



NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

STORM COURIER

Charleston, SC
Weather Forecast Office

Fall/Winter 2014

This Just In...Highlights & Updates

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NWS Charleston Develops & Implements New Wind Chill Criteria - December 1st, 2014

by Steve Rowley - Lead Forecaster & Winter Weather Program Leader

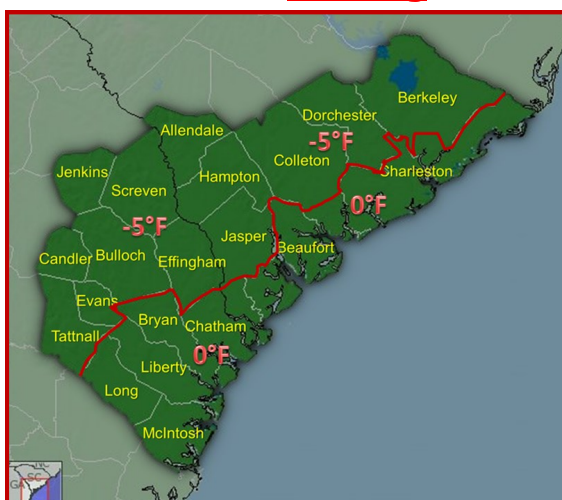
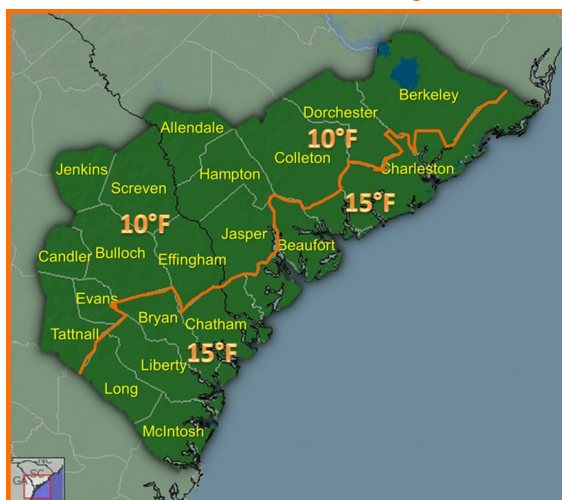
During the winter months, wind and cold temperatures can combine to produce low apparent temperatures, commonly known as [wind chill](#). Low wind chills can produce hypothermia and even frostbite. However, the combination of wind and cold seldom produce hazardous wind chills across southeast Georgia and southeast South Carolina. In fact, our recent apparent temperature criteria for Wind Chill Watches and Warnings, 10 degrees below zero Fahrenheit, and for

Wind Chill Advisories, 5 degrees above zero, proved to be virtually unattainable. Yet, on occasion, the combination of wind and cold can still produce hazardous conditions for anyone venturing outside without warm clothes. If Wind Chill Watches, Warnings or Advisories are never issued because of artificially low thresholds, the misconception that these hazards do not occur here could degrade awareness and preparedness when arctic air sweeps into the region.

In order to address these concerns, meteorologists at the southeast National Weather Service (NWS) offices analyzed the local wind chill climatology. Based on this evaluation and consultation with neighboring NWS offices in Georgia, South Carolina and North Carolina, the Charleston SC NWS office developed more realistic wind chill criteria. Further, we determined that wind chill thresholds across inland counties should be slightly lower than within coastal counties.

The new Wind Chill Watch, Warning and Advisory criteria, which became effective December 1, 2014, are illustrated on the following maps. Utilizing these updated measures of hazardous wind chill, it is anticipated a couple of wind chill advisories will be issued during a typical winter. However, even the new Watch/Warning criteria will remain extremely rare during most winters.

New Wind Chill Advisory Criteria New Wind Chill Warning Criteria



As always, the NWS's central focus is [public safety](#). Therefore, if Advisories, Watches or Warnings are issued, it is earnestly suggested that everyone remain indoors in a heated shelter, or, if one must drive or venture outdoors, dress warmly for protection.

This Just In...Highlights & Updates

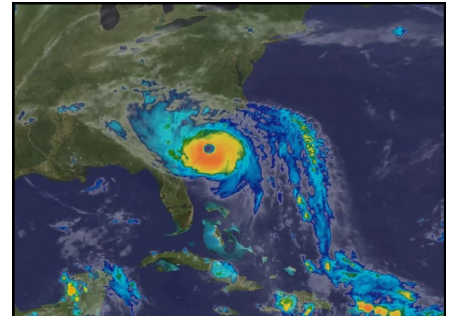
NWS CHS Commemorates the 25th Anniversary of Hurricane Hugo

by Robert Bright — General Forecaster & Tropical Program Leader



September 21-22, 2014 marked 25 years since Hurricane Hugo slammed ashore with the center passing just north of Charleston, South Carolina. The storm produced sustained winds near 140 mph (along with gusts near 200 mph) and a 20 foot storm tide, the highest ever recorded along the U.S. East Coast! The intensity of the storm along with its speed allowed it to continue producing hurricane force winds well inland

to around Charlotte, North Carolina. To commemorate this historic storm, our office produced a 5-part video series that looks back at what it was like before, during and after the storm. It also discusses why Hugo wasn't even a worst case scenario for Charleston as well as some of the things that have changed since 1989, particularly the significant population and infrastructure growth since Hugo. Included in the videos are interviews we conducted with local public officials, local and national media, and NWS personnel, including Director Dr. Louis Uccellini.



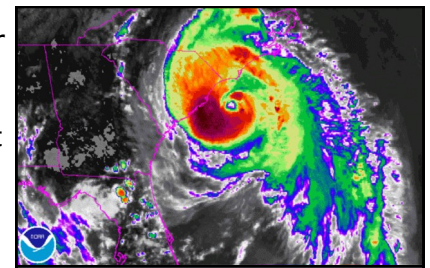
Hurricane Hugo—9.22.1989

For more information on Hurricane Hugo, check out our [commemorative website](#) and [videos](#).

2014 Hurricane Season Ends Much Quieter Than it Began

by Robert Bright — General Forecaster & Tropical Program Leader

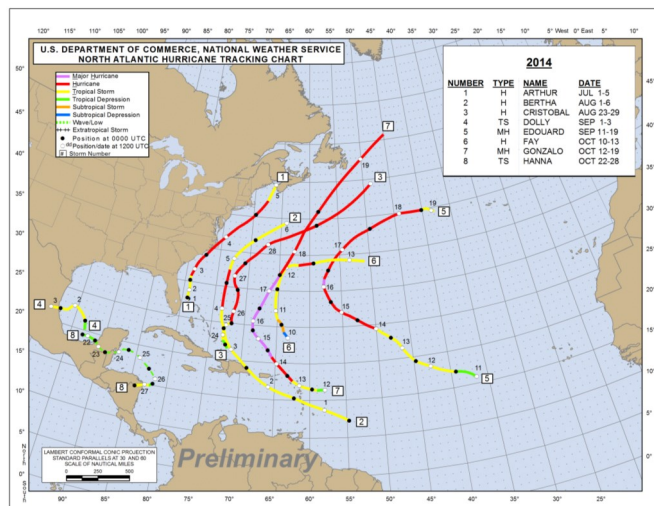
The 2014 Atlantic hurricane season officially ended on a much quieter note on November 30th. However, it got off to a quick start as Tropical Storm [Arthur](#) formed off the east coast of Florida in early July. The storm intensified into a hurricane a few days later as it passed about 100 miles off the coasts of Georgia and South Carolina. The main impact locally was rough surf along the coast before Arthur made landfall in North Carolina near Cape Lookout as a Category 2 storm.



Hurricane Arthur—7.3.2014

Overall, in the Atlantic basin (western Atlantic Ocean, Caribbean Sea and the Gulf of Mexico), there were 8 named storms, 6 of which were hurricanes. The 8 named storms were the fewest since 1997 when there were only 7 named storms and well below the 30-year seasonal average of 12. Still, this was pretty much in line with what [NOAA forecasted in May](#) prior to the start of the season. A combination of atmospheric conditions acted to diminish

Atlantic tropical cyclone activity, including strong vertical wind shear, dry air and near to below average West African monsoon. Interestingly, there have not been any major hurricane landfalls in the United States in the last 9 years, which breaks the previous record of 8 years from 1861 to 1868.



For more information about the 2014 Atlantic hurricane season as well as hurricane history and preparedness information, browse over to the [National Hurricane Center](#). Since it's never too early to prepare for next hurricane season, check out our [local tropical weather webpage](#) for hurricane preparedness information and local hurricane history!

In Touch, In Tune - Outreach & Community

Storm/Tsunami Ready and Weather Ready Nation Ambassadors – *Sorting Out the Differences*

by Ron Morales— Warning Coordinator Meteorologist



2012 Storm Ready Ceremony at the Joint Air Force Base in Charleston, SC

Many of our partners, especially local emergency management (EM), are familiar with the [Storm Ready](#) program, which has been in existence since 1999. There is also a sister program called "[Tsunami Ready](#)", which is used for promoting awareness, preparedness and resiliency from the threat of Tsunamis. Our office is currently helping to review proposed updates to the national Tsunami Ready program guidelines, which will make the recognition process even more comprehensive.

Being recognized as "Storm/Tsunami Ready" means that a community is better prepared to react to and protect their citizens from the hazards of severe weather and tsunami impacts through planning, education and awareness. These programs may also help communities obtain hazardous mitigation grants as well as lowering flood insurance rates through [FEMA's Community Rating System \(CRS\)](#). Each community that has been recognized as Storm/Tsunami Ready must update their recognition every three years, and go through a new application process every six years.



In order to become Storm/Tsunami Ready, a community must have the following:

- 1.) A 24 hour warning point and emergency operations center. A "warning point" may be a 911 center, or an individual(s) responsible for receiving critical weather information such as: warnings, watches and advisories.
- 2.) Have multiple ways to receive severe weather alerts/information and to alert the public.
- 3.) Have the ability to monitor weather conditions locally.
- 4.) Regularly promote preparedness of severe weather/tsunami hazards through community outreach events.
- 5.) Develop a formal hazardous weather/tsunami plan, including regular scheduling of Storm Spotter training sessions and hosting emergency exercises.

We greatly value our Storm/Tsunami Ready partners, and appreciate the work they do to make their communities better prepared to respond and react to all types of hazardous weather.



Congratulations to the following counties recognized in 2014:



In South Carolina: Allendale, Berkeley, Beaufort, Dorchester, Hampton and Jasper.

In Georgia: Bryan, Bulloch, Effingham, and Liberty (Storm and Tsunami Ready).

Seven more of our communities will be due to renew their Storm Ready recognitions in 2015, including Charleston County, which will also work to renew their Tsunami Ready recognition.

In Touch, In Tune - Outreach & Community

Weather Ready Nation Ambassador

by Ron Morales— Warning Coordinator Meteorologist



Who Can Become a Weather Ready Nation Ambassador?

Any organization across all levels of government, businesses large and small, non-profit and non-governmental organizations, and academia can become a WRN Ambassador. If your organization is interested, or you know of ones that might be, additional information can be obtained from the [WRN](#) and [WRN Ambassador](#) webs sites. If you still need more information, please email NOAA's Weather Ready Nation team at: wrn.feedback@noaa.gov

The [Weather Ready Nation \(WRN\) Ambassador](#) program was recently launched in February of this year. This initiative is a method for the National Oceanic and Atmospheric Administration (NOAA) to more formally recognize partners who are helping to improve the nation's readiness, responsiveness, and overall resilience against extreme weather, water, and climate events.

Our WRN Ambassadors are an active part of this initiative, which encourages better preparedness and response from the impacts of extreme weather, water, and climate hazards from ALL sectors of our society. In short, if everyone becomes a [Force of Nature](#), we will have a more Weather-Ready Nation!

Although there are some similarities to Storm Ready, the WRN Ambassador program is distinctly different. It does NOT involve a comprehensive application process for approval, and does NOT require a renewal process like the Storm/Tsunami Ready programs. Our WRN Ambassadors serve as a change agent, leader and inspiration in their community for promoting better all hazards preparedness and awareness. Once an organization becomes an Ambassador, they will stay connected by receiving periodic emails from NOAA/National Weather Service Headquarters concerning events such as Awareness Weeks, new/improved products, and resources to promote better severe weather awareness across social media, the web and at outreach events.

2014 NWS Week of Service - Charleston Animal Society

by Emily Timte - Meteorologist

Every year, the National Weather Service (NWS) holds the National Week of Community Service. During this week, offices around the country make an effort to reach out to help those who are in need in our communities. All of these events occur outside of our normal working hours.

The 2014 NWS National Week of Service was held September 28th through October 4th. This year, the Charleston staff decided to support our neighbors down the road at the Charleston Animal Society by doing a donation drive. We collected bags of dog and cat food, treats, tennis balls, and towels, just to name a few.



NWS Charleston's Donation



Meteorologists Wendy Sellers and Emily Timte

In addition, we raised enough money to purchase an engraved brick to be placed in the Charleston Animal Society's walkway. The brick will be inscribed with "National Weather Service supports the Animal Society." It was very rewarding to give back to a great organization that cares for hundreds of animals each year.

Check out the [2014 Week of Service](#) page to see what other NWS offices did as well as an event summary.

Tech Talk - Information & Technology

KCLX WSR-88D Radar - Major Mechanical Failure

by Julie Packett - Administrative Support Assistant

The combination of the approaching peak of hurricane season and the possibility of strong storms nearly every afternoon is by no means an ideal time for a coastal radar to go down, but on August 5th, 2014, that was the case for the Charleston KCLX WSR-88D radar. The natural wear and tear of over 18 years of extensive radar use resulted in the failure of the azimuth bull gear, the primary component for spinning the radar. To make matters worse, this type of repair generally

requires at least 10 full days to fix once diagnosed and requires a team of specialists from the NEXRAD WSR-88D Radar Operations in Norman, Oklahoma. The NEXRAD team joined forces with NWS Charleston Electronic Technicians, Alan Phillips and Scott Edwards, on August 11th. They worked almost non-stop for about 10 days to complete the necessary replacement of the bull gear, and with the bull gear stationed at the center of the radar, this was not an easy fix. In fact, the entire antenna assembly had to be lifted via a winch in order for the team to even get to the bull gear.



KCLX Radar



Damaged Bull Gear

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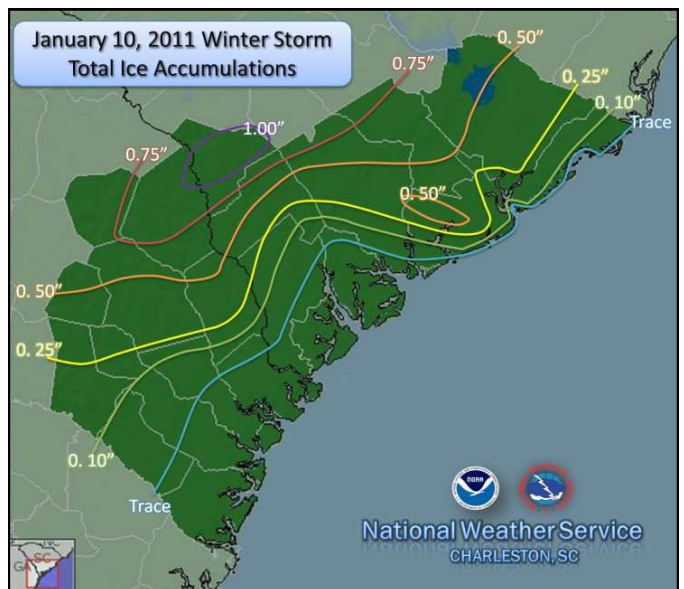
replacement of the bull gear, and with the bull gear stationed at the center of the radar, this was not an easy fix. In fact, the entire antenna assembly had to be lifted via a winch in order for the team to even get to the bull gear. During this time, KCLX radar was completely out of commission, forcing Charleston warning forecasters to utilize neighboring radars, some over 200 miles from the Charleston coastline, in order to interrogate individual storms across the forecast area. However, in order to remain prepared for the unexpected, NWS Charleston routinely performs full office swaps with neighboring NWS sites. As a direct result of this routine training, there was no degradation of service for the Lowcountry, Coastal Empire and nearby coastal waters. The radar became operational again on August 21st, and after some calibration work, it was back to full-service by August 23rd.

Local Research & National Conferences

by Frank Alsheimer - Science and Operations Officer

The Charleston, SC National Weather Service Forecast Office continued to conduct local research during 2014 to help find solutions to both science and communication issues unique to the region. In the process of conducting the research, we were also able to provide valuable experience to meteorology students from different colleges and universities who represent the future of the science. Here's a brief review of some of the research activities.

Winter Weather: Lead forecaster Steven Rowley completed a publication on the [January 2011 ice storm](#) in the Lowcountry. The research looked at some unique aspects of that event which led to the unusual ice accumulation under temperature conditions that were just barely cold enough for freezing rain. This research publication was very timely as the area experienced two ice storms during early 2014. Forecasters at the NWS Charleston office were able to use lessons learned from this 2011 event highlighted in the publication in making quite accurate predictions for the 2014 events, despite their unusual nature.



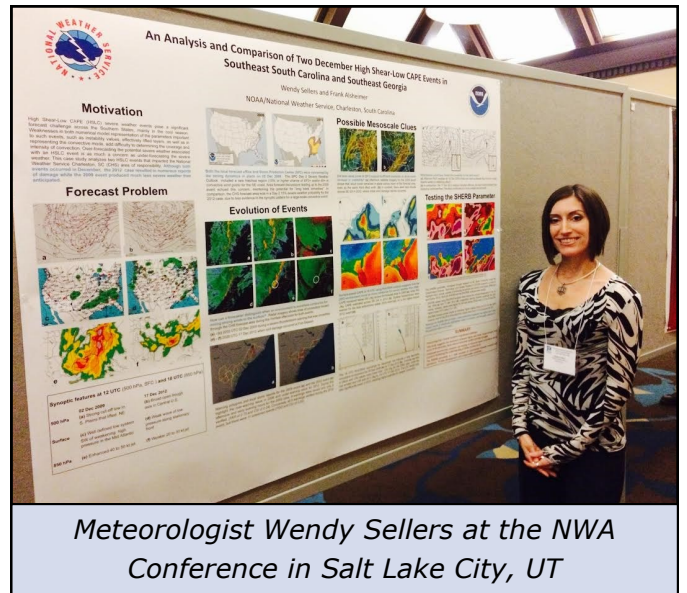
Tech Talk - Information & Technology

Local Research & National Conferences - Continued

by Frank Alsheimer - Science and Operations Officer

Severe Weather: As part of an effort that included students and professors from North Carolina State University as well as meteorologists from several NWS forecast offices in the southeastern U.S. from Maryland to Alabama, NWS Charleston took part in a study on severe weather that incorporated conditions with strong wind shear but also low instability. These conditions occur frequently with storm systems in the winter, but only occasionally produce significant severe weather.

More specifically, meteorologist Wendy Sellers and Science and Operations Officer Frank Alsheimer looked at 2 December severe weather cases (one in 2009, another in 2012) that were particularly difficult to forecast. In one case, the forecast office anticipated a lot of severe weather, but much less occurred than expected, while in another case the office expected only isolated severe weather, but the reality was the wind damage was more widespread. The results from this study were presented at the National Weather Association conference in Salt Lake City in October 2014.



Meteorologist Wendy Sellers at the NWA Conference in Salt Lake City, UT

Tropical Weather: NWS Charleston took part in several different tropical weather studies during 2014, including students from several different schools (NC State, UNC Charlotte, and the College of Charleston). The topics included:

- Producing more accurate and collaborated forecasts of winds during tropical storms and hurricanes.
- Developing a catalog of area impacts from historical tropical storms and hurricanes, concentrating on specific impacts from storm surge, inland flooding, wind, and tornadoes.
- Visualizing the threat of storm surge and its possible impacts in a new and unique way.
- Cataloging upper air patterns that can be precursors to hurricane or tropical storm landfalls days in advance as a reliability tool to compare against computer model output.
- Creating new text products that NWS forecast offices can use to convey the threat, impact, and uncertainties associated with tropical storms and hurricanes.

Minor Coastal Flooding: As minor coastal flooding becomes more common with sea level rise, especially in the immediate Charleston metro area, correctly forecasting such events is becoming a larger part of NWS Charleston, SC operations. To help have a baseline for these events, a local climatology is underway to look at the likelihood of such events based on the previous tidal cycle anomalies (highs and lows) as a first guess. Further, the study plans on looking at outlier events to determine why they did not behave as climatology and astronomy would suggest and examining the critical weather patterns associated with those outliers in order to raise forecaster awareness of forthcoming significant events. This study is currently ongoing with two students from the College of Charleston.

The Wrap-Up - Looking Back at 2014

2014 Weather & Climate Wrap-Up

by Emily Timte - Meteorologist & Climate Program Leader

2014 kicked off with not one, but two winter storms - quite unusual for this part of the country! The [January winter storm](#) brought both snow and ice to the Lowcountry while the February storm brought mostly ice. Ice accumulations up to an inch were reported with the [February storm](#) resulting in hazardous road conditions and numerous down trees and power lines.

As spring arrived, the weather seemed to quiet down. In fact, the severe weather season was well below average with just over 100 Severe Thunderstorm Warnings issued year-to-date (typically ~250 severe events occur per year). Although there was not a significant amount of severe weather, several flash flood events did occur over the spring and summer, especially in the flood prone metropolitan areas such as downtown Charleston. In effect, our climate sites at the Charleston Airport and Downtown Charleston cracked the top 5 wettest Apriils on record due to these large heavy rain events.

At the Charleston Airport, May, June, and August ranked in their top 5 warmest months on record. Although Downtown Charleston and Savannah Airport did not break their top 5, temperature averages were still above normal.

September was a rainy month across the Southeast. No records were broken for the wettest September; however Charleston did tie the record for most days in September with measurable rainfall (considered 0.01 inches or more). Both 1979 and 2014 had 18 days of measurable rainfall at the Charleston Airport. Savannah Airport didn't break their standing record of 22 days (set in 1890) but did have a respectable 16 days.

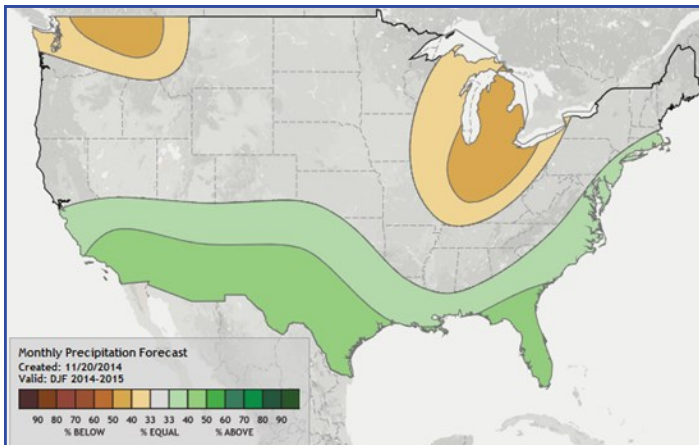
Multiple cold snaps characterized November with the most notable event on the 18th and 19th. Widespread sub-freezing temperatures occurred even at the beaches, which effectively ended the 2014 growing season. Although no monthly temperature records were set, the average temperatures for the month ran 3-5 degrees below normal.

2014 - 2015 Winter Weather Outlook

The latest [U.S. Winter Outlook](#) issued by the [Climate Prediction Center](#) is favoring a cooler and wetter winter over the Southeast. One of the factors in determining the outlook is the state of the El Nino-Southern Oscillation, or ENSO. The ENSO cycle refers to the variations in several elements that occur across the equatorial Pacific Ocean, such as sea surface temperatures, convective rainfall, surface air pressure, and atmospheric circulation. There are three phases of the ENSO cycle: El Nino (warm phase), La Nina (cold phase), Neutral (near normal). This year, a weak El Nino is forecast to develop. What does this mean for us? The jet stream gets shifted further south, and as a result, we see cooler and wetter conditions.

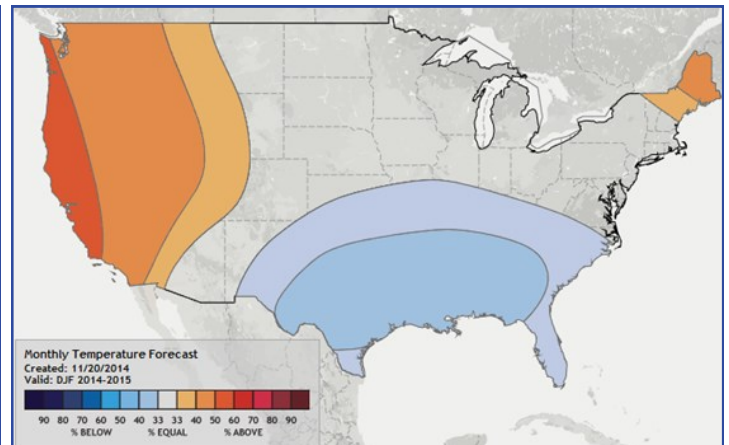
Winter Precipitation Outlook

December, January, & February



Winter Temperature Outlook

December, January, & February



The Wrap-Up - Looking Back at 2014

Coastal Hazards Statistics - Rip Currents & Waterspouts

by Pete Mohlin - Lead Forecaster & Marine Program Leader

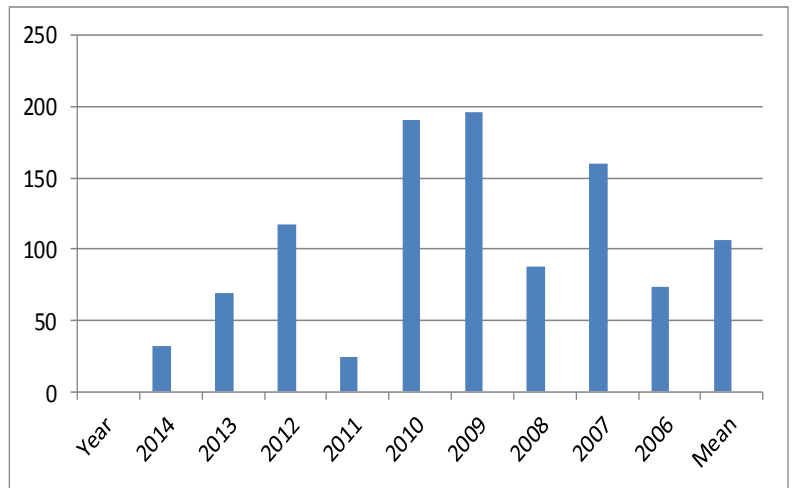
For the second year in a row, the amount of [rip currents](#) reported at the area beaches through the year was below normal. This was in large part due to the absence of any significant swells during much of the year. Swells are a major factor in the formation of rip currents, and when there is little swell activity, the [risk for rip currents](#) is often less.

In 2014, there were just 32 rip currents relayed to us by lifeguards. The vast majority of these occurred at Isle of Palms, SC, and Tybee Island, GA, where there were 20 and 8, respectively.

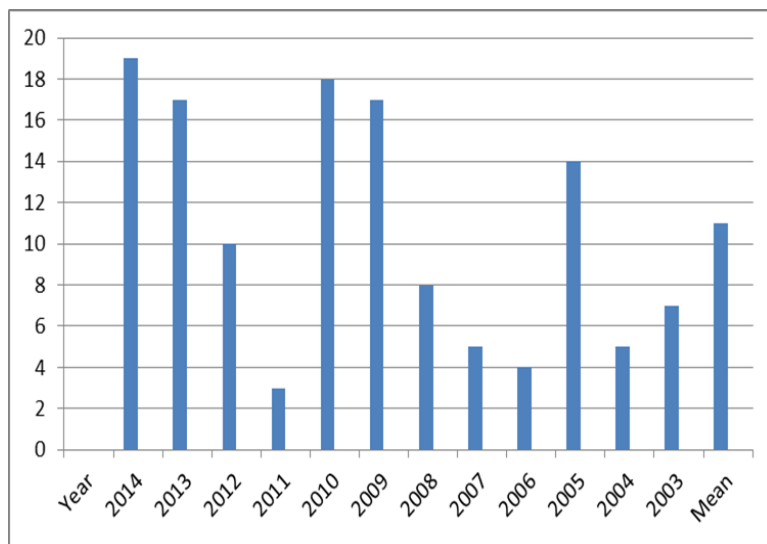
While there were numerous rescues, 1 person unfortunately drowned at Isle of Palms in May. According to the lifeguards on Isle of Palms, there were already cuts and breaks in the sandbar for several days, allowing the rip current to form.

Rip currents can be found on many surf beaches every day. Under most tide and sea conditions, the speeds are relatively slow. However, under certain wave, tide, and beach profile conditions, the speeds can quickly increase to become dangerous to anyone entering the surf.

Rip Currents Reported Per Year



Waterspouts Reported Per Year



There were reports of 19 waterspouts in the Charleston forecast area in 2014. This is the greatest amount ever observed and relayed to us since we starting keeping records in 2003. It is also 8 more than the average of 11 waterspouts during this time.

The most active period was July 6-16 when 7 waterspouts were sighted. In addition, there was also a waterspout that moved onshore at Kiawah Island as an EF-0 tornado on May 31st.

Waterspouts are most common during the warmer months of the year when there is a good supply of moisture, instability, light wind and lines of moderate cumulus and towering cumulus clouds.

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