



# EARTH SYSTEM MONITOR

## Improving Resilience – NOAA's Response to Coastal Communities at Risk

A guide to  
NOAA's data and  
information  
services

### INSIDE

2

Letter from the  
Acting Director  
Terrance Tielking

3

Coastal Storms  
Program Brings  
Tools and Services  
to Coastal  
Communities

4

The 4<sup>th</sup> International  
Polar Year  
(2007-2008)

5-7

Urban Meteorology

8-9

News Briefs

10

Coastal Risk Atlas

12

NOAA Weather  
Radio



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

Margaret Davidson, Director of the NOAA  
Coastal Services Center

The 2005 Atlantic hurricane season demonstrated the vulnerability of coastal towns and cities to natural hazards. Seven out of the ten worst hurricanes in U.S. history occurred between August 2004 and October 2005. Also, in 2005, the United States suffered more economic losses from hurricanes than any other year in history. With coastal populations expected to grow from 153 million in 2003 to an estimated 160 million in 2008, risks to life, property, and coastal habitats will only increase in the future.

The National Oceanic and Atmospheric Administration (NOAA) has a commitment to guard against the loss of life and property from natural hazards. In 2006 and 2007, NOAA stepped up its commitment, stressing agency responsibility to mitigate the escalating economic, societal, and environmental costs of environmental hazards and the need to adopt a strategic framework to develop long-term resilience strategies. NOAA's community resilience activities include education, training, data collection, grants, technology transfer, assessments, geographic positioning, and decision support tools.

NOAA is pursuing a highly collaborative, regionally-based approach with programs across the agency coming together to combine their expertise to help make the Nation's coastal communities more resilient to natural hazards. NOAA continues to partner with communities on key activities, including: 1) conducting community risk and vulnerability assessments; 2) integrating and developing information resources, technology, assessment tools, and decision

support tools to help mitigate identified risks and vulnerabilities; and 3) transferring and delivering state and community education and outreach programs on natural hazards, as well as training decision makers to use community resilience tools.

NOAA's Coastal Services Center leads agency collaboration efforts for resilience activities. The Center also works with partners in government, industry, and academia to develop a



▲ Margaret Davidson (right), Director of NOAA's Coastal Services Center, leads NOAA's collaborative community resilience efforts.

Resilience is defined as the capacity of a system to tolerate disturbance without collapsing into a qualitatively different state. A resilient system can withstand shocks and rebuild itself when necessary.

common set of physical, ecological, and socioeconomic indicators of resilience to measure community progress toward achieving resilience goals.

As a result of NOAA's regionally-focused resilience activities, local and state decision makers, emergency managers, urban planners, and coastal resource managers will be more informed about community hazard risks and mitigation techniques. In addition, coastal communities will have improved capacities for responding to and rebounding quickly and efficiently from coastal hazard events. ■

## Letter from the Acting Director Terrance Tielking

We are now in the middle of the annual hurricane cycle, a time when NOAA pulls together to provide the best possible support to protect lives and property. The lead article introducing this edition's theme, *Resilient Communities*, was prepared by Margaret Davidson, Director of the NOAA Coastal Services Center in Charleston, South Carolina.

She is a strong advocate for coastal community management and resilience. Our coastal communities are exposed to weather events from the ocean, Nor'easters, tropical storms, and flooding from upstream rain events. These events can be disastrous to the public and that is why resilient communities are so important.

August 29<sup>th</sup> marks the second anniversary of Hurricane Katrina, which made landfall and passed over our National Coastal Data Development Center (NCDDC) office in Mississippi. Hurricane Katrina directly affected the staff and gave everyone a new appreciation for the term *preparedness*. Within NOAA, NCDDC works with partners from the National Ocean Service, National Weather Service, and National Marine Fisheries Service offices to promote resilient communities and effective restoration. Barbara Ambrose, a graphic artist at the



▲ Terrance Tielking

Stennis Space Center in Mississippi, created the poster on page 11, which is her creative interpretation of *Resilient Communities*.

We are also happy to include the Office of the Federal Coordinator for Meteorology (OFCM) as a partner for this issue. Sam Williamson of OFCM leads a multiagency team that promotes all Federal activities related to weather. OFCM provides assessments of all storm-related Federal programs, all weather phenomenon (such as winter storms, drought, tropical cyclones, tornadoes), and temperature risks in context to impacts on communities. The OFCM mis-

sion spans all seasons, all locations, and maintains a large scale view of weather risks and national interests.

Teamwork within NOAA has been demonstrated in our commitment to coastal communities and keeping them resilient. Informing the public prior to weather events, as well as supporting them during events, is our priority.

I hope you enjoy this *ESM* edition. We look forward to receiving your feedback. ■

Cheers,  
Terry

### EARTH SYSTEM MONITOR

The *Earth System Monitor* (ISSN 1068-2678) is published quarterly by the NOAA Environmental Information Services. Past issues are available online at <http://www.nodc.noaa.gov/General/NODCPubs/>. *ESM* has RSS feed, see NODC web site.

**Questions and comments should be directed to the Editor, Michael Crane.**

The mailing address for the *Earth System Monitor* is:  
National Oceanographic Data Center  
NOAA/NESDIS E/OC1  
SSMC3, 4<sup>th</sup> Floor  
1315 East-West Highway  
Silver Spring, MD 20910-3282

#### Editors

Michael Crane  
Telephone: 301-713-3277 ext. 149  
Fax: 301-713-3302  
E-mail: [esm@noaa.gov](mailto:esm@noaa.gov)

Mindy Gaines  
Marc Pulliam

#### Disclaimer

Mention in the *Earth System Monitor* of commercial companies or commercial products does not constitute an endorsement or recommendation by the National Oceanic and Atmospheric Administration or the U.S. Department of Commerce. Use for publicity or advertising purposes of information published in the *Earth System Monitor* concerning proprietary products or the tests of such products is not authorized.



**U.S. DEPARTMENT OF COMMERCE**

Carlos M. Gutierrez, Secretary

**National Oceanic and Atmospheric Administration**

Conrad C. Lautenbacher, Jr.,  
Under Secretary and Administrator

# Coastal Storms Program Brings Tools and Services to Coastal Communities

*Keelin Kuipers, Coastal Management Specialist, National Ocean Service*

As the old cliché goes, it's not a matter of if, but when. Hurricanes, floods, and other weather-related calamities will continue to threaten and impact coastal areas. But that's not keeping people away. Coastal tourists, businesses, and full-time residents continue to come in record numbers. And it is predicted that the frequency and intensity of coastal storms will continue to rise. While we haven't figured out how to change the weather, we can do a better job of making our communities more resilient.

The National Oceanic and Atmospheric Administration's (NOAA's) Coastal Storms Program (CSP) is using tools and expertise from NOAA and other organizations to improve storm preparedness. CSP is successful because the program focuses on individual pilot regions, working with local partners and decision makers to ascertain and prioritize needs. The program addresses these needs by building partnerships across NOAA and other Federal, state, and local organizations.

CSP is currently working in three regions: Southern California, the Pacific Northwest, and Northeast Florida. CSP is in the development phase in the Gulf of Mexico region. Below are some examples of tools developed as a result of CSP efforts in these regions.

## • Southern California

- Precipitation Atlas: Updates NOAA's precipitation atlas using information from partners across the region.
- Bathymetric and Topographic Digital Elevation Model and VDatum: Merges bathymetric and topographic data into a seamless model across the land-sea interface.

## • Pacific Northwest

- Lower Columbia River Circulation Model: Provides real-time and forecasts Columbia River conditions, including water level, current, temperature, and salinity.
- Improved Prediction of Coastal Waves: Uses a grid system for better local area forecasts for nearshore wave height and direction for the Columbia River bar. This high-resolution model tool was expanded to cover the

entire West Coast to meet regional demand.

- Improved Observations: Deployed a new buoy to gather quality-controlled oceanographic and meteorological data and installed new water-level sensors to measure wind speed, direction and gust, air and water temperature, and barometric pressure.

## • Northeast Florida

- HURREVAC Inland Flood Planning and Response Tool: Provides real-time flood-related information such as current rainfall estimates and forecasts, current and forecast river stages, and historical flood impacts.
- St. Johns River Bathymetric Survey: Identified 45 obstacles, taking over six million soundings of the river.
- Improved Observations: Deployed a new buoy, which was the first to report real-time salinity measurements; deployed Coastal Marine Automated Network sensors that measure temperature, water level, humidity, precipitation, and visibility; and upgraded numerous tide stations.

At the beginning of a new pilot project, the NOAA project team meets with local and regional stakeholders and partners (e.g., Federal agencies, state and local emergency managers, policy makers, planners, universities, and private organizations) to determine the most pressing local needs for mitigating storm hazard impacts. The information gathered from these meetings guides the development of tools and services. Local users are also trained to use each new product. With each new pilot region, the program continues to maximize the benefits of Federal dollars by bringing organizations together to work on specific regional and community storm-preparedness needs. ■

To learn more about CSP, visit [www.csc.noaa.gov/csp](http://www.csc.noaa.gov/csp).

## NOAA Extreme Weather Information Sheet

*Angela R. Sallis, Outreach Coordinator, National Coastal Data Development Center*

In the immediate aftermath of Hurricane Katrina, critical information was not easily available for many reasons. A convenient and portable information sheet, listing phone numbers and websites of governmental and non-governmental agencies, was needed. In 2006, NOAA's National Coastal

Data Development Center (NCDDC) designed and published a NOAA Extreme Weather Information Sheet (NEWIS) for the Louisiana, Mississippi, and Alabama coastal parishes/counties to emphasize NOAA's commitment to public welfare and the environment. In 2007, an updated NEWIS will be produced for those three states. In addition, the program will expand to include the Gulf Coast regions of Texas and Florida. Over 160,000 laminated NEWIS will be distributed in the five-state area this summer.

NEWIS contains valuable state and local emergency numbers, NOAA website information, media outlets, and hurricane evacuation plans. In 2006, over 43,000 laminated NEWIS were delivered to 231 locations in the three states. The sites chosen to receive NEWIS had a high amount of public traffic or a good internal distribution system. Special emphasis was placed on senior citizens, first responders, and people who might not have internet access. NEWIS was extremely well received by everyone in these areas.

More than half of the Nation's population lives near the U.S. coastline. As this population grows, the need for accurate and timely information related to coastal hazards will become increasingly important. These new residents are often unaware of the level of knowledge and preparedness needed to weather a catastrophic storm. The reaction of the public prior to and after Hurricane Katrina demonstrated that a significant cultural and institutional memory of the effects of these storms does not exist or is waning with successive generations. NOAA strives to remind the public of these dangers by issuing forecast warnings, observing indications, providing alerts, and providing critical information to the public. ■

To download NEWIS files, visit <http://ecowatch.ncddc.noaa.gov/c-side>.

## The 4<sup>th</sup> International Polar Year (2007-2008)

*Anna Fiolek, Metadata Librarian, NOAA Central Library*

The NOAA Central Library is considered to have the most comprehensive multidisciplinary and historically richest scientific collection in hydrographic surveying, oceanography, ocean engineering, atmospheric sciences (climatology and meteorology), meteorological satellite applications, living marine resources, geophysics, cartography, and mathematics in the United States, possibly in the Western Hemisphere. It incorporates holdings of the agencies that preceded NOAA, including the Coast and Geodetic Survey, National Weather Bureau, and the Bureau of Commercial Fisheries. These unique collections reflect the history of these organizations, their scientific research, observations, and data from 1820 to today.

There are historic and current reports from the various polar expeditions, and research and observations from both the Arctic and Antarctic regions. Because of these resources, the NOAA Central Library became a part of the 4<sup>th</sup> International Polar Year (IPY) 2007-2008 activities. A paper from a talk for the Marine Technology Society's Ocean 2007 conference, which will be held in September 2007, describes different formats of the polar resources in the NOAA collections, from printed historical documents, cruise reports, scientific datasets, and still images to digital oceanographic videos from NOAA expeditions.

The comprehensive, online bibliography provides an additional access point to the polar related resources and also serves as an Internet locator for printed and remote resources in polar research. Therefore, during the 4<sup>th</sup> IPY, the NOAA Library Network collections serve as an important historical resource for polar data and research. ■

**International Polar Year 2007-2008**  
Resources on Polar Research in the NOAA Central Library Network  
<http://docs.lib.noaa.gov/rescue/Bibliographies/IPY2007.pdf>

U.S. Department of Commerce, NOAA, NESDIS, National Oceanographic Data Center, NOAA Central Library  
1315 East-West Highway, Silver Spring, MD 20910; e-mail address: [Anna.Fiolek@noaa.gov](mailto:Anna.Fiolek@noaa.gov)  
Janice Beattie, Director

Created by Anna Fiolek, January 2007

LSD Current References 2007-02

## Overview of the Office of the Federal Coordinator for Meteorological Services and Supporting Research

*Samuel P. Williamson, Federal Coordinator for Meteorology*



▲ Samuel P. Williamson

The Department of Commerce created the Office of the Federal Coordinator for Meteorology in 1964 in response to concerns in the Executive Office of the President and Congress that meteorological programs across all Federal agencies were not adequately coordinated. This office, now called the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM),

continues to ensure the effective use of Federal meteorological resources by leading the systematic coordination among the Federal agencies of operational weather requirements and services—and the research necessary to sustain and improve those services.

The key to this coordination has long been a structure of interdepartmental councils and committees through which participating agencies work together to achieve national priorities cost-effectively. At the top of this structure is the Federal Committee for Meteorological Services and Supporting Research (FCMSSR), chaired by the Under Secretary of Commerce for Oceans and Atmosphere and a membership of senior policy executives from 11 Cabinet-level departments or agencies and 5 other Federal entities. FCMSSR provides high-level guidance on policy and priorities to the Federal Coordinator. The Federal Coordinator chairs the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR), which provides advice to OFCM, implements policies set by FCMSSR, and oversees topic-specific committees, working groups, and joint action groups. Program councils are chaired by the Federal Coordinator and report directly to FCMSSR.

OFCM activities examine needs and requirements to meet mission responsibilities, focusing on issues and problems in current capabilities to provide services. Given the emphasis on coordination across multiple existing programs, OFCM conducts crosscut reviews, assessments, and analyses of those programs. The results of these activities are typically disseminated in the form of studies, reports, plans, or handbooks.

Over the past decade, the OFCM's efforts have highlighted national needs and priorities in aviation weather; atmospheric transport and diffusion (ATD) modeling for homeland security, air quality, and other needs; tropical cyclone (hurricane) observation, analysis, and prediction; the effects of solar storms on Earth systems (space weather); phased array radars to perform multiple atmospheric and aircraft surveillance functions simultaneously; information for surface transportation (WIST); the meteorological information needs of urban and regional governments and citizens (urban weather); and weather and climate information to support decision making for wildland fire management (fire weather). When FCMSSR or ICMSSR approves an action for OFCM coordination, an appropriate interagency working group or joint action group is created to provide input, perspective, and review of an approach to improved coordination in pursuit of shared objectives. While the approach focuses on the roles and contributions of the Federal entities, effective coordination requires attention to the roles of other players: state and local governments, the private sector, the academic community, and public-private partnerships. An OFCM coordination product typically also considers the end-to-end system from observations to modeling and data assimilation for analysis and prediction, preparation and dissemination of application-specific products and services, and end-user education. ■

For more information, visit [www.ofcm.gov](http://www.ofcm.gov).

## Urban Meteorology

*Samuel P. Williamson, Federal Coordinator for Meteorology*

Urban meteorology requires much more than observing and forecasting the weather of our cities and metropolitan areas. Scientific and technological advances during the past several decades now allow us to predict a wider set of environmental parameters at finer spatial scales (i.e., from regional to local to neighborhood scales), for time periods ranging from the next hour to the next several months. As seasonal and climate prediction capabilities have improved,

the range of potential uses for the information has increased. Even more important, the potential value of this information has risen dramatically—provided we can deliver reliable information in a timely manner in useful formats. So understanding who needs the data, what data are useful and important to these users, and when they need it are tasks just as important to urban meteorology as producing the data.

Weather and climate have special and significant impacts on people living in large urban areas. Heavy rains can flood neighborhoods and transportation routes, snow and freezing rain can disrupt transportation systems, and severe storms with accompanying lightning, hail, and high winds can cause power failures and structural damage. Urban areas are especially susceptible to landfalling hurricanes because of the large numbers of people at risk (a large percentage of the U.S. urban population is within 50 miles of the Atlantic and Gulf coasts), the high density of manmade structures, and the risks of flooding and contamination of potable water supplies. In today's urban environment, acute air quality concerns and the risks of accidental or deliberate releases of toxic agents highlight the importance of atmospheric transport and diffusion (ATD) to urban safety and health. Climate variability and long-term climate trends in the urban environment affect the risk of flooding, inundation, drought, and long-term health effects of poor air and water quality.

In September 2004, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) sponsored the first forum on urban meteorology, *Meeting Weather Needs in the Urban Community*. This forum presented the opportunity to bring many meteorological activities together to try to meet the special needs of our urban communities. This opportunity arose from three factors: 1) technological advances, 2) concern for national security, and 3) concern for public health and safety. With respect to technology, advances in remote sensing and other observing platforms have made urban observations on the subregional scale possible. The evolution of coupled computer models linking the atmosphere, soil, ocean, and biospheric processes along with smaller grid scale (i.e., greater detail) has contributed to the ability to assess and predict more accurately the state of the urban environment. The increasing capacity of computer and communications networks facilitates storing and disseminating vast quantities of data quickly. Computer applications that combine observing data and forecasting model output within a geographically specific context, interpreted for the decision-making needs of individual users, are now a reality. These are the components of an end-to-end system that can bring new and much improved services to urban managers and citizens alike.

That first urban meteorology forum in 2004 focused on the following areas of concern: severe weather, homeland security and air quality, water quality, and climate.

### **Severe Weather**

Hurricanes, severe convective storms, tornadoes, and winter storms are among the precipitation-related types of severe weather that affect urban communities. But severe weather events also include extreme temperatures (either abnormally cold or hot) and extended periods of either too much or too little precipitation (seasonal river flooding and seasonal and interseasonal droughts with water shortages).

As early as 1998, OFCM began examining a major part of the special needs that urban communities have for information on severe weather: the information needed by those who manage, maintain, or use the Nation's surface transportation systems. The resulting 2002 report, *Weather Information for Surface Transportation: National Needs Assessment Report* (WIST report), covered six surface transportation sectors; four are vital to urban infrastructure—roadways, the marine transportation system (particularly ports, harbors, and intermodal terminals), rural and urban transit systems (including urban light rail and metropolitan/regional bus and van systems), and airport ground operations. The report was the first multisector compilation of users' needs for transportation weather information and was one of the foundations for the September 2005 Urban Meteorology Forum. After that forum, planning, preparation, and response for severe weather events and their effects on surface transportation sectors has continued in follow-on WIST activities, such as the July 2007 3<sup>rd</sup> National Symposium on Surface Transportation Weather.

### **Homeland Security and Air Quality**

When a chemical or biological hazard is released to the environment, either accidentally or as a deliberate act, the hazardous materials are dispersed primarily through air and water. Most pollution releases occur in the atmospheric boundary layer (ABL), the portion of the atmosphere where the Earth's surface (land or water) has a direct influence. The presence of buildings and other structures affects not only wind flow patterns, but also the intensity of atmospheric turbulence; these conditions increase the depth of the ABL.

### **Water Quality**

The problem of water quality management in cities has become a major problem of modern society. For example, drainage system designs pose major engineering challenges. Poor designs or overtaxed drainage systems can deteriorate water quality and create health concerns. Urban meteorology effects water quality because airborne pollution enters the water at the surface and heavy rains can degrade the water quality in addition to causing flooding.

### **Climate**

Current climate simulations predict an overall warming of the atmosphere due to greenhouse gases. Along with a global-average warming trend, these simulations are indicating that regional climate patterns are likely to shift over time,

although the simulations differ in what shifts might occur in a given region. There are also simulation results suggesting that various types of extreme weather events may increase in severity and/or frequency in some regions. A warming climate can also affect the available water for drinking, irrigation, and generating power, all of which impact the viability and sustainability of the urban community. Similarly, naturally occurring regional and seasonal temperature fluctuations due to climate oscillations (e.g., El Niño) appear to shift regional weather patterns in ways we are just beginning to understand (e.g., the relationship between El Niño Southern Oscillation and hurricane frequency and intensity patterns in the Atlantic/Caribbean basin).

Part of the Federal coordinating structure used by OFCM is an interagency Committee for Climate Analysis, Monitoring, and Services. Planning is underway to use the next meeting of that committee to explore the relationship between the intensity and frequency of extreme weather events and climate change and to investigate Federal agency needs and requirements for improved climate services related to extreme weather events. ■

---

## An Interagency Strategy to Improve Hurricane Forecasts and Warnings

*Robert Dumont, OFCM Chief Scientist*

**A**merica's tropical cyclone forecast and warning system is an interdepartmental collaboration. Three forecasting centers—two in NOAA and one in the Department of Defense—cooperate in issuing the official forecasts and warnings. Other NOAA centers have major supporting roles, particularly in running numerical weather prediction models that aid the forecasters. A much broader community of practice, including many Federal and non-Federal entities, conducts or funds research and development (R&D) relevant to the tropical cyclone hazard. This research has greatly improved forecasts and warnings over the past several decades. In recent years there have been major advances in observing systems, computing technology, numerical modeling and data assimilation, and the scientific understanding of the physics that underlie various types of weather phenomena, including tropical cyclones. Even so, the continuing growth in population and economic infrastructure in U.S. coastal and inland areas vulnerable to hurricanes means that economic losses from landfalling hurricanes double every 10 years.

Each year, OFCM hosts an Interdepartmental Hurricane Conference as a forum where the Federal agencies with operational and R&D responsibilities related to tropical cyclones can meet with emergency managers and other representatives of the user communities served by the agencies. The participants review how the Nation's tropical cyclone forecast and warning system has performed and discuss how to improve it in the future.

In the spring of 2004, the 58<sup>th</sup> Interdepartmental Hurricane Conference recommended that a comprehensive strategy be developed to guide interagency tropical cyclone R&D over the next decade. This recommendation was reviewed and approved by FCMSSR and ICMSSR later that same year. In 2005, the Federal Coordinator set up an interagency Joint Action Group for Tropical Cyclone Research to develop the strategy, which was released in February 2007 as the Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead. The strategic research plan reviews the current and planned future capabilities of the tropical cyclone forecast and warning system. ■



## News Briefs

### New Roadmap Evaluates Future Aircraft and Weather Surveillance Needs

An evaluation of phased radar technology was completed recently by the Joint Action Group for the Phased Array Radar Project, which is sponsored by the Office of the Federal Coordinator for Meteorology and headed by Samuel P. Williamson. This work offers a valuable roadmap for evaluating the potential for phased radar technology to meet America's



future aircraft and weather surveillance requirements.

As indicated in the evaluation, multifunction phased array radar is quite a promising technology. Beneficial uses for radar observations of atmospheric phenomena are expanding to new applications with substantial value for increased safety and national economic growth. Radar can be used to detect precipitation type and quantify rate on fine time and space scales necessary for advanced applications in quantitative precipitation forecasting and flash-flood nowcasting. Wind and turbulence phenomena observable by new radar techniques can improve warnings/forecasts for tornadoes and severe thunderstorms, wind shear, and wind gusts and shifts, and the local spin-off effects of cyclonic storms interacting with terrain. Recommen-

dations for moving ahead are incorporated in the report and, given the aging of exiting domestic radar networks for weather and aircraft surveillance, they will be important considerations.

The results of the work are documented at [www.ofcm.gov/r25-mpar/fcm-r25.htm](http://www.ofcm.gov/r25-mpar/fcm-r25.htm).

### End-to-End Review of National Space Weather Program

One year ago, with recommendations from stakeholder agencies, Samuel P. Williamson, the Federal Coordinator for Meteorology, convened an independent team of six space weather experts, all working outside of government. Chaired by Dr. Louis J. Lanzerotti, a physics professor at the Center for Solar-Terrestrial Research, New Jersey Institute of Technology, an end-to-end review of the U.S. National Space Weather Program was conducted. With the space environment around Earth becoming increasingly important to the successful operation of U.S. commercial and government efforts and national security, the aim was to examine a range of current activities and recommend a basis for a new 10-year strategic plan.

Comprised of seven Federal agencies, the National Space Weather Program aims to speed the improvement of space weather products and services. Its goal is to prepare our Nation to handle technological vulnerabilities resulting from space weather. Many elements of commerce and society have become very dependent on global positioning, navigation, and timing systems, and they are all affected by space weather. A one percent gain in continuity and availability of global positioning system satellites alone is estimated to be worth \$180 million per

year. The Department of Defense has estimated that disruptions to government satellites from space weather cost about \$100 million a year.

### Timely, Targeted "Transportation Weather"

Just over three years ago, NOAA released its first report on improving surface transportation, safety, and cost efficiency through improved weather information products. The 2002 WIST Report, "Weather Information for Surface Transportation—National Needs Assessment Report," helped move a rapid expansion of interagency, intergovernmental, and public-private efforts, all designed to enhance safety and mitigate economic impacts of "transportation weather." Now an update to this report provides new data on the risks of transportation weather to America's safety, security, quality of life, and economic activity. While challenges remain when it comes to gathering data needed to tally the safety and economic impacts of weather on every transportation sector and to demonstrate the difference that timely, targeted weather information can make in reducing those impacts, the available data does indicate progress. For example, weather-related crash injuries on our Nation's roadways declined 3.5 percent (estimated 21,023) in the first two years following the release of the WIST Report. Yet during this same period, vehicle miles driven increased by 3.7 percent. The estimated 21,023 fewer injuries in 2004 (compared to 2002) equates to about \$0.5 billion saved in direct and indirect economic consequences. In addition, since 2002, weather has dropped off the Coast Guard's list of "Top Ten Contributing Factors" for recreational boating accidents. We all can be proud that roadway freight lines are equipping their trucks to receive NOAA Weather Radio broadcasts and that some automobile manufacturers offer the capability as an option. As a roadmap



for transportation weather interests, the updated report covers a broad gamut, from railway, marine, and airport ground operations to pipeline systems and the impact of weather on traffic congestion. NOAA appreciates the dedicated efforts of Samuel P. Williamson and everyone on his team at NOAA's Office of the Federal Coordinator for Meteorological Services and Supporting Research. This latest work is an important contribution to an emerging area of great interest.

Visit [www.ofcm.gov/wist/wist.htm](http://www.ofcm.gov/wist/wist.htm) for more information.

### Unmanned Aircraft Systems in Alaska and the Pacific Region

Retired Navy Vice Admiral (VADM) Conrad C. Lautenbacher, Jr., Under Secretary of Commerce for Oceans and Atmosphere, testified before the Senate Committee on Commerce, Science, and Transportation in June 2007. The Full Committee hearing focused on Unmanned Aerial Systems (UAS) in Alaska and the Pacific Region. It was an excellent opportunity to underscore how NOAA is constantly seeking better and more cost-effective strategies to meet our mission goals and responsibilities. This includes evaluating emerging technologies and the roles they could play in our work. NOAA is exploring the use of UAS platforms as one such technology. VADM Lautenbacher is excited about the possibility of using these remotely operated aircraft because they have, for example, the endurance, reliability, and payload capacity to provide the capability to improve mapping, charting, and other vital environmental forecasting in remote areas, such as the Northwestern Hawaiian Islands and Alaska.

UAS have been called the best choice for dirty, dull, and dangerous missions: dirty because they can be sent to contaminated areas; dull because they allow for long transit times opening new dimensions of persistent surveillance and tracking; and dangerous because they can go into hazardous areas with no threat to human life. A UAS can

potentially help us to "see" weather before it happens, detect toxins before we breathe them, and discover harmful and costly algal blooms before the fish do. Given the data, there is urgency in more effectively addressing these issues. In the U.S., average annual damage from tornadoes, hurricanes, and floods averages \$11.4 billion. As the most common serious childhood illness, asthma affects over 20 million Americans, about one-quarter of them children. Between 1987 and 2000, the estimated annual average of harmful algal blooms in the U.S. was \$75 million.

### NOAA Deploys First "SMART BUOY" to Support Captain John Smith Chesapeake National Historic Trail

On May 10, 2007, the NOAA Chesapeake Bay Office deployed its first "smart buoy" as part of the Captain John Smith Chesapeake National Historic Trail, the Nation's first water-based National Historic Trail. The buoy, positioned off Jamestown, Virginia, is the first

observation platform to be launched as part of the Chesapeake Bay Interpretive Buoy System. The buoys collect chemical, optical, and physical observations, among others, and transmit them wirelessly in near-real-time.

To interpret the data available from the buoys, the NOAA Chesapeake Bay Office is developing educational and interpretive components, including a Web-based classroom curriculum that

uses data to teach students about the Bay and its resources. "The Chesapeake Bay Interpretive Buoy System provides a great opportunity for students and teachers to explore topics that weave together science and history," said Peyton Robertson, acting director of the NOAA Chesapeake Bay Office. "Comparing the historical and present day ecological conditions of the Bay can motivate students to be stewards of the Chesapeake and to undertake restoration and conservation efforts."

This year, the NOAA Chesapeake Bay Office will launch and activate two additional buoys. The first will be located where the Potomac River meets the Bay and the second will be on the Patapsco River at the Bay near Baltimore, Maryland. The data from these buoys, displayed with information

Photo courtesy of U.S. Army Corps of Engineers



▲ Buoy in the Captain John Smith Chesapeake Water Trail being deployed off shore from a statue of its namesake in Jamestown, Virginia.

from other observation platforms around the Bay, including the Chesapeake Bay Observing System, will also be available online. ■

Measurements as well as historical and cultural information about the Bay can be accessed at [www.buoybay.org](http://www.buoybay.org) or by calling 877-BUOY-BAY (286-9229).

## Coastal Risk Atlas

*Jason Stradtner, Geographic Information System Specialist,  
National Coastal Data Development Center*

The time to prepare for the Atlantic Hurricane Season is not when it begins each year on June 1<sup>st</sup>, but year-round. Since 2001, NOAA's National Coastal Data Development Center (NCDDC) has sustained the Coastal Risk Atlas (CRA) project, a free, advanced planning tool that allows emergency managers and the public to assess their community's vulnerability to coastal storm events. The CRA incorporates critical facility locations, U.S. Census block group demographics, evacuation zones and routes, and other geographic data together with hazard modeling data to display a worst case scenario of how a community might be affected during and after a storm.

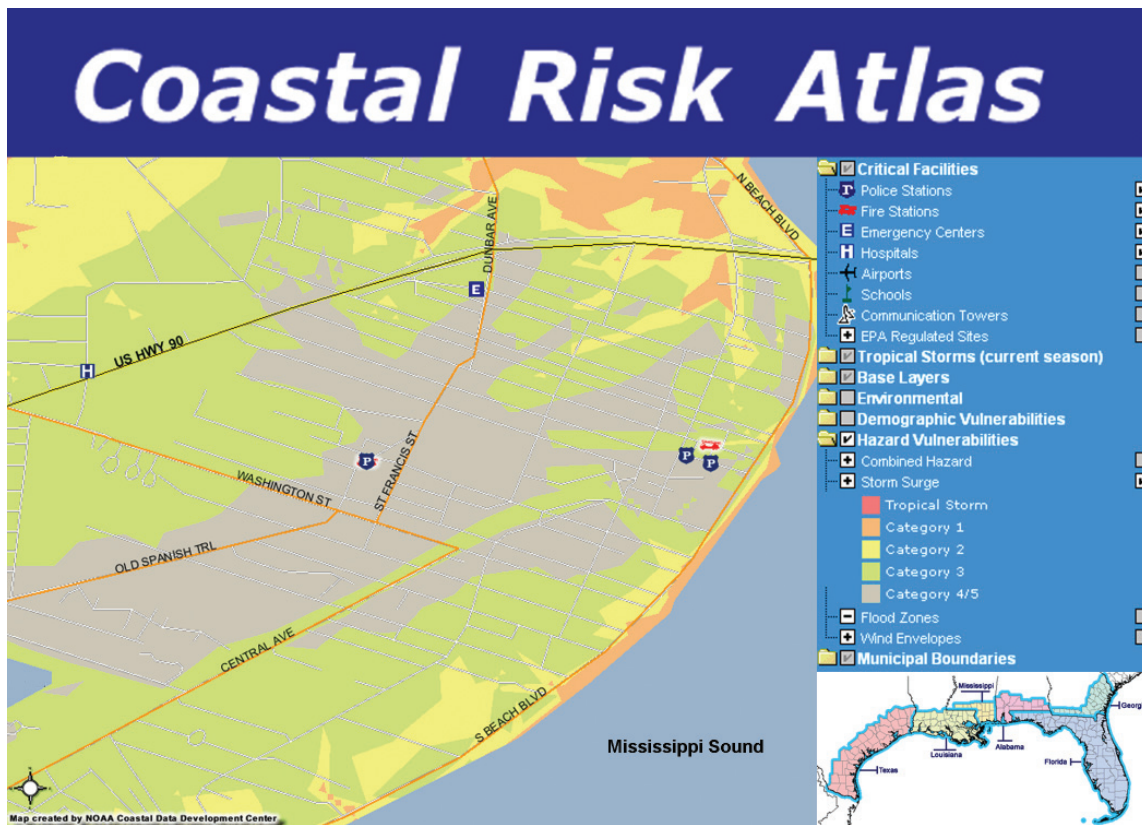
The CRA addresses hazards such as storm surges, storm winds, and inland flooding. Once hazards in an area are

would not be inundated unless hit by a Category 4 Hurricane. Higher elevations are harder to flood so they have lower Vulnerability Indexes. Likewise, populations are assigned Vulnerability Indexes based on the ability to prepare for, survive, and/or recover from a storm event. Several factors are considered: the concentration of elderly, poor, and uneducated populations; households without transportation; renter-occupied housing; and mobile homes.

The project information can be accessed in different ways. One option is to view the online maps and set the map layers to show different hazards in combination with other features of a community such as the characteristics of its people, the location of its first responders, and the location of its major roads. Another option allows the CRA user to download the data and modify or create a community vulnerability assessment. To help CRA users navigate these vulnerability assessments effectively, a suite of software tools has been developed, including an online tutorial and user guides.

In 2001, work began on this project and continues in 2007 so the extended region will be covered. Initial CRA

efforts focused on a few counties along the Mississippi Gulf Coast and in North-eastern Florida. Since that time, the CRA has expanded to include Vulnerability Assessment Map Services for all of Florida as well as coastal counties in Alabama, Georgia, Louisiana, Texas, and Mississippi. The vulnerabilities of 200 counties and over 37 million people can be assessed. NCDDC plans to develop these CRA products for the U.S. coastal region from Brownsville, Texas, to Wilmington, North Carolina. ■



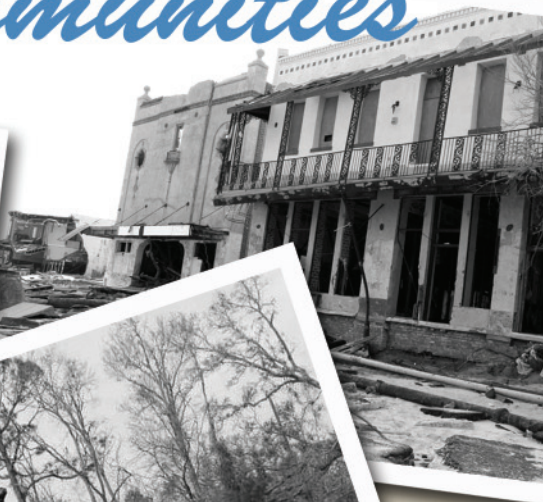
▲ Screen capture from the Coastal Risk Atlas for an area where Hurricane Katrina made landfall in 2005.

identified, their intensities are assigned a Vulnerability Index value. These values are combined to indicate the hazard vulnerability of an area, ranging from low to high. For example, an area inundated by a storm surge during a Category 1 Hurricane has a higher Vulnerability Index than an area that

For more information on CRA, visit [www.ncddc.noaa.gov/cra](http://www.ncddc.noaa.gov/cra) or contact the NCDDC Ecosystem Program Manager at [Sharon.Mesick@noaa.gov](mailto:Sharon.Mesick@noaa.gov).

# RESILIENT

*communities*



Poster Designed By: Barbara Ambrose



# NOAA Weather Radio

*Stan Johnson, National Weather Service NOAA Weather Radio*

On June 21, 2007, NOAA presented the 2007 Mark Trail Award to 15 individuals and organizations for supporting the agency's NOAA Weather Radio All Hazards Program. The Mark Trail Awards Program honors individuals and organizations that use or provide NOAA Weather Radio All Hazards receivers or transmitters to save lives and protect property. "Our Mark Trail Award winners made a difference in communities across the nation and provided an important contribution to NOAA's mission of protecting lives and property," said retired Navy Vice Admiral Conrad C. Lautenbacher, Jr., Ph.D., Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator.



Mark Trail image courtesy of North America Syndicate, Inc., World Rights Reserved

The Mark Trail Awards, named for the nationally syndicated comic strip character, serves as the campaign symbol for the NWR All Hazards Program. The strip's education message includes anyone listening to NWR All Hazards has instant access to the same lifesaving weather reports and all-hazards information provided to meteorologists, emergency personnel, and the media.

other public officials, NWR also broadcasts warning and post-event information for all types of hazards—including natural hazards (such as earthquakes or avalanches), environmental hazards (such as chemical releases or oil spills), and public safety hazards (such as AMBER alerts or 911 telephone outages). ■

The NOAA Weather Radio (NWR) is a nationwide network of radio stations that broadcasts National Weather Service warnings, watches, forecasts, and other hazard information 24 hours a day. NWR includes more than 970 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories.

NWR has updated their Streaming Audio page and Automated Voices page. The Streaming Audio page has added many new streaming audio sites and also includes the National Weather Service offices, which offer downloadable mp3 files of routine NWR content. The Automated Voices page has an expanded history of the automated voices used on NWR along with audio clips of all the current voices.

Working with the Federal Communication Commission's Emergency Alert System, NWR is an "All Hazards" radio network, making it your single source for comprehensive weather and emergency information. In conjunction with Federal, State, and Local Emergency Managers and

**U.S. Department of Commerce NOAA**  
 Publication Distribution Facility  
 1315 East-West Highway, Silver Spring, MD 20910-3282

Address Correction Requested  
**OFFICIAL BUSINESS**  
 Penalty for Private Use \$300