



# Temperature Unit



The following pages are needed for students investigating **Temperature**.

Each student will need an investigation notebook.

You can choose to print evidence for each student, or one or two copies for students to look at together.

The evidence following the notebook are all primary sources, such as forecasted wind speeds from weather models and observed wind speed recorded during the fire.

Directions and handouts for all students are [here](#).

Notebook and evidence for Wind is [here](#).

Notebook and evidence for Forecasts is [here](#).

Notebook and evidence for Precipitation is [here](#).



What evidence was most helpful in your investigation?

What evidence was most helpful in your investigation?



**Put it all together: Tell the story of Temperature and the Marshall Fire.**

Name \_\_\_\_\_

[illegible]

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**Temperature** = the degree of hotness or coldness

How does temperature impact fire risk?

**Look at Climatological Data for Boulder in December, 2021.** Days with a positive “departure” number were warmer than the average temperature for that day compared to other years. Days with a negative “departure” were colder compared to the same day in other years.

How many days in December 2021 were warmer than normal?

How many days in December 2021 were colder than normal?

How do you think temperatures in December 2021 affected fire risk?

Forecasters think about temperature, humidity and wind when they issue Red Flag Days. Was a Red Flag Day issued on December 30th?

Why or why not?

### **Find Boulder County on the County Maximum**

**Temperature Ranks maps.** These maps show how the average high temperature for each month in 2021 compares to average high temperature for that month using all the years from 1895-2021.

Look at the maps from June-December. How many months was Boulder County high temperature warmer than normal?

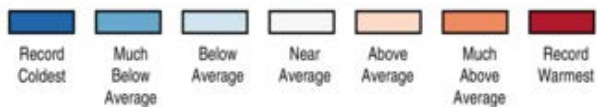
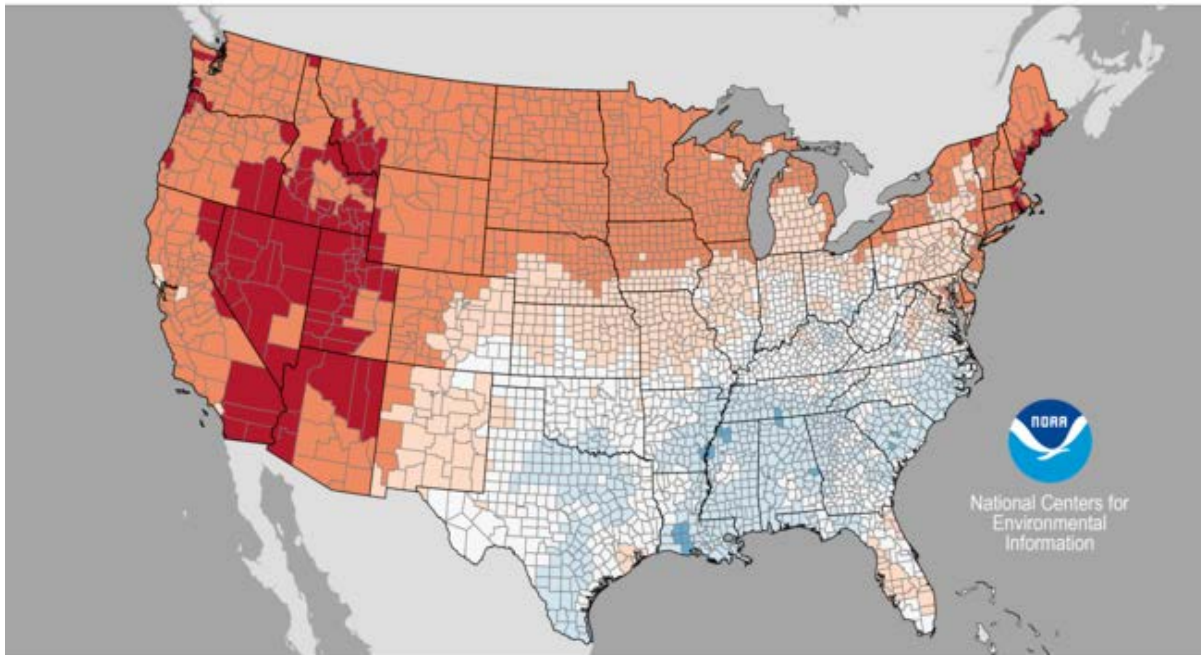
How many months was Boulder County high temperature colder than normal?

**Look at the temperature and precipitation graph.** This graph compares the amount of temperature and precipitation from June-December in 2021 with the same months in other years. How did 2021 compare with other years?

## County Maximum Temperature Ranks

June 2021

Period: 1895–2021



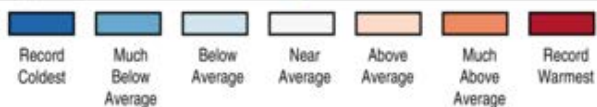
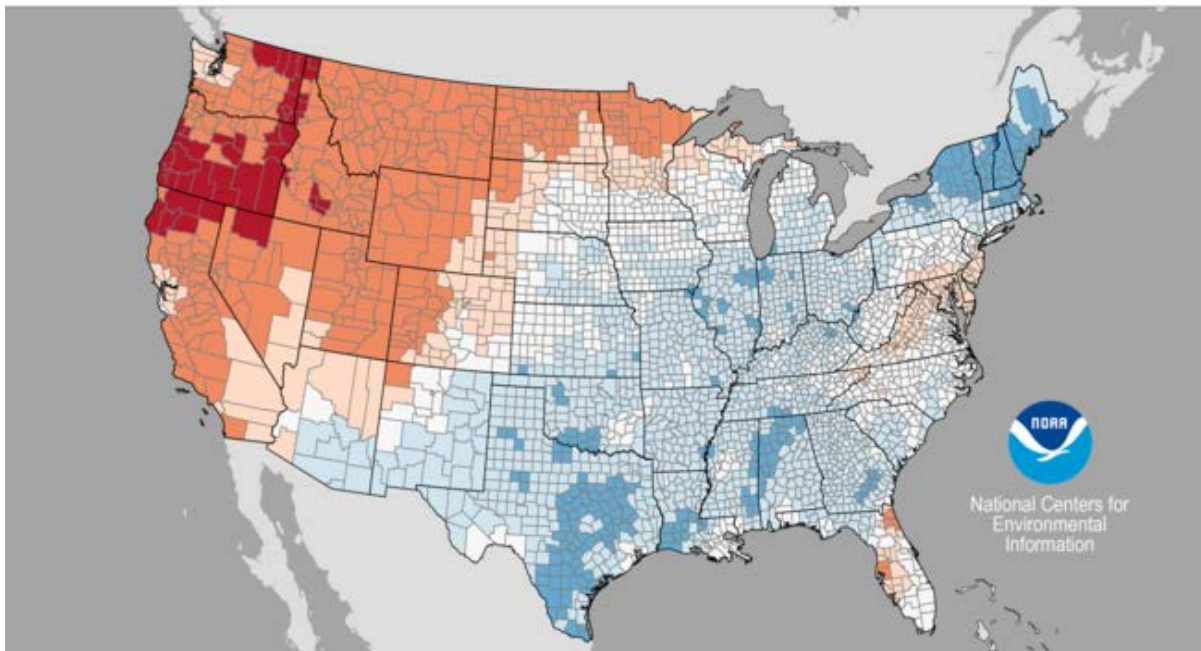
Wed Jul 07 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

July 2021

Period: 1895–2021



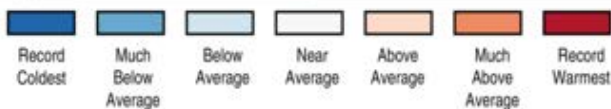
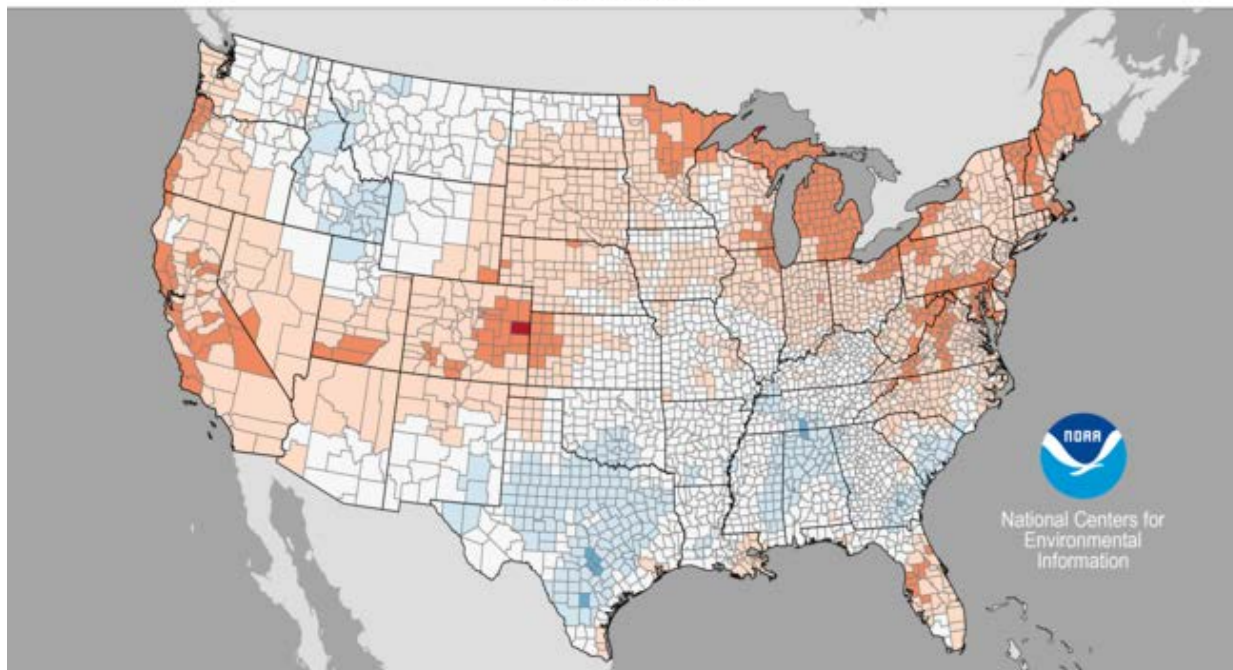
Thu Aug 05 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

August 2021

Period: 1895–2021



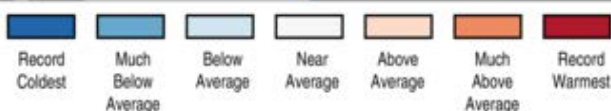
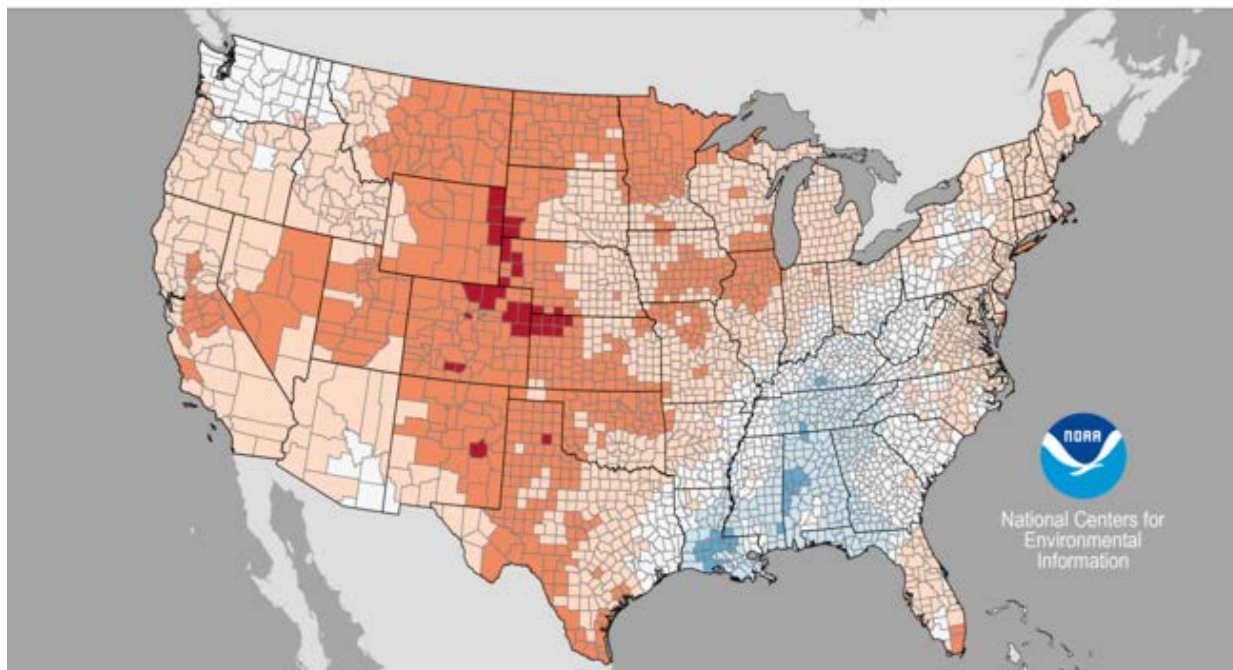
Tue Sep 07 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

September 2021

Period: 1895–2021



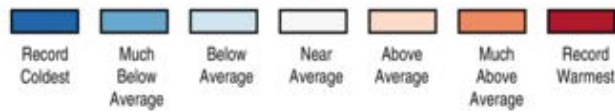
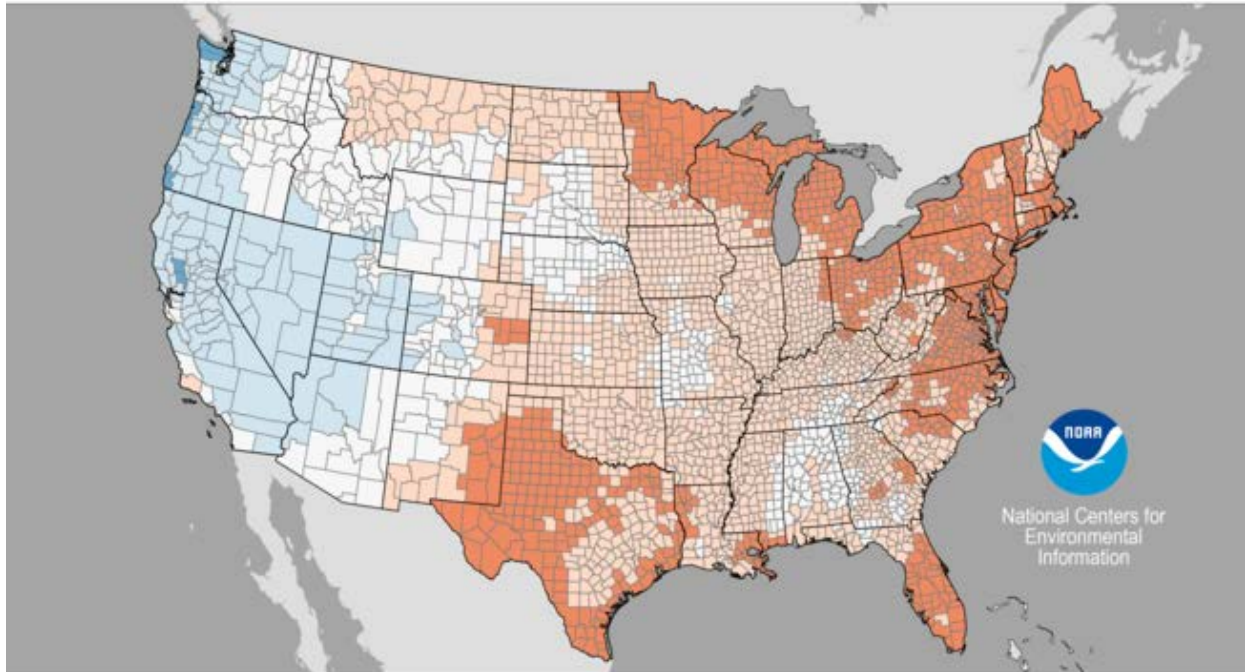
Wed Oct 06 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

October 2021

Period: 1895–2021



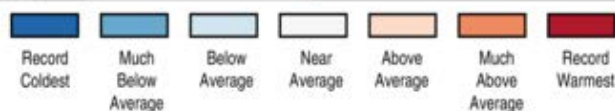
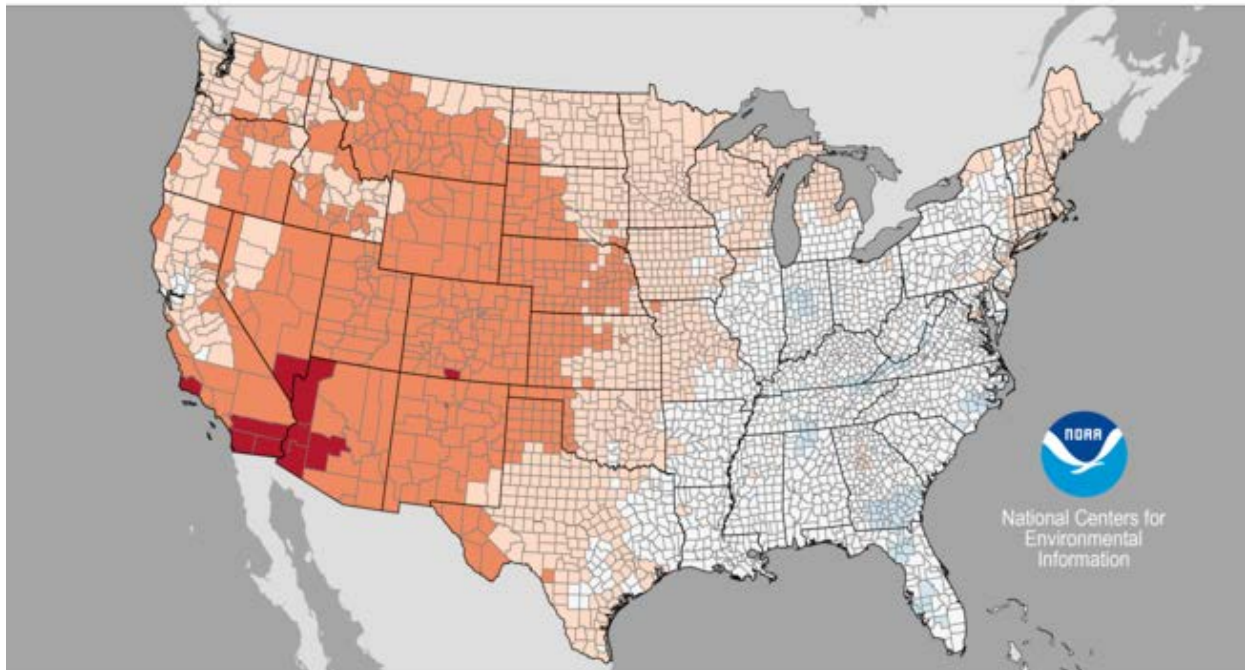
Thu Nov 04 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

November 2021

Period: 1895–2021



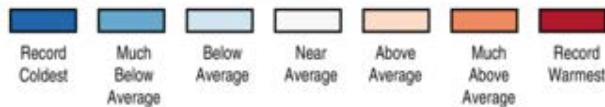
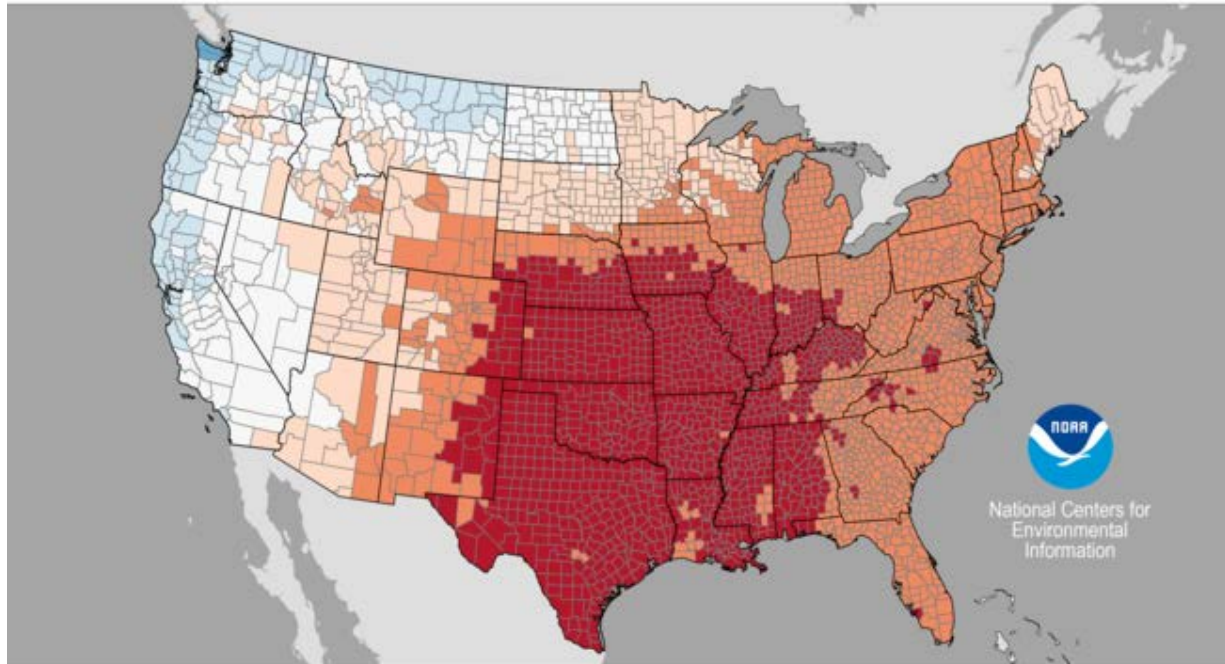
Mon Dec 06 2021

Data Source: nClimGrid

## County Maximum Temperature Ranks

December 2021

Period: 1895–2021



Sat Jan 08 2022

Data Source: nClimGrid



**The official High Temperature at Denver has not fallen to 32 yet!**

2021 is the only year in the last 150 years for the Denver area that hasn't had temperatures remain below freezing for one or more days this far into the winter.

### Top Ten "Lowest High Temperatures" (October 1st through December 29th)

| Rank | Ending Date | Lowest Max Temperature Oct 1 to Dec 29 |
|------|-------------|----------------------------------------|
| 1    | 2021-12-29  | 33                                     |
| 2    | 2010-12-29  | 31                                     |
| -    | 1970-12-29  | 31                                     |
| 4    | 1999-12-29  | 30                                     |
| -    | 1957-12-29  | 30                                     |
| -    | 1910-12-29  | 30                                     |
| 7    | 1994-12-29  | 29                                     |
| -    | 1936-12-29  | 29                                     |
| -    | 1934-12-29  | 29                                     |
| 10   | 1943-12-29  | 28                                     |
| -    | 1933-12-29  | 28                                     |
| -    | 1890-12-29  | 28                                     |

### Climatological Data for BOULDER, CO - December 2021

| Date       | Temperature |         |         |           | HDD | CDD | Precipitation | New Snow | Snow Depth |
|------------|-------------|---------|---------|-----------|-----|-----|---------------|----------|------------|
|            | Maximum     | Minimum | Average | Departure |     |     |               |          |            |
| 2021-12-01 | 72          | 42      | 57.0    | 21.1      | 8   | 0   | 0.00          | 0.0      | 0          |
| 2021-12-02 | 72          | 40      | 56.0    | 20.4      | 9   | 0   | 0.00          | 0.0      | 0          |
| 2021-12-03 | 61          | 33      | 47.0    | 11.7      | 18  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-04 | 69          | 28      | 48.5    | 13.4      | 16  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-05 | 64          | 31      | 47.5    | 12.7      | 17  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-06 | 31          | 14      | 22.5    | -12.1     | 42  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-07 | 56          | 21      | 38.5    | 4.1       | 26  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-08 | 56          | 25      | 40.5    | 6.3       | 24  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-09 | 51          | 38      | 44.5    | 10.5      | 20  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-10 | 42          | 24      | 33.0    | -0.8      | 32  | 0   | 0.09          | 1.0      | 1          |
| 2021-12-11 | 49          | 16      | 32.5    | -1.1      | 32  | 0   | 0.00          | 0.0      | T          |
| 2021-12-12 | 65          | 33      | 49.0    | 15.5      | 16  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-13 | 56          | 28      | 42.0    | 8.6       | 23  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-14 | 62          | 31      | 46.5    | 13.2      | 18  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-15 | 56          | 31      | 43.5    | 10.3      | 21  | 0   | 0.03          | 0.0      | 0          |
| 2021-12-16 | 46          | 31      | 38.5    | 5.4       | 26  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-17 | 45          | 26      | 35.5    | 2.5       | 29  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-18 | 39          | 7       | 23.0    | -10.0     | 42  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-19 | 62          | 18      | 40.0    | 7.0       | 25  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-20 | 62          | 33      | 47.5    | 14.5      | 17  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-21 | 63          | 25      | 44.0    | 11.0      | 21  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-22 | 63          | 32      | 47.5    | 14.5      | 17  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-23 | 63          | 41      | 52.0    | 19.0      | 13  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-24 | 55          | 38      | 46.5    | 13.5      | 18  | 0   | 0.04          | 0.0      | 0          |
| 2021-12-25 | 54          | 34      | 44.0    | 10.9      | 21  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-26 | 52          | 23      | 37.5    | 4.3       | 27  | 0   | T             | T        | 0          |
| 2021-12-27 | 44          | 21      | 32.5    | -0.7      | 32  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-28 | 37          | 23      | 30.0    | -3.3      | 35  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-29 | 33          | 10      | 21.5    | -11.9     | 43  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-30 | 44          | 16      | 30.0    | -3.4      | 35  | 0   | 0.00          | 0.0      | 0          |
| 2021-12-31 | 44          | 25      | 34.5    | 1.0       | 30  | 0   | 0.26          | 4.1      | 4          |
| Sum        | 1668        | 838     | -       | -         | 753 | 0   | 0.42          | 5.1      | -          |
| Average    | 53.8        | 27.0    | 40.4    | 6.7       | -   | -   | -             | -        | 0.2        |
| Normal     | 46.3        | 21.1    | 33.7    | -         | 970 | 0   | 0.81          | 13.0     | -          |

**Observations for each day cover the 24 hours ending at the time given below (Local Standard Time).**

Max Temperature : 5pm

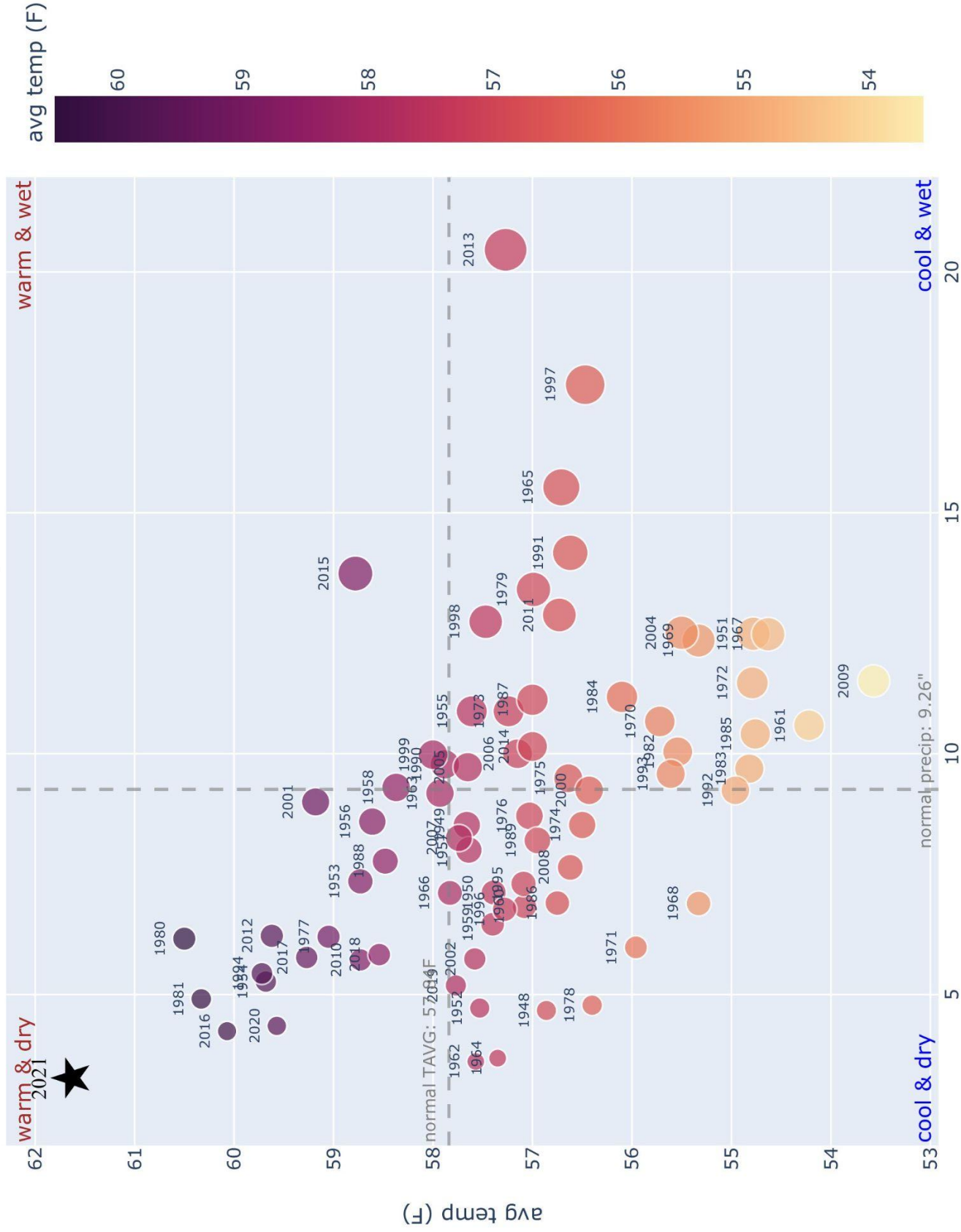
Min Temperature : 5pm

Precipitation : 5pm

Snowfall : unknown

Snow Depth : unknown

# DENVER-CENTRAL PARK temperature and precipitation, June 1 - December 29



size of points proportional to precip,  
color shows temperature  
normals are 1991-2020  
years with fewer than 5 missing days shown

accumulated precipitation (inches)

Russ Schumacher/Colorado Climate Center/CSU  
Data source: ACIS