

June 2023 Central NC Climate Summary

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June continued the cool start to the summer.

June 2023 continued the slow start to the summer heat, which most people are not complaining about. The rainfall returned to near to above normal at most reporting stations. According to preliminary data from NCEI, the statewide temperature averaged 71.1°F, which ranked as the 13th-coolest June in the 129 years of official records. This was due to persistent upper-level troughing and northerly or northwesterly winds. As for central NC, all three climate sites were cooler than normal, by 2-5°F. The monthly average temperatures and their departures from normal at the three climate sites are depicted in Table 1. Greensboro still hasn't reached 90°F this year through the end of June, which is only the 5th time this happened since records began in 1903. Greensboro also tied for its 7th-coolest June on record, and it was the coolest June there since 1997.

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)	80.3	61.0	70.7	-4.6	89 on 6/30	50 on 6/9
Raleigh-Durham (RDU)	86.1	63.5	74.8	-1.9	94 on 6/16, 6/18 and 6/26	50 on 6/9
Fayetteville (FAY)	86.2	65.0	75.6	-2.7	92 on 6/25 and 6/26	54 on 6/10

Figure 1 shows the daily high and low temperatures at the three climate sites during June. The coolest days in the month occurred after a cold front passed on June 9 and 10. Both Greensboro and Raleigh recorded a monthly low temperature of 50°F on June 9, while Fayetteville recorded its monthly low of 54°F on June 10. In addition, on a cool and rainy day on June 22, Greensboro recorded a high of only 68°F. This was 19°F below normal and tied a daily record low maximum temperature that was originally set back in 1918. Summer warmth did return as the hottest days, when temperatures reached the upper-80s to mid-90s, were in the last week of the month. However, even these highs were only slightly above normal.

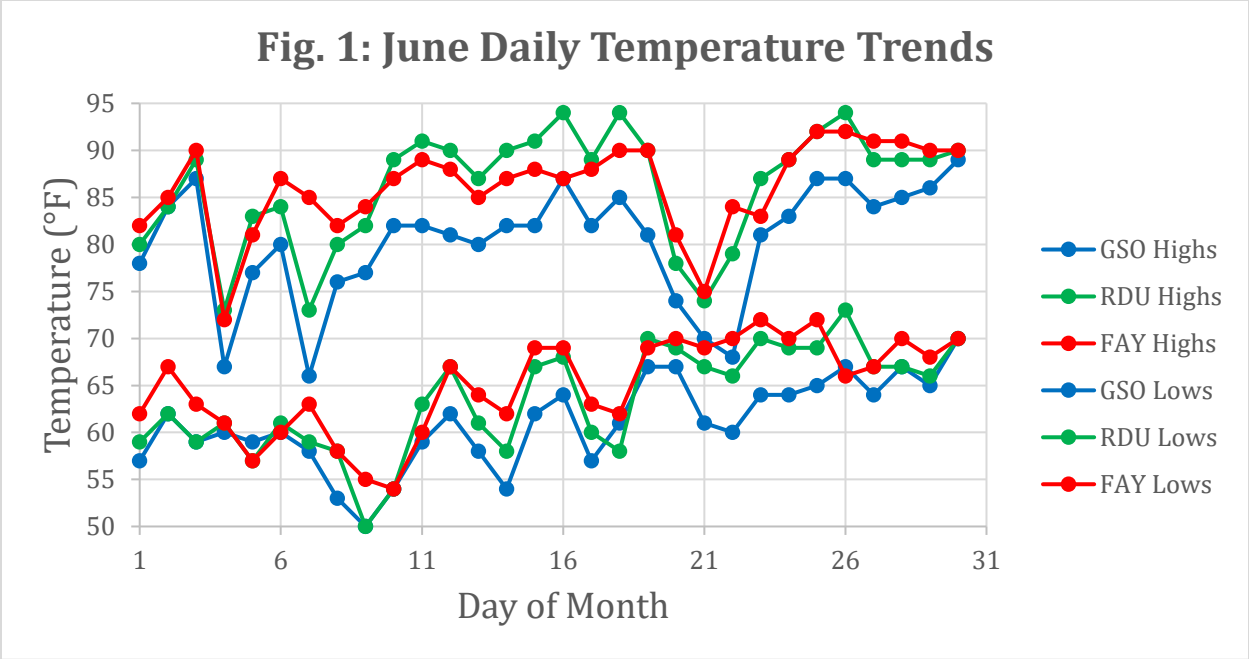
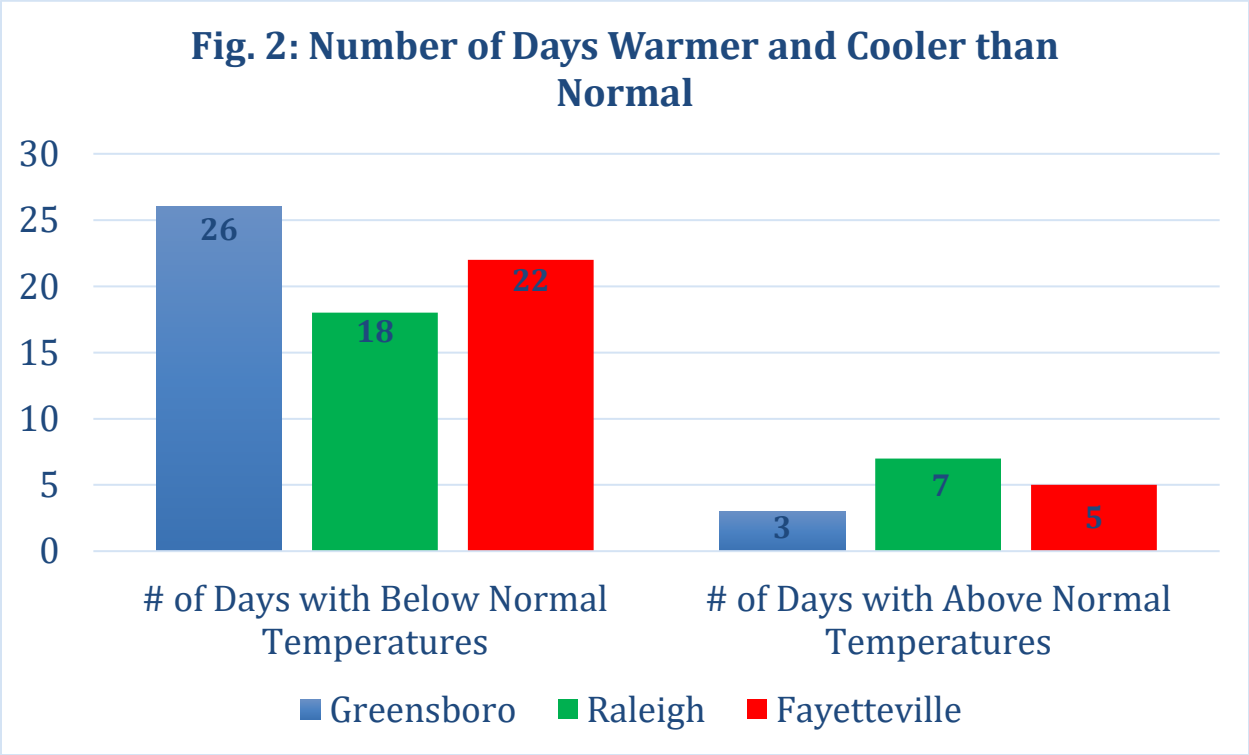
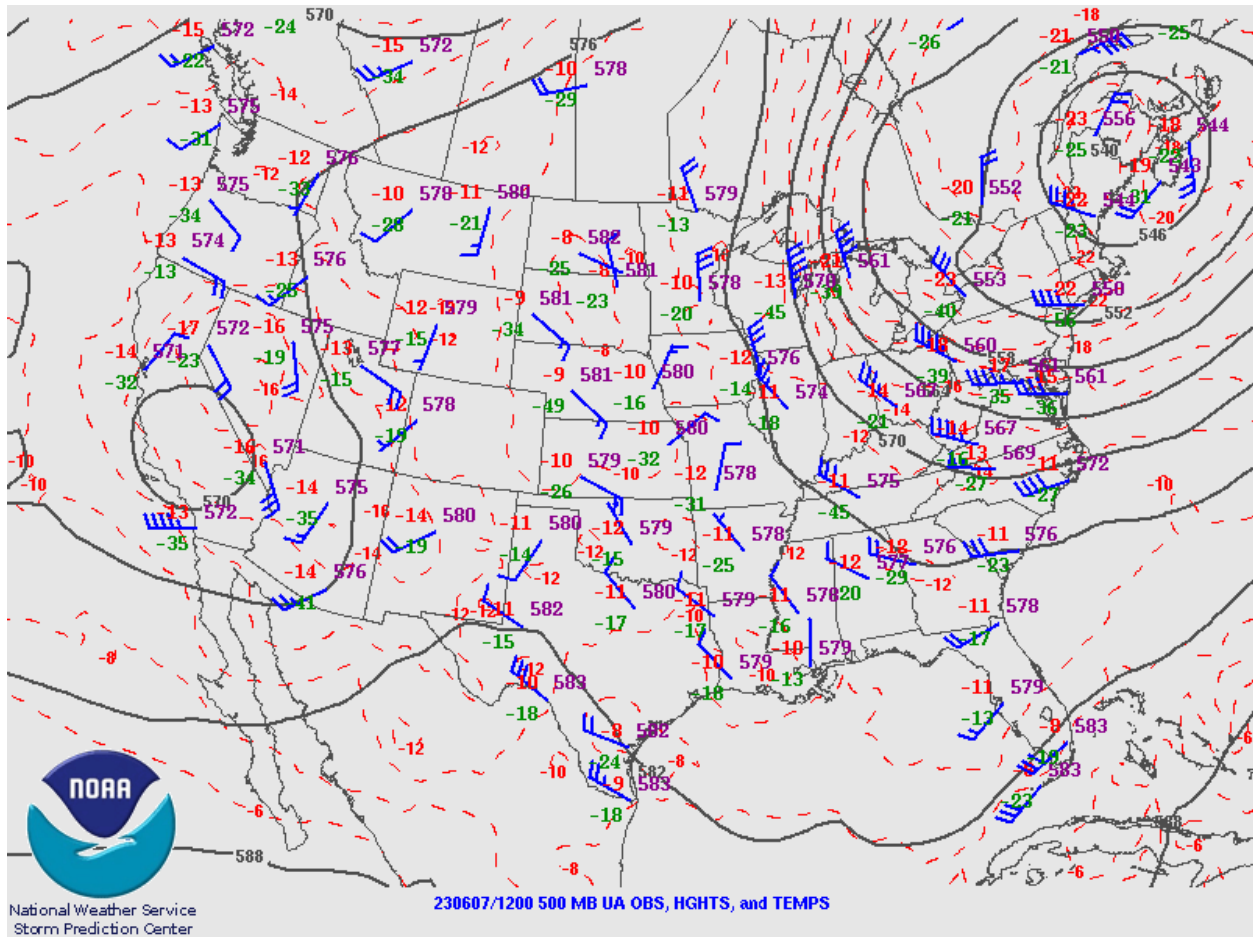


Figure 2 shows that the majority of days in the month of June were cooler than normal at all three climate sites. At Greensboro, a whopping 26 of the 30 days (or nearly 90%) had below-normal temperatures. This shows how persistent the cool conditions were throughout the month, rather than just one very cool period that brought down the averages.



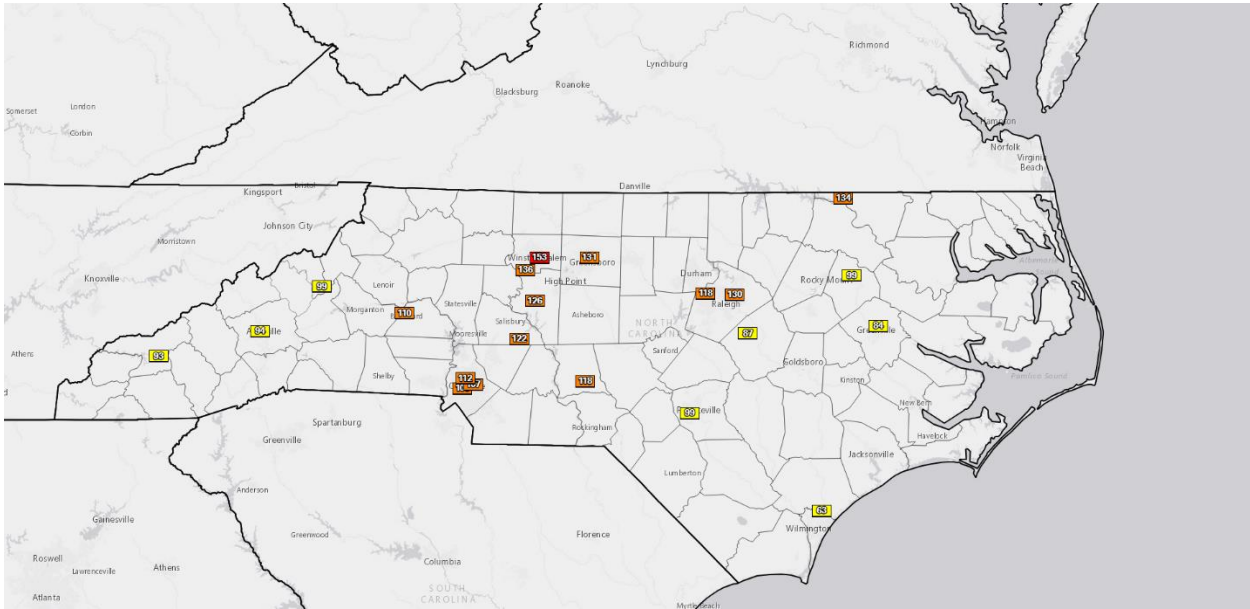
The “system of the month” was the upper-level low pressure system that developed off the New England coast the first week of June. This system brought N-NW winds and cool temperatures to NC in early June. It also was responsible for funneling smoke into the state from the Canadian wildfires. Figure 3 shows the 500 MB chart from June 7 at 800 AM. Note the flow was from the NW directly from the Ontario wildfires at that time.

Fig. 3: 500 mb Analysis at 12z on June 7, 2023



Fine particulate matter (PM_{2.5}) from this smoke resulted in poor air quality at times across central NC during June, particularly during the second week and again at the end of the month. According to the NC State Climate Office, the Millbrook air quality monitor in Raleigh recorded four days in the Code Orange range during June. The last time this happened was July 2012. As shown in Figure 4, the daily average PM_{2.5} concentration at Winston-Salem was in the Code Red (or Unhealthy) range. According to the NC State Climate Office, this was the first Code Red day there since June 30, 2012, and that day was due to elevated ozone levels. The last time Winston-Salem had a Code Red day for fine particulate matter was June 13, 2008 from a fire burning in eastern NC.

Fig. 4: Average Air Quality Index from PM2.5 on June 29, 2023



June 2023 turned wetter than normal for most of the region. According to NCEI, the NC statewide average rainfall was 4.59 inches. This made it the 57th-wettest June in the past 129 years. However, there were some areas of north-central and northeast NC that remained rather dry. According to the NC State Climate Office, the 1.24 inches that fell at Tarboro made it the 4th-driest June on record there. Roanoke Rapids only had 1.68 inches. As shown in Table 2, the final rainfall tallies for June 2023 at Greensboro and Raleigh were just over 3 inches, which was slightly drier than normal. Fayetteville, meanwhile, had nearly 6 inches, or slightly above normal.

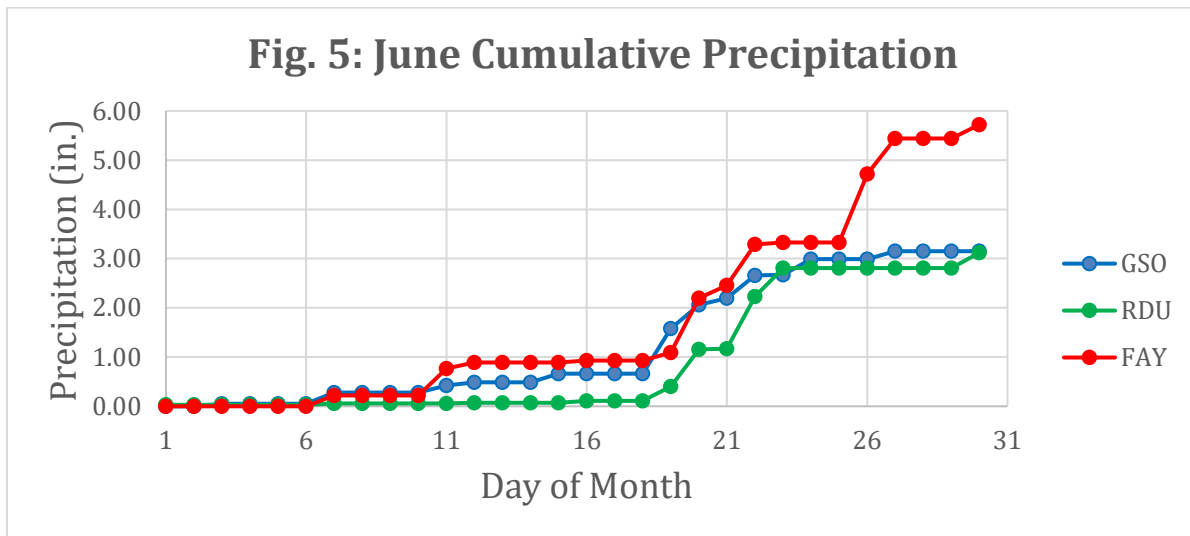
Table 2: Monthly Precipitation Statistics

Site	Total precipitation (in.)	Departure from Normal (in.)	Max Daily Precipitation (in.)
Greensboro (GSO)	3.15	-0.94	0.92 on 6/19
Raleigh-Durham (RDU)	3.12	-0.77	1.06 on 6/22
Fayetteville (FAY)	5.72	+0.83	1.39 on 6/26

Some of the cooperative station rainfall reports from around central NC from June 2023 included: Sparta 7.18 inches (+3.31), Lexington 4.69 inches (+0.51), Winston-Salem 3.86 inches (+0.22), Burlington 4.00 inches (-0.28), Mount Airy 4.87 inches (-0.08), Danbury 4.10 inches (-

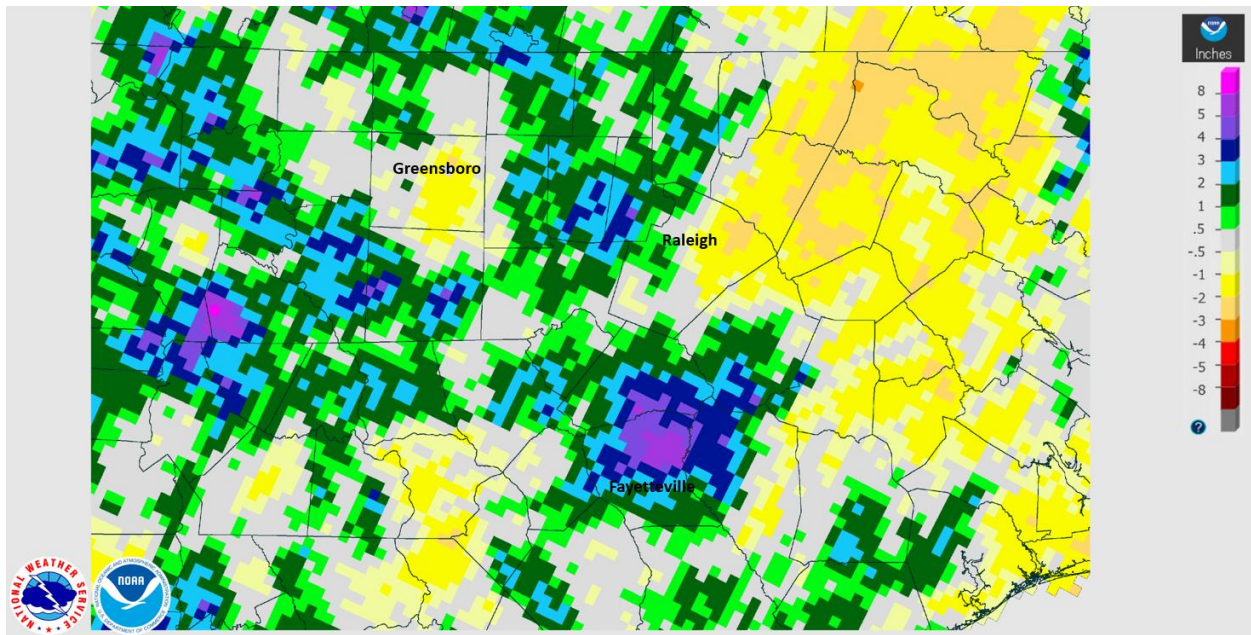
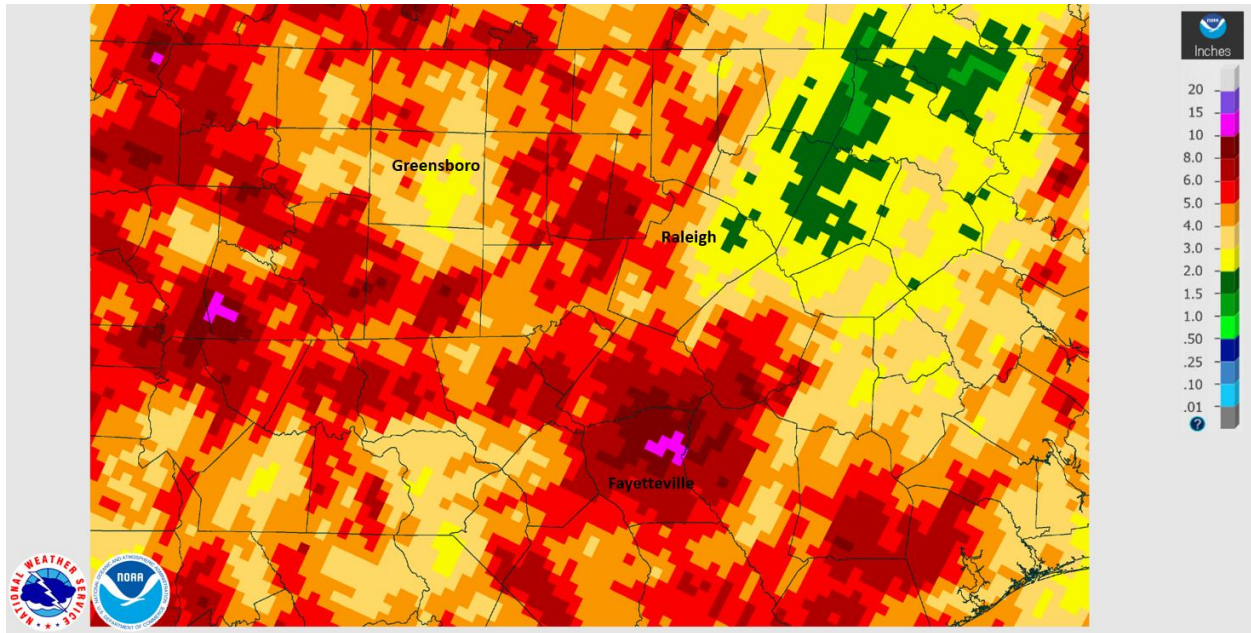
0.07), Yanceyville 4.33 inches (+0.11), Eden 4.06 inches (-0.43), Henderson 4.94 inches (+0.46), Carthage 5.19 inches (+0.69), Cary 5.28 inches (+0.69), Raleigh (NCSU) 3.21 inches (-1.66), Louisburg 1.68 inches (-3.02), Apex 4.40 inches (+0.07), Chapel Hill 5.28 inches (+1.20), Jackson Springs 3.70 inches (-0.66), Clayton 3.75 inches (-0.46), Laurinburg 6.48 inches (+1.47), Rocky Mount 1.68 inches (-2.22), Tarboro 1.24 inches (-3.03), and Clinton 4.57 inches (-0.05).

The cumulative precipitation at the three climate sites for June is shown in Figure 5. The beginning of the month was very dry, as Raleigh only had 0.11 inches from the 1st through the 18th. Greensboro only had 0.66 inches during that period, and Fayetteville had 0.93 inches. However, an upper-level low pressure system quickly ended the dryness, with heavy rain across much of the region from June 19-23.



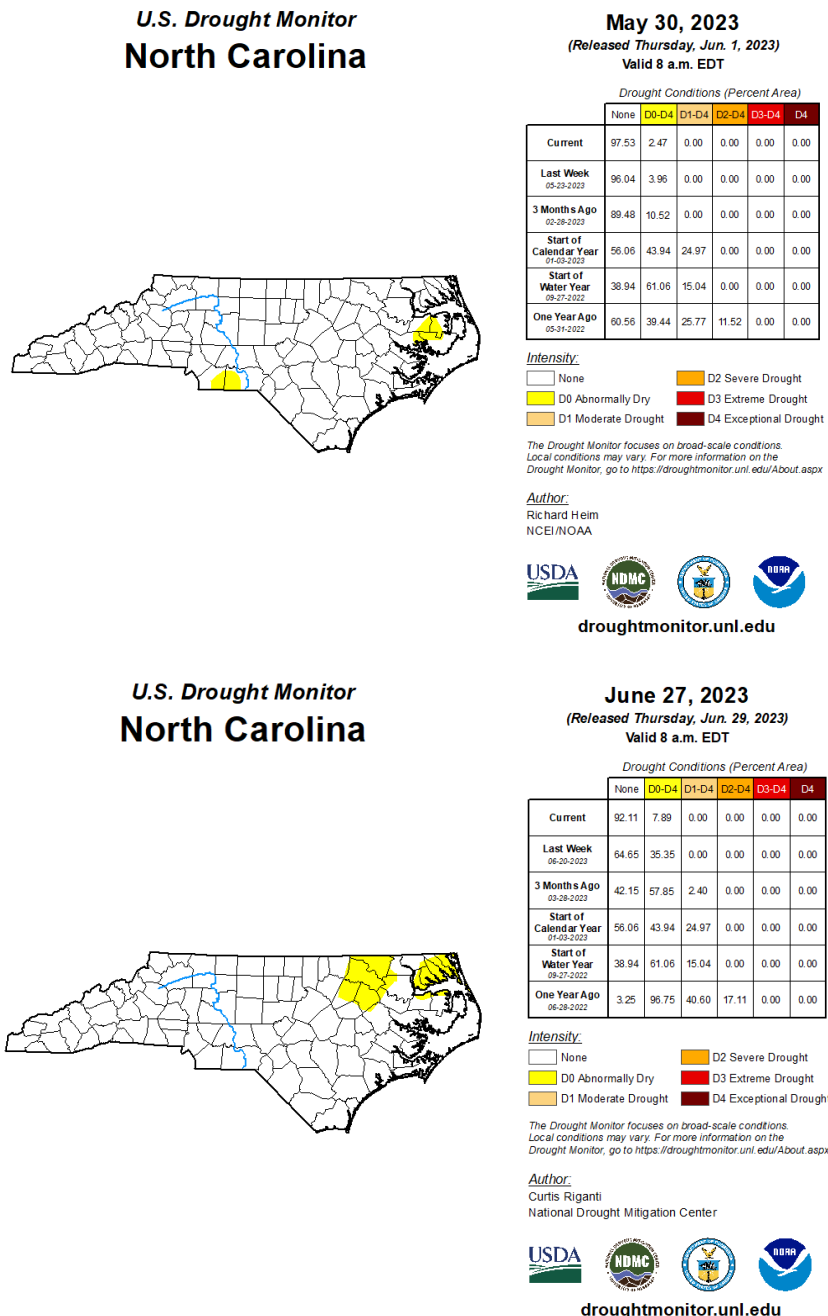
As shown by the radar-estimated precipitation and radar-estimated precipitation departure from normal in Figure 6, the final monthly totals varied widely over short distances, as is typically the case with summertime convection. Some areas, particularly northeast of Raleigh, only received 1-3 inches (1-3 inches below normal). Others to the south and west, including parts of the Triangle, western Piedmont, and Sandhills received 5-8 inches, locally even higher than that.

Fig. 6: Radar-Estimated Monthly Precipitation (top) and Departure from Normal Precipitation (bottom)



The US Drought Monitor maps from late May 2023 and late June 2023 are shown in Figure 7. The D0 (Abnormally Dry) conditions expanded across the northern Coastal Plain due to the below-normal precipitation there. However, there was enough rain in the southern Piedmont to remove the D0 conditions in that area. There were still no drought conditions (D1 or above) anywhere in the state.

Fig. 7: US Drought Monitor for NC on May 30 (top) and June 27 (bottom)



Other notes:

Days with thunderstorms this month:

Greensboro: 6

Raleigh: 7

Fayetteville: 9

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

Greensboro: 1

Raleigh: 1

Fayetteville: 1

Strongest wind gusts and direction:

Greensboro: W (260 degrees) at 34 mph on June 14

Raleigh: SW (210 degrees) at 42 mph on June 26

Fayetteville: E (100 degrees) at 42 mph on June 19

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

Greensboro: 0

Raleigh: 10

Fayetteville: 9

Daily records:

Greensboro:

A daily record low maximum temperature of 68°F was tied on June 22. The record was previously set in 1918.

Raleigh:

None.

Fayetteville:

None.

Monthly records:

Greensboro:

June 2023 was tied for the 7th-coolest June on record, with an average monthly temperature of 70.7°F.

Raleigh:

None.

Fayetteville:

None.