

The Weather Wire

August 2018

Volume 25 Number 8

Contents:

- **El Nino Watch Issued**
- **Drought Monitor**
- **July Summary/Statistics**
- **August Preview**
- **Rainfall Totals**

El Nino Watch Issued

Although there have certainly been some exceptions, by and large much of Colorado has experienced dry conditions over the past 1-2 years, and all but Northeast Colorado is facing drought at the moment. One of the major drivers of long range climate conditions is the El Nino Southern Oscillation (ENSO), and while it certainly isn't the only factor that determines seasonal weather conditions, it is one of the most predictable measures, making it a significant tool used by long range forecasts.

The past two years have featured La Nina conditions during the winter months, and neutral conditions the summer months. In general, La Nina years tend to favor drier than average conditions during the winter months across the I-25 corridor and Eastern Colorado. That has certainly held true over the past two winter seasons, and was especially true this past winter.

There is some good news on the horizon, and that is the increasing potential for an El Nino to develop during the upcoming cool season (i.e. fall, winter, and spring). While not a sure thing, when averaging precipitation amounts and distributions over past years, El Nino years tend to favor above average cool season precipitation across Eastern and Southern Colorado (with minimal signals across the northern and central mountains).

If an El Nino were to develop this year, that would provide some optimism for the I-25 corridor that has seen two below average winters in a row, as well as the San Juan and Sangre de Christo Mountains of Southern Colorado that are experiencing extreme drought conditions.

The image below shows the month-by-month ENSO values since 2006. This is an interesting chart to look at and compare to some of the recent winters we have experienced. Blue/negative values indicate La Nina conditions, and Red/positive values indicate El Nino conditions. Gray values (between -0.5 and +0.5) indicate neutral conditions. The winters of 2016-17 and 2017-18 featured weak to moderate La Nina conditions. This summer we are now back into neutral territory, with a forecast to reach El Nino conditions this fall.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2006	-0.8	-0.7	-0.5	-0.3	0.0	0.0	0.1	0.3	0.5	0.7	0.9	0.9
2007	0.7	0.3	0.0	-0.2	-0.3	-0.4	-0.5	-0.8	-1.1	-1.4	-1.5	-1.6
2008	-1.6	-1.4	-1.2	-0.9	-0.8	-0.5	-0.4	-0.3	-0.3	-0.4	-0.6	-0.7
2009	-0.8	-0.7	-0.5	-0.2	0.1	0.4	0.5	0.5	0.7	1.0	1.3	1.6
2010	1.5	1.3	0.9	0.4	-0.1	-0.6	-1.0	-1.4	-1.6	-1.7	-1.7	-1.6
2011	-1.4	-1.1	-0.8	-0.6	-0.5	-0.4	-0.5	-0.7	-0.9	-1.1	-1.1	-1.0
2012	-0.8	-0.6	-0.5	-0.4	-0.2	0.1	0.3	0.3	0.3	0.2	0.0	-0.2
2013	-0.4	-0.3	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.4	-0.2	0.1	0.3	0.2	0.1	0.0	0.2	0.4	0.6	0.7
2015	0.6	0.6	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.5	2.6
2016	2.5	2.2	1.7	1.0	0.5	0.0	-0.3	-0.6	-0.7	-0.7	-0.7	-0.6
2017	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.1	-0.4	-0.7	-0.9	-1.0
2018	-0.9	-0.8	-0.6	-0.4	-0.1							

Every winter is unique and depends on more than just ENSO, but we can look at the chart above and see some trends during past years with El Nino or La Nina conditions. The last El Nino experienced during 2015-2016 was a big snow year across Eastern Colorado, although it should be noted that this was an exceptionally strong El Nino event. However, the other two El Nino winters on this chart, 2009-10 and 2006-07, were also above average snow years for Eastern Colorado. Some of you may remember the winter of 2006-07, which featured back-to-back major snow events in Denver during the holiday season.

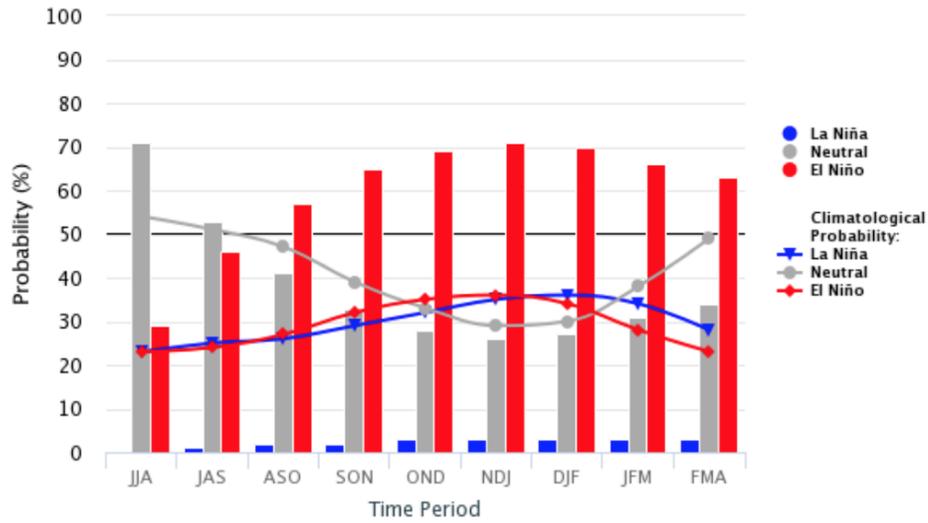
There are some years in which Eastern Colorado experiences below average winter snowfall during El Nino episodes (and vice versa in La Nina episodes), but when you look at past data, it's evident that El Nino years tip the odds in favor of better winter snowfall across Eastern Colorado. Southern Colorado experiences a similar bias during El Nino episodes, while the northern and central mountains do not see much of a bias in either direction, and in some cases these latter areas experience some of their bigger snow years during La Nina episodes (such as during the winter of 2010-11).

So the question remains, how confident are long range forecasters that an El Nino will develop this year? At this point, confidence seems to range from moderate to high. Long range forecasters at NOAA have issued an El Nino Watch for the upcoming winter, and have provided the following statement as of July 30: "ENSO-neutral is favored through Northern Hemisphere summer 2018, with the chance for El Nino increasing to about 65% during the fall, and to about 70% during the winter 2018-19".

The two images below are model projections for the ENSO values for the upcoming winter season. As you can see, the odds are clearly in favor of an El Nino, with roughly a distribution of 70% favoring El Nino, 25% favoring Neutral, and only about 5% favoring La Nina. Skyview Weather will certainly be monitoring these trends as we head into the fall, as these are usually a key in making our winter prediction. There are other factors to consider as well that are too difficult to predict this far in advance. But needless to say, there is some hope for better winter precipitation and drought relief over the next 6-12 months.

Early-Jul CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5 °C to 0.5 °C



Model Predictions of ENSO from Jul 2018

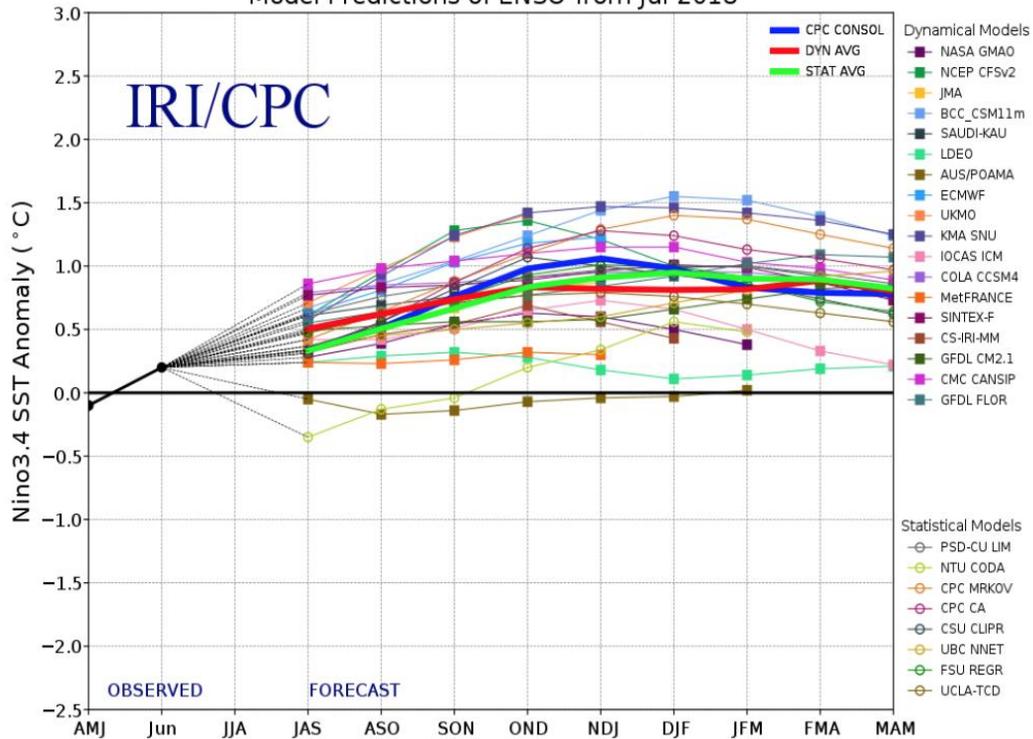
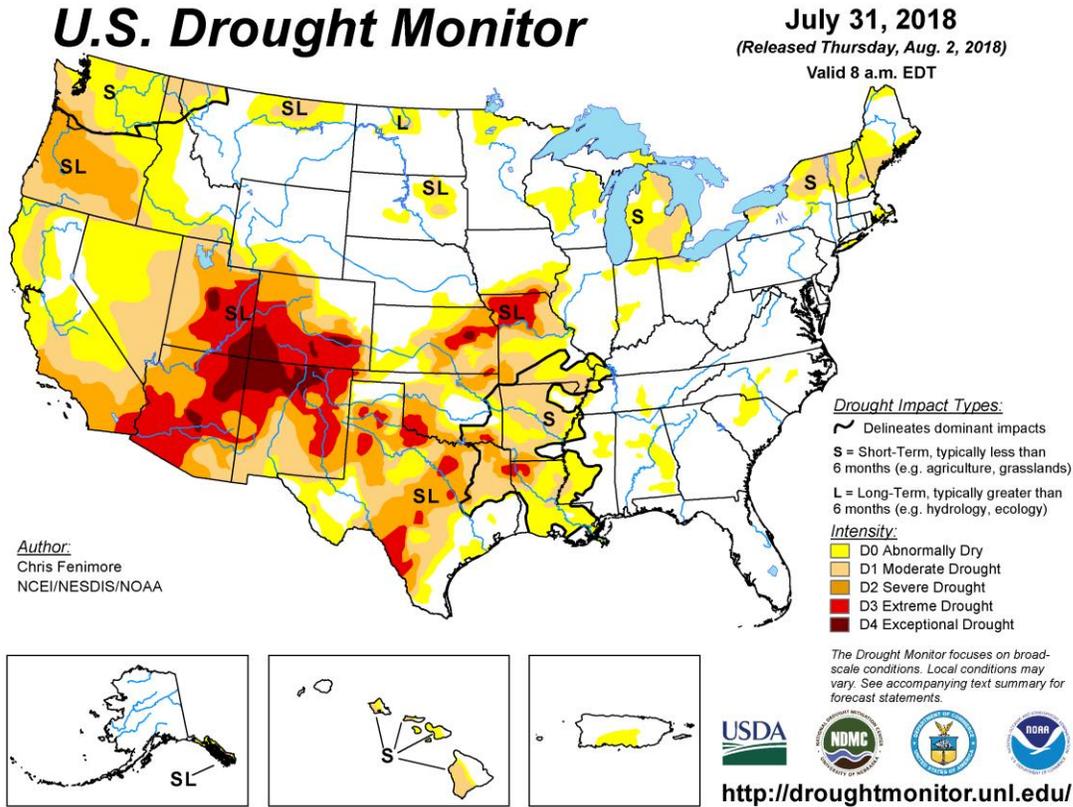


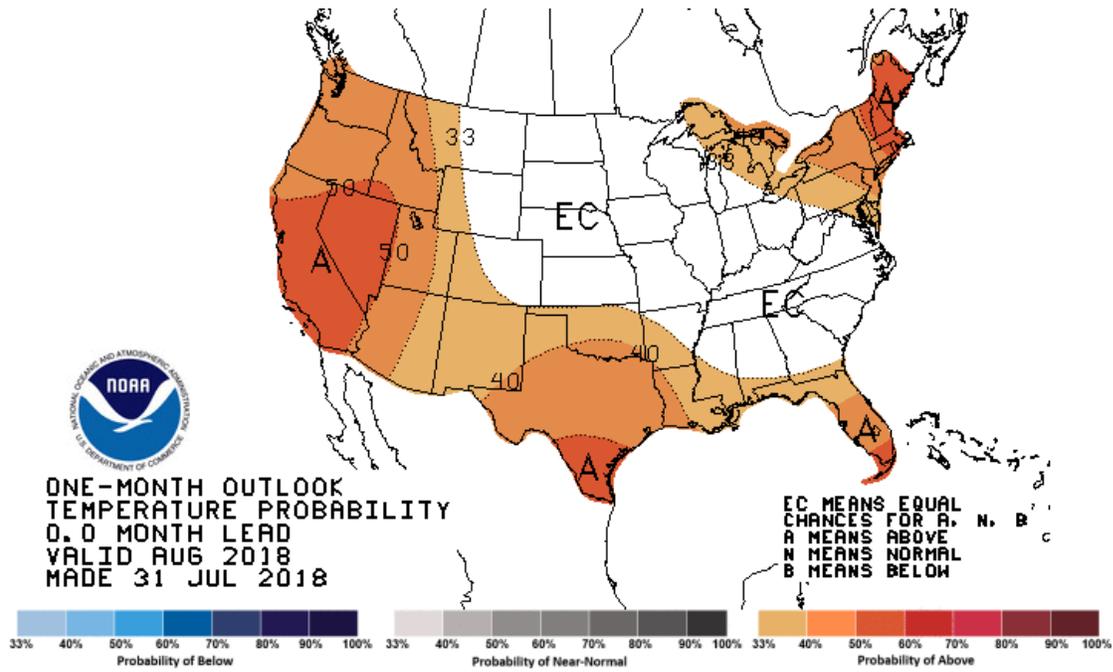
Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 July 2018).

Drought Update

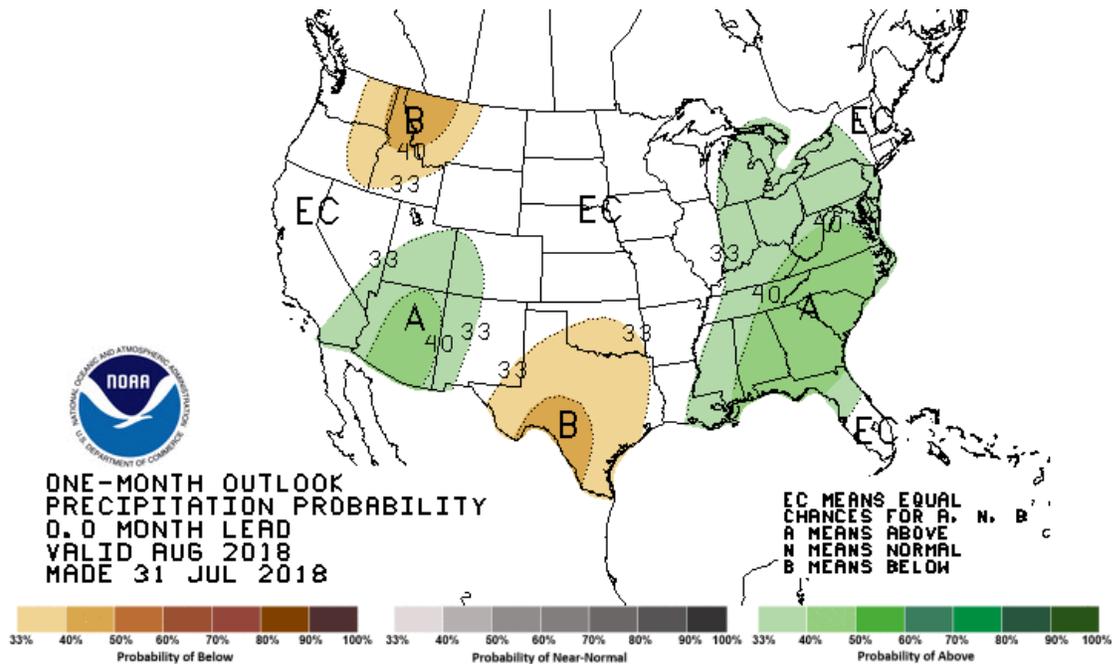
Drought conditions across Colorado have changed little over the past month. Most of the state remains in a drought, with the most extreme drought conditions across southern and western portions of the state. Northeast Colorado remains drought-free, which includes Denver, Boulder, and Ft. Collins. The Four Corners region is where the most widespread drought conditions are occurring, while much of Oregon is now experiencing moderate to severe drought as well.



The map below shows forecasted temperature deviances for August 2018. There is a slight bias toward above normal temperatures across Western Colorado, with equal chances for above or below average temperatures across Eastern Colorado.



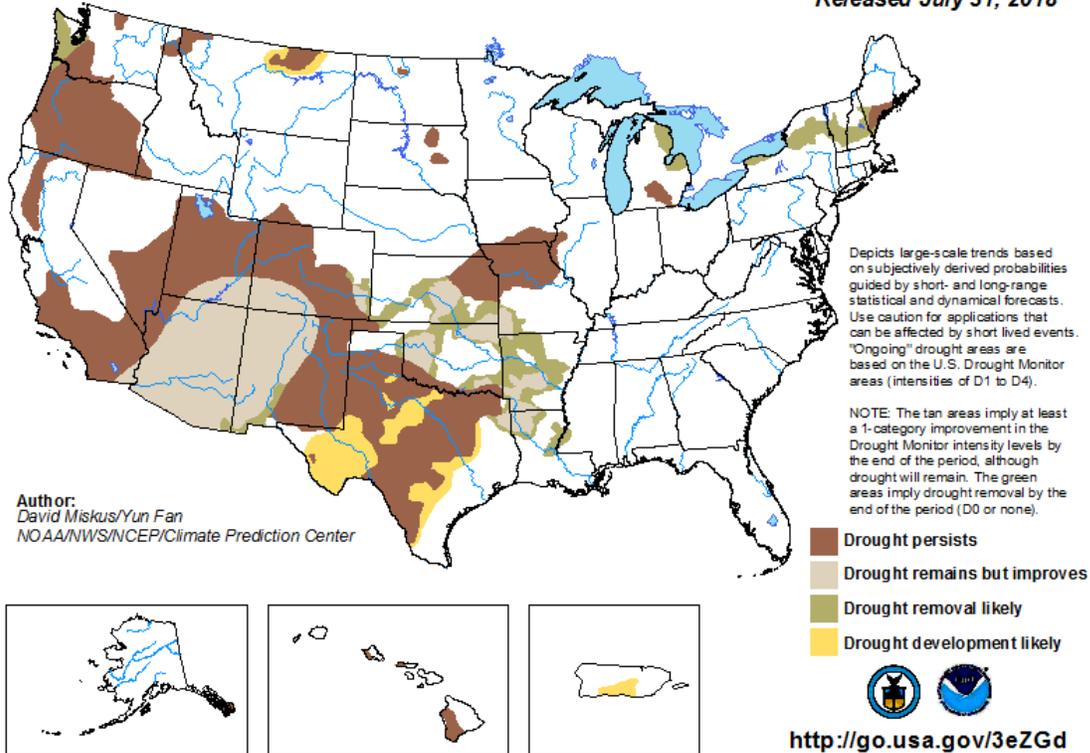
The map below shows forecasted precipitation deviances for August 2018. There is a slight bias toward above normal precipitation across Western Colorado, with equal chances for above or below average precipitation across Eastern Colorado.



Drought conditions are expected to persist across most of Colorado this month, while Northeast Colorado is expected to remain drought-free. Some drought improvement is expected over Southwest Colorado. Little change in drought conditions are expected this month across the remainder of the Western U.S.

U.S. Monthly Drought Outlook Drought Tendency During the Valid Period

Valid for August 2018
Released July 31, 2018



July Summary

July 2018 was hotter than average across the Denver area, although temperature anomalies were much lower compared to June. The average high at DIA was 90.2, which is 0.8 degrees above normal, and the average low was 60.3, which is 1.4 degrees above normal. Overall, the temperature anomaly at DIA was 1.1 degrees above normal. The high temperature for the month was 99, which occurred on the 3rd, and the low for the month was 47, which occurred on the 1st. There were 19 days during the month in which the high temperature reached 90 degrees or higher, which is above the average of 16 days. In general, the first three weeks of July were very hot, while the final week of the month was much cooler and wetter. Rainfall amounts were highly variable across the area during July, but in general rainfall was below average across central/northern Denver metro up to Boulder, while rainfall was above average from south Denver metro to Castle Rock and Colorado Springs. Total rainfall for the month at DIA was only 1.03", which is well below average. However, this was one of the lowest rainfall values across the greater Denver metro area. In general, rainfall amounts ranged from 1.5-3" across greater Denver metro, with 3-5" of rainfall across Douglas and El Paso Counties. The final week of the month featured the most consistently active stretch of weather so far this summer, with many areas experiencing heavy rainfall and severe weather. On the

eastern plains, an EF-2 tornado hit the town of Brush on July 29, causing significant damage to the area.

July Stats

TEMPERATURE (IN DEGREES F)

AVERAGE MAX	90.2	NORMAL 89.4	DEPARTURE 0.8
AVERAGE MIN	60.3	NORMAL 58.9	DEPARTURE 1.4
MONTHLY MEAN	75.3	NORMAL 74.2	DEPARTURE 1.1
HIGHEST	99 on 7/3		
LOWEST	47 on 7/1		

DAYS WITH MAX 90 OR ABOVE	19	NORMAL 16.0
DAYS WITH MAX 32 OR BELOW	0	NORMAL 0.0
DAYS WITH MIN 32 OR BELOW	0	NORMAL 0.0
DAYS WITH MIN ZERO OR BELOW	0	NORMAL 0.0

TEMPERATURE RECORDS

None

HEATING DEGREE DAYS

MONTHLY TOTAL	0	NORMAL 6	DEPARTURE -6
SEASONAL TOTAL	0	NORMAL 6	DEPARTURE -6

COOLING DEGREE DAYS

MONTHLY TOTAL	326	NORMAL 289	DEPARTURE 37
YEARLY TOTAL	615	NORMAL 444	DEPARTURE 171

PRECIPITATION (IN INCHES)

MONTHLY TOTAL	1.03	NORMAL 2.16	DEPARTURE -1.13
YEARLY TOTAL	6.05	NORMAL 9.67	DEPARTURE -3.62
GREATEST IN 24 HOURS	0.43 on 7/23		
DAYS WITH MEASURABLE PRECIP.	8		

SNOWFALL (IN INCHES)

MONTHLY TOTAL	0.0	NORMAL 0.0	DEPARTURE 0.0
SEASONAL TOTAL	25.7	NORMAL 53.8	DEPARTURE -28.1
GREATEST IN 24 HOURS	NA		

GREATEST DEPTH 0

WIND (IN MILES PER HOUR)

AVERAGE SPEED 10.1 mph
PEAK WIND GUST 64 mph from the SE on 7/2

MISCELLANEOUS WEATHER

NUMBER OF DAYS WITH THUNDERSTORM	13	NORMAL	11
NUMBER OF DAYS WITH HEAVY FOG	3	NORMAL	<1
NUMBER OF DAYS WITH HAIL	0		
NUMBER OF SUNNY DAYS	10		
NUMBER OF PARTLY CLOUDY DAYS	20		
NUMBER OF CLOUDY DAYS	1		
AVERAGE RELATIVE HUMIDITY	50%		

August Preview

Monsoon season typically peaks during the first week of August, before dropping off over the second half of the month with thunderstorms becoming weaker and a little less frequent than what is typical during July. Average precipitation during August is 1.69” and there is an average of eight thunderstorm days at DIA during the month. Although it happens on occasion, severe weather is less likely in August compared to May, June, and July, due to typically weaker winds aloft and warmer air at the mid to upper levels of the atmosphere (this has a stabilizing effect) compared to early summer. However, the weaker upper level winds also favor slower-moving storms, so heavy rainfall is a common threat during active monsoonal periods. August is the second hottest month on average in Denver, just a little cooler than July with an average high of 87.2 and an average low of 57.9. The month often starts out hot, but temperatures do start to trend downward over the second half of the month with Canadian cold fronts occasionally bringing brief tastes of fall. The all-time record high in August is 105, set in 1878, and the all-time record low is 40, which has occurred on multiple dates in 1910. For August 2018, we are expecting slightly warmer than average temperatures and below average rainfall. High pressure centered farther west looks to largely cut off the flow of monsoonal moisture through about the middle of the month. By the third week of August, we may start to see some more active weather, but typically by late August thunderstorm activity and rainfall amounts start to decrease compared to mid-summer, so overall the odds are favoring below average precipitation this month. Even so, occasional days with stronger thunderstorms and locally heavy rainfall will be possible.

**DENVER'S AUGUST CLIMATOLOGICALLY NORMAL
(NORMAL PERIOD 1981-2010 DIA Data)**

TEMPERATURE

AVERAGE HIGH	87.2
AVERAGE LOW	57.9
MONTHLY MEAN	72.5
DAYS WITH HIGH 90 OR ABOVE	12
DAYS WITH HIGH 32 OR BELOW	0
DAYS WITH LOW 32 OR BELOW	0
DAYS WITH LOWS ZERO OR BELOW	0

PRECIPITATION

MONTHLY MEAN	1.69"
DAYS WITH MEASURABLE PRECIPITATION	9
AVERAGE SNOWFALL IN INCHES	0.0"
DAYS WITH 1.0 INCH OF SNOW OR MORE	0

MISCELLANEOUS AVERAGES

HEATING DEGREE DAYS	10
COOLING DEGREE DAYS	244
WIND SPEED (MPH)	8.0mph
WIND DIRECTION	South
DAYS WITH THUNDERSTORMS	8
DAYS WITH DENSE FOG	1
PERCENT OF SUNSHINE POSSIBLE	71%

EXTREMES

RECORD HIGH	105 on 8/18/1878
RECORD LOW	40 on multiple dates
WARMEST	77.0 in 2011
COLDEST	66.5 in 1915
WETTEST	5.85" in 1979
DRIEST	0.02" in 1924
SNOWIEST	0.0"
LEAST SNOWIEST	0.0"

Rainfall

May 2018 to October 2018

City	May	Jun	Jul	Aug	Sep	Oct	Total
Aurora (Central)	2.05	1.55	2.14				5.74
Boulder	4.75	1.69	1.67				8.11
Brighton	1.35	1.77	2.06				5.18
Broomfield	2.50	0.80	1.92				5.22
Castle Rock	2.26	0.70	4.50				7.46
Colo Sprgs Airport	1.46	1.43	4.46				7.35
Denver DIA	1.86	0.43	1.03				3.32
Denver Downtown	2.96	1.00	2.41				6.37
Golden	2.54	1.11	1.38				5.03
Fort Collins	4.98	1.45	1.44				7.87
Highlands Ranch	2.25	1.17	3.48				6.90
Lakewood	3.66	0.91	2.80				7.37
Littleton	2.40	0.69	3.17				6.26
Parker	2.29	1.64	2.61				6.54
Sedalia - Hwy 67	2.33	0.45	3.88				6.66
Thornton	1.74	1.08	3.13				5.95
Westminster	2.10	0.72	1.63				4.45
Wheat Ridge	2.66	1.07	1.17				4.90

Skyview Weather
2350 N Rocky View Rd
Castle Rock, CO 80108

Phone: (303) 688-9175
Fax: (303) 380-3338

E-mail: Tim@SkyviewWeather.com
On the web at www.SkyviewWeather.com

Copyright 2018 Skyview Weather