May 2010
Vol 1 No 4

The RCC Report

NEWSLETTER OF THE NOAA REGIONAL CLIMATE CENTERS

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Impacts of the 1954 Heat Wave Studied

In July 1954 a widespread, long-lasting heat wave covered significant parts of 11 states: from eastern Colorado through Kansas, Oklahoma, parts of Texas, Missouri, and Arkansas, southern Illinois, and extending southeast to western Tennessee, Alabama, Georgia, and parts of the Carolinas. Researcher Nancy Westcott with the Midwestern Regional Climate Center and assistant Kevin Grady searched newspaper archives to document the impacts of this record-breaking heat wave in Illinois, Missouri, and Kansas. This event ranked as one of the top five extended periods of heat in these states since 1895.

1954 was the third consecutive year with high summer temperatures in this region, followed by a severe drought. Temperature records set during the Dust Bowl years of the 1930s were broken. A record high temperature of 117°F on July 14, 1954 in East St. Louis, Illinois still stands as the state record. At the St. Louis Lambert International Airport, temperatures of at least 100°F were observed on 22 days (normal is three) from the last week in June through the first week of September 1954. Similarly, Olathe, KS (near Kansas City, MO) recorded 31 days of at least 100°F (normal is five days).

Westcott and Grady searched newspaper archives of the *St. Louis Post Dispatch*, the *Kansas City Star*, and the *Kansas City Times* for stories about impacts of the heat wave. This was a time when air conditioning was still new. Some homes did have room air conditioners, but most businesses were not air conditioned. In hospital rooms without air conditioners, nurses had difficulty taking the temperatures of patients, as thermometers would not go below 100°F. From the last week in June through July 18, 1954, at least 185 heat-related deaths occurred in

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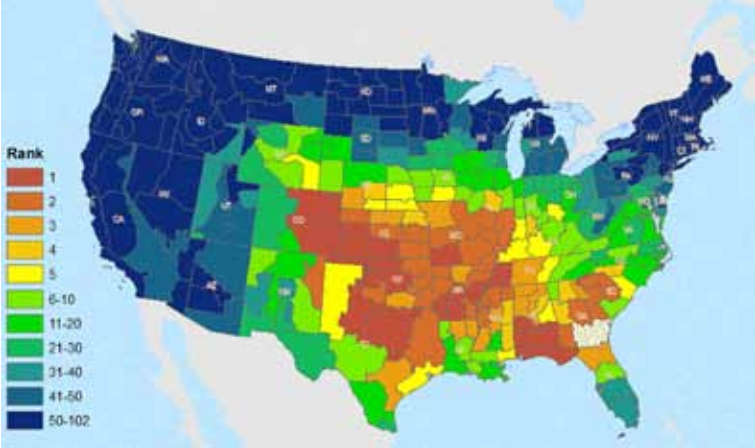

Rank of the June–August 1954 Heat Wave from Climate Division Data (1895–present)

The RCC Report is published four times a year; August, November, February, and May.

Publisher: Steve Hilberg
Editor: Lisa Sheppard
Designer: Sara Olson

Cover photo courtesy National Park Service

RESEARCH

Emergency Management Decision Support Tool for East Coast Winter Storms

East Coast winter storms have total impacts that exceed those associated with tropical storms, yet emergency managers, coastal managers, and engineers are faced with little information concerning the climatology of these damaging storms. The Northeast Regional Climate Center (NRCC) has created a decision-support tool related to East Coast winter storm frequency and impacts in collaboration with the New York Sea Grant.

The development of this tool was funded by a grant from the NOAA Transition of Research Applications to Climate Services (TRACS) program. Operational implementation of the climatological decision tools and seasonal storm activity outlooks were the responsibility of the NRCC, while New York Sea Grant served as both a liaison to the decision-maker team as well as a mechanism for educating emergency managers and other coastal interests (including the general public) about the use of climatological tools and forecasts.

The tool is a Web site (http://ecws.eas.cornell.edu/) and comprises four components:

- Time series of seasonal storm frequency and storm surge events (based on NOAA tide gauge data). Most series cover the period from 1950 to the present.
- Seasonal storm frequency outlooks based on National Science Foundation-supported research of the relationship between atmospheric circulation patterns, sea surface temperature departures, and the total number of storms observed during a winter.
- Information on the tracks of historical impact-producing storms and their associated storm surge.
- Links to relevant NOAA forecasts and data sources.

Feedback from stakeholders drove the creation of a unique feature that identifies historical storms with tracking and pressure characteristics that are similar to an impending East Coast storm. The tool identifies storm occurrences each morning based on the latest GFS model forecast of surface pressure and wind speed.

Once a forecasted storm is identified, the historical storm database is screened

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Record-Breaking Snow, Precipitation in the Northeast

An all-time record seasonal snowfall crippled the Mid-Atlantic during the winter of 2009-2010. Much of the record-setting snow was delivered in three significant storms, hitting the area around December 19, 2009 and February 6 and February 10, 2010. The storms coincided with abnormally cold temperatures that dominated the Mid-Atlantic for much of the winter season.

Location	Oct 2009–Mar 2010 Snow Total (inches)	Departure From Normal (inches)
Beckley, WV	132.9	+76.2
Baltimore, MD	77.0	+58.9
Dulles AP, VA	73.2	+52.4
Philadelphia, PA	78.7	+60.0
Wilmington, DE	72.7	+54.1
Washington, DC	56.1	+40.9
Atlantic City, NJ	58.1	+44.9

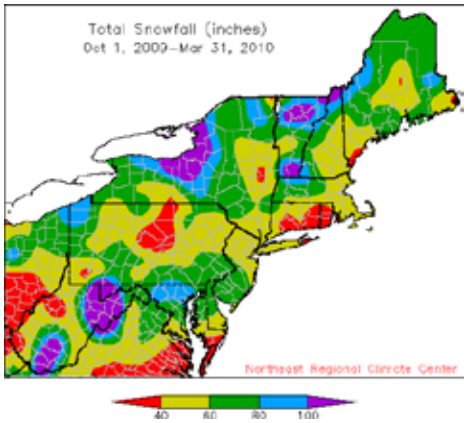
While the December 19 storm created travel and retailer nightmares during the weekend before the Christmas holiday, it was the back-to-back storms in February that put this winter in the record books. By the time the second February storm cleared the East Coast, thousands of flights had been cancelled and ground transportation was slowed to a crawl. Transportation in the Washington, DC metro area was so impaired that the federal government was shut down for 4½ days. Several roof collapses were reported in Maryland, Pennsylvania, and the Washington, DC area, including a hangar at the Dulles Jet Center and a warehouse containing Smithsonian artifacts in Suitland, Maryland.

Preliminary estimates from the risk assessor EQECAT indicate that insured losses from the two storms could top $2 billion. New York City's estimate for snow removal for the two February storms was $30 million. The cost of productivity losses when the U.S. government closes is $100 million per day.

March brought record-breaking rainfall to eastern parts of the region. Most of the 12-plus inches of rain that drenched southern Maine to eastern Connecticut fell from the March 13–15, March 22–23, and March 29–30 events. These events caused varying degrees of flooding, some devastating enough to force evacuations and qualify for federal disaster relief. A sampling of new rainfall records is below:

Wettest March	New (inches)	Previous (inches)
Bridgeport, CT	10.19	9.40 in 1953
Portland, ME	11.06	9.97 in 1953
Boston, MA	14.87	11.00 in 1953
Central Park, NY	10.69	10.54 in 1983
Providence, RI	16.34	8.84 in 1983

The NRCC issued several press releases and fielded many phone calls from the media in response to these snow and rain events. One press release was about the weight of the snow on the ground (and rooftops), using snow water equivalent values. Another press release addressed the fact that, on February 14, 2010, Baltimore's seasonal snow total surpassed normally snowier Syracuse, NY. Syracuse soon surpassed Baltimore, but had no snow in March–another newsworthy event handled by the NRCC.



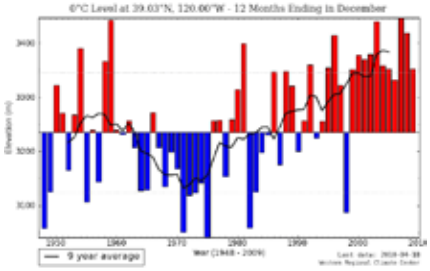
This map shows the total snowfall (inches for the period October 1, 2009 through March 31, 2010 in the Northeastern U.S.

Tracking the Ups and Downs of Mountain Snow Levels

In the mountainous West, two-thirds to three-quarters of the water supplies originate as snow, and anything that affects snow pack is of vital interest. The snow level is closely related to, and slightly below, the altitude in the atmosphere at which freezing temperatures are found. The freezing level affects whether precipitation falls as rain or snow, the internal temperature of the mountain snowpack, and the manner and rate at which this snowpack melts in the spring. Slow variations and trends through time in the freezing level can lead to changes in hydrology and the need for adjustments to water management.

The Western Regional Climate Center (WRCC) has developed a Web tool to track the freezing level since 1948 at any point in North America. The user selects a location by either entering a latitude and longitude or by selecting a location on a map. The months of interest are then selected, and a graph of the freezing levels is generated. The North American Freezing Level Tracker is updated daily, to within two to three days before the current date. An option exists to choose the elevation of other temperatures of interest, such as 10, 20, and 30 degrees C. Temperatures at different elevations have numerous biological and ecological consequences to living organisms, both plants and animals.

The North American Freezing Level Tracker was developed with support from the NOAA Climate Program Office.



This graph shows that the annual freezing level at Lake Tahoe has risen by about 150 meters (around 500 feet) over the past 20 years, through 2009. The black line in the middle of the graph indicates the mean freezing level. Freezing levels lower than average are in blue (indicating colder conditions), and freezing levels higher than average are in red (indicating warmer conditions).

Sporting Event Climatologies Prove Popular with Media

Major outdoor sporting events are sensitive to the weather, and the media is often interested in the history of the weather at these events. In response to media inquiries, the Southeast Regional Climate Center (SERCC) has developed a series of sporting event climatologies. These climatologies summarize the weather observed in prior years at sporting events, including the National Football League's Super Bowl, the Masters Golf Tournament, three NASCAR races, and two running events.

Major media outlets, including *USA Today*, the Weather Channel, and ESPN.com, have referenced these climatologies in their reports to the public and on their blogs. During the Masters Golf Tournament in Augusta, Georgia in April, there was much interest in the tournament climatology as the practice rounds immediately prior to the event experienced record daily maximum temperatures. Fortunately for the golfers and spectators, temperatures cooled down to more normal values once the tournament started.

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USA Today graphic developed from NOAA SERCC's climatology of the Masters Golf Tournament.

PARTNERSHIPS & COLLABORATIONS

Irrigation Scheduling Tool Saves Water, Energy, Production Costs

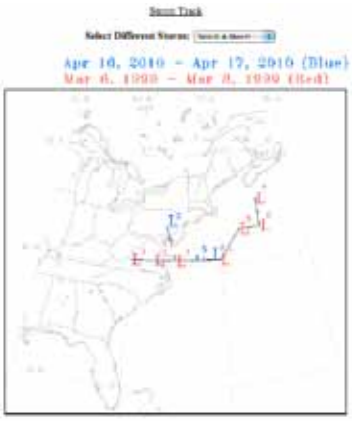
Scientists at the University of Nebraska-Lincoln's Agronomy and Horticulture Department and the High Plains Regional Climate Center (HPRCC) have teamed up to produce a Web tool that will let producers know when timing is right to irrigate their soybean fields.

The total planted acreage for soybeans in Nebraska was nearly 5 million acres in 2009, and soybean yields have increased over the past four decades. Nearly half of the soybeans grown in Nebraska are from irrigated fields, and the majority of the irrigation is from groundwater sources. The scheduling of irrigation only when necessary to prevent plant stress is important to the local producer for conservation of water and energy resources, resulting in a savings of both water and energy costs.

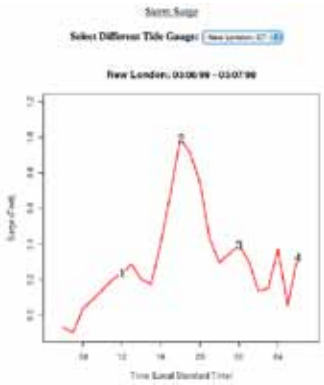
Using a Web interface (termed SoyWater) that utilizes Google Map technology, producers can input their location, soil type (as provided by the online system), crop variety, planting date, and emergence date. Data from the HPRCC Automated Weather Data Network (AWDN) are accessed to determine the local weather conditions closest to the individual's field site. Specific parameters used by the tool include precipitation, soil moisture, and other variables critical to determining evapotranspiration. A crop model is then run to obtain an estimation of plant water use and to alert the producer as to when to irrigate to prevent crop water stress.

Producers can use this tool not only just after emergence, but also throughout the season and make adjustments to the timing and amount of irrigation as needed depending on local weather conditions. The ability to make in-season adjustments to crop water management is a key benefit to the SoyWater tool.

Decision support continued from page 2
to find storms that most closely match the impending storm. Once identified, the tracks of these storms are plotted along with that of the forecasted storm. Historical tide gauge data corresponding to the climatological analogue storm are also presented. This allows emergency managers to anticipate the impacts of the forecasted storm based on the tidal impacts of the analogue. The high number of East Coast winter storms and storm impacts provided a strong test for the decision tool in its inaugural season.



Track of an April 16-17, 2010 storm (blue) superimposed on an analogue storm that occurred in March 1999 (red).



Storm surge associated with the March 1999 storm at New London, CT.

1954 heat wave continued from page 1
Missouri and Kansas alone. However, the toll was likely much higher as heat-related deaths are typically under-reported.

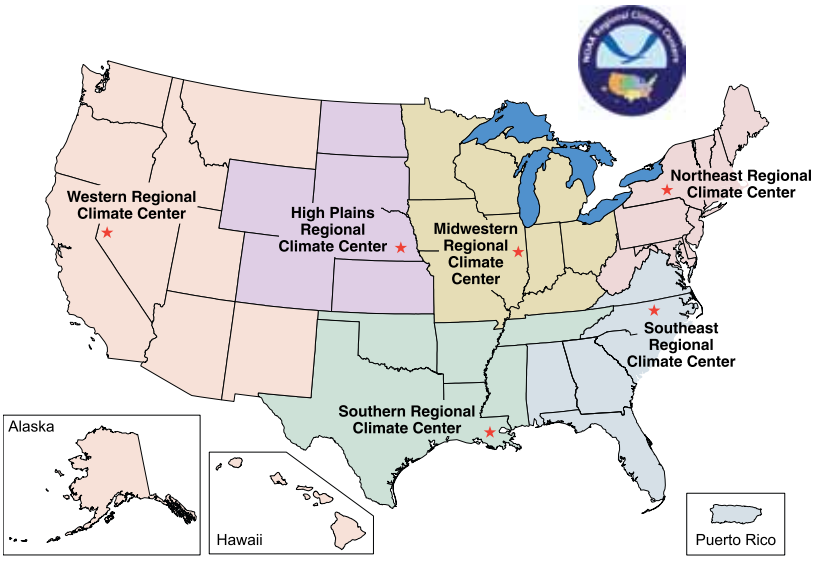
The heat wave affected many sectors, including water resources and agriculture. Three lakes in the St. Louis area dried up from a combination of the heat, previous drought, and sedimentation. Streets buckled and railroad ties warped from the heat. On the positive side, in Kansas it was reported that the rain and sunshine experienced during the first half of June made conditions excellent for plant growth. The hot, dry conditions that followed were ideal for harvesting the Kansas and Missouri winter wheat crop. However, the continued extreme heat and dryness in July negatively impacted the corn, soybeans, and spring wheat crops. The damage to corn was particularly devastating as hot, dry conditions continued through the crucial tasseling stage. By the end of July, some farmers were pulling up damaged corn to use as silage. Some areas reported 100 percent loss of their crop.

What would be the impacts if a similar event occurred today?

"Such prolonged high temperatures have not been experienced by many of us living today," says Westcott. "Studies of past heat waves such as the one in 1954 could serve as a template in planning for a heat wave in the future. If it happened before, it can happen again."

Sporting climatologies continued from page 3
One goal of this work is to develop working relationships with the organizers of these events, which would allow the SERCC to learn about the sensitivity of their events to the weather. This information could be used to develop weather and climate products that aid in planning the details of the event, including the development of contingency plans in the case of adverse weather. The SERCC is presently encouraging event organizers to make Web links from their Web sites to these climatologies. The sporting events climatologies can be found at: http://www.sercc.com/sports.

For more than twenty years NOAA's Regional Climate Center Program has been recognized by Congress as vital to the efficient, coordinated delivery of NOAA climate services from national to local levels. The mission of the six centers is to provide quality data stewardship, improve the use and dissemination of climate data and information for the economic and societal good of the U.S., and conduct applied climate research in support of improved use of climate information.



BY THE NUMBERS
January 1-March 31, 2010

Total Web hits:	21,970,180
Data Requests/contacts:	3,017
Media requests:	86

High Plains RCC University of Nebraska, Lincoln, NE	**(402) 472-6706**
Midwestern RCC University of Illinois, Champaign, IL	**(217) 244-8226**
Northeast RCC Cornell University, Ithaca, NY	**(607) 255-1751**
Southeast RCC University of North Carolina, Chapel Hill, NC	**(919) 843-9721**
Southern RCC Louisiana State University, Baton Rouge, LA	**(225) 578-5021**
Western RCC Desert Research Institute, Reno, NV	**(775) 674-7010**