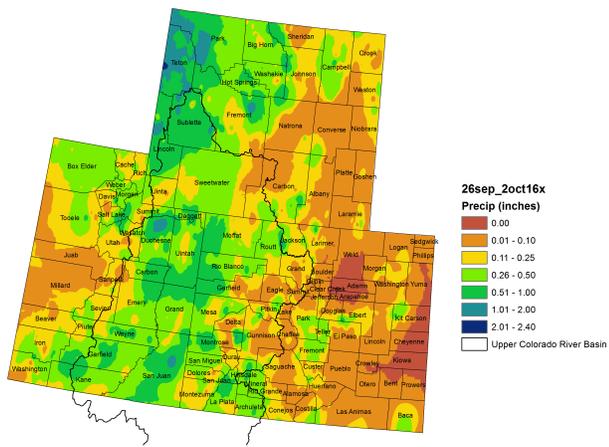


# NIDIS Upper Colorado River Regional Drought Early Warning System October 4, 2016

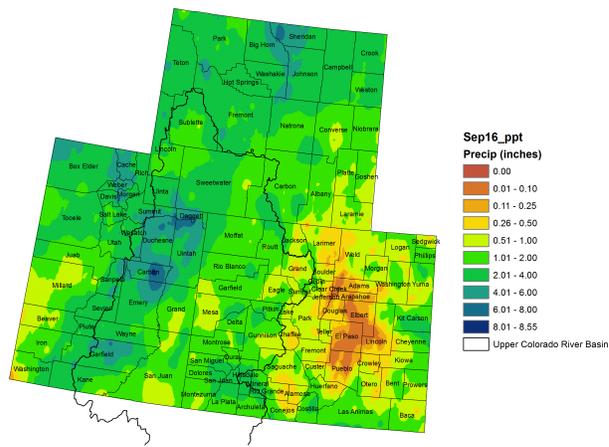


- Precipitation Discussion
- SNOTEL
- SPI
- Streamflow
- Surface Water
- ET
- Temperature
- Outlook
- USDM

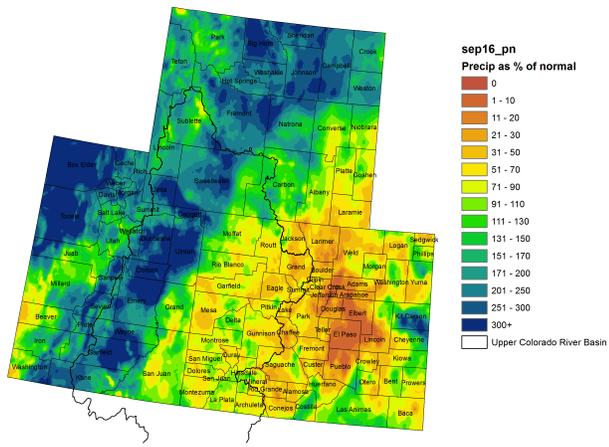
Colorado, Utah and Wyoming 7 Day Precipitation  
26 September - 2 October 2016



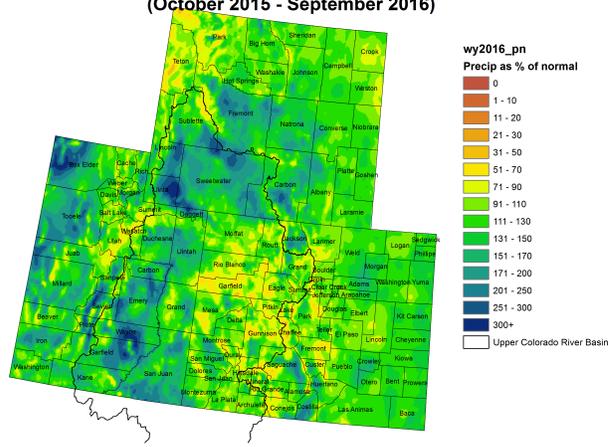
Colorado, Utah and Wyoming September 2016 Precipitation



Colorado, Utah and Wyoming September 2016 Precipitation  
as a Percentage of Normal



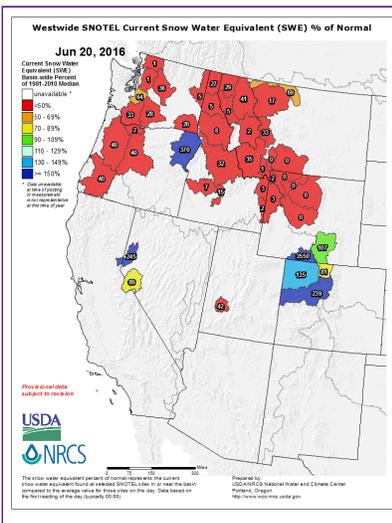
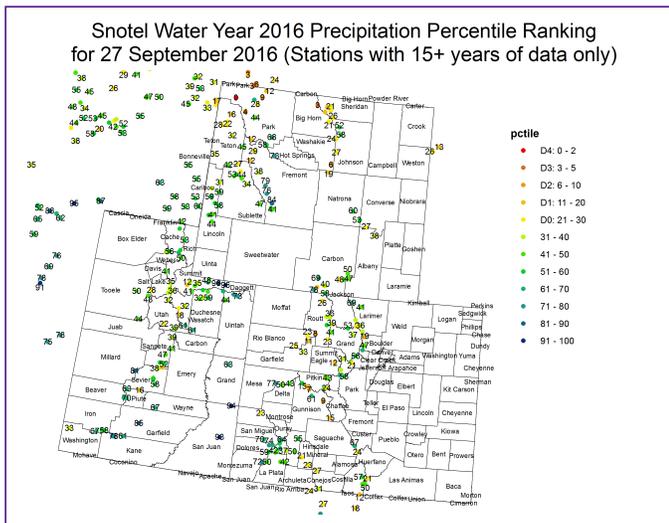
Colorado, Utah and Wyoming Water Year 2016 Precipitation  
as a Percentage of Normal  
(October 2015 - September 2016)



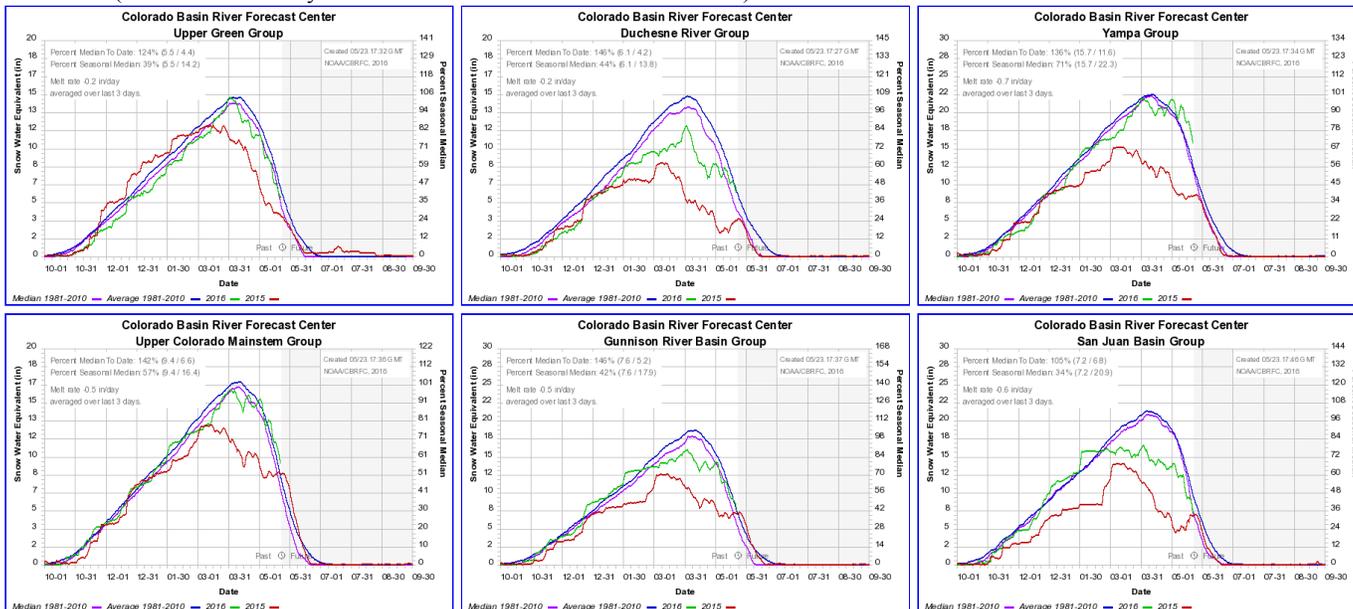
The images above use daily precipitation statistics from NWS COOP, CoCoRaHS, and CoAgMet stations. From top to bottom, and left to right: most recent 7-days of accumulated precipitation in inches; current month-to-date accumulated precipitation in inches; last month's precipitation as a percent of average; water-year-to-date precipitation as a percent of average.

Additional Precipitation Links: (will take you to an outside website)

- [AHPS Precipitation](#)
- [High Plains Regional Climate Center's ACIS Maps](#)

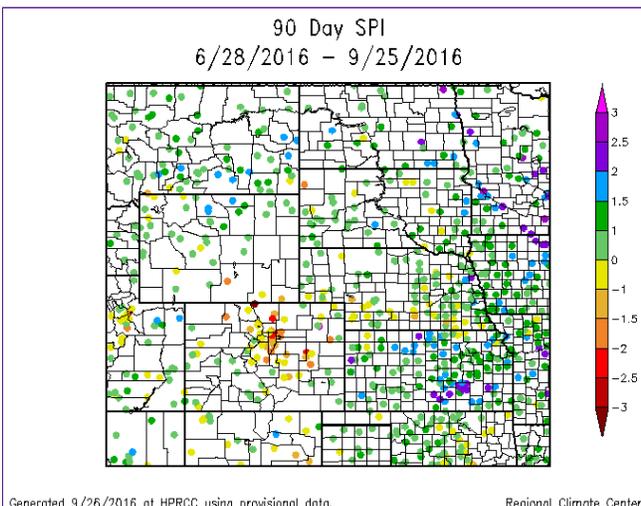
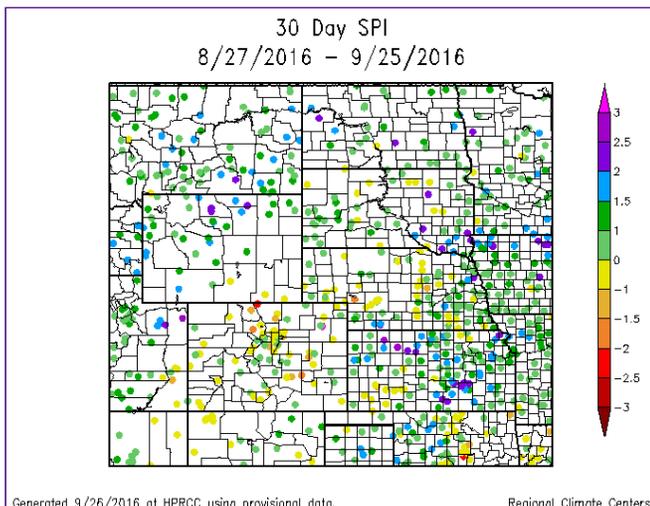


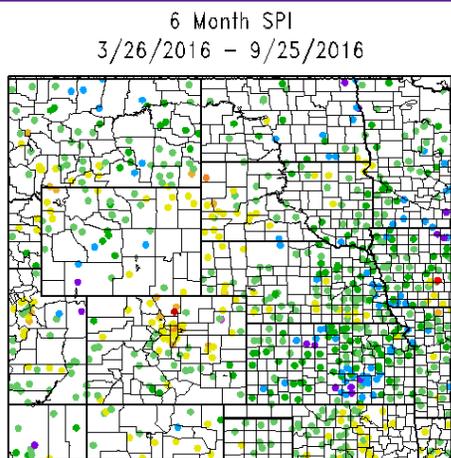
The top left image shows the Natural Resources Conservation Service's SNOTEL water-year-to-date precipitation percentile rankings. The top right image shows sub-basin averaged snow water equivalent accumulations as a percent of average. The images below show accumulated snow water equivalent in inches (green) compared to average (blue) and last year (red) for several different sub-basins across the UCRB (and were created by the Colorado Basin River Forecast Center).



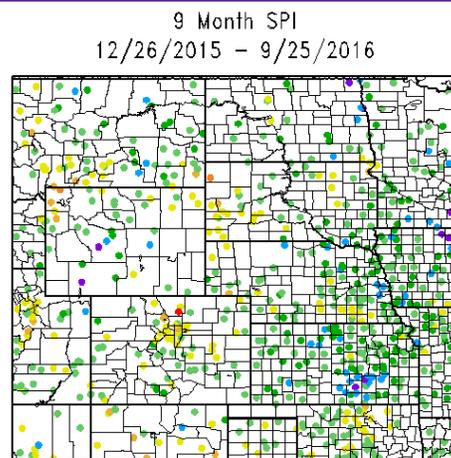
Additional SNOTEL and Snowpack Links: (will take you to an outside website)

- [CBRFC Snow Conditions Map](#)
- [NOHRSC Regional Snow Analyses: Central Rockies](#)





Generated 9/26/2016 at HPRCC using provisional data. Regional Climate Centers



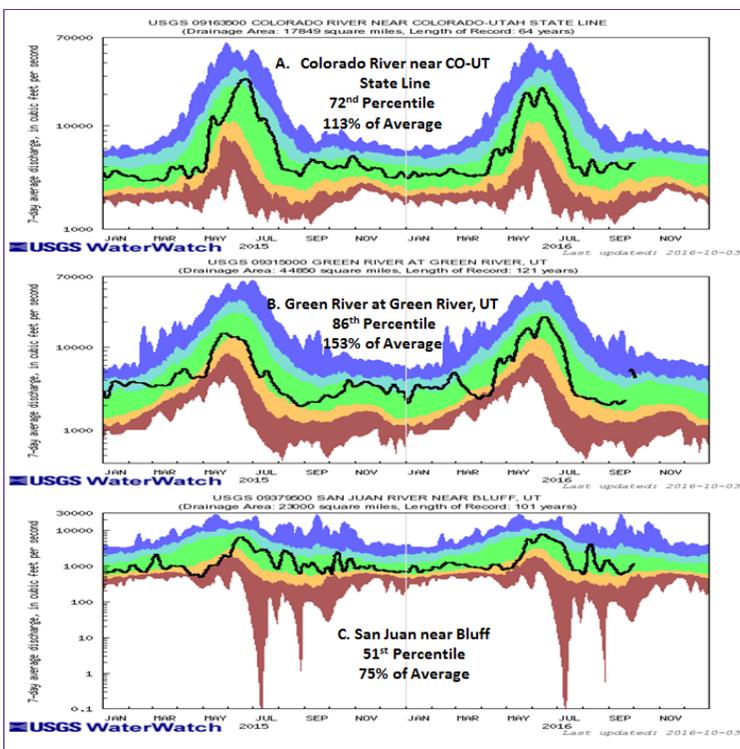
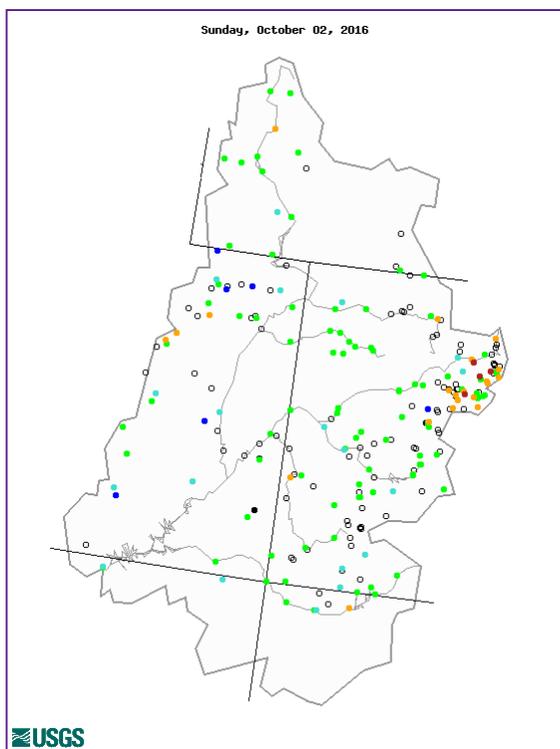
Generated 9/26/2016 at HPRCC using provisional data. Regional Climate Centers

Standardized Precipitation Index standardizes precipitation accumulations for a specified time period into percentile rankings. -1.0 to -1.5 is equivalent to a D1 to D2. -1.5 to -2.0 is equivalent to a D2 to D3. -2.0 and worse is equivalent to a D3 to D4. 30- and 60-day SPIs focus on short-term conditions while 6- and 9-month SPIs focus on long-term conditions. SPI data provided by High Plains Regional Climate Center.

Additional SPI Links: (will take you to an outside website)

[WestWide Drought Tracker SPI Maps](#)

[HPRCC's SPI Maps](#)



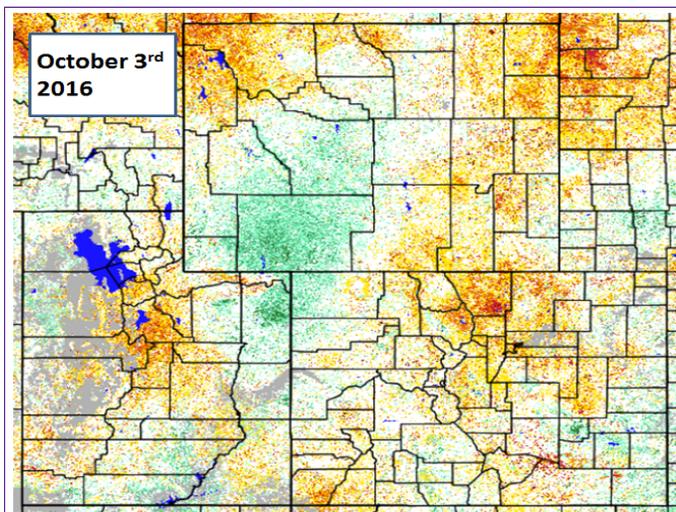
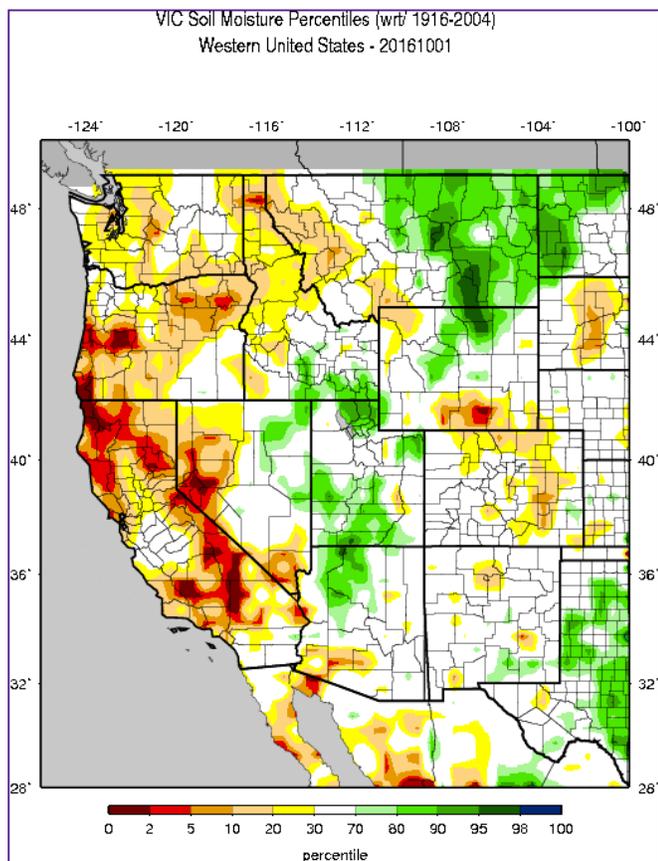
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

The top left image shows 7-day averaged streamflows as a percentile ranking across the UCRB. The top right image shows 7-day averaged discharge over time at three key sites around the UCRB: The Colorado River at the CO-UT state line; the Green River at Green River, UT; and the San Juan River near Bluff, UT. All streamflow data provided by United States Geological Survey.

Additional Streamflow and River Links: (will take you to an outside website)

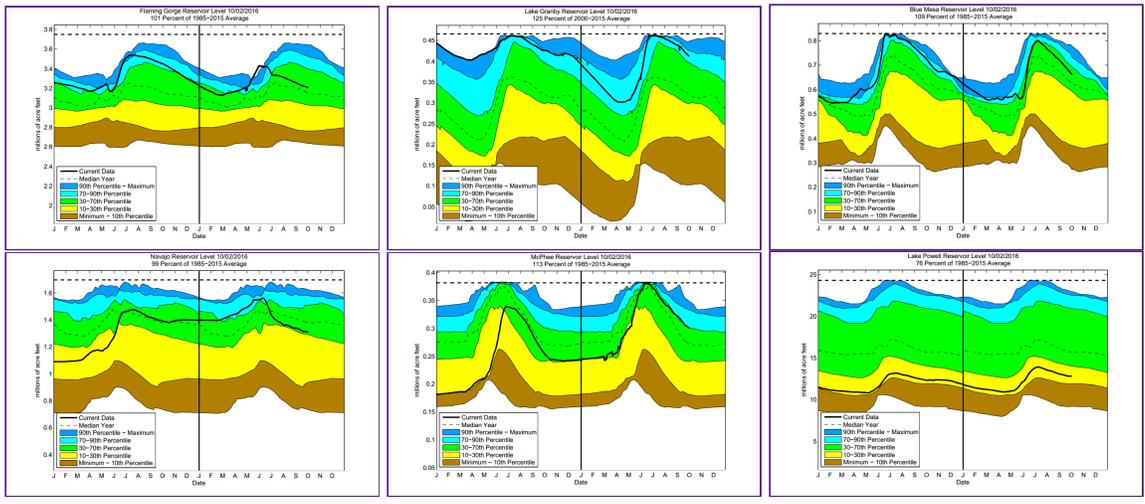
[USGS Streamflow Drought](#)

[CBRFC Peak Flow Forecast Conditions Map](#)



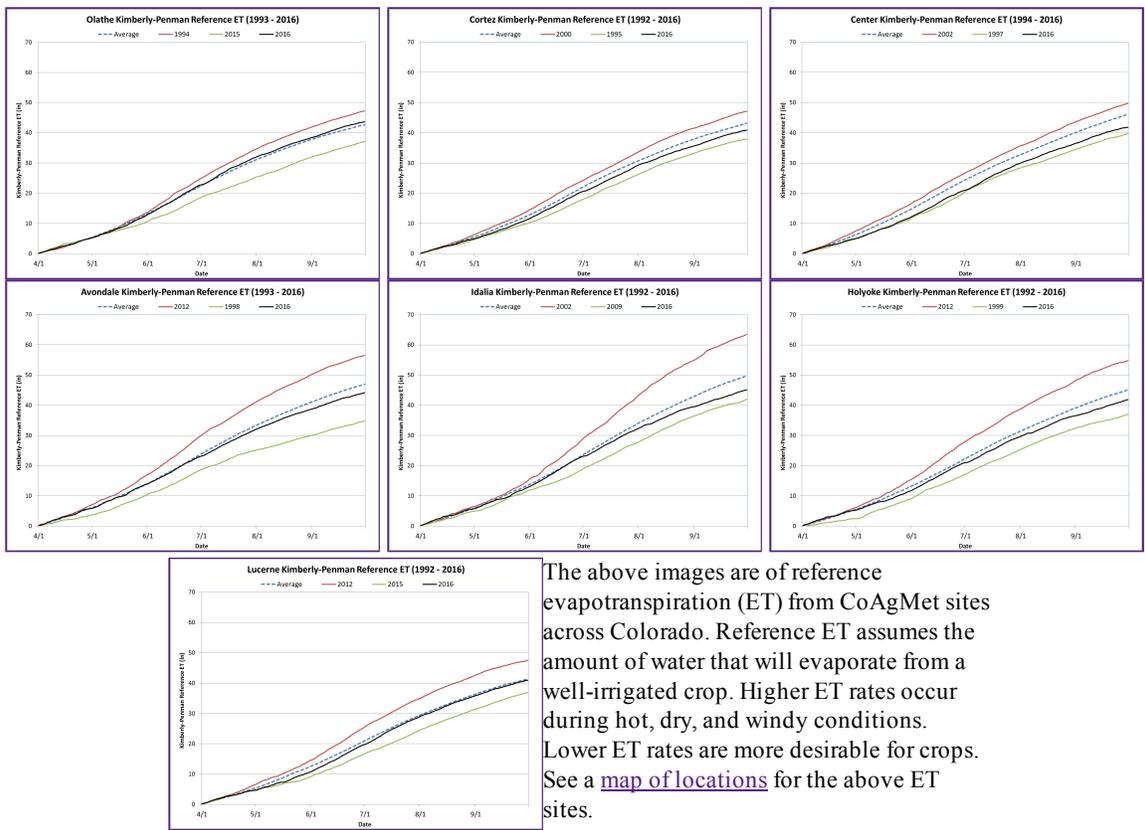
The top left image shows VIC modeled soil moisture as a percentile ranking. The top right image shows satellite-derived vegetation from the VedGRI product (which updates on Mondays).

The graphs shown below are plots of reservoir volumes over the past full year and current year to date (black). The dashed line at the top of each graphic indicates the reservoir's capacity, and the background color-coded shading provides context for the range of reservoir levels observed over the past 30 years. The data are obtained from the Bureau of Reclamation. Some of the reservoir percentiles don't line up at the new year due to differences in reservoir levels at the beginning of 1985 and the end of 2014. Dead storage has been subtracted. Note: Lake Granby data are obtained from the Colorado Division of Water Resources, and only goes back to the year 2000.

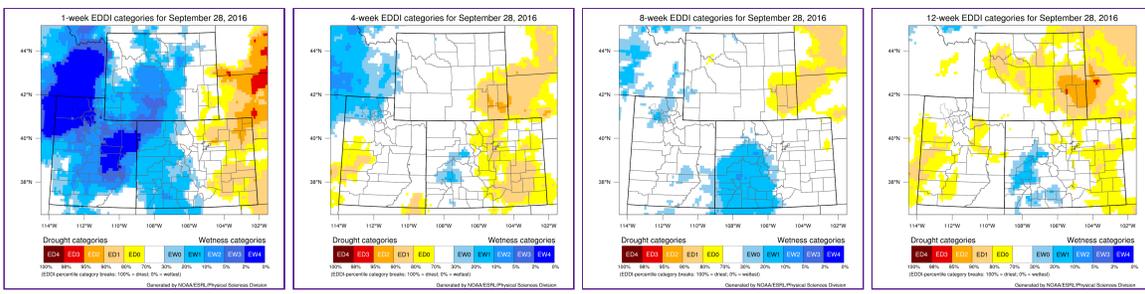


Additional Surface Water Links: (will take you to an outside website)

[NLDAS Drought Monitor](#)

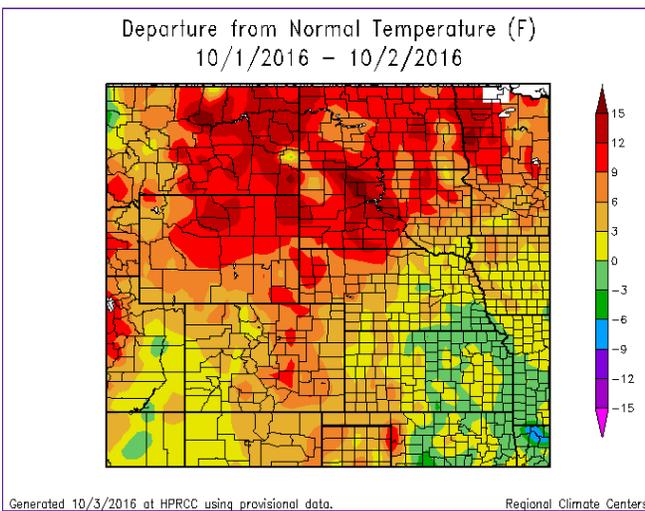
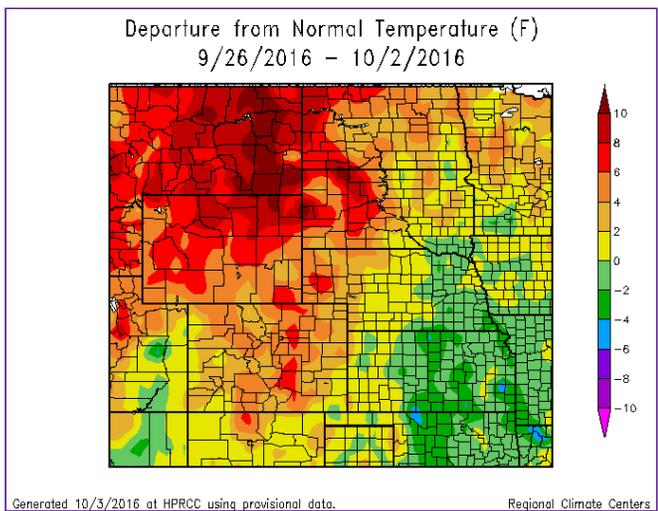


The above images are of reference evapotranspiration (ET) from CoAgMet sites across Colorado. Reference ET assumes the amount of water that will evaporate from a well-irrigated crop. Higher ET rates occur during hot, dry, and windy conditions. Lower ET rates are more desirable for crops. See a [map of locations](#) for the above ET sites.

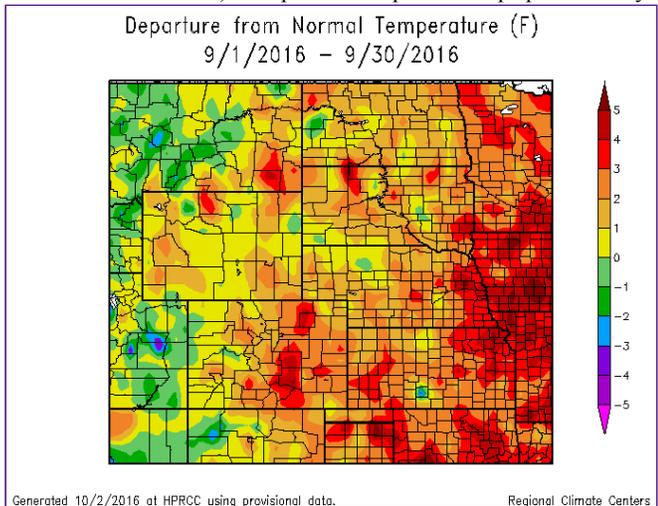


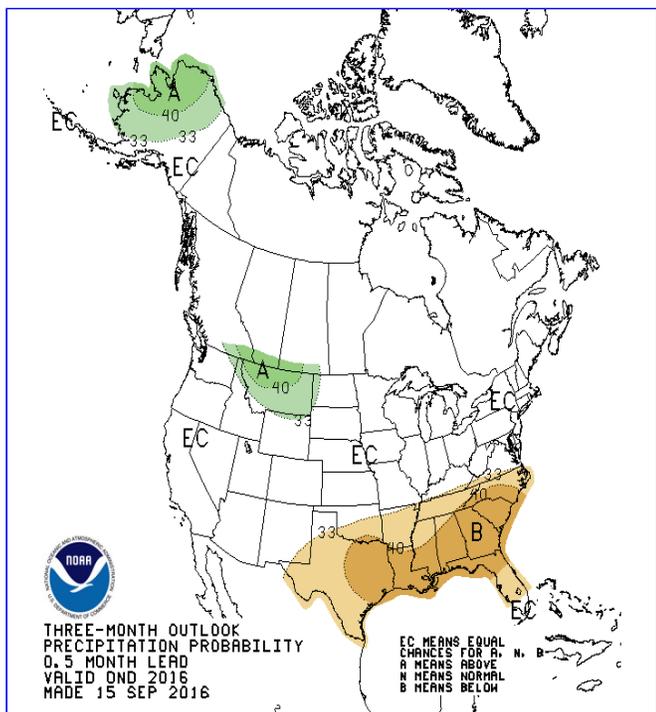
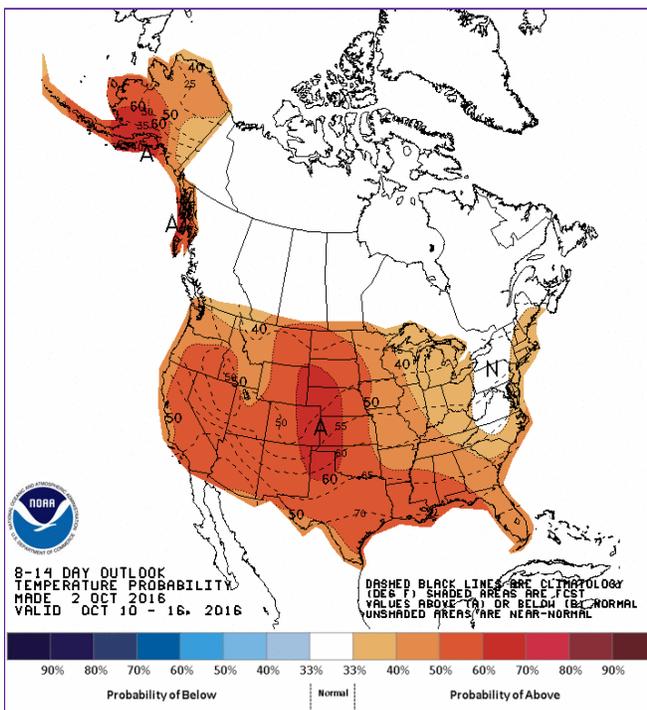
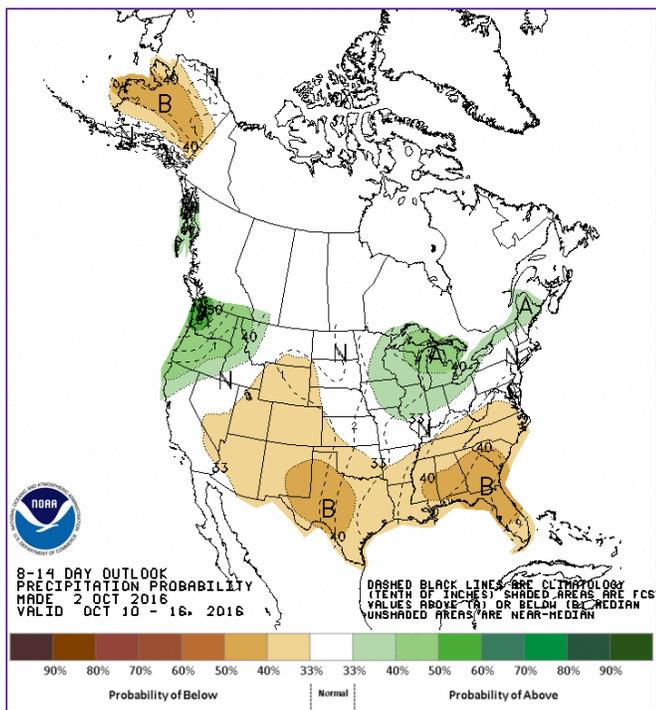
The above images are available courtesy of NOAA's Evaporative Demand Drought Index (EDDI). Drought classification listed is a function of the depth of reference evapotranspiration accumulated over a given period of record with respect to a climatology of 1981-2010. The drought categories displayed are in

line with the US Drought Monitor's Percentile Ranking Scheme <http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx>. Data used to generate these maps come from the North American Land Data Assimilation System Phase-2 (NLDAS-2) project, which assimilates observations of temperature, wind speed, radiation, and vapor pressure deficit. The date indicates the last day of the period of record, and the week number indicates the window size for the period of record..



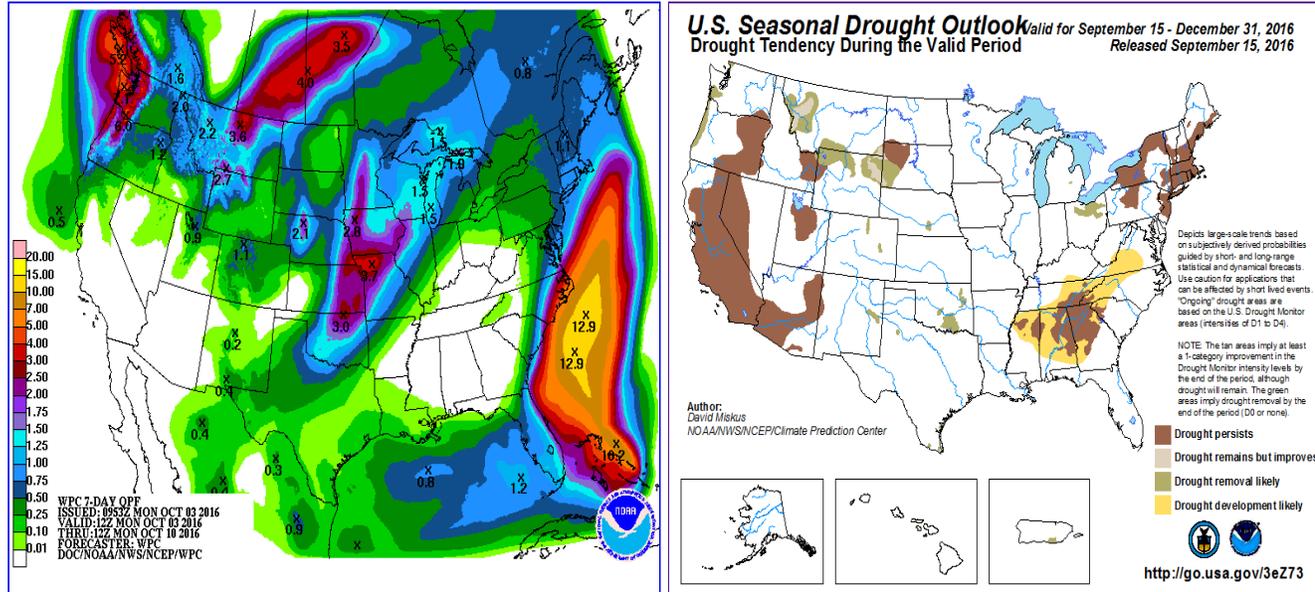
All images show temperature departures from average over different time periods (last 7 days on top left; month-to-date on top right; last full month on bottom). Temperature departure maps provided by HPRCC ACIS.





The top two images show Climate Prediction Center's Precipitation and Temperature outlooks for 8 - 14 days. The middle image shows the 3 months Precipitation outlook. The bottom left image shows the Weather Prediction Center's Quantitative Precipitation Forecast accumulation for the seven days between Tuesday 12Z and ending Tuesday 12Z. The bottom right image shows the Climate Prediction

Center's most recent release of the U.S. Seasonal Drought Outlook.



10/4

### Next Week:

Wednesday-Friday: An upper-level low is spinning over the northwestern quadrant of the United States. Right now only the northern end of the basin is within the reach of cold air below this low pressure system, but on Thursday a cold front will drop through the center of the basin and northeast Colorado. This brings with it 15 degree cooler temperatures and a chance for 0.25-0.50" of precipitation for northwest Colorado. Eastern Colorado may see some precipitation as well, but the forcing for rain will be muted by downslope winds.

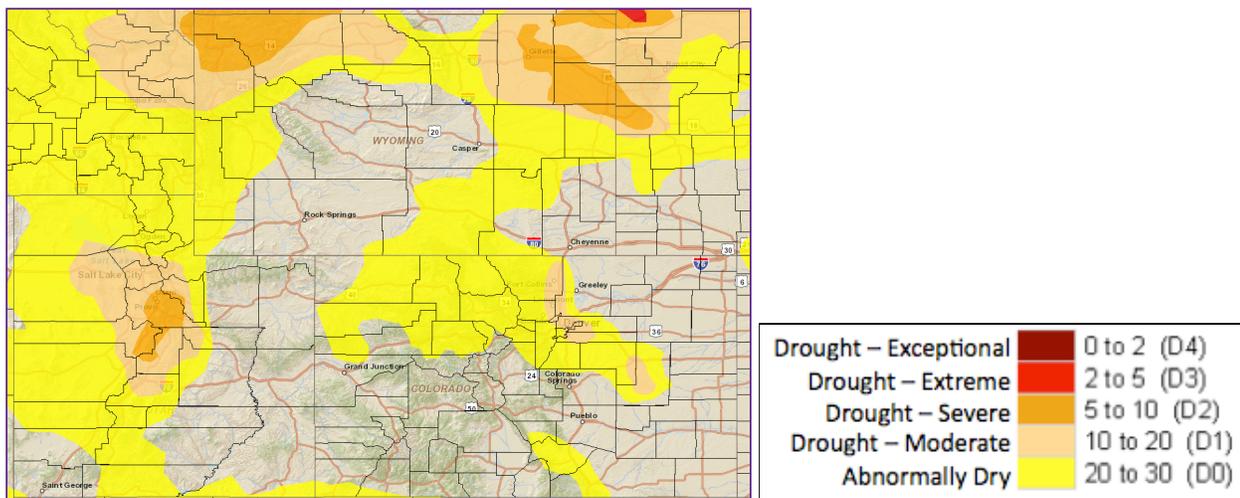
The weekend and beyond: This weekend warmer, drier air settles in from the southwest. Look for slightly above average temperatures this weekend with isolated showers near the Four Corners.

### Longer Term:

Precipitation: The 8-14 day outlook shows a slightly increased chance of below average precipitation for the UCRB and eastern Colorado.

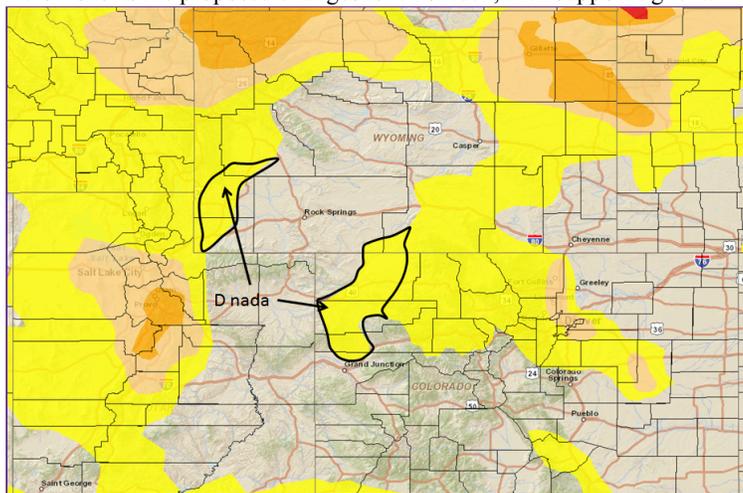
Temperature: The 8-14 day temperature outlook shows a substantial increase in chance of above average temperatures over the UCRB and eastern Colorado. These chances will be highest in eastern Colorado.

Drought: Development of new drought is predicted as being unlikely for any given location in the Upper Colorado River Basin and eastern Colorado over the September through November time frame. The drought in eastern Colorado is predicted to improve.



Above is the most recent release of the U.S. Drought Monitor map for the UCRB region.

Below shows the proposed changes for this week, with supporting text.



**Recommendations**

**UCRB Improvements:** It is recommended that D0 be removed from central Uintah County, south-central Lincoln County, and far southern Sublette County in Wyoming. It is also recommended that D0 be removed from far northern Mesa County, western and central Rio Blanco County, central Moffat County in Colorado. This can be continued through extreme southeast Sweetwater County and extreme southwest Carbon County in Wyoming. These areas received another week of above average precipitation, and appear to have ended the water year with above average precipitation.

**Eastern Colorado:** Status Quo: While the continued dry trend in northern Colorado is troubling long-term water supplies are keeping the agricultural sector afloat. This year's growing season is coming to an end, so with the help of a few good storms between now and March, it's possible we could still escape this funk with relatively little damage.

**Summary: October 4, 2016**

**Past Week Atmospheric Conditions:** This week brought another round of above seasonally-average rainfall to the northern and central portions of the UCRB, though not to the same extent as the previous week. Much of Lincoln and Sublette Counties in Wyoming received between 0.50 and 1.00" of rainfall. The Uintah Range and Roan Cliffs in Utah received similar totals. In western Colorado totals were generally in the 0.25-0.50" range with lower rainfall amounts in the lower valleys and on the far east fringes of the basin. Just over the past 24 hours eastern Moffat County and Routt Counties have received an additional 0.30-0.50" of precipitation. Temperatures in the basin over the past week were, for the most part, above normal. The south-central portion of the basin was 0-2 degrees cooler than average. The highest departures from normal were in the Upper Green River Basin, which was as much as 6-8 degrees above normal. Eastern Colorado was drier. Some thundershower activity on the final day of September dropped over a quarter of an inch of precipitation on central Fremont County, Teller County, and southern Park

County, Most of the eastern half of the state received less than a tenth of an inch of new moisture. This continued what has been a dry trend in eastern Colorado for the month of September, and in some areas along the front range, much longer. Across much of eastern Colorado it was not only dry, but warmer and windier than average, making for increased evaporative demand. Temperatures were generally 4-8 degrees warmer than average along the Front Range and 2-6 degrees above average on the eastern Plains.

Surface Response: Recent wet weather has livened up streamflows and replenished root zone soil moisture throughout much of eastern Utah and southwest Wyoming. Meanwhile, conditions on the eastern side of the basin have been drying in recent weeks. Streamflows are now well below average for the Eagle River and Beaver Creek. The VIC modeled soil moisture is indicating drier than average root zone soils for Routt County and northern Eagle County. For eastern Colorado the drying trend continues. Streamflows are still mostly in the normal range, and reservoirs are still at above average levels due to wetness at longer timescales; this has mitigated impacts of recent dryness. Root zone soils, however, have a shorter memory and are struggling. The VIC model is now showing root zone soil moisture as below to much below average for well over 50% of the eastern half of the state. Satellite measurements are showing vegetation struggling to stay hydrated across much of northeast Colorado.

Water Year Wrap-Up: Reflecting on water year 2016 most of the UCRB experienced a 12-month accumulation total that was above average, but still well within what would be considered a normal accumulation range. In the basin, the eastern side of the Wasatch Range, and the headwaters of the Upper Green River basin were the exceptions on the dry side of this rule, receiving less than normal precipitation. Be that as it may, these areas were also within the normal range. Sweetwater County in Wyoming, the far northwest corner of Colorado, and the far northeast corner of Colorado were wet enough as to be beyond the scope of normal. This is an area that is typically rather arid, so the above average precipitation in this area did not make a large difference from a water supply standpoint. Eastern Colorado likewise recorded a by and large average water year precipitation totals. This precipitation did not all come at the same times for eastern Colorado. For instance, the northern Front Range was way ahead of normal for the water year at the six month mark, but has since fallen way below normal through the summer and early fall. In Larimer and Boulder Counties on the northern Front Range, and Lincoln County out on the plains this warm season dryness was enough to tip the scales towards a dry water year. Conversely, the wettest part of eastern Colorado with respect to average was the southeast corner. This area of the state was very near normal at the six month mark, but managed to rank well above normal following a wet summer.

**\*\*Disclaimer:** The above recommendations are **recommendations only**, based on data, impacts, and input from local experts. These recommendations are sent to the U.S. Drought Monitor author on Tuesdays. The USDM author has sole discretion on final changes made in the region and can accept, reject, or modify the above recommendations and may have additional modifications. Additionally, any recommendations discussed during the NIDIS webinars that are agreed upon by the local experts and USDM author are **still subject to change**. Changes are final and official as of Thursday morning, and can be viewed on the official [U.S. Drought Monitor](#) website.

Additional Drought Index Links: (will take you to an outside website)

- [Palmer Drought Severity Index for Climate Divisions Updated Weekly](#)
- [WestWide Drought Tracker's PDSI Updated Monthly](#)
- [Surface Water Supply Index](#)

When available, maps and text are updated Tuesday afternoons.

- [View Printer Friendly Version](#) of current Drought and Water Assessment
- [View PDF](#) of current Drought and Water Assessment
- [Summary Archive](#)