

August 2021 Central NC Climate Summary

By Phillip Badgett and James Danco

August was the fifth hottest on record at Raleigh.

The heat this summer started rather slowly, but increased greatly by late July into August due to a return of the typical Bermuda high pressure located in the western Atlantic. This pattern brought hot and humid southerly flow for much of the month. This allowed the number of days reaching at least 90°F to surge in August to 24 at Fayetteville, 21 at Raleigh, and 14 at Greensboro. Figure 1 depicts the cumulative number of 90+°F degree days recorded at each climate site from May through August. Note the totals rapidly increased in July and August at all sites after the slow start. By the end of August, Fayetteville reached 63 such days, Raleigh 52, and Greensboro 30. The heat was persistent throughout the month, but there was only one daily record high temperature set at the three climate sites, on August 13 when Raleigh hit 100°F. This was the first triple-digit reading in Raleigh since October 3, 2019. Laurinburg-Maxton Airport also reached 102°F on August 13. By month's end, Raleigh achieved the 5th-hottest August since records began back in 1887, while it was the 7th-hottest at Fayetteville with records going back to 1910. Table 1 depicts the top five hottest Augusts at Raleigh.

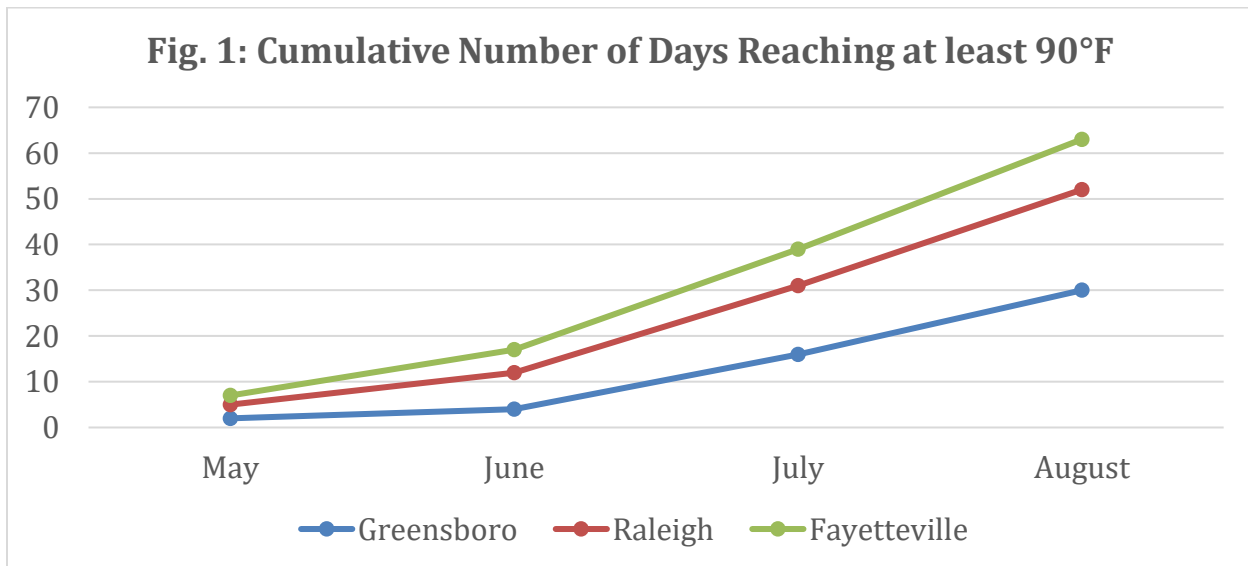


Table 1: Top Five Hottest Augusts in Raleigh

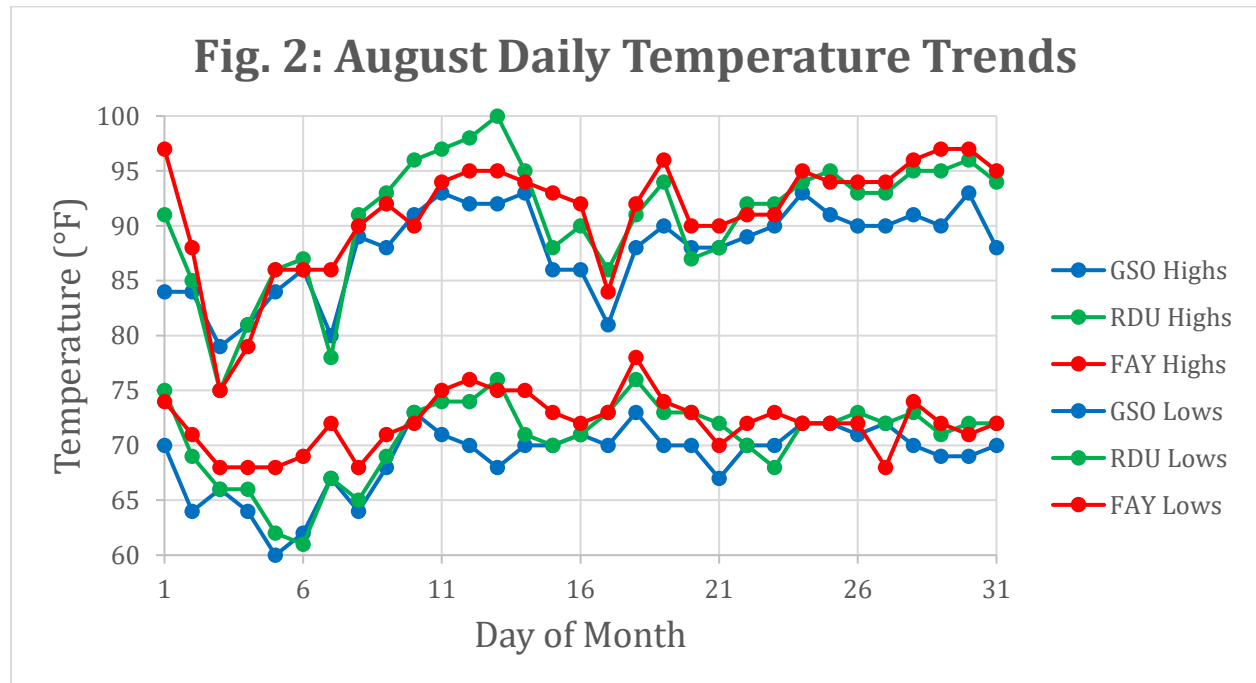
| Year | Average Temperature (°F) |
|------|--------------------------|
| 2007 | 84.1 |
| 1900 | 82.2 |
| 2016 | 82.1 |
| 2010 | 81.1 |
| 2021 | 80.8 |

The August monthly average temperatures and their departures from normal at the three climate sites are depicted in Table 2. Average temperatures were generally 1-2°F above normal.

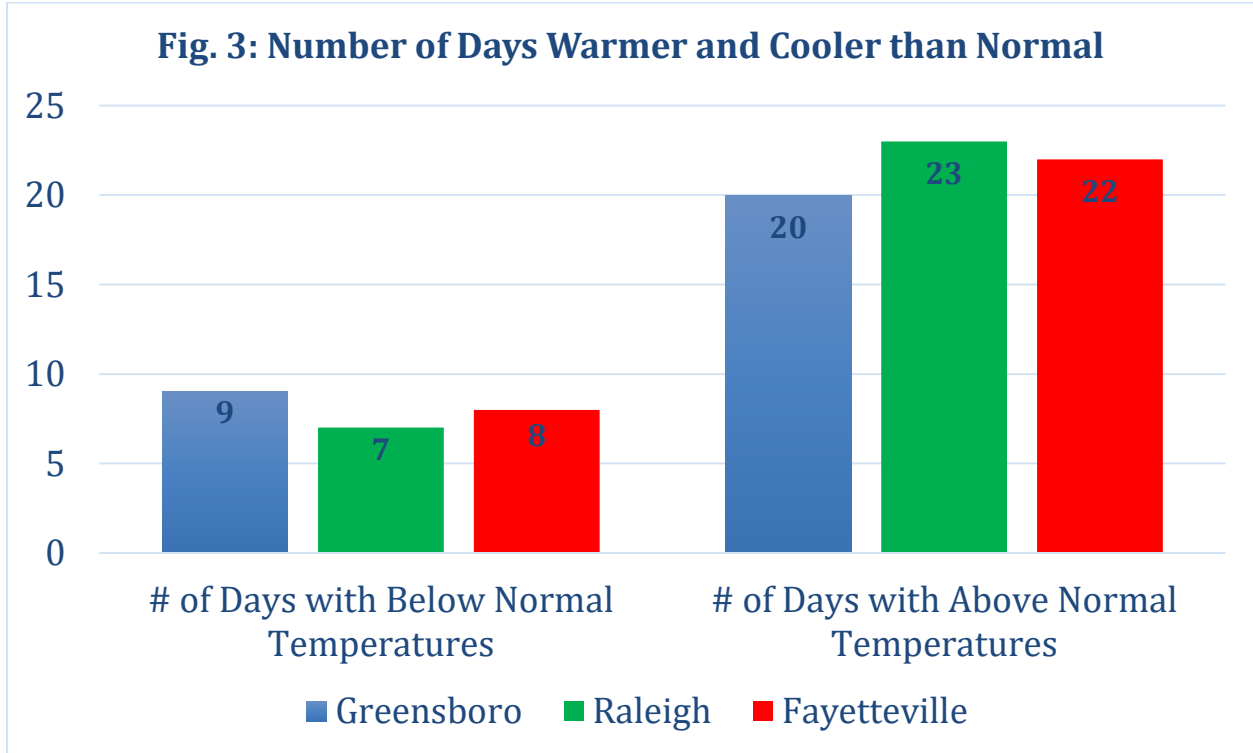
Table 2: Monthly Temperature Statistics

| Site | Avg High Temp (°F) | Avg Low Temp (°F) | Avg Temp (°F) | Departure From Normal (°F) | Maximum Temperature (°F) | Minimum temperature (°F) |
|----------------------|--------------------|-------------------|---------------|----------------------------|------------------------------|--------------------------------|
| Greensboro (GSO) | 88.0 | 68.8 | 78.4 | +1.1 | 93 on 8/11, 8/14, 8/24, 8/30 | 60 on 8/5 |
| Raleigh-Durham (RDU) | 90.8 | 70.7 | 80.8 | +2.0 | 100 on 8/13 | 61 on 8/6 |
| Fayetteville (FAY) | 91.2 | 72.0 | 81.6 | +1.8 | 97 on 8/1, 8/29, 8/30 | 68 on 8/3, 8/4, 8/5, 8/8, 8/27 |

The time series of daily temperature for the month at Greensboro, Raleigh, and Fayetteville can be found in Figure 2. Note that cool air was not to be found in August, with the temperature never getting below the 60's and highs frequently reaching the 90's.



As shown by Figure 3, about 65-75% of days in the month were warmer than normal.



In the middle of August, the typical Bermuda high pressure also steered the third tropical storm to affect NC this summer. The upper air pattern at this time is shown in Figure 4. Note any system in the Gulf Coast region can be steered toward our region with such a pattern in place. Tropical Storm Fred hit the Gulf Coast on August 16, then tracked north-northeast over the mountains of western NC as a tropical depression on August 17. Very heavy rain had already occurred in some spots (especially western NC) out ahead of the remnants of Fred a few days before its arrival. This set the stage for flooding over the NC mountains as the depression tracked through. As much as 6 to 10 inches of rain brought flooding from Brevard and Cherokee to Spruce Pine. The worst hit area was Haywood County, just west of Asheville where six deaths were attributed to the storm. Luckily for central NC, the heaviest rains fell just to the west with the Piedmont being spared of flooding rains. However, totals of 1 to locally 3-4 inches drenched the western Piedmont and Foothills. The 4-day rainfall observations from CoCoRaHS between the morning of August 14 and the morning of August 18 are shown in Figure 5. Note the excessive rainfall totals over the higher terrain, some in excess of 10 inches, with amounts dropping off quickly to the east over the lower Piedmont.

Figure 4: 500 mb Observations, Heights, and Temperatures on August 17

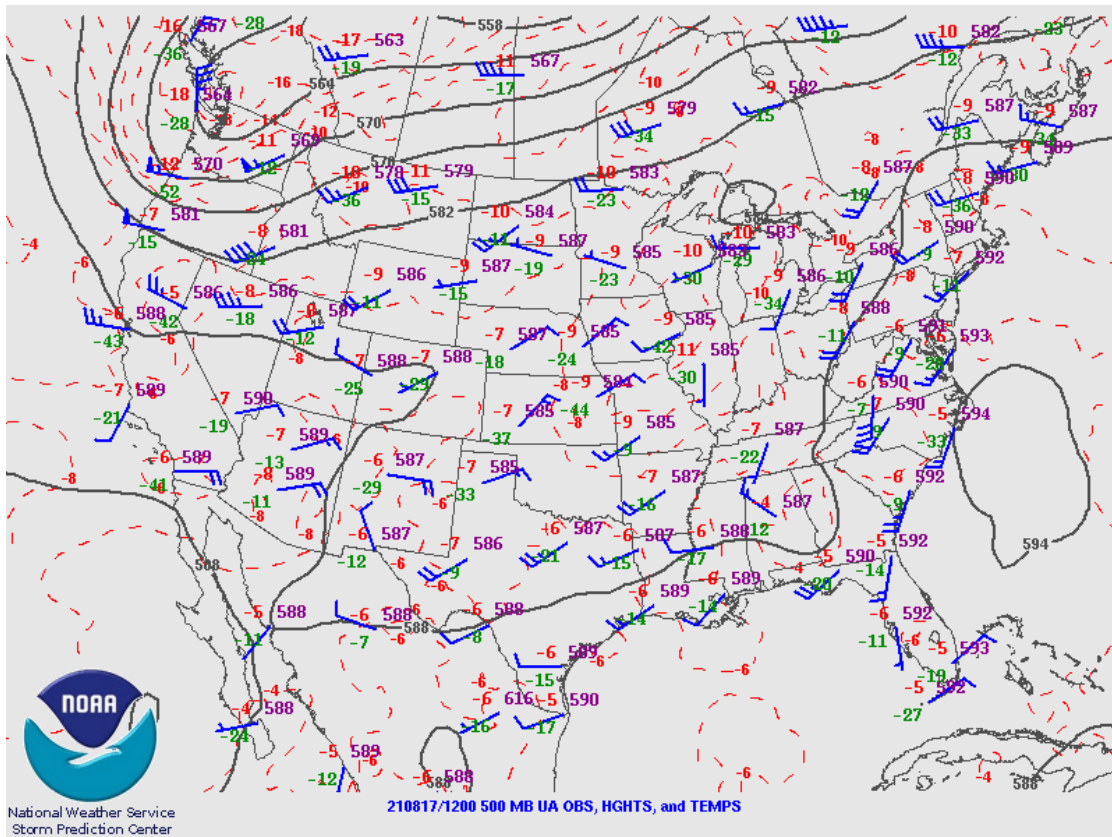
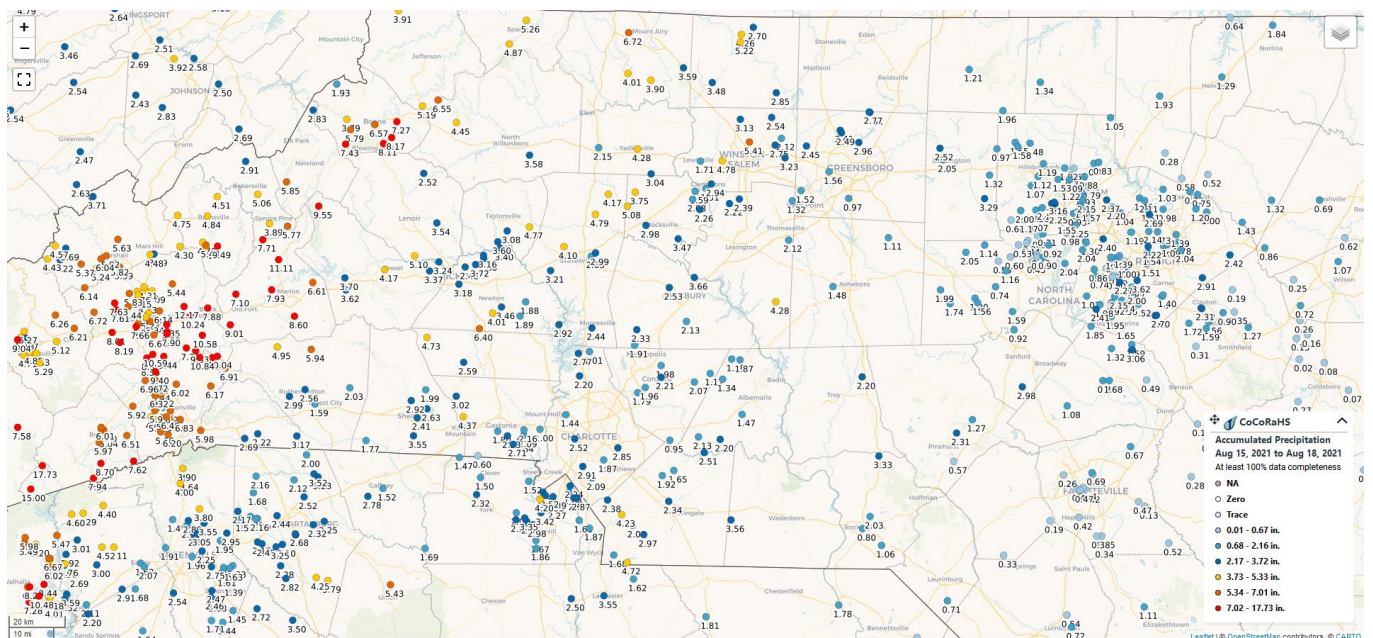


Figure 5: CoCoRaHS Cumulative Precipitation from August 14-18

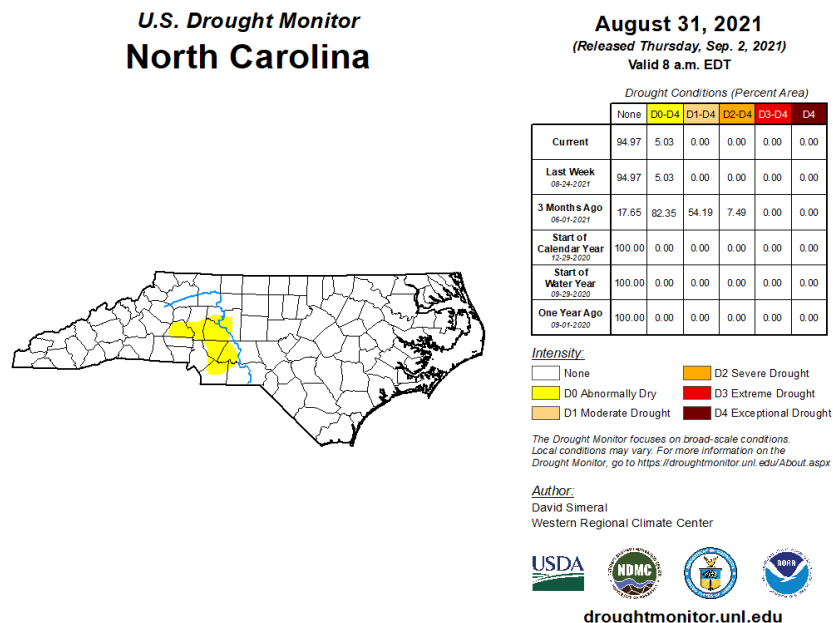


The late half of the month was dominated by the typical isolated to scattered thunderstorm activity. The central Piedmont saw a noted decrease in showers and therefore the soils began to dry out again. By the end of the month, rainfall totals included 4.03 inches at Greensboro, 3.27 inches at Raleigh, and only 2.17 inches at Fayetteville (Table 3). Greensboro’s total was 92 percent of normal, while Raleigh’s total was only 69 percent of normal, and Fayetteville’s total was just 40 percent of normal. In fact, this August tied for the 11th-driest August on record at Fayetteville, with records going back to 1910. As shown by the Drought Monitor in Figure 6, abnormally dry conditions began to return to some areas in the western Piedmont by the end of the month, yet drought concerns remained low thanks to all the rain earlier in the summer. Overall, this summer did not have the prolonged severe drought that was initially feared, in large part thanks to rainfall from three tropical systems.

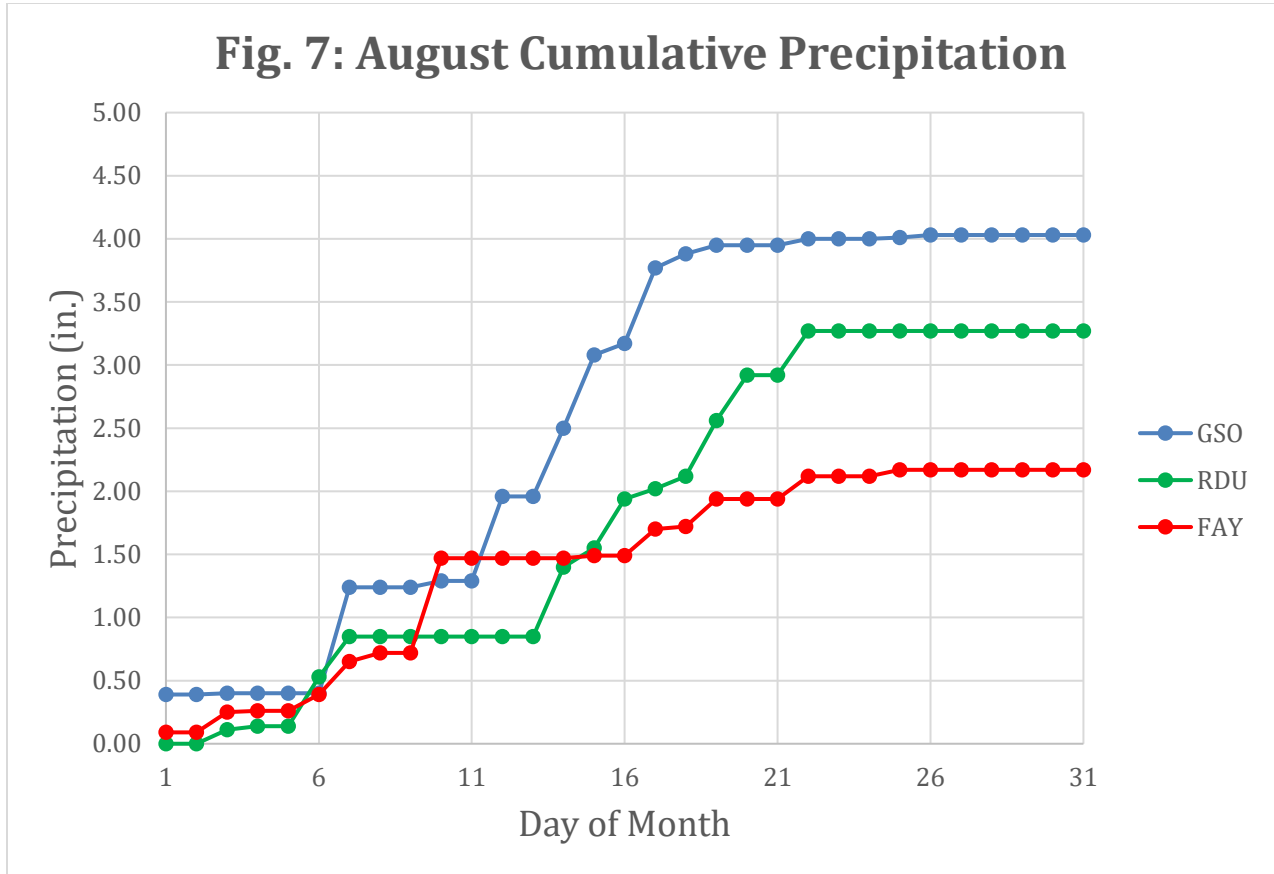
Table 3: Monthly Precipitation Statistics

| Site | Total precipitation (in.) | Departure from Normal (in.) | Max Daily Precipitation (in.) |
|----------------------|---------------------------|-----------------------------|-------------------------------|
| Greensboro (GSO) | 4.03 | -0.33 | 0.84 on 8/7 |
| Raleigh-Durham (RDU) | 3.27 | -1.44 | 0.55 on 8/14 |
| Fayetteville (FAY) | 2.17 | -3.19 | 0.75 on 8/10 |

Fig. 6: U.S. Drought Monitor for North Carolina on August 31



The cumulative precipitation at the three climate sites for the month of May is shown in Figure 7. The very dry end of the month is evident, particularly at Greensboro where just 0.26 inches of rain was measured in the last two weeks of August. From August 23-31, Greensboro only measured 0.03 inches of rain, Raleigh only had a trace, and Fayetteville had just 0.05 inches.



Below are additional selected ASOS or COOP observations for August 2021. Note that some dryness was observed over portions of the Sandhills and Piedmont.

Albemarle (Stanly County) 6.57 inches (1.72 inches above normal), Winston-Salem (Forsyth County) 2.35 inches (2.16 below normal), Mount Airy (Surry County) 6.23 inches (1.54 above normal), Raleigh (NCSU) 4.24 inches (0.47 below normal), Louisburg (Franklin County) 3.20 inches (2.31 below normal), Rocky Mount (Nash County) 3.80 inches (1.12 below normal), Clinton (Sampson County) 5.76 inches (0.25 below normal), Asheboro (Randolph County) 4.84 inches (0.97 above normal), Yadkinville (Yadkin County) 6.56 inches (2.15 above normal), and Reidsville (Rockingham County) 5.49 inches (1.22 above normal).

As displayed by the radar-estimated precipitation and the radar-estimated precipitation departure from normal in Figures 8 and 9, most central areas from the Northeast Piedmont to the Sandhills were 1 to 3 inches drier than normal. Above-normal rainfall was mainly confined to the northwest and far east.

Fig. 8: Radar-Estimated Monthly Precipitation

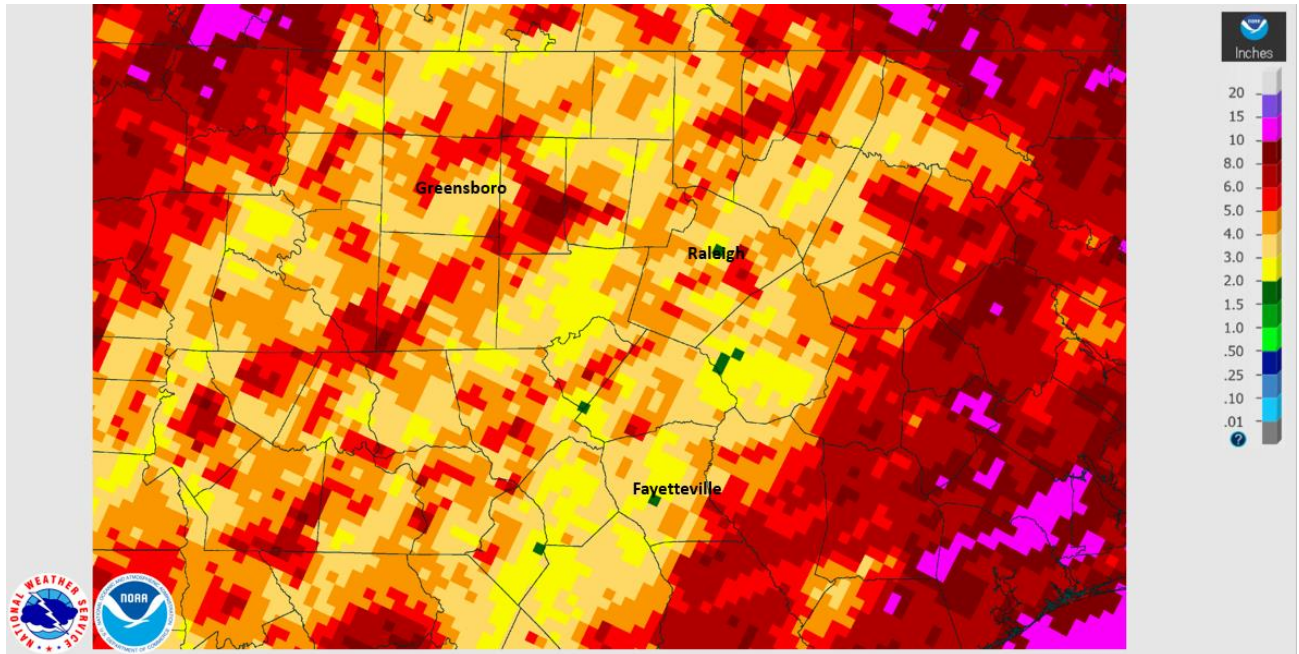
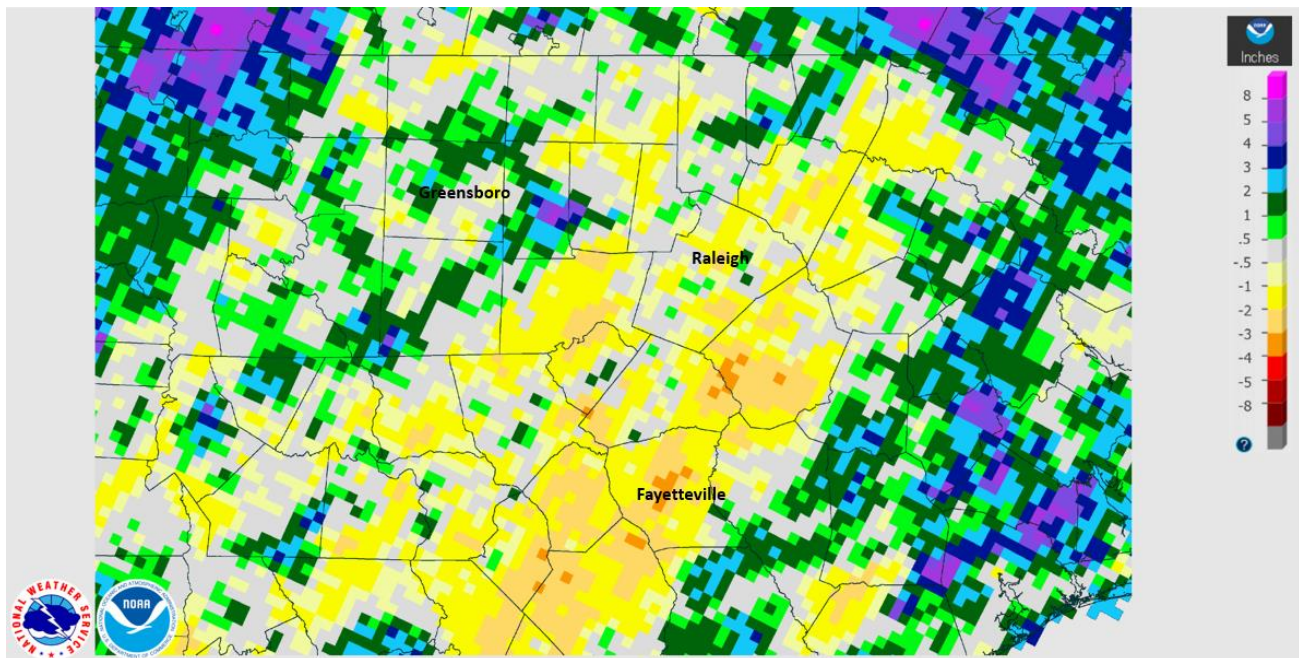
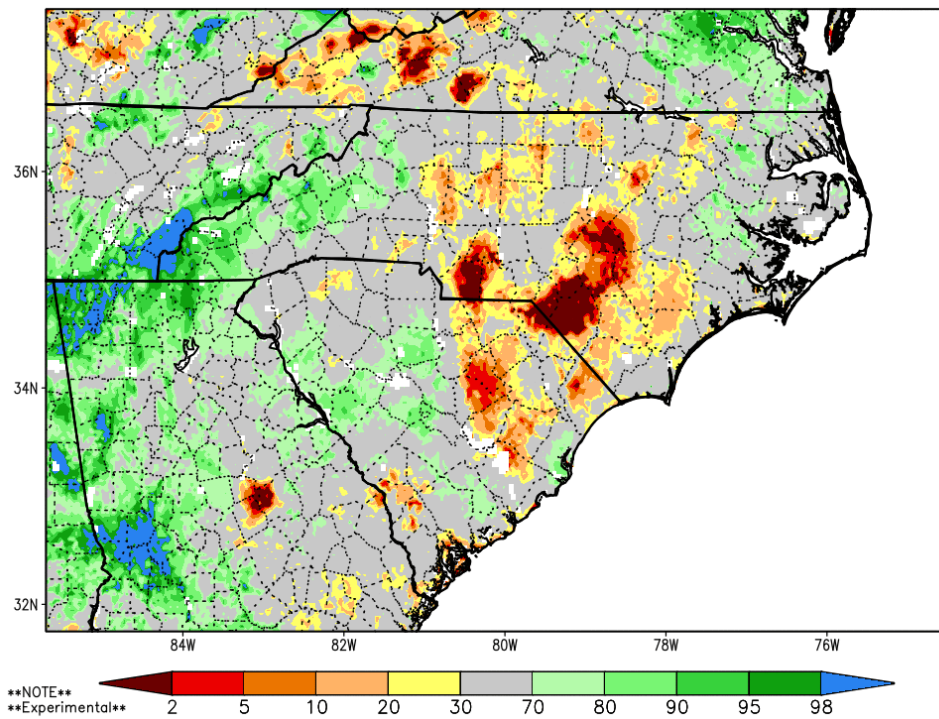


Fig. 9: Radar-Estimated Monthly Departure from Normal Precipitation



As shown in Figure 10, the below-normal rainfall resulted in drier soil moisture compared to July across parts of the Sandhills, but overall, soil moisture in most areas was still near normal.

Fig. 10: NASA SPoRT-LIS 0-100 cm Soil Moisture percentile valid 8/31/21



Other notes:

Days with thunderstorms this month:

Greensboro: 13
Raleigh: 10
Fayetteville: 12

Days with dense fog (visibility of ¼ mile or less):

Greensboro: 0
Raleigh: 3
Fayetteville: 6

Strongest wind gusts and direction:

Greensboro: NW at 46 mph on August 12 (thunderstorm)

Raleigh: SE at 38 mph on August 14 (thunderstorm)

Fayetteville: SW at 37 mph on August 1, SE at 37 mph on August 17 (thunderstorm)

Daily records:

Greensboro:

None.

Raleigh:

A daily record high temperature of 100°F was set at Raleigh on August 13. This broke the old record of 99°F last set in 2002.

Fayetteville:

A daily record low maximum temperature of 75°F was set at Fayetteville on August 3. This broke the old record of 78°F last set in 2014.

A daily record high minimum temperature of 78°F was set at Fayetteville on August 18. This broke the old record of 77°F last set in 2016.

Monthly records:

Greensboro:

None.

Raleigh:

August 2021 was the fifth-warmest August on record at Raleigh with an average temperature of 80.8°F. Records have been kept at Raleigh since 1887.

Fayetteville:

August 2021 was the seventh-warmest August on record at Fayetteville with an average temperature of 81.6°F. Records have been kept at Fayetteville since 1910.

August 2021 was the eleventh-driest August on record at Fayetteville with a total rainfall of only 2.17 inches.