

September 2019 Central NC Climate Summary

September 2019 featured Hurricane Dorian during the first week, followed by dry heat to end the month.

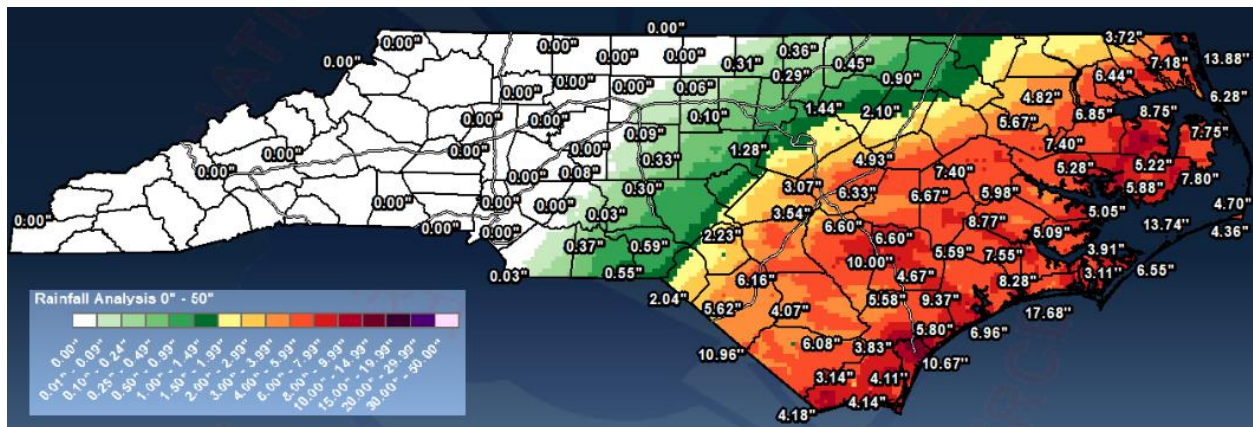
The month of September 2019 was a hot one across central NC, averaging 4-6°F warmer than normal. Greensboro recorded its third-warmest September on record, and numerous daily record high temperatures at all three climate sites were set. The month was dry overall, with the only significant rain coming from Hurricane Dorian's brush with the coast during the first week of the month. The heaviest rain from Dorian fell near and along the coast with no rain in the western part of the state. In fact, there was very little measurable rain during the month across central NC other than that associated with Dorian on September 5 and 6. By month's end, all three sites totaled below normal rainfall. Greensboro and Raleigh were significantly below normal, by more than 3 inches.

Site	Avg High Temp (°F)	Avg Low Temp (°F)	Avg Temp (°F)	Departure From Normal (°F)	Maximum Temperature (°F)	Minimum temperature (°F)
Greensboro (GSO)	86.7	66.0	76.3	+6.1	95 on 9/12	51 on 9/20
Raleigh-Durham (RDU)	87.6	66.0	76.8	+4.9	96 on 9/12	50 on 9/20
Fayetteville (FAY)	89.0	67.2	78.1	+4.5	96 on 9/29	53 on 9/20

Site	Total precipitation (in.)	Departure from Normal (in.)	Max Daily Precipitation (in.)
Greensboro (GSO)	0.56	-3.63	0.54 on 9/27
Raleigh-Durham (RDU)	1.11	-3.25	0.93 on 9/5
Fayetteville (FAY)	3.63	-0.77	3.48 on 9/5

Hurricane Dorian affected the eastern half of North Carolina with heavy rain and gusty wind on September 4, 5, and 6. The storm weakened as it moved northeast along the southeast United States coastline and eventually the North Carolina coast during this period. The persistent ridge of high pressure over the Tennessee Valley region prevented the storm from coming inland to affect a much larger part of the Southeast U.S. states. Instead, the eye (or center) of Dorian moved across a small portion of the Outer Banks of North Carolina during the morning of September 6. The heavy rain and flooding associated with Dorian was mainly confined to areas along and east of Interstate 95; however, significant rains of 1 to 3 inches spread inland to Southern Pines, Raleigh, and Roanoke Rapids. The Coastal Plain communities reported generally 4 to 8 inches of rain during Dorian. The highest reported total came from the Cooperative Observer at Clinton (central Sampson County of the Southern Coastal Plain) with 8.84 inches. This was followed by 6.33 inches at Pine Level (Johnston County), 4.81 inches at Goldsboro (Wayne County), 4.71 inches at Tarboro (Edgecombe County), and 3.58 inches at Fayetteville (Cumberland County). Reports to the west diminished rapidly as the Raleigh NWS office (Wake County) reported 1.68 inches, Raleigh-Durham Airport (Wake County) 1.03 inches, Burlington (Alamance County) 0.11 inches, Albemarle (Stanly County) 0.03 inches, and Greensboro (Guilford County) 0.00 inches. Figure 1 shows a map of the total rainfall from Dorian across NC. The analysis data source is AHPS and regional observations.

Fig. 1: Preliminary Hurricane Dorian Rainfall Totals in NC



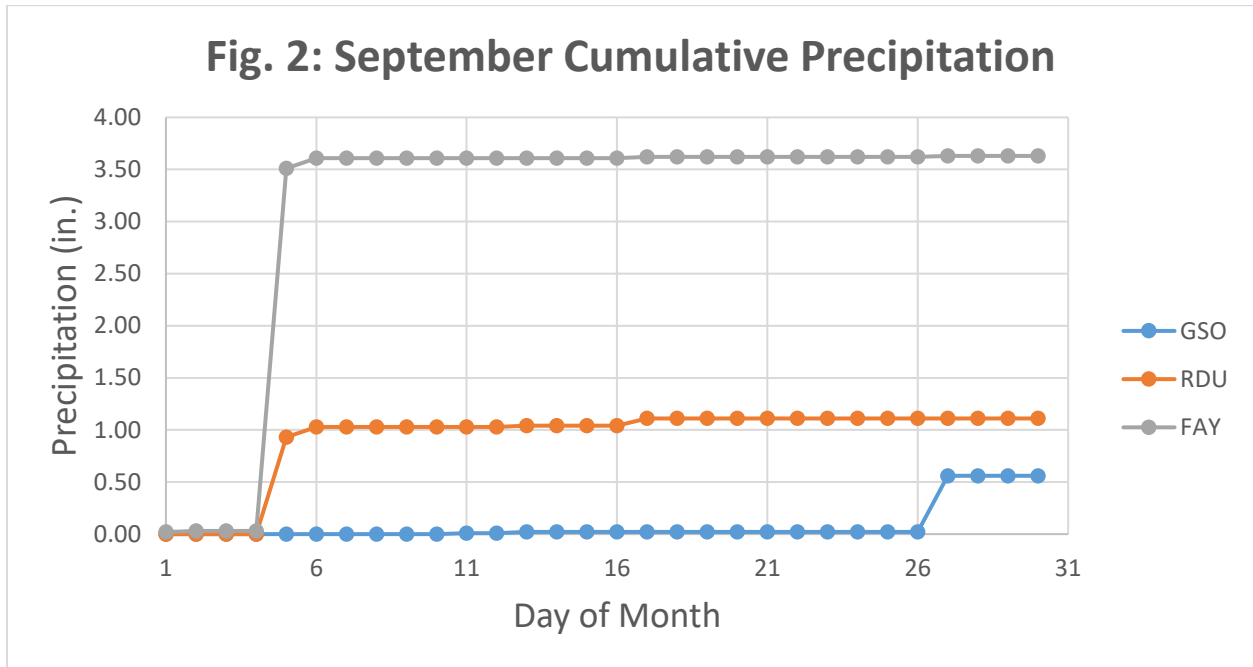
Isolated tornadoes and strong winds were also felt from Dorian. The Coastal Plain was hit hard on September 5 with isolated tornadoes associated with several of Dorian's rain bands. A review of the three tornadoes (two EF0s, one EF1) to affect central North Carolina can be found at the following link:

<https://mesonet.agron.iastate.edu/wx/afos/p.php?pil=PNSRAH&e=201909070211>

The aforementioned hurricane was essentially the only rain producer this month. Since the western part of the state was left out, many areas recorded little to no rainfall the entire month. There were a few days in which widely scattered thunderstorms occurred, but even this "pulse" shower and storm activity was greatly diminished from the previous month. Thunder was reported on only 4 of the 30 days in Greensboro and only 5 days in Raleigh. For the entire month,

Greensboro tallied only 0.56 inches of rain (3.63 inches below normal), Raleigh reported 1.11 inches of rain (3.25 inches below normal), and Fayetteville fared a little better totaling 3.63 inches (0.77 inches below normal). These final totals at the three main climate sites were not necessarily representative of most of central NC, as these sites were on the lower end of the monthly totals.

The cumulative precipitation for September at the three climate sites is shown below in Figure 2. Raleigh reported measurable rainfall (0.01 inches or more) on just 4 of the 30 days, Greensboro measured rainfall on 3 days, and Fayetteville recorded measurable rainfall on 6 days. Note that rainfall was very minimal to non-existent after Dorian's passage on September 6!



The radar-estimated precipitation and monthly departure from normal precipitation across central NC for September are shown in Figures 3 and 4 respectively. Note the much higher precipitation the eastern part of the region received compared to the western, due to the tight gradient in rainfall from Hurricane Dorian.

Fig. 3: Radar-Estimated Monthly Precipitation

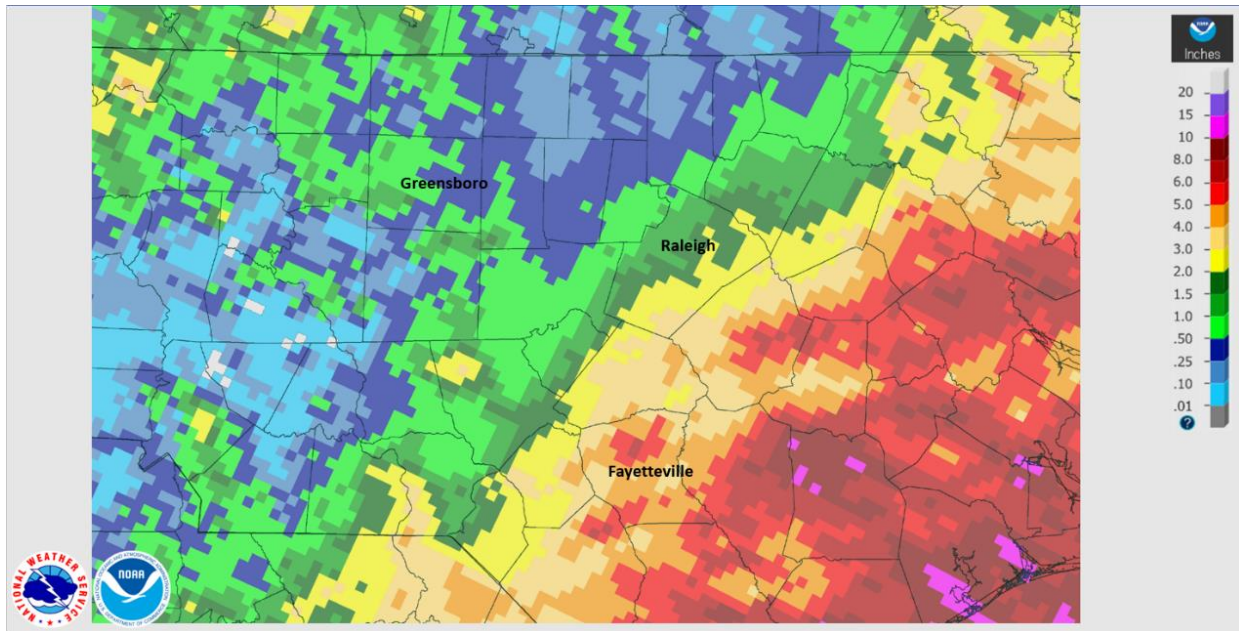
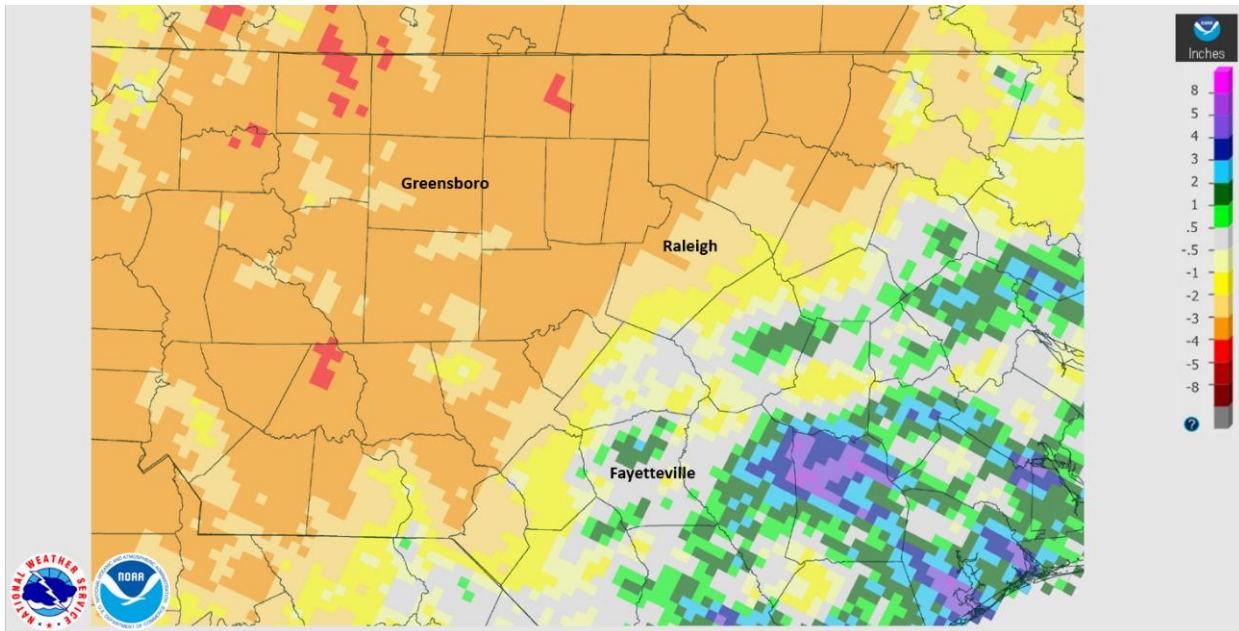


Fig. 4: Radar-Estimated Monthly Departure from Normal Precipitation

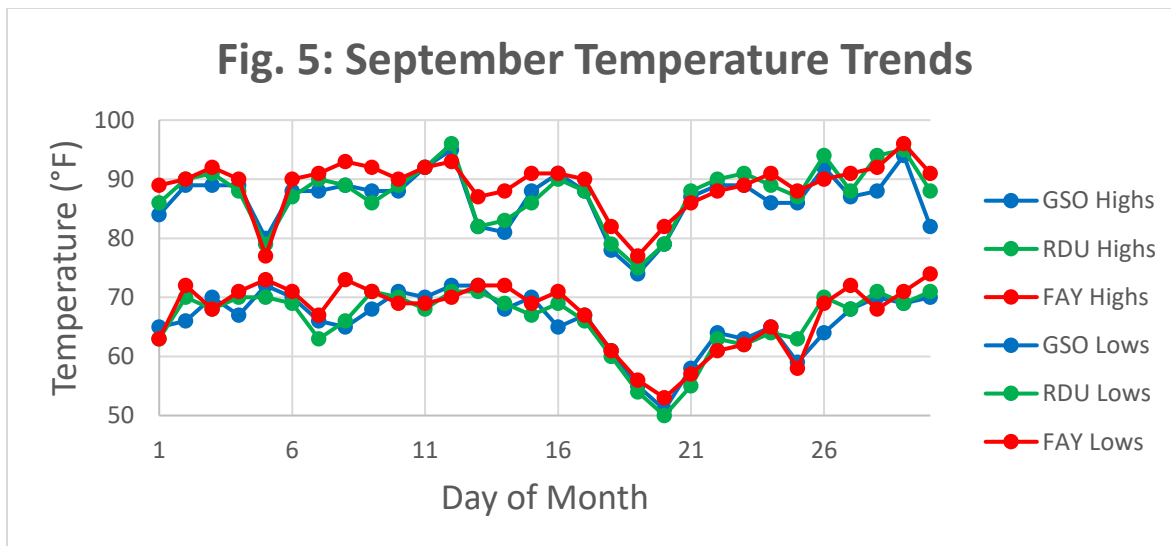


After Dorian during the first week, the rest of September was dominated by an increasingly strong, hot, and dry subtropical ridge of high pressure. The high was centered over the Gulf Coast states and Tennessee Valley to the southern Appalachians early in the month. Then, the position of the high built east to cover western portions of the Carolinas and Virginia in mid-to-late

September. This allowed heat and drought conditions to spread east from the Tennessee Valley and Gulf Coast states to much of western and central North Carolina. There were a couple of cold fronts that helped beat down the heat temporarily during the month, most notably September 18-21. As the ridge spread in from the west, hot and dry conditions returned across central North Carolina for the last days of the month.

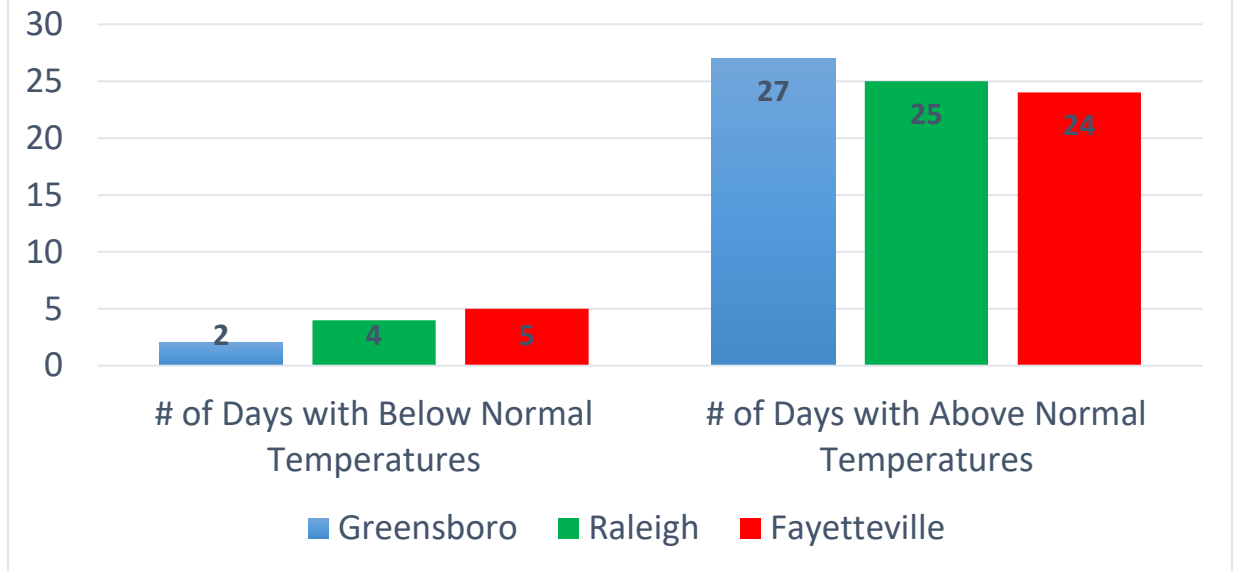
Overall, September was much warmer than normal across central NC. The average temperature for the month at Greensboro was 76.3°F, which was 6.1°F above the 30-year mean. The hottest day at Greensboro was 95°F on September 12. This tied a daily record high. Another record daily high was set on September 29, when 94°F was recorded. Raleigh reported an average for the month of 76.8°F (4.9°F above normal). New daily record high temperatures were set or tied on September 12, 26, and 29 when readings of 96°F, 94°F, and 95°F were recorded, respectively. Fayetteville reported a new daily record high of 96°F on September 29. In addition, the average temperature for the month was 78.1°F (4.5°F above normal). No record lows were set this month. The coolest period occurred during September 18-21. The lowest temperatures of the month were recorded on September 20. Raleigh fell to 50°F, Greensboro 51°F, and Fayetteville 53°F. Some cooler locations in central NC reached as low as the mid-40's.

The daily high and low temperatures at Greensboro, Raleigh, and Fayetteville for the month of September are graphed in Figure 5. The elevated temperatures generally were felt throughout the month, with a notable dip from September 18-21.



The number of days in September with above and below normal temperatures are shown in Figure 6. The temperatures were above normal on 80-90% of days, with only a few days below normal.

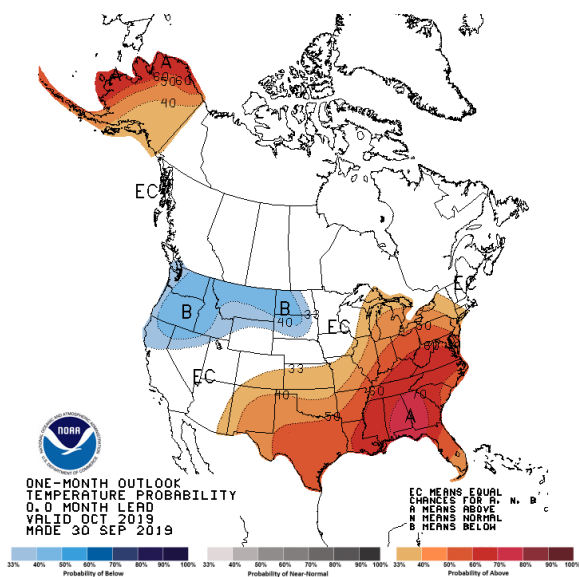
Fig. 6: Number of Days Above and Below Normal



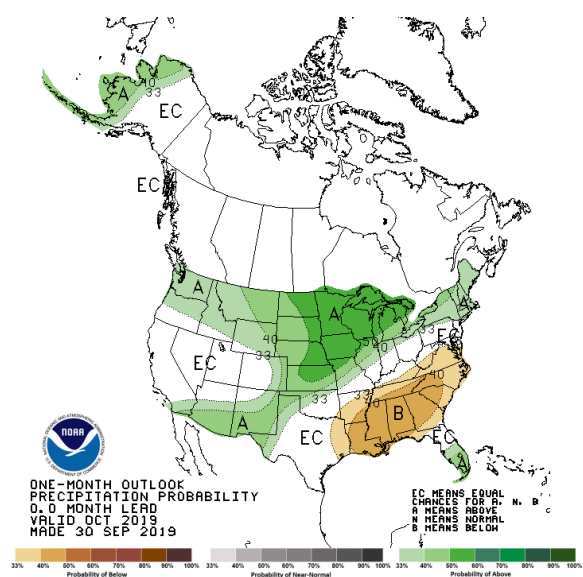
October Outlook

The latest October outlook from the Climate Prediction Center indicates high probabilities of above-normal temperatures across much of the southeastern U.S., including central NC. There are also increased probabilities of drier-than-normal conditions across the region.

Temperature Outlook



Precipitation Outlook



Other notes:

Number of days with high temperatures at or above 90°F this month:

Greensboro: 5
Raleigh: 11
Fayetteville: 19

Number of days with high temperatures at or above 90°F this year so far:

Greensboro: 47
Raleigh: 72
Fayetteville: 95

Strongest wind gusts and direction (all associated with Dorian):

Greensboro, North at 32 mph on September 5
Raleigh, North at 37 mph on September 5
Fayetteville, North at 52 mph on September 5

Hottest temperatures:

Greensboro 95 on September 12
Raleigh 96 on September 12
Fayetteville 96 on September 29

Coollest temperatures:

Greensboro 51 on September 20
Raleigh 50 on September 20
Fayetteville 53 on September 20

Records:

A record high temperature of 95 degrees was tied at the Piedmont Triad International Airport on September 12th. This ties the old record of 95 set in 1983.

A record high temperature of 94 degrees was set at the Piedmont Triad International Airport on September 29th. This breaks the old record of 90 set in 1921.

The monthly average temperature of 76.3 degrees at the Piedmont Triad International Airport makes this the third-warmest September on record. The warmest September on record was in 1921, averaging 78.2 degrees.

A record high temperature of 96 degrees was tied at the Raleigh-Durham International Airport on September 12. This ties the old record of 96 set in 1983.

A record high temperatures of 94 degrees was set at the Raleigh-Durham International Airport on September 26. This breaks the old record of 93 set in 1933.

A record high temperature of 95 degrees was set at the Raleigh-Durham International Airport on September 29. This breaks the old record of 92 set in 1941.

A record rainfall of 3.48 inches was set at the Fayetteville Regional Airport on September 5. This breaks the old record of 3.34 inches set in 1979.

A record high temperature of 96 degrees was set at the Fayetteville Regional Airport on September 29. This breaks the old record of 95 set in 1933.