Aware is published by NOAA's National Weather Service to enhance communications within the Agency and with the emergency management community.

Aware

Volume 2, April 2008

Climate, Water, Weather

How to Reduce Weather Deaths in the 21st Century

By Ken Graham, OCWWS Integrated Services Director
Kenneth.Graham@noaa.gov

To say 2008 has been an active weather year is an understatement. In just three months, the tornado count is already over half the 3 year average of 1159. Even more alarming, the number of fatalities has already exceeded the 3 year average of 62 and it is only April. Why so many fatalities this year?

Weather is connected to the sciences of meteorology and hydrology. But when looking at how people receive warnings, interpret information, and respond in life threatening situations, social science is playing an increasing larger role. Of course, there could be meteorological reasons for the high number of fatalities in 2008, including the strength and size of the tornadoes, but other social science questions come to mind such as:

- What role does time of day play in tornado fatalities?
- What is the most effective way people receive warnings?
- Where do people believe is a safe place during a Tornado Warning?
- Did people feel they were in a safe shelter?
- Is there such thing as too much lead time?
- Do people prepare during an outlook 6 days prior to the onset of severe weather?
- What actions are taken during a Watch?
- What is the impact of tornadoes outside the traditional "severe weather season" of a particular area?
- When do people seek shelter during a tornado warning, when the warning is issued or when they hear the "freight train"?
- How is Web information interpreted?

In recent interactions with media and emergency managers (EM), I see new actions being taken when NWS issues a Tornado Watch. These actions include activation of an Emergency Operations Center (EOC), overtime staffing of an EOC or TV station, and even evacuating high risk areas such as mobile home parks and schools. To reflect these changes, the Super Tuesday (February 5-6, 2008) severe weather outbreak service assessment included social science as part of the evaluation and study. The report will contain thought provoking information related to social science and potential paths forward. The need for social science will continue to increase as uncertainty, decision support tools, and incident support becomes more prevalent.

As spotter talks and preparedness efforts continue, keep social science in mind during interactions. It is just as important to understand what actions were taken as it is to prepare people for where they should go when severe weather threatens. ❄

Inside Aware

New 30-Hour TAF to Affect Coding Worldwide

By Michael Graf, NWS Aviation Services Branch
Michael.Graf@noaa.gov

In response to requests by long haul operations for better service, the International Civilian Aviation Organization made provisions for a 30-hour Terminal Aerodrome Forecasts (TAF) in Annex 3 for the Meteorological Service for International Air Navigation, Amendment 74. This code change, which takes place in November 2008, will affect all TAFs. This longer TAF influences codes used worldwide. More specifically, each change group in a TAF will now have a date. This change applies to states not providing 30-hour TAFs.

Meteorological providers/vendors and users should begin to address whether software will work with the new TAF code and what publications and training will need to be revised to make sure their users are equipped.

Sample Forecast

The example below is a 30-hour TAF using feet and knots. More examples and explanations of the 30-hour TAF are available online at the following link:
www.weather.gov/os/aviation/pdfs/30-hr_taf-examples.pdf

Typical US TAF using the new 30-hour period
TAF for KABC (Anywhere State (ST)):

TAF
KABC 152335Z 1600/1706 ...
TEMPO 1608/1612 ...
FM170100 15015KT P6SM BKN020

Meaning of the Forecast

TAF for Anywhere ST, issued on the 15th of the month at 2335 UTC valid from the 16th 0000 UTC to the 17th 0600 UTC; surface wind direction 130 degrees; wind speed 18 knots; visibility greater than 6 statute miles, Sky condition broken at 2000 feet; temporarily between 0800 UTC on the 16th and 1200 UTC on the 16th surface wind direction 170 degrees; wind speed 25 knots gusting to 45 knots; visibility 1 mile in a thunderstorm with moderate rain, scattered cumulonimbus clouds at 1000 feet and broken clouds at 2000 feet; from 0100 UTC on the 17th the surface wind direction 150 degrees; wind speed 15 knots; visibility greater than 6 Statue miles; and broken clouds at 2000 feet.

Important Points to Consider

- All TAFs will have to conform to the new Date-Time Standard on November 5, 2008
- Decoding software will likely need to be changed
- Training publications will need to be changed

For More Information

- Template for TAF, Table A5-1: **www.weather.gov/os/aviation/pdfs/TAF_template.pdf**
- Sample TAFs for testing: **www.weather.gov/os/aviation/res/sample_testbed.txt** ❄

Aware

NOAA's
National Weather Service
Office of Climate, Water and Weather Services

Director, OCWWS
Dave Caldwell

Chief, Performance and Awareness Division
Bob McLeod

Managing Editor
Melody Magnus
Melody.Magnus@noaa.gov

Editors
Darcey Dodd
Art Kraus
Eva Whitley

Aware online
www.weather.gov/os/aware/

Subscribe/Unsubscribe
www.weather.gov/os/awarelist.shtml

ISSN 1936-8178

Disaster Conference Features Feedback/Listening Session

By Tanja Fransen, WCM, NWS Glasgow, MT
Tanja.Fransen@noaa.gov

A feedback/listening session was just one of the innovative features of the 3rd annual Eastern Montana Disaster and Emergency Services Workshop. The feedback session was facilitated by a Disaster and Emergency Service Coordinator, similar to those conducted at the National Emergency Management Association and International Association of Emergency Managers conferences last year.

The conference, hosted by the NWS Montana offices, included presentations applicable nationwide, including:

The third annual Eastern Montana Disaster and Emergency Service Workshop featured a new feedback/listening session in addition to numerous disaster awareness presentations.

- **The Case for Climate Change:** Dr. Dave Easterling, Scientific Services Division Chief, National Climatic Data Center and contributing author to the Intergovernmental Panel on Climate Change Fourth Assessment Report.
- **Risk Management Beyond Boundaries:** Dr. Donna Woudenberg, National Drought Mitigation Center
- **Incident Support Specialist Program:** Roger Lamoni, NWS Western Region Headquarters, Meteorological Services Division, Fire Weather Program Manager
- **Community Collaborative Rain, Hail and Snow program and Statewide NOAA Weather Radio All Hazards Campaign:** *John Pulasky, Northern Ag Radio Network Weatherman*

The following sessions were presented by WCMs Tanja Fransen, Tom Frieders and Dan Reilly:

- **Major Severe Weather Outbreak Summer of 2007**
- **Fully Localized Atmospheric Research Environment (FLARE**
- **Western Region Mobile Warning Alerting Messaging Applications program**
- **Iowa Environmental Mesonet (IEM) chat**
- **Updated Montana Emergency Alert System (EAS) plan**
- **Forecast Process and Winter Weather Simplification Proposal**

To access the presentations, go to: **www.wrh.noaa.gov/ggw/desworkshop.php.** ❄

Hazmat Support Webpage Provides Fast, Easy Access

By Christopher Gitro, NWS Chicago, IL
Christopher.Gitro@noaa.gov

The Chicago metro area has a population exceeding 10 million. It is the largest distribution center in the United States with more than 30 percent of all national rail freight passing through the city. It also has the world's busiest airspace.

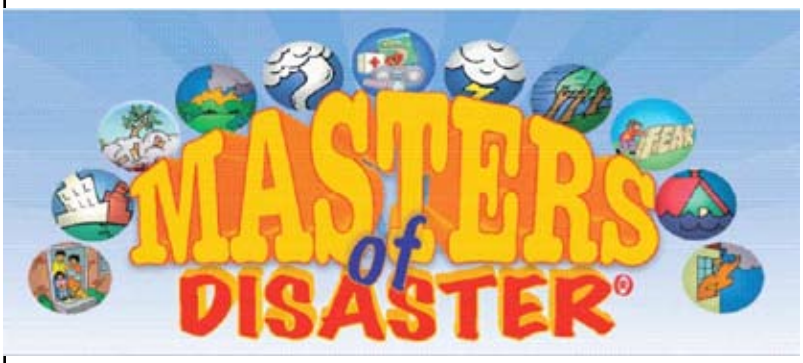
In an effort to better serve emergency responders, NWS Chicago created a Hazmat support webpage for quick and effective assistance. The Website is a one-stop shop for the emergency response community. The site provides current and forecast weather conditions, along with

information on HYSPLIT dispersion and trajectory model forecasts. NWS Chicago staff hope that knowledge of the Website's availability will increase through the emergency response community, resulting in greater reliance on the NWS for support during hazmat incidents and other disasters. For more information, visit **www.crh.noaa.gov/lot/?n=hazmat**. ❄

Master of Disaster® Kits Available

By The American Red Cross
Ron.Gird@noaa.gov

The American Red Cross Masters of Disaster® curriculum is centered on a series of ready-to-go lesson plans that help organizations educate youth about important disaster safety and preparedness information. The curriculum uses fun and engaging lessons to educate children. This tool provides educators with meaningful hands-on, interactive ways to help children understand important concepts on preventing, preparing for, and responding to both natural and human-caused disasters.



Activities are independent—teachers decide which are most important for their students. The curriculum flexibility allows users to choose what will complement the lessons they are already teaching. Lessons meet national educational standards—to reinforce student academics while building life skills—and are specifically tailored for lower elementary grades (K-2), upper elementary (3-5) and middle school (6-8) classes. The kit includes a CD with all lessons and activity sheets, stickers, a poster and a DVD in English and Spanish about safety for disasters. Each Masters of Disaster® Educator's Kit includes activities for:

- Be Disaster Safe
- Earthquakes
- Facing Fear
- Floods
- In the Aftermath
- Hurricanes
- Home Safety
- Lightning
- Fire Prevention and Safety
- Tornadoes
- Wildland Fires

For more information, go to www.redcross.org/disaster/masters. ❄

Talking About Disaster: Resources for Parents, Teachers

By The American Red Cross
Ron.Gird@noaa.gov

Did you know a free online resource is available to help teachers and school administrators talk to children about disasters that could occur and how to prepare for them?

The Talking About Disasters: Guide for Standard Messages is available for professionals to access and deliver consistent preparedness messaging to the public. This resource offers teachers and school administrators detailed information about different types of disasters and general tips on individual preparedness actions, including evacuation and what to include in a disaster supplies kit.

This guide was developed and is maintained by the Coalition of Organizations for Disaster Education, which is comprised of representatives from more than 20 Federal agencies and

non-profit organizations. The coalition is convened by the American Red Cross and works by professional consensus of the participants, all with interests in educating the public using consistent disaster preparedness messages and information. Subject matter experts in each of the topic areas work to achieve consensus on preparedness messages, which participating organizations voluntarily agree to follow in their public education materials. The information contained in the "Talking about Disasters Guide" follows that consensus.

This guide is available at www.redcross.org/disaster/disasterguide/. Please take advantage of its availability to help get preparedness and safety messages to your community! ❄

Dissemination

Should NWS Services for PDAs and Cell Phones Continue?

By: Robert Bunge, Office of Chief Information Officer
Robert.Bunge@noaa.gov

NWS is accepting comments on whether services for wireless Personal Digital Assistants (PDA) and cell phones should be continued. Comments will be accepted through July 31, 2008.

The PDA service, designed for wireless devices with small screens and Web browsers, is available at **mobile.weather.gov.** The cell phone service is intended for phones with Wireless Application Protocol (WAP). You must have WAP to access the following site: **cell.weather.gov**

These services provide basic low bandwidth access to NWS products, including watches and warnings, zone forecasts, low and high resolution radar and satellite images, surface observations, marine forecasts and most other NWS text products. To provide a comment, please visit **www.srh.noaa.gov/cte.htm**. ❄

EMWIN Vendor Marketing Receive Systems

By Bill Johnson, NWS Office of the Chief Information Officer
William.Johnson@noaa.gov

A vendor is now marketing Emergency Managers Weather Information Network-N (EMWIN) receive systems to the public. The system incorporates many of the features that are found in the EMWIN-N prototype receiver, jointly developed by National Environmental Satellite, Data, and Information Service (NESDIS) and the NWS. These features include the capability to receive either the current EMWIN broadcast or the EMWIN-N broadcast. Users will be "transition-ready."

The transition to EMWIN-N will occur no later than 2011 and could be earlier if NESDIS deems appropriate. Anyone with an EMWIN-N capable system can try out the broadcast on the Geostationary Satellite-10 (GOES-10) satellite, which is currently transmitting an EMWIN-N test broadcast. You can find more details on the EMWIN Website at the end of this article. For vendor contact information, see the following link:

The latest plan is for a combined broadcast of EMWIN and the NESDIS Low Rate Information Transmission (LRIT) service. A prototype is being developed using an open source, software-defined radio that will be backward compatible for EMWIN and LRIT. The design will allow for a greatly enhanced EMWIN broadcast while maintaining the current satellite dish size. As always, NWS is working to keep the system cost low.

To keep abreast of new developments in the EMWIN transition, please visit the NWS EMWIN Website at: **www.weather.gov/emwin/index.htm**. ❄

NOAA Weather Radios Sales Linked to Severe Weather

By Barry Gooden, WCM, NWS Atlanta, GA
Barry.Gooden@noaa.gov

In response to a spate of intense severe weather in the Southeast last year, including several tornadoes, NWS Atlanta staff has escalated efforts to promote NOAA All Hazards Weather Radio (NWR) ownership. As a result of promotional efforts undertaken with local partners, weather radios sold out in just a few hours in neighborhoods that were impacted by tornadoes in southern Georgia.

Television station WALB in Albany, GA, and Harvey Supermarket in Doughtery, and Sumter counties in Georgia helped promote the sale of these lifesaving radios. In Doughtery, WFO Tallahassee, FL, WALB-TV Meteorologist Yolanda Amadeo and the Albany Amateur Radio Club helped new buyers program their weather radios.

The most recent promotion took place in Americus, GA, where, on March 1, 2007, an Enhanced Fujita 3 (EF-3) tornado tore through the town leaving it ravaged. The deadly storm was 38 miles long, spanning over three counties, but the greatest width, 1 mile, was in Americus. The promotion helped sell more than 200 NWR receivers in just 4 hours. This sale took place on the grounds of Harvey Supermarket where Yolanda Amadeo, members of the Albany Ham Club, Americus Ham Club and the NWS Atlanta staff joined together to support the effort. Many thanks to all who took part. ❄

A "Poor Man's" NWR for Micronesian Pacific Islands

By Chip Guard, WCM, NWS Guam
Chip.Guard@noaa.gov

Figure 1. Tonowas Island, one of the many high islands in Chuuk Lagoon.

Because NWR transmitters are relatively expensive and require sophisticated maintenance, Guam and the Commonwealth of the Northern Mariana Islands are the only islands in the Western Pacific to have NWR capability. Even where transmitters are available the cost of buying receivers is frequently an issue for islanders.

The many islands of Chuuk Lagoon in the Federated States of Micronesia (FSM) and of Majuro in the Republic of the Marshall Islands are extremely vulnerable to tsunamis and to a variety of weather and ocean hazards. Unfortunately, capability to warn the public of these life threatening events is severely limited.

There are 40,000 people living on Chuuk Lagoon, a place made of high islands that are very susceptible to mudslides and coastal inundation (Figure 1). Majuro is a 30-mile-long lagoon surrounded by small, narrow islets that rise about 7 feet above sea level (Figure 2).

Approximately 35,000 people live on those islets. Chuuk is about 600 miles southeast of Guam and Majuro is about 1800 miles east-southeast of Guam.

There is no reliable radio station in Chuuk State in the FSM and Majuro has only one AM

station and about three FM stations. None broadcast live after midnight.

That's why in 2006 and 2007, WFO Guam submitted two critical projects to the NOAA TsunamiReady Program.

First, WFO Guam proposed an early warning radio capability to meet the requirements of the islands. The Telecommunication and Distance Education Operation (TADEO) at the University of Guam designed the early warning capability, which included an FM radio station and a VHF emergency communications base station, both located at the Weather Service Offices (WSO) on Chuuk and Majuro (Figure 3).

The system in Chuuk has been operating successfully for several months; the Majuro system was installed in late March 2008. The range of the broadcast is about 30 miles. Each day, the WFO Guam forecast products for specific locations are transmitted on the radio by the WSO personnel; broadcasts are in English and in the local language. Users can receive the weather broadcasts on boom boxes, transistor radios and car radios, effectively reaching a much larger listening community day and night.

Now WFO Guam and WSO Chuuk are working to have a repeater set up to reach an additional 10,000 people in the Lagoon. A repeater will also be requested to beam the Majuro signal to the neighboring Arno Atoll. ❄

Figure 2. *Part of Majuro Atoll in the Republic of the Marshall Islands. The elevation of this islet is only around 7 feet above sea level.*

Figure 3. *Staff at the FM radio station set up at WSO Majuro receive training for the new FM station. Broadcasts can be produced in real time or prerecorded on cassette tape or CD-ROM.*

Innovations in Storm and Emergency Communication

By Hector Guerrero, WCM, NWS San Angelo, TX
Hector.Guerrero@noaa.gov

NWS offices are always looking for new ways to improve communication with storm spotters, first responders, media and emergency management partners before and during significant weather events.

In San Angelo, TX, before a storm event, local officials are briefed by the staff through Special Weather Statements and conference calls. Before a significant weather or non-weather episode, NWS staff prepare and send a multimedia briefing to partners. Next, San Angelo staff post a Graphicast on its Website, illustrating the high impacts of an upcoming event. Spotters are then activated so they can provide advance notice of approaching severe storms.

During a storm, San Angelo staff use amateur radios and telephones to communicate with spotters and dispatchers while maintaining contact with emergency management in Abilene, San Angelo, Brownwood, Brady and Sweetwater, TX.

San Angelo staff also mobilize to provide on-scene or remote incident support to first responders should a storm cause significant recovery or response efforts. Some have even taken part in tabletop and functional exercises alongside first responders and emergency

management partners using the Incident Command System.

To further enhance communication, since 2006 staff have helped promote the sale of more than 5,000 NWR receivers in the San Angelo area and given out more than 15,000 safety magnets. Soon there will be an onsite All Hazards communication expert to manage collaborative tools and to continue to develop innovative communication techniques.

To see the multimedia briefing, visit: **www.srh.noaa.gov/sjt/brief/daily.html.** ❄

Drought Awareness

Two New Drought Products Introduced by University of Nebraska

Tanja Fransen, WCM, NWS Glasgow, MT
Tanja.Fransen@noaa.gov

The University of Nebraska-Lincoln's National Drought Mitigation Center (NDMC) recently worked with NWS Glasgow and the Fort Peck, MT, Reservation Drought Advisory Committee to host a drought tools workshop. The workshop was conducted to get feedback from those involved in the agricultural/ranching industries on two products produced by the NDMC : Vegetation Drought Response Index (VegDRI) and Vegetation Outlook (VegOUT).

Dr. Donna Woudenberg and I organized the workshops's logistics. We are both involved with the Weather and Society: Integrated Studies (WAS*IS) program. This workshop was an excellent example of the anticipated collaborations envisioned when WAS*IS was developed.

The drought tools workshop, conducted by Dr. Woudenberg, Dr. Brian Wardlow, and Dr. Tsegaye Tadesse, drew 26 participants. Also included was the use of a newer technology that allowed NDMC to poll participants anonymously. Every participant was given a "clicker" allowing them to input their feedback, receive instantaneous results and gauge the needs of the agricultural community. For more information on VegDRI or VegOUT, visit the following Websites:

- **VegDRI** uses satellite data to allow producers to monitor vegetation stress at a regional, state, county or sub-county level. VegDRI operates from May through October and is updated every 2 weeks: **drought.unl.edu/vegdri/VegDRI_Main.htm**
- **VegOUT** is an experimental forecasting method that incorporates oceanic information into satellite data to predict expected level of vegetation stress at 2, 4 and 6-week intervals during the growing season: **drought.unl.edu/vegdri/experimental.htm.** ❄

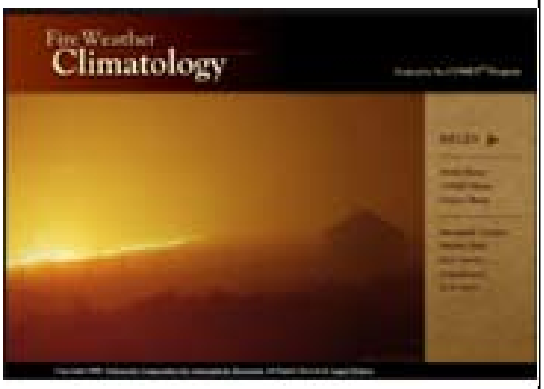
Fire Weather

COMET® Releases Advanced Fire Weather Course

By Dr. Timothy Spangler, Director of COMET
fire_wx@comet.ucar.edu

The Cooperative Program for Operational Meteorology, Education and Training (COMET) has developed an online version of the Advanced Fire Weather Forecasters Course (S-591) open to NWS staff, emergency managers and other partners. The course

consists of individual modules from which users can pick and choose. The course contains 12 hours of online instruction on the following topics:



- Scientific Subjects of Fire Behavior
- Assessing Fire Danger
- Fire Weather Climatology
- Stability, Smoke Management, and Fire Weather Forecasting
- Mesoscale Meteorology Effects on Fire Behavior
- Grid Techniques for Forecasting Relative Humidity and Dewpoint Temperature.
- The Structure of the NWS Fire Weather Program
- Fire Weather Forecasting: Clear Communications
- History of the Incident Meteorologist Program

Part of the success of the S-591 residence course was the great interaction students had with experienced Incident Meteorologists. To help capture that experience, the Subject Matter Experts for this online version make up a talented group of NWS meteorologists who share their expertise and best practices for serving fire weather partners in the course modules. These experts include Larry Van Bussum and Heath Hockenberry from NWS Headquarters; Brent Wachter from NWS Albuquerque, NM; Coleen Decker and Tim Barker from NWS Boise, ID; Dan Borsum from NWS Billings, MT; Roger Lamoni from NWS Western Region Headquarters; Robert Nester from NWS Missoula, MT; Byron Paulson from NWS Minneapolis, MN; Chuck Maxwell and John Saltenberger from Predictive Services; and many other scientists from the NWS and land management agencies. As part of the learning experience, numerous case study examples and lessons learned have been integrated into the modules.

More information about the course and access to the modules can be found on the MetEd site: **www.meted.ucar.edu/dl_courses/fire/**. The COMET Program welcomes feedback on the course and the individual modules via **fire_wx@comet.ucar.edu**. ❄

Hurricane Safety

Tropical Cyclone Product Updates and Activities

By Scott Kiser, NWS National Tropical Program Manager
Scott.Kiser@noaa.gov

A face-lift is in store this 2008 hurricane season for the Hurricane Local Statement (HLS). The new segmented HLS will provide comprehensive tropical cyclone information, including Valid Time Event Code (VTEC), to users for coastal waters, the Tropical Prediction Center issued watches and warnings for coastlines, and the WFO issued tropical cyclone wind watches and warnings for inland areas. WFO staff should watch for training sessions later this spring.

NHC will be showcasing several experimental products. An already popular graphical Tropical Weather Outlook (GTWO) has been further enhanced to a three-tiered, color-coded, categorical genesis forecast. The GTWO is intended to be a visual companion to the operational text-only tropical weather outlook.

Another experimental product is the Tropical Cyclone Wind Field graphic. This graphic shows areas potentially affected by sustained winds of tropical storm and hurricane force. You will also see an approximate representation of coastal areas under tropical cyclone watches and warnings, the current position of the center of the tropical cyclone and track history.

Websites for these and other experimental products will be ready by June 1 at the following Website: **www.nhc.noaa.gov/aboutexperimental.shtml.**

Hurricane Preparedness Week

NOAA will conduct National Hurricane Preparedness Week May 25-31. We have submitted a request for another Presidential Proclamation. If signed, this would be the 8th such Presidential Proclamation in a row! ❄

Outreach Innovations

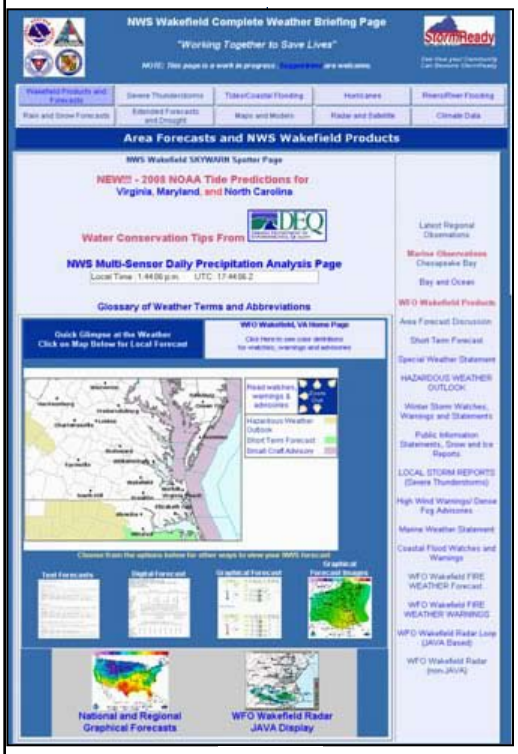
Preparedness CDs Save Money

By Bill Sammler, WCM, NWS Wakefield, VA
William.Sammler@noaa.gov

In an effort to reduce costs, WFO Wakefield, VA, has developed two outreach/preparedness CDs which contain all of the FEMA/Red Cross/NWS weather safety brochures, FEMA's "Are You Ready" materials, and other locally prepared materials, including county warning areas and NWR coverage maps.

One of these CDs is distributed to Community Emergency Preparedness Team classes for which our office provides hazardous weather training. This CD contains our preparedness presentation, as well as the course materials.

The CDs use Microsoft Windows autorun capabilities to bring up an easily navigable point-and-click HTML page from which the user can view all materials. The easy-to-produce CD costs less than $.50 each, including label and paper jacket and are much easier to carry than hundreds of brochures. The Wakefield office estimates it has given out around 5,000 CDs in the 6 years we've been producing them. ❄



Comprehensive Briefing Webpage Brings NWS Products Together

Bill Sammler, WCM, NWS Wakefield, VA
William.Sammler@noaa.gov

NWS has many Websites containing lots of different types of information. It was clear from our conversations with emergency managers that much of this information was being missed, since the data is at National Center Websites or in locations away from local WFO pages.

For example, unless SPC's Website is referenced on a WFO front page, it might take 3-5 clicks to reach the Day 1 Convective Outlook. In an effort to combine critical NWS information into one comprehensive, easily navigable site, NWS Wakefield has created a Comprehensive Briefing Page.

Originally advertised as an emergency management Website, the page has evolved into a one-stop shop for NWS information, both for the WFO and National Centers. A site update last summer reorganized the page into topical tabs, from which site users can select information they want to view. The site has been very well received by local emergency managers, with a number of them using it as one of their browser home pages. Wakefield staff have revised the Website based on user suggestions. The URL is: **www.erh.noaa.gov/er/akq/empage.php**. ❄

Rip Currents

New Rip Current Signs Offer English, Spanish on Same Sign

By Melody Magnus, Aware Editor
Melody.Magnus@noaa.gov

The NWS Marine Services branch has just posted a new option for community officials who want to alert both English and Spanish speaking visitors to the danger of rip currents on local beaches. The new sign offers warnings in both languages on the same sign. Previously, communities had to post two separate signs. Rip currents take dozens of lives each year when even strong swimmers venture into these dangerous currents without understanding how to escape "the Grip of the Rip."

For more safety tips and resources and to download the artwork for the signs, go to: **www.ripcurrents.noaa.gov/**. For more information about the signs, contact **Deborah.Jones@noaa.gov**. ❄

Severe Weather

NWS Assessing Two Significant Severe Weather Events

By Wayne Presnell, Meteorologist, Performance Branch
Wayne.Presnell@noaa.gov

The U.S. winter season of 2007-2008 brought widespread severe weather. The active season began in early December when three storms moved onshore in the Pacific Northwest December 1-3; the third was unusually intense. Then, in February, widespread deadly tornadoes affected areas of the mid-South.

This significant weather activity launched the formation of service assessment teams by NWS to evaluate its performance during each weather event. Service Assessment teams help NWS improve its services and minimize the threat to life and property in future significant severe weather events.

The teams determined that NWS performance during both these events was excellent despite fatalities and significant property damage.

Looking north over Interstate 5 near Chehalis, WA, shortly after the December 1-3, 2007, storms. Photo courtesy of Jeremy King of the Washington State Department of Transportation

The Pacific Northwest is no stranger to strong winter storms with high winds and flooding; however, the storms of December 1-3, 2007, were unusually intense and caused problems even long-term residents had not experienced.

The third and most powerful storm was fueled by remnants of Western North Pacific Ocean tropical systems Hagibis and Mitag. Heavy rainfall, combined with rapidly melting snow, produced record flooding in western Oregon and Washington. The maximum storm total rainfall in Oregon was 14.5 inches and in Washington was 19.33 inches. New flood level records were set at several sites, some of which are considered to be 1 in 500 year events. The storm also generated hurricane force winds that lasted more than 30 hours. The peak wind gust was 147 mph in Naselle Ridge, WA, while Bay City, OR, measured a 129 mph gust.

Sadly, there were 11 fatalities associated with the event; three in Oregon and eight in Washington. Five of those were linked to avalanches. Preliminary property damage estimates are in the billions of dollars. A portion of Interstate 5 near Chehalis, WA, (see photo Page 11) was closed for several days due to flooding. Because the Interstate is the main thoroughfare between Portland and Seattle, this caused an estimated $4 million per day in lost commerce.

Tornadoes Devastate South

On February 5-6, 2008, a storm system developed over the Gulf of Mexico states and moved northeast. The intense rotation and instability of the system produced 82 tornadoes in 12 hours. The tornadoes raced across areas of Arkansas, Tennessee, Kentucky and Alabama. In all, 56 deaths were attributed to the event. One EF-4 (EF-4) tornado traveled a remarkable 123 miles. Another EF-3 took 22 lives, making it one of the deadliest single tornadoes in U.S. history. This was the largest tornado outbreak in terms of fatalities since May 31, 1985. There were 5 EF-4 tornadoes during this weather event. NWS staff issued Tornado Watches and Warnings for all areas in which fatalities occurred.

Damage from an EF-4 tornado which hit Union University in Jackson, TN. There were no fatalities and only minor injuries due to timely warnings from the NWS and proactive preparedness actions by the university. Photo courtesy of the NWS office in Memphis, TN.

Despite accurate Watches and Warnings from NWS during these events, the number of deaths and amount of property damage was unusually high. The assessment teams have identified areas for improvements and made recommendations. These recommendations will help users and partners make more appropriate decisions to reduce threats to life and property from such future extreme weather events.

The teams have also identified best practices for other NWS offices to emulate during similar severe weather events. The team assessment reports are expected to be released this summer and early fall 2008. Check the summer edition of *Aware* for the link. ❄

SANS: Will It Change Storm Spotting?

By Todd Shea, WCM, NWS La Crosse, WI
Todd.Shea@noaa.gov

A new Spotter Activation Notification System (SANS) will allow NWS La Crosse to manually recommend spotter activation in counties within its service area. Through the use of a simple PC-based interface, the status of spotters in each county can now be easily and quickly changed to be activated or deactivated as storms approach. When a spotter is activated, notification will go out to emergency management personnel, spotters and other local officials via email, cell phone text message, shortwave radio or the Internet.

This system will provide recommendations for activating specific spotter groups and thus offer additional guidance to assist with local decision making. Spotter groups will still be

encouraged to monitor severe weather outlooks, radar imagery and other trends in storms as these events approach their communities.

NWS will request feedback during and after the test period to measure whether the system effectively reaches spotters and if the system boosted communication with real-time reports into NWS severe weather operations. ❄

National Severe Weather Workshop 2008

By John Ferree, OCWWS; Greg Carbin, SPC, Dale Morris, WDTB
John.Ferree@noaa.gov

Almost 400 people attended the 2008 National Severe Weather Workshop, March 6-8, in Norman, OK. Attendees represented NOAA staff, emergency managers, first responders, media, private sector companies, storm spotters and chasers, and state and local governments. The storm spotter training session brought an additional 133 participants, setting a record attendance for the 8-year run of the workshop.

This year's theme was "From Readiness to Recovery." Presentations covered a wide range of key information from the latest in high-resolution radar imagery, to emergency communications technology, to a better appreciation of the need to respond to individuals with special needs when severe weather threatens. Of particular note was a presentation made by Les Lemon of COMET on the threat of tornadoes to large venues, like stadiums. During this presentation, he stated, "It is not a matter of if, but a matter of when a tornado will hit a large venue." Les made this statement one week before an EF-2 tornado tracked within 100 yards of a capacity crowd at the Georgia Dome in Atlanta.

Mock WFO set-up at the National Severe Weather Workshop. This group issued warnings and advisories using the Weather Event Simulator and communicated with emergency managers and media.

Presentation files in PDF format are available for download from the 2008 National Severe Weather Workshop Website at: **www.norman.noaa.gov/nsww2008/**.

Attendees also took part in an interactive scenario simulating an actual severe weather event. This scenario provided eye-opening interactions among the different groups and spurred ongoing discussions about ways to improve emergency communications and the warning process. This session was an opportunity for workshop participants to walk in someone else's shoes. During a simulated version of the November 15, 2001, flood and tornado event in the Austin, TX, metro area, attendees had the opportunity to switch roles and act as emergency managers, NWS meteorologists and on-camera broadcast meteorologists. Participants were separated in rooms transformed into a mock television station, a mock emergency operations center and a mock WFO, where they gained a better understanding of communications and teamwork challenges involved in the warning process.

To highlight challenges associated with large event venues, the scenario script included a University of Texas football game. The scenario team included subject matter experts from the NWS Warning Decision Training Branch and other Office of Services employees, the Storm Prediction Center, Norman WFO, Oklahoma Climatological Survey, three broadcast stations, and two emergency management offices.

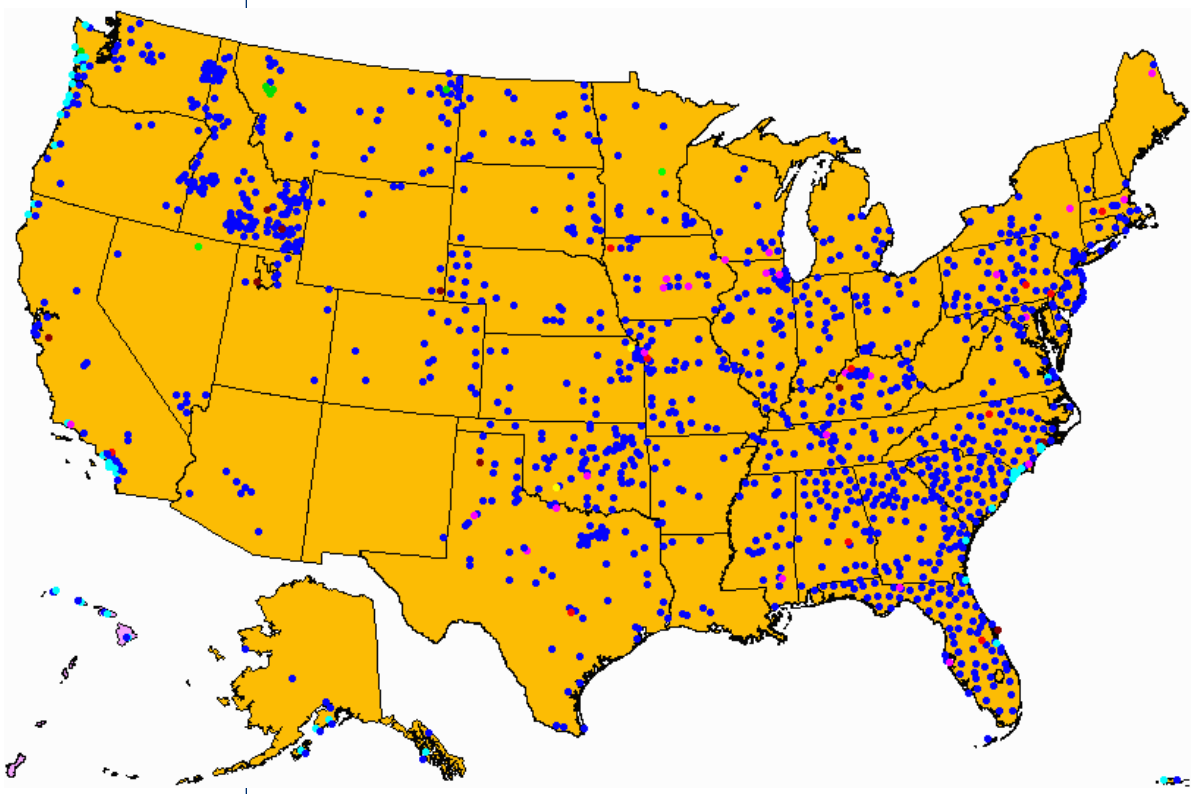
The 9th Annual National Severe Weather Workshop will likely take place in early March of 2009. Stay tuned for details. ❄

StormReady Gains 30 New Sites in 15 States; TsunamiReady Boasts County with all Coastal Cities Recognized

By Melody Magnus, Aware Editor
Melody.Magnus@noaa.gov

In the last 3 months, the StormReady program gained a total of 30 new counties and communities in 15 states and Puerto Rico. The list includes a new government site: the Lower Colorado River Authority in Texas, and two university sites: Grinnell College in Iowa and Siena Heights University in Michigan.

The TsunamiReady Program gained Seal Beach and Laguna Beach in Orange County, CA, making Orange County the first to have all coastal cities and the county TsunamiReady. Although the risk of a tsunami seems distant to many Americans, it only takes one major wave to wreak enormous havoc on the overpopulated coasts of the United States. U.S. weather history includes



records of numerous tsunamis on both the East and West Coasts.

The goal of both the StormReady and TsunamiReady programs is to help assure local and prospective business owners, tourists and residents that a community is prepared for extreme weather events. StormReady sites post local signs to alert residents to the community's commitment to safety and preparedness.

Emergency Managers who want to learn more about the StormReady/TsunamiReady program and the supporter program should contact their local NWS WCM for details. Find contact information by clicking on "Local Contacts" at **www.stormready.noaa.gov**. ❄

NWS Expands Efforts to Mitigate Effects of High Impact Sub-Advisory Snowfall

By Greg DeVoir and David Ondrejik, NWS State College, PA
Greg.Devoir@noaa.gov and David.Ondrejik@noaa.gov

In the winter of 2004-2005, NWS State College, PA, began an experimental partner project with the Pennsylvania Department of Transportation (PENNDOT) and the Pennsylvania State Police (PSP) to reduce the devastating effects of High Impact Sub-Advisory (HISA) snow events along the Interstate 80 corridor (I-80) in central Pennsylvania. In recent years, this stretch of I-80 has experienced a series of tragic multi-vehicle accidents during snow squalls (Loganton, PA in 2001, Milesburg, PA in 2004), resulting in numerous deaths and injuries, as well as millions of dollars in economic loss. This article details the success of this project, as well as the need to expand these efforts, both regionally and nationally.

The NWS's multi-tiered approach to warn of the likelihood, potential severity and impact of impending winter weather events relies on the timely issuance of specific, event-driven Watches, Warnings, Advisories or Special Weather Statements (SPS). These products discuss the likelihood and potential impact of various events, while advising users on appropriate actions to be taken to protect life and property. While this approach works well for the majority of longer-fused scenarios involving snow accumulation and various precipitation types, a number of winter events occur each year when the total snow accumulation falls short of meeting Advisory and Warning criteria, yet still poses a substantial hazard.

Recent High Impact Snow Squall Events Across Northeastern U.S., Great Lakes And Southeast Canada

Date	Time	State/ Province	Impacts	Character
12-Mar-98	1235 LST	MA,NH	Snow squall	Fatal 30-35 vehicle pileup on I-495 near Rt 2 (Boxborough, MA); two fatalities including a 3-month-old girl
12-Feb-99	0900 LST	WI	Snow squall (1 day after record warmth)	Pileups involving 80 cars on 2 freeways, U.S. 41/45 near Menomonee Falls, WI, Waukesha County, 18 injured
28-Dec-01	1600 LST	PA	Snow squall	I-80 pileups near Loganton involving more than 100 vehicles; 8 dead, 45 injured
28-Dec-01	1600 LST	PA	Snow squall	Series of chain reaction pileups, including a fatal 30-car pileup near Hazleton that killed a 13-year old girl
6-Jan-04	1215 LST	PA	Snow squall	Fatal I-80 pileups: 6 dead, 17 injured, portions of I-80 closed for more than 2 days
13-Feb-06	1130 LST	MI	Snow squall	86-vehicle chain reaction pileup on US 31, 25 injured
26-Feb-06	0920 LST	PA	Snow squall	25 separate accidents over a quarter mile stretch of I-81; highway closed for 5 hours
7-Dec-06	1535 LST	PA	Snow squall	15-vehicle pileup including 7 tractor trailers, no injuries or fatalities despite conditions similar to Jan. 6, 2004
16-Jan-08	1045 LST	WV	Snow squall	Numerous accidents, including a fatal 8-vehicle pileup on I-81; 2 fatalities
20-Jan-08	1300 LST	ON	Snow squall	Up to 100 vehicles involved in several pileups; 1 dead, 29 injured. Highway closed for 10 hours
10-Feb-08	1400 LST	PA	Snow squall	68-car pileup on I-81 killed 1 and injured 36; northbound lane closed for 5 hours

Sub-advisory events, characterized by short-lived but extremely heavy snow bursts or squalls and often compounded by rapid wind and temperature fluctuations, can quickly create life-threatening conditions on highways, including near-zero visibility, rapidly deteriorating road conditions and increased driver anxiety and confusion. The resulting impact of such events can be greatly disproportionate to overall observed snow amounts (see table Page 15).

The PENNDOT/PSP/NWS partnership for HISA snow events has resulted in the establishment of an NWS/PENNDOT/PSP alerting protocol for events expected to produce hazardous conditions. Whenever possible, NWS staff notify PENNDOT when HISA events are forecast more than a day in advance. On the day of an expected HISA event, NWS staff issue Special Weather Statements and start a cooperative call chain to the PSP, which, in turn, contacts its local offices. NWS notices contain highway mile-marker information and snow squall path timing, similar to NWS pathcasts in Severe Thunderstorm Warnings. As a consequence, PENNDOT and PSP have made significant changes to their winter weather operational planning and response including pre-treating roads and dispatching PSP cruisers with running lights in expected HISA snow event areas.

In the 3.5 years since the I-80 project began, and despite potentially hazardous conditions, no significant HISA incidents have occurred on this stretch of I-80; however, incidents have occurred outside of the experimental area. NWS staff is working to expand the area notified, perhaps by developing and issuing a new short-fused cold season convective warning or advisory product. At the same time, it is balancing workload constraints and verification issues related to these events.

NWS needs a more efficient and automated way to disseminate this information. Efforts are underway to expand the notification system and develop a new NWS warning or advisory text product. Given the life-threatening impact of HISA events, a short-fused winter weather warning product may be justified. NWS may also consider using the Emergency Alert System to notify law enforcement and emergency management officials.

For more information on HISA research including workshop presentations and conference papers, visit our Website at: **www.erh.noaa.gov/ctp/HISA/HISA.php.** ❄

Online Spring and Summer Awareness Resources

Spring is severe weather, flood and hurricane season. NWS offers numerous resources to help communities, schools and individuals better prepare for emergencies. Check out the following sites for posters, videos, animations, photos, survivor stories, kid and teacher resources, policy statements and much more.

- **Flood Safety: www.floodsafety.noaa.gov/index.shtml**
- **Hurricane Safety: www.weather.gov/os/hurricane/index.shtml**
- **Lightning Safety: www.lightningsafety.noaa.gov/index.htm**
- **Severe Weather: www.weather.gov/os/severeweather/index.shtml** ❄

Climate, Water and Weather Links

Aviation Weather:	**www.aviationweather.gov/**
Brochures/Booklets/Posters:	**www.weather.gov/os/brochures.shtml**
Education/Outreach:	**www.weather.gov/os/edures.shtml**
Marine Weather:	**www.weather.gov/os/marine/home.htm**
MIC/WCM/SOO/DOH List:	**www.weather.gov/os/wcm-soo.pdf**
National Digital Forecast Database:	**www.weather.gov/ndfd/**
Natural Hazards Statistics:	**www.weather.gov/os/hazstats.shtml**
NOAA Weather Radio Information:	**www.weather.gov/nwr/**
Past Weather/Climate:	**lwf.ncdc.noaa.gov/oa/ncdc.html**
Rip Current Awareness:	**www.ripcurrents.noaa.gov/**
StormReady Home Page:	**www.stormready.noaa.gov/**