

October 2015 Historic Flood

OPEN-FILE REPORT

**South Carolina Department of Natural Resources
Land, Water and Conservation Division
South Carolina State Climatology Office**

Compiled by: Wes Tyler
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A Narrative of the South Carolina's Record Rains and Flooding of October 1-6, 2015

The coastal sunrise on October 1, 2015, was obscured by low clouds on the eastern horizon. The Georgetown AP had already received early morning rains of 2.75 inches. This was the slow beginning of South Carolina's record rains and flooding of October 1-6, 2015.

Between the forcing of a nearly stationary upper level area of low pressure near the Alabama-Georgia border, high pressure just north of the Great Lakes and a distant Category 3 Hurricane Joaquin near the Bahamas Islands, moist air was channeled from the Atlantic's warm Gulf Stream waters into South Carolina. Over a lifting field of northeast to east surface winds, that river of air was condensed into historic rain.

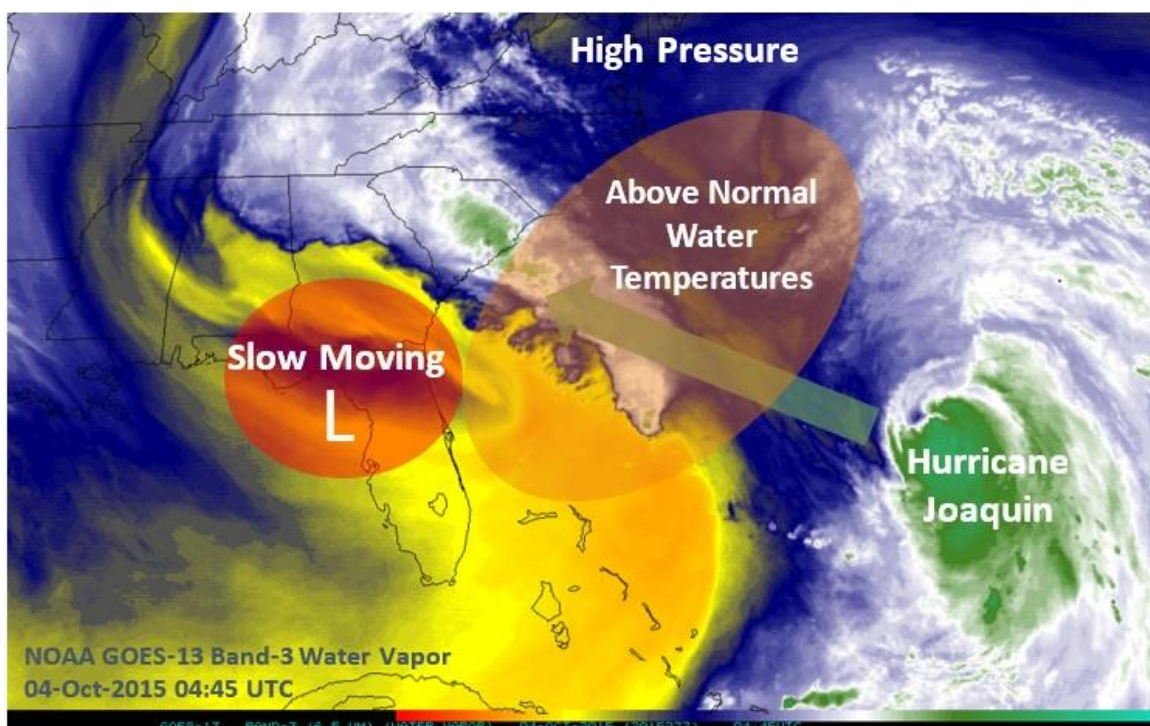


Figure 1. NOAA Water Vapor with Overlay of Parameters Contributing to the Heavy Rain

At 1:56 p.m. on Thursday, October 1, the Charleston AP reported heavy rain that closed streets on the city's peninsula. A foot of water had entered homes near the Charlestown Landing. At midnight, 3.14 inches of rain had fallen on Charleston City with steady rain continuing. A CoCoRaHS volunteer observer at Folly Beach reported an overnight rainfall of 5.46 inches. Up the coast, an axis of torrential rain was falling over Horry and Georgetown counties.

The Friday, October 2, 5:22 a.m. observation at N Myrtle Beach noted north-northeast winds gusting at 31 mph and heavy rain. Intensities at N Myrtle Beach climbed to 1.27 inches per hour at 4:53 p.m. and 1.72 inches per hour at 7:53 p.m. Flooded roadways and parking lots in Horry County were littered with groups of abandoned cars. At 9:15 p.m., the USGS rain gage at Buck Creek near Longs had accumulated a running 24-hour total of 9.79 inches. At midnight, the N Myrtle Beach AP had received 7.88 inches of rain and its greatest calendar-day amount since the flooding caused by Hurricane Floyd in August 1999. Florence Regional AP received 4.73 inches on October 2. Two NWS CWOP (Citizen Weather Observer Program) volunteers reported overnight rainfalls taken on Saturday morning, October 3, of 16.00 inches in Little River and 15.86 inches in N Myrtle Beach. Rainfall as far away as Chesterfield had then reached 5.85 inches for the 24-hours ending at 7:00 a.m. At the same time, a Charleston National Weather Service employee rainfall measurement, taken 6.4 miles northeast of Mount Pleasant, indicated 7.76 inches had fallen over the previous 24-hours, yielding a three-day total of 11.33 inches. Extensive road flooding, closures and detours were observed within Charleston, Dorchester and Berkeley counties from daylight into the evening hours.



Figure 2. Dorchester County, South Carolina
Photo Source: DNR Law Enforcement

At 10:56 a.m., water was reported to be “waist deep” on parts of Johns Island. Springmaid Pier at Myrtle Beach recorded east winds gusting 46 mph at 11:54 a.m. and a near time high tide value of 8.30 feet (+2.25’ above predicted) that resulted in nearby tidal flooding to low elevation streets and property.

The Charleston AP 1:12 p.m. surface weather observation noted rain with thunder, east-southeast winds gusting at 36 mph. Kingstree's 3:00 p.m. 15-minute rainfall of 0.75 inches had increased their 36-hour total to 5.59 inches. At around 5:00 p.m., Williamsburg County began to report flooding. Just before 6:00 p.m., portions of Wadmalaw Island were under three feet of water. Access to Kiawah Island was stopped due to impassable roads. During the evening hours winds gusted to 60 mph in the Charleston Harbor and 53 mph at Sullivan's Island. Wind driven waves, on top of elevated tides, broke against and over the Charleston peninsula's southeast battery. Rainfall rates at Charleston AP increased to 2.06 inches per hour by 10:00 p.m. The calendar-day-ending total of 11.50 inches at the Charleston AP established the greatest 24-hour rainfall since recordkeeping began at that location in 1938. In addition, the October 1-3 total of 14.48 inches bested the full 31-day October record of 12.11 inches set in 1994. Well before sunrise on Sunday, October 4, record and deadly rains expanded into Clarendon, Orangeburg, Williamsburg, Florence, Sumter, Kershaw, Richland and Lexington counties with rainfalls of 10 inches or higher. An automated Forestry Service rain gage near Santee in Clarendon County indicated that as of 1:44 a.m. 9.81 inches of rain had fallen over the previous 24-hours.



Figure 3. Clarendon County, South Carolina
Photo Source: DNR Law Enforcement

In the seemingly endless hours of intense rain before Sunday's light, fast moving water coursed over heavily used roads and freeways. The intersection of Highway 601 and 378 was closed at 4:29 a.m. Cars were stalled along highway 378 near the McEntire ANG AP. The Interstate 20/Interstate 26 west exit ramp was closed. The SC Highway Patrol closed a portion of Interstate 26 in Clarendon County at 6:00 a.m. due to flooding.



Figure 4. Clarendon County, South Carolina
Photo Source: DNR Law Enforcement

Hourly rainfall rates at the Forest Acres Richland County Emergency Services Gills Creek automated gage (Forest Drive and I-77) recorded 1.76 inches from 2-3:00 a.m., 3.76 inches from 3-4:00 a.m., 3.00 inches from 4-5:00 a.m. and 2.12 inches from 5-6:00 a.m. yielding an unprecedented 10.64 inches over four hours. At 7:00 a.m., the Gill's Creek site had accumulated 12.68 inches of rain since midnight. Spillways and dams along the Arcadia Lakes watershed were overwhelmed. As dawn arrived, so did a succession of dam failures that included the Pine Tree Lake Dam (just below Windsor Lake), the Havird Pond on Arcadia Road, the Cary Lake Dam at Skii Lane and the Semmes Lake Dam on Fort Jackson, sending a flash flood downstream.



Figure 5. Cary Lake Dam Failure at Skii Lane
Photo Source: Wes Tyler, SC Climatology Office

Daylight revealed overflowing roadside ditches moving into streams and creeks and rapidly filling ponds and lakes. Vehicles were being swept off of Dentsville’s Decker Boulevard near the intersection of O’Neil Court, trapping the occupants and requiring teams of rescue response.



Figure 6. Richland County, South Carolina
Photo Source: DNR Law Enforcement

Hurried swift water specialists from multiple agencies performed emergency rescues throughout the morning removing homeowners from the Lake Katharine community downstream into the Garners Ferry Road business section.



Figure 7. Richland County, South Carolina. Assisting Swift Water Rescue Teams.
Photo Source: DNR Law Enforcement

Many one story homes were submerged. A USGS gage along Gills Creek at Fort Jackson Boulevard was destroyed after transmitting a height of 17.1 feet. A USGS post flooding survey analysis would indicate a peak stage of 19.6 feet. At noon, the Forest Acres Gills Creek gage rainfall amount had risen to an incredible 15.51 inches for the past twelve hours. Not even the oldest of inhabitants had ever witnessed such an event. The Rocky Creek Branch stage at South Main and Whaley in downtown Columbia climbed to its second highest stage of record when it crested at 12.28 feet on Sunday afternoon. So much rain fell over the Twelve Mile Creek basin in Lexington County the historic Lexington Mill Pond earthen dam failed, sweeping away much of the restored mill's business property and taking out a portion of Highway 1. A CoCoRaHS observer in Lexington reported a 24-hour total, ending at 7:00 a.m. on Sunday morning of 8.40 inches. Urban and rural washouts along rail and roadway beds, shoulders, overpasses and bridges resulted in barricades and lengthy detours from the Midlands south into the Lowcountry and eastward into the Pee Dee.



Figure 8. Lexington County, South Carolina
Photo Source: DNR Law Enforcement

A Coast Guard helicopter was called to rescue service in lifting a mother and child from rising water in Huger. The Columbia Metro AP 24-hour rainfall of 8.74 inches established an all-time record for any month. At 6:45 p.m., the Congaree River at Columbia reached a peak and “major flood” stage of 31.81 feet with a calculated flow of 185,000 cubic feet per second. It was discovered during the earliest minutes of daylight on Monday morning, October 5, the 120-year-old Broad River diversionary Columbia Canal had breached, compromising the availability

of treated drinking water for the service area populace. A combined “around the clock” effort to stabilize the canal failure was performed and completed by the engineering leadership represented by the City of Columbia, the U. S. Geological Survey, Federal Emergency Management Agency and the U. S. Army and National Guard.



Figure 9. Columbia Canal breach
Photo Source: Wes Tyler, SC Climatology Office

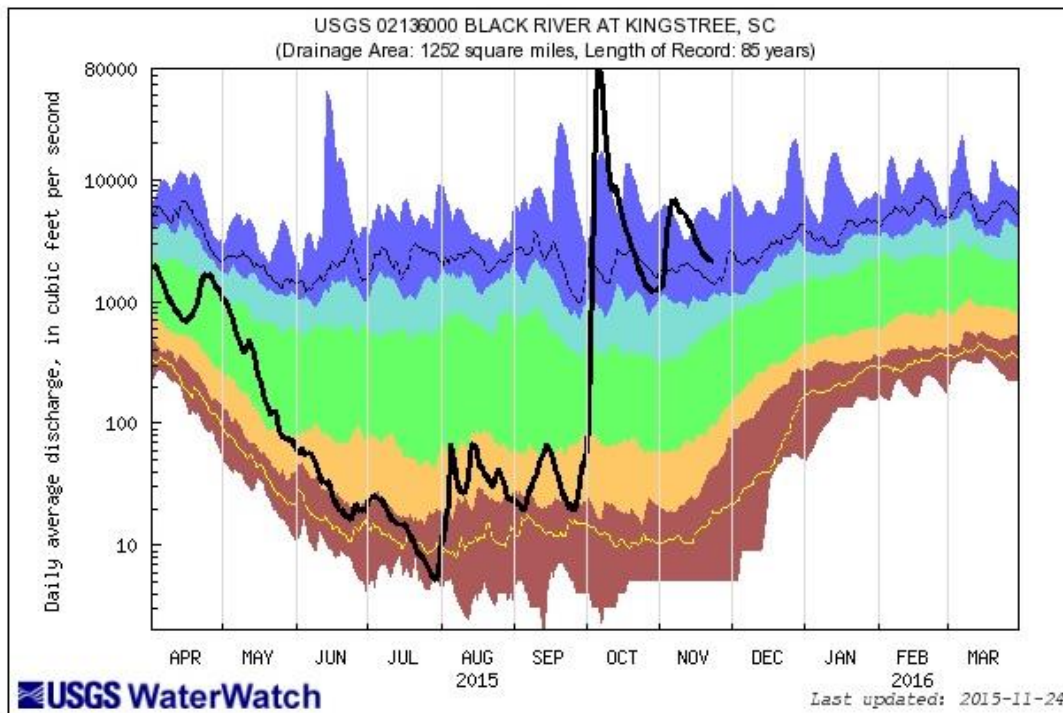
Georgetown’s 12.32-inch total over Saturday and Sunday turned the county into a lake. The USGS Black River gage at Kingstree indicated a Sunday 24-hour rain total of 12.83 inches. The city of Kingstree was surrounded by rising water and residents were evacuated. The Gills Creek gage midnight ending rainfall total of 16.69 inches was the greatest known amount ever



Figure 10. Title Max building collapse in Garners Ferry Road business section.
Photo Source: Wes Tyler, SC Climatology Office

measured in South Carolina over 24-hours. According to the National Weather Service Hydrometeorological Design Studies Center, that amount exceeded the 1,000 year average recurrence interval for any location in the state. At the end of the day, many citizens experienced restrictions to travel, overnight curfews, forced relocation and widespread losses of water and electricity. Confirmed vehicle drownings had risen to 4, some were missing. The unstoppable rain kept falling.

At 12:15 a.m. on Monday morning, October 5, Shaw AFB in Sumter reported north-northeast winds gusting to 37 mph. There were scattered reports of mature trees toppling onto cars, power lines and residential property as root systems gave way to the overly saturated soils. Twenty-four-hour overnight rainfall amounts reported on Monday morning, October 5, included 10.00 inches at Myrtle Beach and 9.29 inches at the Crabtree Swamp near Conway. Periods of rain, sometimes heavy, fell through the day before tapering off during the evening hours. Running “event” rainfall totals had reached 21.49 inches for the Forest Acres Gills Creek gage, 19.81 inches at Shaw AFB in Sumter and an incredible 26.92 inches was measured by a Charleston NWS employee at Mt. Pleasant. The USGS gage on the Black River at Kingstree recorded an October 1-5 rainfall amount of 22.91 inches. On Tuesday, October 6 at 9:30 p.m., the Black River at Kingstree reached an all-time record stage of 22.65 feet surpassing the previous record flood stage of 19.77 feet set on June 14, 1973.



Explanation - Percentile classes						Flow
lowest-10th percentile	5	10-24	25-75	76-90	95	
Much below Normal	Below normal	Normal	Above normal	Much above normal	90th percentile - highest	

Figure 11. Black River at Kingstree, SC: Daily Mean Discharge
Photo Source: U.S. Geological Survey

Records began January 1, 1894. Travel within Williamsburg County required the familiarity of known high water markers and a boat. The official NWS Cooperative volunteer observer at Summerville reported 25.35 inches of rain over the six-day period ending on October 6. FAA automated instruments at the Georgetown County AP had measured 23.88 inches.