NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Columbia, SC
Weather Forecast Office

FAMOUSLY HOT FORECASTS

Fall/Winter 2021

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South Carolina Now a StormReady State

by John Quagliariello - Warning Coordination Meteorologist

The National Weather Service (NWS) recently honored South Carolina's emergency management team for completing a set of rigorous criteria necessary to earn the entire state the distinction of being recognized as StormReady. All 46 counties in the state earned the StormReady recognition, making South Carolina one of only 6 states in the country to have all counties StormReady.

National Weather Service officials from all 4 Weather Forecast Offices serving the state were joined by South Carolina Emergency Management Division (SCEMD) Director Kim Stenson, South Carolina Emergency Management Association President Kristy Burch, and county emergency management directors from across the state for a press conference on September 28 to celebrate this achievement.

The NWS works within the entire public-private weather enterprise to build a "Weather-Ready Nation". We interact with our partners in Emergency Management to ensure every community is ready, responsive, and resilient to weather, water and climate threats. StormReady recognition ensures communities are prepared to take action to safeguard lives and livelihoods ahead of the onset of dangerous weather conditions.

NWS Columbia WCM, John Quagliariello, is joined by other NWS and South Carolina EM partners at a press conference to celebrate the state's StormReady status.

South Carolina StormReady – Continued

StormReady provides communities with a standard level of preparedness for hazardous weather. In order for a community to be recognized as StormReady, it must:

- Establish a 24-hour warning point and Emergency Operations Center
- Have multiple ways to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community outreach
- Develop a formal hazardous weather plan, which includes training severe weather spotters and participating in emergency exercises and drills

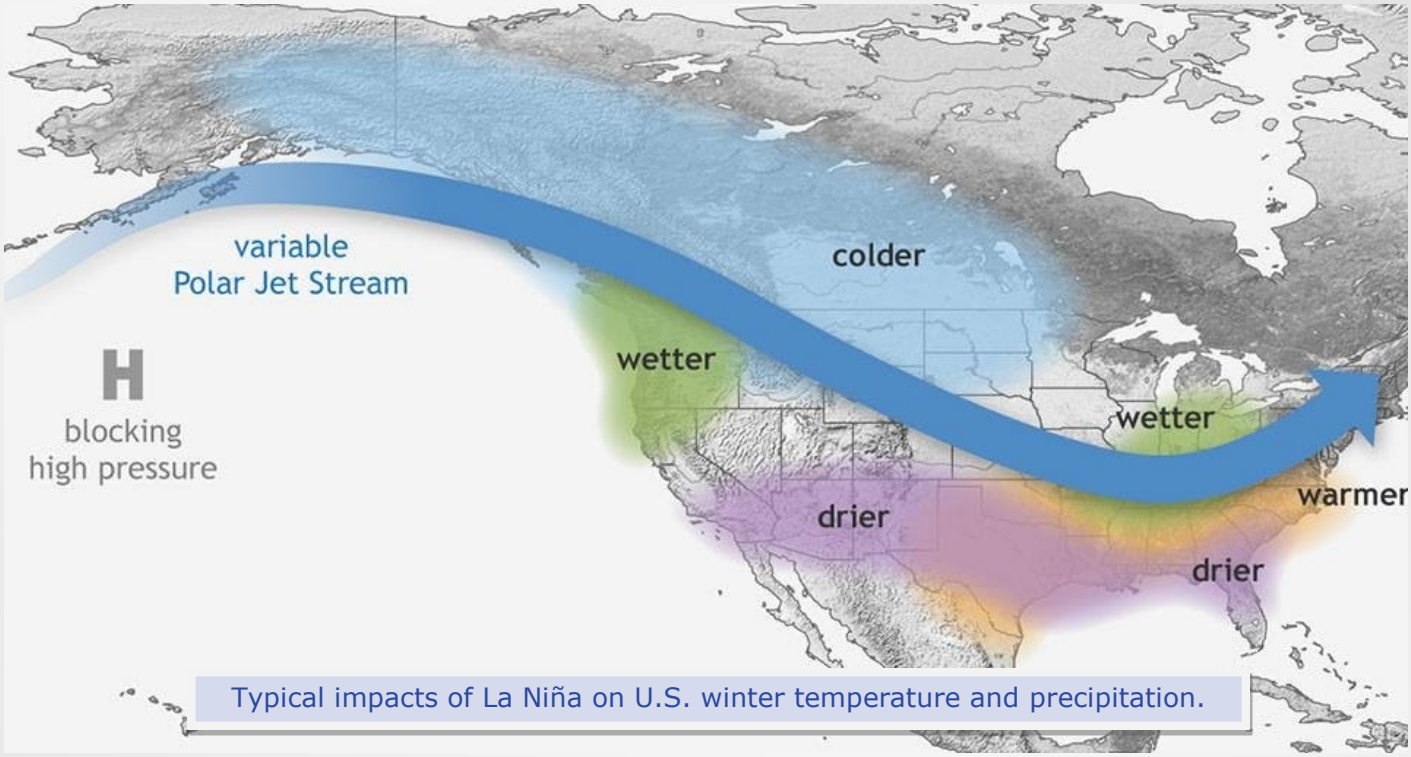
Although impacts from extreme weather events, including hurricanes, floods, tornadoes, and winter storms are often unavoidable, residents and visitors to South Carolina can be assured that the state is as prepared as it can be to plan for and respond to these events. This is a testament to the strong partnership between our local NWS Weather Forecast Offices in Charleston, Columbia, Greenville-Spartanburg, and Wilmington, NC, and emergency management at the state, county, and local level.

To learn more about the StormReady program and to view the communities in central South Carolina and east-central Georgia that have been recognized as StormReady, go to: https://www.weather.gov/StormReady

La Niña Winters in the Southeast

by Frank Alsheimer - Science and Operations Officer

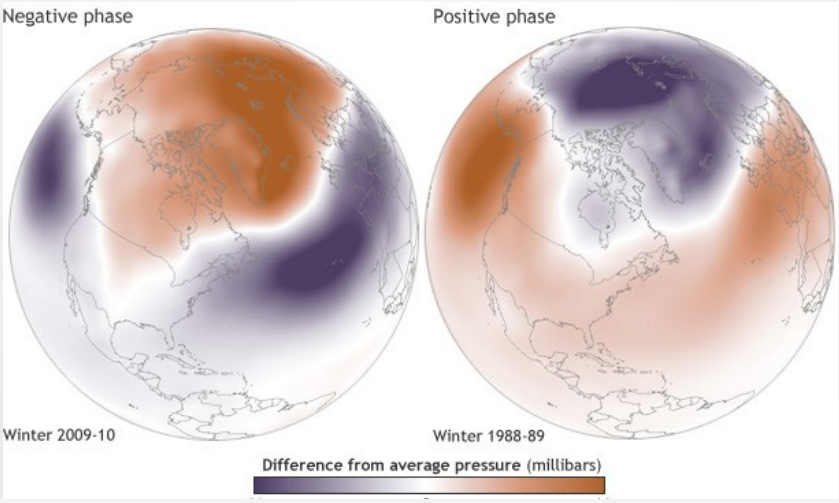
As of October 14, La Niña conditions have developed and are expected to continue through the winter of 2021-2022 according to the Climate Prediction Center. In general, La Niña winters are milder and drier than normal across the southeast. The polar jet stream, while variable, tends to support frontal systems and low pressure areas stretching from western North America across the northern and central United States. This pattern limits the southward intrusion of arctic air into the southeast.



Typical impacts of La Niña on U.S. winter temperature and precipitation.

It is important to note, however, that while the winter may average warmer and drier than normal, there will still be periods of cold and stormy weather because La Niña is not the only phenomena that impacts our weather.

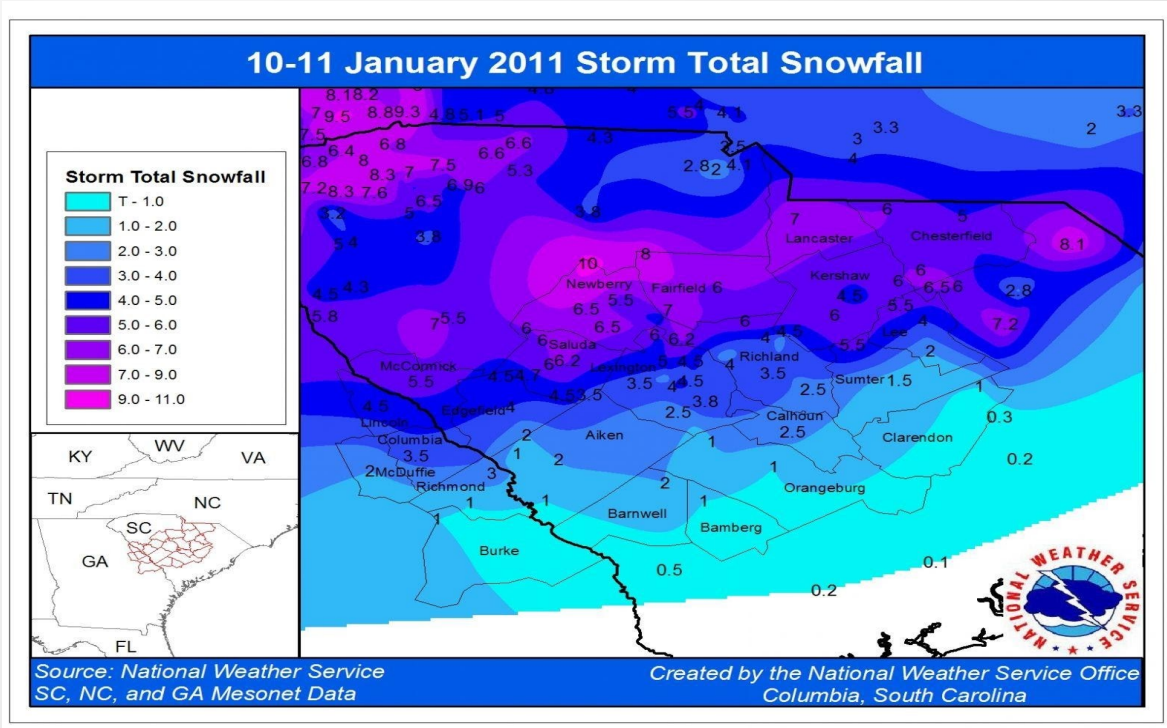
One example is the Arctic Oscillation (AO). The AO varies on shorter time scales than El Niño/La Niña, and can dominate the pattern for a few weeks. The positive phase of the Arctic Oscillation tends to amplify La Niña conditions, while the negative phase can counteract La Niña and bring occasional cold blasts and winter weather into the southeastern United States.

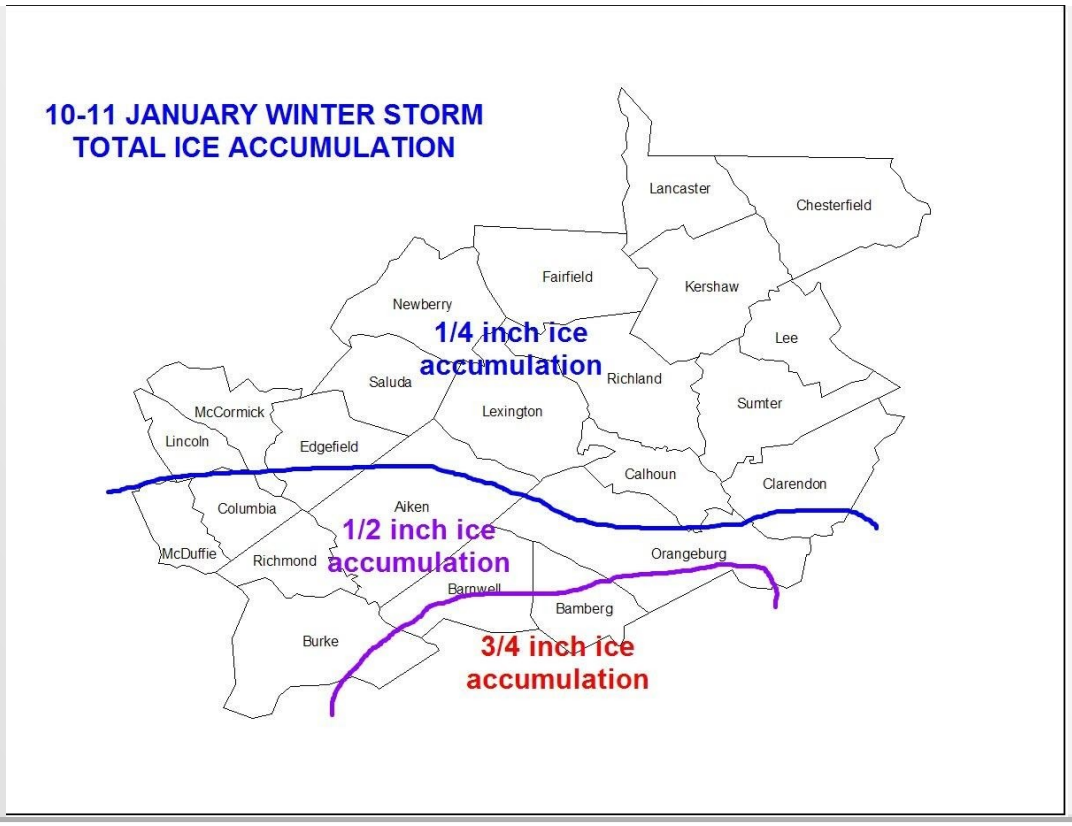


Arctic Oscillation in Negative (left) and Positive Phase (right).

La Niña Winters - Continued

An example of a La Niña year that still produced winter weather in the Midlands and CSRA is the 2010-2011 season. An arctic air mass moved into South Carolina and Georgia early in 2011, setting up a significant snow and ice storm on January 10-11. So, while we are generally expecting a warmer and drier than normal winter, there is still a chance for a period of cold and snow/ice sometime during December through February.





Fall Foliage in South Carolina & Georgia

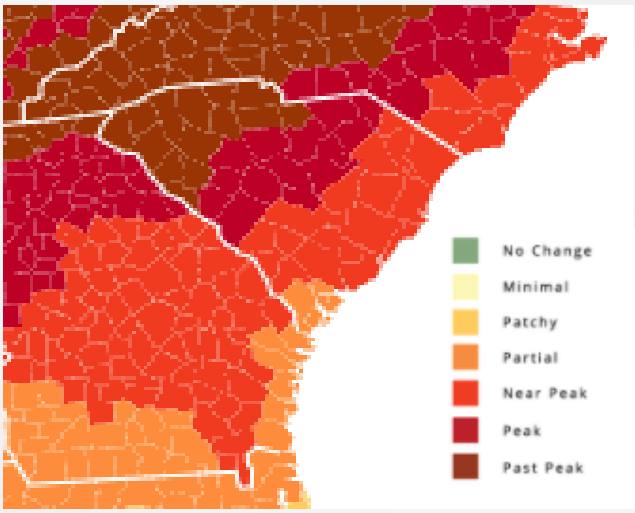
by Pierce Larkin - Meteorologist

Autumn is one of the best seasons of the year. Football season gets going, cooler weather and lower humidity ushers in, and the leaves begin to change color as we get into October and November! This yearly pattern is especially wonderful being so close to the Appalachian Mountains, where the colors are vibrant around this time of year.

Leaves turning vibrant colors in northern Georgia

So what is the primary cause of the changing colors? It is fairly simple! The changes occur because of decreasing sunlight in autumn. Daily sunlight changes falls upwards of 1 hour between October 1st and November 1st alone. This has a big impact of the leaves in trees. The green color comes from chlorophyll, which allows sunlight to be absorbed by the trees. As sunlight decreases, the leaves get less and less to absorb, and they allow other colors to shine through as they die off for the season. This is what allows the trees to become beautiful reds, oranges, and yellows during the autumn season before the leaves ultimately fall off the tree for the winter months.

There are several places in South Carolina to view these, including several state parks! Head up to SC Upstate fixtures like Jones Gap State Park or Table Rock State Park and you'll find plenty of fall colors in the trees. For those in Georgia, check out Amicalola Falls State Park north of Atlanta or Black Rock Mountain State Park up in the Blue Ridge Mountains. Beyond these popular state parks, there's plenty of other hidden gems to check out in the Midlands and the Central Savannah River Area to see those changing leaves. The expectation is that Fall Foliage will peak between the weeks of October 18th and November 8th across region, with the higher elevations on the earlier end of that spectrum.

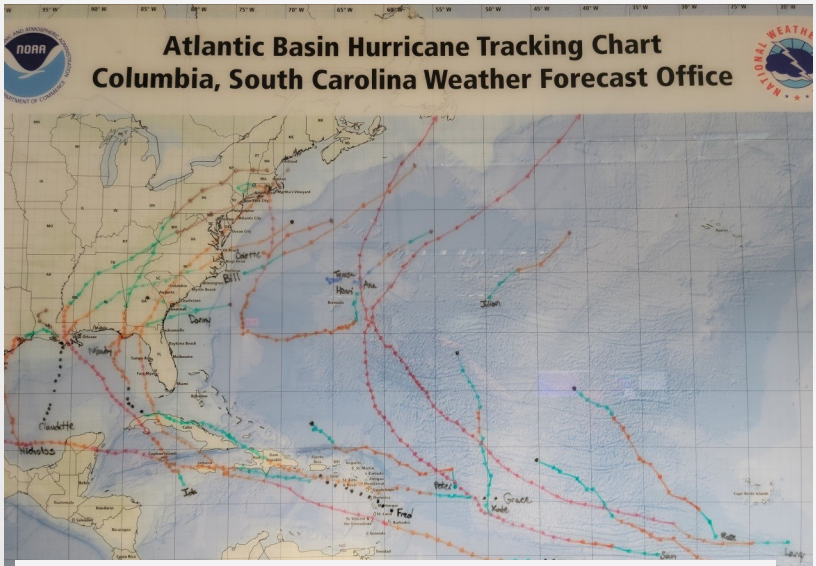


Map showing what stage is expected to be during the week of October 25, 2021

2021 Atlantic Hurricane Season (So Far)

by Steve LaVoie - Meteorologist

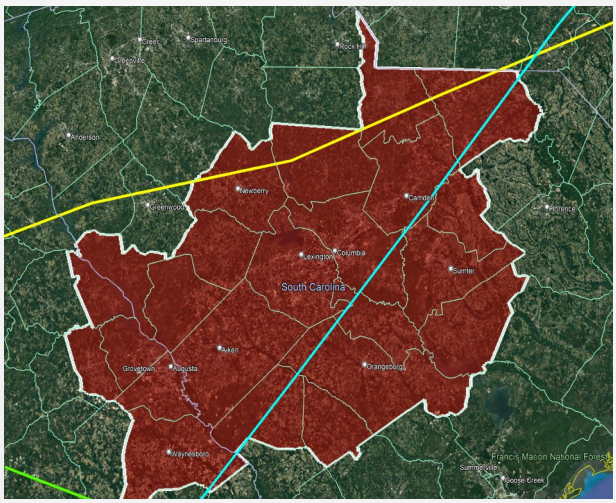
The 2021 Atlantic Hurricane Season has continued the streak of years with mostly above average activity that began in 1995. While not as active as record-breaking 2020, through October, we have seen 20 tropical storms, 7 hurricanes, and 4 major hurricanes which have winds exceeding 110mph. Notable tropical storms in our forecast area this year include Elsa in July and Fred in August. Current estimates place 2021 as the 4th costliest hurricane season on record with projected losses exceeding 69 billion US dollars, mostly from Hurricane Ida and its impacts to Louisiana and parts of the northeastern United States. Ida became a Category 4 hurricane in August and caused an estimated 64.5 billion USD and 115 fatalities.



2021 Hurricane Tracking Chart at NWS Columbia

The first tropical system to impact our region was Tropical Storm Claudette in late June. Claudette developed over Louisiana on June 19th and quickly weakened to a tropical depression before passing through our CWA on June 20th and 21st. Claudette brought much needed rainfall to the Midlands and CSRA but did not produce significant damage in our area. Elsewhere, the tropical storm produced an estimated 350 million dollars in damage and is blamed for 14 deaths. Tropical Storm Danny developed on June 28th quickly developing as it approached the South Carolina coast attaining peak winds of 45mph. Danny came ashore just north of Hilton Head Island that evening and quickly dissipated after landfall. Danny was the first tropical cyclone to make landfall in South Carolina in June since an unnamed hurricane in 1867. During its short life, Danny produced little damage and no casualties with most of the impacts occurring near the coast.

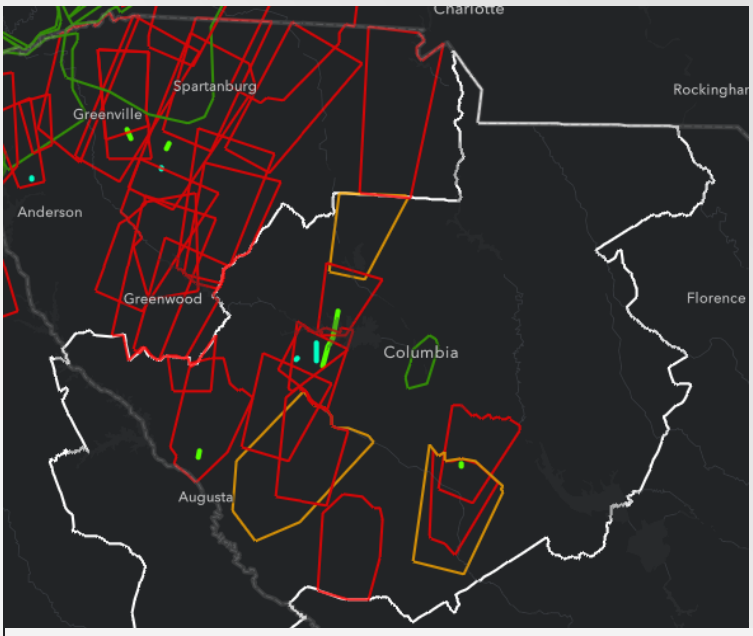
One named storm developed in the month of July. Elsa developed east of the Lesser Antillies on the 1st and became the first hurricane of the season reaching a maximum intensity of 85mph while in the Caribbean and later making landfall in Florida as a tropical storm on July 7th. Elsa was the third tropical cyclone of the season to move through our area passing through as a tropical storm on July 7th and 8th. Elsa produced an estimated 1.2 billion US dollars in damage and is responsible for five fatalities. In our area, Elsa produced an EF0 tornado in Clarendon County along with more beneficial rainfall. The passage of Claudette, Danny, and Elsa in quick succession had a role in reversing the dry conditions we saw during the Spring.



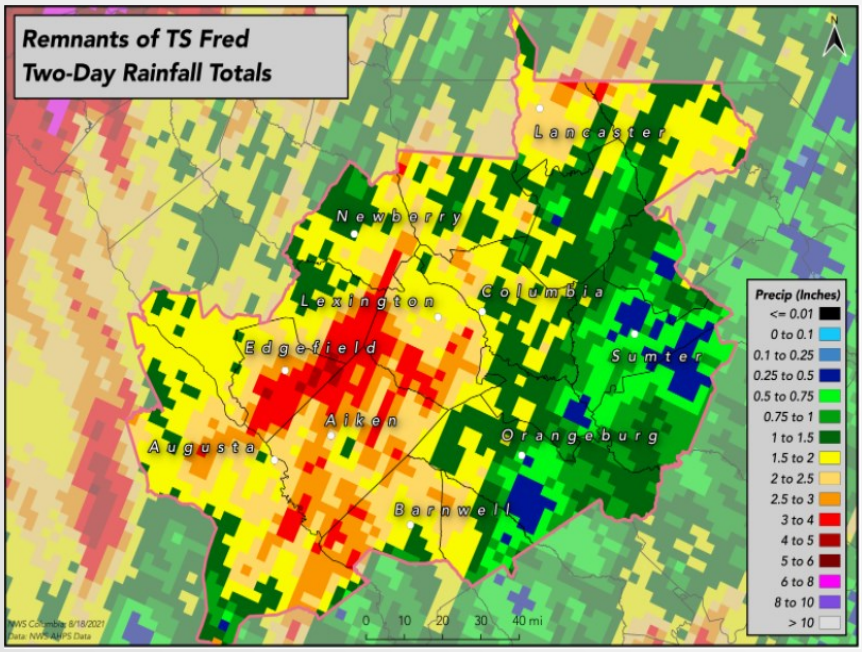
Tracks of Claudette (yellow) and Elsa (Cyan) in our forecast area.

2021 Tropical Season - Continued

Once Elsa dissipated, there was a lengthy period of inactivity that continued through the remainder of July and into the first 10 days of August. The tropics returned to life with the formation of Tropical Storm Fred on the 11th. Fred formed south of Puerto Rico eventually making landfall in Florida on August 16th at peak intensity with winds of 65mph. Even though the center of Fred passed to our west, it produced severe weather on the 17th including five confirmed tornadoes. Fred caused an estimated 1.3 billion USD dollars in damage and seven fatalities, mostly in western North Carolina which saw significant flooding. More information on Fred's impacts to our region can be found at our [Remnants of Tropical Storm Fred StoryMap].



Warnings associated with the remnants of Fred as well as the paths of five tornadoes in our area.

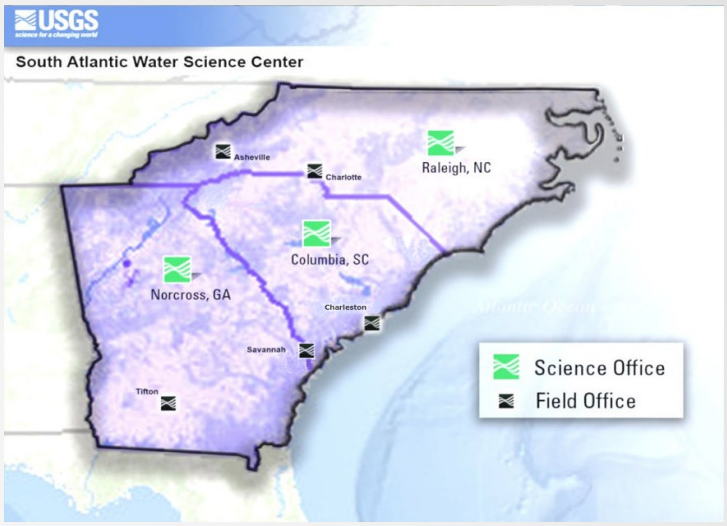


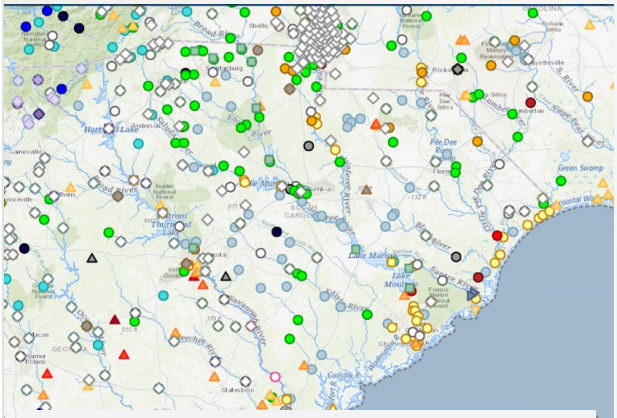
After four tropical systems in a row moved through the area, the Midlands and CSRA saw a reprieve for the rest of August though the tropics remained active. The fifth and final tropical storm to impact our region formed in early September. Mindy was a short-lived tropical storm that made landfall in Florida on the 9th bringing areas of heavy rainfall to parts of our forecast area as it passed to our south. While seven more tropical storms would form in September after Mindy, they mostly tracked over the open Atlantic having only minor impacts to land areas. The most notable of these was Hurricane Sam, the strongest hurricane of the season with peak winds of 155mph. Despite passing well to the east of the United States, both Sam and Larry produced significant waves and rip currents along the east coast for several days in September. The official end of the 2021 Atlantic hurricane season will be on November 30th though named storms have occurred in December. Should another tropical storm form this year, its name will be Wanda.

A Morning in the Field with USGS - One of the NWS Most Important Partners

by Leonard Vaughan - Senior Service Hydrologist/Meteorologist

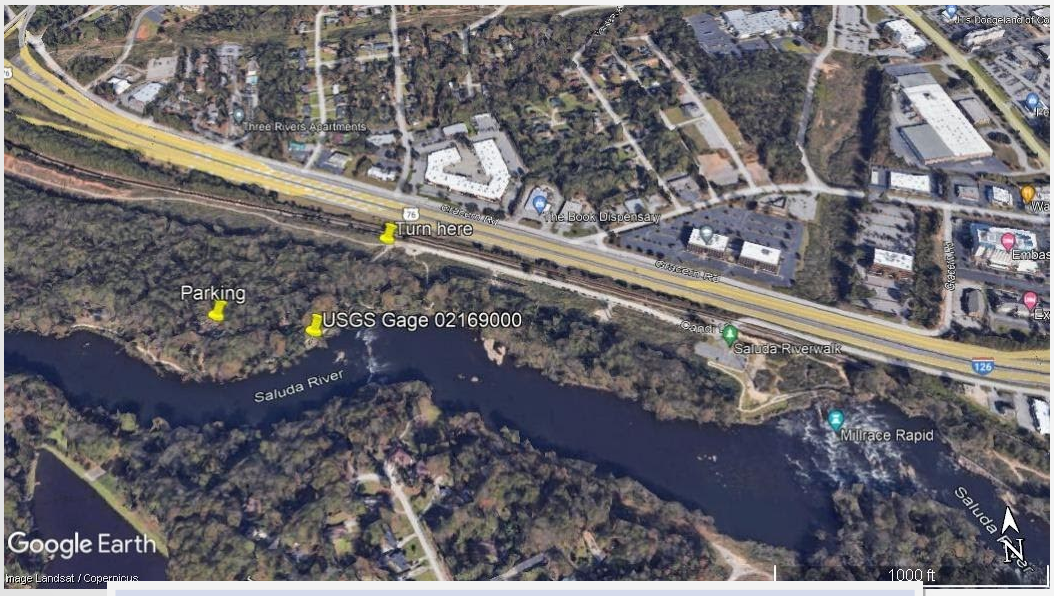
One of the most important responsibilities of the National Weather Service (NWS) is to issue Flash Flood Warnings and River Flood Warnings. Without the extensive river and rain gage network that is installed and maintained by the U.S. Geological Survey (USGS), this would be nearly impossible. The USGS field office in Columbia is a part of the South Atlantic Water Science Center (SAWSC) and maintains numerous monitoring sites across the southeastern US.





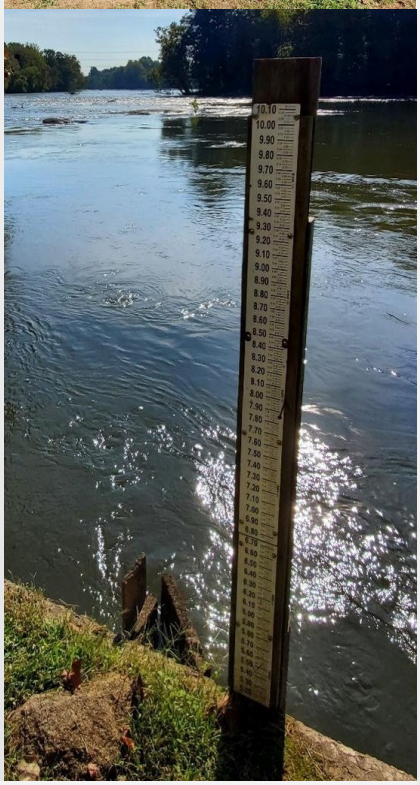
Locations of stream gages in SC and GA

Our staff met with Chris Smith (Acting Field Office Chief), Whitney Smith (Assistant Director for Data) and Kendra Smith (Hydrologic Technician) from the USGS office in Columbia along the Saluda River near Riverbanks Zoo. We met on the morning of October 13th at a stream gage just upstream of the zoo, "The Saluda River near Columbia". The gage has been in operation since August 1925, which provides us with nearly 100 years worth of data. Today it provides stream or gage height, stream discharge or flow, dissolved oxygen, specific conductance and the temperature of the water.



Location of stream gage along the Saluda River. Gage is visible from the Saluda Riverwalk.

USGS Meetup - Continued



Stilling well (top) and Staff Gage (bottom) to measure discharge and stream height

Chris Smith and Kendra Smith gave a presentation about how the USGS makes water measurements and let us visit the instrumentation at the gage. The location has a "Staff Gage" and a "Stilling Well". The USGS uses tools to measure flow and map the profile of the stream bed. Two of the tools they use often are a current meter and newer technology such as the Acoustic Doppler Profiler (ADCP). By knowing the velocity of the water along with the depth and width of the stream, the USGS can create a value of discharge for a location along a stream. The relationship of discharge (cubic feet per second) can then be correlated to a stage height (height of the water level in feet). It was a cool sunny October morning to get out of the office along the beautiful Saluda River and interact with one of our most important partners. We appreciate the staff of the USGS sharing a little of their job with the Columbia National Weather Service Office.

To learn more about the USGS South Atlantic Water Science Center (SAWSC), check out their website:

https://www.usgs.gov/centers/sa-water

Left to Right: Chris Smith (USGS), Pierce Larkin (NWS), Chris Rohrbach (NWS), Steve LaVoie (NWS), Leonard Vaughan (NWS), Nicole Steeves (NWS), Dan Miller (NWS) and Kendra Smith (USGS). Photo taken by Whitney Smith (USGS)

USGS
science for a changing world

NATIONAL WEATHER SERVICE

Office Updates

by Chris Rohrbach - Meteorologist

Staffing Changes

There have been several new additions to the Columbia, SC staff in the last year. In December of 2020 we welcomed Matt Gropp to the ranks of Meteorologist. Matt came to us as a doctoral student at the University of North Carolina at Charlotte. Matt's Master's Thesis helped update the Storm Prediction Center's Supercell Composite Parameter in terms of nocturnal convective threats.

Steve LaVoie was next to arrive at NWS Columbia as a Meteorologist in May of 2021. Steve previously worked as a manager at Versar. This company provides meteorological decision support services to various contractors including military operations in the Middle East.

Our latest newcomer, Emily Carpenter, joined us in September 2021 as a Lead Meteorologist. Emily graduated with a B.S. in Atmospheric Science from Rutgers University and a M.S. in Atmospheric Science from the South Dakota School of Mines. She entered the NWS as a Meteorologist Intern at the Weather Forecast Office in Tucson, AZ in 2013.

Whitney Smith (left) and Tenia Morrison (right) observing a prescribed burn at Carolina Sandhills.

The Columbia, SC forecast office also had two departures in 2021. Tenia Morrison, Lead Meteorologist, retired this past summer after 28 years of service at the Columbia, SC Weather Forecast Office. During this time, Tenia served as the office's aviation program leader. She led the office in creating specialized weather forecasts for one of the NWS's largest partnerships. In January, Meteorologist Whitney Smith accepted a supervisory position at the Columbia, SC USGS office. Whitney joined WFO Columbia in 2011 as a Meteorologist. She became a Deployment Ready Meteorologist and performed decision support services at the SC Emergency Operations Center during Hurricanes Irma and Florence. She is a Regional Cline Award winner and was the leader of several office teams.

Office Ongoings

Constant summertime thunderstorms can be a source of stress as an operational meteorologist in the Southeast. After a busy convective season, NWS Columbia had a chance to unwind at a Columbia Fireflies baseball game in late August. We took advantage of the unseasonably cool, calm night to spend time with some of our co-workers and their families.

CAE staff and their families enjoying a night of baseball at Segra Park, home of the Columbia Fireflies.

COOP Corner

by Doug Anderson - Observation Program Leader

NEWS FLASH

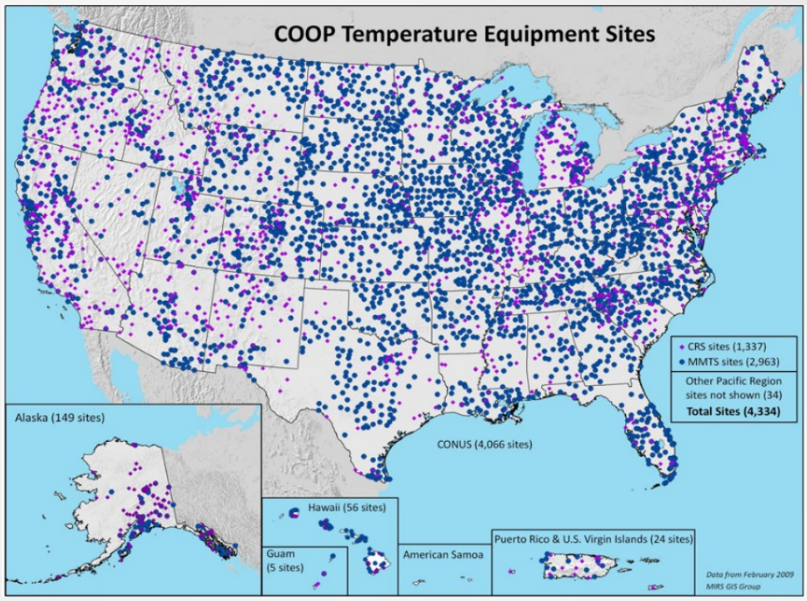
We are looking for volunteers in or near the following communities: (SC) **Bishopville, Camden, Euataville, Kershaw, Lancaster, Pageland, Patrick, McBee, Rimini/ Santee, Jackson, Springfield and St. Matthews**. In Georgia, **Hepzibah**.

Cooperative Weather Stations Serve Our Nation

The Cooperative Weather Observing Program's roots can be traced back to 1797 when Thomas Jefferson envisioned a nationwide network of weather observers. The program was created in 1890 under the Organic Act passed by Congress. Its mission is two-fold:

- To provide climatological records, usually consisting of daily high and low temperatures, snowfall and precipitation totals. This data is essential to defining U.S. Climate and measure long-term climate trends.

- To supply observational meteorological data in near real-time to support forecast, warning and other public service programs (drought, agricultural, fire weather, etc.) programs of the NWS.



Cooperative stations (COOP) are locations at which volunteers take daily weather observations using temperature and rainfall sensors that we supply. COOP volunteer stations help fill in the gaps between other types of observing stations such as airports, mesonets, etc. We are always looking for new observers to join the NWS Columbia team that are willing to take observations over many years to come. Contact Doug Anderson, douglas.anderson@noaa.gov for more information. On the web: https://www.weather.gov/coop/

NWS Columbia Moving Ahead With the Future of COOP Station Technology!

The National Weather Service continues to field new technology. One of the main limitations of the current stations is that the equipment must be manually read every day by the observer. That is beginning to change as new systems called CCOOP (Cellular-COOP) have been developed over the last few years. We've installed 3 of them at Sumter, SC, Winnsboro, SC and on the UofSC Campus in Columbia.

COOP Corner - Continued

These CCOOP systems allow automatic measurements of temperature and rainfall using a sensor and weighing-type rain gauge. The measurements are transmitted every 15 minutes to our database servers using a cellular network connection. This allows anyone to see the rainfall and temperature data virtually in near real-time. NWS Columbia is excited to be part of the future of the NWS COOP Network.

SSH Leonard Vaughan and OPL Doug Anderson pose in front of CCOOP equipment on UofSC's campus

Station Name	State	Co-Op ID Number	Year Started
Appling 2 NW	GA	09-0311	1/1961
Bamberg	SC	38-0448	8/1951
Batesburg	SC	38-0506	5/1894
Cheraw	SC	38-1588	1/1893
Clarks Hill 1 W	SC	38-1726	8/1952
Columbia University of SC	SC	38-1944	9/1954
Parr	SC	38-6688	3/1946
Johnston 4 SW	SC	38-4607	8/1957
Lincolnton	GA	09-5204	1/1893
Little Mountain	SC	38-5200	10/1893
Midville Experiment Station	GA	09-5863	6/1957
Newberry	SC	38-6209	1/1893
Orangeburg 2	SC	38-6527	10/1919
Pelion 0.8 NW	SC	38-6775	1/1947
Saluda	SC	38-7631	4/1902
Sumter	SC	38-8440	12/1901
Wateree Dam	SC	38-8979	1/1893
Waynesboro 2 S	GA	09-9194	10/1892
Winnsboro	SC	38-9327	3/1896

How Long Have COOP Stations Been Reporting Weather Information?

We've already mentioned that the COOP Weather Observing Program was established back in 1890, with organized weather observing dating back to Thomas Jefferson's vision in 1797. Many of our volunteer observing stations have a very rich history. Here's a look at some of our oldest stations:

Some of the stations have breaks in their temperature and rainfall data, but many such as Winnsboro, Sumter and Little Mountain have virtually no breaks in their reports. That's incredible when you think about it! These three stations have been included in a very special group…the US Historical Climate Network (USHCN). USHCN stations are considered to be the "gold standard" for climate research and tracking due to their quality and long period of records. Out of over 4000 COOP stations nationwide, less than 1,500 are included in this special group. Not only are they used for research, the rainfall data they provide are used by other customers such as setting flood insurance rates, and planning for energy and agricultural concerns. A very special group of volunteer stations indeed!

Coming next issue: the first of a series of COOP Observer Snapshots, highlighting our volunteers.

Weather-Ready Nation Ambassadors

by John Quagliariello - Warning Coordination Meteorologist

The Weather-Ready Nation (WRN) Ambassador initiative is the National Weather Service's (NWS) effort to formally recognize NWS partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water and climate events. The WRN Ambassador initiative helps unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme environmental hazards.

To be recognized as a WRN Ambassador, an organization must commit to:

⇒ Promoting Weather-Ready Nation messages and themes to their stakeholders

⇒ Engaging with NWS personnel on potential collaboration opportunities

⇒ Sharing their success stories of preparedness and resiliency

⇒ Serving as an example by educating employees on workplace preparedness

To support the efforts of WRN Ambassadors, the NWS can:

⇒ Provide outreach content about creating a Weather-Ready Nation

⇒ Explore innovative approaches for collaboration with your organization

⇒ Assist with StormReady opportunities for communities

⇒ Recognize your organization as a WRN Ambassador

⇒ Share the WRN Ambassador logo for your use

We must involve everyone in an effort to move people, and society, toward heeding warnings, taking action, and influencing their circles of family, friends, and social network to act appropriately. The WRN Ambassador initiative is the connecting hub of a vast network of federal, state, and local government agencies; emergency managers and city planners; researchers; the media; the insurance industry; nonprofit organizations; the private sector; and many others who are working together to address the impacts of extreme weather on daily life.

2021 WRN Ambassador of Excellence Award: Columbia County EMA

In addition to their role in sharing vital weather information as a core partner, the Columbia County Emergency Management Agency is proactive in promoting weather safety and preparedness within Columbia County, GA. They organized a Public Safety and Preparedness Fair, which featured agencies responsible for preparedness and response at the county, state, and federal level, including the National Weather Service, with interactive and fun activities for families. Additionally, they have distributed about 125 NOAA Weather Radios to citizens, host multiple Pack a Bag/Ready Kit classes that highlight recommended items if there is a need to evacuate and/or shelter in place, promote National Safety Campaigns, and are working to implement a stream gauge plan for areas prone to flooding.

Weather-Ready Nation - Continued

How to Become a WRN 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 by submitting a short online application.

- 28th Operational Weather Squadron Shaw AFB
- Aiken County Emergency Management Division
- Aiken Regional Medical Centers
- Augusta-Richmond County EMA
- Augusta University
- Bamberg County Emergency Services
- Barnwell County Emergency Management
- Buford Fire & Rescue
- Burke County EMA
- Calhoun County Emergency Management Agency
- Carolinas Integrated Sciences & Assessments (CISA)
- Challenger Learning Center of Richland District One
- Chris Wolfe SC Weather
- City of Columbia Police Department
- City of Sumter
- Columbia County Emergency Management Agency
- Columbia International University
- Columbia Metropolitan Airport
- CSRA East Central District Amateur Radio Emergency Service
- CSRA Weather
- District Five of Lexington and Richland Counties
- Dominion Energy SC
- Edgefield County EMA
- Fairfield County Emergency Management
- GA Dept. of Public Health - East Central Health District
- Gold Cross EMS
- Kershaw County Amateur Radio Club, Inc.
- Kershaw County Emergency Management
- Lady Starr Radio
- Lancaster County Emergency Management
- Lee County Emergency Management
- Lexington County Emergency Management Division
- Livingston Insurance
- McCormick County Emergency Services
- McDuffie County Fire Rescue Service
- Michelin Tire North America - Lexington, SC
- @Midlands_Wx
- Montmorenci Volunteer FD
- Newberry County Emergency Services Alliance
- Orangeburg County Emergency Services
- Orangeburg County Fire District
- Palmetto Chapter - American Meteorological Society
- Pantagraph.online
- Pee Dee Ice & Fuel, Inc.
- Richland County Emergency Services
- Richland Library
- Robert Bryant & Son, Inc.
- SC Department of Transportation - Traffic Management
- SC State Fire
- Simply Flood LLC
- South Carolina Emergency Management Division
- South Carolina Farm Bureau Insurance
- South Carolina State Climatology Office
- The Times and Democrat
- University of South Carolina Emergency Management
- USGS South Atlantic Water Science Center
- US Postal Service (National Preparedness)
- Wagener Fire Department
- WAGT (Augusta, GA)
- Wilbur's Last Ride
- WFXG FOX 54 NEWS NOW (Augusta, GA)
- WIS-TV (Columbia, SC)
- WJBF-TV (Augusta, GA)
- WLTX-TV (Columbia, SC)

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