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## **Wind Chill Questions and Answers**

### **1. What is wind chill temperature?**

**A.** The wind chill temperature is how cold people and animals feel when outside. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature. Therefore, the wind makes it FEEL much colder. If the temperature is 0 degrees Fahrenheit and the wind is blowing at 15 mph, the wind chill is -19 degrees Fahrenheit. At this wind chill temperature, exposed skin can freeze in 30 minutes.

### **2. Can wind chill impact my car's radiator or exposed water pipe?**

**A.** The only effect wind chill has on inanimate objects, such as car radiators and water pipes, is to shorten the amount of time for the object to cool. The inanimate object will not cool below the actual air temperature. For example, if the temperature outside is -5 degrees Fahrenheit and the wind chill temperature is -31 degrees Fahrenheit, then your car's radiator will not drop lower than -5 degrees Fahrenheit.

### **3. What is FROSTBITE?**

**A.** You have frostbite when your body tissue freezes. The most susceptible parts of the body are fingers, toes, ear lobes, or the tip of the nose. Symptoms include a loss of feeling in the extremity and a white or pale appearance. Get Medical attention immediately for frostbite. The area should be SLOWLY re-warmed.

### **4. What is HYPOTHERMIA?**

**A.** Hypothermia occurs when body temperature falls below 95 degrees Fahrenheit. Determine this by taking your temperature. Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and exhaustion. **Get medical attention immediately.** If you can't get help quickly, begin

warming the body **SLOWLY**. Warm the body core first, **NOT** the extremities. Warming extremities first drives the cold blood to the heart and can cause the body temperature to drop further—which may lead to heart failure. Get the person into dry clothing and wrap in a warm blanket covering the head and neck. Do not give the person alcohol, drugs, coffee, or any **HOT** beverage or food. **WARM** broth and food is better. About 20% of cold related deaths occur in the home. Young children under the age of two and the elderly, those more than 60 years of age, are most susceptible to hypothermia. Hypothermia can set in over a period of time. Keep the thermostat above 69 degrees Fahrenheit, wear warm clothing, eat food for warmth, and drink plenty of water (or fluids other than alcohol) to keep hydrated. *NOTE: Alcohol will lower your body temperature.*

## **5. Tips on How to Dress during cold weather**

**A.** The best way to avoid hypothermia and frostbite is to stay warm and dry indoors. When you must go outside, dress appropriately. Wear several layers of loose-fitting, lightweight, warm clothing. Trapped air between the layers will insulate you. Remove layers to avoid sweating and subsequent chill. Outer garments should be tightly woven, water repellent, and hooded. Wear a hat, because half of your body heat can be lost from your head. Cover your mouth to protect your lungs from extreme cold. Mittens, snug at the wrist, are better than gloves. Try to stay dry and out of the wind.

## **6. Avoid Overexertion**

**A.** Your heart is already working overtime in cold weather. The strain from the cold and the hard labor of shoveling heavy snow, walking through drifts or pushing a car may cause a heart attack. Sweating from overexertion could lead to a chill and hypothermia.

## **7. Is there a Celsius version of the chart?**

**A.** We will look into adding a Celsius version to the web page calculator. In the mean time, you can go to <http://www.wrh.noaa.gov/slc/projects/wxcalc/windChill.php>

## **8. Wind Chill factor vs. Wind Chill temperature.**

**A.** These terms are almost the same. The wind chill factor describes what happens to a body when it is cold and windy outside. As wind increases, heat is carried away from the body at a faster rate, driving down both skin temperature (which can cause frostbite) and eventually the internal body temperature (which can kill).

Wind chill temperature is a unit of measurement to describe the wind chill factor. Wind chill temperature is a measure of the combined cooling effect of wind and temperature. Since you and your husband ride motorcycles, you can insert your driving speed to estimate the wind speed and the outside temperature. These two parameters combined will give you the wind chill temperature, or how it feels to you skin. On the bottom of the wind chill chart is the updated wind chill temperature formula.

## **9. Is it possible to get frostbite if the temperature is above freezing but the wind chill is below freezing?**

The air temperature has to be BELOW freezing in order for frostbite to develop on exposed skin. Wind chill can bring the temperature to below freezing for humans and animals.

#### **10. How is the Wind Chill is calculated?**

The wind chill temperature is calculated using the following formula:

$$\text{Wind chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where: T = Air Temperature (F)

V = Wind Speed (mph)

^ = raised to a power (exponential)

Wind chill Temperature is only defined for temperatures at or below 50 degrees F and wind speeds above 3 mph. Bright sunshine may increase the wind chill temperature by 10 to 18 degrees F.

#### **11. When does the National Weather Service issue a Wind Chill Advisory or Warning?**

Criteria for issuing wind chill Warnings and Advisories are set locally. For the Rochester, NY area, wind chill Warnings are issued when the wind chill Temperature is expected to fall at or below -25 F. Wind chill Advisories are issued when the wind chill temperature is expected to fall between -15F and -24F.

#### **12. Does wind chill only apply to people and animals?**

Yes. The only effect wind chill has on inanimate objects, such as car radiators and water pipes, is to more quickly cool the object to cool to the current air temperature. Object will NOT cool below the actual air temperature. For example, if the temperature outside is -5 degrees Fahrenheit and the wind chill temperature is -31 degrees Fahrenheit, then your car's radiator will not drop lower than -5 degrees F.

#### **13. Does humidity or being near a large water body affect on wind chill?**

When we tested the new wind chill Temperature Index (WCTI), our researchers applied the new index to 12 test subjects. The results of the tests showed that relative humidity was an insignificant weather parameter, less than one degree at worst. To simplify the calculation, relative humidity was left out of the formula.

We did research a wet wind chill or blowing water spray. This research was to simulate a person near a body of water or a mariner. These findings are being finalized and may be incorporated for the winter season 2003-2004.

#### **14. How does this chart apply to children?**

The tests that were done on wind chill were conducted on adult subjects. For legal and safety reasons, NWS could not ask for child volunteers. Use the existing chart as a starting point and be even more cautious with children, seniors and persons with compromised health.

Information on wind chills from the National Weather Service. Information on [cold-related health problems](#) and [winter storm safety](#) from the Centers for Disease Control and Prevention (CDC)

## Wind Chill Chart

### New Wind Chill Chart

|            |    | Temperature (F) |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------|----|-----------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|            |    | Calm            | 40 | 35 | 30 | 25 | 20  | 15  | 10  | 5   | 0   | -5  | -10 | -15 | -20 | -25 | -30 | -35 | -40 | -45 |
| Wind (mph) | 5  | 36              | 31 | 25 | 19 | 13 | 7   | 1   | -5  | -11 | -16 | -22 | -28 | -34 | -40 | -46 | -52 | -57 | -63 |     |
|            | 10 | 34              | 27 | 21 | 15 | 9  | 3   | -4  | -10 | -16 | -22 | -28 | -35 | -41 | -47 | -53 | -59 | -66 | -72 |     |
|            | 15 | 32              | 25 | 19 | 13 | 6  | 0   | -7  | -13 | -19 | -26 | -32 | -39 | -45 | -51 | -58 | -64 | -71 | -77 |     |
|            | 20 | 30              | 24 | 17 | 11 | 4  | -2  | -9  | -15 | -22 | -29 | -35 | -42 | -48 | -55 | -61 | -68 | -74 | -81 |     |
|            | 25 | 29              | 23 | 16 | 9  | 3  | -4  | -11 | -17 | -24 | -31 | -37 | -44 | -51 | -58 | -64 | -71 | -78 | -84 |     |
|            | 30 | 28              | 22 | 15 | 8  | 1  | -5  | -12 | -19 | -26 | -33 | -39 | -46 | -53 | -60 | -67 | -73 | -80 | -87 |     |
|            | 35 | 28              | 21 | 14 | 7  | 0  | -7  | -14 | -21 | -27 | -34 | -41 | -48 | -55 | -62 | -69 | -76 | -82 | -89 |     |
|            | 40 | 27              | 20 | 13 | 6  | -1 | -8  | -15 | -22 | -29 | -36 | -43 | -50 | -57 | -64 | -71 | -78 | -84 | -91 |     |
|            | 45 | 26              | 19 | 12 | 5  | -2 | -9  | -16 | -23 | -30 | -37 | -44 | -51 | -58 | -65 | -72 | -79 | -86 | -93 |     |
|            | 50 | 26              | 19 | 12 | 4  | -3 | -10 | -17 | -24 | -31 | -38 | -45 | -52 | -60 | -67 | -74 | -81 | -88 | -95 |     |
|            | 55 | 25              | 18 | 11 | 4  | -3 | -11 | -18 | -25 | -32 | -39 | -46 | -54 | -61 | -68 | -75 | -82 | -89 | -97 |     |
|            | 60 | 25              | 17 | 10 | 3  | -4 | -11 | -19 | -26 | -33 | -40 | -48 | -55 | -62 | -69 | -76 | -84 | -91 | -98 |     |

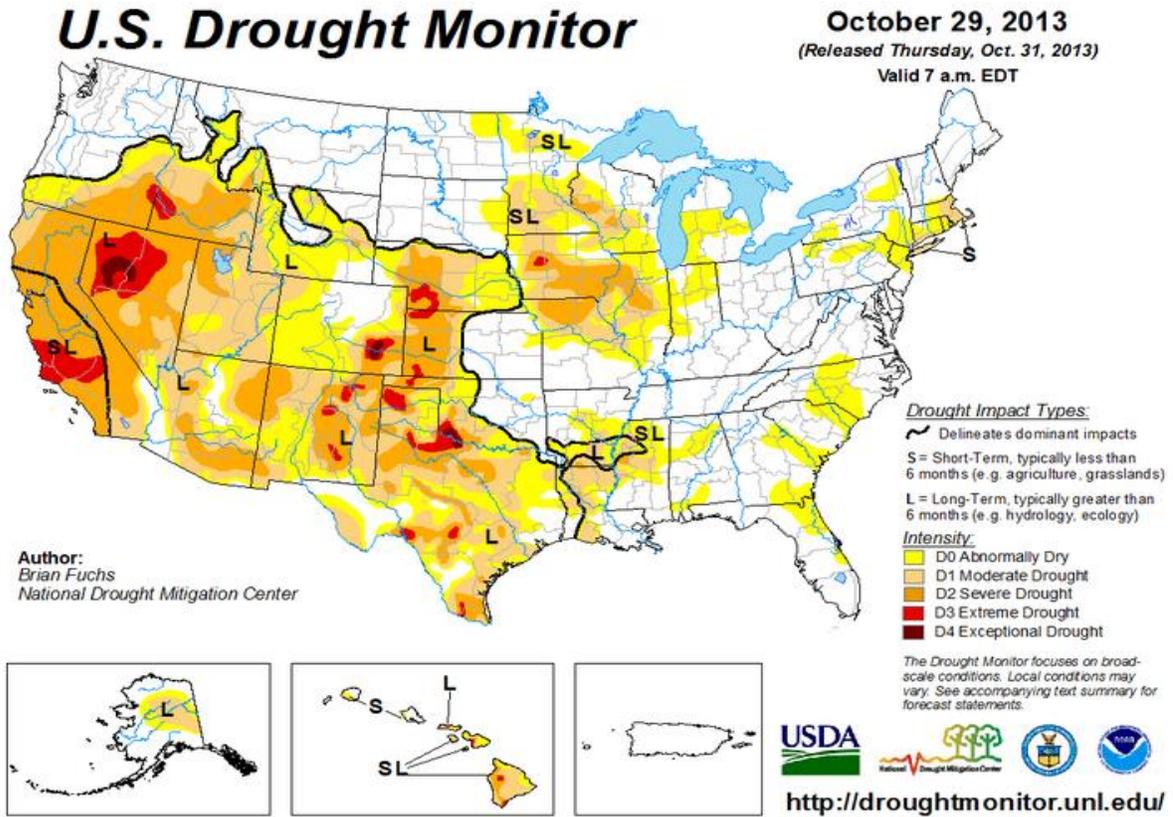
*Frostbite occurs in 15 minutes or less*

This wind chill chart and more information can be found on the web at:

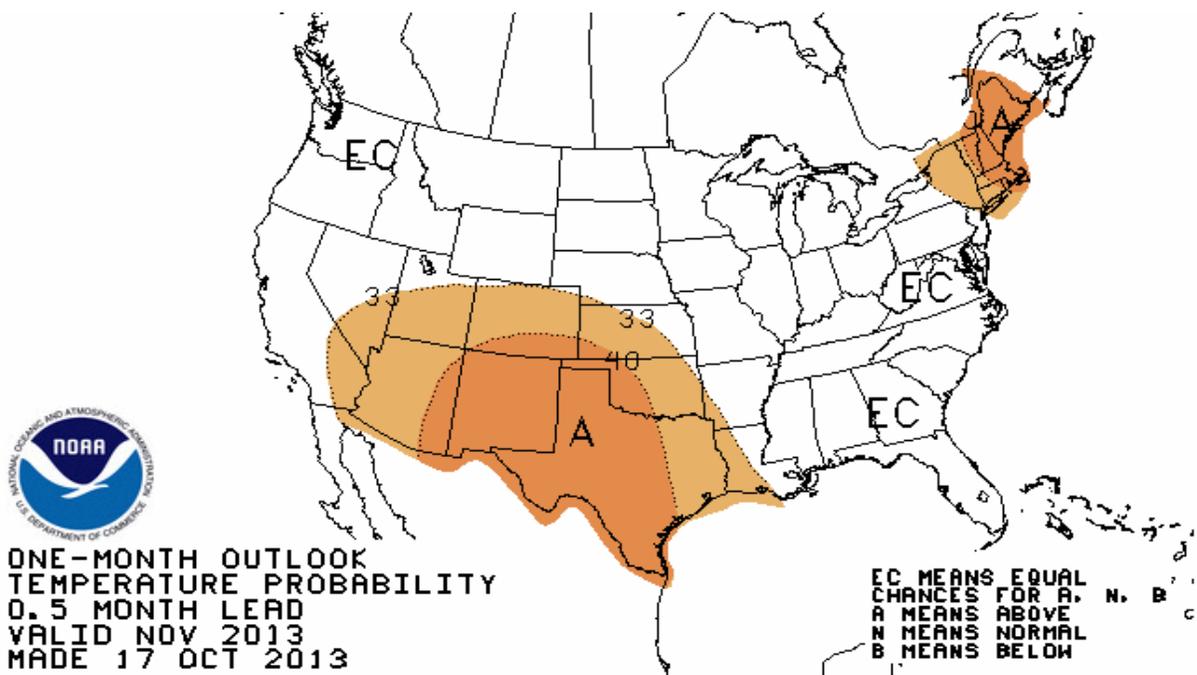
<http://www.crh.noaa.gov/ddc/?n=windchill>

# Drought Update

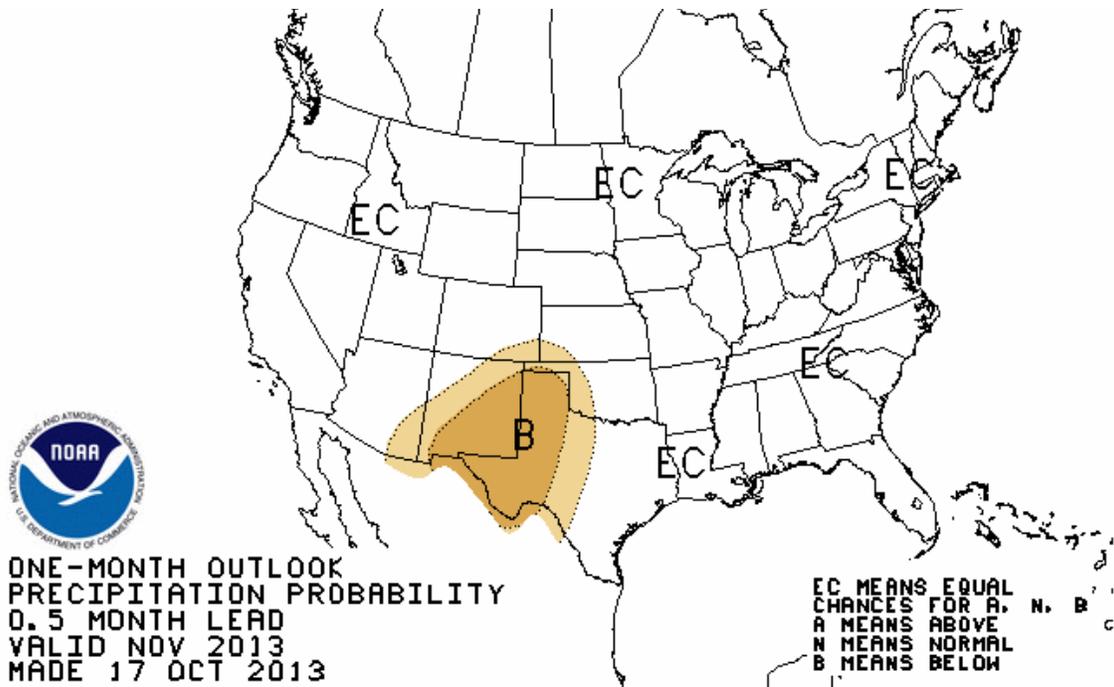
Despite the below normal precipitation in October the heavy rains and flooding during September have kept northeastern Colorado drought free. Parts of SE Colorado still suffer from extreme to exceptional drought.



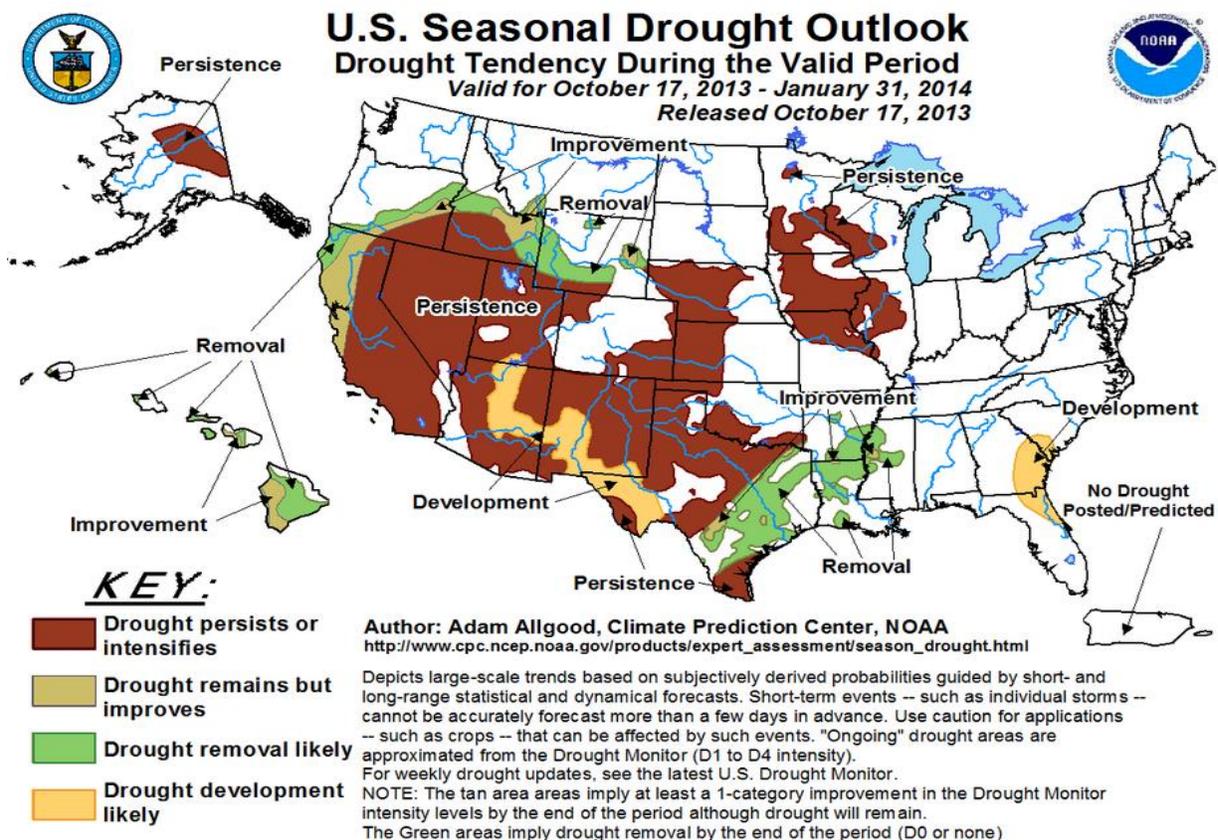
The map below shows forecasted temperature deviances for November 2013. Above normal temperatures are expected over most of the state favoring southern Colorado.



The map below shows forecasted precipitation deviances for November 2013. Near normal precipitation is forecast over Colorado.



Drought conditions are forecast to persist in parts of Colorado already under drought conditions. Improving conditions are expected over portions of the NW and lower Mississippi River valley into SE Texas.



## October Summary

October was relatively quiet weather wise especially compared to the record breaking precipitation in September. Temperatures for the month were below normal as well as precipitation and snowfall. Average highs were about 5 degrees colder than average at 60 degrees while lows were only around 1 degree below normal. This resulted in a monthly mean temperature of about 3 degrees below normal for the month. The warmest temperature of the month was 70 degrees on the 8<sup>th</sup> and the coldest temperature was 27 degrees reached twice, once on the 5<sup>th</sup> and again on the 16<sup>th</sup>. There were 12 days during the month with a temperature at or below freezing. There was one record low that was tied set back in 1877 on the 4<sup>th</sup> at 28 degrees. Precipitation was around 30% below the normal of 1.02" with 0.72" measured at DIA. Due to the excessive rainfall in September the yearly total stands at 17.08" compared to 13.34" on average with a surplus of 3.74". Even if DIA does not receive another drop of precipitation through the end of the year our yearly total will still be above normal. Snowfall for the month was a meager 1.4" with higher amounts over the western and southern suburbs but still below normal for October standards. Normal snowfall for October at DIA is 4.0". Our departure for the month was 2.6" with the season now 3.9" below the normal of 5.3". There was one thunderstorm day reported during the month on the 14<sup>th</sup>.

## October Stats

### TEMPERATURE (IN DEGREES F)

|              |      |   |                |
|--------------|------|---|----------------|
| AVERAGE MAX  | 60.0 | NORMAL 65.3                                 | DEPARTURE -5.3 |
| AVERAGE MIN  | 35.5 | NORMAL 36.6                                 | DEPARTURE -1.1 |
| MONTHLY MEAN | 47.7 | NORMAL 50.9                                 | DEPARTURE -3.2 |
| HIGHEST      | 79   | on the 8 <sup>th</sup>                      |                |
| LOWEST       | 27   | on the 5 <sup>th</sup> and 16 <sup>th</sup> |                |

|                             |    |        |   |
|-----------------------------|----|--------|---|
| DAYS WITH MAX 90 OR ABOVE   | 0  | NORMAL | 0 |
| DAYS WITH MAX 32 OR BELOW   | 0  | NORMAL | 0 |
| DAYS WITH MIN 32 OR BELOW   | 12 | NORMAL | 9 |
| DAYS WITH MIN ZERO OR BELOW | 0  | NORMAL | 0 |

### TEMPERATURE RECORDS

Tied record low of 28 degrees on the 4th

### HEATING DEGREE DAYS

|                |     |            |              |
|----------------|-----|------------|--------------|
| MONTHLY TOTAL  | 525 | NORMAL 440 | DEPARTURE 85 |
| SEASONAL TOTAL | 608 | NORMAL 581 | DEPARTURE 27 |

### COOLING DEGREE DAYS

|               |     |            |               |
|---------------|-----|------------|---------------|
| MONTHLY TOTAL | 0   | NORMAL 5   | DEPARTURE -5  |
| YEARLY TOTAL  | 999 | NORMAL 769 | DEPARTURE 230 |

### PRECIPITATION (IN INCHES)

|                              |                                 |              |                 |
|------------------------------|---------------------------------|--------------|-----------------|
| MONTHLY TOTAL                | 0.72                            | NORMAL 1.02  | DEPARTURE -0.30 |
| YEARLY TOTAL                 | 17.08                           | NORMAL 13.34 | DEPARTURE 3.74  |
| GREATEST IN 24 HOURS         | 0.25" on 10/18 and 10/3 to 10/4 |              |                 |
| DAYS WITH MEASURABLE PRECIP. | 8                               |              |                 |

### SNOWFALL (IN INCHES)

|                      |                              |            |                |
|----------------------|------------------------------|------------|----------------|
| MONTHLY TOTAL        | 1.4                          | NORMAL 4.0 | DEPARTURE -2.6 |
| SEASONAL TOTAL       | 1.4                          | NORMAL 5.3 | DEPARTURE -3.9 |
| GREATEST IN 24 HOURS | 1.4" on the 18 <sup>th</sup> |            |                |
| GREATEST DEPTH       | NA                           |            |                |

### WIND (IN MILES PER HOUR)

|                |                            |
|----------------|----------------------------|
| AVERAGE SPEED  | 8.8mph                     |
| PEAK WIND GUST | 48mph from the NW on 10/10 |

### MISCELLANEOUS WEATHER

|                                  |     |        |   |
|----------------------------------|-----|--------|---|
| NUMBER OF DAYS WITH THUNDERSTORM | 1   | NORMAL | 4 |
| NUMBER OF DAYS WITH HEAVY FOG    | 9   | NORMAL | 1 |
| NUMBER OF DAYS WITH HAIL         | 0   |        |   |
| NUMBER OF SUNNY DAYS             | 12  |        |   |
| NUMBER OF PARTLY CLOUDY DAYS     | 14  |        |   |
| NUMBER OF CLOUDY DAYS            | 5   |        |   |
| AVERAGE RELATIVE HUMIDITY        | 61% |        |   |

## November Preview

November is on average the 2<sup>nd</sup> snowiest month of the year behind March and normally features less sunshine than any other month in the calendar year. Temperatures begin to cool aggressively in November with average low temperatures in the mid 20s. Average highs are typically in the lower 50s but there are typically 3 days where the high temperature does not even reach the freezing mark. Overnight lows can easily dip below zero towards the end of the month as the first arctic air masses arrive and say goodbye to those 80 degree days as the all time record high for November is 80 degrees set back in 2006. Normal November precipitation is well under 1" at 0.61" with an average snowfall of 8.7". There are typically 3 days in the month with greater than 1" of snow observed and around 5-6 total storms. If you believe the drought monitor conditions for November of 2013 are expected to be above normal in temperature and near normal in precipitation.

### DENVER'S NOVEMBER CLIMATOLOGICALLY NORMAL (NORMAL PERIOD 1981-2010 DIA Data)

#### TEMPERATURE

|                              |      |
|------------------------------|------|
| AVERAGE HIGH                 | 52.1 |
| AVERAGE LOW                  | 24.5 |
| MONTHLY MEAN                 | 38.3 |
| DAYS WITH HIGH 90 OR ABOVE   | 0    |
| DAYS WITH HIGH 32 OR BELOW   | 3    |
| DAYS WITH LOW 32 OR BELOW    | 23   |
| DAYS WITH LOWS ZERO OR BELOW | 1    |

#### PRECIPITATION

|                                    |       |
|------------------------------------|-------|
| MONTHLY MEAN                       | 0.61" |
| DAYS WITH MEASURABLE PRECIPITATION | 5     |
| AVERAGE SNOWFALL IN INCHES         | 8.7"  |
| DAYS WITH 1.0 INCH OF SNOW OR MORE | 3     |

#### MISCELLANEOUS AVERAGES

|                              |        |
|------------------------------|--------|
| HEATING DEGREE DAYS          | 801    |
| COOLING DEGREE DAYS          | 0      |
| WIND SPEED (MPH)             | 8.2mph |
| WIND DIRECTION               | South  |
| DAYS WITH THUNDERSTORMS      | 0      |
| DAYS WITH DENSE FOG          | 1      |
| PERCENT OF SUNSHINE POSSIBLE | 64%    |

#### EXTREMES

|             |                        |
|-------------|------------------------|
| RECORD HIGH | 80 on 11/08/2006       |
| RECORD LOW  | -18 on 11/29/1877      |
| WARMEST     | 50.9 degrees in 1949   |
| COLDEST     | 22.0 degrees in 1880   |
| WETTEST     | 3.21" in 1946          |
| DRIEST      | TR in 1949, 1901, 1899 |
| SNOWIEST    | 42.6" in 1946          |

**Sunrise/Sunset (July - December Denver area)**

|    | JUL            | AUG            | SEP            | OCT            | NOV            | DEC            |    |
|----|----------------|----------------|----------------|----------------|----------------|----------------|----|
|    | <b>SR - SS</b> |    |
| 01 | 0534-0831      | 0558-0812      | 0627-0731      | 0655-0642      | 0728-0556      | 0701-0435      | 01 |
| 02 | 0535-0831      | 0559-0811      | 0628-0729      | 0656-0641      | 0729-0555      | 0702-0434      | 02 |
| 03 | 0535-0831      | 0600-0810      | 0629-0728      | 0657-0639      | 0630-0454      | 0703-0434      | 03 |
| 04 | 0536-0830      | 0600-0809      | 0630-0726      | 0658-0637      | 0631-0453      | 0704-0434      | 04 |
| 05 | 0536-0830      | 0601-0808      | 0631-0725      | 0659-0636      | 0632-0452      | 0705-0434      | 05 |
| 06 | 0537-0830      | 0602-0807      | 0631-0723      | 0700-0634      | 0634-0451      | 0706-0434      | 06 |
| 07 | 0538-0830      | 0603-0806      | 0632-0721      | 0701-0633      | 0635-0450      | 0707-0434      | 07 |
| 08 | 0538-0829      | 0604-0805      | 0633-0720      | 0702-0631      | 0636-0449      | 0708-0434      | 08 |
| 09 | 0539-0829      | 0605-0803      | 0634-0718      | 0703-0629      | 0637-0448      | 0708-0434      | 09 |
| 10 | 0540-0829      | 0606-0802      | 0635-0717      | 0704-0628      | 0638-0447      | 0709-0434      | 10 |
| 11 | 0540-0828      | 0607-0801      | 0636-0715      | 0705-0626      | 0639-0446      | 0710-0434      | 11 |
| 12 | 0541-0828      | 0608-0800      | 0637-0713      | 0706-0625      | 0640-0445      | 0711-0434      | 12 |
| 13 | 0542-0827      | 0609-0758      | 0638-0712      | 0707-0623      | 0642-0444      | 0712-0435      | 13 |
| 14 | 0542-0827      | 0610-0757      | 0639-0710      | 0708-0622      | 0643-0443      | 0712-0435      | 14 |
| 15 | 0543-0826      | 0611-0756      | 0640-0708      | 0709-0620      | 0644-0443      | 0713-0435      | 15 |
| 16 | 0544-0826      | 0612-0754      | 0641-0707      | 0710-0619      | 0645-0442      | 0714-0435      | 16 |
| 17 | 0545-0825      | 0613-0753      | 0642-0705      | 0711-0617      | 0646-0441      | 0714-0436      | 17 |
| 18 | 0546-0824      | 0614-0752      | 0643-0703      | 0712-0616      | 0647-0440      | 0715-0436      | 18 |
| 19 | 0546-0824      | 0615-0750      | 0644-0702      | 0714-0614      | 0648-0440      | 0715-0437      | 19 |
| 20 | 0547-0823      | 0616-0749      | 0645-0700      | 0715-0613      | 0649-0439      | 0716-0437      | 20 |
| 21 | 0548-0822      | 0616-0747      | 0646-0658      | 0716-0612      | 0651-0439      | 0717-0437      | 21 |
| 22 | 0549-0822      | 0617-0746      | 0646-0657      | 0717-0610      | 0652-0438      | 0717-0438      | 22 |
| 23 | 0550-0821      | 0618-0745      | 0647-0655      | 0718-0609      | 0653-0437      | 0717-0439      | 23 |
| 24 | 0551-0820      | 0619-0743      | 0648-0654      | 0719-0608      | 0654-0437      | 0718-0439      | 24 |
| 25 | 0551-0819      | 0620-0742      | 0649-0652      | 0720-0606      | 0655-0437      | 0718-0440      | 25 |
| 26 | 0552-0818      | 0621-0740      | 0650-0650      | 0721-0605      | 0656-0436      | 0719-0440      | 26 |
| 27 | 0553-0817      | 0622-0739      | 0651-0649      | 0722-0604      | 0657-0436      | 0719-0441      | 27 |
| 28 | 0554-0816      | 0623-0737      | 0652-0647      | 0723-0602      | 0658-0435      | 0719-0442      | 28 |
| 29 | 0555-0815      | 0624-0736      | 0653-0645      | 0724-0600      | 0659-0435      | 0719-0442      | 29 |
| 30 | 0556-0815      | 0625-0734      | 0654-0644      | 0726-0559      | 0700-0435      | 0720-0443      | 30 |
| 31 | 0557-0814      | 0626-0732      |                | 0727-0557      |                | 0720-0444      | 31 |

# Snowfall

## October 2013 to April 2014

| City               | Oct | Nov | Dec | Jan | Feb | Mar | Apr | Total |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-------|
| Aurora (Central)   | 3.5 |     |     |     |     |     |     | 3.5   |
| Brighton           | 2.0 |     |     |     |     |     |     | 2.0   |
| Broomfield         | 3.9 |     |     |     |     |     |     | 3.9   |
| Castle Rock        | 3.7 |     |     |     |     |     |     | 3.7   |
| Colo Sprgs Airport | TR  |     |     |     |     |     |     | TR    |
| Denver DIA         | 1.4 |     |     |     |     |     |     | 1.4   |
| Denver Downtown    | 1.7 |     |     |     |     |     |     | 1.7   |
| Golden             | 3.6 |     |     |     |     |     |     | 3.6   |
| Fort Collins       | 4.1 |     |     |     |     |     |     | 4.1   |
| Highlands Ranch    | 3.5 |     |     |     |     |     |     | 3.5   |
| Lakewood           | 2.1 |     |     |     |     |     |     | 2.1   |
| Littleton          | 2.5 |     |     |     |     |     |     | 2.5   |
| Parker             | 3.2 |     |     |     |     |     |     | 3.2   |
| Sedalia - Hwy 67   | 4.0 |     |     |     |     |     |     | 4.0   |
| Thornton           | 2.9 |     |     |     |     |     |     | 2.9   |
| Westminster        | 3.3 |     |     |     |     |     |     | 3.3   |
| Wheatridge         | 3.0 |     |     |     |     |     |     | 3.0   |

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