

THE WEDGE FRONT

NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC



Volume 2, Issue 2

Winter 2019-2020

On Hugo's 30th Anniversary - Rethinking "The Big One"

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Just after midnight on September 22, 1989, category four Hurricane Hugo made landfall on Sullivan's Island, South Carolina, changing the face of the coastal plain forever. Hugo, steered by strong winds in the upper levels of the atmosphere, raced inland towards the northwest. By the time it reached Charlotte, North Carolina six hours later, Hugo was still a hurricane and would topple over 40,000 trees around the city. It took days for many residents in the Midlands of South Carolina and western North Carolina to cut themselves out of the piles of trees that fell in Hugo's wake, and weeks to months to clean up the debris and damage. Because of its unusual strength inland and resulting significant widespread damage, Hugo is one of the worst hurricanes to impact the Carolinas in modern history.

No one can deny the impacts Hugo's fury had on both the infrastructure and the psyche of the Carolinas, and they are rightly cemented in our history. For the western Carolinas, this type of fast-moving storm that could reach up to 200 miles inland as a hurricane was "The Big One" - the worst case scenario. But what if Hugo wasn't the only "Big One" we needed to worry about?



Figure 1: The track of Hurricane Hugo, 1989.

Recent history suggests that we may actually have to worry much more about a very different type of tropical system. Hugo was extremely damaging because it moved quickly inland and retained its strength as far as wind speed, but what about a tropical system that moved extremely slowly and stalled out after landfall? Its winds would be relatively weak over land, usually tropical storm strength at best, but its slow motion would allow feet

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feet of heavy rainfall to accumulate in areas impacted by the storm over just a few days time. The resulting flooding in the western Carolinas would be catastrophic, and landslides and debris flows would be widespread across the southern Appalachians.

Now what exactly would things look like if a tropical system or remnant dump feet of rainfall over the western Carolinas in just a few days time? The exact impacts are hard to pin down, but there would likely be hundreds (if not more) roads and bridges washed out. Interstate 40 in North Carolina, would likely experience numerous landslides, with parts closed for months to repair damage to the road. Thousands of homes and businesses may have feet of water in them for days, causing significant damage and numerous total losses of structures. Damage from flooding like this has the potential to be more widespread, more costly, and much harder to clean up than the damaging wind event Hugo presented. Florence (2018) and Harvey (2017) are recent storms we could use as models of what might happen if a tropical system came through the western Carolinas and caused significant flooding - both were strong hurricanes upon landfall, but the real catastrophe both storms are remembered for is the extreme flooding they caused.

So why should we be more concerned about a tropical system that might cause significant flooding versus one that could cause significant inland wind damage? The key here is that a major hurricane making landfall on the Carolina coast and then moving inland so rapidly that it retains hurricane strength winds hundreds of miles inland is rare. A tropical storm or tropical depression drifting into the southeast and stalling somewhere for days? This happens more commonly, as weak storms are much more common in any given year than strong ones. Of the 41 tropical systems that have moved through the western Carolinas in the last 150 years, only three have been hurricanes - the rest have been tropical storms, depressions, or post-tropical remnants (see figure 2).

Another way to think about this - there are many more tropical systems in any given year that could cause significant flooding (most of them) than storms that make landfall with hurricane-force winds or greater. As far as flooding goes, a storm wouldn't have to be strong or all that remarkable in order to cause catastrophic impacts. There's actually a good chance "The Big One" of the future might not even make landfall as a hurricane at all. The steps you need to take to stay safe, though, aren't revolutionary at all: get prepared, pay attention to the forecast, and remember, it only takes one!

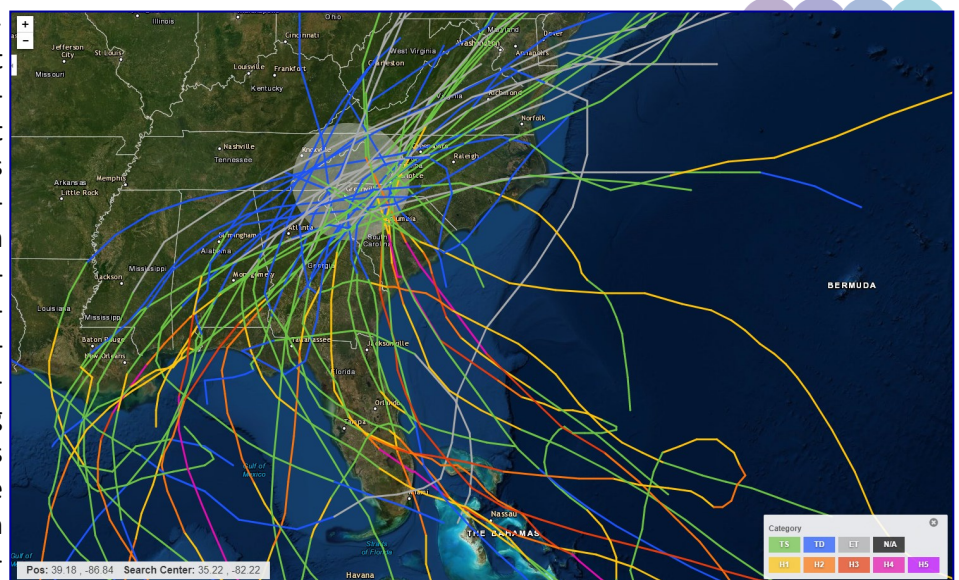


Figure 2 : Hurricane Tracks for the Western Carolinas

Remember Katrina, Iniki, and Hugo?

Check out this interactive hurricane archive that shows the path and intensity of previous hurricanes and tropical storms, and get motivated to prepare for the next storm.



Visit coast.noaa.gov/hurricanes/



freezing drizzle

The fine layer of ice that forms during freezing drizzle may be hard to notice on the road, but it is one of winter's most dangerous types of weather.

safety tips

- Slow down
- Don't use cruise control
- Leave plenty of distance between you and other vehicles

"Sneaky" Winter Hazards

The winter season brings many weather events that can "sneak" up on you. These are weather hazards that cause big impacts and make travel difficult without making big news.

weather.gov



flash freeze

Wet roads can freeze quickly at night or when there is a rapid drop in temperature behind a cold front.

ROAD ICY
PLEASE USE
SLOWER SPEED

safety tips

- Slow down
- Don't use cruise control
- Leave plenty of distance between you and other vehicles

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weather.gov



Our New Warning Coordination Meteorologist

Trisha Palmer is our new Warning Coordination Meteorologist (WCM), taking over from Tony Sturey who held that position for the last 10 years. The WCM is the primary liaison between the local NWS office and the partners and public, which includes leading the Impact-Based Decision Support Services (IDSS) Program, directed mostly toward Emergency Management, as well as any awareness and outreach campaigns designed to educate the public to ensure the mitigation of wealth, injury and property damage or loss caused by hazardous weather events across the area. The WCM also leads the effort to oversee high standards for the products we issue, and leads any necessary service improvement projects. As a member of local office management team, the WCM assists the Meteorologist-in-Charge and the Science with local leadership and management, and of course fills in on operational shifts as necessary.



Trisha has been a Lead Meteorologist here at NWS GSP since 2015 and has been our IDSS Program and Outreach Team Leader during that time, so is already very familiar with the area and our partners. Trisha is originally from Arkansas, earned her B.S. in Meteorology in 2002 from the University of Oklahoma (Boomer!), and her M.S. in Atmospheric Sciences in 2004 from North Carolina State University. She began her career in the NWS in 1999 as a student employee at NWS Little Rock AR. She transferred as a student to NWS Raleigh NC in 2002, and was promoted to a Meteorologist Intern position there in 2003. She then went to NWS Atlanta GA as a Meteorologist in 2005 before coming to GSP.

Trisha's husband, Joshua, is the Senior Service Hydrologist here at NWS GSP. When not at work, they mostly keep busy with their children. They enjoy spending time as a family traveling, hiking, seeing the local sights and taking in the scenery that this beautiful area and fantastic country have to offer.



Winter Hazards: Are You Prepared?

Building a Weather-Ready Nation
Know your Risk, Take Action, Be a Force of Nature!

While dangerous road conditions are one of the most deadly hazards during winter, it's not the only threat you may encounter. Other winter hazards include brutal cold, heavy snow and ice, dangerous flooding, extreme wind, and treacherous fog.

To learn more about winter safety, visit
https://www.weather.gov/wrn/winter_safety



Be Prepared for Winter Weather

Exposure to extreme cold, fires and poisoning due to the improper use of heaters, and vehicle accidents are just a few reasons as to why dozens of fatalities are reported each year due to winter weather, an overlooked significant threat. Now you may be thinking that the winter season across the Coastal Carolinas is nothing compared to, for example, the New England region. Well, we have our share of winter weather across the Carolinas, thus you should always be prepared.

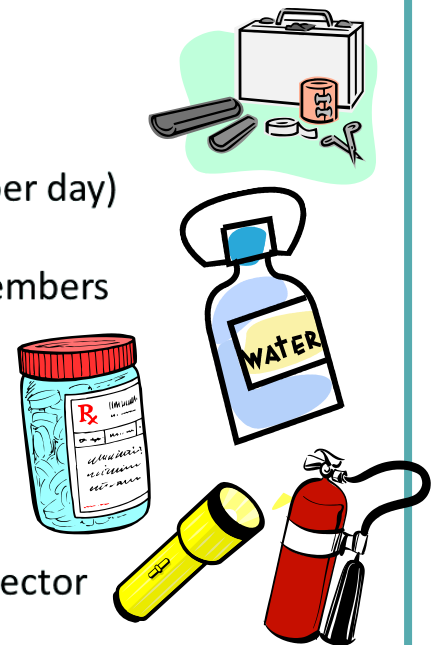
In preparation for a winter weather event, keep in mind that the primary concern will be the loss of heat, power outages, and shortage of supplies if storm or proceeding conditions persist for more than one day.

Before winter weather strikes, be sure to take necessary precautions such as maintaining, cleaning, and annually inspecting chimneys and other heating equipment, and making sure your vehicle is prepared by having a full gas tank and inspecting the antifreeze levels, brakes, battery, and more!

For additional information, visit www.ready.gov

Safety Kit Checklist: Home & Work

- Flashlight and extra batteries
- Battery-powered NOAA Weather Radio
- Extra food and water (1 gallon of water per person, per day)
- Prescription medicines
- Special items for infant, elderly or disabled family members
- Cash
- Emergency phone numbers
- Important documents
- Blankets and extra clothing
- First aid supplies
- Fire extinguisher/smoke alarm/carbon monoxide detector
- Emergency heat source (fireplace, space heater, etc)



Safety Tips: Outdoor Animals & Pets

- * Move animals to sheltered locations
- * Have extra feed on hand or near feeding areas
- * Have water available (animals may die from dehydration)

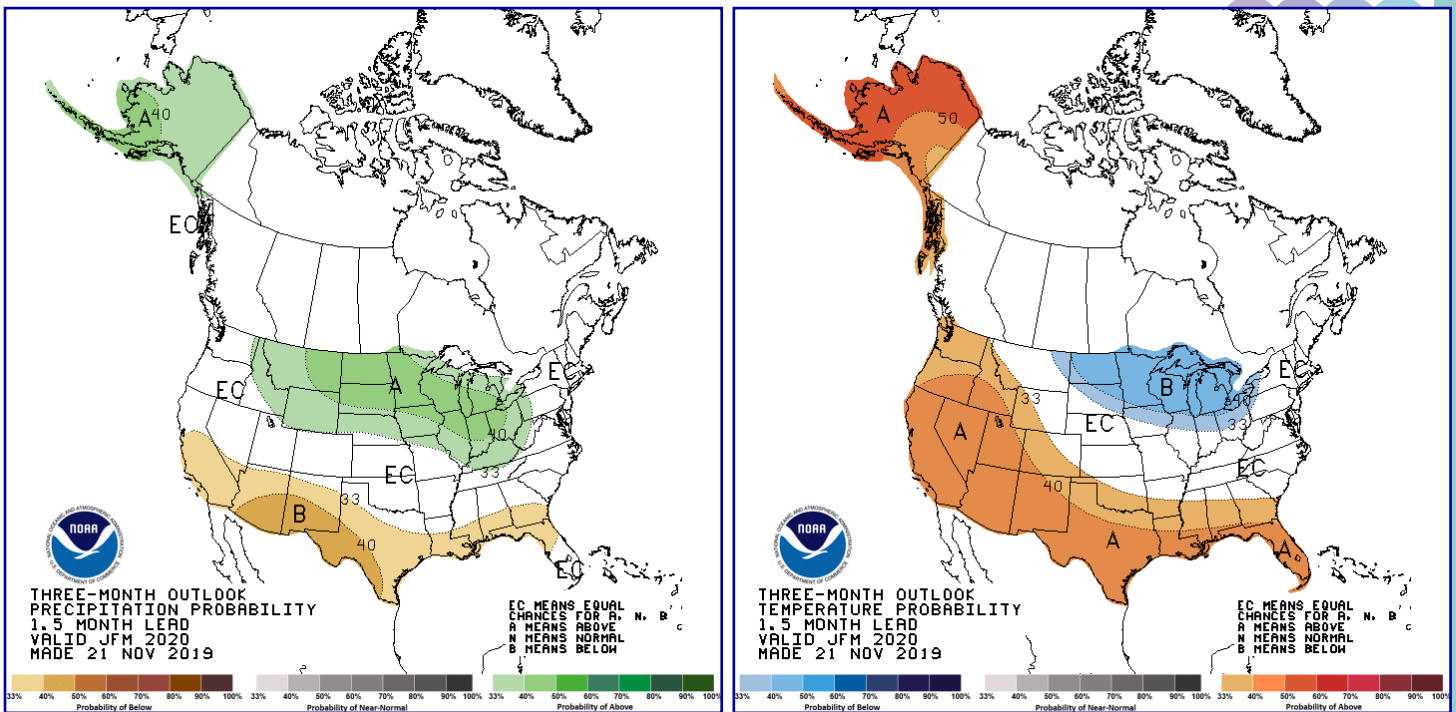


Winter 2019-2020 Outlook for the Western Carolinas and Northeast Georgia

We have now entered meteorological winter which started on December 1st. So you may be thinking, what might we expect for the rest of the winter? The outlook issued by the Climate Prediction Center (CPC) on November 21st indicates near normal temperatures and precipitation for the region which may also suggest near normal snowfall. Their prediction banks on troughing (ridging) and more (less) persistent active weather across the eastern (western) continental United States. This setup would be somewhat similar to the weather pattern we've experience in the latter half of fall.

Okay, for those weather savvy people out there or for those who just want to learn a bit more about what goes into seasonal prediction, let's look into a few of the factors that went into this forecast. Climate prediction utilizes three tools; (1) statistical tools using climate oscillations (i.e. El Niño)/ ocean temperatures, (2) climate models, and (3) analogue conditions (fancy way of saying past weather). We'll briefly look into 1 within this article.

One of the main drivers for seasonal changes across our region is the El Niño Southern Oscillation often referred to El Niño (warm phase) and La Niña (cold phase). Simply put, it's tied to ocean temperatures across the central to eastern equatorial Pacific Ocean. As of now it appears this oscillation will not be a big factor for this winter as the CPC places about a 70 percent chance of neutral (not El Niño or La Niña) conditions continuing through this winter. According to CPC, the negative phase of the North Atlantic Oscillation (NAO) may persist for much of the winter. This on its own can support more frequent storminess across the East Coast including our area. However, above normal ocean temperatures present in the northeast Pacific Ocean often supports ridging near the West Coast, which would also tend to support troughiness and more active weather near the East Coast.



The lack of El Niño or La Niña signal likely reduces confidence in the prediction somewhat with the lack of El Niño lowering the odds of strong nor'easters in our region. However, should a negative NAO and warm ocean temperatures in the northeast Pacific persist, periods of active weather are likely across the region. Climate models (2) and analogue conditions (3) also support these trends as described by CPC. In summary, we expect near normal conditions with periods of storminess across the region through the winter of 19'/20'.

Did You Know?

Carbon monoxide can accumulate from:

- Furnaces
- Water heaters
- Boilers
- Wood stoves
- Fireplaces
- Charcoal grills
- Gas cooking stoves
- Clothes dryers
- Gas or kerosene space heaters
- Automobile exhaust

Carbon Monoxide: The Invisible Killer

Carbon monoxide (CO) is a deadly odorless, colorless, and poisonous gas that is the cause of fatalities each year, especially during the winter weather season. It is a result of the incomplete burning of various fuels (ie coal, wood, kerosene, propane) from equipment such as generators and cars.

Ways to Prevent CO Poisoning

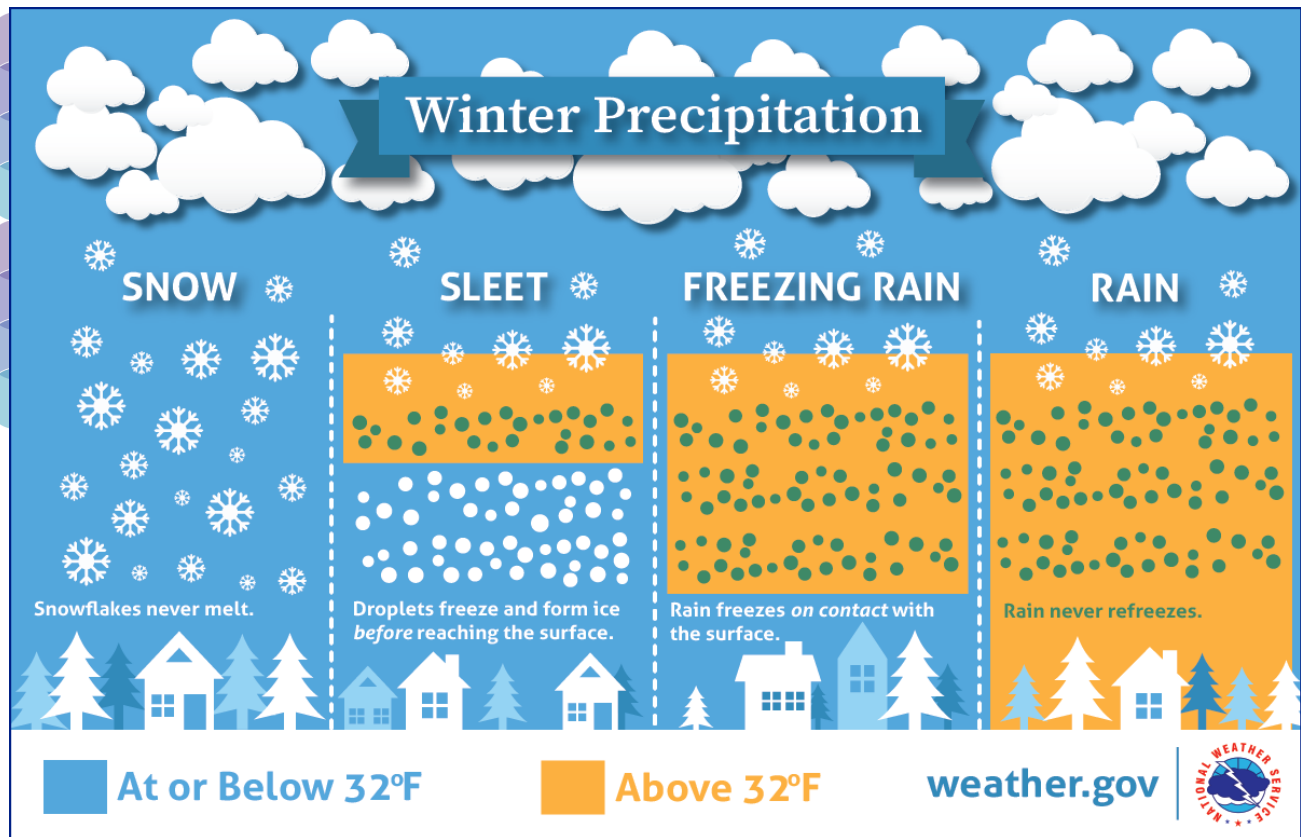
- Never operate equipment in enclosed spaces (garage or locations in a home)
- Never leave car running in an attached garage (even with garage door open)
- Never burn charcoal inside home, vehicle, garage
- Never use gas appliances to heat your home (ovens, clothes dryers, etc.)
- Never operate equipment where people are sleeping
- Install carbon monoxide alarms in central locations on every level of your home
- If carbon monoxide alarm sounds, move quickly to fresh air



SYMPTOMS OF CO POISONING

- Dizziness
- Nausea
- Fatigue
- Headache
- Shortness of breath
- Vomiting*
- Mental confusion*
- Loss of consciousness*

*High level of CO Poisoning



Will there be rain, ice or snow? This graphic explains how having different layers of warm and cold air between the clouds and the ground determines the type of precipitation that hits the ground. To learn more, visit <http://www.nssl.noaa.gov/education/svrwx101/winter/types/>

Expanding StormReady® Across the Western Carolinas and Northeast Georgia



It has been a busy year for StormReady®! But first, what exactly *is* StormReady®? This is a program designed to recognize entities (counties, cities, universities, and corporations) that have reached a high level of severe weather preparedness. To be recognized as StormReady®, communities must meet criteria that have been established jointly between the NWS and state/local emergency management officials. These criteria include:

- Having a local 24-hour warning point and an Emergency Operations Center
- Having multiple ways of receiving NWS warnings
- Being able to monitor local weather/river conditions
- Having multiple ways of alerting the public
- Promoting public readiness through community seminars and presentations
- Having a formal hazardous weather plan
- Having trained spotters
- Conducting periodic drills/exercises
- Interacting with their supporting NWS office

At the beginning of 2019, there were 30 StormReady® communities across our forecast area, including 28 (out of our 46) counties, one city (Concord NC) and one University (UNC Charlotte). North Carolina is actively trying to become a StormReady® state; that is, to have all 100 NC counties recognized. In furthering this goal, since January, we have recognized an additional nine StormReady® entities, including five counties, two universities, and two corporations:

- Gaston County, NC
- Jackson County, NC
- Macon County, NC
- Rowan County, NC
- Swain County, NC
- Furman University (Greenville, SC)
- Queens University of Charlotte
- Biltmore Estate
- Charlotte Douglas International Airport

We also have six StormReady® Supporters. These are entities that are highly active and engaged in severe weather preparedness but do not meet the StormReady® requirements; usually K-12 schools, businesses, and event venues.

Are you interested in learning more about the StormReady® program? www.weather.gov/stormready has all the information you need. Additionally, we have about 60 WeatherReady Nation Ambassadors across our area, and we're always excited to bring more into the community! Please see www.weather.gov/wrn/ambassadors for more information on that program.

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Queens University of Charlotte - Mecklenburg County (NC)



The Biltmore Company - Buncombe County (NC)



Furman University - Greenville County (SC)



Jackson County (NC)



Gaston County (NC)



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Warning Signs of Hypothermia



Confusion



Shivering



Difficulty Speaking



Sleepiness



Stiff Muscles

weather.gov/cold



NO WIND

98.6°F

Average temperature of the human body

Under calm conditions, the body radiates heat, creating a layer of warmth between our skin and the cold surroundings.



The Science of Wind Chill

WINDY

95°F

Hypothermia begins when our body temperature drops two to four degrees

But when it's windy, the moving air breaks up this insulating layer. It speeds up heat loss by whisking away the warmth from our skin.

Heat is moved away from our bodies.



weather.gov/winter