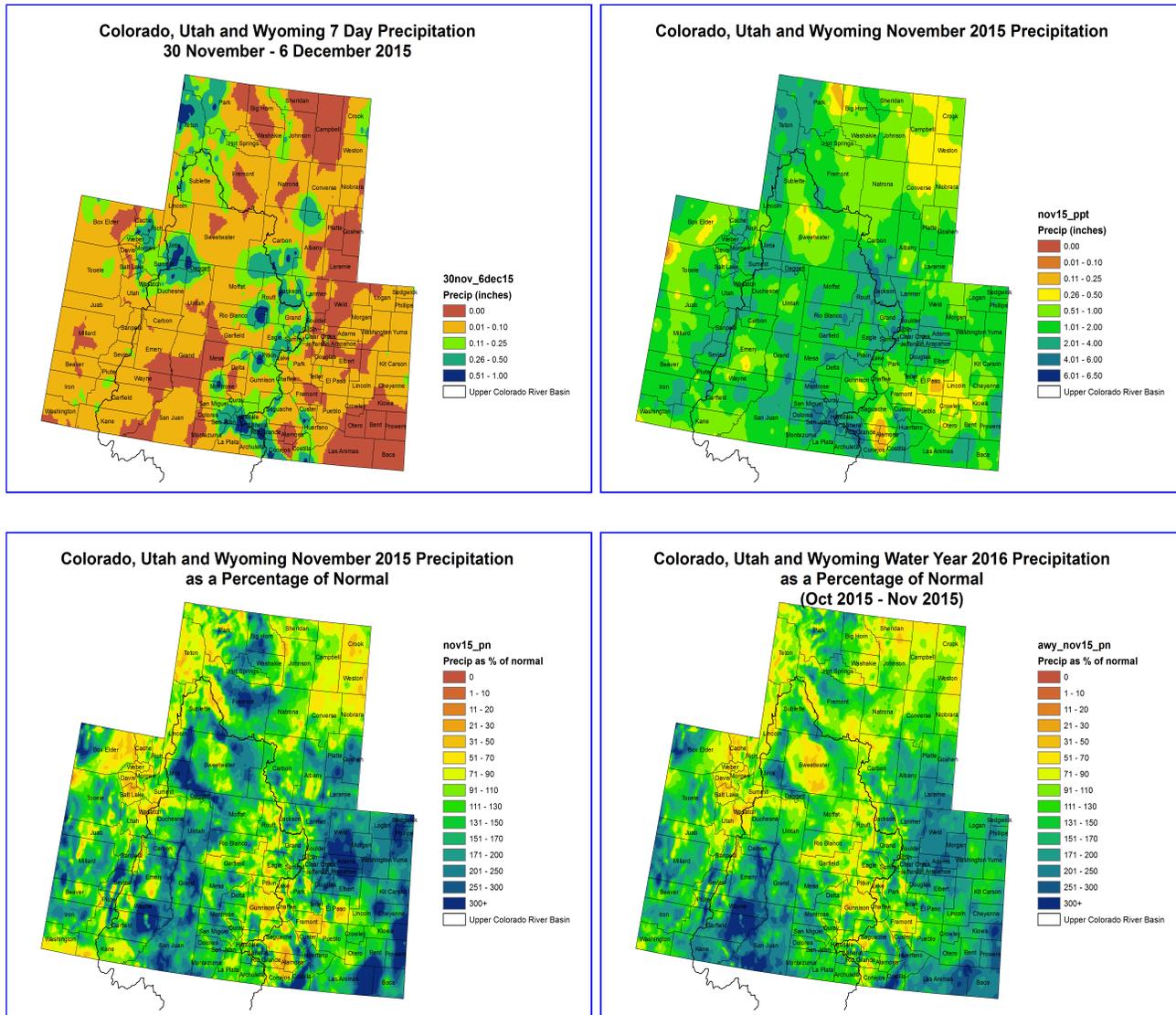


# PRECIPITATION



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.

## Last Week Precipitation:

- Precipitation over the UCRB was very spotty over the past week, with some areas receiving 0.1" or even 0, while some areas like eastern Rio Blanco recieved up to 1".
- The Upper Green River basin was mostly dry, with the exception of Uinta County and very far southwest Sweetwater County, which recieved over 0.25" and two areas that got over 0.5".
- The area in northeast Utah that connects with Wyoming was the only place in the state to recieve any appreciable precipitation over the past week, over 0.25".

- Western Colorado was also very spotty in terms of precipitation. The Rio Grande River Basin seems to have fared best in terms of precip, with some areas in San Juan, Hinsdale, Mineral, and Rio Grande counties receiving nearly 1" of precipitation.
- East of the divide in Colorado was an all-around dry week, save for a few spots in Custer, Conejos, and Costilla counties that saw about 0.25" or more of precipitation. The rest of the eastern portion of Colorado received 0.1" or less.

### **November Precipitation:**

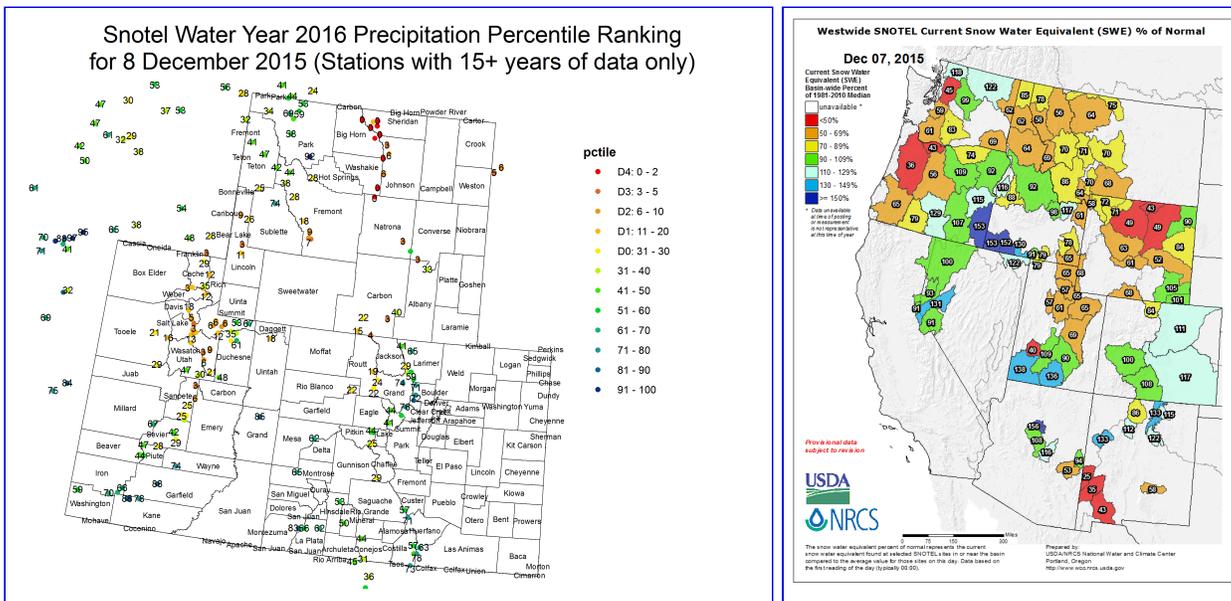
- November for the Upper Colorado River Basin was a bit on the dry side in the headwaters area, generally between 50 to 100% of normal. Further downstream in Mesa County and into Utah, however, precipitation totals spiked up, all over 100% and in many places near 200% or more of normal.
- The Green River Basin in Wyoming saw plenty of beneficial precipitation in November. Uinta, eastern Lincoln, and parts of Sweetwater counties fared especially good, with these locations seeing 300+% of normal precip.
- The Yampa, White, and Duchesne river basins were all for the most part at or above normal for the month of November. Some spots in northern Routt County saw precip only at about 50% of normal, but these areas were small.
- The San Juan and Dolores river basins in southwestern Colorado both saw precipitation that was generally 150% or greater than normal for the month, while the Rio Grande Basin did not fare as well. Areas in Rio Grande, Alamosa, and Conejos counties were substantially low at less than 50% of average.
- Eastern Colorado saw plenty of precipitation for November. The South Platte River Basin in particular was hit with plenty of moisture and saw greater than 300% of normal precipitation over a large area. The Arkansas River Basin also received plenty of precipitation in many places, such as Las Animas, Baca, southern Bent, and eastern Kiowa and Prowers counties. Further upstream in Fremont, El Paso, and eastern Pueblo counties, however, were below normal for November.

### **Water Year 2015 Precipitation (Oct-Sep):**

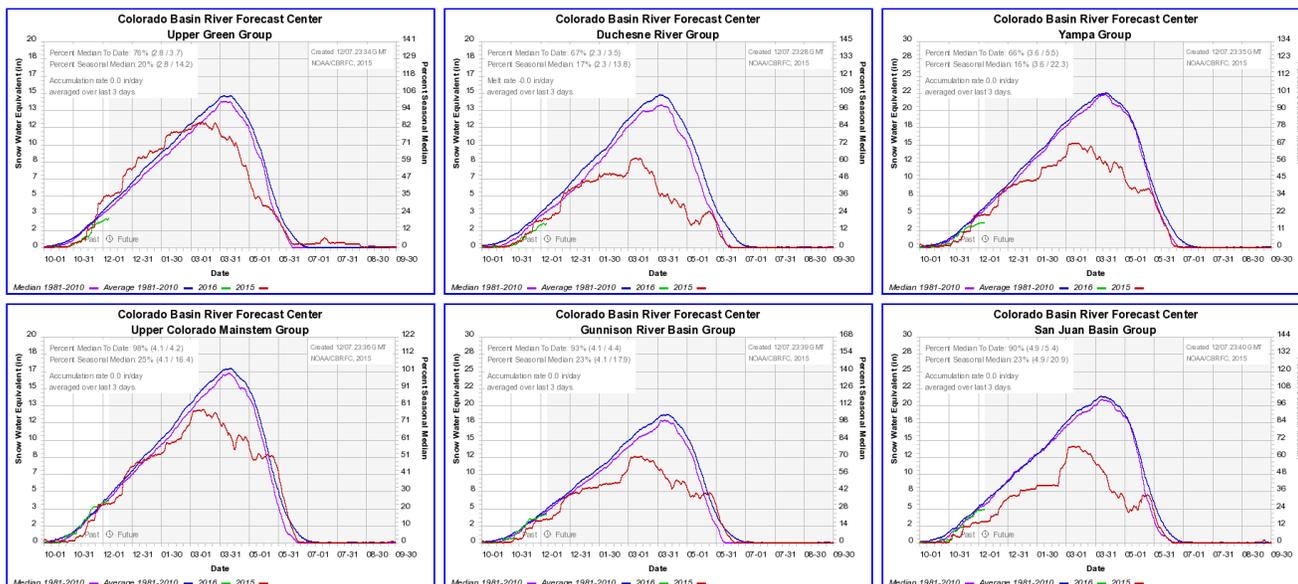
- As a result of a very wet Spring, Colorado east of the divide is still above average across the board for the water year to date with a few small exceptions. Isolated areas of Custer and Huerfano Counties are showing below 100% of average.
- The UCRB is mostly close to, but a little below normal for the water year to date.
- Most of the Upper Green River Basin is between 50 and 90% of normal for the water year to date. Central Sweetwater County is in great shape at over 110% of normal.

- Northeastern Utah is mostly between 75 and 100% of normal for the water year to date. Farther to the west over higher terrain percentages are a little lower at between 50 and 75%.
- Southeastern Utah has balanced out to a fairly typical water year to date. The area is between 75 and 125% of normal.
- AHAPS indicates a very dry band in Conejos, Rio Grande, Mineral, and southwest Saguache Counties. Here precipitation is less than 50% of average for the water year to date. Radar does tend to struggle in this area, so it may be worth taking another look at when our precipitation figures update. Most of western Colorado is just slightly dry. The area is between 75 and 110% of normal for the water year to date.
- The Rio Grande Basin is now showing a mixed bag of above and below normal water year to date conditions. Southern Costilla County is doing very well at over 150% of normal for the water year to date.

## SNOTEL AND SNOWPACK



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).



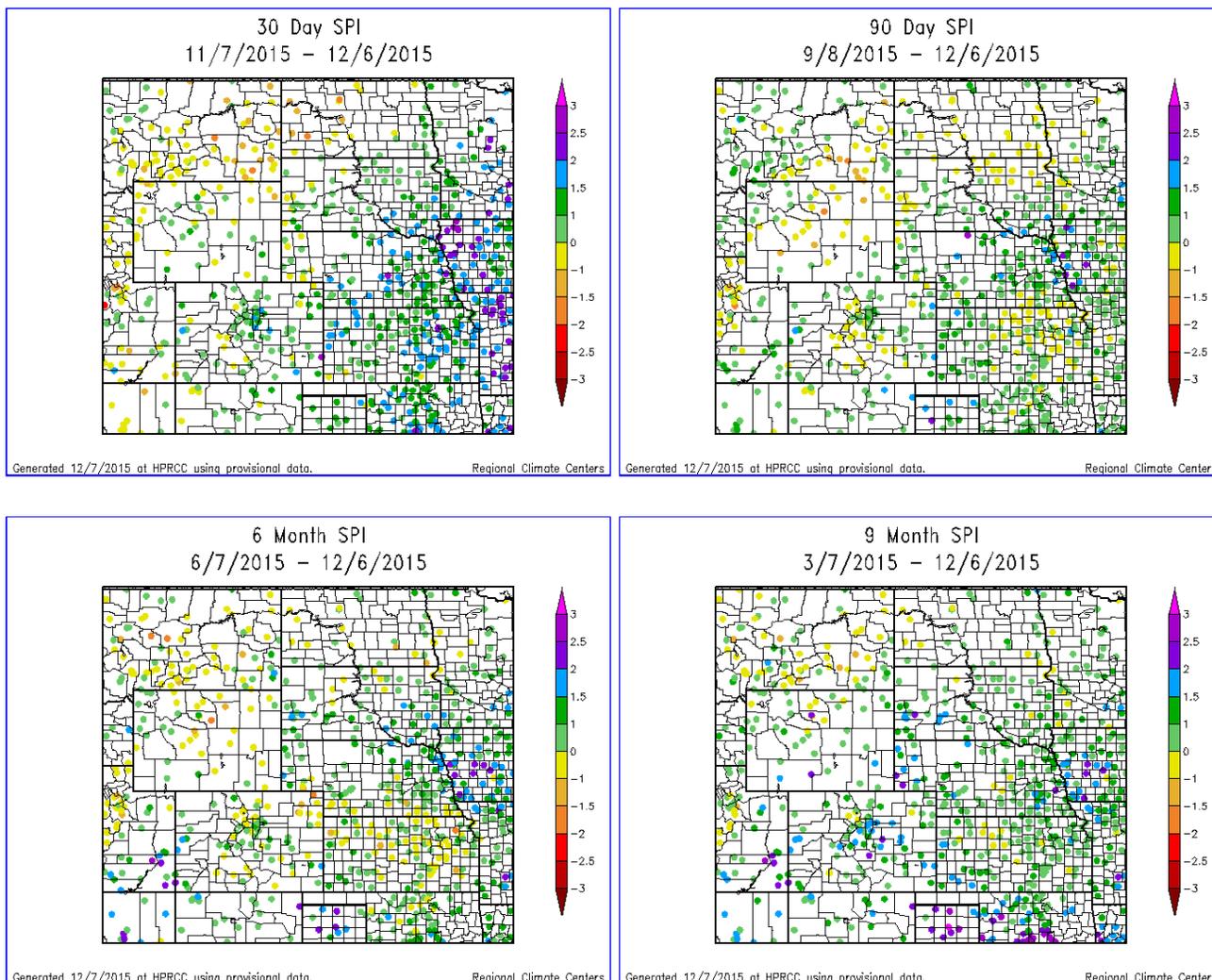
**SNOTEL Precipitation Percentiles:**

- SNOTEL Water Year precipitation percentiles in the Upper Green Basin are mostly below normal. They range from the 9th to one station reporting in the 92nd percentile.
- In Utah, both the Wasatch and Uintah Mountain Ranges are showing some above average percentiles, especially in the southern Wasatch. However, near Salt Lake City especially, values are frequently down in the teens or lower.
- The San Juan and Sangre de Cristo Ranges in southwest and southern Colorado are mostly above average for the water year to date. Percentiles range from 31 to 83.
- Stations closest to the Front Range in Colorado are continuing to show mostly at or above average percentiles, as do the Sange de Cristo Mountains in southern Colorado. Percentiles fall rapidly towards the western slopes, with stations generally below average in the 20 to 40% range.

**SWE Timeseries Graphs:**

- The dry week saw an overall decrease in median snowpack for our basin groups.
- The Upper Green Basin is at 76% of median snowpack for the season to date.
- The Duchesne is at 67% of median snowpack for the season to date.
- The Yampa River Basin is at 68% of median snowpack for the season to date.
- The Upper Colorado River Mainstem is at 98% of median snowpack for the season to date.
- The Gunnison Basin is at 93% of median snowpack for the season to date.
- The San Juan Basin is at 90% of median snowpack for the season to date.

**STANDARDIZED PRECIPITATION INDEX**



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.

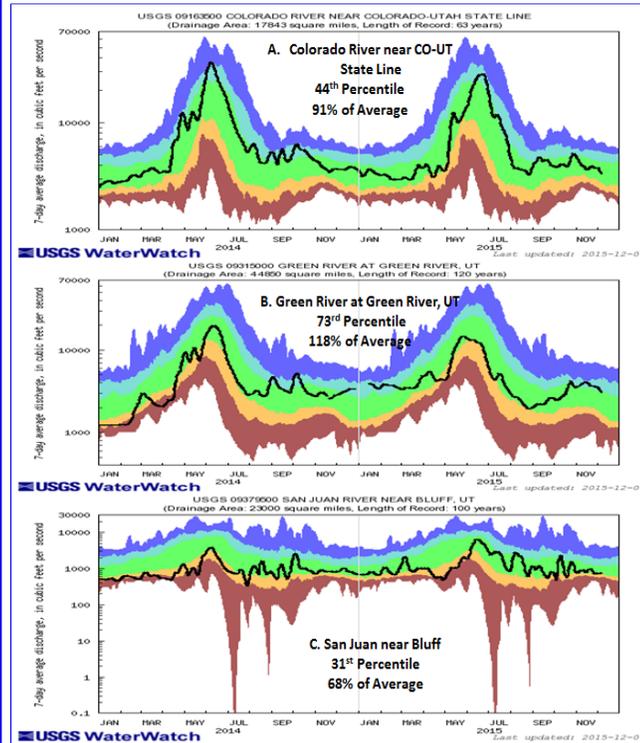
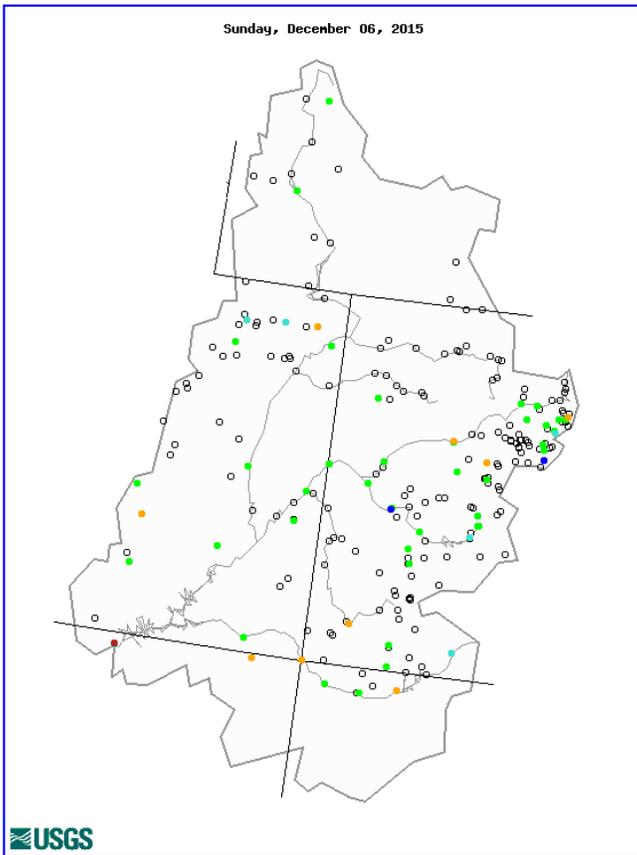
### Short Term (30-day):

- The UCRB has SPIs generally in the normal range, between -1 and +1, while one station is reporting up to +2 SPI in Mesa County.
- The Green River Basin is also in the normal range in the short term, as is northeast Utah. In the southwest portion of Utah, there is quite a bit of diversity in SPIs, with a station in Wayne County reporting -1.5 SPI and a station on the Garfield/Kane County border showing +1.5 SPI.
- Western Colorado continues to show short term SPIs in the normal range, with what could be considered a slightly dry area in the Gunnison forrest down to the San Luis Valley.
- Eastern Colorado is all in the normal to above normal range. The Denver metro area has multiple stations reporting greater than +1.5 SPI. There is a station in far eastern Prowers County that is reading +2 SPI.

**Long Term (6-month):**

- The UCRB is still in the normal range between -1 and +1 SPI, with the driest stations up in the headwaters region. Down further into Mesa County and into Utah in Grand, Wayne, and San Juan counties, SPIs increase substantially, up to +2.5 SPI.
- The Upper Green River basin is also still in the normal range, as is much of northeastern Utah. SPIs dry out into the Wasatch Range, however.
- Southwest Colorado is still holding on to wet SPIs in the long term, especially far southwest in Montezuma County.
- 6-month SPIs in eastern Colorado are continuing to dry out. This is especially noticeable in northeast Colorado, with a station in Sedgwick County reporting up to -2 SPI, while surrounding stations report at least -1. Southeast Colorado is faring better, with SPIs in the normal to slightly above normal range.

**STREAMFLOW**



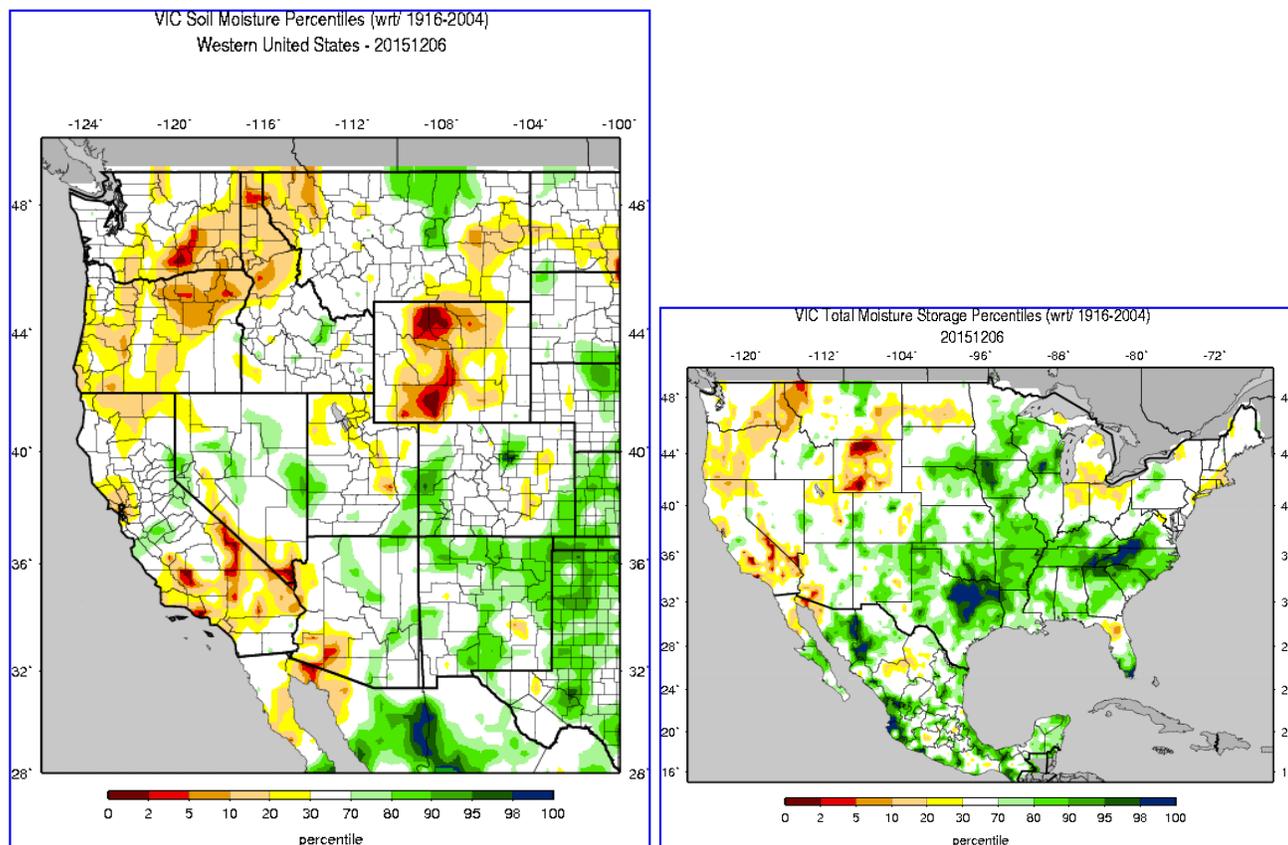
Explanation - Percentile classes							
<b>Low</b>	<10	10-24	25-75	76-90	>90	<b>High</b>	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

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.

### Streamflow Statistics:

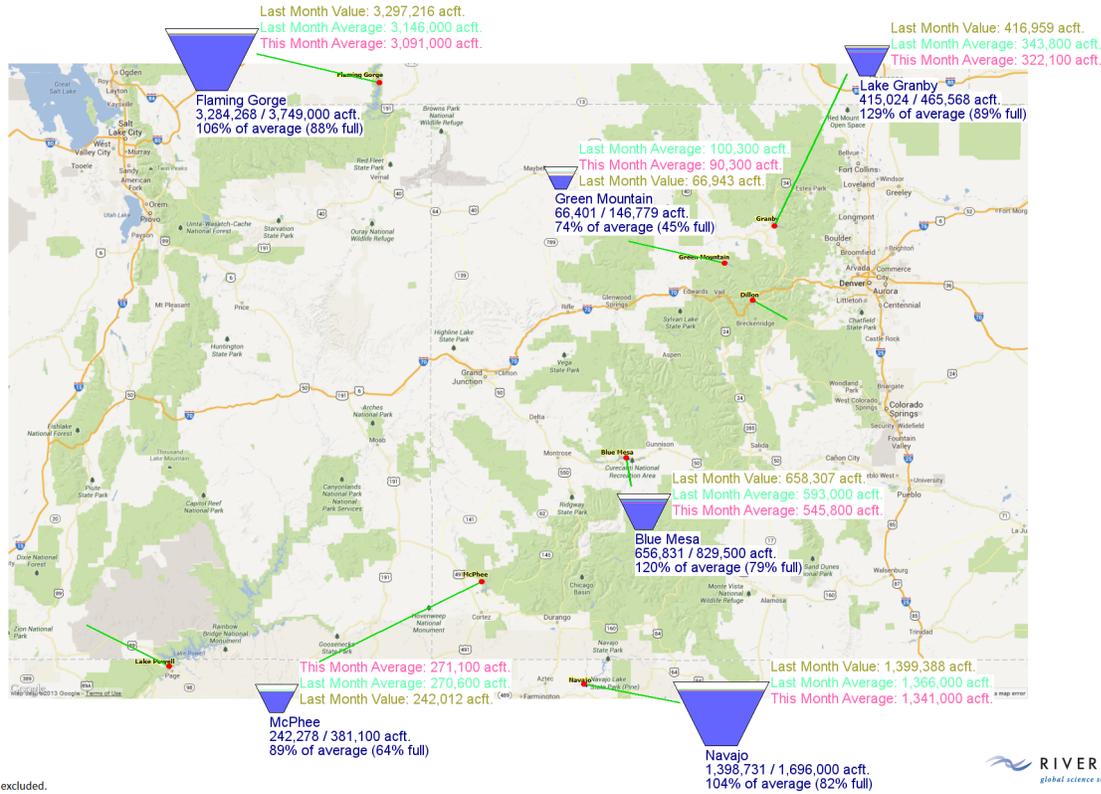
- There are only 77 stream gages in the UCRB that are still reporting out of about 140 gages.
- 89% of gages are reporting in the normal to much above normal range for the 7-day average streamflow, with 1% reporting record high 7-day average streamflow for the last 7 days.
- 11% of gages are below normal and no gages in the basin are much below normal.
- The Colorado River at the CO-UT state line is at 91% of average and in the 44th percentile.
- The Green River near Green River, UT is at 118% of average and in the 73rd percentile.
- The San Juan River near Bluff has been up and down for much of the late summer and fall, but has steadied out. It is now reporting at 68% of average, which corresponds to the 31th percentile.

## SURFACE WATER



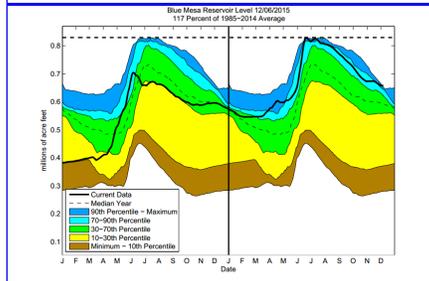
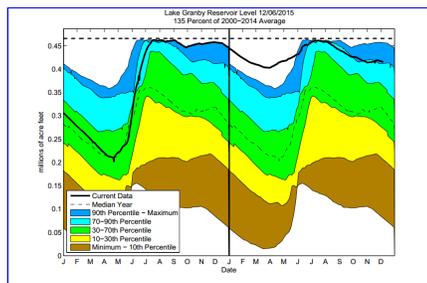
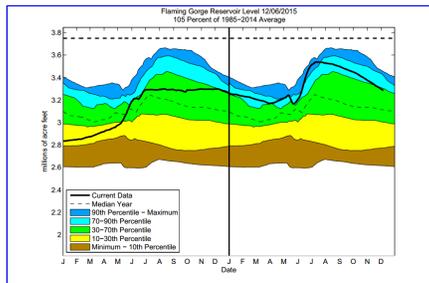
The top left image shows VIC modeled soil moisture as a percentile ranking. The top right image shows VIC+SWE.

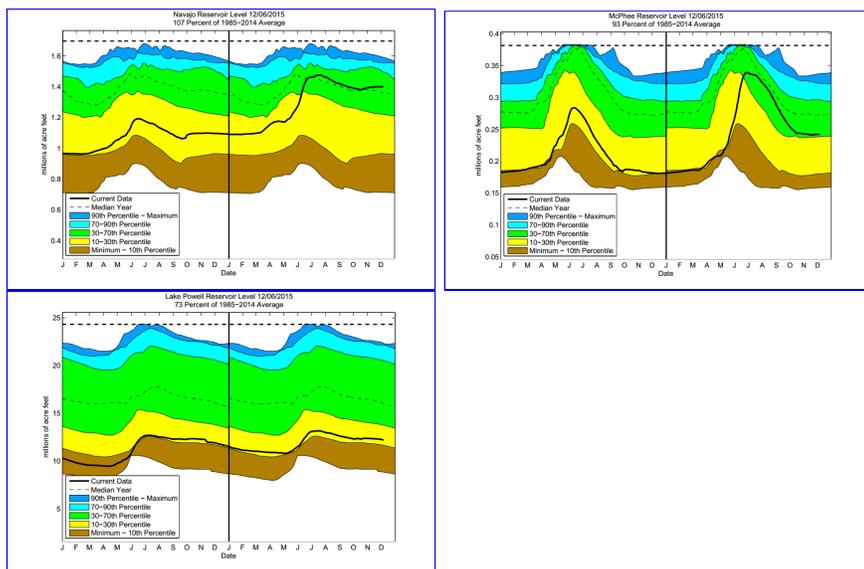
2015/12/07



The above image shows last month's and this month's current volumes of the major reservoirs in the UCRB, with percent of average and percent of capacity.

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.





## VIC:

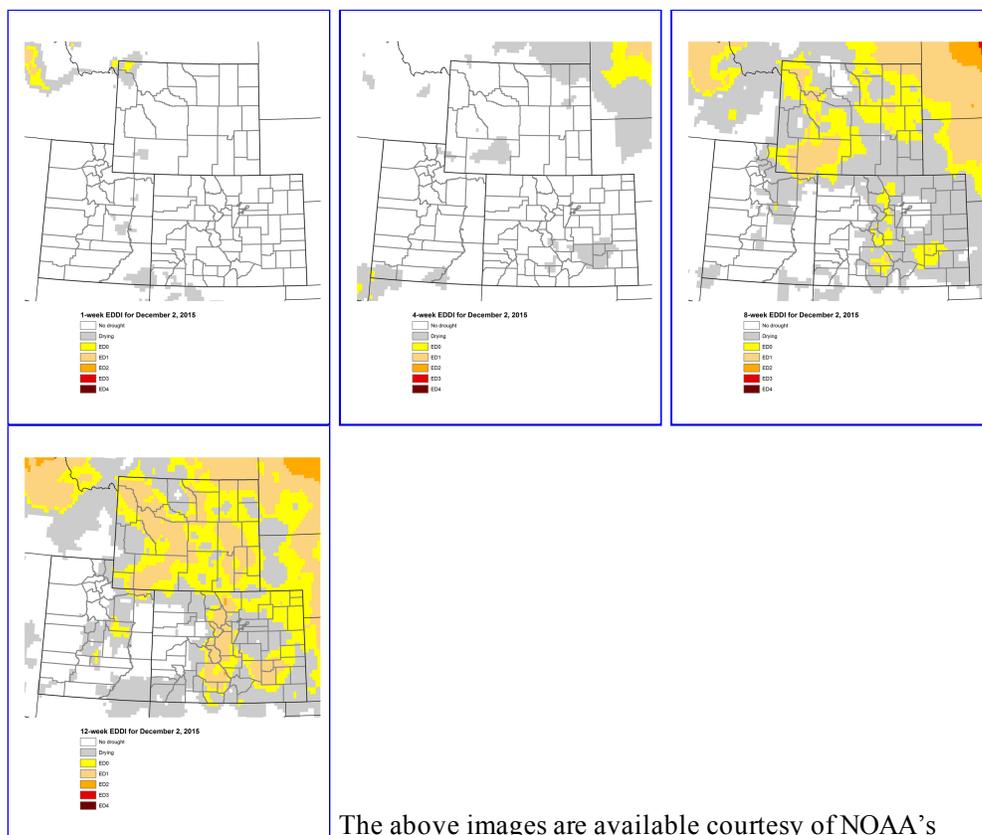
- The Green River Basin in Wyoming continues to be much below normal in Sweetwater county, below the 2nd percentile in the eastern portion of the county. Dry soils, in the 10th to 30th range, are also starting to sneak north into Sublette and Uintah Counties.
- The Yampa, White, and Duchesne Basins are mostly in the normal range with some drier soils (20-30th percentile) in the Duchesne Basin, and some wetter soils (70-80th percentile) in the White Basin.
- The Colorado River Basin is either in the normal range or above normal. Soils are as wet as the 90th to 95th percentile in western Mesa County, and continues to stay at or above normal further downstream in Utah.
- The San Juan Basin is showing mostly west soils between the 70th and 90th percentile.
- Soils in the Upper Rio Grande part of Colorado are mostly in the normal range with some wetter soils near the Colorado-New Mexico border.
- Soils in eastern Colorado are mostly in the normal range. There is a wet spot ranging from the 70th to 90th percentile in Jefferson, Broomfield, Adams, Boulder, and southern Weld Counties. There is another wet spot from the 70th to 90th percentile along most of the Colorado-Kansas border. Some dry soils remain in eastern Pueblo, southeast El Paso, Otero, and Crowley Counties. Here Soil moisture is in the 5th-30th percentile range. Another dry area exists in northern Lincoln and southern Washington counties (20th - 30th percentile).

## Reservoirs:

- Flaming Gorge is at 106% of the November average.
- Lake Granby is at 129% of the November average.

- Green Mountain is now at 74% of the November average and 45% full.
- Blue Mesa is at 120% of November average and 79% full.
- Navajo is at 104% of November average, 82% full.
- McPhee is at 89% of its November average and 64% full.
- Lake Powell percent of average is missing, but 73% of average for the year (not just November).

## EVAPOTRANSPIRATION



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..

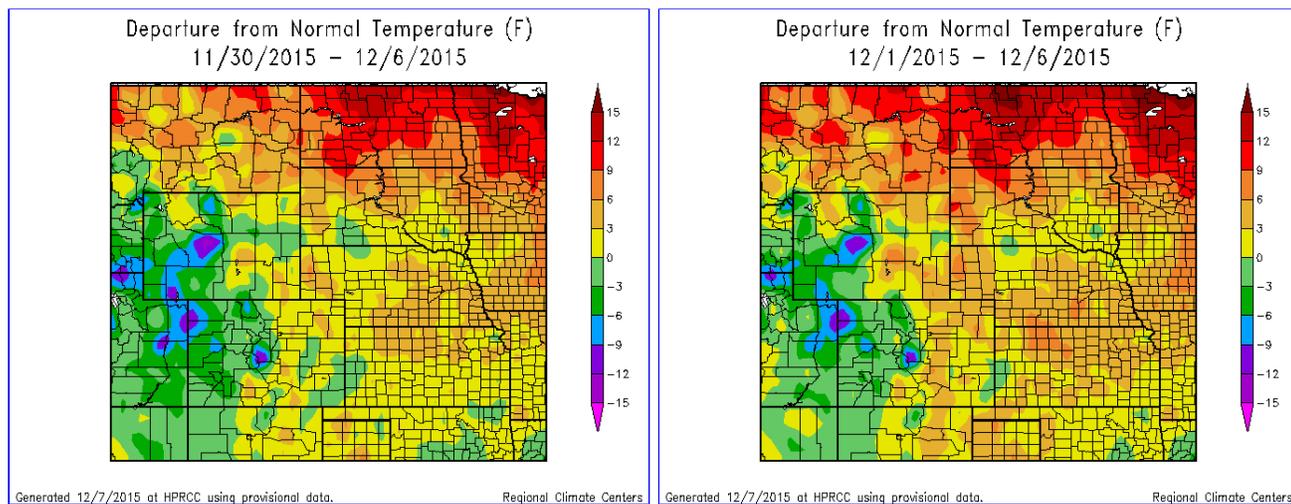
### Reference Evapotranspiration:

- Olathe finished the growing season with cumulative ETs below the previous all-time low year of 1999.
- Cortez saw ETs following roughly the low year of 1995, if not a little above, since summer, and has ended well below normal.
- Center began seeing an increase in ET since mid-July, but has still

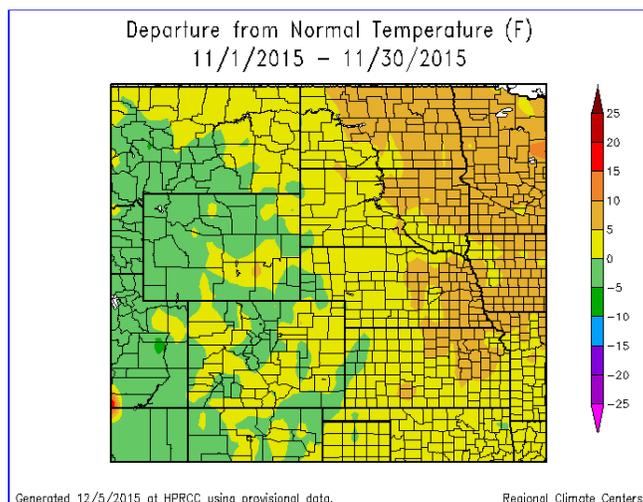
ended the growing season below average.

- Avondale tracked along a normal rate for the growing season, save for a dip from early to late May, and thus has ended slightly below normal.
- Idalia ET was tracking at roughly the low year of 2009 for almost the entire growing season until late August, when ETs started to increase substantially. Cumulatively, however, Idalia has ended below normal.
- Holyoke ET started around normal and dropped below normal since the second week of May. It continued to track at a normal rate through the growing season.
- Lucerne had been tracking lower than the previous record low year in 2009 since the second week of May. It has completed the growing season at nearly the same cumulative ET as 2009.

## TEMPERATURE



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.



## **Last Week Temperatures:**

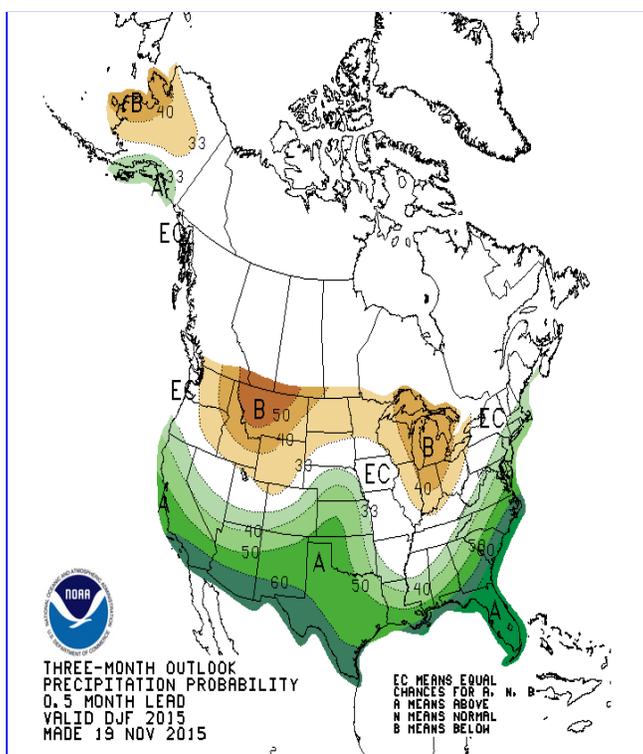
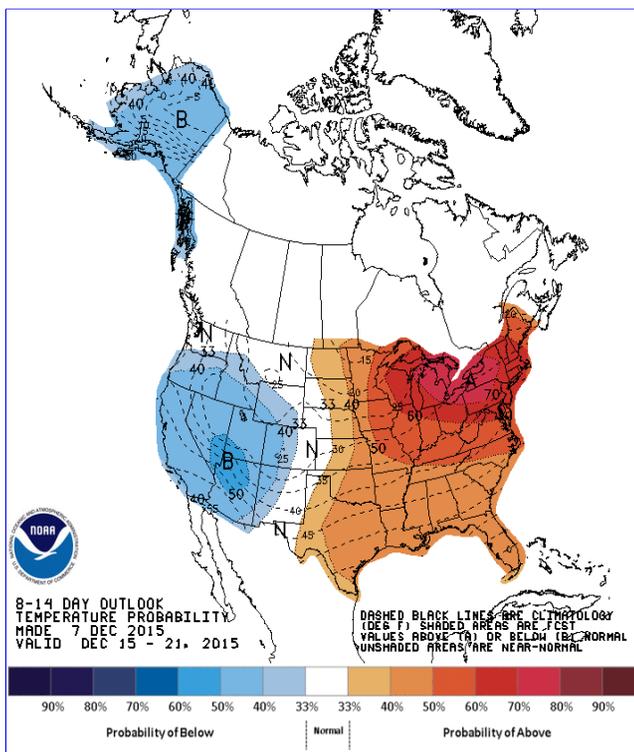
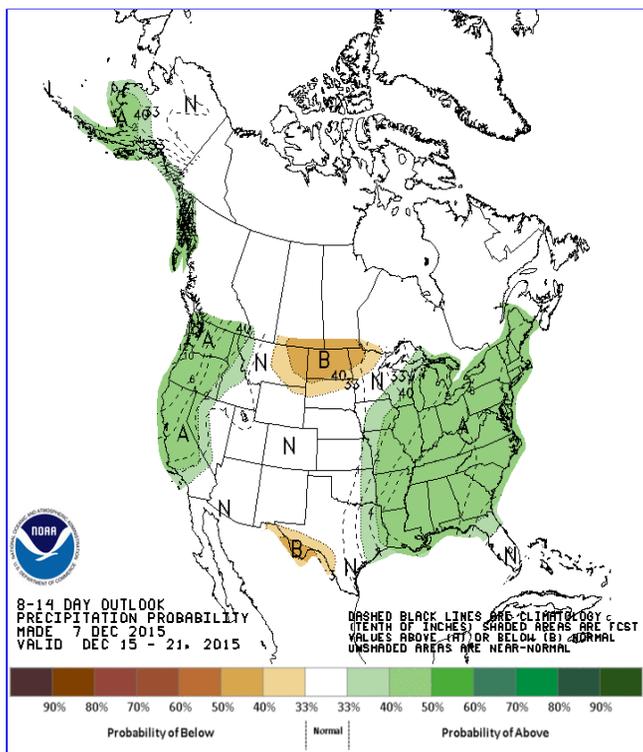
- Most of the UCRB experienced below average temperatures over the last week, generally around -3 degrees.
- The Green River Basin was again cooler than normal with temperatures anywhere from 3 to 12 degrees below average.
- Eastern Utah was below average across the board, with northeast Utah coolest with pockets in Uintah, Carbon, and Emery counties down to 12 degrees below normal.
- The western portion of Colorado was also all below normal for the last week, generally between 3 and 6 degrees below normal.
- It was a different story east of the divide, however, with mostly above average temperatures. This departure was generally within the 3 to 6 degrees above normal range, with some pockets in Lincoln and Crowley as well as a swath from eastern Las Animas up and over to eastern Cheyenne and Kiowa counties that show temperatures about 3 degrees below normal.

## **November Temperatures:**

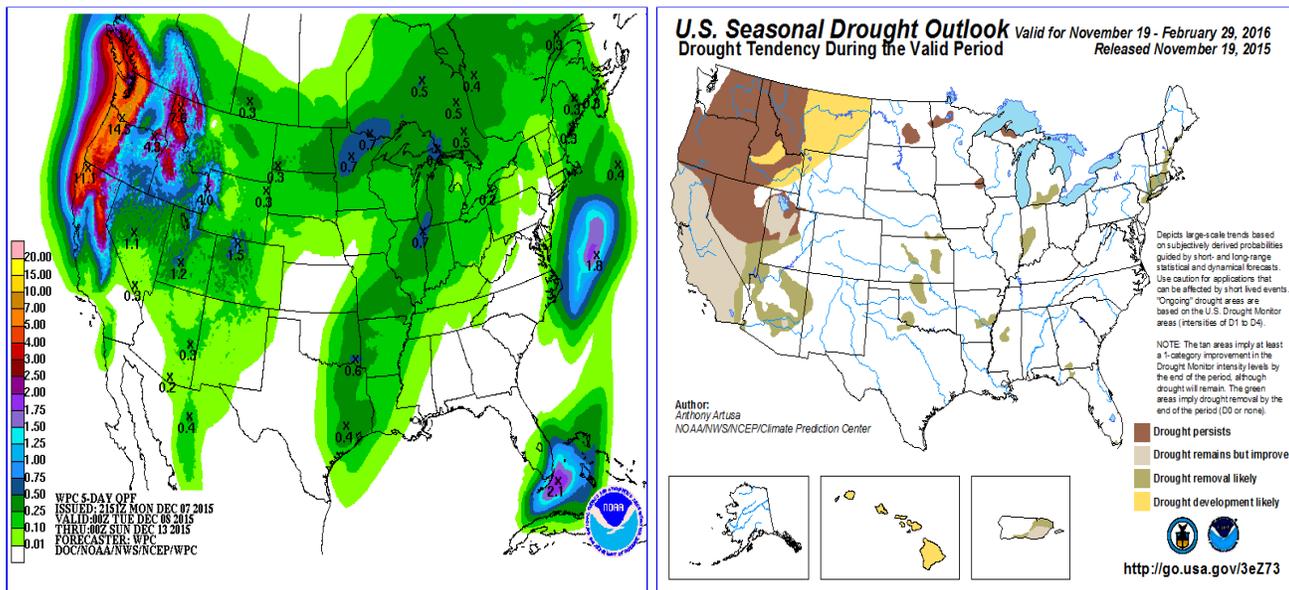
- The UCRB and the entire state of Colorado saw temperatures between -5 to +5 degrees of normal for the month of November. The Rocky Mountains generally maintained a cooler than average temperature, while the western slopes, down to the Gunnison and the San Luis Valley area, and up northeast into the high plains experienced the slightly above normal temperatures.
- The Green River Basin in Wyoming was mostly 5 degrees below normal.
- Eastern Utah was in the slightly below normal range as well for November. The only exceptions being in Duchesne and Uintah counties (5 above normal), and a pocket in northeast Emery and southern Carbon counties showing temperatures down to -10 degrees below normal.

---

## **FORECAST AND OUTLOOK**



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 Hydrologic Prediction Center's Quantitative Precipitation Forecast accumulation for the five days between Tuesday 12Z and ending Sunday 12Z. The bottom right image shows the Climate Prediction Center's most recent release of the U.S. Seasonal Drought Outlook.



### Short Term: (12/8)

- Today precipitation in the basin is mainly confined to the high elevations of the Upper Green. Some light snowfall may occur over the northern Colorado Rockies. Temperatures are much warmer over eastern Colorado than the UCRB at similar elevations due largely to a downslope wind event in the lee of the Rockies.
- On Thursday afternoon a much colder airmass begins to creep into the UCRB from the northwest. By Friday evening this event will take hold of the region bringing down temperatures by ten degrees west of the divide and 20 degrees east of the divide.
- The Rockies, Wasatch, and Uintah Mountain Ranges all stand to receive some good snowfall out of this event. Over half an inch of moisture should be expected over the mountains by Saturday. The Upper Green Basin should be the biggest beneficiary with up to 2-2.50" possible.
- On Friday evening into Saturday some snowfall is likely for eastern Colorado as well, especially southeast Colorado, though this does not look like a big upslope event at this point in time.
- Currently, models are hinting at more light snow and even cooler air for the first half of next week.

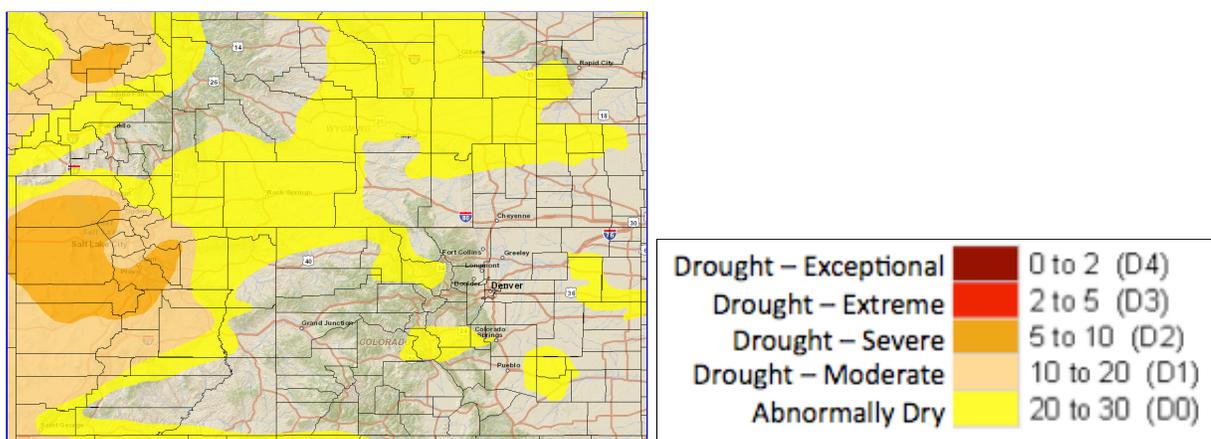
### Longer Term:

- The 8-14 day precipitation outlook shows even chances of above and below normal precipitation for the entirety of the UCRB and eastern Colorado.
- The 8-14 day temperature outlook shows increased chances for below average temperature for the entirety of the UCRB. These chances maximize towards the southwest end of the basin. East of the divide equal chances of above and below average temperatures are forecast.
- The Climate Prediction Center December through February precipitation outlook shows increased chances for above average

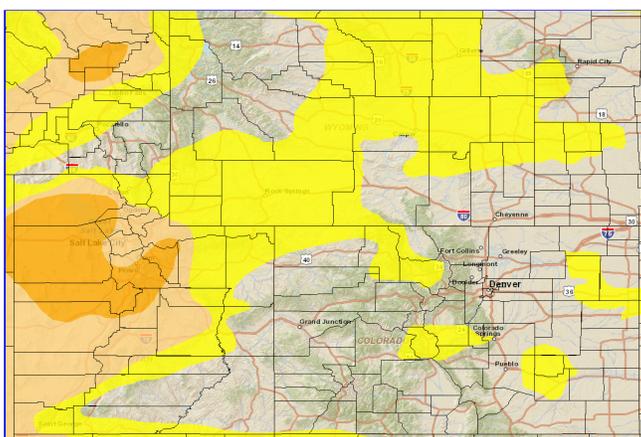
precipitation the south end of the UCRB. In the Upper Green River Basin and the northern portion of the Yampa River Basin precipitation is expected to be below normal. Most of Colorado east of the divide is forecast increased chances of above average precipitation, particularly towards the southeast corner of the state. The northern Front Range is forecast equal chances of above and below normal precipitation.

- The seasonal drought outlook for December through February indicates that drought improvement and removal are likely for the southwest portion of the UCRB by the end of January, but drought is likely to persist or intensify where it exists in the northern Wasatch and Uintah Ranges.

## U.S. DROUGHT MONITOR



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.



### Summary: December 8, 2015

This last week has been fairly normal in terms of temperatures, with departures for the most part within a modest +/- 6 degree range. Precipitation, on the other hand, was quite heterogeneous across the Upper Colorado River Basin and the rest of Colorado. Many low-lying areas across the state missed out on precipitation, while most high elevations (the San Juan, Sangre do Cristo, Mosquito, and Front ranges in particular) received pockets of substantial precipitation, generally greater than 0.5". This precipitation in the mountains is somewhat reflected in new Snotel precipitation percentile rankings. Many stations along these mountain ranges saw at least slight improvements in their rankings, however areas like the

western slopes in Colorado are still fairly well below normal for this time of year, despite the snowfalls.

SPIs for the 30 day up to the 6 month time scale are showing mostly normal numbers now, generally within -1 to +1 SPI. Northeastern Colorado in the 6 month time scale is still a bit dry with areas down to -2 SPI. NOAA's Evaporative Demand Drought Index (EDDI) model is also showing no indication of drought conditions across Colorado for the past 4 weeks. A return of cold temperatures and a continued chance for snowfall across the region over the next week gives us hope that this pattern will continue.

**Recommendations:**

**UCRB:** Unfortunately, the area in north/northwestern Colorado lost out on any appreciable precipitation over the past week and continues to show no increase in VIC soil moisture percentiles. Southwest Wyoming in Uinta and southwest Sweetwater counties as well as Daggett, Summit, and northern Duchesne counties in Utah did however receive a fair amount of precipitation. While certainly helpful over the past week, even short-term SPIs in this area are still a bit on the dry side, and a majority of Snotel stations in the area still show substantially below average numbers for this time of year. If this area continues to show cooler than average temperatures and precipitation over the next week or two, a downgrade is certainly possible. For now, we will go with status quo.

**Eastern Colorado:** Status quo. Every area east of the divide currently in D0 received less than 0.1" of precipitation over the past week and slightly above average temperatures, except for the D0 area in eastern Gunnison, Chaffee, and southern Park counties.