

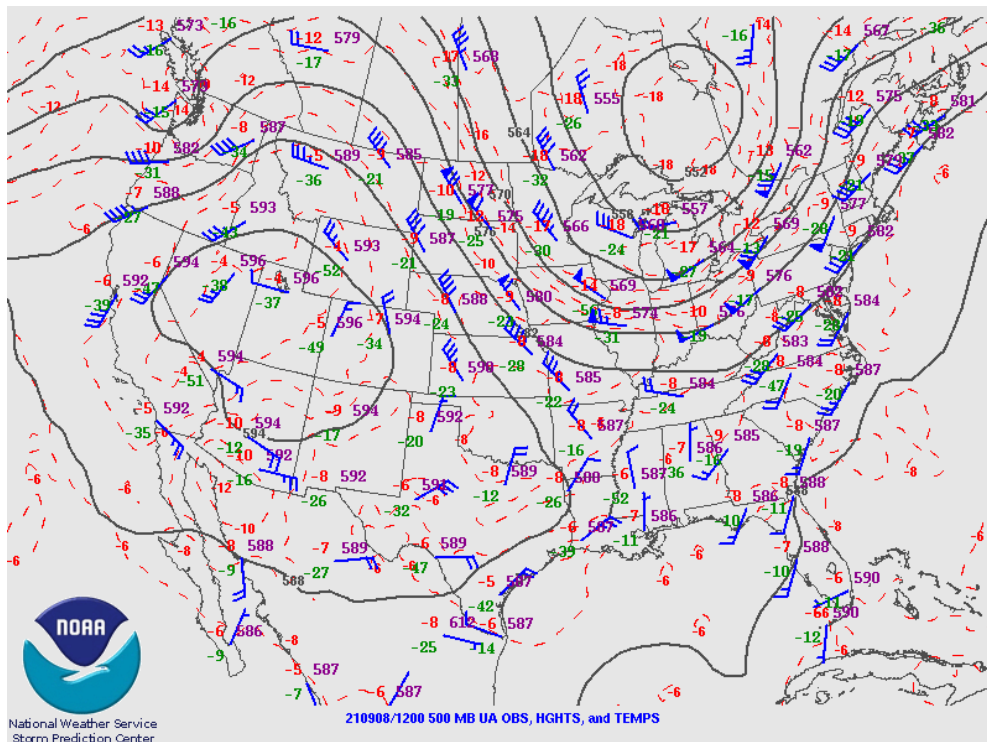
September 2021 Central NC Climate Summary

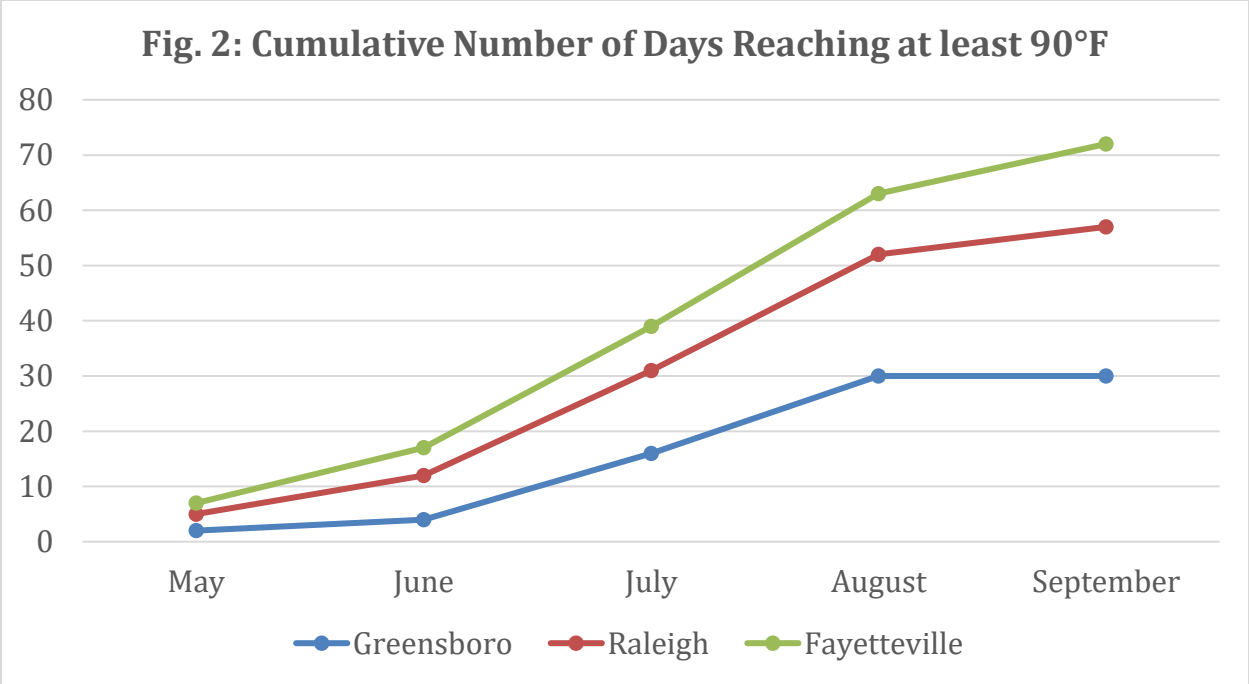
By Phillip Badgett and James Danco

Summer heat lasts well into September.

The heat of July and August continued into the third week of September 2021. The heat was beaten down a few times by cold frontal passages that brought showers and thunderstorms followed by a few days each of cooler temperatures. A persistent Bermuda high pressure system located in the western Atlantic continued to be the main culprit for the heat. See Figure 1. This pattern continued to bring a hot and humid southerly flow for much of the month, which brought some additional 90+°F days in all but the Northwest Piedmont where mid-to-upper-80s were common. Fayetteville had 9 days reaching at least 90°F while Raleigh had 5. Greensboro did not hit 90°F during the month. Figure 2 depicts the cumulative number of 90+°F days recorded at each climate site from May through September. Note that after a slow start, the totals rapidly increased in July and August at all sites, before the typical trend to cooler temperatures occurred in September as we moved into autumn. The total number of 90+°F days for the year reached 72 at Fayetteville, 57 at Raleigh, and 30 at Greensboro. There were only two records this month as Fayetteville tied a couple of daily high minimum temperatures. One was 77°F on September 1, a record that had just been set last year, and the other was 74°F on September 17.

Figure 1: 500 mb Observations, Heights, and Temperatures on September 8



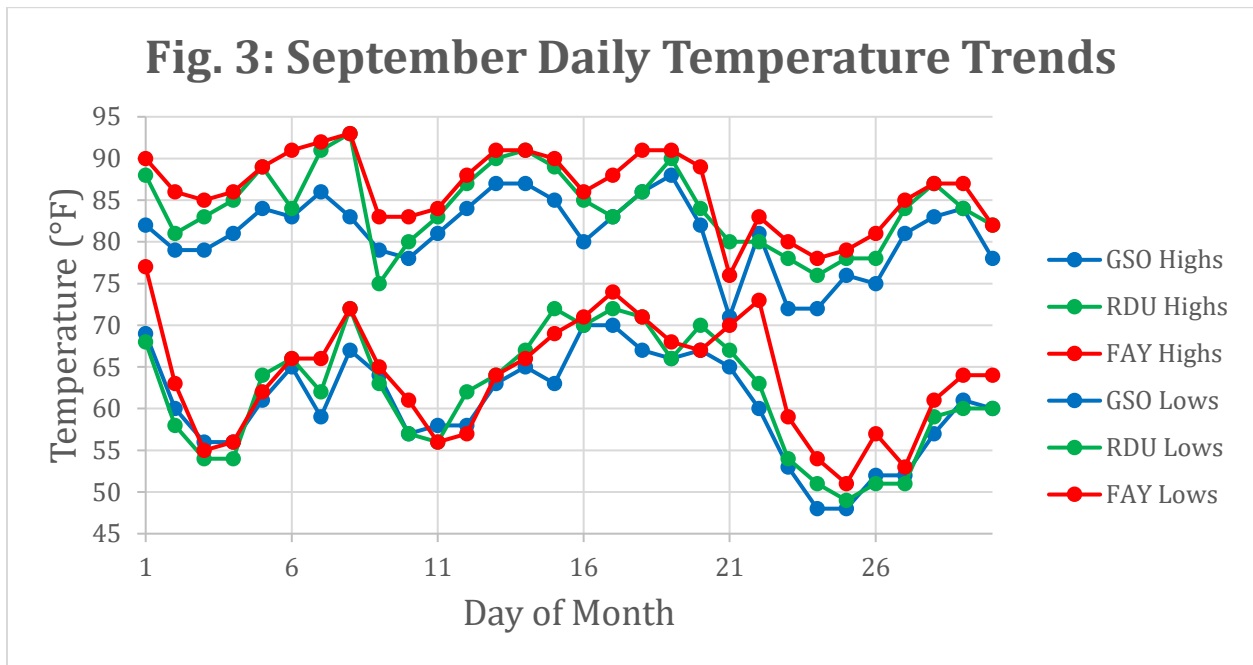


The September monthly average temperatures and their departures from normal at the three climate sites are depicted in Table 1. Note that Greensboro was slightly cooler than normal, while Raleigh and Fayetteville were slightly warmer than normal. The high temperatures are what made the month warm, as they were 1.6°F above normal at Raleigh and 2.3°F above normal at Fayetteville, while lows were 0.9°F below normal at all three climate sites.

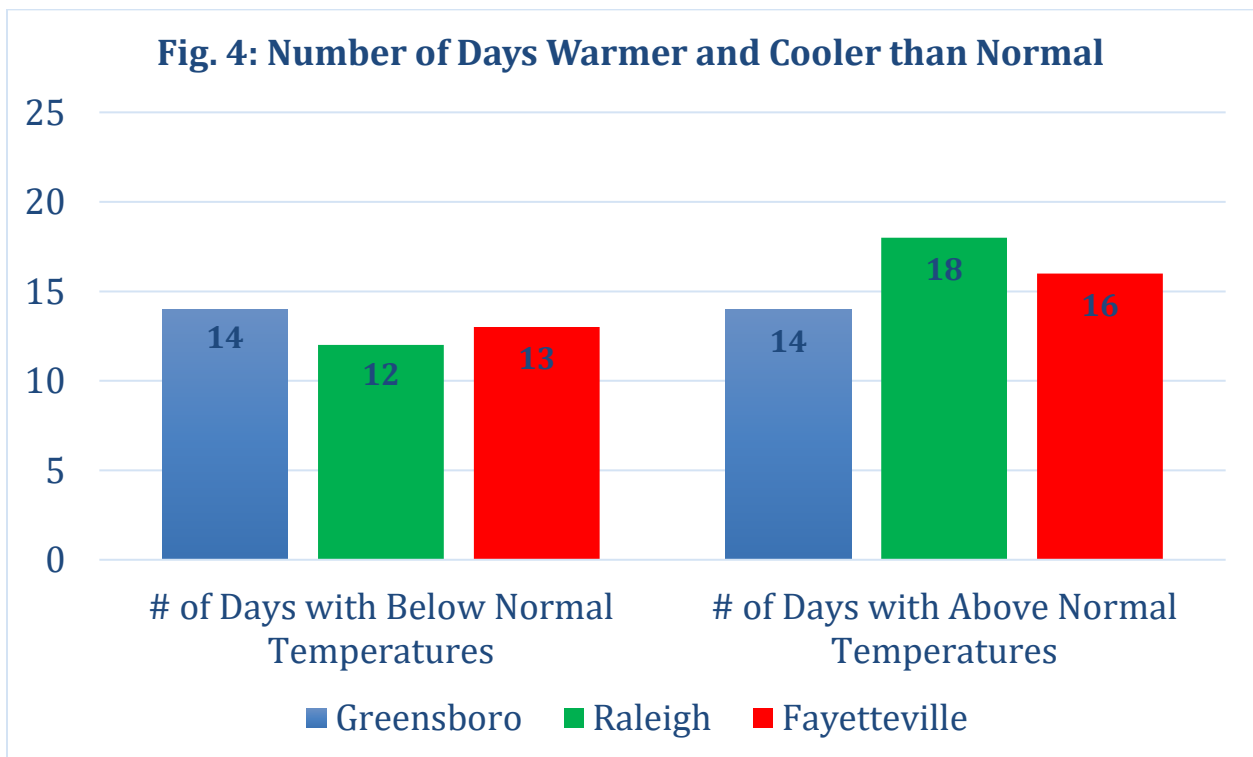
Table 1: Monthly Temperature Statistics

Site	Avg High Temp (°F)	Avg Low Temp (°F)	Avg Temp (°F)	Departure From Normal (°F)	Maximum Temperature (°F)	Minimum temperature (°F)
Greensboro (GSO)	81.0	60.6	70.8	-0.2	88 on 9/19	48 on 9/24 and 9/25
Raleigh-Durham (RDU)	84.1	61.8	73.0	+0.4	93 on 9/8	49 on 9/25
Fayetteville (FAY)	86.2	63.7	75.0	+0.8	93 on 9/8	51 on 9/25

The time series of daily temperature for the month at Greensboro, Raleigh, and Fayetteville can be found in Figure 3. Note the three cold frontal passages with the strongest cooling from the last cold front on September 21-22.



As shown in Figure 4, Greensboro had equal numbers of warmer and cooler than normal days. At Raleigh and Fayetteville, a majority of days had above-normal temperatures.



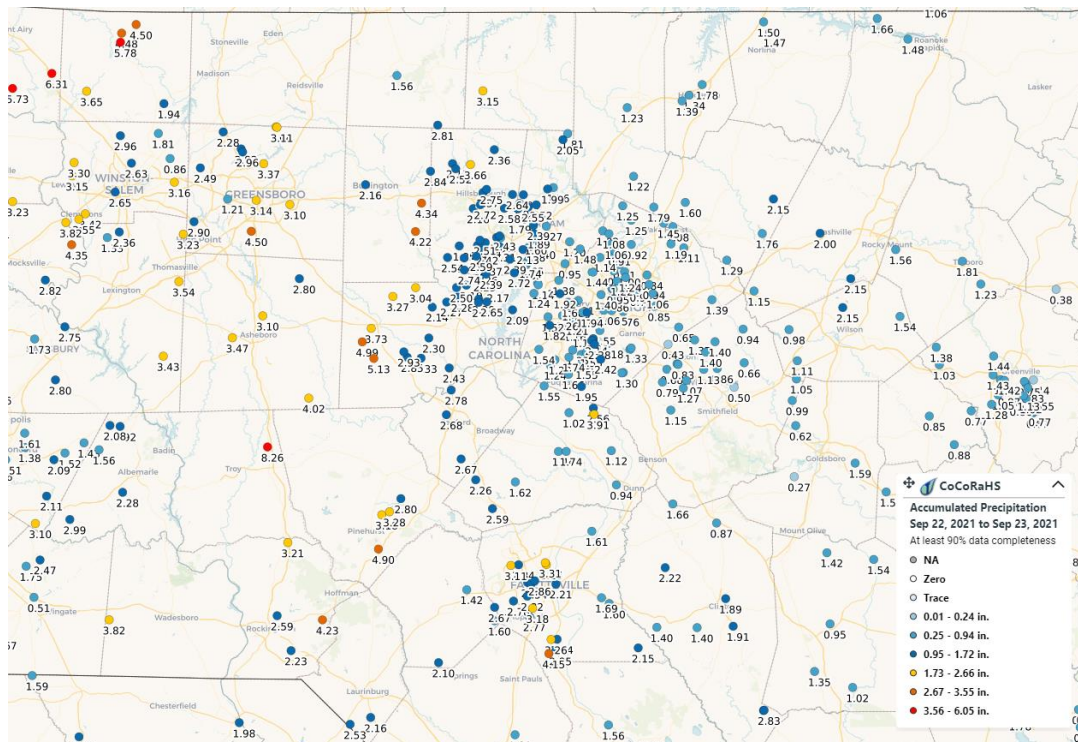
The monthly precipitation statistics for September at the three climate sites are shown in Table 2. It was a drier-than-normal month at all three locations, by nearly an inch at Greensboro and Fayetteville and by over two inches at Raleigh.

Table 2: Monthly Precipitation Statistics

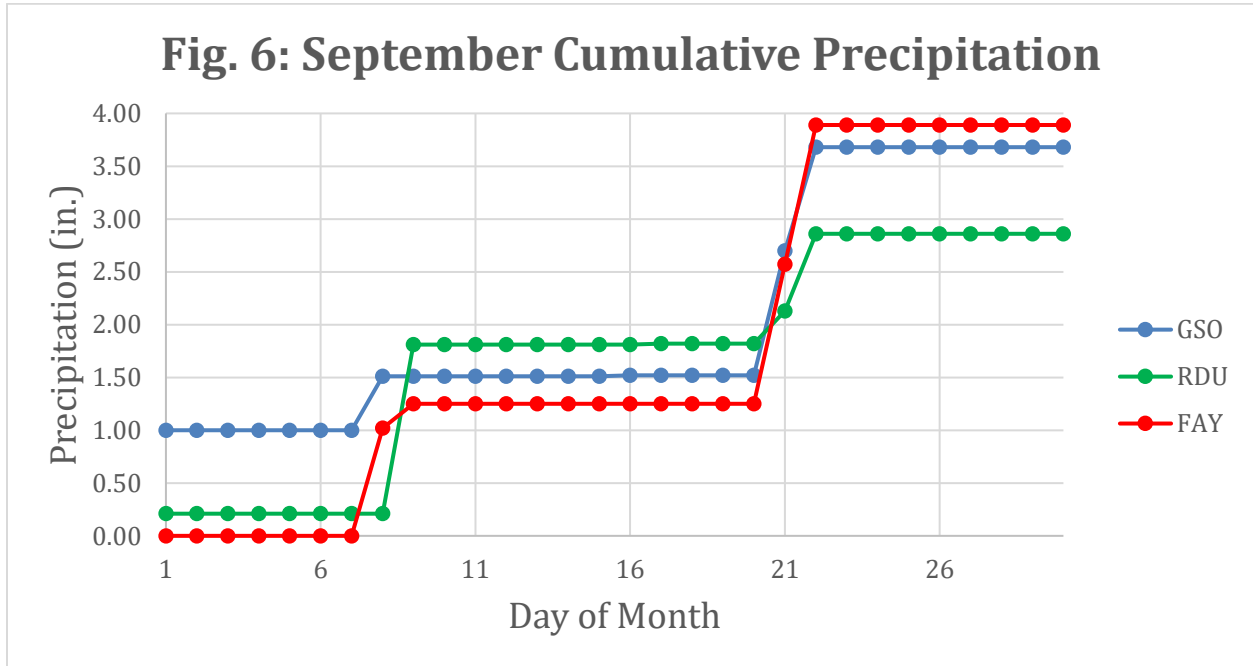
Site	Total precipitation (in.)	Departure from Normal (in.)	Max Daily Precipitation (in.)
Greensboro (GSO)	3.68	-0.91	1.18 on 9/21
Raleigh-Durham (RDU)	2.86	-2.29	1.60 on 9/9
Fayetteville (FAY)	3.89	-0.98	1.32 on 9/21 and 9/22

The third week of the month brought the strongest cold front of the month just in time for the official arrival of the fall season. The front brought not only a dramatic cooling between September 21st and 26th, but also beneficial rain to the region that had become rather dry during the first two-thirds of the month. As shown in Figure 5, a widespread 1-3 inches fell across central NC on the 21st and 22nd, with locally higher amounts mainly in the west of 3-5 inches.

Figure 5: CoCoRaHS Cumulative Precipitation on September 21-22



Even with that rainfall event on the 21st and 22nd, rainfall events during September were hard to come by. There were essentially only three events during the month and all were related to cold frontal passages, with no tropical systems to speak of. The rainfall events recorded were limited to September 1st-2nd, the 8th-9th, and finally on the 21st-22nd. This is clearly seen in the cumulative precipitation graph (Figure 6).



Additional selected ASOS or cooperative observations for September 2021 (note the wetness favored the west and dryness favored the east): Albemarle (Stanly County) 4.28 inches (0.34 below normal), Winston-Salem (Forsyth County) 4.43 inches (0.57 above normal), Mount Airy (Surry County) 4.99 inches (0.73 above normal), Raleigh (NCSU) 3.37 inches (1.35 below normal), Louisburg (Franklin County) 2.93 inches (1.98 below normal), Rocky Mount (Nash County) 2.94 inches (1.97 below normal), Clinton (Sampson County) 1.86 inches (4.70 below normal), Asheboro (Randolph County) 5.08 inches (0.24 above normal), Yadkinville (Yadkin County) 7.00 inches (2.90 above normal), and Reidsville (Rockingham County) 4.08 inches (0.83 below normal).

As displayed by the radar-estimated precipitation in Figure 7, monthly rainfall totals ranged from just 1-3 inches in the Coastal Plain to 4-8 inches in much of the western Piedmont. Most of central NC outside of the western Piedmont was drier than normal (Figure 8).

Fig. 7: Radar-Estimated Monthly Precipitation

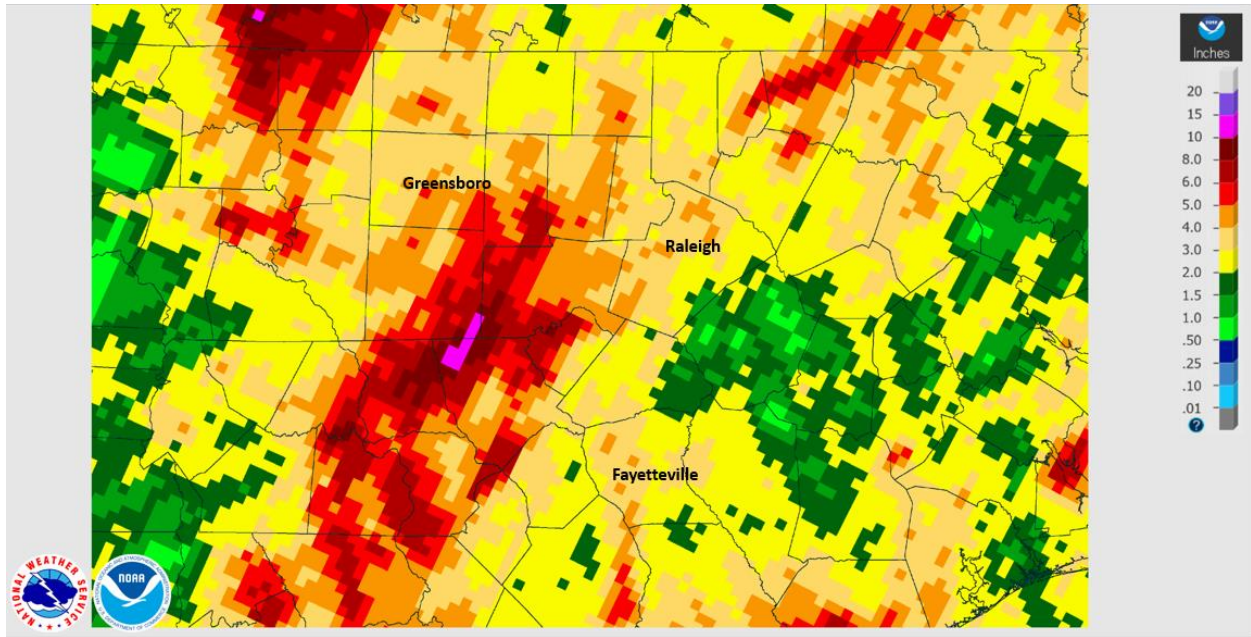
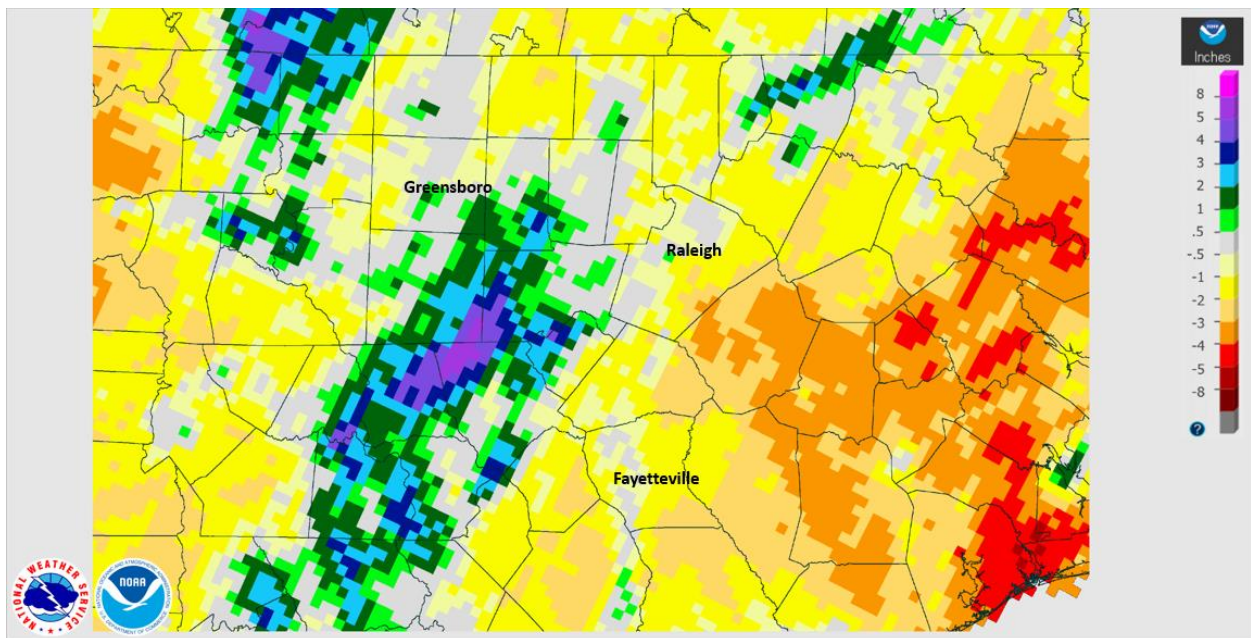
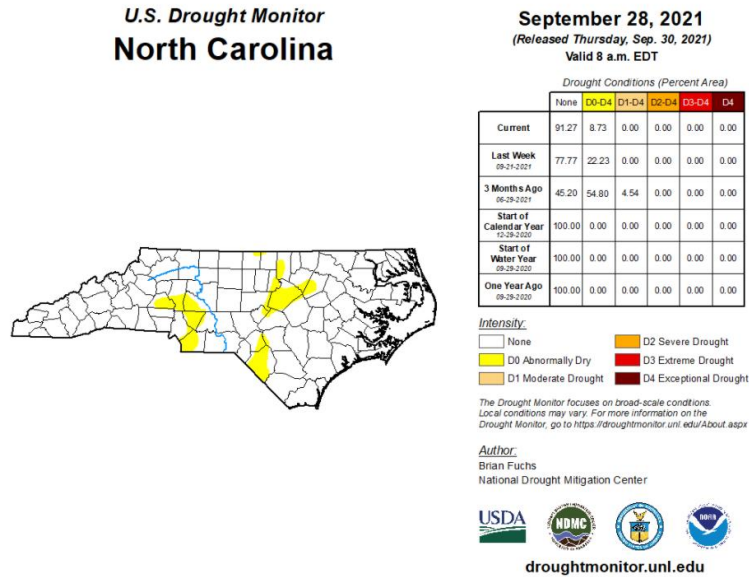


Fig. 8: Radar-Estimated Monthly Departure from Normal Precipitation



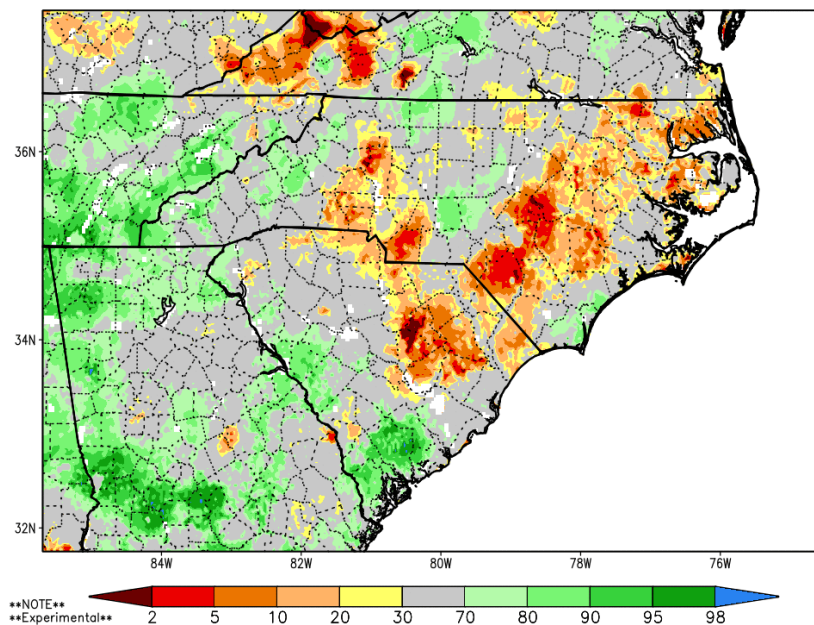
The lack of rainfall meant abnormally dry conditions expanded or returned to scattered portions of central NC through mid-September, decreasing by the end of the month thanks to the third rainfall event (Figure 9). Drought concerns continued to be low due to the arrival of cooler fall temperatures.

Fig. 9: U.S. Drought Monitor for North Carolina on September 28



The rainfall on the 21st and 22nd also resulted in improvements to soil moisture across NC compared to the end of August, as shown in Figure 10.

Fig. 10: NASA SPoRT-LIS 0-100 cm Soil Moisture percentile valid 9/30/21



Other notes:

Days with thunderstorms this month:

Greensboro: 3
Raleigh: 2
Fayetteville: 1

Days with dense fog (visibility of $\frac{1}{4}$ mile or less):

Greensboro: 1
Raleigh: 0
Fayetteville: 1

Strongest wind gusts and direction:

Greensboro: SW at 36 mph on September 8 (thunderstorm)
Raleigh: SW at 38 mph on September 1 (thunderstorm)
Fayetteville: SW at 50 mph on September 8 (thunderstorm)

Daily records:

Greensboro:

None.

Raleigh:

None.

Fayetteville:

A daily record high minimum temperature of 77°F was tied on September 1. This record was last set in 2020.

A daily record high minimum temperature of 74°F was tied on September 17. This record was last set in 2018.

Monthly records:

Greensboro:

None.

Raleigh:

None.

Fayetteville:

None.