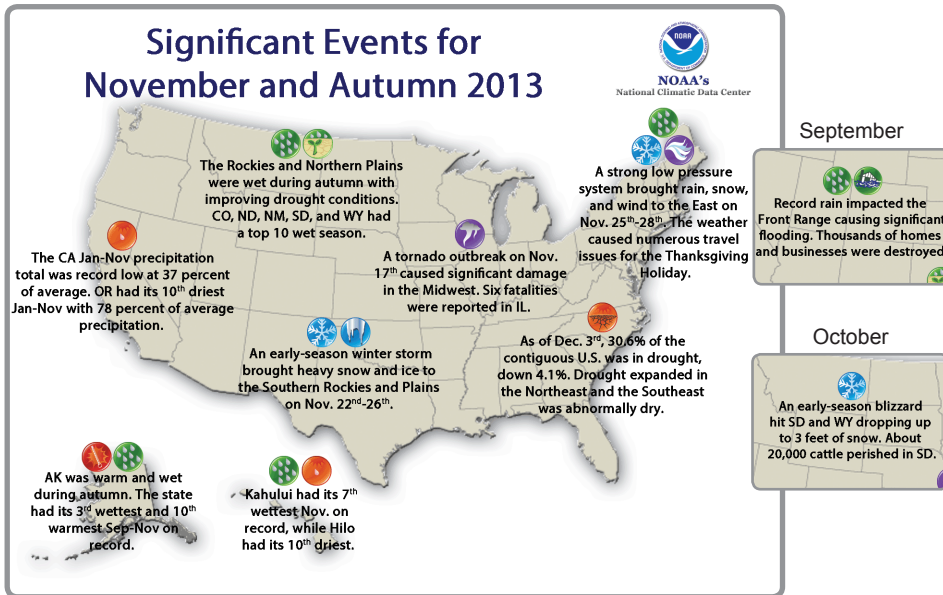


## National - Significant Events for September 2013 - November 2013



### Highlights for the Basin

It was a wet autumn for the Basin as many states ranked in the top 5 wettest autumns on record. These states included Colorado (2), Wyoming (2), North Dakota (2), and South Dakota (4). The bulk of the precipitation came during September and October as November brought near to below normal precipitation.

Extremely heavy rainfall and flooding impacted the Front Range from September 9-15. Precipitation totals topping 10 inches were common. Boulder, CO received 9.08 inches in just one day, setting many records.

An early-season blizzard hit the Dakotas, Wyoming, and Nebraska dumping up to 5 feet of snow in some locations. Lead, SD set a new 1-day snowfall record for the month of October with 42.0 inches. Rare for October, this same system also caused 15 tornadoes - 2 of which were rated EF-4. One hit Wayne, NE and injured 15.

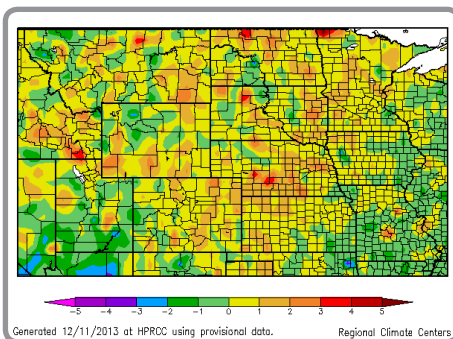
Even with a month left in the year, some locations in the Basin have already set new records for wettest year. Examples include Boulder, CO and Lead, SD.

The average U.S. temperature during November was 41.6°F, 0.3°F below average. The autumn U.S. temperature was 54.1°F, 0.5°F above average. November U.S. precipitation was 2.01 inches, 0.11 inch below average. The autumn precipitation total was 7.23 inches, 0.52 inch above average.

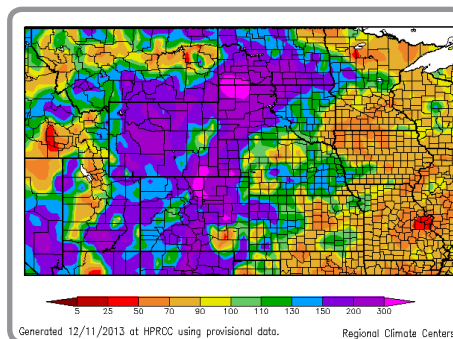
## Regional - Climate Overview for September 2013 - November 2013

### Temperature and Precipitation Anomalies

Departure from Normal Temperature (°F)  
September 1 - November 30, 2013

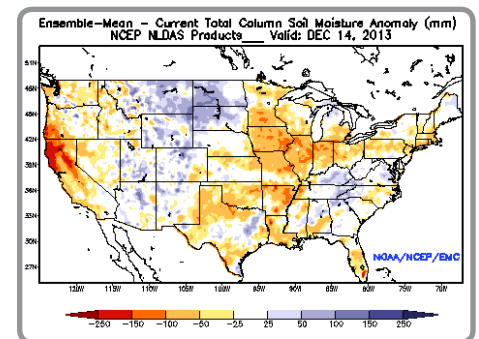


Percent of Normal Precipitation (%)  
September 1 - November 30, 2013



### Soil Moisture

Soil Moisture Anomaly  
12/14/2013



Overall, autumn temperatures were near normal across the Basin, but each month was distinct. The season started off warm as September temperature departures generally ranged from 2.0-6.0 degrees above normal. October was the opposite, with most of the Basin having below normal temperatures, especially in Wyoming, western South Dakota, and northern Nebraska where departures were up to 5.0 degrees below normal. Finally, November was warm in the west and cool in the north and east.

Precipitation was generally near or above normal this autumn. The highlights were dominated by two major events - the flooding in September and the blizzard in October. These events caused precipitation totals to range from 150-300% of normal for a large portion of the Basin including much of Colorado, Wyoming, eastern and northern South Dakota, and southern North Dakota. Localized amounts topped 300% of normal. Areas missing out included portions of central Montana, eastern Kansas, and Missouri.

Heavy precipitation over the past few months has led to a recovery in soil moisture conditions, especially across the northern tier of the Basin. At this time of the year, it is highly unlikely that the soils will dry out and will consequently retain their moisture throughout the winter. Drier soils were present further down the Basin in areas of western Iowa and northern Missouri. This particular map shows the total column soil moisture anomaly in millimeters, from a NOAA soil moisture model called NLDAS.

## Regional - Impacts for September 2013 - November 2013

### September Flooding in Colorado

The impacts of the mid-September heavy precipitation and flooding along the Front Range were numerous. Photos indicate that the landscape has been reshaped and the incredible amount of damage that the flooding caused will take months to years to repair. As many as 8 lives were lost and during the flooding over 1,000 went missing. Roads and bridges washed away, homes and business were destroyed, and some communities were cut off completely. Schools, businesses, and even Rocky Mountain National Park closed due to the dangerous conditions. Ultimately, even locations far away from the initial flooding were affected as the floodwaters traveled the South Platte. On a positive note, the heavy precipitation also brought drought relief and helped boost the water supply during a time when reservoir storage is usually in decline.

(<http://www.climate.gov/news-features/event-tracker/historic-rainfall-and-floods-colorado>)



Above: Destroyed road in Boulder, CO - courtesy Daily Camera

### Early October Blizzard

Many different sectors across the Dakotas, Wyoming, and Nebraska were impacted by the first major snowstorm of the season. The heavy, wet snow fell during a time when many trees still had their leaves which resulted in major tree and limb damage as well as power outages. When the storm hit, livestock were still out on open range with little shelter and had not grown protective winter coats yet. The combination of rain, snow, and high winds caused catastrophic cattle losses - South Dakota alone lost at least 25,000 animals, including more than 21,000 cattle, according to the State Veterinarian. The sunflower crop in North Dakota was also hit particularly hard as losses of 20-90% were reported in southwestern parts of the state. Precipitation from this storm ultimately delayed clean-up efforts and harvest activities as the fields were too wet. In the end, the direct economic losses were estimated at \$38 million in damage to both public and private property.

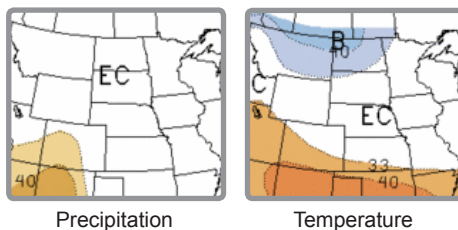


Above: Frozen cattle near Sturgis, SD - courtesy Rapid City Journal

## Regional - Outlook for Winter 2013-2014

### 3-Month Precipitation and Temperature Outlooks

Valid for January - March 2014



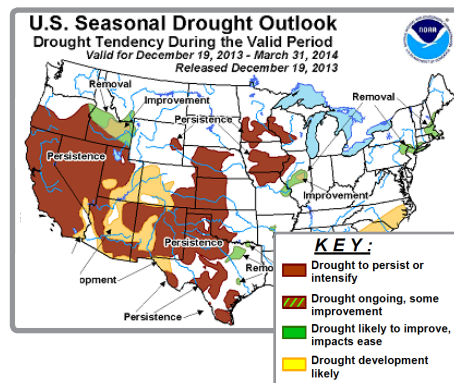
EC: Equal chances of above, near or below normal  
A: Above normal, B: Below normal

ENSO (El Niño/Southern Oscillation) neutral conditions were still present and are forecast to continue into 2014. Enhanced chances exist for below normal precipitation in western Colorado along with below normal temperatures in portions of the Dakotas and Montana.

Recent heavy precipitation and wet soils may draw concerns about possible spring flooding in the Basin. Heavy winter and spring precipitation that cause spring flooding have not occurred; therefore, a spring flood situation does not exist at this time. Conditions will continue to be monitored throughout the winter and spring.

### U.S. Seasonal Drought Outlook

Valid for 12/19/2013 - 03/31/2014



Drought conditions improved greatly this autumn. Heavy precipitation eliminated or improved drought conditions in each state in the Basin. Some standouts include a drought-free status in the Dakotas, most of Colorado, and the majority of Wyoming. Although conditions improved in eastern Colorado, western Kansas, and west-central Nebraska, drought does remain in these areas. Since the winter is typically the driest part of the year there, these drought conditions are expected to persist through at least March. Additionally, drought development is likely across western Colorado.

## MO River Basin Partners

High Plains Regional Climate Center

[www.hprcc.unl.edu](http://www.hprcc.unl.edu)

National Oceanic and Atmospheric Administration

[www.noaa.gov](http://www.noaa.gov)

National Weather Service - Central Region

[www.crh.noaa.gov/crh](http://www.crh.noaa.gov/crh)

National Climatic Data Center

[www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

Missouri River Basin Forecast Center

[www.crh.noaa.gov/mbrfc](http://www.crh.noaa.gov/mbrfc)

Climate Prediction Center

[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)

National Operational Hydrologic Remote Sensing Center

[www.nohrsc.noaa.gov](http://www.nohrsc.noaa.gov)

National Drought Mitigation Center

<http://drought.unl.edu>

State Climatologists

[www.stateclimate.org](http://www.stateclimate.org)

South Dakota State University Extension

<http://igrow.org>

National Integrated Drought Information System (NIDIS)

[www.drought.gov](http://www.drought.gov)

US Army Corps of Engineers - Missouri River Basin Water Management Division

[www.usace.army.mil](http://www.usace.army.mil)

U.S. Geological Survey, Water Mission Area

<http://www.usgs.gov/water>

Western Governors' Association

<http://westgov.org>