

December 2022 Central NC Climate Summary

By Phillip Badgett and James Danco

December was highlighted by an Arctic blast.

December 2022 will be remembered for the Arctic cold front that blasted through the region on December 23, with very cold temperatures through the 26th. Temperatures plunged into the single digits and teens over central NC during this period. On the morning of December 24, readings fell to 5°F at Greensboro, 10°F at Raleigh, and 15°F at Fayetteville. The last time Greensboro got that cold was on January 7, 2014, and you have to go all the way back to January 28, 2000 to find a temperature there that dropped below 5°F. It was Raleigh's coldest temperature since January 18, 2018 and Fayetteville's coldest since January 8, 2018. Unfortunately for snow lovers, this Arctic air did not bring any accumulations of snow with it. However, this made the cold even more impressive and unusual, as many times the coldest temperatures across our region (such as in January 2000 and January 2018) are aided by snow cover, which was not in place at all for this event. This cold outbreak was short-lived as Arctic high pressure shifted off the coast on the 27th, allowing for a moderating trend in temperatures through the end of the month.

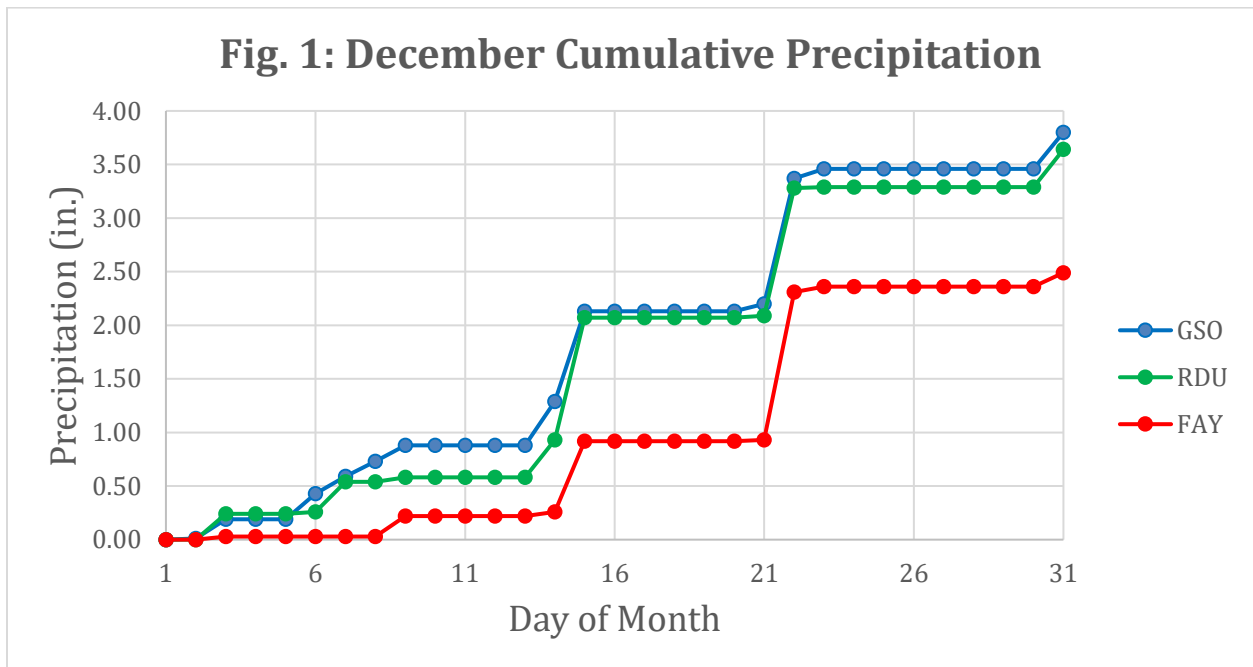
Rainfall events continued to be more common and heavier in December over the western and northern sections of central NC, namely the Piedmont. Rainfall was less common in the south and east, including the Coastal Plain and Sandhills. The main storm track continued to be west of the Appalachians, allowing for a continued improvement in soil moisture levels and drought conditions over the western third of NC. There still needed to be significant rainfall events in the south and east to help with the ongoing drought there, but December brought below-normal rainfall in those areas. A coastal low on December 22 at least helped cut into the rainfall deficits there. According to preliminary data from NCEI, the state of NC had an average rainfall of 3.10 inches. This made it the 51st-driest December since 1895. The final tallies for December 2022 from the three main climate reporting sites are shown in Table 1. Greensboro and Raleigh were slightly wetter than normal, and Fayetteville was slightly drier than normal.

Table 1: Monthly Precipitation Statistics

Site	Total precipitation (in.)	Departure from Normal (in.)	Max Daily Precipitation (in.)
Greensboro (GSO)	3.80	+0.63	1.17 on 12/22
Raleigh-Durham (RDU)	3.64	+0.25	1.19 on 12/22
Fayetteville (FAY)	2.49	-0.48	1.38 on 12/22

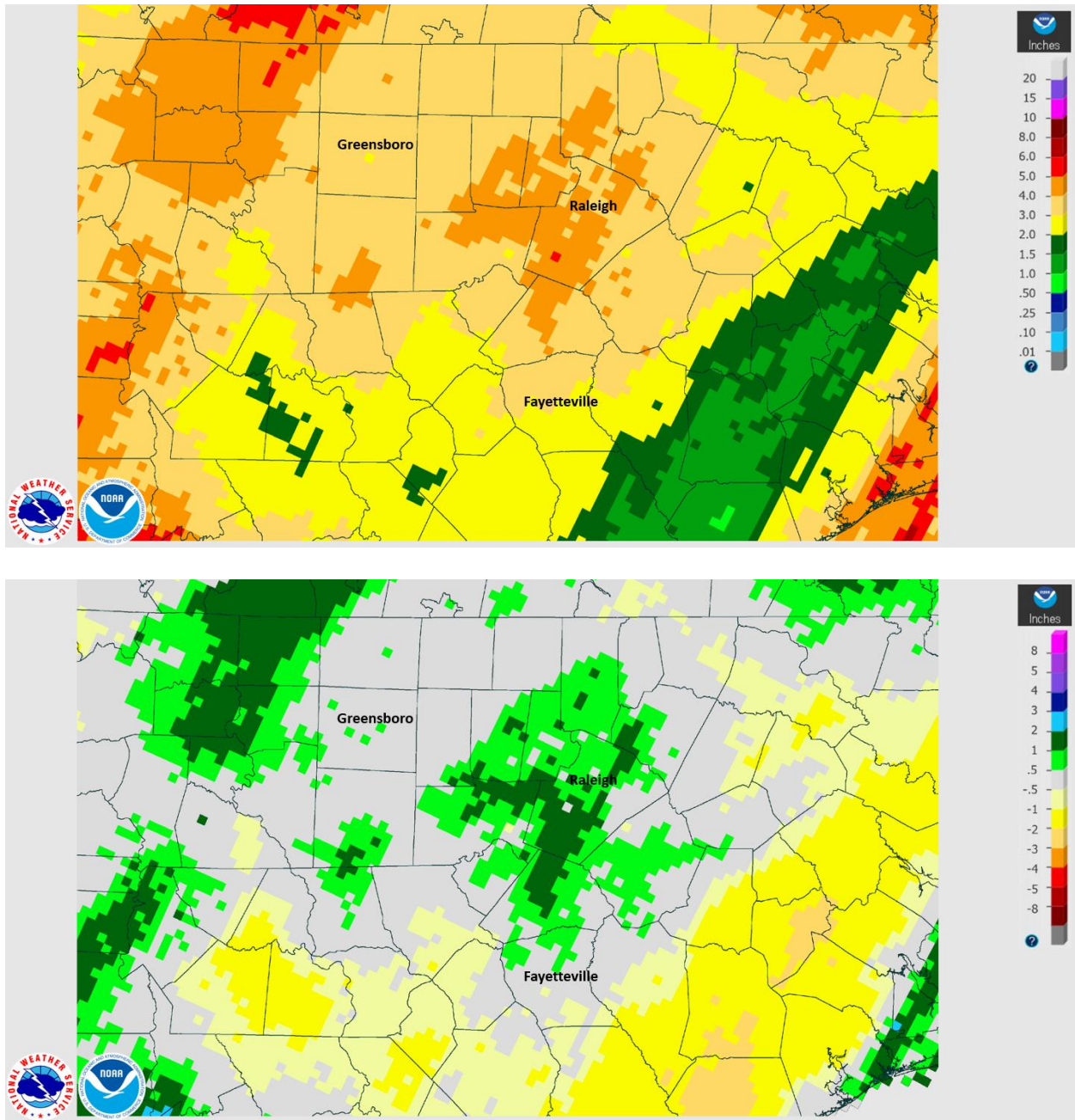
Some of the cooperative station reports from around central NC in December 2022 included: Sparta 3.44 inches, Lexington 3.11 inches, Winston-Salem 3.72 inches, Mount Airy 4.20 inches, Danbury 4.74 inches, Yanceyville 3.86 inches, Eden 3.80 inches, Henderson 3.28 inches, Carthage 2.96 inches, Cary 2.90 inches, Raleigh (NCSU) 3.88 inches, Louisburg 3.86 inches, Apex 3.95 inches, Chapel Hill 4.05 inches, Jackson Springs 3.01 inches, Clayton 3.34 inches, Laurinburg 1.55 inches, Rocky Mount 2.51 inches, Tarboro 3.08 inches, and Clinton 1.61 inches.

The cumulative precipitation at the three climate sites for the month of December is shown in Figure 1. Precipitation was fairly evenly distributed throughout the month at Greensboro and Raleigh, while most of Fayetteville’s rain fell on the 22nd. Only 0.22 inches of rain fell at Fayetteville during the first 13 days of the month.



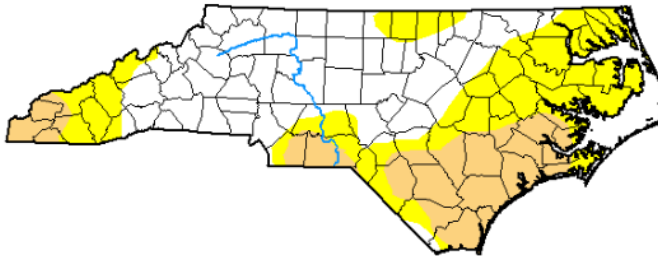
The radar-estimated precipitation and radar-estimated precipitation departure from normal for the month are shown in Figure 2. The northern Piedmont generally had about 3-5 inches, which was near to 1-2 inches above normal. The highest amounts were around the Triangle region and Winston-Salem. Much of the southern Piedmont, Sandhills and Coastal Plain only received 1-3 inches which was near to 1-2 inches below normal.

Fig. 2: Radar-Estimated Monthly Precipitation (top) and Departure from Normal (bottom)



As depicted in Figure 3, the US Drought Monitor maps from early December 2022 and from later in the month indicate the last of the D0 (Abnormally Dry) conditions was eliminated in the northern Piedmont. However, the southern and eastern zones continued in D0 and D1 (Moderate Drought) conditions as systems passed by to the northwest.

Fig. 3: US Drought Monitor for NC on December 6 (top) and December 27 (bottom)



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	46.38	53.62	21.11	0.00	0.00	0.00
Last Week <i>11-29-2022</i>	42.95	57.05	22.72	2.50	0.00	0.00
3 Months Ago <i>09-06-2022</i>	61.72	38.28	0.00	0.00	0.00	0.00
Start of Calendar Year <i>01-04-2022</i>	2.84	97.16	60.20	2.76	0.00	0.00
Start of Water Year <i>09-27-2022</i>	38.94	61.06	15.04	0.00	0.00	0.00
One Year Ago <i>12-07-2021</i>	1.27	98.73	79.46	51.24	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

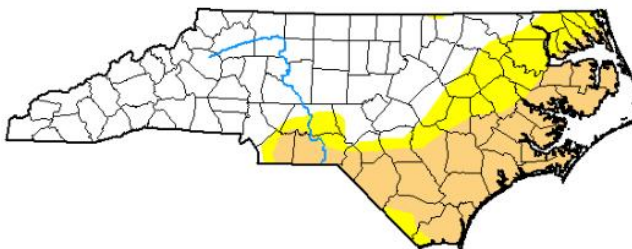
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

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droughtmonitor.unl.edu



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	56.06	43.94	28.07	0.00	0.00	0.00
Last Week <i>12-20-2022</i>	53.71	46.29	28.07	0.00	0.00	0.00
3 Months Ago <i>09-27-2022</i>	38.94	61.06	15.04	0.00	0.00	0.00
Start of Calendar Year <i>01-04-2022</i>	2.84	97.16	60.20	2.76	0.00	0.00
Start of Water Year <i>09-27-2022</i>	38.94	61.06	15.04	0.00	0.00	0.00
One Year Ago <i>12-28-2021</i>	0.70	99.30	86.81	41.64	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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As for temperatures, December featured a mild start followed by a cold period in the middle of the month from December 12-28 when most days were below normal. This cold spell peaked on December 24 when an Arctic blast affected much of the eastern US including NC. Temperatures fell into the single digits and teens over central NC, with widespread wind chills in the single digits above zero to single digits below zero. Raleigh tied a daily record low maximum temperature on December 24, with a high of just 29°F. This occurred after the low fell to 10°F. Greensboro set a daily record low maximum temperature of 26°F on December 24. This occurred after the low fell to 5°F. In addition, Fayetteville recorded a high of only 30°F on December 24. Daily average temperatures on the 24th were 20-25°F below normal. A surface analysis as the Arctic front is passing through NC on the morning of 12/23 is shown in Figure 4, and a map of low temperatures on 12/24 from the NC State Climate office is noted in Figure 5. Temperatures were still quite cold on Christmas Day, with lows in the teens on Christmas morning and only reaching the mid-30s to lower-40s during the afternoon. The end of the month quickly turned very mild as the cold high shifted offshore, with highs back into the 60s and 70s.

Fig. 4: WPC Surface Analysis at 12z on 12/23

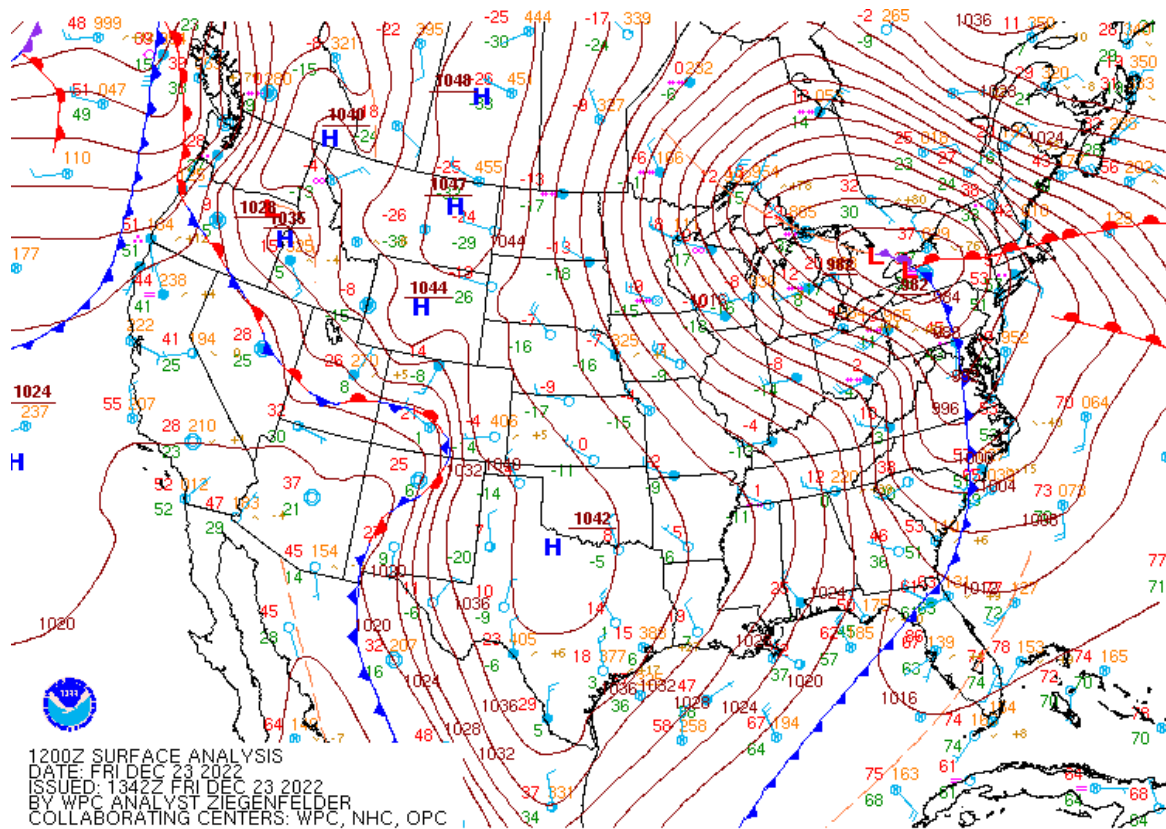
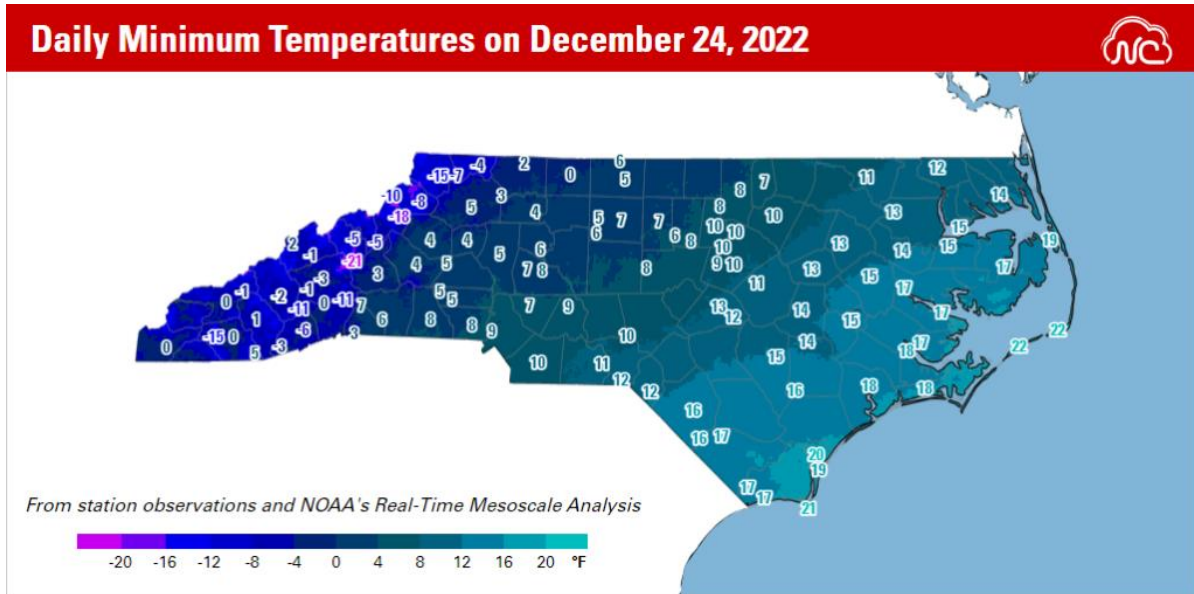


Fig. 5: Daily Minimum Temperatures on December 24, 2022



By month's end, temperatures averaged nearly 3°F below normal at Greensboro and 1-1.5°F below normal at Raleigh and Fayetteville (Table 2). This was greatly skewed by the Christmastime cold outbreak, as they would have been near or slightly above normal otherwise. The preliminary monthly temperatures across the whole state of NC averaged 41.6°F according to NCEI, which ranked December 2022 as the 61st-coldest since 1895 (just slightly cooler than the median). Raleigh and Greensboro both finished the month with 17 days with nighttime lows at or below 32°F, while Fayetteville had 13 such days. Peak winds for the month were found on December 23 along and just ahead of the Arctic cold front. Greensboro reported a peak gust of 50 mph from the west, Raleigh reported a gust to 53 mph from the SW, and Fayetteville reported a gust to 55 mph from the SW.

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)	48.6	31.0	39.8	-2.7	66 on 12/30	5 on 12/24
Raleigh-Durham (RDU)	53.0	33.4	43.2	-1.4	72 on 12/30	10 on 12/24
Fayetteville (FAY)	55.9	35.2	45.5	-1.0	73 on 12/30	15 on 12/24

The time series of daily temperature for the month at Greensboro, Raleigh, and Fayetteville can be found in Figure 6. The sharp drop in temperatures around Christmas is evident, followed by the very sharp rise in temperatures after that. Highs on the 30th were 40-45°F warmer than they were six days earlier on the 24th.

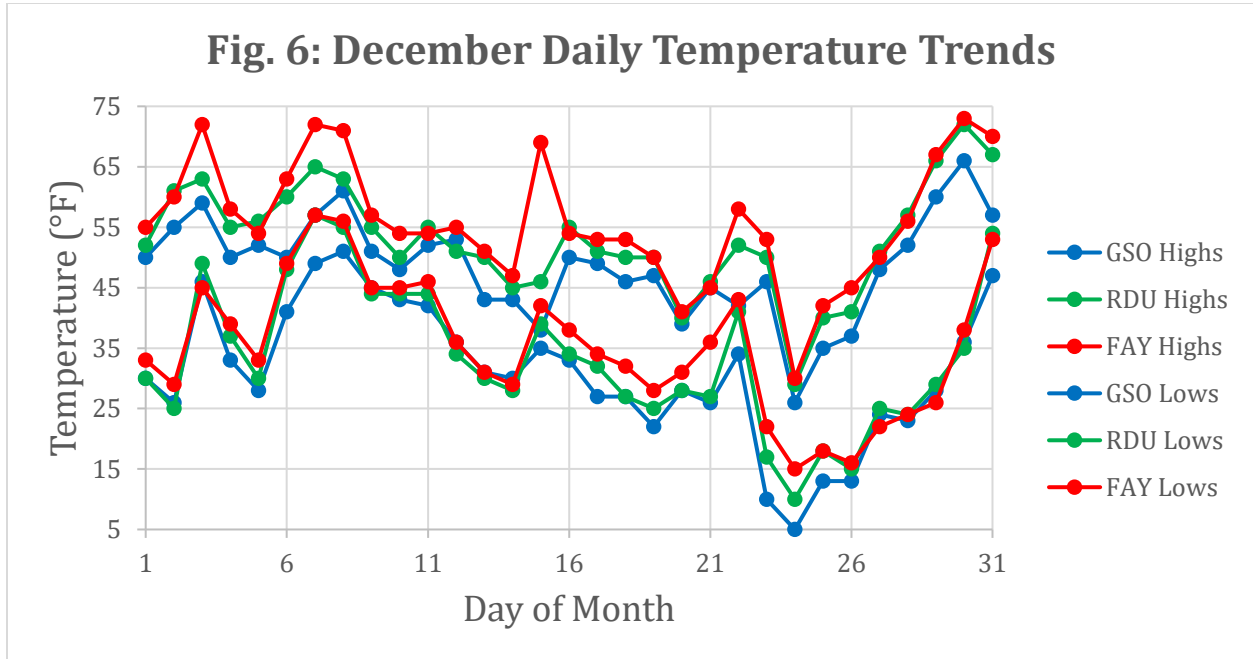
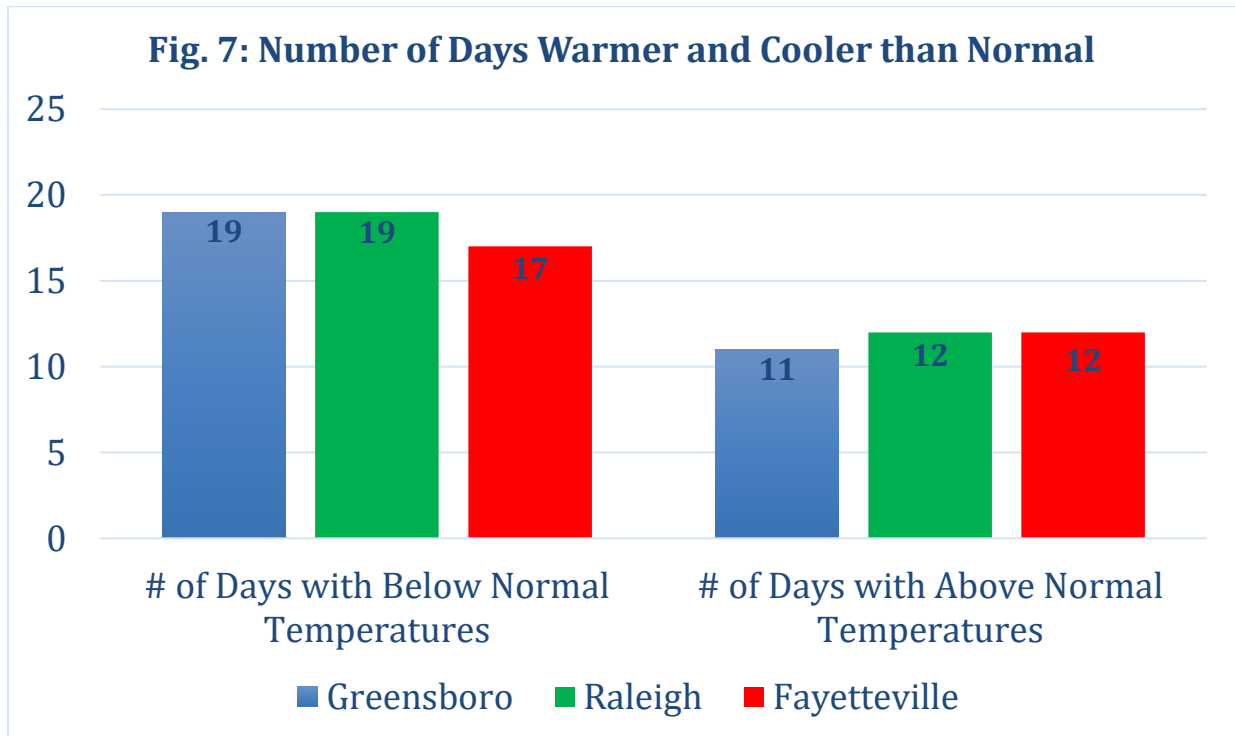


Figure 7 shows that a majority of days in the month of December were cooler than normal at all three climate sites.



Other notes:

Days with thunderstorms this month:

Greensboro: 0
Raleigh: 0
Fayetteville: 1

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

Greensboro: 6
Raleigh: 3
Fayetteville: 3

Strongest wind gusts and direction:

Greensboro: W (290 degrees) at 50 mph on December 23
Raleigh: SW (230 degrees) at 53 mph on December 23
Fayetteville: SW (230 degrees) at 55 mph on December 23

Daily records:

Greensboro:

A record low maximum temperature of 26°F was set on December 24. This broke the record of 28°F set in 1943.

Raleigh:

A record low maximum temperature of 29°F was tied on December 24. This record was previously set in 1943.

Fayetteville:

A record rainfall of 1.38 inches was tied on December 22. This record was previously set in 2015.

Monthly records:

None at all three climate sites.