combined audience of some seven million visitors of all ages around the U.S. were viewing recent satellite data acquisitions (renewed on a two-week schedule) and scientific



NOAA Second Life Island: “A NOAA crab, as found on the Second Life online virtual world.” Credit: Eric Hackathorn



Conference exhibit participation: "NOAA Education was represented at National Science Teacher Association and other conferences during 2007." Credit: Robert Hansen

interpretations, all of which were vetted by NOAA scientists.

Post-Secondary Education

NOAA welcomed the Class of 2007 Graduate Scientists, the largest class to date: Vankita Brown, Carwyn Hammond, Natasha Henry, Andrew Mason, Jose Reyes-Tomassini, Katherine Smith, and Jessica Winter. These outstanding graduate students were competitively selected for positions in NOAA Fisheries (Hammond, Reyes-Tomassini, and Smith); NOAA's National Weather Service (Brown); and NOAA's National Ocean Service (Henry, Mason, and Winter).

Further, the following NOAA Educational Partnership Program (EPP) Graduate Scientist Program participants completed

their graduate degrees in FY07: Dr. Cassandra Barnes (Class of 2004, OAR); Dr. DaNa Carlis (Class of 2002, NWS); Dr. Trika Gerard (Class of 2002, NMFS); Ms. Ahira Sanchez-Lugo (Class of 2004, NESDIS); Dr. Marco Vargas (Class of 2006, NESDIS); and Dr. Marian Westley (Class of 2002, OAR).

NOAA OEd Student Scholarship Program team selected 110 students (the largest to date) as Ernest F. Hollings Scholarship recipients. The program also saw the completion of the first class of Hollings Scholars from the Class of 2005.

Outreach

Conference exhibit participation – The office participates and supports numerous education outreach events and conferences throughout the year. Significant conference



JASON: "NOAA research meteorologist Shirley Murillo "headlines" a chapter in *Operation: Monster Storms*, the JASON Project's new middle school classroom curriculum on weather developed with NOAA, National Geographic Society, and NASA." Credit: The JASON Project

participation through exhibits included the National Science Teachers Association (NSTA) national conference in St. Louis, MO; the National Marine Education Association in Portland, ME; the North American Association for Environmental Education in Minneapolis, MN; the American Geophysical Union conference in San Francisco, CA; the Association of Science Technology Centers Annual Conference in Louisville, KY; the American Meteorological Society Annual Conference in San Antonio, TX; the National Conference on Aviation and Space Education in Arlington, VA; and regional meetings of NSTA in Baltimore, MD, Omaha, NE, and Salt Lake City, UT.

Student Ship-Naming Contests – Two student ship-naming contests were conducted within the past year. A west coast regional contest to name a fisheries research vessel resulted in the selection of the name BELL M. SHIMADA. A

team of five 9th-grade students and their teacher from Marina High School in Marina, California produced an essay that supported their selection of a ship name. The second ship-naming contest to name a coastal mapping vessel was for student teams in New England. A team of four 10th-grade students and their teacher from Naugatuck High School in Naugatuck, Connecticut submitted their winning essay and name, The FERDINAND R. HASSLER. Both student teams and their school representatives participated in the keel-laying ceremony in Pascagoula, MS.

NOAA Environmental Heroes – Two of the ten 2007 NOAA Environmental Heroes were submitted by NOAA Education staff: Nolan Doesken of Fort Collins, CO, exceeded all expectations of NOAA involvement through CoCoRaHS, a network of citizen volunteers to measure and report precipitation from their homes, thereby enhancing the forecasting and warning capabilities of the National Weather Service; and Jack Elrod, Jr. of Atlanta, GA, who entertained and educated millions of readers through his Mark Trail cartoon strip.

PRODUCTS AND SERVICES

- EPP Cooperative Science Centers
 - Provide funding to eligible minority-serving institutions, on a competitive basis, to educate and graduate students in NOAA sciences: atmospheric, oceanic, environmental, living marine resources, remote sensing, and scientific environmental technology. The program's goal is to increase the number of students from underrepresented communities who are educated and graduate in sciences directly related to NOAA's mission.
- EPP Graduate Sciences Program – Provides opportunities for students in NOAA-related fields to pursue research and educational training in atmospheric, environmental, and oceanic sciences, and remote-sensing technology at minority-

serving institutions, when possible. Overall, the objective of the Graduate Sciences Program is to increase the number of students who undertake coursework and graduate with post-graduate degrees in the targeted areas integral to NOAA's mission.

- Dr. Nancy Foster Scholarship Program – Provides support for outstanding academic scholarship and encourages independent graduate-level research in oceanography, marine biology, or maritime archaeology, particularly to women and members of minority groups.
- EPP Undergraduate Scholars Program – Provides support for students who study and graduate with degrees in targeted areas integral to NOAA's mission. This program targets students who have completed their sophomore year, and attend minority-serving institutions. Scholars are placed at NOAA offices and sites for two 10-week paid summer internships.
- Ernest F. Hollings Undergraduate Scholarship Program – Provides support for undergraduate student training in NOAA mission sciences and teacher education. Awards include academic assistance for full-time study during an academic year; a 10-week internship during the summer at a NOAA facility; and, if reappointed, academic assistance for full-time study during a second academic year.
- Environmental Literacy Grants – A highly competitive grants program that builds partnerships for NOAA with formal and informal education centers. Funding is provided for a variety of programs that support environmental literacy.
- EPP Environmental Entrepreneurship Program (EEP) – Provides funding to eligible minority-serving institutions on a competitive basis to encourage students to pursue advanced academic study and entrepreneurship opportunities in NOAA-

related sciences. NOAA's EEP supports student training and experiential learning opportunities for the purpose of stimulating job-creation and business development. The EEP's objective is to increase the number of students at minority-serving institutions proficient in environmental business enterprises.

- Taking the Pulse of the Planet Award – Part of the Intel International Science and Engineering Fair, this award recognizes students whose outstanding projects further our understanding of Earth's systems. The award is intended to recognize the importance of the U.S.-led initiative to develop a global Earth Observation System.

FUTURE OUTLOOK

The best way to ensure NOAA's scientific leadership and global expertise in oceanic and atmospheric research, observations, forecasting, and environmental and ocean health is to have the best and the brightest students, from a diversity of backgrounds, become fascinated with science education and the environment in which we live. Through the passage of the America COMPETES Act, NOAA will embark on a 20-year education plan that will have significant impacts on the future direction of education within NOAA. In order to provide critical support for its mission, NOAA must exploit its expertise in oceanic and atmospheric science to train and attract its future workforce and promote environmental literacy among the public. This will happen through a strategically-directed education program capable of harnessing the power of NOAA science. The broad authority granted in the America COMPETES Act enables NOAA to be a leader in both science research and education.



*Eric Webster, Director
Office of Legislative Affairs*

Office of Legislative Affairs

Significant Congressional Events

Rep. Mike Sodrel Participates in NOAA Weather Radio Schools Event: On October 11th, Rep. Mike Sodrel (R-IN) participated in ceremonies marking the delivery of NOAA Weather All Hazards Radio (NWR) receivers to the Jasper (IN) Middle School and the Columbus (IN) East High School in his Southeast Indiana District. Representing NOAA was the Deputy Assistant Secretary for Oceans and Atmosphere Tim Keeney. The radios are among the 80,000 NWR radios being sent to every American public school (K-12) by NOAA this year (16,000 were delivered last year as part of a pilot project). Also representing NOAA was National Weather Service Central Region Director Lynn Maximuk and the Meteorologists-In-Charge of the Louisville and Indianapolis Weather Forecast Offices.

Rep. Farr Speaks at Dedication of New NOAA Sanctuaries Vessel: On October 17th, Rep. Sam Farr (D-CA) spoke at the dedication of the newest National Marine Sanctuary Program vessel, the R/V /FULMAR/ which was christened at the Coast Guard Pier in Monterey. Rep. Farr's comments were very positive towards NOAA and the National Marine Sanctuaries Program. Representing NOAA was the Deputy Under Secretary for Oceans and Atmosphere **Brigadier General John (Jack) J. Kelly, Jr., USAF (Ret.)**.

Rep. Forbes Address Chesapeake, VA, Restoration Event: On October 19th, Rep. Randy Forbes (R-VA) addressed participants at an event unveiling a plan to restore the river bottom off Money Point in Chesapeake, VA. Representing NOAA was the Deputy Assistant Secretary for Oceans and Atmosphere Tim Keeney. The location is considered the most polluted in the Elizabeth River and one of the most toxic sites on Chesapeake Bay. This restoration event launched the Money Point Revitalization Plan and celebrated the plan as a national model for a thriving industrial waterfront co-existing with ecological regeneration. Partners include NOAA Restoration Center, Elizabeth River Project, University of Virginia, and Living River Restoration Trust. The agenda included planting of native species.

Sen. Mikulski Guest of Honor at NOAA/JASON Program: On October 24th, Sen. Barbara Mikulski (D-MD) was the guest of honor at a program to acquaint young people on the NOAA/JASON ocean education project. The

program was held at Churchill High School in Potomac, MD and featured Bob Ballard, an ocean explorer best known for discovering the sunken ocean liner *Titanic*. Representing NOAA was Chief of Staff Scott Rayder. The JASON Project serves nearly 1.7 million students each year, and is used by approximately 33,000 teachers in the U.S. and abroad.

Sen. Stevens Visits Barrow Lab: On October 24th, Sen. Ted Stevens (R-AK) visited the NOAA Barrow (AK) Atmospheric Baseline Observatory. The Senator was provided general overview of the Observatory and was briefed on the cooperative efforts with other government agencies, both within NOAA and outside agencies. This facility is manned year around by two engineers/scientists who often commute to work in winter on snow machines. Due to its unique far Northern location, the Barrow Observatory is host to numerous cooperative research projects from around the world.

Sen. Ben Nelson Attends StormReady Ceremony: On October 25th, Sen. Ben Nelson (D-NE) attended a StormReady presentation ceremony for Keith County, NE. Sen. Nelson noted his strong support of Emergency Management and the important mission of the National Weather Service, as a member of Senate Committee on Commerce, Science, and Transportation. The National Weather Service StormReady program provides a guideline for communities to follow for severe weather preparation. The program's most important function is to highlight the achievement of municipalities who have taken steps to be prepared for severe weather. The event took place in Ogallala about 332 miles west of Omaha.

Rep. Tierney Attends Groundbreaking for new Gloucester Facility: On November 28th, Rep. John Tierney (D-MA) attended a groundbreaking ceremony for the new NOAA facility in Gloucester, MA, hosted by the NOAA Fisheries Northeast Regional



Office. The event was also attended by NOAA Chief of Staff Scott Rayder, NOAA Fisheries Deputy Assistant Administrator John Oliver, and local officials. NOAA has signed a 15-year lease for the new building housing NOAA Fisheries and NOAA Ocean Service employees, and a NOAA Weather Service rooftop antenna.

Secretary Gutierrez Hosts Magnuson-Stevens Act Reauthorization Event:

On January 5th, Secretary of Commerce Carlos Gutierrez hosted a celebration of the Congressional enactment of the Magnuson-Stevens Fishery and Conservation Act (HR 5946). Attending the event were Congressional staff, representatives from non-governmental organizations, the fisheries industry and NOAA Fisheries staff. Also speaking at the event was Council on Environmental Quality Chairman James Connaughton, Deputy Under Secretary Brigadier General Jack Kelly, USAF (Ret.), and NOAA Fisheries Assistant Administrator William Hogarth. Also attending the event was Deputy Secretary of Commerce David Sampson.

Reps. Etheridge and Holden Visit Raleigh Weather Forecast Office:

On March 12th, Reps. Bob Etheridge (D-NC) and Tim Holden (D-PA) made an unannounced visit to the Raleigh Weather Forecast Office (WFO) for a quick visit including a firsthand forecast check. Rep. Holden is the new Vice Chairman of the House Agriculture Committee. He apparently was in Raleigh working with Rep. Etheridge on agriculture issues. Both asked about the collaboration between the Raleigh WFO and North Carolina State University. Rep. Holden noted that he would participate in a St. Patrick's Day parade in Harrisburg, PA on March 17th and the WFO staff shared with him the most recent forecast.

Freshman Rep. Kagen Visits Green Bay Weather Forecast Office; Had Once Used Weather Forecast Data for Pollen Forecasts Provided to CNN:

On April 5th,

Rep. Steve Kagen (D-WI) spent 75 minutes visiting the Green Bay Weather Forecast Office. According to Meteorologist-In-Charge Gary Austin, Rep. Kagan was quite familiar with National Weather Service (NWS) products and the effects of El Nino and La Nina. As an allergist, he devised a pollen forecast model using NWS water vapor imagery. The resulting pollen forecasts were supplied to CNN, where he served as a consultant from 1995 to 2002. In his private medical practice, he used the pollen forecasts in prescribing allergenic drugs. Dr. Kagan was winner of the 2004 Public Outreach Award from the American Academy of Allergy, Asthma and Immunology.

VADM Lautenbacher Participates in West Virginia Conference with Chairman Mollohan:

On April 13th, the Under Secretary for Oceans and Atmosphere, VADM Conrad C. Lautenbacher, Jr., USN (Ret.) joined House Appropriations Commerce, Justice, Science Chairman Alan Mollohan (D-WV) at an event sponsored by the West Virginia High Tech Consortium Foundation. The conference is taking place in Fairmont. VADM Lautenbacher discussed NOAA and Technology.

Rep. Culberson Joins Secretary in Attending Event Marking NOAA's 200th Anniversary:

On April 13th, Rep. John Culberson (R-TX) attended a ceremony at the Jefferson Memorial in Washington, DC marking the 200th anniversary of the founding of what later became NOAA. To help facilitate safe, efficient commerce, President Jefferson signed legislation creating the Survey of the Coast in 1807 to survey and map the country's coastline. The survey evolved into the nation's first scientific agency, the U.S. Coast and Geodetic Survey, a predecessor of NOAA. Secretary of Commerce Carlos Guterrez told the audience of President Jefferson's role in establishing the Survey of the Coast because of the importance of seaborne commerce to the fledgling nation—which

continues to the present. Chief of Staff Scott Rayder represented NOAA. The Master of Ceremonies was former House of Representatives Reading Clerk Paul Hayes.

Hurricane Awareness Tour Begins with Participation by Rhode Island Delegation and Governor:

On April 30th, Sen. Sheldon Whitehouse (D-RI), Reps. Patrick Kennedy (D-RI) and James Langevin (D-RI), and staff for Sen. Jack Reed (D-RI) participated in the NOAA Hurricane Awareness Tour. Rhode Island Governor Donald Carcieri (R) also participated. The annual tour kicked off at the Quonset Point State (RI) Airport and was led by National Weather Service Director BGEN D.L. Johnson, NOAA Marine and Aviations Operations Director RADM Sam DeBow and the new NOAA National Hurricane Center Director Bill Proenza. Several of the Members complimented NOAA for its efforts to protect Southern New England's coastal population at a press conference. NOAA hurricane experts continued to travel aboard a NOAA WP-3 Orion turboprop Hurricane Hunter in a five-day, five-city tour of the East Coast to raise public awareness of the threat of Atlantic Seaboard hurricanes. A staffer for Sen. Barbara Mikulski (D-MD) participated in the scheduled stop at Martin State Airport, near Baltimore.

Four House Members and Congressional Staff Attend NOAA Hurricane Aircraft Tour at Washington Reagan National Airport:

On May 22nd, four House Members toured NOAA hurricane reconnaissance and research aircraft on display at Washington Reagan National Airport. Also attending were over 20 Congressional staff members. The event had a three fold purpose: (1) To announce the 2007 Atlantic hurricane seasonal forecast; (2) to draw public attention to National Hurricane Preparedness Week; and (3) to acquaint Members and their staffs of NOAA's sophisticated aircraft providing critical storm data to NOAA's National Hurricane

Center (NHC). Also on the tarmac was a United States Air Force Reserve C-130 aircraft and crew flown by the 53rd Weather Reconnaissance Squadron in Biloxi, MS. The squadron also provides data to the NHC and serves as a unique example of federal interagency cooperation. Present for the airport orientation were: House Science and Technology Subcommittee on Energy and Environment Chairman Nick Lampson (D-TX) and Reps. Mario Diaz-Balart (R-FL), Tom Feeney (R-FL) and Ron Klein (D-FL).

Rep. Hirono Visits Hawaiian Sanctuary: On May 27th, freshman Rep. Mazie Hirono (D-HI) visited the Hawaiian Islands Humpback Whale National Marine Sanctuary, including meeting with a volunteer school group. Nearly two-thirds of the entire North Pacific population of humpback whales migrates to Hawaii each winter. Here, they engage in breeding, calving and nursing activities critical to the survival of their species. Rep. Hirono was accompanied by National Marine Sanctuary Program Pacific Regional Superintendent Alan Tom.

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Seven House Members Visit Weather Forecast Offices; More Next Week: On June 1st, House Science and Technology Energy and Environment Subcommittee Chairman Nick Lampson (D-TX) visited the Houston National Weather Service Forecast Office (WFO). He was particularly interested in learning more about hurricane tracking. He was accompanied by National Weather Service Director BGEN D.L. Johnson, USAF (Ret.) and Southern Region Director Steven Cooper. On the same day, the Chairman of the House Science and Technology Investigations and Oversight Subcommittee Brad Miller (D-NC) visited the Raleigh WFO and the Ranking Minority Member of the House Science and Technology Research and Science Education Subcommittee Vern Ehlers (R-MI) visited the Grand Rapids WFO. On May 30th, Rep. Tim Murphy (R-PA), toured the Pittsburgh WFO. On May



31st, Reps. Mario Diaz-Balart (R-FL) and Ron Klein (D-FL) visited the Miami WFO. On June 5th, Rep. Fred Upton, (R-MI) will be visiting the Grand Rapids WFO.

Sens. Mikulski and Cardin Attend Ribbon-Cutting for New Maryland Satellite Facility: Maryland Senators Barbara Mikulski (D) and Ben Cardin (D) spoke at the June 11th ribbon-cutting ceremony for the new NOAA Satellite Operations Facility (NSOF), in Suitland, MD. Representing NOAA was the Under Secretary for Oceans and Atmosphere VADM Conrad Lautenbacher, Jr., USN (Ret.). Sen. Mikulski said: "NOAA and its employees are world-class ... They are working everyday to save lives and livelihoods. The nations depends on them to...secure their property and protect their families, and to assist in search and rescue operations for lost mariners... they deserve a world-class facility so they can do their job and meet NOAA's mission and mandate." Sen. Cardin said: "This remarkable facility is the culmination of a successful partnership between NOAA, the GSA (General Services Administration), Prince George's County, and private-sector partners, giving us the opportunity to better monitor global climate change and its impact on Maryland."

Mrs. Catherine Sununu Lays the Keel for a New NOAA Vessel: A combined keel laying ceremony was held on June 15th in Moss Point, MS. The keel laying is the first milestone in a ship's construction. Sponsoring the first ship was Catherine

"Kitty" Sununu, the wife of Sen. John Sununu (R-NH), who laid the keel for the Small Waterplane Area Twin Hull (SWATH), to be home ported in New Castle, NH. Sponsoring the second ship was Susan Lautenbacher, the wife of Under Secretary for Oceans and Atmosphere VADM Conrad Lautenbacher, Jr., USN (Ret.). She laid the keel for the *Bell M. Shimada*, the fourth NOAA fishery survey vessel under construction at VT Halter Marine. It will be home ported on the West Coast.

Rep. Ellsworth Gives Keynote Address at Mark Trail Awards Ceremony; Record Congressional Turnout: On June 21st,

NOAA held its eleventh annual NOAA Weather Radio All Hazards ceremony and lunch on Capitol Hill. Rep. Brad Ellsworth (D-IN) presented the keynote address highlighting his introduction the previous day of "CJ's Home Protection Act (HR 2787)." The bill requires the installation of NOAA Weather Radio All-Hazards be installed in all manufactured (mobile) homes made or sold in the United States. It is modeled after a similar law passed by the Indiana General Assembly.

The legislation is named for two-year old CJ Martin, who was killed in a tornado. His mother Kathryn turned her grief into a state-wide advocacy campaign in Indiana for Weather Radios to be included in all new mobile homes.

The awards are presented annually to individuals and public and private organizations for noteworthy contributions to the success of NOAA Weather Radio All-Hazards. Besides Rep. Ellsworth, these House Members attended: Reps. Spencer Bachus (R-AL), John Boozman (R-AR), Nancy Boyda (D-KS), Jerry Costello (D-IL), Ron Klein (D-FL), John Linder (R-GA), Jerry Moran (D-KS), Randy Neugebauer (R-TX), Mike Rogers (R-AL), and Vic Snyder (D-AR).

Sen. Levin Tours Thunder Bay Sanctuary and Visits NOAA Green Ship: On July 4th, Sen. Carl Levin (D-MI) visited the Thunder Bay National Marine Sanctuary in Alpena, MI. He was hosted by Sanctuaries Manager Jeff Gray. He also attended the Great Lakes Maritime Heritage Festival sponsored by the Sanctuary featuring the 200th Anniversary of NOAA and toured the Great Lakes Environmental Research Laboratory Green Ship *Huron Explorer* which operates exclusively on biofuels and biolubricants.

Sen. Bill Nelson Participates in Dedication of NOAA Weather Radio

Transmitter: On July 16th, Sen. Bill Nelson (D-FL) spoke at the dedication of a new NOAA Weather All-Hazards Radio Transmitter in Sumterville, FL, in Sumter County, northwest of Orlando. When a series of devastating tornadoes hit Central Florida on February 1st, they caused 21 deaths, damaged more than 1,500 homes, and caused \$160 million in estimated damage. Although the National Weather Service provided long lead time warnings they could not be heard by Sumter County and adjoining county residents because the signals were not strong enough from distant transmitters. To resolve the problem, Sumter County, The Villages Homeowners Association, and other contributors combined their resources to finance the construction of the new transmitter.

Rep. Jim Moran Praises NOAA at

Teacher-at-Sea Reception: On July 25th, Rep. Jim Moran (D-VA) participated in a Teacher-at-Sea reception in Old Town Alexandria, VA. The ceremony honored Mrs. Linda Armwood, who participated in NOAA's Teacher at Sea program in 2006 and is featured in a children's book unveiled during the ceremony. The reception was part of a series of public outreach and education events featuring the NOAA ship THOMAS JEFFERSON, which was docked in Old Town Alexandria. Rep. Moran praised NOAA, acknowledged Mrs. Armwood for her contribution to NOAA's education

and outreach efforts, and addressed the importance of the ship's hydrographic survey mission. In addition, RADM Sam DeBow, Director of the Office of Marine and Aviation Operations and Director of the NOAA Corps, spoke. He read a congratulatory letter from Rep. Bobby Scott (D-VA), who represents the Richmond district where Mrs. Armwood teaches. Also on hand at the reception were the Under Secretary for Oceans and Atmosphere

VADM Conrad Lautenbacher, Jr., USN (Ret.) and Alexandria Mayor William Euille.

Rep. Baird Visits South Florida NOAA

Facilities: On July 28th, Rep. Brian Baird (D-WA) visited NOAA facilities in South Florida including: the Tropical Prediction Center/National Hurricane Center, the Atlantic Oceanographic and Meteorological Laboratory (AOML), NOAA's Undersea Research Center Aquarius Undersea Laboratory, and the Florida Keys National Marine Sanctuary. Rep. Baird took a walking tour of the National Hurricane Center operations area, the FEMA/NOAA Hurricane Liaison room, and the collocated Miami Weather Forecast Office. Rep. Baird is a member of the House Science and Technology Energy and Environment Subcommittee, which has jurisdiction over NOAA's atmospheric programs. At AOML, he mentioned the possible role of the lab in rapidly identifying coastal pathogens under the Community Beaches Protection Act (HR 1505).

Sen. Stabenow and Rep. Ehlers Visit NOAA Lake Michigan Field Station:

On August 9th, Sen. Debbie Stabenow (D-MI) and Rep. Vern Ehlers (R-MI) visited the NOAA Great Lakes Environmental Research Laboratory (GLERL) Lake Michigan Field station in Muskegon. The purpose was to attend a discussion of Great Lakes issues organized by "Healing Our Waters--Great Lakes Coalition" (a consolidated non-governmental organization). Rep. Ehlers spoke of

his support of NOAA and the agency's importance in Great Lakes issues. Sen. Stabenow added support for greater preservation efforts of Great Lakes natural and maritime heritage. Both spoke of their opposition to increased refinery effluent discharge in Lake Michigan (the permit recently issued by Indiana for BP's Whiting oil refinery). GLERL was represented by Gary Fahnenstiel, Dennis Donahue and Julie Dyble.

Rep. Wasserman-Schultz Visits

National Hurricane Center: Rep. Debbie Wasserman-Schultz (D-FL) and four of her staff visited the Tropical Prediction Center/National Hurricane Center (NHC) on August 31st. This was her first visit to NHC. The staff provided an administrative briefing and answered several questions about operations, modeling, and observations. After the briefing, staff provided a tour of the facility, which included: the Miami Weather Forecast Office; NHC/Tropical Analysis and Forecast Branch; NHC/Hurricane Specialists Unit; Chief, Aerial Reconnaissance Coordination, All Hurricanes; and the Federal Emergency Management Agency Hurricane Liaison Team office. Overall, Rep. Wasserman-Schultz spent about 75 minutes at the center.

Rep. Klein Tours Atlantic Oceanographic and Meteorology Laboratory (AOML):

On August 31st, AOML hosted Rep. Ron Klein (D-FL) for a tour of AOML's facility and select research areas. Bob Atlas, Frank Marks, Joe Cione, Peter Black, Mark Powell and Jason Dunion provided overviews of the lab's ability to transition hurricane research to operations and how its cutting edge science is serving

the American public. Libby Johns and Molly Baringer educated Rep. Klein on efforts to monitor Florida's coastal waters and its critical relationship to Florida's ecosystems and climate. John Proni, Rik Wannikhof, Tsung-Hung Peng, and Chris Sinigalliano provided a targeted overview of our monitoring and prediction efforts to describe human impacts on the oceans.

The Congressman and his District Director, Felicia Goldstein, were very happy for the opportunity to learn about AOML's efforts in the area of hurricane research and coastal monitoring, especially impacts to coral reefs. Rep. Klein also asked several follow up questions as to the role of global ocean circulation and related climate impacts. The Congressman also indicated that he favorably viewed working closely with other Federal and scientific groups to coordinate any larger programs on hurricane research to improve the ability to predict hurricane intensity.

Rep. Holt Visits J.J. Howard Marine Sciences Laboratory in Sandy Hook,

NJ: On September 14th, Rep. Rush Holt (D-NJ) and his staffer Alison Zayas visited the NOAA Fisheries Service J.J. Howard Marine Sciences Laboratory (Sandy Hook Lab). Acting Lab Director, Dr. Beth Phelan provided a tour of the facility where NOAA scientists described research into PCBs in bluefish and lobsters. Rep. Holt visited the lab's large research aquarium, holding a collection of bluefish, and was given a demonstration of a hydroacoustic unit. Rep. Holt showed particular interest in the acoustic tagging program along the New York and Connecticut coasts. He also asked about nearshore Liquid Natural Gas terminals.



FY 2007 Congressional Hearings

Date	Congressional Committee	Subject	NOAA Witness
September 27, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	Aquatic Nuisance Species	Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere
August 2, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	Endangered Salmon Predation Prevention Act	D. Robert Loh Regional Administrator Northwest Pacific Region NOAA Fisheries Service
August 1, 2007	Senate Commerce, Science, and Transportation Committee	Oversight of the U.S. Commerce Department	Carlos Gutierrez Secretary of Commerce
July 31, 2007	House Natural Resources Committee	Crisis of Confidence: The Political Influence of the Bush Administration on Agency Science and Decision-Making	Dr. William T. Hogarth Assistant Administration NOAA Fisheries

Date	Congressional Committee	Subject	NOAA Witness
July 19, 2007	House Science and Technology Subcommittees on Energy and Environment and Investigations and Oversight	Tracking the Storm at the National Hurricane Center	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator and Dr. Robert Atlas Director, Atlantic Oceanographic and Meteorological Laboratory
July 18, 2007	Senate Commerce, Science, and Transportation	Chinese Imports, including seafood	Dr. William T. Hogarth Assistant Administration NOAA Fisheries
July 12, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	National Offshore Aquaculture Act of 2007	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator
July 11, 2007	Senate Commerce, Science, and Transportation Committee	United States weather and environmental satellites, focusing on their readiness for the 21st century	Mary Ellen Kicza Assistant Administrator for NOAA Satellite and Information Service
June 28, 2007	Senate Commerce Oceans, Atmosphere, Fisheries, and Coast Guard Subcommittee	FY '08 NOAA budget request	VADM Conrad C. Lautenbacher, Jr., Under Secretary for Oceans and Atmosphere USN (Ret.)
June 7, 2007	House Science and Technology Energy and Environment Subcommittee,	Update to a Government Accountability Office (GAO) report issued last November on the National Polar-orbiting Operational Environmental Satellite System (NPOESS)	Brigadier General Susan Mashiko U.S. Air Force, Program Executive Officer for Environmental Satellites John Marburger III White House Office of Science and Technology Director

Date	Congressional Committee	Subject	NOAA Witness
June 5, 2007	House Natural Resources Committee Subcommittee on Fisheries, Wildlife and Oceans	National Ocean Exploration Program Act; HR 2400, the Ocean and Coastal Mapping Integration Act; and HConRes 147, commemorating the 200th anniversary of NOAA and its predecessor agencies	Craig McLean Office of Oceanic and Atmospheric Research Deputy Assistant Administrator for Programs and Administration
May 23, 2007	House Natural Resources Committee	Energy Policy Reform and Revitalization Act	Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere
May 10, 2007	Senate Commerce, Science and Transportation Subcommittee on Oceans, Atmosphere, Fisheries and Coast Guard	Effects of Climate Change and Ocean Acidification on Living Marine Resources	Dr. Richard A. Feely Pacific Marine Environmental Laboratory Supervisory Chemical Oceanographer
April 26, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	HR 21 Oceans Conservation, Education, and National Strategy for the 21st Century Act (Ocean-21),	John H. Dunnigan Assistant Administrator for Ocean Services and Coastal Zone Management
April 24, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee and the Subcommittee on Energy and Mineral Resources	Resources Renewable Energy Opportunities and Issues on the Outer Continental Shelf	Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere
April 17, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	Wildlife and Oceans in a Changing Climate	Dr. C. Mark Eakin Coordinator. NOAA Coral Reef Watch NOAA Satellite and Information Service
April 17, 2007	House Science and Technology Committee	2007 Intergovernmental Panel on Climate Change (IPCC) Working Group II Report	Dr. Roger S. Pulwarty Physical Scientist, Climate Program Office Office of Oceanic and Atmospheric Research

Date	Congressional Committee	Subject	NOAA Witness
March 29, 2007	House Natural Resources Fisheries, Wildlife and Oceans Subcommittee	Ocean Policy Priorities in the United States	Mary Glackin Office of Program Planning and Integration Assistant Administrator
March 22, 2007	House Science and Technology Energy and Environment Subcommittee	FY '08 NOAA budget request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator
March 21, 2007	House Appropriations Commerce, Justice, Science Subcommittee	FY '08 NOAA budget request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator
March 8, 2007	Senate Appropriations Commerce, Justice, Science Subcommittee	FY '08 NOAA budget request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator
March 6, 2007	House Committee on Natural Resources, Subcommittee on Fisheries, Wildlife and Oceans	Reauthorization of the <i>Coral Reef Conservation Act Of 2000</i>	Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere
February 27, 2007	House Natural Resources Fisheries, Oceans and Wildlife Subcommittee	FY '08 NOAA budget request	Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Under Secretary for Oceans and Atmosphere and NOAA Administrator

Date	Congressional Committee	Subject	NOAA Witness
February 7, 2007	Senate Commerce, Science, and Transportation Committee,	Climate Change Research and Scientific Integrity	Dr. William Brennan Acting Director of the U.S. Climate Change Science Program
February 7, 2007	Senate Commerce, Science, and Transportation	Committee Climate Change Research and Scientific Integrity	Dr. Thomas Knutson Research Meteorologist, Climate Dynamics and Prediction Group, Geophysical Fluid Dynamics Laboratory, NOAA, Princeton, NJ
February 7, 2007	Senate Commerce, Science, and Transportation Committee	Climate Change Research and Scientific Integrity	Dr. James R. Mahoney, Environmental Consultant
February 8, 2007	House Science and Technology Committee	NOAA, and Co-chairman of Intergovernmental Panel on Climate Change Working Group I, charged with investigating the physical basis of climate change	Dr. Susan Solomon Senior Scientist, Earth System Research Laboratory, Office of Oceanic and Atmospheric Research, Boulder, CO



Northern elephant seal and bird, San Simeon, California, Monterey Bay National Marine Sanctuary. Photo Credit: Robert Schwemmer

NOAA OPERATIONS, PRODUCTS, AND SERVICES





*John H. Dunnigan
Assistant Administrator*

National Ocean Service

America's Oceans and Coasts: Safe, Healthy,
and Productive

The coastal environment is one of our Nation's most valuable assets. It provides food and livelihoods for people and essential habitat for thousands of species of marine animals and plants. A healthy coast is vital to the U.S. economy. Marine commerce and transportation, commercial and recreational fishing, tourism, and recreation all depend on a vibrant coastal environment. However, as more of the U.S. population becomes concentrated along the coastline, our coastal ecosystems are becoming stressed. Habitat loss, erosion, pollution, harmful algal blooms, and dead zones are all on the rise. 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

NOAA Moves Forward on Plans for Monitoring the Seas

Changes in the ocean, from sea level rise and coastal flooding to harmful algal blooms and dead zones, are impacting our society. To prepare for and help manage these changes, NOAA's Integrated Ocean Observing System (IOOS) Program was established to advance data integration and support regional IOOS development within the long-term goals of improving the Nation's understanding of climate change, safety and efficiency of marine operations, mitigation of natural hazards, and protection and restoration of marine ecosystems.

Ocean observations are of increasing importance to scientists who characterize, understand, predict, and monitor changes in coastal and ocean environments and ecosystems. Integration of data from ocean observations is also critical to commercial fisheries by allowing the incorporation of climate forecasts into management and harvest decisions. Ocean observation networks can improve NOAA's storm surge forecasts, allowing emergency managers to make better decisions about evacuation plans. In FY 2007, NOAA announced an IOOS merit-based competition to support regional IOOS development as an opportunity for FY 2008. In addition, the NOAA IOOS Program published the first version of the National High Frequency Radar Plan, which represents the needs of Federal and state governments and establishes a formal requirement for this system within NOAA. Working

with interagency partners, NOAA published a national near-shore waves plan which documents a national requirement for wave measurement that will define type and location of systems, applicable standards, and data products.

Emergency Coral Restoration Conducted in Puerto Rico and Hawaii

During 2007, NOS and other NOAA offices participated in field activities to restore coral reefs that were severely injured by two vessel groundings in 2006. In one incident, the oil tanker M/T *Margara* grounded along the south coast of Puerto Rico. The Responsible Party performed emergency restoration work under the oversight of NOAA and the Commonwealth of Puerto Rico's Department of Natural and Environmental Resources. The work included the reattachment of 9,500 soft

corals, hard corals, and coral fragments, about 10 percent of which were fragments of Staghorn coral (*Acropora cervicornis*), which is listed as threatened under the Endangered Species Act.

The second grounding incident involved the bulk carrier M/V *Cape Flattery*, which grounded in coral reef habitat off Barbers Point (Kalaeloa), Oahu. Efforts to free the ship and prevent an oil spill caused widespread injury to the reef and its inhabitants, resulting in the largest natural resource damage assessment case conducted in Hawaii to date. The Responsible Parties, NOAA, and other natural resource trustees finished two phases of emergency restoration in 2007, during which 2,800 corals and coral fragments were reattached to the reef. NOAA and its partners removed or re-cemented an estimated 45,000 tons of dislodged coral



NOAA divers collecting corals in the region of impact resulting from the grounding of the tanker *Margara* off the coast of Puerto Rico.

rock, so that it would neither wash away nor crush or bury the surviving reef organisms.

Delivering Real-time Data to Help Shellfish Growers

Shellfish growers in the Pacific Northwest can get near real-time water quality data from the System-wide Monitoring Program operating at National Estuarine Research Reserves in Alaska, Washington, and Oregon. The data are available through a Web site (<http://www.nanoos-shellfish.org/>) jointly sponsored by NOS and the Northwest Association of Networked Ocean Observing Systems (NANOOS). Shellfish growers and buyers can view up-to-date water temperature, salinity, oxygen, turbidity, pH, and chlorophyll data from reserves in Kachemak Bay, AK; South Slough, OR; and Padilla Bay, WA. Data are also available from four buoys operated by the University of Washington in Hood Canal, a long arm of Puget Sound west of the main basin. The project received funding support from NOS, the National Estuarine Research Reserve Association, and NANOOS. The Pacific Coast Shellfish Growers Association and the Pacific Shellfish Institute provided technical assistance. Water quality and weather data are transmitted every 30 minutes via satellite from monitoring stations at all 27 National Estuarine Research Reserves, providing information to the growing Integrated Ocean Observing System.

Reporting on Nutrient Pollution Levels in U.S. Estuaries

On July 31, 2007, NOS released a report titled *The Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change, National Estuarine Eutrophication Assessment Update*. The report contains the Nation's most comprehensive assessment of nutrient pollution (eutrophication) in U.S. estuaries to date. The report, which updated the 1999 *National Estuarine Eutrophication Assessment*, clearly indicated links between



By looking at eutrophication in the Venice Lagoon, Italy, NOAA scientists and partners learned that flood protection measures can accentuate eutrophic symptoms such as dissolved oxygen, macroalgae, and loss of submerged aquatic vegetation. Several such case studies are presented in The Effects of Nutrient Enrichment in the Nation's Estuaries report. By investigating the causes and implications of eutrophication across the globe, scientists can learn new, successful ways to manage and monitor estuaries. Stefano Ciavatta.

upstream activities and the health of coastal ecosystems, as two-thirds of the 99 U.S. estuaries assessed were moderately to highly impacted. NOAA scientists and their partners at the University of Maryland Center for Environmental Science found that, overall, eutrophic conditions were not significantly different – neither worse nor improved – between the early 1990s and early 2000s. Eutrophication is caused by excess nutrients in the water, which can result in increased blooms of algae, decreased dissolved oxygen, and loss of seagrasses. The end result of eutrophication is often loss of critical marine life habitat. The report is available online on the Center for Coastal Monitoring and Assessment Web site (<http://www.ccma.nos.noaa.gov>).

Largest Gulf of Mexico “Dead Zone” on Record Predicted

In July 2007, a team of scientists from NOAA, the Louisiana Universities Marine Consortium, and Louisiana State University released their forecast of the “Dead Zone” off the Louisiana and Texas coasts. Based on data from the U.S. Geological Survey

and models developed by NOAA and its partners, the summer 2007 Dead Zone was predicted to encompass 8,500 square miles, an area about the size of New Jersey. This is significantly larger than the average area since 1990, and would be the largest area since measurements began in 1985. In the Dead Zone, seasonal oxygen levels drop too low to support most life in bottom and near-bottom waters. The low-oxygen phenomenon is caused by increased nutrients, such as nitrogen and phosphorus, which flow into the Gulf of Mexico from the Mississippi and Atchafalaya Rivers and stimulate excessive algal growth. The excess algae consume oxygen faster than it can be replenished. The actual size of the Dead Zone is affected by factors such as the number and intensity of hurricanes and tropical storms.

Helping Pacific Northwest Communities Prepare for Coastal Storms

The NOAA Coastal Storms Program developed a suite of products for Oregon and Washington coastal communities to improve storm planning, prediction, and recovery. The Pacific Northwest is vulnerable to flooding, sediment and debris flows, and coastal erosion because of severe coastal storms during the winter months. The impacts of these storms range from treacherous navigation conditions at the mouth of the Columbia River (known as “the graveyard of the Pacific”), to storm-water impacts on spawning salmon. Chief among the new products is an online decision-support tool that combines hazard-related real-time and forecast information into a mapping interface that identifies coastal storm impacts and hazard risks. The tool helps emergency managers and the public monitor coastal storms and identify location-specific hazards. Other tools developed by the program include ecological assessments of aquatic impacts from stormwater runoff, an atmospheric profiler, a digital elevation model, and a precipitation atlas. Together,

these tools will benefit communities and emergency managers by equipping them to better prepare for and mitigate the effects of coastal hazards.

NOAA Ranked Number One in Global Positioning System Accuracy

NOS achieved a precision level of nearly one centimeter in the computation of Global Positioning System (GPS) satellite orbits. The satellite locations are computed daily in collaboration with seven other analysis centers that are part of the International Global Navigation Satellite System Service (IGS), a voluntary federation of more than 200 worldwide organizations that pool resources and continuous satellite-tracking data to generate precise products.

Over the past year, numerous model upgrades and strategy changes were applied to GPS data analysis, bringing the daily orbit errors down to about two centimeters. In January 2007, NOS achieved a new level of excellence in its orbit computations, and was ranked number one among contributing IGS agencies, which include the National Aeronautics and Space Administration and the Massachusetts Institute of Technology. Incorporating accurate GPS data into the Nation’s consistent coordinate system enhances the reliability of transportation and communication systems, boundary and property surveys, land record systems, mapping and charting, and many scientific and engineering applications.

National Spatial Reference System Updated

In March 2007, NOS completed a two-year project to readjust the National Spatial Reference System (NSRS). NOAA defines and maintains the NSRS, which provides the Nation’s positioning infrastructure for transportation and communication, mapping and charting, and a multitude of scientific and engineering applications.

The NSRS includes a network of permanently marked points; a consistent, accurate, and up-to-date national shoreline; a network of Continuously Operating Reference Stations which supports three-dimensional positioning activities; and a set of accurate models describing dynamic geophysical processes that affect spatial measurements.

The NSRS readjustment updated all GPS survey control point positions in North America. NOS released the readjusted coordinates with local and network accuracies and made them available through online data sheets. This accomplishment significantly improves the Nation's fundamental positioning infrastructure.



NOS employees Mark Eckl (left) and Don Breidenbach (right) inspect a Continuously Operating Reference Station (CORS) in Alaska. CORS sites help NOS provide precise positioning services as well as a number of other scientific and engineering applications.

The 1,001st Continuously Operating Reference Station Installed

In January 2007, NOS installed a commemorative geodetic marker to recognize the installation of the 1,001st Continuously Operating Reference Station (CORS). The station ushers in a new generation of CORS by becoming the first to provide precise global positioning data in real time from both the U.S.-based Global Positioning System (GPS) and the Russian-based Global Navigation Satellite System. The 1,001st CORS is also part of the International Ocean Observing System and is co-located with a NOAA tide station in Key West, FL, where it collects local sea-level data for the globally consistent, rigorously defined International Terrestrial Reference System.

Managed by NOS, CORS is a cooperative effort involving 175 organizations. Each CORS station sits at a known, precise location and receives GPS radio signals 24 hours a day, seven days a week. Information collected through the CORS network is processed by NOS and made available to surveyors, engineers, scientists, and others around the world. CORS data are essential for ensuring the reliability of transportation and communication systems, mapping and charting, and many scientific and engineering applications.

OPUS, the Online Positioning Users Service, Updated

In January 2007, NOS, with help from researchers at Ohio State University, released a new version of its Online Positioning Users Service (OPUS). The new version is known as OPUS Rapid Static, or OPUS-RS. OPUS enables scientists, engineers, surveyors, and others to obtain Global Positioning System (GPS) positions with centimeter-level accuracies. OPUS-RS requires as little as 15 minutes of GPS data to produce an improved, highly accurate GPS position. This compares to

the two-to-six hours of data required for standard OPUS.

Online Watershed Databases Updated

During the year, NOS released significant updates to the Hudson River and Portland Harbor watershed databases. The Hudson River database includes sediment chemistry, fish-tissue chemistry, and the results of toxicity tests from multiple years of monitoring the river, which is heavily contaminated with polychlorinated biphenyls (PCBs). The database contains more than one million sediment chemistry records and more than 600,000 records of tissue chemistry. NOS also posted a major update of the Portland Harbor/Willamette River watershed database. The update includes more than 100 new sediment samples and almost 200 new tissue samples; the database now contains more than half a million sediment chemistry records. The data are an integral part of Watershed Database and Mapping Projects for both rivers. The two databases, and more than 15 other databases, support ongoing efforts to assess risk and injury to NOAA trust resources. The databases can be viewed online at the Office of Response and Restoration Web site (<http://www.response.restoration.noaa.gov/watersheddownloads>).

New Technology Used to Identify Potentially Hazardous Ordnance Around Vieques Island, Puerto Rico

NOS participated in a project involving underwater mapping and object detection to help locate and clean up unexploded ordnance in Puerto Rico's Vieques National Fish and Wildlife Refuge. The U.S. military used the area for target training for more than 60 years, leaving behind an unknown number of unexploded bombs, mines, and other ordnance. Using an autonomous underwater vehicle (AUV), NOAA personnel located and charted the unexploded ordnance. Then, using a remotely operated AUV, personnel took underwater video that



NOAA is moving rapidly toward a next generation of observation instrumentation that will be deployed on unmanned platforms. Autonomous underwater vehicles, such as the one being deployed here, are programmable robotic submarine sensor platforms that can be deployed from ships, small craft, or shore.

will prove valuable when the ordnance is eventually removed. This ongoing activity supports the cleanup and restoration of more than 14,000 acres of wildlife habitat and identifies objects that pose potential hazards to navigation—an important concern because the area and surrounding bays are frequented by pleasure boaters.

National Water Level Observation Network Upgraded to Real-time Status

NOS completed a three-year effort to upgrade the technology of its National Water Level Observation Network (NWLON). NWLON stations provide mariners, first responders, and the public with real-time tide and water-level information. A major benefit of the upgrade is that network stations normally equipped to transmit water-level and other environmental data

at hourly intervals via NOAA Geostationary Operational Environmental Satellites now transmit data every six minutes, enabling users to access data much more quickly. Real-time data from the NWLON are critical for supporting safe and efficient navigation, tsunami and storm-surge warnings, and hazmat emergency response efforts. In addition, the data supports the definition of marine boundaries, habitat restoration, the monitoring of long-term sea-level trends, and other important applications.



This benchmark commemorates the installation of the agency's 200th National Water Level Observation Network station in Mobile, AL. In addition to celebrating the occasion, the mark will also be used for positioning needs relative to the local area and is now part of the National Spatial Reference System.

200th National Water Level Observation Network Station Installed in Alabama

As part of NOAA's 200th anniversary celebration in 2007, NOAA representatives joined other Federal, state, and local officials in Mobile, AL, to mark the installation of the agency's 200th National Water Level Observation Network (NWLON) station at the Port of Alabama State Docks. Operated by NOS, the NWLON station provides mariners, first responders, and the public with real-time tide and water-level information. The State Docks station is a key component of NOAA's Mobile Bay Physical Oceanographic Real-Time System (PORTS®), also installed in 2007. The Mobile PORTS® consists of three water-level stations, two current meters, three



NOAA is responsible for providing real-time data and other navigation products to promote safe and efficient navigation within U.S. waters. In 2007, NOS installed the 200th National Water Level Observation Network station on Pier A at the Port of Alabama State Docks. The State Docks station is a component of the Mobile Bay NOAA Physical Oceanographic Real-Time System (PORTS®), which was also installed during 2007.

meteorological packages, and a salinity sensor. PORTS® provides pilots, shippers, and agents with real-time information to facilitate vessel safety, reduce transit delays, and optimize cargo carriage.

Updating Alaska's Nautical Charts

In 2007, NOS completed an analysis of the charted features off the coast of Alaska,



Boats in Sitka, AK.

leading to an official baseline in accordance with international law. The baseline marks the definitive position and limits of the U.S. territorial sea off the Alaskan coast. These data are extremely important for applying fishing and maritime laws. As a result of this four-year project, NOAA will update the newly established maritime zones on approximately 200 nautical charts of Alaska.

Boston Shipping Lanes Shifted to Reduce Collisions between Ships and Whales

Years of effort by NOAA and the U.S. Coast Guard paid off when, for the first time in the United States, ship traffic lanes were shifted to reduce the risk of collisions between large ships and whales. As of July 1, 2007, ships transiting in and out of Boston Harbor traveled a different path through the Stellwagen Bank National Marine Sanctuary to avoid waters where whales – in particular, the highly

endangered North Atlantic right whale – tend to concentrate. NOAA scientists did an extensive study of ship traffic and whale behavior to devise this measure, which provides a much safer environment for both the ships and the whales, while being the least disruptive to the economy. The International Maritime Organization, a specialized agency of the United Nations that addresses issues pertaining to international shipping traffic, approved the proposed lane revision in December 2006. Approximately 3,500 ships transit within the Sanctuary every year.

Marine Reserves Established in Channel Islands National Marine Sanctuary

In 2007, NOS established the Federal portion of the marine reserves and conservation area network within the Channel Islands National Marine Sanctuary. As the largest network of marine reserves



The network of marine zones in the Federal waters of the Channel Islands National Marine Sanctuary will protect marine habitats and organisms within the Sanctuary. The Channel Islands are known as the Galapagos of North America for their rich biodiversity and endemic species found nowhere else in the world. Credit: Robert Schwemmer.

in Federal waters in the continental United States, it will help maintain natural biological communities, habitats, and ecological processes. The State of California established a network of marine reserves and conservation areas within the State waters of the sanctuary in 2003.

Papahānaumokuākea Marine National Monument Celebrates First Anniversary

In 2006, President George W. Bush created the world's largest fully protected marine conservation area in the Northwestern Hawaiian Islands to protect the area's pristine islands, coral reefs, unique native species, and cultural and historic resources. In the year since the designation of the Papahānaumokuākea Marine National Monument, significant steps have been taken to implement the President's action, including interagency cooperative

agreements, education and outreach efforts, and research. In August 2006, the co-trustee agencies, including NOAA, the Department of the Interior's Fish and Wildlife Service, and the State of Hawai'i, published joint regulations to implement the President's proclamation and ensure resource protection. In April 2007, the United States submitted proposals to the International Maritime Organization that, if implemented, will help reduce threats to the monument posed by international shipping. In addition, the State of Hawai'i, with the support of NOAA and the Fish and Wildlife Service, submitted an application nominating the monument to be considered for the U.S. World Heritage Tentative List.

West Coast Pilot Project on Marine Protected Areas Launched

The Marine Protected Areas (MPA) Center launched a pilot project with the states of



A NOAA diver checks the health and abundance of one of the many coral reefs of Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands. Credit: NOAA National Marine Sanctuary Program.

California, Oregon, and Washington, other Federal agencies, and tribes to design and manage a regional system of MPAs on the West Coast. Last year, government partners, including Federal agencies, states, and tribes, met to share their understanding of place-based management in the region and began to identify activities to enhance MPA planning and management. In the last year, the MPA Center worked with other offices within NOS to conduct an ecological characterization for the region; additional analyses of human uses, ocean governance, and cultural resources are under way.

Strengthening the Gulf of Mexico Alliance

Throughout the last year, NOS provided Federal leadership for the increasingly successful Gulf of Mexico (GOMEX) Alliance. The states of Alabama, Florida, Louisiana, Mississippi, and Texas initiated the GOMEX Alliance in 2004 with the goal of significantly increasing regional collaboration to enhance the environmental and economic health of the Gulf of Mexico. In 2006, the Alliance released the *Governors' Action Plan for Healthy and Resilient Coasts*, a statement of action endorsed and signed by all five Gulf State Governors and the Chairman of the U.S. Council on Environmental Quality. NOAA played a key role in developing the plan, which identified five priority issues for the region that can be effectively addressed through increased collaboration at the local, state, and Federal levels. The identified issues are: water quality for healthy beaches and shellfish beds; wetland and coastal conservation and restoration; environmental education; identification and characterization of Gulf habitats; and reduction of nutrient inputs to coastal ecosystems. The Alliance also coordinates closely with the Gulf of Mexico States Accord to facilitate eventual collaboration with the six Mexican Gulf of Mexico states. NOAA co-chairs the Gulf of Mexico Regional Partnership

Federal Workgroup together with the U.S. Environmental Protection Agency; 11 other Federal agencies participate in the Workgroup.

Future of Coastal Zone Management Envisioned

Last year, NOS teamed with the Coastal States Organization to envision the future of coastal management as part of the Coastal Zone Management Act reauthorization process. The partners systematically gathered stakeholder input regarding what is and is not working in coastal management and what they might do to improve the process, both collectively and



In the United States, coastal communities constitute only 17 percent of the total land area (not including Alaska), but account for 53 percent of the total population. Continued growth in coastal communities, such as this area in North Carolina, will present new challenges for coastal managers as they seek ways to balance environmental, economic, and human health.

as individual agencies. In May and June 2007, stakeholder meetings were held in Boston, Atlanta, Chicago, Honolulu, and San Francisco, followed by meetings with Federal partners and Congressional staff. More than 400 people participated, including NOAA staff, other Federal and state partners, nongovernmental organizations, industry, academia, and private citizens. Overall, participant responsiveness was positive and enthusiastic, expressing interest in a variety of topics including public access, pollution, and urban development.

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 periodically 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.

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, water quality and quantity, and community resilience. For example, geographic information system maps of coastal habitats and data about storms and other risks help coastal managers mitigate a range of potential hazards. NOS is also developing its capability to produce science-based ecological forecasts and scenarios that assist coastal managers and decision makers in choosing the best management actions (such as shellfish closures and harmful algal bloom forecasts along the western coasts of Florida). An Integrated Ecological Assessment (IEA) is a synthesis and quantitative analysis of information on relevant physical, chemical, ecological, and human processes that affect an ecosystem. It is an invaluable tool to enable coastal managers to employ an ecosystem-based approach to managing the resources under their responsibility.

Real-time Data

NOS provides the national infrastructure, science, and technical expertise to monitor, assess, and distribute tide, current, water level, and other coastal oceanographic products and services. By providing real-time information about water levels, tides and currents, salinity, and weather conditions in ports, the Physical Oceanographic Real-Time System (PORTS®) mitigates coastal hazards and minimizes delays in marine transportation. Recreational boaters also use PORTS® to avoid groundings and collisions during inclement weather. Through its Phytoplankton Monitoring Network and Analytical Response Team, NOS provides remote-sensing real-time observations that assist in the identification of harmful algal blooms and associated marine biotoxins. NOS also disseminates, in real time, bulletins forecasting HAB movement and land fall. The products assist resource and public health managers in taking actions to protect coastal communities. Other NOS programs such as National Estuarine Research Reserves and National Marine Sanctuaries have deployed instruments and buoys that measure real-time oceanographic, atmospheric, and water-quality parameters. NOAA's Integrated Ocean Observing System Program is helping advance data coordination and integration and is supporting regional ocean observing systems.

Unique Ocean and Coastal Areas

NOS manages a system of 13 national marine sanctuaries, the Papahānaumokuākea Marine National Monument, and 27 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. NOAA also works in partnership with 34 coastal and Great Lakes

states, territories, and commonwealths to preserve, protect, develop, and, where possible, restore and enhance the Nation's coastal zone resources. Additionally, the Coral Reef Conservation Program supports effective management and sound science to preserve, sustain, and restore valuable coral reef ecosystems.

Height Modernization

NOS manages the Height Modernization Program, which provides accurate height information by integrating Global Positioning System (GPS) technology with existing survey techniques. For years, GPS has been used to determine accurate horizontal positions (latitude and longitude), but now, by following Height Modernization standards, specifications, and techniques, GPS can efficiently establish accurate elevations for all types of positioning and navigational needs.

Precise Positioning

NOS manages the National and Cooperative CORS (Continuously Operating Reference Stations) program. CORS comprises a nationwide network of permanently operating Global Positioning System (GPS) receivers. NOS provides access to GPS data from this network free-of-charge via the Internet. The program's primary objective is to enable GPS users to determine precise positional coordinates relative to the National Spatial Reference System. Through CORS, users can achieve centimeter-level accuracy by post-processing several hours or minutes of their GPS observations together with data from the CORS network. There are currently over 1,200 CORS established and maintained by 190 partner organizations.

FUTURE OUTLOOK

NOS envisions America as a place that fosters safe, healthy, and productive oceans and coasts for ecology, heritage, and economy. To achieve this outcome, NOS will continue to:

- Implement the U.S. Ocean Action Plan and encourage an ecosystem approach in coastal and marine resource management.
- Strengthen state and Federal partnerships for managing America's coasts.
- Develop an integrated vision for improved coastal science and management and identify methods for improving program implementation at the state and national levels.
- Protect unique places in our oceans and along our coasts that are essential pieces of the fabric of America's heritage and culture.
- Conduct natural resource damage assessments and provide ecological forecasts.
- Lead the Nation in coral reef conservation, management of marine protected areas, integrated ocean and coastal management, and strategic ocean governance.
- Deliver products and services from our core capabilities in observing systems; data acquisitions, assimilation, and application; mapping and charting; marine transportation; and geodetic positioning services.
- Reduce human risk and environmental and economic consequences resulting from natural or human-induced emergencies.
- Lead the development and implementation of an Integrated Ocean Observing System.

NOS will achieve these outcomes by leveraging resources in partnerships with other Federal agencies; state, regional, and tribal institutions; public, private, and international organizations; and others.

National Marine Fisheries Service

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

NOAA's National Marine Fisheries Service (NOAA Fisheries Service) is dedicated to the stewardship of our Nation's living marine resources and their habitats through scientific research, fisheries management, law enforcement, and habitat conservation. NOAA Fisheries Service is a world leader in fisheries research, providing a sound scientific foundation for the stewardship of living marine resources. NOAA Fisheries Service is also a leading voice for commercial and recreational fisheries from the Atlantic Ocean to the Gulf of Mexico to the Pacific Ocean. We couple our interdisciplinary expertise in biological, physical, and social sciences with our talents in information technology to monitor, assess, and predict the status and trends of marine stocks, their natural environment, and the socioeconomic benefits they provide. We will continue to focus on conservation, management, and sustainable development as we face new challenges in the 21st century.

ACCOMPLISHMENTS

NOAA Exercises International Leadership in Fisheries Management

During FY 2007, NOAA continued to exercise strong international leadership and achieved results that advanced broad U.S. objectives for effective conservation and management of living marine resources. NOAA officials led U.S. delegations to meetings of international fisheries organizations and arrangements, such as the Inter-American Tropical Tuna Commission, the Western and Central Pacific Fisheries Commission, the Northwest Atlantic Fisheries Organization, and the North Atlantic Salmon Commission. NOAA staff served as chair of important international groups: Dr. William Hogarth, the former Assistant Administrator for Fisheries, served as Chairman of the International Whaling Commission and as chairman of the International Commission for the Conservation of Atlantic Tunas; Greg Schneider served as Chairman of the Organization for Economic Development Committee on Fisheries. At the first- ever joint meeting of the world's five Tuna Regional Fisheries Management Organizations (RFMOs) in January 2007, U.S. leadership resulted in agreement to improve RFMO effectiveness and



Beach and dune construction, Chaland Headland, October 2006. Credit: Weeks Marine, Inc.

coordination. At the 2007 Conference of Parties to the Convention on International Trade in Endangered Species, a U.S. proposal to list all species of sawfish was adopted. At the 27th Meeting of the Food and Agriculture Organization Committee on Fisheries, U.S. leadership resulted in the advancement of a number of significant U.S. objectives, including addressing the effects of fishing on the

marine environment and deterring illegal, unregulated, and unreported fishing. At the May 2007 meeting of the International Whaling Commission, NOAA leadership resulted in the renewal of U.S. five-year aboriginal subsistence whaling catch limits for bowhead and gray whales. NOAA was also instrumental in ongoing efforts to create non-tuna conservation and management regimes in the Northwest Pacific and South Pacific regions.



Sand fencing and installed native vegetation, Chaland Headland, April 2007. Credit: NOAA

NOAA Aids in the Recovery of Fisheries and Fishing Communities

NOAA funded and conducted a number of activities aimed at helping Gulf Coast fisheries recover from the devastating impacts of Hurricanes Katrina, Rita, and Wilma, which struck the Gulf Coast in 2005. Through two cooperative agreements with the Gulf States Marine Fisheries Commission, NOAA awarded the Gulf Coast states about \$85.0 million in emergency supplemental funds for fishery-related hurricane recovery activities. This is in addition to the \$127.3 million provided to the GSMFC for Hurricane recovery efforts



Red Snapper (Lutjanus campechanus). Credit: Illustration by Diane Rome Peebles; provided courtesy of Florida Fish and Wildlife Conservation Commission

in 2006. The states are using these funds to restore and rehabilitate oyster, shrimp, and other marine fishery habitats damaged or destroyed by hurricane events, and to conduct cooperative research and monitoring and other activities designed to recover and rebuild Gulf of Mexico fisheries and fishing communities.

NOAA also distributed nearly \$60 million in response to a fishery failure determination in the Klamath Basin. Of these funds, \$33 million has already been distributed to fishermen, processors, affected businesses, and others in California and Oregon.

NOAA Improves the Management and Sustainability of Atlantic Herring and Red Snapper Through Limited Access Programs

NOAA Fisheries Service implemented limited access programs for the Atlantic herring fishery (an important provider of herring for human consumption and for lobster bait) and for the Gulf of Mexico red snapper fishery. The Atlantic herring program was developed by the New England Fishery Management Council in conjunction with NOAA to ensure the continued participation of major historical fishery participants while capping fishing effort. This program protects the sustainability of the herring resource and

the valuable American lobster fishery, and ensures adequate protection of herring, which are forage for whales, tunas, and other valuable marine species. The red snapper program is an Individual Fishing Quota (IFQ) program intended to improve social and economic conditions in this fishery by reducing the number of fishermen competing for the commercial red snapper quota, while increasing fishermen's ability to make sound business decisions. IFQ programs are a type of limited access privilege program that provide individual fishermen or corporations the exclusive privilege to harvest a certain percentage of a fishery's total allowable catch.

NOAA Scientists Discover New Species of Marine Life

NOAA Fisheries Service scientists led a team of world-renowned taxonomists on a three-week expedition in the Hawaiian Islands that found several potentially new species of crabs, corals, sea cucumbers, sea quirts, worms, sea stars, snails, and clams. From this expedition, well over 100 new species records will likely be identified for French Frigate Shoals in the Papahānaumokuākea Marine National Monument. The expedition was part of the international Census of Marine Life's Census of Coral Reef Ecosystems (CReefs), and was the first in a series of proposed coral reef surveys to take place around the globe, led jointly by Scripps Institution of Oceanography at the University of California–San Diego, Australian Institute of Marine Science, and NOAA. The goal of the expedition was to conduct biodiversity surveys, with a focus on small marine organisms (invertebrates, algae, and microbes). Over 50 sites were surveyed throughout the atoll using a variety of ingenious collection methods including baited traps, brushing of rubble, underwater vacuuming with gentle suction, plankton tows, light traps, and sediment and water sampling. These methods were

meticulously developed over the course of a year to minimize impact to the environment.

NOAA Project Named One of America's "Top Restored Beaches"

NOAA's Chaland Island project in Louisiana's Plaquemines Parish was recently named one of America's "Top Restored Beaches" by the American Shore and Beach Preservation Association. Despite delays caused by Hurricane Katrina, NOAA is on schedule to complete the first phase of an 800-acre barrier island project that will help protect Louisiana's coastal communities from the devastating effects of wind, waves, and flooding associated with these types of storms, which together with human factors, have caused severe erosion of the shoreline. In the largest island restoration project ever done by NOAA, workers are mitigating the effects of erosion by dredging and performing major earth-moving activities on Chaland Island to create beach and marsh habitat.

NOAA and Partners Set The Course for Salmon Recovery in Puget Sound

NOAA Fisheries Service approved a far-reaching plan to recover threatened Chinook salmon in the Puget Sound region of Washington State. This salmon recovery plan, required under the Endangered Species Act (ESA), is one of the largest and most comprehensive ever approved by the Federal Government. Although recovery plans for threatened and endangered species are typically written by federal officials, the Recovery Plan for Puget Sound Chinook Salmon was developed during more than five years of cooperative efforts by local stakeholder groups. NOAA is conducting recovery planning in conjunction with Shared Strategy for Puget Sound, a coalition of local citizens, tribes, technical experts, and policy-makers engaged in building a practical, cost-effective recovery plan endorsed by the people living and working in the watersheds of Puget Sound. This plan sets the course for bringing

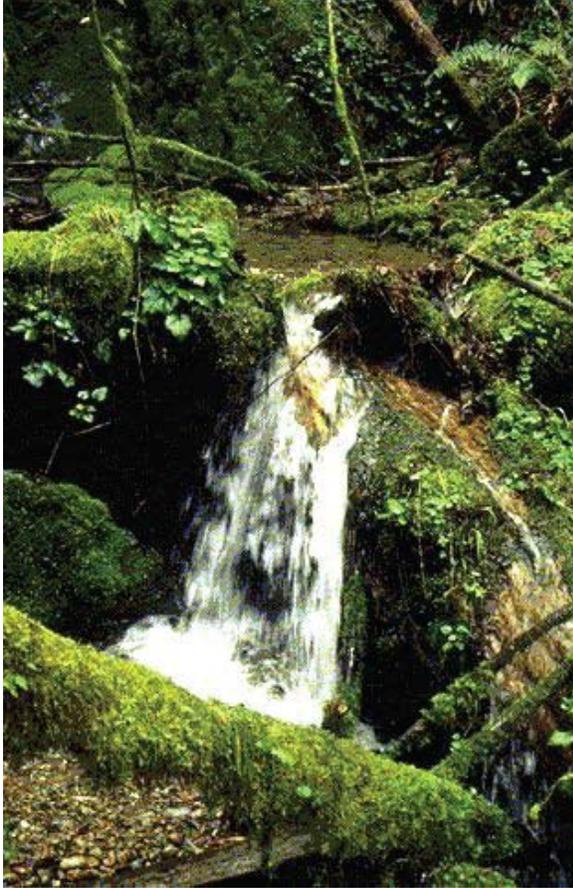
salmon back to a healthy population size in Puget Sound, and integrates the management of habitat, harvest, and hatcheries—the "three Hs" considered key to salmon recovery.

NOAA Issues Guidance Allowing Councils Flexibility in the Design and Use of Limited Access Privilege Programs

NOAA Fisheries Service developed a technical memorandum to provide guidance to the Regional Fishery Management Councils on the design and implementation of Limited Access Privilege programs (LAPP) for federally managed fisheries allowed by the recently reauthorized Magnuson-Stevens Act. The philosophy underlying the document is that the Councils should have as much latitude as possible in the design of fishery management plans. This flexibility pertains to the choice of whether to use a LAPP approach, and if so, to the type and the construction of that program. This document provides information on the important issues that must be addressed for each of the allowable types of LAPPs, and discusses the pros and cons of various options for addressing those issues. The document was developed in a transparent and collaborative process by NOAA and the Councils.

Innovative Ecosystem Agreement Aids Atlantic Salmon Recovery

NOAA Fisheries Service signed the 2007 Saco River Fisheries Assessment Settlement Agreement, an ecosystem approach to river management with coastal community participation that protects habitat and NOAA trust resources from priority threats. The Settlement provides upstream and downstream fish passage measures for several species in the Saco River; creates studies evaluating fish passage and management needs; and enhances Atlantic salmon stocking efforts throughout



Green Diamond land to benefit from the Habitat Conservation Plan, Northern California. Credit: Green Diamond Resource Company

the Maine watershed. In addition, the Settlement eliminates a previous challenge to fishway prescriptions and resolves similar issues that might be subject to future trial-type challenges at five other dams.

Innovative Habitat Conservation Plan Ushers In “New Era” With Timber Industry

NOAA Fisheries Service, in cooperation with Green Diamond Resource Company and the U.S. Fish and Wildlife Service, developed and approved a habitat conservation plan to conserve ESA-listed salmon and steelhead trout on Green Diamond’s timberlands in northern California that minimizes and mitigates the effects of Green Diamond’s commercial timber management practices, providing

the company with regulatory assurances that enhance its ability to make long-term investments, thus allowing the company to remain competitive while becoming a better environmental steward. A local newspaper editorialized that with this plan “the relationship between the timber industry and environmentalists has entered a new era.” This 50-year plan covers 416,000 acres critical to the support and recovery of these species. It focuses on enhancing and extending habitat by protecting streamside areas, avoiding surface erosion and land sliding, accelerating improvement of old and poorly designed roads, and opening access to spawning and rearing habitat that was previously blocked or naturally inaccessible.

NOAA Discovers New Cetacean Sounds Similar to Morse Code

In the past year, NOAA Fisheries Service researchers described a new kind of dolphin communication. The sound consists of repeated patterns of “burst pulses” of varying lengths. A burst pulse is a series of echo-location clicks that are so close together that they make a continuous buzzing sound. The repeated patterns of these clicks are closer to Morse Code than they are to any previously described type of dolphin call. So far, this type of sound appears to be made only by northern right whale dolphins. It is still not clear how the dolphins use this sound, but the sound is likely to be useful to NOAA researchers in acoustically identifying this species at sea. A paper describing this discovery was published in the *Journal of the Acoustic Society of America*.

NOAA’s Scientific Collaboration with Industry Improves Management of Key Recreational Fishery

In partnership with fishermen, NOAA Fisheries Service has developed a non-lethal surveying technique to assess the habitat and stocks of selected rockfish species in two marine conservation areas

recently created in the Southern California Bight. Because this method involves collaboration with the fishing industry, the industry is supportive of the results, making management less contentious. Marine sportfishing in Southern California is a huge industry, in excess of \$200 million annually, and non-lethal fish surveying techniques are key to maintaining rockfishes and other overfished species because they are estimated at or below 25 percent of their pristine levels. The new survey method combines the information obtained from multi-frequency echo sounders mounted on Commercial Passenger Fishing Vessel (CPFV) vessels with images captured by video and still cameras deployed from a remotely operated vehicle, exploiting the advantages of each measurement technology.

NOAA Celebrates the International Polar Year (IPY) with Important Antarctic Research

NOAA's Antarctic Marine Living Resources (AMLR) Program is charged with providing the scientific information needed to conserve and manage the marine living resources in the oceans surrounding Antarctica. The United States is the leading consumer of Antarctic marine resources, including 80 percent of the imported Patagonian and Antarctic toothfish (Chilean sea bass). AMLR data is valuable to the nation's commitment to the international treaty to preserve the Antarctic as its 21-year long-term data stream can be used to provide a unique historical perspective to IPY research. AMLR has become a most comprehensive research program that utilizes land, sea, and space-based platforms to gather information on the environment and ecology from the northern end of the Antarctic Peninsula, and through cooperation with our international



Vermilion rockfish. (Sebastes miniatus) off the Channel Islands, California Credit: Fisheries Research Division, Southwest Fisheries Science Center, NOAA Fisheries Service

partners, relates this to the well being of the Southern Ocean. The program's mission of tracking the food web relationships between Antarctic krill and its predators, as well as collecting environmental data under changing sea ice conditions, is critical to managing these resources wisely. Completing its 21st year of land-based and ship-based research in the Antarctic, an AMLR-chartered vessel traveled approximately 3,250 nautical miles, allowing researchers to document population distribution patterns of finfish and crab species and place tracking tags on marine mammals to investigate annual survival rates. From these data, researchers can get an idea of what is occurring in the animals' environment over long distances and time periods.

Beginning to Flow: First Projects Completed under NOAA's Open Rivers Initiative

In its first year, NOAA's Open Rivers Initiative (ORI) completed three projects that restored over 30 miles of spawning and rearing habitat for migratory fish. The obsolete Brownsville Dam, located on the Calapooia River in Oregon, was removed in August 2007, effectively



The NOAA-chartered research vessel R/V Yuzhmorgeologiya, as seen from NOAA's summer field camp at Cape Sheriff (Livingston Island), in the Antarctic peninsular region. Credit: Mike Goebel, Antarctic Ecosystem Research Division, Southwest Fisheries Science Center, NOAA Fisheries Service

eliminating an obstruction to migratory fish and a safety hazard to the local human community. In California, two failing and undersized culverts were removed, allowing endangered salmon to reach their historic spawning and rearing grounds. In collaboration with local communities, ORI will continue to restore free-flowing river systems and yield unimpeded fish passage to historic habitat by removing obsolete dams and barriers that dot the rivers of coastal states.

Future Outlook

NOAA Fisheries Service has the stewardship responsibility for the world's largest Exclusive Economic Zone. Healthy and productive coastal, marine, and Great Lakes ecosystems create billions of dollars of value in recreational and commercial activity each year. New legislation, evolving management philosophies, and scientific advances have created new opportunities for managing the Nation's living marine resources. The Administration's U.S. Ocean Action Plan identifies and supports an ecosystem approach to management and clearly states that an effective U.S. ocean policy must be grounded in an understanding and management of ecosystems. This ecosystem approach is the cornerstone of the management tools that will lead NOAA Fisheries Service to meet its immediate and long-term goals, including:

- Implementing the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006
- Ending overfishing
- Reducing bycatch and discards
- Increasing the number of Limited Access Privilege Programs to 16 by 2011
- Securing passage of an offshore aquaculture bill

- Providing effective conservation under the Endangered Species Act and the Marine Mammal Protection Act
- Ensuring effective science and management
- Strengthening environmental compliance for national defense and energy-related activities in our oceans and coastal areas
- Being an environmental leader domestically and internationally
- Promoting healthy coastal habitats in support of fisheries and environmentally and economically resilient coastal communities.

NOAA Fisheries Service will also work collaboratively with other agencies and organizations on an ecosystem-based approach to develop indicators of ecosystem status and trends, and joint strategies to address regional ecosystem priorities. NOAA Fisheries Service will continue to adopt the necessary tools to meet all of its goals well into the future and will apply fiscal and programmatic resources wisely to ensure the integrity of the Nation's marine ecosystems for the sustained socioeconomic, environmental and cultural benefit of all Americans.

PRODUCTS AND SERVICES

Managing the Nation's Fisheries

NOAA Fisheries Service management supports an industry that contributes \$35 billion annually

to the U.S economy. It is guided by more than 100 Federal laws, including the

Magnuson-Stevens Fishery Conservation and Management Act, the Marine

Mammal Protection Act, and the Endangered Species Act.

Products: Status of U.S. Fisheries annual report; fishery management plans

Supporting American Anglers

NOAA Fisheries Service recognizes the value and contributions of recreational fisheries to the U.S. economy and has begun the process to modernize the Agency's recreational data collection program by establishing a national registry of saltwater anglers.

Agency scientists and managers are collaborating with partners in the recreational fishing industry to design a new, statistically sound data collection program for our Nation's marine recreational fisheries.

Products: Marine Recreational Information Program

Protecting Marine Mammals and ESA Listed Marine Species

NOAA Fisheries Service works to protect marine mammals and sea turtles under its jurisdiction. Many of these species are affected by fishing and other human impacts, as well as environmental changes. Several innovative programs – recovery plans, ship strike strategies, stranding networks, and rehabilitation efforts – are working to restore threatened and endangered marine animals to healthy populations.

Products: MMPA Annual Report; ESA Biennial Report; recovery plans

Maintaining Healthy Ecosystems

NOAA Fisheries Service leads regional and community-based efforts to protect and restore habitat vital for healthy ecosystems and sustainable populations of protected and harvested species. Riverine, coastal, and ocean habitats support our Nation's fisheries and are home to dozens of imperiled species. Scientists and managers address threats to habitat posed by natural events and human activities, recommending improvements to proposed development

plans to protect vital habitat. The Agency also restores degraded habitat and works to address threats from aquatic invasive species.

Products: Restored and protected habitats; extended fish passage; stewardship training

Working Globally Toward Healthy and Productive Oceans

NOAA Fisheries Service has strong domestic programs that give the Agency credibility and a platform to engage and persuade other countries to take a stronger conservation approach to fisheries management to end overfishing throughout the world's oceans. In addition, the Agency leads efforts to curtail illegal, unregulated, and unreported fishing throughout the world.

Products: International management agreements; tariff and trade agreements

Achieving World-Class Science

NOAA Fisheries Service is the leader in providing world-class science programs that continue to improve with the adoption of robust scientific peer reviews and the continued development of an ecosystem approach to managing our Nation's marine resources. In addition, the Agency conducts cooperative marine research with a number of Federal and state agencies, universities, fishermen and others to help develop sound fishery management measures.

Products: Fisheries of the U.S. annual report; Our Living Oceans

Enabling Sustainable Marine Aquaculture

NOAA's Aquaculture Program fosters additional domestic marine aquaculture production to meet the growing demand for safe, healthy seafood, create jobs in U.S. coastal communities, increase regional food supply and security, help restore depleted commercial and recreational marine

species, and help the Nation reduce its \$9.1 billion annual seafood trade deficit.

Products: NOAA's 10-Year Plan for Marine Aquaculture

Seafood Inspection Services

NOAA Fisheries Service provides a variety of professional inspection services to the seafood industry which ensure compliance with all applicable Federal food regulations. NOAA Fisheries Service is the only agency with the authority to bestow the U.S. Grade A mark for seafood. Annual participants include more than 2,500 importers and exporters.

Products: Seafood certified as safe

Law Enforcement

NOAA special agents and enforcement officers are charged with protecting the Nation's 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 applying "Community-Oriented Policing and Problem Solving" to promote voluntary compliance with the Magnuson-Stevens Fishery Conservation and Management Act.



John L. "Jack" Hayes, Ph.D.
Assistant Administrator

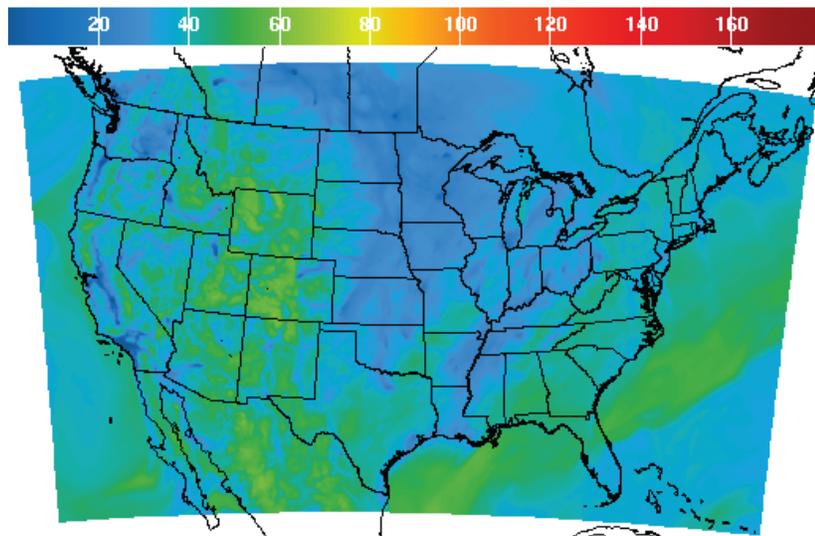
National Weather Service

Science and Service for Protecting Lives,
Livelihoods, and Your Way of Life

Each year, the United States averages some 10,000 thunderstorms, 5,000 floods, 1,000 tornadoes and six deadly hurricanes, as well as widespread droughts and wildfires. Some 90 percent of all presidentially-declared disasters are weather-related, causing approximately 500 deaths per year and \$14 billion in damage. About one-third of the U.S. economy – some \$3 trillion – is sensitive to weather.

NOAA's National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure that can be used by other governmental agencies, the private sector, the public, and the global community.

Weather services cost each American about \$5 a year—roughly the price of a fast-food meal. This investment allows NWS to issue climate, public, aviation, marine, fire weather, air quality, space weather, river, and flood forecasts and warnings every day. NWS has approximately 4,800 employees in 122 weather forecast offices, 13 river forecast centers, nine national centers, and other support offices around the country.



1Hr Avg Ozone Concentration(PPB) Ending Mon Oct 29 2007 12PM EDT
(Mon Oct 29 2007 16Z)



National Digital Guidance Database

06z model run Graphic created-Oct 29 8:34AM EDT



The NWS annual budget of approximately \$881 million in 2007 supports a national infrastructure to gather and process data worldwide from the land, sea, and air. This infrastructure includes collecting data using technology, such as Doppler weather radars; satellites operated by NOAA's National Environmental Satellite, Data and Information Service; data buoys for marine observations; surface observing systems; and instruments for monitoring space weather and air quality. These data feed sophisticated computer models running on high-speed supercomputers. NWS's highly trained and skilled workforce uses powerful workstations to analyze all of these data and issue forecasts and warnings. High-speed communications tie this information infrastructure together and disseminate forecasts and warnings to the public. NWS staff also use trained community volunteers to enhance weather service operations. These observers collect weather data that become part of the nation's climate records, and citizen storm spotters provide NWS with visual confirmation of severe weather events.

As environmental information becomes more sophisticated, complete, and available to all, the public's environmental literacy becomes more important. NWS outreach and education activities focus on making sure the public understands the information NWS provides and can use it effectively in the decisions they make.

FY 2007 ACCOMPLISHMENTS

New Community Hydrologic Prediction System Successfully Demonstrated

NOAA National Weather Service, Office of Hydrologic Development (OHD) completed the first successful demonstrations of pilot components of the new Community Hydrologic Prediction System (CHPS) at the Northwest River Forecast Center in Portland, OR during April 2007 and at the

California-Nevada RFC in Sacramento, CA during July 2007. The CHPS is a modern software infrastructure, built on standard software packages and protocols, and open data modeling standards. It is designed to provide the basis from which new and existing hydraulic and hydrologic models and data can be shared within a broader hydrologic community. Developed using a "service oriented architecture," an emerging standard for large-scale system design, the CHPS enables scientists and programmers to work together and rapidly transition new innovative analyses and forecast techniques. For example, the system can be used to efficiently develop new water quality models from the drawing board to operational deployment. The CHPS provides a new business model in which members of the hydrologic community, including other agency and academic collaborators, can operate more collaboratively through the sharing and infusion of advances in science and new data.

Web-Based Product Brings Weather Forecasts Instantly to Fire Agencies

The Fire Weather Dynamic Point Forecast Matrix (PFM), an experimental web-based product, is helping land managers and fire agency officials better plan for and manage fire activity, from prescribed burns to large wildfires. Activated in January 2007, PFM is available across the Western United States. It provides dynamic forecast updates with enhanced usability for fire management,



A wild fire in Wyoming.

including Lightning Activity Level, Haines Index and smoke management variables. More efficient fire administration results in cost savings to the nation and improved management of public lands and forest ecosystems. A typical weather forecast is produced for seven days— every three hours for the first three days and then every six hours for the last four days. With PFM's web-based tool fire agencies can click a map and receive a Dynamic Forecast generated from the latest information available.

NOAA Weather Radio Activities: Meeting the Expectations of the Nation for Weather and All Hazard Warning Information

NOAA Weather Radio All Hazards is a reliable and inexpensive means of communicating weather, hazard, and emergency information directly to the public. The network infrastructure consists of over 972 broadcast stations covering 98 percent of the nation's population. It can deliver messages to millions through the Emergency Alert System, monitored by television and radio license holders, as well as to individuals monitoring their own receivers.

The network is required to broadcast to all areas in the U.S. identified as being at high risk of experiencing severe weather, and to sustain a high level of reliability and maintainability in those areas. NOAA categorizes 248 areas in the U.S. as being at high risk of experiencing severe weather events including tornados, hurricanes, flash floods, flooding, severe winter weather, and severe marine weather. To achieve 100 percent coverage of these areas, NOAA added 17 broadcast stations to the network during 2006 and 2007. NOAA also refurbished 62 broadcast stations with technology upgrades that significantly improve reliability and availability while reducing maintenance costs. Refurbishing these older broadcast stations and installing

new broadcast stations allows the network to meet expectations of availability as the nation's weather and all hazard warning system.

NOAA Triples its Water Vapor Data to Improve its Weather Predictions

NOAA expects a three-fold increase in atmospheric measurements to improve the accuracy of a variety of weather watch, warning, and forecast products, thanks to an expanded network of aircraft-mounted sensors on board several commercial air-carriers. In June 2007, NOAA National Weather Service enhanced its data collection capabilities with the purchase of 41 water vapor sensors for installation on Southwest Airlines 737s. It also and upgraded 25 sensors in place on



Photo of a water vapor sensor courtesy of SpectraSensors, Inc.

United Parcel Service 757s that currently collect wind, temperature and pressure. These systems now allow for a complete atmospheric profile from aircraft for use in NWS operations, providing a dramatic increase in the availability of data over the United States. NWS and Mesaba Airlines will also be installing 49 sensors on Mesaba's Saab 340 aircraft. Once fully operational, these sensors will produce over 600 soundings each day, more than triple the number currently available from the Rawinsonde network. This data will be ingested into National Weather Service numerical weather prediction models and

used directly by forecasters to support the watch, warning and forecast process.

NOAA Surpasses Goal for Increasing the Number of Heat Health Warning Programs in US Cities

Recognizing the danger of excessive heat conditions, NOAA has exceeded its goal for implementing the Heat Health Watch/Warning Systems (HHWSs). NOAA National Weather Service forecasters will use this system to help predict severe heat conditions that adversely affect human health and endanger life. In May 2007, NWS successfully implemented two HHWSs in San Francisco/San Jose, CA and Houston, TX. The California HHWS is a multi-city system with funding contributed by San Jose's Office of City Emergency Services, which helped NWS exceed its HHWS coverage goal for 2007. This brings the total number of HHWSs to 19, covering 29 cities.



NOAA image of DART buoy.

Expanding U.S. Tsunami Preparedness

The National Data Buoy Center (NDBC) is responsible for the expansion of the U.S. network of tsunami detection sensors. During the year, 14 Deep-Ocean Assessment and Reporting of Tsunamis (DART) buoys were established: four in the Western Pacific Ocean, three off the Pacific Coast of Central America, five in the North

Western Pacific Ocean, and two in the North Atlantic Ocean. This brings the total number of U.S. DART stations to 34. The DART project is an ongoing effort to maintain and improve the capability for the early detection and real-time reporting of tsunamis in the open ocean. DART is essential to fulfilling NOAA's national responsibility for tsunami hazard mitigation and warnings and providing for capacity building in the international tsunami community.

NWS also works with communities to prepare for tsunamis through the TsunamiReady Program. To date, there are 42 TsunamiReady sites in nine states, Puerto Rico and Guam. NWS reached its goal of recognizing 10 new TsunamiReady communities in FY 2007.

Satellites Find Cleaner Air Across the Eastern U.S.

A major smog-forming pollutant is declining over the eastern United States, according to a new study by scientists at NOAA and the University of Bremen, Germany. New satellite observations mark the first time space-based instruments have detected the regional impact of pollution controls implemented by coal-burning electric power plants in the 1990s. The findings were published in *Geophysical Research Letters*, a publication of the American Geophysical Union.

High-precision instruments aboard European satellites have detected a 38 percent decline in nitrogen dioxide in the Ohio River Valley and nearby states between 1999 and 2005, according to the study. Nitrogen dioxide (NO₂) and nitric oxide (NO) are two gases that form a group of pollutants known as nitrogen oxides (NO_x), which are created primarily through fossil fuel burning. When combined with other gases and sunlight, they form ozone, the major urban air pollutant in smog. Ground-level ozone harms human health and vegetation and is a key pollutant

targeted by the U.S. Environmental Protection Agency. Lead author of the study Si-Wan Kim, also of ESRL and CIRES, noted that the next step is to confirm through observations and further analysis that ozone is actually declining. "NOAA scientists and their colleagues have provided an objective assessment of the positive impact on Earth's atmosphere of actions taken by industry with the ultimate goal to improve air quality over the eastern United States," said Richard W. Spinrad, Ph.D., assistant administrator of NOAA Research. "This work is an excellent example of NOAA's value to society as an objective science broker."

NOAA National Weather Service Activates the New Climate & Weather Supercomputer

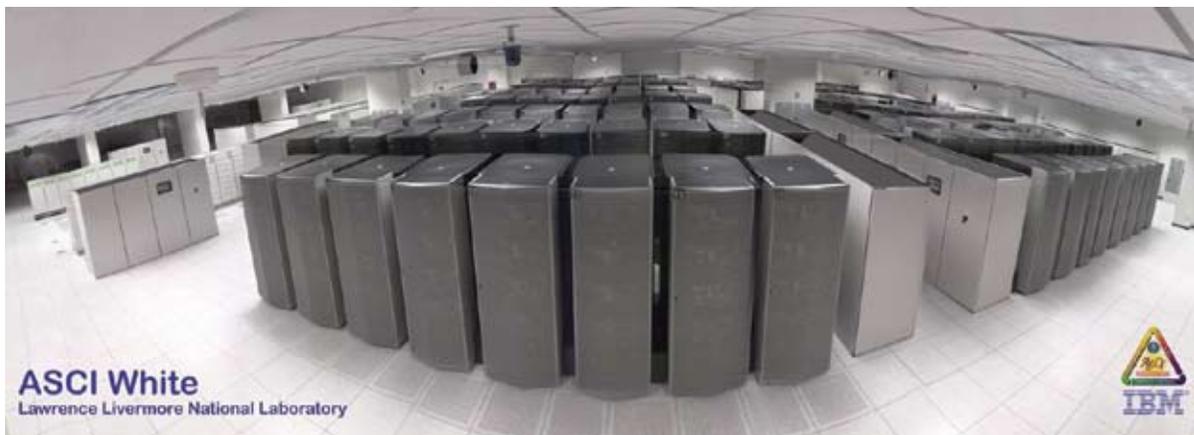
Improved models, better data, and faster computations driven through NOAA's newest supercomputer will result in more accurate, timely weather and climate forecasts. These new weather and climate supercomputers will increase the computational might used for the nation's climate and weather forecasts by 320 percent. The new IBM machines process 14 trillion calculations per second at maximum performance and ingest more than 240 million global observations daily.

The primary and back-up systems, ranked 36th and 37th in the world on the Top 500 list of the world's fastest computers, will enable NWS to deliver more products, with greater accuracy, at longer-lead times. The supercomputers will consume more data and generate highly advanced models that may enable meteorologists to begin making significant inroads in cracking hurricane intensity forecast challenges.

"NOAA's partnership with IBM is a great case study of the public and private sectors working together to save lives," said retired Navy Vice Adm. Conrad C. Lautenbacher, undersecretary of commerce for oceans and atmosphere and NOAA administrator.

Advanced Hurricane Model Aids NOAA Forecasters

Understanding hurricane intensity is one of NOAA's greatest challenges. To that end, The National Centers for Environmental Prediction implemented the Hurricane Weather Research and Forecast Model. The model became operational on June 19, 2007, and joined the Geophysical Fluid Dynamics Laboratory Hurricane Model to provide operational hurricane guidance forecasts for the 2007 hurricane season. The new model is designed to improve forecast accuracy by better addressing the intensity, structure and rainfall forecast problem, in addition to advancing wave



NOAA image of IBM supercomputers used for climate and weather forecasts.

and storm surge forecasts. “It is vital that we understand all the factors of hurricane forecasting throughout the life of a storm, and HWRF will provide an unprecedented level of detail. Over the next several years, this model promises to improve forecasts for tropical cyclone intensity, wave and storm surge, and hurricane-related inland flooding,” said Mary Glackin, NWS acting director. “It will be one of the most dynamic tools available for our forecasters.”

Over the next three years the model will be upgraded to include advanced data assimilation for the hurricane core, making use of observations from airborne Doppler radar and land-based radars, and will be coupled to an advanced version of the operational hurricane wave model. Additionally, a land surface component will improve forecasting of inland flooding problems associated with hurricane land falls.

National Data Buoy Center Deploys New Buoys to Improve Hurricane Forecasting



NOAA image of the map indicating the NOAA deployment two of eight new hurricane buoys.

The National Data Buoy Center (NDBC) established five new hurricane buoys in FY 2007 with an additional three to be deployed in October 2007 in the Caribbean Sea and the Atlantic Ocean. The hurricane buoys, “hardened” with redundant instruments, communication paths and power supplies, provide oceanographic and atmospheric data in areas of hurricane

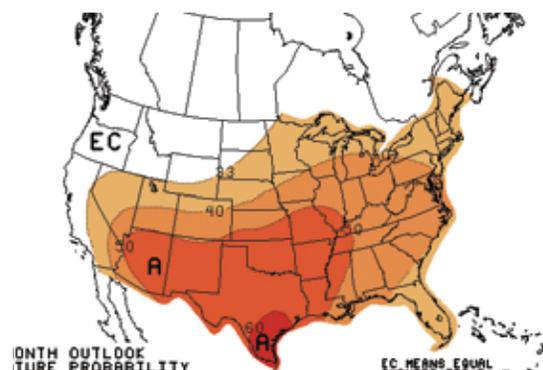
formation or along their subsequent travel paths. This data is provided directly to the National Hurricane Center and all weather-related agencies in hurricane-prone areas.

These buoys measure wind, wave, barometric pressure, and air and sea temperatures to determine hurricane formation or dissipation, extent of wind circulation, maximum intensity and center location. Hurricane buoys provide year-round data for analysis and forecasts of other marine disturbances but are more robust than other weather buoys because they contain an internal back-up system.

“We are in a period of an active hurricane cycle and this deployment equips our forecasters with an additional tool to track hurricanes and support our mission of saving lives and livelihoods,” said retired Navy Vice Admiral Conrad C. Lautenbacher, undersecretary of commerce for oceans and atmosphere and NOAA administrator.

NOAA Releases Local Temperature Outlook

NWS released its first official local climate outlook product for 1,000 locations nationwide including Alaska and Hawaii. The Local 3-Month Temperature Outlook augments current climate services by providing local-level outlooks. The forecasts are produced monthly for 13 three-month forecast periods. This new product will, for the first time, give the agricultural industry,



Temperature Outlook from the National Weather Service website

local government officials, and the public the ability to plan for longer-term temperature events. The forecasts are available on national and local NWS websites under the heading "Climate" (www.weather.gov/climate/l3mto.php).

Expanded Alaska Marine Weather Data Buoy Network Improves Marine Forecasts

Marine transportation and exports are a key driver of the Alaskan economy. Providing the Alaska maritime industry with timely and accurate marine weather forecasts is crucial to the operations and safety of the fleet. This presents a significant challenge because no other marine system in the U.S. has such extreme weather and climate, vast geographic distances (larger than the combined marine systems in the rest of the U.S.) and length of coastline (44,000 miles).

To help improve these marine forecasts, NOAA embarked on a multi-year program to build a comprehensive network of 19 marine weather buoys for the Alaska waters. On May 4, 2007, the final buoy was deployed in the central Gulf of Alaska. In addition, two Coastal Marine Automated Network stations have also been deployed in Alaska's treacherous maritime waters. The expansion of the Alaska Data Buoy Network has improved wind speed and wave height verification by 25 percent and 32 percent, respectively. This improvement is the largest since the beginning of electronic verification in the mid-1990s.

"Weather buoys provide not only marine forecasts and warnings, but they also play a significant role in science and research programs," said Senator Ted Stevens. "The expansion of the Alaska Data Buoy Network will help ensure mariners and the United States Coast Guard have the critical information they need to safely navigate our State's waters."

FUTURE OUTLOOK

NWS is looking to the future, to become, by 2015, an integrated environmental information service provider with expanded capabilities to contend with a more diverse set of high-impact environmental events. The NWS of 2015 will provide greater value by being a flexible and efficient service organization with the freedom at the local office to focus on high-impact events, collaborate easily and directly with other NOAA components and external partners, and maximize the value of new science and technology.

NWS is looking to evolve its services to meet society's changing weather, water, and climate needs while maintaining its role as the nation's preeminent environmental information services provider. It is taking steps to apply new technologies to meet the needs of the public and of users in a changing forum in public safety and to support stakeholders in the Weather Enterprise.

The goal is for NWS to provide a broad set of NOAA environmental information services in an easy-to-use format that are as highly valued and well known as the NWS hurricane warnings are today.

NOAA's NWS 2015 means:

- Providing superior, focused response for high-impact events
- Meeting the increasing demands for services in the digital age and beyond
- Stronger partnerships with all sectors
- Enhanced economic opportunities for private sector
- Accelerated academic and NOAA research to operations
- Accelerated science and technology infusion

Through services evolution, NWS aims to develop new high-impact decision support

services that are customer-focused to protect lives, livelihoods, and the standard of living Americans have come to expect.

PRODUCTS AND SERVICES

Local Warnings and Forecasts

NWS provides an integrated suite of warning and forecast products and services from its 122 weather forecast offices (WFO) located across the nation. Forecasters at the WFOs integrate multiple sources of observational data from radars, surface observing systems, weather data buoys, and satellites along with centrally provided weather prediction model guidance using advanced processing systems to generate these key products:

Public Weather – local forecasts and warnings of severe weather such as tornadoes, severe thunderstorms, flash floods, and extreme heat/cold

Aviation Weather – airport terminal forecasts, in-flight hazard warnings for turbulence, icing and convection

Marine – warning and forecast services for coastal waters, offshore, and Great Lakes

Fire Weather – routine fire weather forecasts and “red-flag” warnings; spot forecasts for wildfires; on-site fire support

Tsunami watches and warnings – issued from two tsunami warning centers based on a strengthened tsunami warning system consisting of Deep Ocean Assessment and Reporting of Tsunamis (DART) systems, seismic sensors, tide gages, inundation mapping/modeling, and community awareness and education.

Environmental Modeling & Prediction

The NWS National Centers for Environmental Prediction (NCEP) support the local warning and forecast process through centralized processing of weather observations, followed by the application

of high-resolution computer models of the atmosphere and oceans on NOAA supercomputers, and critical input by NCEP forecasters. NCEP’s weather and climate prediction model output and forecast products are also used directly by the public, industry, and the commercial weather enterprise to improve decision making across a wide range of applications, all impacting the nation’s economy. NCEP’s suite of forecast and prediction products range from minutes to one year in duration and include: national severe weather watches; space weather forecasts and warnings; hurricane advisories, watches, and warnings; precipitation forecasts; aviation area forecasts for the national airspace; seasonal outlooks and predictions; ocean predictions and high seas warnings, tsunami warnings, watches, and advisories, outlooks, climate forecasts, rainfall prediction and fire weather forecasts and outlooks.

Hydrologic Services

NWS provides river-flow and flood-forecast services using prediction models and databases at 13 River Forecast Centers (RFCs). This information is the basis for flash-flood and flood-warning programs implemented at WFOs. These services support emergency management and water resources activities. NWS is striving to provide water resource managers with localized water and soil condition forecasts via a national digital database incorporating all available hydrometeorological data and observations.

Air Quality Forecasting Services

NOAA provides operational production of air quality forecast guidance for ozone over the continental U.S. Its end-to-end forecast system provides timely, reliable forecast guidance to accurately predict the onset, severity and duration of poor air quality.



Richard W. Spinrad, Ph.D., CMarSci
Assistant Administrator

Office of Oceanic and Atmospheric Research

Outstanding Accomplishments in Research

The Office of Oceanic and Atmospheric Research (OAR) conducts preeminent research to provide value to society through improved weather and climate forecasts, enhanced navigation and aviation safety, and improved ocean and coastal services. From remote sensing to climate research and ocean exploration, our world-class scientists conduct research that contributes to public health and safety, healthy ecosystems, and a robust economy. Today, NOAA's research team is working with partners to build the foundation for Earth-system modeling which will provide a more complete picture of our planet and increase our capacity to predict changes in our oceans and atmosphere. Through research, NOAA studies the Earth system from the depths of the ocean to the upper reaches of the atmosphere. Research helps us understand and predict environmental changes on local to global scales and at time scales from minutes to millenia. OAR is integrated across three central research themes: climate; weather and air quality; and ocean, coastal, and Great Lakes resources.

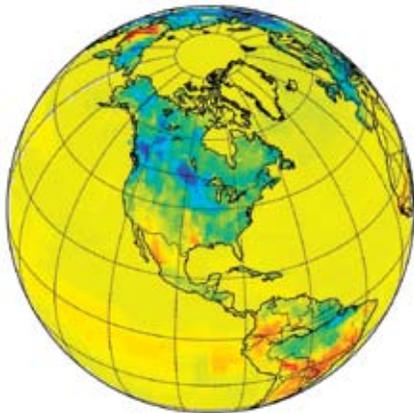
The NOAA research network consists of seven Federal research laboratories; an Office of Ocean Exploration and Research sponsoring both internal and extramural research; the National Sea Grant College program, a nationwide network (administered through NOAA), of 30 university-based programs that work with coastal communities; an Office of Weather and Air Quality to facilitate the transition of weather and air quality research to operations; a climate research grants program through the Climate Program Office; and 13 cooperative institutes with academia.

Ultimately, the information NOAA research provides is used by decision-makers at all levels to prevent the loss of human life and manage natural resources, while maintaining a strong economy.

ACCOMPLISHMENTS

NOAA is Major Contributor to IPCC Reports: Collective IPCC Effort Earns Nobel Peace Prize

Many NOAA scientists, as well as NOAA technology and models contributed to the IPCC climate science reports since the IPCC was established in 1988. For their collective efforts,



A graphical snapshot of the surface uptake of CO₂ across North America shows the strongest CO₂ sinks (blue colors) in the East Coast forests, coniferous forests in Canada and the U.S. Midwest. Note that the largest carbon cycle component, the fossil fuel emissions, is not shown on this map. The figure represents a week in July of 2005 and illustrates one of the many products in CarbonTracker, a new tool to monitor changes in atmospheric carbon dioxide and other greenhouse gases by region and source. CarbonTracker will enable users to evaluate the effectiveness of their efforts to reduce or store carbon emissions. (NOAA graphic)

the nearly 2,000 scientists who compose the IPCC were awarded the 2007 Nobel Peace Prize. The depth of NOAA's contributions in this international effort, highlight the preeminent science conducted by NOAA, providing observations, data, model simulations, analysis, authors and review editors. A cadre of NOAA scientists from the laboratories and programs, including the joint and cooperative institutes, served as contributors and government reviewers of the final report, which is a state-of-the-science analysis based on published peer-reviewed literature. Many of the IPCC efforts were supported by NOAA and the U.S. Climate Change Science Program.

In February 2007, the IPCC released the Summary for Policy Makers of the first chapter of the Fourth IPCC Assessment Report—The Physical Science Basis for Climate Change. NOAA's Earth System Research Laboratory Scientist Dr. Susan Solomon, co-chair of IPCC Working Group 1, was instrumental in the production of the report. Nine lead and review authors were NOAA scientists. NOAA observation networks, computer modeling labs, and research programs provided data and analysis.

Much of the data analysis for the report was directly related to NOAA's investment in enhanced computing power at the Geophysical Fluid Dynamics Laboratory (GFDL). These computing improvements made it possible for the lab to provide models runs to the IPCC that enhanced the projections in the report. GFDL contributed climate models, which couple the interactions of the atmosphere and the ocean to help understand climate phenomena on time scales of decades to centuries. The new models show improved resolution and can incorporate more sophisticated physical parameters.

Western Water Assessment to Identify Climate Change Vulnerabilities

Scientists at NOAA's Earth System Research Laboratory and colleagues at the NOAA-supported Cooperative Institute for Research in Environmental Sciences at the University of Colorado created the Western Water Assessment (WWA). The goal is to identify and characterize regional vulnerabilities to climate change and variability, such as drought, and assess how climate variability and change affect water supplies in the western United States. The WWA is providing decision support to state governments, water managers, industry interests (such as skiing and tourism), and others in the Intermountain West. The WWA web page (<http://wwa.colorado.edu/>) provides users with links to forecasts and outlooks. The site also offers a reservoir management decision calendar that graphically depicts the annual decisions of reservoir operators and factors influencing those decisions, including planning, operations, and climate and weather forecasts. A Climate Services Clearinghouse draws together climate services and products across sectors, from NOAA, non-NOAA government agencies, academia, and the private sector, enabling providers to identify and fix overlap and gaps in existing services.

Powerful New NOAA Tool to Track Atmospheric Carbon Dioxide by Source

Scientists from NOAA's Earth System Research Laboratory launched a new tool called "CarbonTracker" to monitor changes in atmospheric carbon dioxide and other greenhouse gases by region and source. CarbonTracker will enable its users to evaluate the effectiveness of their efforts to reduce or store carbon emissions. The online data framework distinguishes between changes in the natural carbon cycle and those occurring in human-produced fossil fuel emissions.

It also provides verification for scientists using computer models to project future climate change. Potential users include corporations, cities, states, and nations assessing their efforts to reduce fossil fuel emissions around the world.

NOAA Scientists Monitor Oceanic Methane Emission Bubble Sounds for Climate Impact

Using a listening device, scientists supported by NOAA's National Undersea Research Program (NURP) developed a new technique to monitor emissions of methane from the seabed. This new approach will improve understanding of the climate threat from seabed emissions of methane, a potent greenhouse gas.



As ALVIN Launch Coordinator for the dive, pilot Gavin Eppard pays close attention as the sub is gently lowered into the Gulf of Mexico during a 2006 mission supported by NOAA and MMS. The deep submergence vehicle Alvin is operated by Woods Hole Oceanographic Institution. Photo by Jeremy Potter, NOAA, courtesy of Expedition to the Deep Slope.

Methane is stored in and on the seafloor as hydrate (ice-like) deposits. These deposits are susceptible to catastrophic events that could release methane into the atmosphere, and could contribute to global warming, among other processes. As part of a multidisciplinary program, the NURP scientists mounted a hydrophone on a submersible vehicle, allowing them to quantify the size and distribution of bubbles as they form on the seabed. By listening to the unique sounds that different-sized bubbles produce, the scientists can determine if bubble formation is increasing or decreasing. They can also estimate the quantity of methane being released and the portion of methane that reaches the sea surface and atmosphere. The size of methane bubbles and how many are being formed determines their fate in the water column and the rate at which bubbles escape to the atmosphere.

NOAA Climate Models Suggest Warming-Induced Wind Shear Changes Could Impact Future Hurricanes

Global climate model simulations for the 21st century performed at NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) indicate that a robust increase in vertical wind shear in the tropical Atlantic and East Pacific oceans could act to inhibit the development or intensification of hurricanes in these regions. Historically, increased wind shear has been associated with reduced hurricane activity and intensity. While other studies have linked hurricane intensity to global warming, this is the first published study to indicate that changes to vertical wind shear seen in future climate projections would likely diminish the frequency and intensity of hurricanes. This research adds important, previously unavailable information to the body of scientific knowledge regarding the potential impacts of global climate change on hurricane formation and intensity.

NOAA Research and Partners Launch First Buoy to Measure Acidification

The first buoy to monitor ocean acidification—a result of carbon dioxide absorbed by the ocean—has been launched in the Gulf of Alaska. The buoy is a new tool for researchers to examine how ocean circulation and ecosystems interact to determine how much carbon dioxide the North Pacific Ocean absorbs each year. It is part of a National Science Foundation project awarded to oceanographers at NOAA's Pacific Marine Environmental Laboratory (PMEL) and the University of Washington in Seattle, in collaboration with Fisheries and Oceans Canada and the Institute of Ocean Sciences in Sidney, B.C. The buoy is anchored in water nearly 5,000 meters deep and transmits data via satellite. Buoy instruments will measure the air-sea exchange of carbon dioxide, oxygen, and nitrogen gas, in addition to the pH—a measure of ocean acidity—of the surface waters. This system is the first specifically designed to monitor for ocean acidification.

Mid-Atlantic Array to Aid in Study of Atlantic Meridional Overturning Circulation

NOAA's Atlantic Oceanographic and Meteorological Laboratory scientists and their partners installed an array of moorings in the mid-Atlantic to help study the Atlantic Ocean Meridional Overturning Circulation (MOC) that brings warm waters northward, and to assess its relationship to observed climate fluctuations. New results from this array have identified much larger variability than previously thought, which can impact marine ecosystems and the climate of North America.

Ozone Depleting Gas Index Developed

Scientists at NOAA's Earth System Research Laboratory have developed a new Ozone-Depleting Gas Index (ODGI). This simple index helps assess the decline in ozone-depleting gases



Katrin Iken (left) and Bodil Bluhm move deep-sea mud from the trawl net to a bucket during the 2005 NOAA-sponsored "Hidden Ocean" cruise to study marine life in all realms of the Canada Basin, one of the deepest parts of the Arctic Ocean. The mud has to be sieved before the creatures within it will be found, identified and analyzed. Photo by Jeremy Potter, NOAA, courtesy of The Hidden Ocean, Arctic 2005 Exploration.

from the maximum observed in the 1990s, relative to the amount at which ozone-recovery is expected. The index allows policy-makers to better assess the effectiveness of the Montreal Protocol on Substances that Deplete the Ozone Layer to diminish atmospheric levels of ozone-depleting gases and enable the recovery of stratospheric ozone.

Ring-of-Fire Undersea Explorations Conducted

NOAA Ocean Exploration continued a multi-year series of discovery missions to undersea volcanoes and hydrothermal vents associated with the Submarine Ring of Fire—a large but virtually unexplored

province in the Pacific where the Earth's tectonic plates are being forced below the Earth's crust. Accomplishments include discovery of abundant flows of both gaseous and liquid carbon dioxide from the seafloor, which will provide a natural deep-ocean laboratory for studying ocean sequestration of this greenhouse gas. Because the Mariana Arc hydrothermal fluids are very different from those associated with seafloor spreading centers, a large number of apparently unique ecosystems have been discovered. The biotechnical and pharmaceutical value of these organisms is under study.

State of the Arctic Report Released

In October 2006, NOAA's Pacific Marine Environmental Laboratory released a State of the Arctic Report, a review of environmental conditions during the past five years relative to those in the 20th century. The report updates some of the records from the Arctic Climate Impact Assessment released in November 2004, and is available on the PMEL website (www.pmel.noaa.gov).

Collectively, the observations presented in the report show convincing evidence of a sustained period of warming in the Arctic, including a continued reduction in sea ice extent, observed at both the winter maximum and summer minimum, and widespread changes in Arctic vegetation. The overall warming trends are resulting in complex and difficult-to-predict shifts in Arctic vegetation, land temperature patterns, ocean salinity and temperature, sea-ice thickness/extent, and permafrost distributions.

Lake Superior Warming Faster Than the Air Around It

A Minnesota Sea Grant scientist noted that Lake Superior's surface water temperature last summer reached a peak of 74 degrees (until recently, the lake rarely climbed above 60 degrees). Global warming could be a factor

because the winters are shorter and less ice forms on the lake. The lake warms up sooner and earlier than in past years, and does so rapidly. Scientists are worried about the lake's vulnerability to exotic species since frigid waters act as a natural barrier.

NOAA Great Lakes Lab Recognized for 'Green' Research Vessels

NOAA's Great Lakes Environmental Research Laboratory (GLERL) converted a fleet of research vessels from petroleum-based to 100 percent bio-based fuel and lubricants, earning a White House Closing-the-Circle Award in the "green purchasing" category. This initiative reduced costs and has a positive impact on the work environment for the vessels' crews and researchers. GLERL operates research vessels throughout the Great Lakes region as scientific platforms for ecosystems research and other NOAA interests in the area. The lab has focused efforts on innovative ways to engineer, operate, and maintain these ships to support scientific missions and advance NOAA's larger mission as a steward of the marine environment. The conversion was a result of a call for "greening" of Government agencies through waste reduction, recycling, and the use of environmentally friendly and sustainable products including bio-products. GLERL's approach to this Federal program was to focus on the use of bio-products with a goal of demonstrating the environmental and operational benefits.

NOAA Expands Great Lakes Research: Ten Universities Named to Form Great Lakes Cooperative Institute

In June, NOAA established a new Great Lakes Cooperative Institute to conduct collaborative research through a consortium of universities and institutions in the Great Lakes region. Research efforts will focus on: forecasting; invasive species, control, impact, and assessment; the Great Lakes Observing System; protection and restoration of resources; and Great Lakes education and outreach. The Cooperative Institute for Limnology and Ecosystems Research (CILER) is a consortium of ten academic institutions: Grand Valley State

University, Michigan State University, Ohio State University, Penn State University, State University of New York-Stony Brook, University of Illinois of Urbana-Champaign, University of Michigan, University of Minnesota, University of Toledo, and University of Wisconsin.

CILER replaces the Great Lakes Cooperative Institute at the University of Michigan and includes an expanded partnership. CILER joins NOAA's other cooperative and joint institutes across the country, which are NOAA-supported, non-federal organizations that have established an outstanding research program in one or more areas relevant to NOAA's mission. CILER collaborates with NOAA scientists

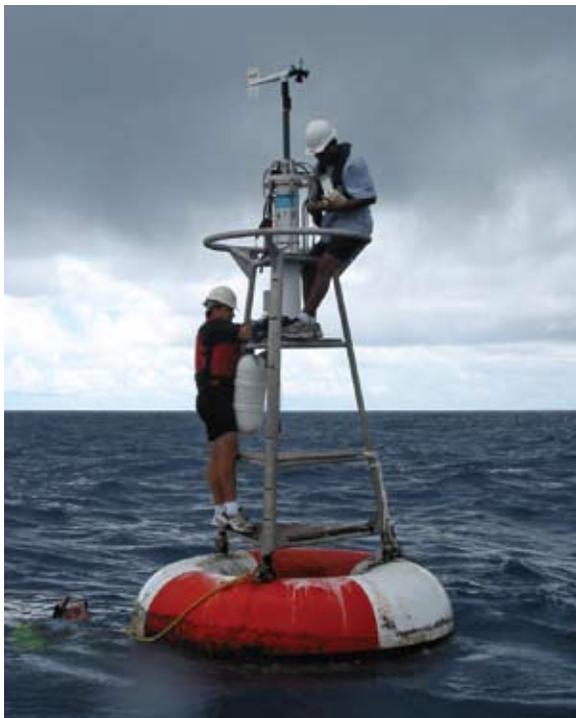
The Deep Sea Systems, Inc. Global Explorer ROV returns from a dive deep below the Arctic ice. The Global Explorer is configured to capture specimens using two methods: detritus samplers (cylindrical containers with sliding covers on the bottom, front portion of the ROV) or a suction device (on the center, left side of the ROV). Photo by NOAA's Jeremy Potter, courtesy of The Hidden Ocean, Arctic 2005 Exploration.



on long-term research topics and provides significant coordination of resources among all non-government partners and promotes the involvement of students and postdoctoral scientists in NOAA-funded research.

Tracer Dispersion Study Supports Efforts to Safeguard Pentagon

The NOAA Air Research Laboratory, Field Research Division (FRD) completed a study of meteorological conditions around the Pentagon, part of a multi-agency and multi-institutional program dubbed “Pentagon Shield.” FRD released a harmless atmospheric tracer from various locations around the Pentagon during several intensive observation periods to mimic a potential attack. FRD placed sensors on, around, and in the Pentagon to measure the dispersion characteristics of the tracer into and around the building. The resultant dispersion patterns have been used to verify a series of nested meso- and building-



NOAA buoy technician Dane Jaynes (left) and scientific observer Alex Ysam (right) repair a TAO mooring while KA'IMIMOANA OCO CDR Mark Pickett (left) and CO CDR Chris Beaverson (right) dive to repair subsurface instrumentation on the mooring. Photo by Linda Stratton, NOAA

scale meteorological models used in an automated operational building protection system. Results of the study will support development of a system to protect its more than 25,000 occupants from chemical, biological, and radiological attack.

NOAA and Indonesia Strengthen Tsunami Warning System in Indian Ocean

The United States and Indonesia jointly launched the second Indian Ocean Tsunami Warning System Deep-ocean Assessment and Reporting of Tsunami (DART™) II buoy to warn of approaching tsunamis. NOAA deployed the first operational tsunami detection system in the Indian Ocean in 2006. The two DART buoys, developed by NOAA's Pacific Marine Environmental Laboratory, are the only operational tsunami-detecting devices in the Indian Ocean. The buoys are the latest additions to the expanding Global Earth Observation System of Systems, an international effort to monitor and predict changes in the Earth to benefit the environment, human health and the economy. The new tsunami-detection network will provide better data to improve the Indian Ocean Tsunami Warning System, saving lives in the event of a tsunami.

The deployment was funded under a US Agency for International Development program (USAID) to make strategic investments in support of the Indian Ocean Tsunami Warning System (IOTWS). NOAA provided the key technical expertise behind the Indian Ocean Tsunami Warning System and has engaged in a \$4.5 million effort, and is contributing technology and training to help the region create round-the-clock coverage for the region, which was devastated by the Dec. 26, 2004, Indian Ocean tsunami. Since the 2004 tsunami, the United States and NOAA have worked with USAID, Indonesia and other partners to build an end-to-end tsunami warning system in the region with the member states of the Intergovernmental Oceanographic Commission of UNESCO,

the United Nations Environment, Science, and Cultural Organization.

NOAA Researchers Co-Author Report on Carbon Dioxide Threats to Marine Life

A peer-reviewed paper co-authored by NOAA researchers at the Pacific Marine Environmental Laboratory documents how carbon dioxide from burning fossil fuel dramatically alters ocean chemistry and threatens the health of marine organisms, including corals. The researchers also uncovered new evidence of ocean acidification in the North Pacific. Scientists observed measurable decreases in pH, along with an increase in dissolved inorganic carbon, both signs of ocean acidification, which may be the result of the ocean's uptake of anthropogenic carbon dioxide.

The increased acidity lowers the concentration of carbonate ions, a building block of the calcium carbonate that many marine organisms use to grow their skeletons and create coral reef structures. Corals and some free-floating plants and animals at the bottom of the food chain have a more difficult time producing their shells, with potential consequences for other sea life that depend on the health and availability of these shelled organisms. The report resulted from a workshop sponsored by NOAA, the National Science Foundation, and the U.S. Geological Survey. The researchers were among a group of NOAA researchers awarded the Commerce Department's Gold Medal for pioneering research leading to the discovery of increased acidification in the world's oceans.

NOAA Research Radar Gets True Test During Stormy Spring Weather

Storms across Oklahoma in the spring of 2007 provided NOAA's National Severe Storms Laboratory researchers an unprecedented opportunity to study rapidly evolving weather phenomena and the potential to extend warning lead-times

for severe weather using the Phased Array Radar (PAR), part of the National Weather Radar Testbed (NWRT). For the first time, these data were made available for operational use to the NWS Weather Forecast Office in Norman, OK. This innovative technology, developed by the Department of Defense, has the potential to vastly improve upon the capabilities of the national NEXRAD radar network for all weather radar applications. Tests demonstrated that a complete volume scan around the Multi-functional Phased Array Radar can be obtained in less than one minute, while the current NEXRAD radar takes five to six minutes for such a scan. The NWRT demonstration will support the development of scientifically sound severe storm guidance applications and techniques to aid forecasters in the forecast and warning process, helping to protect the aviation community and the public.

NOAA Studies the Causes of Catastrophic Urban Floods on the West Coast

Researchers from NOAA's Earth System Research Laboratory (ESRL) are intensively monitoring air, water, and soil in the American River basin between Reno, NV, and Sacramento, CA. Part of a regional implementation of a national hydrometeorological testbed (HMT) program, ESRL scientists are working closely with NOAA National Weather Service forecasters and hydrologists and other NOAA Research laboratories to improve predictions of California's heavy winter rains to help water resource managers prevent catastrophic flooding in the Sacramento region. New sensors, computer models, and other tools tested during the study eventually will be used to improve NOAA National Weather Service rainfall forecasts for the West Coast through HMT's efforts to enhance and accelerate the transition of research findings to operational capabilities.



A brilliant twilight glow signals the ending of another day of measurements at Hawaii's Mauna Loa Observatory on 29 May 2006. The red twilight is caused by Asian dust, which forms layers that are visible in the twilight glow. The Mauna Loa Observatory has been continuously monitoring and collecting data related to climate change, atmospheric composition, and air quality for 50 years. Today, the observatory is best known for its measurements of rising anthropogenic carbon dioxide concentrations in the atmosphere. Photo by Forrest M. Mims III.

A new water vapor flux product, using HMT observational data, was developed and distributed for the first time this year. In mountainous terrain, rainfall is directly related to the water vapor flux. Rainfall estimates derived from high-resolution, gap-filling radars were delivered to the NWS in support of the second Distributed (hydrologic) Model Inter-comparison Project (DMIP2).

Storm Size, Intensity are Key to Evaluating Potential Hurricane Damage

During 2007, NOAA hurricane researchers investigated the destructive potential of land-falling hurricanes and noted that the overall size of the storm, as well as the area reached by its winds, should be considered when assessing its possible damage. The April 2007 issue of the Bulletin of the

American Meteorological Society published a study by a research meteorologist at the NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML), describing a new Hurricane Destructive Potential classification. The new proposed metric associates a numerical value similar to the Saffir-Simpson scale to each storm, and reflects potential damage due to wind, storm surge, and waves. The overall goal is to provide a better measure of the threat posed by a hurricane.

UrbaNet National Capital Region Testbed Completed

Most of the Nation's population lives in urban areas, but accurate meteorological predictions can be difficult due to the influence of the built environment on

the atmosphere. With the installation of meteorological instruments on the roof of the headquarters of the American Geophysical Union in Washington, DC, NOAA's Air Resources Laboratory (ARL) finished deploying the UrbaNet National Capital Region Testbed. The 12-station testbed network supports research into improved approaches for forecasting the dispersion of hazardous materials in urban areas. The stations in the testbed network collect temperature, humidity, and wind information with high temporal resolution. This information is used to estimate the amount of turbulence or mixing in the air and the direction that pollutants will flow. ARL, and partner AWS Convergence Technologies, will use the data from the testbed to evaluate the utility of integrating diverse mesonet data to provide a more complete picture of meteorological conditions in complex urban regions. ARL will also use the data to evaluate and improve high-resolution models of winds and dispersion in those regions.

Advanced Hurricane Model Aids NOAA Forecasters

The National Centers for Environmental Prediction (NCEP) implemented the Hurricane Weather Research and Forecast (HWRF) Model operationally in June. To provide a transition for NCEP's Tropical Prediction Center forecasters, the HWRF is running in parallel with the Geophysical Fluid Dynamics Laboratory Hurricane Model. The goal of the HWRF model is to address the tropical cyclone intensity, structure, and rainfall forecasting, in addition to advancing wave and storm surge forecasts. The model promises to improve forecasts for tropical cyclone intensity, wave height and storm surge, and hurricane-related inland flooding. Over the next three years, the HWRF will be upgraded to include advanced data assimilation for the hurricane core, making use of observations from airborne Doppler radar and land-based

radars. It will be coupled to an advanced version of the operational hurricane wave model, WAVEWATCH, with a multi-scale grid structure over the hurricane environment and a moving nest around the hurricane. Additionally, a land-surface component will serve as input to hydrology and inundation models to address the hurricane-related inland flooding problem, and HWRF will eventually be coupled to a dynamic storm-surge model.

Sea Grant Develops Storm Surge Vulnerability Maps

The University of Puerto Rico Sea Grant College Program (UPRSGCP) developed a storm surge flood model that assesses individual and community vulnerability on the coasts of Puerto Rico. New GIS maps were prepared by merging current coastal flood maps with satellite images and census data. The census data includes socio-economic and demographic information, which produces a more accurate representation of which, and to what degree, coastal community members are at risk. In the future, these maps will be available to planners, managers, and public officials throughout the island via a new interactive software program that will allow them to click on census blocks and view pertinent information about who lives in these vulnerable coastal areas. The data from this research were also used to develop the National Tsunami Hazard Mitigation Program, which led to Mayaguez, the third largest city in Puerto Rico and hometown of UPRSGCP, being certified as the first tsunami-ready city on the island. These maps will greatly benefit the approximately 1.4 million people in Puerto Rico who live in flood-sensitive zones.

Roundtables Give OAR Insight into Constituent Needs and Research Priorities

Constituent involvement is essential to OAR's efforts to define its priorities and

align them with the new NOAA Five-Year Research Plan. In FY 2007, OAR hosted a series of high-level roundtables to solicit input from key constituents to ensure OAR's priorities reflect the needs of our current and future partners and customers. Topics included: the Great Lakes; Earth System Modeling; Environmental Data & Information Services; Ocean and Coastal Ecosystem Management; Global Observations – Local Decisions, Global Earth Observation System of Systems; Advanced Undersea Technologies; and Building NOAA's Weather & Water Social Science Program.

FUTURE OUTLOOK

As changing demographics causes rising demand for scarce resources and puts more people in the path of natural hazards, NOAA research is unlocking the mysteries of variability in our oceans and atmosphere in support of NOAA's efforts to provide effective environmental service and stewardship to the Nation. We are delivering the information needed to develop sustainable fisheries yields while promoting healthy marine and coastal ecosystems. This approach recognizes the importance of understanding the Earth system on time scales ranging from minutes to decades, and even longer, when investigating processes associated with climate, weather, and ecosystems.

Research at NOAA has improved our ability to offer timely and accurate forecasts, including major hurricanes, tornadoes, snowstorms, and tsunamis. Working with our partners, we provide a unique foundation of information documenting the natural and human-related drivers of climate change and have improved and extended our ability to map the ocean floors and coastal waters, where commerce is vital. NOAA is the agency that integrates research in all of these areas. We are committed to providing the best available information and products to help decision-makers at local, regional, national and

international levels plan for and respond to environmental challenges now and in the future.

NOAA's science mission is challenging because of the complexity and connectedness of the natural systems. NOAA scientists seek to explore and generate useful information from the connections among our planet's air, water, land, and socio-economic systems. For example, each year we expand our knowledge of the ocean's role in influencing climate patterns; this insight contributes to our ability to understand the role of the dynamic climate system in weather phenomena around the world. The need for unbiased scientific information to support a multitude of decisions about environmental challenges has never been more critical. NOAA research creates a balance of near-term responsibility to enhance the operational and regulatory roles of NOAA and our stakeholders with a long-term commitment to conduct visionary, discovery-based research. This dual responsibility requires transfer of research to operations, as well as continued exploration and discovery in new areas that will expand the boundaries of our understanding of the Earth system and lay the foundation for the NOAA services of the future. NOAA Research also recognizes that new scientific ideas depend on the vast amount of data collected from observing systems and the management of that data, a cross-cutting priority of NOAA discussed in detail in the NOAA Strategic Plan.

A well-planned and focused research effort that enlists workforce creativity will enable NOAA's near-term goals to be achieved, and will position the Nation and society to make informed decisions in the decades to follow.

PRODUCTS AND SERVICES

Environmental Observation and Monitoring Networks

OAR scientists monitor ozone, record solar radiation, collect air samples from all over the world to measure greenhouse gases, and observe the oceans in an effort to learn more about Earth's atmosphere and oceans. Much of these data are collected through global partnerships. The measurements have allowed NOAA scientists to answer important questions regarding oceanic and atmospheric variability. In addition, long-term observations of physical, chemical, and biological parameters are used to monitor current environmental conditions and provide a baseline for assessing future changes.

Interagency Field Experiments

OAR scientists lead field experiments focused on the study of environmental phenomena. Fieldwork improves our ability to understand and predict the Earth's climate and atmosphere. Major efforts focus on: exploring the links between oceans and atmosphere in the eastern tropical Pacific; analyzing natural and anthropogenic

climate change by aerosols; and tracking intercontinental movements of pollutants that result from human activity such as the increased concentrations of ozone particles, fine particles, and other chemically active "greenhouse" compounds.

Global Models

OAR models of the atmosphere, ocean, and climate are becoming increasingly accurate and comprehensive in terms of predictive capabilities. More sophisticated prediction capabilities provide leaders in government and industry with better scientific information for decision-making.

Scientific Assessments

OAR plays a leading role in periodically assessing the state of scientific understanding on many environmental issues facing government and industry decision-makers, including climate change, air and water quality, and ozone depletion.

Outreach and Extension

Important discoveries are made every day by scientists sponsored by NOAA or working at one of our laboratories. These discoveries solve problems, answer questions, and can save lives. It is science that offers real-world solutions. Through outreach efforts, such as those of the National Sea Grant College Program, this research is translated into usable information and products for a variety of audiences. These efforts ensure science is delivered to those who need it in ways they can use the information.



This fisheye image of NOAA's Mauna Loa Observatory in Hawaii was taken from the instrument desk atop the NDSC building. The Mauna Loa Observatory is located at the 11,200 feet level of Hawaii's Mauna Loa volcano. The Keeling Building, the original building at Mauna Loa Observatory, can be seen at the right side (north) of the small blue building at far left. Photo by Forrest M. Mims III.



Mary E. Kicza
Assistant Administrator

National Environmental Satellite, Data, and Information Service

The Nation's Eye on the Environment

NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) operates the Nation's civil operational environmental satellite system, taking constant observations of our Earth and its oceans and atmosphere. Satellite observations are collected, processed, and use to develop weather, climate, and other environmental products, services, and long-term observation records to benefit all people and all sectors of society. NOAA's satellites include Geostationary Operational Environmental Satellites (GOES) and Polar-orbiting Operational Environmental Satellites (POES). Together these two systems provide the U.S. space-based component of a global operational environmental monitoring system. On behalf of the Department of Defense, NESDIS also operates the Defense Meteorological Satellite Program (DMSP) spacecraft, part of the military's sixth generation of weather satellites. Additionally, on behalf of the Department of Commerce, NESDIS licenses the operation of commercial remote-sensing space systems.

NESDIS also provides long-term stewardship of environmental data, managing the world's largest collection of atmospheric, geophysical, and oceanographic data derived from both in-situ and space-based systems. Environmental data directly impacts the national economy: Weather forecasts affect the tourism industry; solar weather information influences decisions on energy distribution. The data are used to monitor global food supplies, and they play a key role in management of natural resources. NESDIS serves a broad spectrum of users, from weather forecasters to climate scientists to coastal resource managers.

2007 NESDIS ACCOMPLISHMENTS

EUMETSAT SATELLITE, A MILESTONE IN U.S.-EUROPEAN COOPERATION

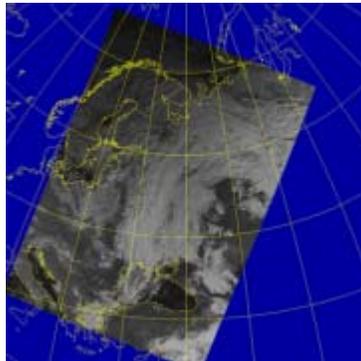
MetOp-A was launched from the Baikonur Space Cosmodrome in Kazakhstan on October 19, 2006. The European polar-orbiting satellite, MetOp-A, is being heralded



MetOp-A satellite launched on October 19, 2006.

as a major milestone in the U.S.-European Initial Joint Polar System (IJPS). The agreement between NOAA and the European Organization for the Exploitation of Meteorological Satellites, or EUMETSAT, coordinates polar satellite launches

to improve coverage of weather and climate conditions. MetOp-A was declared the operational morning satellite in the NOAA polar-orbiting constellation effective May 21, 2007.



First AVHRR image from MetOp taken on October 25, 2006.

MetOp-A instruments provided by NOAA include the Advanced Microwave Sounding Unit; the High Resolution IR Sounder; the Advanced Very High Resolution Radiometer; and the Space Environment Monitor.

NOAA SATELLITE OPERATIONS FACILITY (NSOF)

The new home for NOAA's around-the-clock, environmental satellite operations, which provides data critical for weather and climate prediction, was officially opened on June 11, 2007, at a ribbon-cutting ceremony in Suitland, Maryland. NESDIS completed a successful transition of its satellite data processing and product generation operations from Federal Building 4 to the new NOAA Satellite Operations Facility

in Suitland. During FY 2007, NESDIS continued to produce environmental data and over 450 satellite derived products, providing vital information on the atmosphere, ocean, and land to serve its stakeholders' needs. While ensuring the integrity, validity, and availability of data and products, the program remained on target to meet its performance metrics for ingesting, processing and distributing satellite data for both NOAA managed and non-NOAA managed satellites within the required timeframes. NESDIS transitioned six (6) products from research development to operations. This included several projects that are being tracked by NOAA's Transition Board including COSMIC, Ocean Color from Satellites and Global Precipitation Measurements. Each day, NSOF processes more than 16 billion bytes of environmental satellite data from NOAA's geostationary and polar-orbiting spacecraft and the Department of Defense's Meteorological Satellite Program (DMSP). The NOAA National Weather Service uses these data for constant tracking of severe weather and as inputs into models for medium to long range forecasts for weather prediction and tracking climate change. NSOF, which spans 208,271 gross square feet, supports more than \$50 million of high technology equipment, including 16 antennas that control more than \$4.7 billion worth of environmental spacecraft.



NOAA's Satellite Operations Control Center (SOCC) at NSOF.

FUTURE GEOSTATIONARY ENVIRONMENTAL SATELLITE CONTINUITY

The GOES-R series, NOAA's next generation of geostationary satellites, promises significant technological advances in the quality and quantity of meteorological and environmental data NOAA provides its users. On March 28, 2007, NOAA announced a new development strategy. Under the new strategy, NOAA and NASA will share development responsibility for the new satellites through multiple contracts. NOAA will retain overall program management responsibility and provide all of the funding. NOAA also will acquire the ground system, operate the system following satellite launch, and develop algorithms. NASA will award separate contracts for the satellites, instruments, and launch vehicle. Also during 2007, NOAA awarded the instrument contracts for the Solar Ultraviolet Imager, the Extreme Ultra Violet and the X-Ray Irradiance Sensors, and the Geostationary Lightning Mapper. In February 2007, NOAA participated in the Critical Design Review of the Advanced Baseline Imager, the key instrument to be manifested on the GOES-R series of spacecraft.

NOAA PROVIDES THE NATION WITH AN ANNUAL STATE OF THE CLIMATE REPORT

The *State of the Climate* in 2006 report, published as a special supplement to the June 2007 *Bulletin of the American Meteorological Society*, provides a summary of global climate conditions for the year. This 135 page report is the product of collaboration among 159 individuals from 33 countries. The 2006 edition reported on 20 essential climate "state" variables. The goal of the annual report is to routinely analyze and report on a total of 42 atmospheric, ocean, and terrestrial climate "state" variables. Reports such as these are part of NOAA suite of climate information

products and allow policy makers and resource managers to make more informed decisions that have far reaching effects on our environment and socio-economic related issues. Website: www.ncdc.noaa.gov/oa/climate/research/state-of-climate/state-of-climate.html

NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NPOESS)

In 2007, the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office (IPO) completed restructuring of this critical satellite program following its certification through the Nunn-McCurdy process in 2006. A \$4.2 billion modification of the Northrop Grumman Space Technology contract culminated a rigorous year-long effort to replan virtually every aspect of the NPOESS program. The new plan includes two development satellites and an option for two production satellites. Beginning in 2013, the first NPOESS satellites will begin to collect and disseminate data on Earth's weather, atmosphere, oceans, land, and near-space environment. The polar-orbiting environmental satellites are able to monitor the entire planet and provide data for long-range weather and climate forecasts. NPOESS will increase the timeliness and accuracy of severe weather event forecasts. In April, 2007, NOAA and NASA announced a plan to restore a key climate sensor, designed to give climate researchers a more precise depiction of the structure of the Earth's ozone layer, to the NPOESS Preparatory Project (NPP). The sensor, called the Ozone Mapping and Profiler Suite Limb (OMPS Limb), will be returned to the NPP satellite.

COMPREHENSIVE LARGE ARRAY-DATA STEWARDSHIP SYSTEM (CLASS)

CLASS is NOAA's premier data archive and distribution system for providing the world science community and others with long-term, satellite based climate records for use in climate monitoring, modeling, and research. It is NOAA's premier web-based facility for the distribution of polar and geostationary satellite derived data products. In March 2007, a Request for Proposal was issued to support the development, engineering, integration, test, operations, and maintenance of the CLASS program. A contract award is anticipated in 2008.

In 2007, the National Oceanographic Data Center (NODC) initiated an Archive Management System pilot project. In August 2007, the technical portion of the Pilot Project was successfully demonstrated. NODC successfully transmitted over 650 gigabytes of data to CLASS or 10% of the aggregate NODC holdings.

NEW SATELLITE COVERAGE IN SOUTH AMERICA SUPPORTS NATURAL DISASTERS

On April 10, 2007, NOAA and the Government of Brazil publicly announced the successful repositioning of GOES-10 satellite and the emerging GEONETCast capability as significant first steps in the realization of GEOSS (Global Earth Observation System of Systems) in the Americas. NOAA is taking the lead role in the development of a regional GEONETCast system for the Americas, called GEONETCast Americas. GEONETCast Americas is being developed and implemented by NOAA in coordination with the U.S. Group on Earth Observations. GEONETCast is a near real time, global network of satellite-based data dissemination systems designed to distribute space-based, air-borne and in situ

data, metadata, and products to diverse communities.

South Americans, and millions more in the Western Hemisphere, are benefiting from the repositioning of NOAA's GOES-10 spacecraft, a move designed to lessen the effects of natural disasters in the region. Through this endeavor, NOAA is exploring partnerships with countries and scientific organizations in the Americas and Caribbean to share Earth observations and develop and strengthen data networks. Western Hemisphere nations will work together to ensure the satellite data are disseminated and training is available to enable full use of the new information.



NOAA image of the NOAA GOES-10 satellite monitoring South America.

NOAA CENTRAL LIBRARY

NOAA Central Library staff provided essential support to **NOAA's 200th Celebration of Science, Service, and Stewardship**. In addition to providing accurate historical information and artifacts to the events, library staff served as consultants, team leaders, and coordinators to the local and regional teams. NOAA leadership recognized Albert E. Theberge, staff librarian, with a special 200th

Celebration Achievement Award; earned for his outstanding contributions. The NOAA Central Library holds important physical archives and rare books.

DIGITAL ELEVATION MODELS FOR TSUNAMI MODELING

Digital Elevation Models (DEMs) are a critical foundation for tsunami forecasting and modeling efforts at the NOAA Center for Tsunami Research, Pacific Marine Environmental Laboratory (PMEL). In support of this effort, NOAA's National Geophysical Data Center (NGDC) developed over 20 high-resolution digital elevation models. The DEMs are part of the tsunami forecast system SIFT (Short-term Inundation Forecasting for Tsunamis) currently being developed by PMEL for the NOAA Tsunami Warning Centers.

NOAA SATELLITES HELP SAVE 347 PEOPLE IN FY 2007

2007 marks the 25th anniversary of the SARSAT Program's first satellite launch and save. Since the initiation of the program in 1982, over 22,000 people have been rescued worldwide. Of these, 5,677 were U.S. rescues.

In 2007, the international COSPAS-SARSAT program aided in the rescue of 353 people, which represents a ten year high. This well surpasses the previous year's total where NOAA satellites helped save 264 people from potentially life-jeopardizing emergencies throughout the United States and its surrounding waters. One possible explanation for the high totals this year is the increase in beacon population. NOAA currently has over 190,000 406 MHz emergency beacons in their registration database and continues registering record numbers each month.

NOAA's polar-orbiting and geostationary satellites, along with Russia's COSPAS spacecraft, make up the international

Search and Rescue Satellite-Aided Tracking System, called COSPAS-SARSAT.

Looking ahead, older emergency beacons operating on the 121.5 MHz and 243 MHz frequency will cease to be monitored after February 1, 2009. Mariners, aviators, and individuals using emergency beacons will need to switch to those operating at 406 MHz if they want to be detected by satellites. Emergency beacon owners can register their 406 MHz beacons online at www.beaconregistration.noaa.gov

NOAA'S CORAL REEF WATCH PROGRAM RELEASES ENHANCED DATA PRODUCT

The NOAA Coral Reef Watch (CRW) program released an updated Experimental Doldrums Product, which includes enhancements of the experimental product first released in 2006. The product identifies regions of sustained low wind speed to help coral reef managers and scientists better assess conditions that may lead to coral bleaching. Lower wind speeds reduce vertical mixing, evaporative cooling, and sensible heat transfer, thereby increasing the likelihood of coral bleaching during summertime maximum water temperatures. The product uses scatterometry-derived winds and is being developed in collaboration with the Southwest Fisheries Science Center/ Environmental Research Division. Unlike the earlier version of this product, the new Version 0.2 now incorporates the duration of these doldrums events by accumulating the number of days over which this condition in met (doldrums days). Doldrums day images are made available daily, complimenting the operational CRW product suite, and are available in a series of formats (including Google Earth). Coral Reef Watch is continuing to work with users to further develop the algorithm and test its predictive skill against past bleaching events.

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's vision for the future. Future environmental observing capabilities, new information technologies, and the growing needs and expectations of our numerous customers will present opportunities and challenges for delivering improved products and services to future customers. Our national security, economy, and environment have become inextricably linked. No single environmental observing platform can fulfill all environmental remote-sensing requirements. Therefore, our customers need the best mix of observations from available and planned platforms and sensors. The upcoming expansion of advanced satellite instruments and data from such systems as NPOESS, the next generational geostationary satellites (GOES-R), and the European polar meteorological satellite program (MetOp) promises an auspicious future as we move toward the production of significantly better forecasts from numerical weather prediction models. We must use operational satellite observing systems comprehensively to extract the best-quality products 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 the local, regional, national, and global scale. Striving to be the preferred source of 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. It will lead 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 also implement new technologies to archive and provide access to massive amounts of new data that describe our climate, support development of Integrated Ecosystem Assessments, and fulfill growing customer requirements for quality and timely state-of-the-art products and services.

NESDIS RESEARCH

Center for Satellite Applications and Research (STAR)

Located in Camp Springs, MD, *STAR* is the science arm of NESDIS. The mission of STAR is to create satellite-based observations of the land, atmosphere, and ocean and to transfer them from scientific research and development into routine operations. In addition, STAR offers state-of-the-art data, products, and services to decision makers. STAR also calibrates the Earth-observing instruments of all NOAA satellites to provide reliable measurements for assessing the current conditions on Earth in a timely manner, predicting changes in conditions, and studying long-term trends in the environment.

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 the development of natural resources. Environmental scientists and observers

also have a critical need for 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. The usefulness of NOAA data archives makes the NOAA Data Centers resources a national treasure.

National Oceanographic Data Center (NODC)

Located in Silver Spring, MD, NOAA's NODC maintains the largest collection of publicly available oceanographic data and 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, chemical, and biological properties of the oceans, currents, weather, and biota, as observed from ships, buoys, and satellites. 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, maritime industries, and foreign communities. Examples of these products and special topic data sets include the World Ocean Database, Global Argo Data Repository, Coral Reef Information System, and the Global Ocean Data Assimilation Experiment High Resolution Sea Surface Temperature Project. NODC also operates the NOAA Library and Information System, which consists of the NOAA Central Library in Silver Spring, MD, with Regional Libraries in Seattle, WA, and Miami, FL. 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 Web, which routinely handles more than 250,000 queries a month.

National Coastal Data Development Center (NCDDC)

NOAA established NCDDC at the Stennis Space Center in Mississippi to provide access to long-term coastal data records and archives of coastal records at the appropriate NOAA National Data Centers and NOAA Centers of Data. NCDDC is a major component of the National Oceanographic Data Center (NODC). Coastal zone resource managers, the research community, coastal weather forecasters, fisheries managers, and others require that marine data be made more accessible to help our Nation acquire a better understanding of the health of our coastal environment. NCDDC's goal is to improve the quality of and accessibility to marine data characteristics (such as chemistry, biology, and geology) and to physical parameters (such as water levels, bathymetry, winds, and waves). Working with Federal, state, and local agencies, academic institutions, nonprofit organizations, and the private sector, 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 online access to the coastal user community. Additionally, NCDDC will produce retrospective analyses and trend information to help form the basis for Integrated Ecosystem Assessments and public policy.

National Climatic Data Center (NCDC)

Located in Asheville, NC, NOAA's NCDC archives billions of meteorological observations, making it the largest climate data center in the world. NCDC receives, processes, archives, and disseminates surface, marine, upper air, radar, satellite, and model output data. NCDC serves a large and diverse community, responding to more than one million requests per year. It makes environmental data and information available through both

the Internet and physical delivery of products and services. In response to the exponential growth of radar and satellite observations being archived—on the order of several petabytes—NOAA is developing the Comprehensive Large Array-data Stewardship System (CLASS).

NCDC's climate data products support decision making in many sectors of the economy including energy, transportation, agriculture, insurance, engineering, healthcare, and manufacturing (i.e. www.ncdc.noaa.gov/oa/esb). NCDC also develops climatic applications for other government agencies, including NASA, the Environmental Protection Agency, and the Departments of Defense and Energy, in addition to serving as a key participant in numerous national and international climate assessments including the IPCC, CCSP, and the U.S. State of the Climate Report. Through participation in these assessments and dialog with users in workshops and webinars NCDC actively identifies the needs of NOAA data users in addressing climate change. As a testament to NCDC's involvement in significant climate research, nine scientists from NCDC are recipients of the 2007 Nobel Peace Prize for their dedicated work with numerous IPCC assessments over the last two decades. For the most recent IPCC assessment these scientists include review editor Thomas Karl, lead authors David Easterling and Thomas Peterson, and contributing authors Jay Lawrimore, Russell Vose, David Levinson, Pavel Groisman, David Wuertz and Byron Gleason. Over two thousand scientists worldwide have contributed to the work of the Intergovernmental Panel on Climate Change (IPCC) since its inception in 1988. These scientists and former U.S. Vice President Al Gore have been jointly awarded the 2007 Nobel Peace Prize by the Norwegian Nobel Committee "for their efforts to build up and disseminate greater knowledge about man-made climate change

and to lay the foundations for the measures that are needed to counteract such change."

National Geophysical Data Center (NGDC)

Located in Boulder, CO, NOAA's NGDC provides scientific stewardship, products, and services for geophysical data describing the solid Earth, marine, and solar-terrestrial environment, as well as Earth observations from space. NGDC's data holdings currently contain more than 400 digital and analog databases. Digital databases at NGDC include more than 20 million data records. As technology advances, so does the search for more efficient ways of preserving these data. NGDC works closely with contributors of scientific data to prepare documented, reliable data sets and continually develops data management programs that reflect the changing world of geophysics. Recent examples of NGDC's work include the creation of digital elevation models of U.S. coastal communities for prediction of potential tsunami impacts, estimation of global emissions of natural gas associated with petroleum production, and support of a future submission for extended continental shelf boundaries under the United Nations Convention on the Law of the Sea.

NESDIS PLATFORMS, PRODUCTS, AND SERVICES

Geostationary Operational Environmental Satellites

NESDIS operates a system of Geostationary Operational Environmental Satellites (GOES) that provide data for short-term weather warnings and forecasts. GOES orbit the Earth at 22,600 miles above the equator. Two GOES satellites remain operational at all times—one providing coverage of the eastern United States and most of the Atlantic Ocean and the other providing coverage of the western United

States and the Pacific Ocean basin. NOAA maintains a spare GOES in orbit ready to take over in the event an operational GOES fails. GOES satellites provide images of the entire United States every 15 minutes and are capable of imaging as frequently as every minute to monitor the development of severe weather. NOAA's 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 for severe weather events. Nightly weather reports at the Nation's local television stations regularly bring GOES images into homes across America as well as images around the world each day.

Geostationary Satellites Advance: GOES-R Series

The next generation of geostationary satellites, the GOES-R series, will offer improved spacecraft and instrument technologies and will maintain geostationary satellite data continuity into the future. GOES-R will provide new and improved atmospheric, oceanic, climatic, solar, and space data. This new satellite series will scan the Earth nearly five times faster than the current GOES, providing television meteorologists, private weather companies, the aviation and agriculture communities, and national and international government agencies with about one hundred times the amount of data currently provided. GOES-R sensor and system advancements will result in more timely and accurate weather forecasts and improve support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and, ultimately, economic health and development. GOES-R is scheduled to launch in 2015.

Polar-orbiting Satellite Systems

The NESDIS Polar-orbiting Operational Environmental Satellite (POES) system provides an uninterrupted flow of critical global information used in global 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 events such as El Niño as early as possible. Earlier warnings of these impending events allow emergency and agricultural managers to activate plans to reduce the impacts 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. NPOESS will provide a single, improved national system capable of satisfying both civil and national security requirements for real-time, space-based, remotely sensed environmental data. NOAA will also receive data from and share data with its European partner, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), who launched the METOP-A satellite in October 2006.

Advanced NPOESS sensors will deliver higher-resolution atmospheric, oceanic, and terrestrial data, enabling more accurate short-term weather forecasts and severe storm warnings. NPOESS will also provide improved measurements and information about the space environment for reliable operations of space and ground-based systems and will continue to provide surface data collection and search-and-rescue capabilities.

The Polar Orbiting Satellites also provide a Data Collection System (DCS) called Argos, which is a joint U.S., France, and EUMETSAT mission. The Argos DCS is used for transmitting Weather and oceanographic information from buoys and ships, as well as for wildlife tracking and other experimental activities.

NOAA SEARCH AND RESCUE SATELLITE AIDED TRACKING (SARSAT) SYSTEM SAVES LIVES

COSPAS-SARSAT is an international search and rescue system that uses satellites to detect and locate emergency beacons carried by ships, aircraft and individuals. The system consists of a network of satellites, ground stations, mission control centers and rescue coordination centers. Here are some highlights of the 347 rescues from fiscal year 2007.

On January 11 the COSPAS-SARSAT system detected a 406 MHz distress signal north of the Bismark Archipelago, New Guinea. The distress beacon automatically activated when the Fishing Vessel Dolores 830 sank after being hit by a large wave. The crew of 25 people managed to board their life boats. The Coast Guard Marsec Rescue Coordination Center was able to communicate with a sister vessel the Dolores 834 via Immarsat. Dolores 834 diverted to the scene and took the crewmembers of the sunken vessel aboard.

On March 23 the COSPAS-SARSAT system detected a 406 MHz distress signal in Curry County, Oregon. A 54 year old man activated his 406 MHz PLB when he suffered a compound fracture in his right leg and was going into shock. The Air Force

Rescue Coordination Center received the SARSAT alert and contacted the Coast Guard Station North Bend. Coast Guard launched a helicopter which arrived on the scene and transported the injured man to a waiting ambulance for transport to a local hospital.

On April 9 the COSPAS-SARSAT system detected a 121.5 MHz distress signal in the Lake Tahoe, California area. The El Dorado County Sheriff's Department was sent to look for an ELT when they discovered a plane crash with one deceased. However they also noted foot prints leading away from the wreckage. The Sheriff's department received help from a Naval Air Station helicopter to search for the missing person. The crew of the helicopter located her and transported her to the Renown Medical Center.

On April 11 the COSPAS-SATSAT system detected a 406 MHz distress signal about 175 nm southwest of Tampa, Florida. A distress beacon automatically activated when the 35 foot catamaran S/V PARADOX hit a squall and capsized. Coast Guard District 7 launched a Clearwater Air Station fixed wing aircraft to the scene. The crew of the aircraft located the vessel with two persons clinging to the hull. Air Station Clearwater launched a helicopter to the scene. The crew of the helicopter hoisted the two people aboard the helicopter and transported them to a hospital in the lower Florida Keys.

On May 7 the COSPAS-SARSAT system detected a 406 MHz distress signal 200 NM east southeast of Cape Hatteras, North Carolina. The Coast Guard Lantarea Rescue Coordination Center received the alert and launched a fixed wing aircraft to the SARSAT position. The crew of the aircraft located a make shift raft with three people aboard who had abandoned the Sailing Vessel SEAN SEYMOUR II. Weather conditions in the area were poor with wind gusts of 80 miles/hour and waves over 50 feet. The Coast Guard dispatched





- **11 April 07**
- **S/V Paradox**
- **CG 1504**

View of the S/V PARADOX from the USCG C-130 Hercules rescue aircraft.

the helicopter. The hiker was too exhausted to continue. The helicopter transported him to the Ontario Airport in San Bernardino CA.

On September 17 the COSPAS-SARSAT system detected a 406 MHz distress signal 120 NM west of Ilwaco, Washington. The Fishing Vessel Ida W II with three persons on board was taking on

a helicopter to the scene where they hoisted the three people aboard. The three survivors suffered from mild hypothermia and one had a possible rib fracture. The rescue swimmer suffered back spasms. All were transported to Cherry Point, North Carolina for medical attention.

On June 9 the COSPAS-SARSAT system detected a 406 MHz distress signal 1/2 mile southwest of Wrightwood, California. The Air Force Rescue Coordination Center contacted the wife of the PLB owner. She stated her husband was hiking along the Pacific Crest Trail toward Big Bear Lake. The Air Force contacted the California Civil Air Patrol, which found the hiker and requested a San Bernardino County Sheriff's Department helicopter. The crew of the helicopter hoisted up the 71 year old hiker aboard

water. The Coast Guard District 13 Rescue Coordination Center launched a aircraft, a helicopter, and a 210-foot Coast Guard cutter. The helicopter arrived on the scene and dropped a rescue man with a pump. The vessel was able to keep ahead of the flooding with the use of the pump. The crew secured the source of the flooding. The vessel was escorted back to port by the Coast Guard Cutter.



The crew of the SEAN SEYMOUR II in the life raft as seen from the USCG H-60 Jayhawk on scene. Sea height was estimated to be between 50 – 70 feet.



*Rear Admiral Jonathan W. Bailey, NOAA
Director, NOAA Corps and
Office of Marine and Aviation Operations*

Office of Marine and Aviation Operations

On the Sea and in the Air

The mission of NOAA's Office of Marine and Aviation Operations (OMAO) is to manage, operate, and maintain the Nation's largest domestic fleet of research and survey ships and aircraft, which acquire data for NOAA's varied environmental programs. OMAO also manages NOAA's Diving Program and the NOAA Commissioned Officer Corps (NOAA Corps), one of the Nation's seven uniformed services. OMAO employees are civil service, wage grade, and wage marine civilians, as well as commissioned officers.

NOAA ships operate world wide, supporting a broad range of common and unique oceanic and atmospheric activities, including fisheries and coastal research, nautical charting, and long-term ocean and climate studies. The ships are equipped and designed to support scientific programs, and have data collection capabilities generally not found in the commercial fleet. For example, NOAA fisheries vessels can conduct joint operations of fishery stock assessments and oceanography, giving scientists a complete picture of a fish species, its habitat, and the physical oceanographic properties of its surrounding environment.

NOAA aircraft operate throughout the world, collecting data for national programs ranging from hurricane prediction and winter



storm research, to snow-pack surveys for flood prediction and water resource management, coastline mapping for erosion studies, and marine mammal surveys. NOAA's aircraft are unique, and are continually reconfigured to carry instruments to support scientific missions.

The NOAA Corps operates and manages NOAA ships and aircraft, and brings its operational expertise and knowledge of platform capabilities to land-based assignments throughout NOAA. NOAA Corps officers work in locations as diverse as NOAA's mission, serving in management and technical positions throughout all Line Offices of NOAA. They can be readily assigned to any area in the agency or Nation as needed. In addition, a NOAA Corps officer is director of NOAA's Homeland Security Program Office. NOAA

Corps officers are in the vanguard of those advancing NOAA's Homeland Security efforts—specifically, keeping the agency up and running in the event of an emergency. Along with other Line Office representatives, rotating NOAA Corps watch officers bring a broad understanding of NOAA, integrating NOAA's assets and services into national Homeland Security operations at the Department of Homeland Security Operations Center. These officers help staff the Center round-the-clock during significant events such as hurricanes, earthquakes, and tsunamis.

Visitors line up to tour THOMAS JEFFERSON during its Alexandria, VA, port call. The ship was there to promote public education about NOAA's mission as part of the Agency's 200th celebration.





NOAA's WP-3D Orion "Hurricane Hunter" braves winter weather in St. John's, Newfoundland, during the Ocean Winds Experiment that ultimately will help improve marine weather forecasts.

ACCOMPLISHMENTS

Fleet Modernization Moves Ahead

Some major ship fleet modernization milestones were achieved in FY 2007. In June, NOAA celebrated the keel laying of NOAA ships BELL M. SHIMADA (Fisheries Survey Vessel 4) and FERDINAND

R. HASSLER (SWATH CMV—small waterplane area twin hull coastal mapping vessel) at the VT Halter Marine shipyard in Moss Point, MS. This marked the first time NOAA has celebrated this important construction milestone for two ships simultaneously. HENRY B. BIGELOW, second of the four fisheries survey vessels of the same class being built by VT Halter Marine, was commissioned into the fleet in July before beginning operations in New England. Prior to commissioning, the U.S. Navy completed a battery of underwater acoustic tests that found BIGELOW's acoustics exceed international standards set by the International Council for the Exploration of the Sea to optimize fisheries research worldwide. In September, Phase I of conversion of NOAA Ship OKEANOS EXPLORER (formerly USNS CAPABLE) to an ocean exploration ship was completed by Todd Pacific Shipyards of Seattle, WA, following successful completion of sea trials.

On the aircraft side, the first phase of rehabilitation of NOAA N44RF—the third P-3



A Navy color guard helps kick off the commissioning ceremony of HENRY B. BIGELOW in Norfolk, VA. NOAA's newest fisheries survey vessel is one of the most technically advanced fisheries research ships in the world.

acquired from the Navy in April 2006—was successfully completed in October 2006 with the aircraft's first flight out of the Navy's Aerospace Maintenance and Regeneration Center in Arizona. The aircraft flew exceptionally well, with only a few minor glitches that are being addressed during its current phase of rehabilitation. OMAO expects the aircraft to be fully operational by the 2008 hurricane season. In September, OMAO signed a contract for the construction of a new King Air turboprop aircraft from Hawker Beechcraft Corporation in Wichita, KS. The aircraft will replace the aging Citation, and provide NOAA customers with a more versatile platform than those currently in the fleet. OMAO expects the aircraft to be completed and operational in 2009.

NOAA Platforms and Charters Advance Data Acquisition and Global Observations

OMAO employs a mix of NOAA platforms and charters to fulfill NOAA's data acquisition needs. The data support such varied missions as climate-change research, nautical charting, flood forecasting, fisheries management, and ocean exploration. Data acquired aboard NOAA ships and aircraft across the globe will become an important component of the emerging Global Earth Observation System of Systems (GEOSS), through which NOAA is working with its Federal partners and more than 60 countries to develop a global earth observation network.

In FY 2007, NOAA aircraft logged 2,869 mission flight hours and NOAA ships

Kitty Sununu, wife of Senator John Sununu of New Hampshire, welds her initials on the keel plate of NOAA Ship FERDINAND R. HASSLER, now under construction at VT Halter Marine Inc. in Moss Point, MS. Mrs. Sununu is sponsor of the ship, NOAA's first small waterplane area twin hull (SWATH) coastal mapping vessel. (Sununu after signing plate)





During the THOMAS JEFFERSON's Alexandria, VA, 200th Celebration port call, kids get hands-on ship construction experience when fashioning hulls out of clay and testing their designs in the water.

accomplished 3,801 operating days in support of NOAA's programs. NOAA also outsourced 2,716 flight hours and 1,670 ship-operating days.

NOAA Ships Arrive at New Home Port in Hawaii

OSCAR ELTON SETTE, HI'IALAKAI, and KA'IMIMOANA relocated to piers F-9 and F-10 at historic Ford Island, Pearl Harbor, HI, heralding the permanent presence of NOAA on Ford Island. This was a major milestone in the multi-year, multi-phase construction of the NOAA Pacific Regional Center, a project to consolidate NOAA

programs and operations on the island of Oahu into a single facility on Ford Island.

Marine Operations Center-Atlantic Wins Environmental Award

The Marine Operations Center-Atlantic (MOC-A) won the "Outstanding Achievement for a Government Facility, Federal Government" category of the 2006 Bay Environmental Excellence Awards. MOC-A was one of 16 organizations and three individuals recognized by the Chesapeake Bay Foundation's Businesses for the Bay initiative in November 2006. Award recipients were selected by their peers and

honored for their successful efforts to implement pollution-prevention projects. MOC-A was cited for implementing pollution-prevention measures as part of its newly created Environmental Management System.

NOAA P-3 and G-IV Participate in Hurricane Awareness Outreach

NOAA P-3 “hurricane hunter” Kermit participated on the East Coast Hurricane Awareness Tour (HAT) in May 2007. The purpose of the five-city tour was to raise public awareness of hurricanes that can threaten the Atlantic Seaboard, and to educate the public that preparation is vital. The P-3 and Gulfstream-IV and their flight crews participated in the 2007 Hurricane Season Outlook press conference held in the General Aviation hangar at Reagan National Airport in May. Several members of Congress as well as Hill staffers and media had the opportunity to learn about NOAA aircraft and the people who fly and manage them.

THOMAS JEFFERSON Visits Alexandria

As part of NOAA’s 200th Celebration, THOMAS JEFFERSON made a rare port call in Old Town, Alexandria, VA, in July to promote public education and awareness of NOAA’s mission. The event, which drew more than 750 visitors, included NOAA exhibits and hands-on demonstrations supported by OMAO, NOS, NMFS, and NOAA Preserve America. The event also received extensive media coverage of NOAA’s and THOMAS JEFFERSON’s mission.

NOAA Teacher at Sea Program Unveils New Children’s Book

NOAA’s Teacher at Sea program unveiled its third in a series of four planned children’s books in July in Alexandria, VA, in conjunction with THOMAS JEFFERSON’s 200th Celebration port call. The book,

aimed at middle school students, is about the experiences of a NOAA Teacher at Sea aboard the hydrographic survey ship FAIRWEATHER. The book was written by a former university professor and NOAA Teacher at Sea Mary Cook and Diane Stanitski and was illustrated by NOAA chief boatswain, Bruce Cowden. It has been widely disseminated to teachers and students across the nation and has received outstanding reviews.

Two NOAA Corps Basic Officer Training Classes Graduated

Thirty-three officers successfully completed the three-month NOAA Corps Basic Officer Training Classes (BOTC) during FY07. This intense training involves ship management, bridge operations, radar plotting, navigation, firefighting, service protocol, and other skills at the U.S. Merchant Marine Academy in Kings Point, NY.

Unmanned Aircraft Systems Billet at NASA-Dryden Approved

A new NOAA Corps billet was created for NASA’s Dryden Flight Research Center for Unmanned Aircraft Systems (UAS). NASA received a new Predator-B UAS in December, and began scientific research using the platform early in 2007. NOAA is looking at the possibility of using UAS for research and required observations. The officer in the new billet, who must have aviation expertise, will gain experience in areas such as operations, maintenance, logistical support, instrumentation integration, and coordination with the FAA for access into the National Airspace System.

Future Outlook

Emerging mission requirements such as homeland security, ocean exploration, and habitat mapping will place additional demands for ship and aircraft data acquisition. OMAO will face the challenges of providing multi-mission capable

platforms, up-to-date technology, and highly skilled NOAA Corps officers and civilian personnel to support its five mission goals:

- Improve the efficiency of existing NOAA platforms
- Modernize or replace aging platforms with platforms that have the capabilities to serve more than one Line Office
- Incorporate into the fleet emerging technologies such as unmanned aircraft systems and autonomous underwater vehicles
- Recruit and retain a motivated and technically competent workforce
- Achieve a proper mix of in-house and contracted work to meet these needs

PRODUCTS AND SERVICES

NOAA Commissioned Officer Corps

The NOAA Commissioned Officer Corps operates and manages NOAA ships and aircraft, while bringing operational expertise and knowledge to land-based NOAA programs through rotational assignments. Officers work under a personnel system similar to that of the U.S. Armed Forces, giving them the flexibility to move rapidly into disaster-response situations. NOAA Corps officers work closely with other uniformed services: They coordinated many of NOAA's hurricane response activities with the U.S. Coast Guard, Army Corps of Engineers, and Navy following Hurricanes Katrina and Rita and flew remote-sensing missions over the collapsed World Trade Center and Pentagon after September 11, 2001, at the request of the Army. NOAA Corps officers, with their flexibility and broad-based experience, leadership, and operational and management skills, are a valued resource used by all NOAA Line Offices to achieve mission goals.

Data Collection and Global Observations

NOAA ships and aircraft have sophisticated data collection capabilities, such as Doppler radar on the RONALD H. BROWN, state-of-the-art acoustic technology aboard the new fisheries survey vessels, and Stepped Frequency Microwave Radiometers on the WP-3D Orion hurricane research aircraft. Most ships are equipped with an OMAO-developed Scientific Computer System, which integrates data from shipboard and deployed 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, OMAO has developed capabilities that enable ships at sea to connect to the Internet on a limited basis to transmit research data, real-time images of ship personnel and scientists at work, and other valuable products and services. The data collected from sensors on NOAA platforms make these platforms an essential component of the Global Earth Observation System of Systems (GEOSS).

OUTSOURCING SUPPORT

OMAO provides guidance and staff support to NOAA programs interested in obtaining chartered ships and aircraft. OMAO recommends chartering options to NOAA programs and ensures that platforms are safe and outfitted to meet program requirements.

Aviation Safety Program and Small Boat Safety Program

To promote safe use of small boats and aircraft, OMAO manages two safety programs. The NOAA Small Boat Safety Program provides support to ensure that NOAA offices that use small boats to meet their mission requirements have properly trained personnel, appropriate equipment,

and safety standards. The safety program provides standardized operator training and safety equipment, assistance with boat acquisition and alterations, and routine safety inspections.

When fully implemented, the NOAA Aviation Safety Program will provide support to ensure that NOAA personnel who use commercial aviation services or NOAA aircraft to meet their mission requirements are properly trained in basic safety and provided with aviation life support equipment. The program ensures that contracted aircraft meet NOAA airworthiness and operational safety standards and that these standards are incorporated in aviation services procurement documents.

NOAA Diving Program

The NOAA Diving Program (NDP) 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. Averaging more than 15,000 dives per year, the NDP has consistently maintained an excellent diving safety record (99.97% safe dive statistic).

NOAA Teacher at Sea and Teacher in the Air Programs

Now in its 16th year, the NOAA Teacher at Sea Program has enabled more than 500 educators to gain hands-on NOAA research experience at sea. Each year, approximately 30 kindergarten through college-level educators spend time aboard NOAA hydrographic, oceanographic, and fisheries 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—enriching their lives as well as their curricula. While onboard, teachers write logs, take photos, and interview scientists and crew. Some teachers use the Internet to communicate their experiences to students back home. NOAA's successful Teacher at Sea program has led to the creation of an offshoot—NOAA Teacher in the Air—where teachers fly with NOAA on airborne missions.



*Paul N. Doremus, Ph.D.
Acting Assistant Administrator*

NOAA Office of Program Planning and Integration

Guiding NOAA Strategically

OVERVIEW

The NOAA Office of Program Planning and Integration (PPI) helps NOAA fulfill its vision and mission through strategic, corporate leadership and the application of matrix management principles to major NOAA programs. PPI is driven toward the ideal of one NOAA working together, guided by a clear strategic vision for planning, programming, and execution to achieve its mission goals and mandates. Strategic planning and management of NOAA's activities work best when those who benefit from these activities and those who provide NOAA's services contribute to the process. As such, PPI works with stakeholders, employees, and domestic and international partners to ensure that every initiative — existing or new — arises from a collaborative effort among Line Offices, Goal Teams, and Councils. PPI believes that more-developed and better-executed NOAA programs foster richer, more productive partnerships with the public, private, and academic sectors and improved outcomes for the Nation.

PPI defines NOAA's high-impact missions and focuses corporate-wide attention on them through formal Strategic Planning and Performance Evaluation. PPI develops the NOAA Strategic Plan, which articulates NOAA's long-range vision and path for the future. PPI also develops the Annual Guidance Memorandum, which provides annual adjustments to the direction of NOAA Program priorities. Both products demand yearly assessment of emerging challenges and opportunities and yearly evaluation of NOAA's priorities and progress. PPI strives to improve the efficiency and effectiveness of NOAA's strategic planning processes, using research and economic evaluations as the basis for identifying the changing national needs in NOAA mission areas.

PPI not only creates NOAA's strategy and updates it annually, but also continually maintains NOAA's internal strategic alignment through Program and Policy Integration. It provides corporate management to coordinate NOAA's many lines of service with the Nation's many needs for environmental information and stewardship. It ensures that agency investments and actions are guided by the NOAA Strategic Plan and Annual Guidance Memorandum; are based on sound social and economic analysis; adhere to executive branch and legislative branch science, technology and environmental policy;



*General Session at NOAA 2007
National Stakeholder Forum.*



Question and Answer Session at NOAA 2007 National Stakeholder Forum.

and integrate the full breadth of NOAA's resources, knowledge and talent to meet its stated mission goals.

ACCOMPLISHMENTS

PPI Leads Articulation of NOAA's Key Strategies—As an addition to the 2007 strategic planning process PPI coordinated the efforts of high-level planning teams at NOAA to produce four papers covering climate, weather, ecosystems, and hazard resilience. The purpose was to articulate the internal and external assessment of strategically important issues, answer critical strategic investment questions, and provide NOAA leadership with options for addressing each opportunity. By executive decision in early August 2007 these papers were used as guidance in the creation of the NOAA Program, the precursor to the FY 2010 budget. Based on these strategy papers and supporting planning materials, NOAA is

- generating strategic options to build NOAA's climate services, along with the necessary adjustments to the NOAA Program structure,
- seeking to mitigate risks to core weather services and accelerate improvements in operational hurricane forecasts,
- developing proposals to implement Integrated Ecosystem Assessments on the large marine ecosystem scale, and
- developing the agency's role in increasing the hazard resilience of coastal communities.

These papers now serve as a primary source of analytical backing for NOAA's budget and policy activities in support of the NOAA mission goals.

PPI Instrumental in Establishing Corporate Decision-making Policy and Standardized Business Operations — PPI led efforts culminating in the issuance of NOAA Administrative Order (NAO) 216-111, which codifies NOAA's Planning, Programming, Budgeting, and Execution System (PPBES). This NAO represents a foundational shift by firmly establishing, as NOAA policy, PPBES management changes begun in 2003. The PPBES is a strategic decision-making process used to allocate resources among competing priorities. It is a requirements-based, integrated series of processes that 1) uses NOAA's strategic vision and mission to drive annual investment and management priorities, programmatic and policy choices, and budget and organizational development; 2) provides a systematic approach to reviewing performance and progress, allocating resources optimally to satisfy NOAA's statutory and regulatory duties and to maximize programmatic impact; and 3) identifies, analyzes, and resolves key policy, organizational, acquisition and managerial decisions that are critical to NOAA's success.

Additionally, PPI published a significant revision of the NOAA Business Operations Manual (BOM). This living document provides a comprehensive overview of NOAA's functions, organizational structure, and business operations, and for the first time, includes information on all phases of PPBES. The BOM is designed to ensure quality and uniformity of operations in the agency and is useful as a primary reference guide for NOAA employees, especially those with a role in PPBES. The BOM provides standardized, up-to-date information and guidance for greater clarity and transparency of business processes, enhanced internal and external communications to support client and stakeholder needs, and fact-based decision-making. It also provides employees



NOAA's 2007 Regional Collaboration Framework.

with a comprehensive overview of the NOAA Functional Model, organizational structure, management techniques, PPBES, Operational Support Services and Program Support Services.

PPI Leads NOAA Efforts to Respond Effectively to Regional Priorities—NOAA continues to build its capabilities at the regional level to provide products and services tailored to constituents' highest priority needs. PPI is leading NOAA's effort to understand the complex demand for our services in eight NOAA regions. These regions serve as a flexible framework to bring together NOAA assets to address environmental issues that occur at a variety of scales. Bringing together the components of the NOAA family, including critical partnerships, allows us to develop collaborative solutions for product delivery that meet unique regional needs and increase the value of NOAA's products and services.

The impact of this commitment has already been seen in several of NOAA's mission areas. For example, NOAA's National Weather Service and Ocean Service are being consulted on a NOAA Fisheries Service dam removal project in the northeast; a comprehensive NOAA data portal pilot is being developed in the southeast; and in the west, NOAA sponsored "Science on a Sphere" at the California State Fair to educate the public about critical safety and environmental issues. These are some early examples of how NOAA can integrate its resources to respond to existing regional

needs. NOAA will continue to use this mechanism to anticipate future priorities and prepare for trends in mission requirements.

Developing Strategies for NEPA Compliance—In 2007 PPI developed several important National Environmental Policy Act (NEPA) products. Products included an Environmental Compliance Questionnaire for Financial Assistance Award Applicants; Procedures for Submitting Comments on other Federal Agency NEPA Documents; and a system to track NEPA document development. PPI assisted in developing a process to review and comment on proposed liquefied natural gas facilities and assisted in developing guidance on applying NEPA to financial assistance awards. PPI represented NOAA and the Department of Commerce on three Council on Environmental Quality working groups focused on NEPA modernization.

PPI Convenes NOAA National Stakeholder Forum—PPI designed and executed NOAA's major national stakeholder forum for 2007 in the Washington, DC, area. This continuation of NOAA's ongoing dialog with stakeholders offered an additional opportunity to discuss external trends and implications for NOAA, to gather stakeholder views on NOAA's direction and priorities, and to facilitate broad discussion among stakeholders and NOAA leadership. The more than 170 external stakeholders attending provided perspective and insight on NOAA's strategic direction and priorities in four key thematic areas: societal demands for climate information services; research and technological challenges to improving extreme weather forecasting and prediction; decision support services for hazard resilient coastal communities, commerce, and transportation; and ecosystem approaches to management in an era of changing mandates and increasing pressure on ocean and coastal resources. The input received informed NOAA's FY 2010-14 planning efforts and continues to inform NOAA policymakers.

PPI Leads Integration Efforts for Transition of Research to Applications—In an effort to accelerate and streamline the transition of research to applications, PPI continues to lead the NOAA Transition Board to ensure that the transition of research is incorporated into the annual and long-term strategic planning process. Specifically, in 2007, PPI facilitated a bottom-up identification of current and future transition projects by incorporating transition planning into the FY 2010 Program Operating Plans (POPs) as well as providing an analysis of the data which was utilized during the FY 2010 Programming process. Additionally, PPI has integrated transitions into the Line Office execution reporting requirements for FY 2008. These activities will provide for better integration and standardization of how Program Managers, Goals, and Line Offices plan for and execute the transition of research to applications.

Services

Strategic Planning—PPI is responsible for managing the NOAA-wide planning cycle and for producing its outputs. These include updates to the NOAA Strategic Plan and release of the Annual Guidance Memorandum, which articulates investment priorities over a five-year period. PPI designs planning guidance for NOAA Programs, oversees their planning processes, and monitors and evaluates Program implementation. It also interacts with NOAA stakeholders and acquires, synthesizes and responds to their inputs. The strategic planning function employs PPI's expertise in social, economic and policy analysis to understand and evaluate the societal impact of NOAA Programs.

Performance Evaluation—PPI leads NOAA's development of performance measurements, both at the Program and the corporate level. It refines their content over time and ensures their consistent and appropriate use across diverse management and reporting processes. PPI

is the interface to NOAA's budget office regarding performance evaluation methods, performance metrics, and performance-based management practices.

Program Integration—PPI provides oversight of the direction, integrity and performance of NOAA Programs and the Program structure. NOAA has adopted a matrix organizational structure to ensure that its functions meet its mission goals. PPI develops the capacity and integrity of Programs within the matrix, including the integration of social science research and analysis capabilities. PPI also works closely with NOAA's Programs, Goal Teams and Councils to strengthen the Planning, Programming, Budgeting and Execution System process and strategic decision-making in general.

Policy Integration—PPI represents NOAA in interagency functions, including those associated with the National Environmental Policy Act, the U.S. Climate Change Science Program, and the U.S. Ocean Action Plan. PPI catalyzes, launches and monitors the implementation of new internal policies that are needed to advance Program integration and improve Program performance. The office guides and monitors the progress of policies on such issues as the transition of research to application, NOAA's partnerships with the private and academic sectors, and NOAA's use of social science to measure performance and prioritize activities.

National Environmental Policy Act Responsibilities—Successfully meeting the requirements of NEPA is an essential element of achieving program and NOAA-wide outcomes. The NOAA NEPA Coordinator in PPI ensures NEPA compliance in NOAA by reviewing and clearing all NEPA documents, overseeing other elements of NEPA compliance in NOAA, and training NOAA and Department of Commerce staff on NEPA policy and guidance. PPI also provides a liaison to the U.S. Environmental Protection Agency and the Council on Environmental Quality.



The science team descends onto the ice below in a manlift during the NOAA-sponsored "Hidden Ocean" cruise to study marine life in all realms of the Canada Basin, 2005. Photo Credit: Jeremy Potter

NOAA

FINANCIAL OVERVIEW



Maureen E. Wylie
Chief Financial Officer



Close up of tentacles of the American Tube Anemone at Gray's Reef National Marine Sanctuary. Photo Credit: Greg McFall

Office of Chief Financial Officer

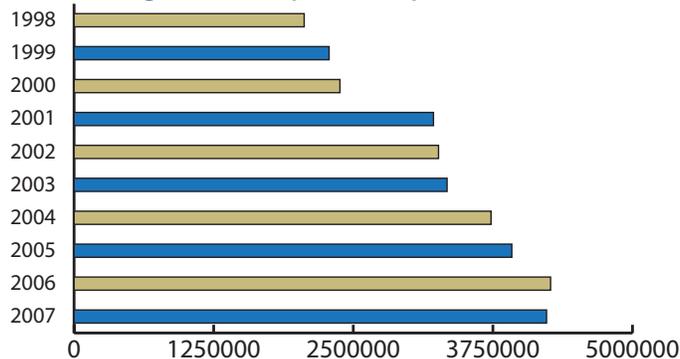
Budget Overview

NOAA's total budget appropriation was \$4.2 billion for Fiscal Year 2007. These funds were directed toward fulfilling NOAA's statutory and legal obligations, as well as Congressional responsibilities. NOAA conducts research and gathers data about the global oceans, atmosphere, space, and solar activities, and applies this knowledge to science and services that touch the lives of all Americans. NOAA warns of dangerous weather, charts our seas and skies, guides us in the wise use of ocean and coastal resources, and conducts research to improve our understanding and stewardship of the environment that sustains us all. Over the last 10 years, NOAA's appropriated funding level has grown by 51 percent.

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; fisheries and protected species management; and coastal ecosystems health responsibilities. 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.

Consolidated Balance Sheet

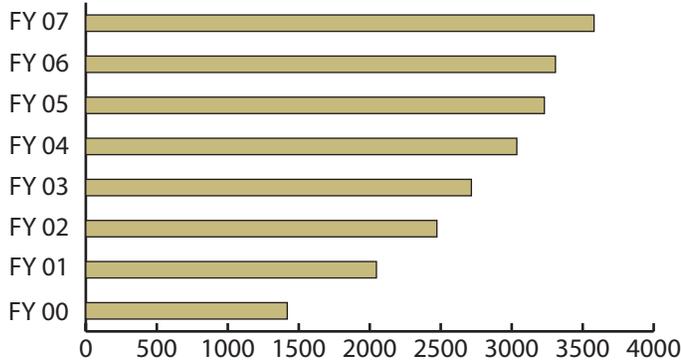
NOAA Budget Growth (in billions)



Financial Analysis ASSETS: The FY 2007 Consolidated Balance Sheet reflects total assets of \$9.2 billion and primarily consists of the following:

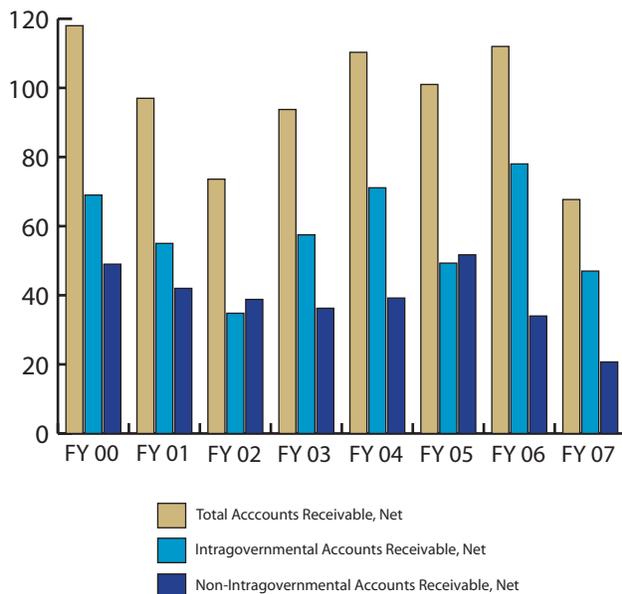
Fund Balance with Treasury of \$3.6 billion consists primarily of appropriated funds to pay current liabilities and finance authorized purchase commitments.

Fund Balance with Treasury (in billions)



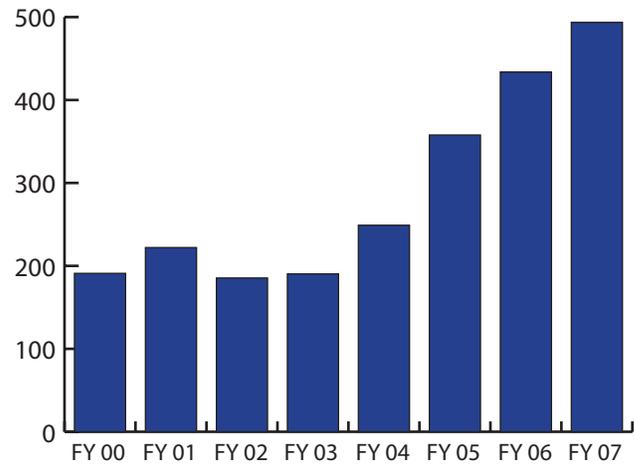
Accounts Receivable, Net of \$67.7 million consists of intragovernmental (Federal agencies) accounts receivable of \$47.0 million and non-intragovernmental accounts receivable of \$20.7 million. Outstanding billed and unbilled reimbursable services provided to other Federal agencies compose the majority of NOAA's accounts receivable. Accounts

Accounts Receivable, Net (in millions)



receivable are established to receive payments for direct and indirect costs of services provided to another Federal agency or non-intragovernmental entity.

General Property Plant and Equipment (in billions)

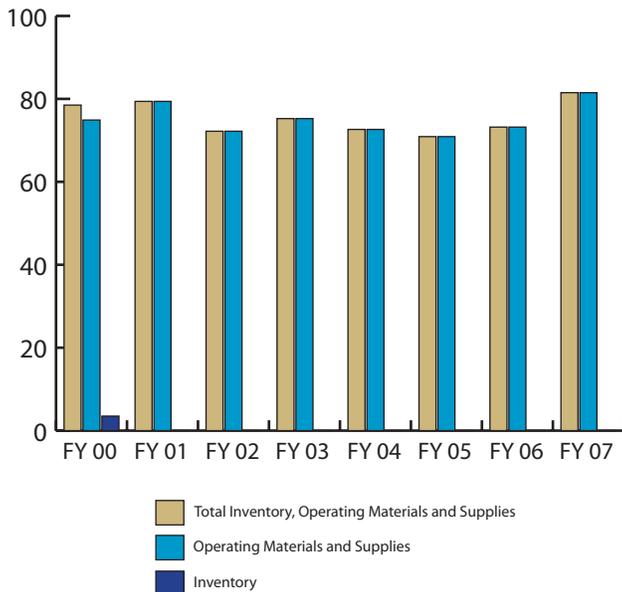


Loans Receivable and Related Foreclosed Property, Net of \$493.6 million consists of monies disbursed by the Fisheries Finance Program to private lenders for guaranteed loans in default, and monies disbursed as direct loans to finance various National Marine Fisheries Service loans totaling \$4.9 million and \$488.7 million, respectively.

Inventory and Related Property of \$81.5 million consist solely of operating materials and supplies. Operating materials and supplies consist of tangible personal property to be consumed in normal operations. 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, consisting primarily of maps and charts, was transferred to the Federal Aviation Administration during FY 2001.

General Property, Plant, and Equipment is stated at net book value of \$4.8 billion and consist mainly of construction work-in-progress, satellites and weather systems, structures and facilities, and other personal property with net book values of \$3.2

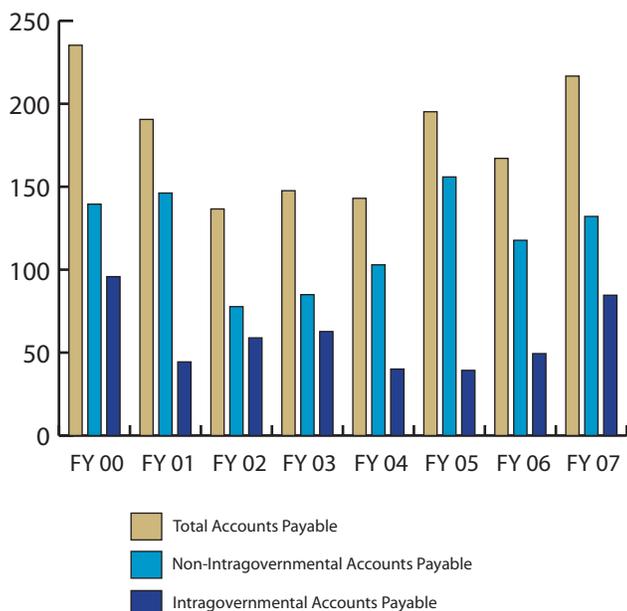
Inventory and Operating Materials and Supplies (in millions)



billion, \$0.9 billion, \$0.3 billion, and \$0.4 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 2007 Consolidated Balance Sheet reflects NOAA liabilities totaling **\$1.6 billion**. The following significant liabilities represent monies owed

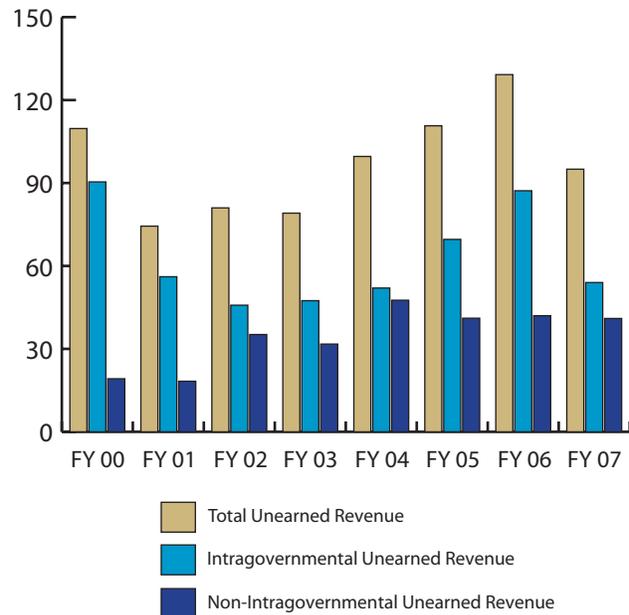
Accounts Payable (in millions)



for goods and services that have been received but for which payment has not yet been made.

Accounts Payable of \$216.7 million consists of \$84.6 million of intragovernmental accounts payable and \$132.1 million of non-intragovernmental accounts payable.

Unearned Revenue (in millions)



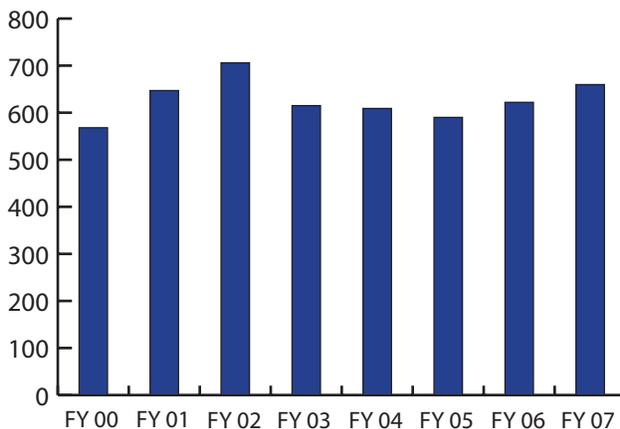
Unearned Revenues of \$95.0 million consist of intragovernmental and non-intragovernmental unearned revenue of \$54.0 million and \$41.0 million, respectively. The majority of NOAA's unearned revenue consists of amounts advanced to NOAA by other Federal entities (such as the Department of Transportation and the Department of Defense) and non-intragovernmental entities, for goods and services to be furnished.

Future Funding Requirements of \$659.7 million represent liabilities not funded by budgetary resources. These include NOAA Corps pension liability of \$416.0 million, NOAA Corps retirement health benefits of \$45.4 million, accrued leave balances of \$100.0 million, FECA Actuarial and Accrued liability of \$76.8 million, environmental

cleanup costs of \$20.4 million, and contingent liabilities of \$1.1 million.

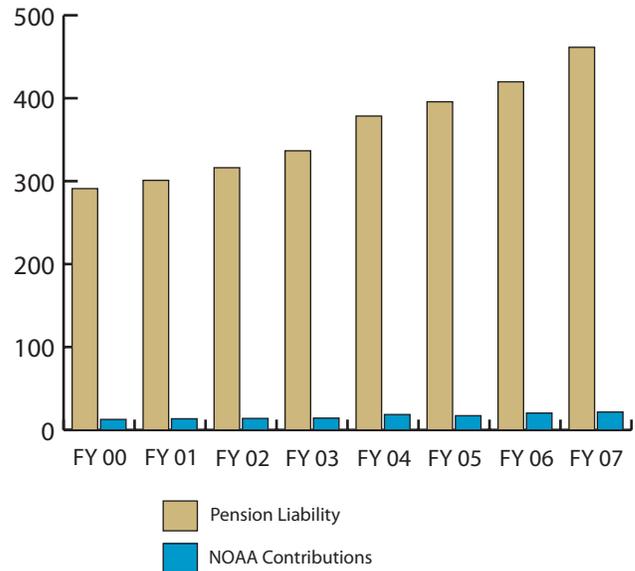
Liabilities not covered by budgetary resources result from the receipt of goods or services in the current or prior periods, or the occurrence of eligible events in the current or prior periods, for which appropriations, revenues, or other financing sources of funds necessary to pay the liabilities have not been made available through Congressional appropriations or current earnings of NOAA. The total amount of liabilities classified as unfunded exceeds the amount of available unobligated appropriations of \$244.1 million, by \$415.6 million as of September 30, 2007. These liabilities are presented as unfunded rather than allocating portions of each of these liabilities to appropriated funds.

Future Funding Requirements (in millions)



NOAA Corps Pension Liabilities of \$461.4 million, as mentioned above, represent non-intragovernmental liabilities not covered by budgetary resources relating to the NOAA Corps Retirement System. The NOAA Corps Retirement System is a non-contributory, defined benefit plan covering all active duty officers, retiree annuitants, and surviving families totaling 689 as of September 30, 2007. During FY 2007, NOAA contributed \$21.7 million to the NOAA Corps Retirement System.

Pension Liability (in millions)



FLUCTUATION ANALYSIS

The following balance sheet fluctuations were noted between FY 2006 and FY 2007 financial statements:

ASSETS

NOAA's total assets increased by approximately \$636.3 million from September 30, 2006, to September 30, 2007. The majority of the increase in total assets is attributable to increases in Property, Plant & Equipment of \$345.7 million, Fund Balance with Treasury of \$271.6 million, and Loans Receivable and Related Foreclosed Property of \$59.8 million. Decreases in Accounts Receivable totaled \$44.3 million.

LIABILITIES

NOAA's total liabilities increased by approximately \$134.9 million from September 30, 2006, to September 30, 2007. This was mainly due to an increase in Debt to Treasury of \$60.1 million, Accounts Payable of \$49.5 million, and Federal Employee Benefits of \$26.0 million. There were decreases in Environmental and Disposal Liabilities and Loan Guarantee Liabilities of \$7 million and \$4.8 million, respectively.

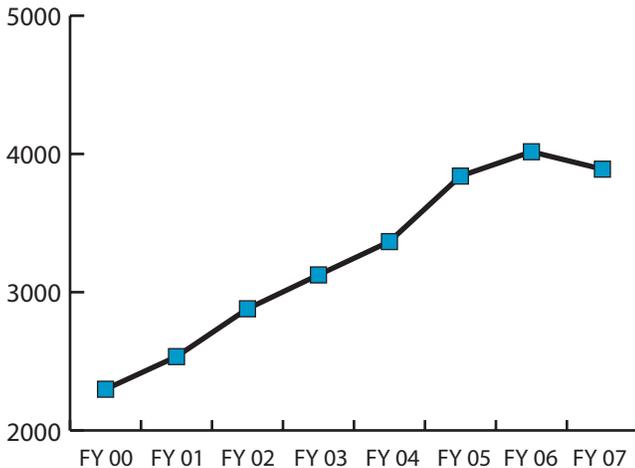
EQUITY

NOAA's Net Position increased by approximately \$501.4 million from FY 2006 to FY 2007. The \$7.5 billion of net position consists of \$3.2 billion of Unexpended Appropriations and \$4.3 billion from Cumulative Results of Operations.

Consolidated Statement of Changes in Net Position

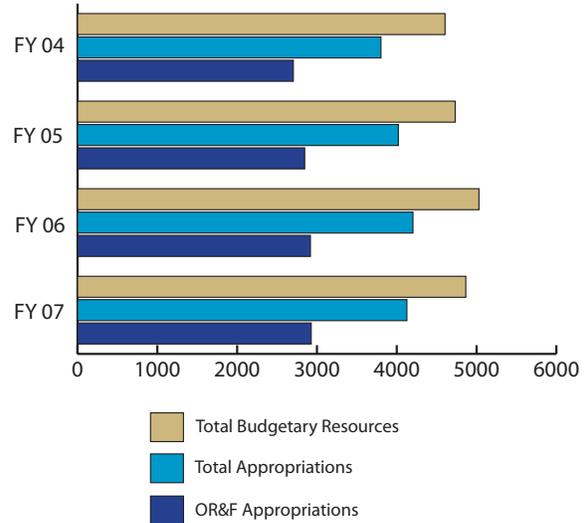
The FY 2007 Statement of Changes in Net Position reports the beginning net position, the items which caused net position to change during the year ended, and the ending net position. The majority of the activity in this statement involves two components of net position: net cost of operations and appropriations used (revenues), totaling \$3.8 billion and \$3.9 billion, respectively.

Appropriated Capital Used (in billions)



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.

Budgetary Resources (in billions)



Combined Statement of Budgetary Resources

The FY 2007 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 84 percent, or \$4.1 billion, of its budgetary resources of \$4.9 billion through appropriations. Of the \$4.1 billion, NOAA's OR&F appropriation received \$2.9 billion. Other major sources of budgetary resources include unobligated balances carried over from FY 2006 and spending authority from offsetting collections, totaling \$313.9 million and \$321.9 million, respectively. Of the total budgetary resources of \$4.9 billion, \$4.6 billion were obligated during FY 2007.

**U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Consolidated Balance Sheets As of September 30,
2007 and 2006 (In thousands)**

ASSETS	2007	2006
Intragovernmental Assets:		
Fund Balance with Treasury	\$3,580,037	\$3,308,451
Accounts Receivable, Net	47,003	77,997
Loans Receivable and Related Foreclosed Property, Net	3	
Advances and Prepayments	84,823	56,166
Total Intragovernmental Assets	3,711,866	3,442,614
Non-Intragovernmental Assets:		
Cash and Other Monetary Assets	490	490
Accounts Receivable, Net	20,656	33,945
Loans Receivable and Related Foreclosed Property, Net	493,623	433,844
Inventory, Materials and Supplies	81,475	73,244
General Property, Plant and Equipment, Net	4,804,596	4,458,906
Advances and Prepayments	61,276	94,692
Other	1,858	1,843
Total Non-Intragovernmental Assets	5,463,974	5,096,964
TOTAL ASSETS	\$9,175,840	\$8,539,578

**U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Consolidated Balance Sheets,
Continued As of September 30, 2007
and 2006 (In thousands)**

LIABILITIES	2007	2006
Intragovernmental Liabilities:		
Accounts Payable	84,608	49,436
Debt to Treasury	478,958	418,840
Resources Payable to Treasury	1,862	1,846
Unearned Revenue	53,959	87,229
Other	60,150	39,217
Total Intragovernmental Liabilities	679,537	596,568
Non-Intragovernmental Liabilities:		
Accounts Payable	132,072	117,724
Loan Guarantee Liabilities	998	
Accrued Payroll and Annual Leave	139,526	135,892
Actuarial FECA Liability	63,108	63,858
NOAA Corps Pension	416,000	370,600
NOAA Corps Retirement Health Benefits	45,400	49,200
Accrued Grants	85,247	74,336
Environmental and Disposal Liabilities	20,474	27,441
Capital Leases	15,395	16,310
Unearned Revenue	41,019	41,976
Other Liabilities	8,316	18,277
Total Non-Intragovernmental Liabilities	967,555	915,614
TOTAL LIABILITIES	1,647,092	1,512,182
NET POSITION		
Unexpended Appropriations	3,210,005	3,013,906
Cumulative Results of Operations	4,318,743	4,013,490
TOTAL NET POSITION	7,528,748	7,027,396
TOTAL LIABILITIES AND NET POSITION	\$9,175,840	\$8,539,578



National Ocean Service
www.oceanservice.noaa.gov

National Marine Fisheries Service
www.nmfs.noaa.gov

Office of Oceanic and Atmospheric Research
www.research.noaa.gov

National Weather Service
www.nws.noaa.gov

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

Office of Marine and Aviation Operations
www.oma.noaa.gov

Office of Program Planning and Integration
www.ppi.noaa.gov

Office of International Affairs
www.international.noaa.gov

Office of the Chief Financial Officer
www.corporateservices.noaa.gov

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
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